Docket	:	A.25-06-017
Exhibit Number	:	CA-04-SA
Commissioner	:	M. Baker
Admin Law Judge	:	R. Haga
Witness	:	A. Asadi

PUBLIC ADVOCATES OFFICE
CALIFORNIA PUBLIC UTILITIES COMMISSION

APPENDIX B

SUPPORTING ATTACHEMNTS

TO
TESTIMONY

San Francisco, California
December 12, 2025

LIST OF ATTACHMENTS FOR APPENDIX B

Attachment #	Title	Bates No.
Attachment 1	Liberty response to data request CalAdvocates-LIB-A2506017-014, September 29, 2025 and excerpt of internal attachment.	CA-04-0001
Attachment 2	Liberty response to data request CalAdvocates-LIB-A2506017-035, November 13, 2025 and excerpt of internal attachment.	CA-04-0012
Attachment 3	SDG&E's 2020 Wildfire Mitigation Plan, February 7, 2020, Appendix A, Tables 13 and 14.	CA-04-0032
Attachment 4	SCE's 2020 Wildfire Mitigation Plan, February 7, 2020, Appendix A, Tables 13 and 14.	CA-04-0032
Attachment 5	Liberty response to data request CalAdvocates-LIB-A2506017-029, October 29, 2025 and excerpt of internal attachment.	CA-04-0577
Attachment 6	Liberty response to data request CalAdvocates-LIB-A2506017-008, September 5, 2025.	CA-04-0589
Attachment 7	Liberty amended response to data request CalAdvocates-LIB-A2506017-017, October 22, 2025.	CA-04-1155
Attachment 8	Oklahoma Mesonet, Oklahoma Climatological Survey, available at: https://content.mesonet.org/mesonet/okfire/OK-FIRE_Basics_for_Fire_Danger.pdf .	CA-04-1177
Attachment 9	Weather station measurements from University of Utah, MesoWest at: https://mesowest.utah.edu/.	CA-04-1180
Attachment 10	National Centers for Environmental Information, National Oceanic and Atmospheric Administration, Dead Fuel Moisture, available at https://www.ncei.noaa.gov/access/monitoring/dyk/deadfuelmoisture.	CA-04-1182
Attachment 11	Liberty's Revised 2020 Wildfire Mitigation Plan, February 28, 2020.	CA-04-1185
Attachment 12	Liberty response to data request CalAdvocates-LIB-A2506017-006, August 21, 2025 and excerpt of internal attachment.	CA-04-1321
Attachment 13	Liberty's 2020 Wildfire Mitigation Plan Annual Report on Compliance, March 31, 2021.	CA-04-1332

ATTACHMENT 1

Liberty response to data request CalAdvocates-LIB-A2506017-014 September 29, 2025 and excerpt of internal attachment

Liberty Utilities (CalPeco Electric) LLC
933 Eloise Avenue
South Lake Tahoe, CA 96150
Tel: 800-782-2506
Fax: 530-544-4811

September 29, 2025

Liberty Utilities (CalPeco Electric) LLC

A.25-06-017
WEMA

The Public Advocates Office

Data Request No.:	CalAdvocates-LIB-A2506017-014
Requesting Party:	Public Advocates Office
Originator:	Amanda Asadi, Amanda.Asadi@cpuc.ca.gov
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	Cal Advocates Wildfire Discovery, CalAdvocates.WildfireDiscovery@cpuc.ca.gov
Date Received:	September 15, 2025
Due Date:	September 29, 2025

Situational Awareness

REQUEST NO. 1:

In the Application, Exhibit Liberty-03, page 35, Liberty states: "Liberty installed ten weather stations in 2019 and an additional 19 weather stations in 2020…At the time of the [Mountain View] fire, six weather stations were active on the Topaz 1261 Circuit." [emphasis added]

In Liberty's response to data request CalAdvocates-LIB-A2506017-006, Question 3, Excel file titled "CalAdvocates-LIB-A2506017-006-Q3.xlsx," Liberty shows that, as of November 17, 2020, Liberty owned two weather stations (LIB-3130/TPZ1261-Eastside Lane and LIB-3106/TPZ1261-Walker) assigned to the TPZ1261 circuit. One other weather station (LIB-3105/TPZ1261-Park Ranch) was assigned to TAH1261 circuit.

a) Please clarify whether it is correct that the LIB-3105 weather station is assigned to the "TAH1261" circuit, or if it should be assigned to the "TPZ1261" circuit.

b) Explain the discrepancy between the Exhibit Liberty-03 excerpt and the Excel file titled "CalAdvocates-LIB-A2506017-006-Q3.xlsx," with respect to the number of weather stations that Liberty owned on the Topaz 1261 Circuit.

RESPONSE:

a) The reference to "TAH1261" in cell N5 of the spreadsheet *CalAdvocates-LIB-A2506017-006-Q3.xlsx*, attached to Liberty's response to CalAdvocates-LIB-A2506017-006, Question 3, was a typographical error. LIB-3105 was assigned to the Topaz 1261 Circuit and cell N5 should read "TPZ1261." Please refer to attachment *CalAdvocates-LIB-A2506017-006-Q3_Amended.xlsx* for a corrected version of the spreadsheet.
b) As of November 17, 2020, Liberty had three weather stations assigned to the Topaz 1261 Circuit, as indicated in *CalAdvocates-LIB-A2506017-006-Q3_Amended.xlsx*. Liberty will correct the language in *Liberty-03: Prudence of Operations* in forthcoming errata testimony.

REQUEST NO. 2:

Liberty's response to data request CalAdvocates-LIB-A2506017-008, Question 8d states "Liberty had a fire weather dashboard (https://tahoefireweather.com/) that displayed FPI values by zone that was updated daily."[1]

a) Provide copies of Liberty's real-time FPI (i.e., using real-time weather station or other data to calculate FPI at a present moment in lieu of calculating a forecasted FPI for a time in the future) as calculated on November 16, 2020 and November 17, 2020.
b) How often did Liberty check the real-time FPI each day?
c) Provide documentation showing how Liberty calculated its real-time FPI.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed, including with respect to the use of the term "real-time FPI." Subject to and without waiving its objections, Liberty responds as follows:

a) As explained in *Liberty-03: Prudence of Operations* (*e.g.*, pp. 34-35), Liberty's FPI tool provided a seven-day forecast for 11 different geographic zones in Liberty's service area. The FPI values displayed on Liberty's fire weather dashboard reflected forecasted values calculated from two National Fire Danger Rating System ("NFDRS") indices—Energy Release Component ("ERC") and Burning Index ("BI")—and did not reflect "real-time weather station or other data" at a particular moment. The ERC and BI percentile forecasts used to calculate Liberty's FPI were obtained from the U.S. Forest Service Wildland Fire Assessment System ("WFAS"). As explained in Liberty's Response to CalAdvocates-LIB-A2506017-008, Question 8, subpart (d), the FPI values displayed on Liberty's fire weather dashboard were updated daily, and Liberty produced FPI forecasts for the specified dates in attachment *FPI Forecasts.pdf* to that response.
b) Liberty's fire weather dashboard was an online tool available to Liberty's personnel. Liberty did not track the frequency with which its personnel checked the dashboard.

[1] In data request CalAdvocates-LIB-A2506017-08, Question 8d, Cal Advocates asked "As of November 2020, did Liberty have a method or protocol to calculate FPI in real-time?"

c) For an explanation of how Liberty calculated its forecast FPI values, please refer to pages 35-38 of *2021 Wildfire Mitigation Update (Public Version).pdf*, attached to Liberty's Response to CalAdvocates-LIB-A2506017-001, Question 13.

REQUEST NO. 3:

Liberty's response to data request CalAdvocates-LIB-A2506017-008, Question 8e states: "Liberty used inputs measured by weather stations for temperature, relative humidity, wind speed, and fuel moisture as well as field fuel moisture sampling to calculate FPI."

a) Prior to the Mountain View Fire ignition, where did Liberty perform its field fuel moisture sampling?
b) Prior to the Mountain View Fire ignition, which kinds of fuels did Liberty perform field fuel moisture sampling on?
c) Prior to the Mountain View Fire ignition, when had Liberty last performed a field fuel moisture sampling?
d) Prior to the Mountain View Fire ignition, how often did Liberty perform field fuel moisture sampling?
e) Describe how the "fuel moisture" as measured by Liberty's weather stations was different from Liberty's "field fuel moisture sampling".

RESPONSE:

a) – d) In 2020, Liberty performed field fuel moisture sampling on 1,000-hour dead fuels and live woody fuels. Liberty's vendor performed field fuel moisture sampling on a weekly or bi-weekly basis between June 2020 and November 2020. The most recent field fuel moisture sampling prior to November 17, 2020, was performed on November 3, 2020. Please refer to the table below for a list of Liberty locations for fuel moisture sampling in 2020 and the primary types of fuels at each location. Liberty's vendor also conducted field fuel moisture sampling at additional NV Energy locations in the Greater Lake Tahoe area (Alder Creek, Knox 2 RAWS, Spooner Summit, and Kingsbury/Tahoe Rim Trail North), and Liberty had access to data from both Liberty and NV Energy fuel sampling sites.

Location	Latitude	Longitude	Primary dead fuel	Primary live fuel
Ward Creek	39.1404	-120.191	Jeffrey pine	Manzanita
Burton Creek	39.1866	-120.125	Jeffrey pine	Manzanita
Meyers	38.8553	-120.026	Lodgepole pine	Sagebrush

e) Liberty's weather stations were equipped with automatic sensors that measured 10-hour dead fuel moisture. The 10-hour dead fuel moisture readings registered the moisture content of small twigs, sticks, and branches measuring between one-quarter inch and one inch in diameter. These readings complemented Liberty's field fuel moisture sampling, which involved manual collection of vegetation samples that are then dried and weighed to determine fuel moisture content. Whereas weather station sensors measured 10-hour dead fuels, which reflect changes in short term weather conditions, field fuel moisture sampling

targeted 1,000-hour dead fuels and live woody fuels, providing information regarding longer-term fuel moisture trends and conditions of live fuels.

REQUEST NO. 4:

Liberty's response to data request CalAdvocates-LIB-A2506017-008, Question 6a states: "As of November 17, 2020, Liberty had engaged a third-party expert consultant (Western Weather Group) to support installation of Liberty-owned weather stations, including determining the number of weather stations to install and their locations."

As of November 17, 2020, what other services did Western Weather Group provide to Liberty?

RESPONSE:

In addition to providing support to Liberty regarding the number of weather stations and the siting of those stations, Western Weather Group supplied the weather stations, supported cellular network access for weather station communications, and provided data hosting services for the data reported by the weather stations.

REQUEST NO. 5:

On November 14, 2020, Southern California Edison (SCE) activated its Incident Management Team in preparation for a potential Public Safety Power Shutoff (PSPS) event that it anticipated would begin on November 17, 2020, at noon and continuing through November 18, 2020, at noon that could affect circuits in Inyo, Mono, San Bernardino, Kern, and Ventura counties.[2]

a) Was Liberty aware that SCE was activating for a potential PSPS event?
b) If the answer to subpart (a) is yes, when did Liberty become aware of SCE's potential PSPS event?
c) If the answer to subpart (a) is yes, describe any communications that Liberty and SCE had regarding the potential PSPS event and when those communications were exchanged.

RESPONSE:

a) Liberty has a distinct service area from SCE. Liberty is not aware of any communication with SCE regarding activation of SCE's Incident Management Team on November 14, 2020 for a potential PSPS event.
b) N/A
c) N/A

[2] SCE's November 14-18, 2020 PSPS Post-Event Report, December 4, 2020 at 2. Available at https://www.cpuc.ca.gov/-/media/cpuc-website/files/uploadedfiles/cpucwebsite/content/news_room/newsupdates/2020/nov-14-18-2020-sce-psps-post-event-report.pdf

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3101	GLS7600-Walden	39.3314	-120.073873	5/1/2019	5/1/2019	5/1/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	GLS7600	See narrative response
LIB-3102	TAH7300-DL Bliss	38.975618	-120.100287	5/2/2019	5/2/2019	5/2/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TAH7300	See narrative response
LIB-3103	MUL1296-Woodfords	38.782655	-119.817875	5/17/2019	5/17/2019	5/17/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MUL1296	See narrative response
LIB-3105	TPZ1261–Park Ranch	38.641208	-119.520245	5/20/2019	5/20/2019	5/20/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TPZ1261	See narrative response
LIB-3106	TPZ1261-Walker	38.533929	-119.504175	5/31/2019	5/31/2019	5/31/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TPZ1261	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3104	BKY4201-Summit	39.261201	-120.07203	6/10/2019	6/10/2019	6/10/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	BKY4201	See narrative response
LIB-3108	111Line-Columbine Trail	38.890622	-119.959667	6/10/2019	6/10/2019	6/10/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	111 Line	See narrative response
LIB-3109	POR31- Iron Horse	39.77898	-120.502853	6/17/2019	6/17/2019	6/17/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	POR31	See narrative response
LIB-3110	619 Line-Sierra Valley West	39.759316	-120.374116	6/24/2019	6/24/2019	6/24/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	619 Line	See narrative response
LIB-3107	Meyers3400-Uplands	38.895633	-120.037454	4/30/2020	4/30/2020	4/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3400	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3111	SQV8200-Squaw Valley	39.198471	-120.230336	7/27/2020	7/27/2020	7/27/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	SQV8200	See narrative response
LIB-3128	7201-Alpine Meadows	39.181695	-120.221456	7/30/2020	7/30/2020	7/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	SQV7201	See narrative response
LIB-3121	7400-Glenshire	39.352082	-120.097467	8/21/2020	8/21/2020	8/21/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	GLS7400	See narrative response
LIB-3124	Washoe204-Fariad	39.449832	-120.009825	8/27/2020	8/27/2020	8/27/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	WSH204	See narrative response
LIB-3115	Hobart Sub	39.399213	-120.149933	9/11/2020	9/11/2020	9/11/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	HOB7700	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3120	TAH7300-Homewood	39.085796	-120.161076	9/14/2020	9/14/2020	9/14/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TAH7300	See narrative response
LIB-3125	MEY3400-Camp Richardson	38.934039	-120.047506	9/14/2020	9/14/2020	9/14/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3400	See narrative response
LIB-3126	MEY3500-STPD Office	38.921807	-119.970729	9/14/2020	9/14/2020	9/14/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3500	See narrative response
LIB-3117	TRK7202-Cabin Tree	39.292012	-120.215211	9/16/2020	9/16/2020	9/16/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TRK7202	See narrative response
LIB-3123	WSH201-Floriston	39.4048	-120.025474	10/5/2020	10/5/2020	10/5/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	WSH201	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3112	CEM41-Garage Pit Rd	39.675089	-120.221981	10/9/2020	10/9/2020	10/9/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	CEM41	See narrative response
LIB-3116	SRB51-Smithneck Rd	39.643493	-120.21375	10/9/2020	10/9/2020	10/9/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	SRB51	See narrative response
LIB-3113	CAL204-Dog Valley	39.52486	-120.004442	10/16/2020	10/16/2020	10/16/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	CAL204	See narrative response
LIB-3118	Muller1296-Emigrant Trail	38.819952	-119.779508	10/17/2020	10/17/2020	10/17/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MUL1296	See narrative response
LIB-3127	621Line-I-80 Gravel Pit	39.369637	-120.11362	10/20/2020	10/20/2020	10/20/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	621 Line	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3130	TPZ1261-Eastside Lane	38.521953	-119.456098	10/20/2020	10/20/2020	10/20/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TPZ1261	See narrative response
LIB-3122	MEY3300-Grass Lake Road	38.803324	-120.015564	10/30/2020	10/30/2020	10/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3300	See narrative response
LIB-3129	MUL1296-Markleeville	38.694666	-119.780667	10/30/2020	10/30/2020	10/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MUL1296	See narrative response
LIB-3114	TRUCKEE7203 - Northstar Golf Course	39.300652	-120.115562	11/2/2020	11/2/2020	11/2/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TRK7203	See narrative response

ATTACHMENT 2

Liberty response to data request CalAdvocates-LIB-A2506017-035, November 13, 2025 and excerpt of internal attachment

Liberty Utilities (CalPeco Electric) LLC
933 Eloise Avenue
South Lake Tahoe, CA 96150
Tel: 800-782-2506
Fax: 530-544-4811

November 13, 2025

Liberty Utilities (CalPeco Electric) LLC

A.25-06-017
WEMA

The Public Advocates Office

Data Request No.:	CalAdvocates-LIB-A2506017-035
Requesting Party:	Public Advocates Office
Originator:	Amanda Asadi, Amanda.Asadi@cpuc.ca.gov
	Aaron Louie, Aaron.Louie@cpuc.ca.gov
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cc:	Matthew Karle, Matthew.Karle@cpuc.ca.gov
	Cal Advocates Wildfire Discovery CalAdvocates.WildfireDiscovery@cpuc.ca.gov
Date Received:	October 30, 2025
Due Date:	November 13, 2025

Public Safety Power Shutoffs (PSPS)

REQUEST NO. 1:

In the Application, Exhibit Liberty-03, page 34, Liberty states:

> In 2020, with the assistance of the third-party fire science and risk modeling consultant, Liberty developed and implemented a Fire Potential Index ("FPI"), a fire risk modeling tool that used multiple data inputs (e.g., live and dead fuel moisture, "green-up" factor, ambient temperature, relative humidity, and the Fosberg Fire Weather Index ("FFWI")) to calculate a standardized numeric ranking of fire threat at any given time and to obtain a forecast of expected fire weather conditions.

a) For the period from November 11, 2020 through November 17, 2020, provide the raw inputs used to calculate Liberty's Fire Potential Index and the source of those inputs (e.g., weather station ID and name).

b) For the period from November 11, 2020 through November 17, 2020, provide the raw inputs used to calculate Liberty's 6-hour average Fosberg Fire Weather Index and the source of those inputs (e.g., weather station ID and name).

c) For the period from November 11, 2020 through November 17, 2020, provide the raw inputs used to calculate Liberty's 6-hour average wind gust and the source of those inputs (e.g., weather station ID and name).

d) For the period from November 11, 2020 through November 17, 2020, provide the raw inputs used to determine the ERC forecast and the source of those inputs (e.g., weather station ID and name).

e) Provide Liberty's fire weather dashboard forecasts for the period from January 1, 2020 through November 10, 2020.

f) Was the data collected from Liberty's weather stations used as an input for any of the forecasts discussed above?

g) If the answer to subpart (f) is yes, explain which weather station provided the data, which data was used, what the data was used for, and when that data was used.

h) If the answer to subpart (f) is no, explain why not.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows: Liberty understands this Question to be referencing forecasts displayed on Liberty's fire weather dashboard. As Liberty has explained in its responses and amended responses to various questions in CalAdvocates-LIB-A2506017-011, CalAdvocates-LIB-A2506017-014, and CalAdvocates-LIB-A2506017-017, Liberty obtained forecasts displayed on this dashboard from third-party data sources and from its fire science and risk modeling consultant.

a) As Liberty explained in its response to CalAdvocates-LIB-A2506017-014, Question 2, Liberty's FPI forecasts were calculated from two National Fire Danger Rating System ("NFDRS") indices—Energy Release Component ("ERC") and Burning Index ("BI"). The ERC and BI percentile forecasts used to calculate Liberty's FPI originated from the U.S. Forest Service Wildland Fire Assessment System ("WFAS"). Liberty did not calculate the FPI. Liberty drew upon WFAS's calculations and did not archive the raw inputs used by the WFAS within the specified timeframe. Liberty will clarify the referenced testimony in *Liberty-03* in forthcoming errata.

b) The 6-hour average Fosberg Fire Weather Index (FFWI) values displayed on its fire weather dashboard were calculated by its fire weather and risk modeling consultant using inputs from National Weather Service ("NWS") weather forecast models. Liberty and its consultant did not archive this weather model data within the specified timeframe.

c) The 6-hour average wind gust forecasts displayed on its fire weather dashboard were calculated by its fire weather and risk modeling consultant using inputs from NWS

weather forecast models. Liberty and its consultant did not archive this weather model data within the specified timeframe.

d) As Liberty explained in its response to CalAdvocates-LIB-A2506017-017, Question 1, the ERC percentile forecasts displayed on Liberty's fire weather dashboard were not calculated by Liberty but were obtained from the WFAS. WFAS does not distribute the raw inputs that WFAS uses to calculate ERC percentile forecasts.
e) Liberty does not have access to fire weather dashboard data from the specified timeframe given the passage of time.
f) No.
g) N/A
h) Please refer to Liberty's response to CalAdvocates-LIB-A2506017-029, Question 5 for information on how Liberty used data from its weather stations.

REQUEST NO. 2:

In Liberty's Amended response to data request CalAdvocates-LIB-A2506017-017, question 1c, Liberty states:

> Liberty did not measure or calculate ERC in real-time, as Liberty understands that term. ERC is a National Fire Danger Rating System ("NFDRS") index. Liberty's ERC percentile forecasts were obtained from the U.S. Forest Service Wildland Fire Assessment System ("WFAS") and updated on Liberty's fire weather dashboard daily.

For January 1, 2020 through November 17, 2020, provide an Excel file that displays each zone[1] in Liberty's fire weather dashboard that Liberty obtained ERC percentile forecasts for as a row and the following as columns:

a) Weather station ID that the forecast was derived from;
b) Weather station name that the forecast was derived from; and
c) Time Period that Liberty used the weather station that the forecast was derived from.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) As referenced in Liberty's response to Question 1(d) of this set of data requests and its amended response to CalAdvocates-LIB-A2506017-017, Question 1(c), Liberty obtained ERC percentile forecasts displayed on its fire weather dashboard from WFAS. Liberty was an end-user, not a developer, of these ERC percentile forecasts.
b) See Liberty's response to subpart (a) of this Question.
c) See Liberty's response to subpart (a) of this Question.

REQUEST NO. 3:

In the Application, Exhibit Liberty-03, pages 37-38, Liberty states:

[4] Application, Exhibit Liberty-03 at 35 states "Liberty's FPI tool provided a seven-day forecast for 11 different geographic zones across 26 Liberty's service area."

> The PSPS protocol used a predictive tool to capture three fire weather components: (a) Energy Release Component ("ERC"); (b) wind gusts; and (c) Fosberg Fire Weather Index ("FFWI"). Together, these three components were intended to capture the risk of wildfire ignition and spread based on forecasted medium- and long-term environmental conditions and weather conditions.

For January 1, 2020 through November 17, 2020, provide an Excel file that displays each zone[2] in Liberty's fire weather dashboard that Liberty obtained wind gust forecasts for as a row and the following as columns:

a) Weather station ID that the forecast was derived from;
b) Weather station name that the forecast was derived from; and
c) Time Period that Liberty used the weather station that the forecast was derived from.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) As referenced in Liberty's response to Question 1(c) of this set of data requests, wind gust forecasts displayed in Liberty's fire weather dashboard were calculated by its fire weather and risk modeling consultant using inputs from NWS weather forecast models. These forecasts were not based on weather station observations.
b) See Liberty's response to subpart (a) of this Question.
c) See Liberty's response to subpart (a) of this Question.

REQUEST NO. 4:

In the Application, Exhibit Liberty-03, pages 37-38, Liberty states:

> The PSPS protocol used a predictive tool to capture three fire weather components: (a) Energy Release Component ("ERC"); (b) wind gusts; and (c) Fosberg Fire Weather Index ("FFWI"). Together, these three components were intended to capture the risk of wildfire ignition and spread based on forecasted medium- and long-term environmental conditions and weather conditions.

For the period prior to the Mountain View Fire ignition, provide an Excel file with each zone[3] in its fire weather dashboard that Liberty obtained data for use in its FFWI forecasts for as a row and the following as columns:

a) Weather station ID that the forecast was derived from;
b) Weather station name that the forecast was derived from; and
c) Time Period that Liberty used the weather station that the forecast data was derived from.

RESPONSE:

[5] Application, Exhibit Liberty-03 at 35 states "Liberty's FPI tool provided a seven-day forecast for 11 different geographic zones across 26 Liberty's service area."

[6] Application, Exhibit Liberty-03 at 35 states "Liberty's FPI tool provided a seven-day forecast for 11 different geographic zones across 26 Liberty's service area."

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) As referenced in Liberty's response to Question 1(b) of this set of data requests, the FFWI forecasts displayed in Liberty's fire weather dashboard were calculated by its fire weather and risk modeling consultant using inputs from NWS weather forecast models. These forecasts were not based on weather station observations.
b) See Liberty's response to subpart (a) of this Question.
c) See Liberty's response to subpart (a) of this Question.

REQUEST NO. 5:

In Liberty's response to data request CalAdvocates-LIB-A2506017-017, question 1d, Liberty states:

> WFAS typically provided updated ERC values on a daily basis. Because ERC is a fire danger index intended to measure intermediate- to longer-term dryness and its calculation considers antecedent conditions over the prior several weeks, ERC calculations typically show little variation at sub-daily timescales.

a) What does an ERC of 0.0 represent?
b) What would ERC forecast calculations increasing from 0.0 to 60 from one day to another represent?
c) Did Liberty perform calculations on the ERC that it obtained from WFAS in order to create a daily percentile for its fire weather dashboard?
d) If the answer to subpart (c) is yes, provide documents showing how Liberty used WFAS data to create an ERC percentile.
e) If the answer to subpart (c) is no, explain why not

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty understands the term "ERC" and "ERC forecast" in this Question to refer to the ERC percentile forecasts displayed on Liberty's fire weather dashboard. Subject to and without waiving its objections, Liberty responds as follows:

a) ERC percentile forecasts are measures of the potential energy per unit area that would be released in the flaming front of a fire normalized against historical ERC values for a specific area, and vary based on the moisture content of live and dead fuels. An ERC percentile forecast of 0.0 means there is no potential energy available within fuels to sustain the spread of a fire, such as when there is snow cover on the ground. As referenced in Liberty's amended response to CalAdvocates-LIB-A2506017-017, Question 3, at times, an ERC percentile forecast of 0.0 may also reflect data gaps due to delays or other issues with WFAS reporting.
b) An increase of 0.0 to 60 in ERC percentile forecasts means that the amount of potential energy that would be released in the flaming front of a fire has increased due to an increase in fuel dryness, and that raw ERC values are higher than those seen on 60% of historical days at a specific location.

c) Liberty objects that the term "calculations" is vague and ambiguous. Once gridded ERC percentile forecasts were obtained from WFAS, average values were calculated for each of Liberty's pre-defined PSPS zones, and those values were displayed in tabular format in Liberty's fire weather dashboard.
d) N/A
e) The ERC forecasts obtained from WFAS were already in percentile form.

REQUEST NO. 6:

In Liberty's Amended response to data request CalAdvocates-LIB-A2506017-017, question 1c, Liberty states:

> Liberty did not measure or calculate ERC in real-time, as Liberty understands that term. ERC is a National Fire Danger Rating System ("NFDRS") index. Liberty's ERC percentile forecasts were obtained from the U.S. Forest Service Wildland Fire Assessment System ("WFAS") and updated on Liberty's fire weather dashboard daily. With support from its vendor, Liberty also calculated ERC values on a weekly or biweekly basis as part of its field fuel moisture sampling to support situational awareness.

a) Provide documents showing Liberty's calculations and values for the ERC that Liberty calculated weekly or biweekly in the entirety of 2020.
b) Provide Liberty's ERC percentile forecasts that it obtained from the U.S. Forest Service Wildland Fire Assessment System that corresponded to each date and time that Liberty performed ERC calculations for in the entirety of 2020.

RESPONSE:

a) Liberty is providing the information requested by this subpart in the "ERC" and "ERCraw" tabs of attachment *CalAdvocates-LIB-A2506017-035-Q6.xlsx*. This spreadsheet contains records of data collected and calculated by Liberty's vendor from field fuel moisture sampling sites in 2020.
b) Liberty does not have access to the ERC percentile forecasts obtained from WFAS for the specified timeframe given the passage of time.

REQUEST NO. 7:

In Liberty's response to data request CalAdvocates-LIB-A2506017-017, question 2, Liberty provided the attachment "LU Fire Prevention Plan 10-9-2020.pdf," page 4, which states:

> During Red Flag Events, Liberty CalPeco will monitor wind gusts at the peak elevation located at Bliss State Park using the link below or other available data.
> Liberty CalPeco has identified 46 Public Safety Power Shut-off (PSPS) zones that are based on isolation points within certain circuits or areas. If Reax forecasts for these zones that the ERC, wind, and FFWI will come within 80%, 90%, or 100% of the thresholds for de-energization, Liberty CalPeco will enact a PSPS upon or just before reaching 100%. During a PSPS event, Liberty CalPeco will suspend noncritical operational work to focus efforts on current conditions and proactive patrols after de-energizing and when restoring power. Liberty CalPeco adheres to the guidelines provided in R. 18-12-005, an open proceeding that prescribes utilities' PSPS processes, among other issues. Liberty CalPeco

will provide updated protocols for internal PSPS practices in the 2020 version of its Wildfire Mitigation Plan.

In the Application, Exhibit Liberty-03, pages 38-39, Liberty states:

Figure 16: De-Energization Decision Tree for Most of Liberty's PSPS Zones

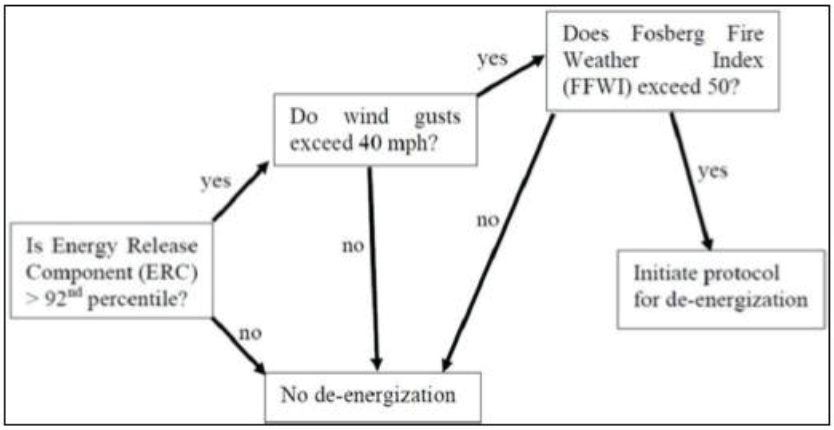
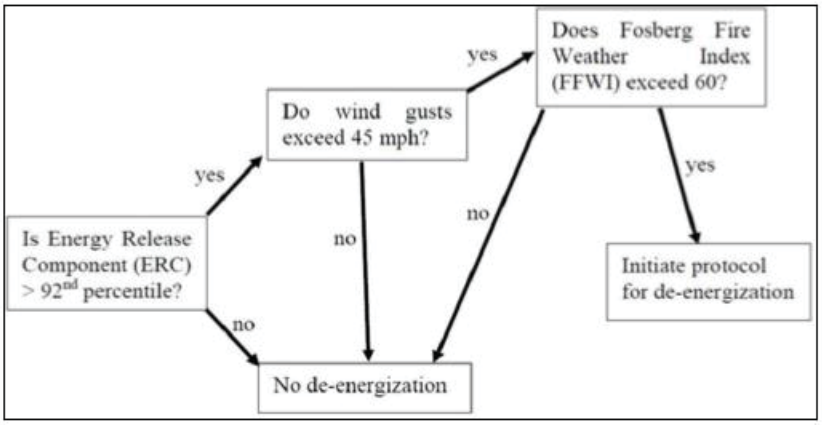


Figure 17: De-Energization Decision Tree for Topaz and Muller 1296 R3 PSPS Zones



a) Clarify the discrepancy between "LU Fire Prevention Plan 10-9-2020.pdf," page 4, "If Reax forecasts for these zones that the ERC, wind, and FFWI will come within 80%, 90%, or 100% of the thresholds for de-energization, Liberty CalPeco will enact a PSPS upon or just before reaching 100%" and Application, Exhibit Liberty-03, pages 38-39 stating that an ERC greater than the 92nd percentile must first be met.
b) Regarding the statement in "LU Fire Prevention Plan 10-9-2020.pdf," page 4, "If Reax forecasts for these zones that the ERC, wind, and FFWI will come within 80%, 90%, or 100% of the thresholds for de-energization, Liberty CalPeco will enact a PSPS upon or just before reaching 100%" Did Liberty interpret this statement to mean that, if either the ERC forecast or the wind gust forecast or the FFWI forecast approached 80% or 90% or

100% of thresholds, then Liberty would initiate a PSPS or did Liberty interpret this statement to mean that if all three thresholds were met simultaneously (ERC forecast, wind gust forecast, and FFWI forecast) approached 80% or 90% or 100%, then Liberty would initiate a PSPS?

c) Define "will come within 80%, 90%, or 100% of the thresholds" and explain whether Liberty included a buffer zone.
d) Explain why Liberty's "LU Fire Prevention Plan 10-9-2020.pdf," page 4, states its ERC, wind, and FFWI forecasts will come within 80% while the Application, Exhibit Liberty-03, pages 38-39, show that the first threshold is ERC of the 92nd percentile.
e) In practice, from October 9, 2020 through November 17, 2020, did Liberty follow the "LU Fire Prevention Plan 10-9-2020.pdf" as it related to Liberty deciding whether to consider a PSPS? If so, state when and how Liberty used "LU Fire Prevention Plan 10-9-2020.pdf." If not, explain why not.
f) In practice, from October 30, 2019 through October 9, 2020, did Liberty follow its Revised 2020 Wildfire Mitigation Plan, attachment "Liberty CalPeco's Fire Prevention Plan for Overhead Electric Facilities" as it related to Liberty deciding whether to consider a PSPS?[4] If so, state when and how Liberty used "Liberty CalPeco's Fire Prevention Plan for Overhead Electric Facilities". If not, explain why not.
g) Explain why Liberty used a 6-hour average wind gust forecast versus a 1-hour average wind gust forecast in Liberty's fire weather dashboard.
h) Explain why Liberty used a 6-hour average FFWI forecast versus a 1-hour average FFWI forecast in its fire weather dashboard.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as argumentative and assuming facts. Subject to and without waiving its objections, Liberty responds as follows:

a) Liberty does not agree there is a discrepancy between the two sources cited by Cal Advocates. Both the quoted passage from Liberty's Fire Prevention Plan (FPP) (attachment *LU Fire Prevention Plan 10-9-2020.pdf*) and the decision trees that appear in *Liberty-03* refer to Liberty's PSPS procedures in effect as of November 17, 2020 and tie to the same de-energization thresholds. See *CONFIDENTIAL-2019-08-20 Liberty Utilities de-energization thresholds.pdf*, attached to Liberty's response to CalAdvocates-LIB-A2506017-011, Question 2. The FPP summarized how Liberty's PSPS procedures were operationalized in advance of a potential PSPS event. Forecasted conditions exceeding 80%, 90%, and 100% of the thresholds informed Liberty's decision to activate its Incident Management Team (IMT) and initiate PSPS notifications while observed conditions exceeding relevant thresholds for the three criteria specified in the decision trees informed Liberty's decision to de-energize.
b) As of November 17, 2020, forecasts would typically have to simultaneously exceed 80%, 90%, or 100% of de-energization thresholds for all three PSPS criteria for Liberty to consider activating its IMT for a PSPS event. As referenced in *CONFIDENTIAL-2019-08-20 Liberty Utilities de-energization thresholds.pdf* (at p. 35), observed conditions

[7] *Liberty Utilities Revised 2020 Wildfire Mitigation Plan*, February 28, 2020, attachment "Liberty CalPeco's Fire Prevention Plan for Overhead Electric Facilities."

would typically have to simultaneously exceed 100% of de-energization thresholds for all three criteria for Liberty to consider de-energization during a PSPS event.

c) Liberty does not understand what Cal Advocates means by the use of the term "buffer zone." The phrase "will come within 80%, 90%, or 100% of the thresholds" refers to situations where the forecasted values for ERC, FFWI, and wind gusts exceed 80%, 90%, or 100% of the de-energization thresholds for the relevant PSPS zone, as established by and defined in Liberty's PSPS protocol at the time, see *CONFIDENTIAL-2019-08-20 Liberty Utilities de-energization thresholds.pdf*.
d) Liberty objects to this subpart as vague and ambiguous. See Liberty's response to subpart (a).
e) As Liberty explained in its response to CalAdvocates-LIB-A2506017-017, Question 2, Liberty used its Fire Prevention Plan (attachment *LU Fire Prevention Plan 10-9-2020.pdf*) to guide operation and maintenance activities based on the five categories of FPI risk conditions. The FPP summarized how Liberty's PSPS procedures were operationalized and outlined operational restrictions during a PSPS event. Please refer to Liberty's response to CalAdvocates-LIB-A2506017-011, Question 2 for the PSPS procedures that were in effect as of November 17, 2020.
f) See Liberty's response to subpart (e).
g) As a mitigation measure of last resort, Liberty's PSPS protocol was designed to balance customer impact and public safety risks associated with power shutoffs with the risk of utility-caused wildfires. Based on the expertise and judgment of Liberty's fire science and risk modeling consultant at the time, using a 6-hour wind gust average forecast was more suited to balancing these risks and to minimize the potential for customer impact and safety risks during short-duration weather events. Around the time Liberty's fire science and risk modeling consultant designed Liberty's PSPS protocols in 2019, other utilities also used 6-hour average forecasts to inform their PSPS decision-making.
h) See Liberty's response to subpart (g).

REQUEST NO. 8:

In the Application, Exhibit Liberty-03, page 38, footnote 48, Liberty states:

> FFWI is a commonly-used measure of fire risk that takes into account short-term variations in temperature, relative humidity, and wind speed. It does not take into account fuel type, topography, or fuel moisture. The FFWI scale ranges from 0 to 100, with a reading above 50-60 considered high risk. This component complemented the ERC's seasonal considerations by measuring short-term weather conditions conducive to rapidly-spreading fires.

a) From January 1, 2020 to November 17, 2020, how did Liberty calculate its FFWI?
b) Provide documents showing how Liberty calculated its FFWI.
c) From January 1, 2020 to November 17, 2020, did Liberty calculate FFWI in real-time?
d) If the answer to subpart (c) is no, explain why not.
e) If the answer to subpart (c) is yes, explain what Liberty did with its calculated FFWI data with respect to its operations (including but not limited to PSPS protocols).

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) With respect to FFWI forecasts displayed in Liberty's fire weather dashboard, see Liberty's response to Question 1(b) of this set of data requests. With respect to FFWI values recorded by Liberty's weather stations, see Liberty's response to subpart (c).
b) N/A
c) Within the specified timeframe, some of Liberty's weather stations recorded FFWI values, which were calculated based on measurements gathered by certain weather sensors at those stations. See Liberty's response to Question 16(a) of this set of data requests.
d) N/A
e) Refer to Liberty's response to CalAdvocates-LIB-A2506017-029, Question 5 for an explanation of how Liberty used its weather station data.

Fire Potential Index

REQUEST NO. 9:

In Liberty's response to data request CalAdvocates-LIB-A2506017-008, question 8, Liberty provided the attachment "FPI Forecasts.pdf" showing Liberty's fire weather dashboard forecasts (which included Fire Potential Index forecasts, Fosberg Fire Weather Index forecasts, and wind gust forecasts) for the period from November 11, 2020 through November 17, 2020. At 6:00am on November 17, 2020, Liberty's forecast showed that Topaz would have a Fire Potential Index of "Moderate" on November 18, 2020.

a) What was Liberty's plan to prepare for the forecasted "Moderate" conditions it expected on November 18, 2020?
b) When did Liberty begin planning for the forecasted "Moderate" conditions?
c) When did Liberty actually begin to prepare for the forecasted "Moderate" conditions?
d) Provide any documents showing that Liberty staff responded to the forecasted "Moderate" conditions it expected on November 18, 2020.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) Please refer to Liberty's Fire Prevention Plan (FPP) in effect at the time, provided in *LU Fire Prevention Plan 10-9-2020.pdf*, attached to CalAdvocates-LIB-A2506017-017, Question 2. Under Liberty's FPP, the operating procedures for Low and Moderate FPI categories were equivalent to normal operating procedures, which required field personnel to follow general safety instructions with respect to fire awareness and fire safety. *See LU Fire Prevention Plan 10-9-2020.pdf* at 6-7.

b) See Liberty's response to subpart (a). Liberty communicated FPI forecasts to its operations personnel each morning.
c) See Liberty's response to subparts (a) and (b).
d) See Liberty's response to subpart (a). Because there would have been no need for additional operational preparations beyond following general fire safety instructions for the forecasted "Moderate" conditions, Liberty is not aware of records formally tracking Liberty personnel responding to the "Moderate" FPI conditions.

REQUEST NO. 10:

In Liberty's response to data request CalAdvocates-LIB-A2506017-008, question 8, Liberty provided the attachment "FPI Forecasts.pdf" showing Liberty's fire weather dashboard forecasts (which included Fire Potential Index forecasts, Fosberg Fire Weather Index forecasts, and wind gust forecasts) for the period from November 11, 2020 through November 17, 2020. At 12:00pm on November 16, 2020, Liberty's forecast showed that Topaz would have a Fire Potential Index of "Moderate" on November 17, 2020.

a) What was Liberty's plan to prepare for the forecasted "Moderate" conditions it expected on November 17, 2020?
b) When did Liberty begin planning for the forecasted "Moderate" conditions?
c) When did Liberty actually begin to prepare for the forecasted "Moderate" conditions?
d) Provide any documents showing that Liberty staff responded to the forecasted "Moderate" conditions it expected on November 17, 2020.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) See Liberty's response to Question 9(a) of this set of data requests.
b) See Liberty's response to Question 9(b) of this set of data requests.
c) See Liberty's response to Question 9(c) of this set of data requests.
d) See Liberty's response to Question 9(d) of this set of data requests.

REQUEST NO. 11:

In Liberty's response to data request CalAdvocates-LIB-A2506017-017, question 2, Liberty provided the attachment "LU Fire Prevention Plan 10-9-2020.pdf," page 6, which states:

> Moderate Fire Risk: As determined by the Wildfire Prevention Department, Normal Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are not elevated but still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The FPI is indicated as "Green."

Low Fire Risk: As determined by the Wildfire Prevention Department, Normal Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are low but may sometimes still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have

stipulations and additional fire mitigation activities may be required. The Low Fire Risk status is the default operational state and the FPI is indicated as "Blue."

a) Explain why Liberty assigned the same Operating Procedures for both Low and Moderate Risk Index Ratings, as shown on "LU Fire Prevention Plan 10-9-2020.pdf," page 12.
b) Explain the purpose of having a Low Risk Rating and a Moderate Risk Rating.
c) Provide the date of Liberty's attachment to its 2020 Wildfire Mitigation Plan (WMP), titled "Liberty CalPeco's Fire Prevention Plan for Overhead Electric Facilities."[5]
d) Explain the purpose of changing Liberty's FPI Risk condition categorization from three (Normal, Elevated, and Extreme Fire Risk)[6] to five (Low, Moderate, High, Very High, and Extreme Fire Risk).[7]

RESPONSE:

a) Liberty's FPI was a tool designed to support situational awareness of fire risk for its operational activities in the field. Based on Liberty's current understanding, Liberty's FPP prescribed the same operating procedures for Low and Moderate categories because the differences in risk between these two categories did not justify the implementation of additional work restrictions and/or requirements, which could potentially cause disruptions to Liberty's inspection, maintenance, and construction activities and affect Liberty's ability to respond to emergencies on its system.
b) As explained in Liberty's response to CalAdvocates-LIB-A2506017-029, Question 1, the purpose of Liberty's FPI and its different risk categories was to advise Liberty personnel on the level of fire risk, based on correlation with fire occurrence and final fire size of all causes, to inform Liberty's field crews of precautions they should take to mitigate those risks.
c) According to historical records available to Liberty, Liberty understands the FPP attached to its 2020 WMP to have been finalized around October 29, 2019.
d) Based on Liberty's current understanding, at the time when Liberty drafted the FPP that was attached to its 2020 WMP, Liberty's FPI methodology was still in development, as referenced on pages 2 and 5 of that FPP. Liberty updated its FPP in 2020 pursuant to the FPI methodology developed by Liberty's fire science and risk modeling consultant, which contained five risk categories.

Situational Awareness

REQUEST NO. 12:

On November 16, 2020, provide the total circuit-miles of Liberty's system in the categories below:

a) Primary Overhead Distribution System;
b) Secondary Overhead Distribution System; and
c) Overhead Transmission System.

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8 Liberty's Revised 2020 Wildfire Mitigation Plan (Liberty's Revised 2020 WMP), February 28, 2020.
9 Liberty's Revised 2020 WMP, attachment "Liberty CalPeco's Fire Prevention Plan for Overhead Electric Facilities" at 5.
10 Liberty's response to data request CalAdvocates-LIB-A2506017-017, question 2, Liberty provided the attachment "LU Fire Prevention Plan 10-9-2020.pdf" at 5-6.

RESPONSE:

Liberty objects to this Question as vague and ambiguous. Liberty understands the term "transmission" to refer to the Office of Energy Infrastructure Safety (OEIS)'s definition of transmission lines (>65 kV). Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows: Liberty does not have records tracking the number of total circuit-miles specifically as of November 16, 2020. Based on historical records available to Liberty, Liberty is providing circuit mileage data as of January 2021.

a) As of January 2021, Liberty had approximately 694.01 miles of primarily overhead distribution lines.
b) As of January 2021, Liberty had approximately 790 miles of secondary overhead distribution lines.
c) As of January 2021, Liberty had approximately 19.37 miles of transmission lines.

REQUEST NO. 13:

In Liberty's response to data request CalAdvocates-LIB-A2506017-014, question 3, Liberty states:

> In 2020, Liberty performed field fuel moisture sampling on 1,000-hour dead fuels and live woody fuels. Liberty's vendor performed field fuel moisture sampling on a weekly or bi-weekly basis between June 2020 and November 2020…Please refer to the table below for a list of Liberty locations for fuel moisture sampling in 2020 and the primary types of fuels at each location…

Location	Latitude	Longitude	Primary dead fuel	Primary live fuel
Ward Creek	39.1404	-120.191	Jeffrey pine	Manzanita
Burton Creek	39.1866	-120.125	Jeffrey pine	Manzanita
Meyers	38.8553	-120.026	Lodgepole pine	Sagebrush

a) For the period from June 1, 2020 through November 17, 2020, provide an excel file containing the field fuel moisture sampling values and results for the three Liberty locations (Ward Creek, Burton Creek, and Meyers), including the type of sample collected, date of collection, date of analysis.
b) Were these results made available publicly? If so, please provide where these results can be accessed. If not, explain why not.

RESPONSE:

a) See attachment *CalAdvocates-LIB-A2506017-035-Q6.xlsx*. This spreadsheet contains records of data collected and calculated by Liberty's vendor from Liberty and NV Energy field fuel moisture sampling sites in 2020.
b) Fuel moisture sampling data gathered and calculated by Liberty's vendor at Liberty and NV Energy locations within were available at fuelmoisture.com. The line graphs in this database presented weekly averages across all years of sampling, minimum and

maximum values, and current year data. The table displayed in this database presents data gathered and calculated from the most recent 25 samples.

REQUEST NO. 14:

In Liberty's response to data request CalAdvocates-LIB-A2506017-014, question 3, Liberty states:

> Liberty's vendor also conducted field fuel moisture sampling at additional NV Energy locations in the Greater Lake Tahoe area (Alder Creek, Knox 2 RAWS, Spooner Summit, and Kingsbury/Tahoe Rim Trail North), and Liberty had access to data from both Liberty and NV Energy fuel sampling sites.

a) For January 1, 2020 through November 17, 2020, provide an excel file containing the field fuel moisture sampling values and results for the NV Energy locations, including the type of sample collected, date of collection, date of analysis.
c) Were these results made available publicly? If so, please provide where these results can be accessed. If not, explain why not.

RESPONSE:

a) See attachment *CalAdvocates-LIB-A2506017-035-Q6.xlsx*. This spreadsheet contains records of data collected and calculated by Liberty's vendor from Liberty and NV Energy field fuel moisture sampling sites in 2020.
c) Fuel moisture sampling data gathered and calculated by Liberty's vendor at Liberty and NV Energy locations were available at fuelmoisture.com. The line graphs in this database presented weekly averages across all years of sampling, minimum and maximum values, and current year data. The table displayed in this database presents data gathered and calculated from the most recent 25 samples.

REQUEST NO. 15:

In the Application, Exhibit Liberty-03, page 40, Liberty states, "The [National Weather Service (NWS)] issued a high wind warning for the area but did not issue a Red Flag Warning."

a) From January 1, 2020 through November 17, 2020, what did the NWS define as RFW conditions and criteria?
b) From January 1, 2020 through November 17, 2020, did Liberty use its weather station data to observe and confirm whether its territory experienced the conditions and criteria as defined by NWS Red Flag Warning?
c) If the answer to subpart (b) is yes, explain how Liberty used its weather station data and provide documents showing that Liberty utilized the data.
d) If the answer to subpart (b) is no, explain why not.
e) From January 1, 2020 through November 17, 2020, what did the NWS define as high wind warning conditions and criteria?
f) From January 1, 2020 through November 17, 2020, did Liberty use its weather station data to observe and confirm whether its territory experienced the conditions and criteria as defined by NWS high wind warning conditions?
g) If the answer to subpart (f) is yes, explain how Liberty used its weather station data and provide documents showing that Liberty utilized the data.
h) If the answer to subpart (f) is no, explain why not.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) Liberty understands that, within the specified timeframe, the NWS's Reno office issued Red Flag Warnings when it determined that the following conditions were forecasted:
   - In Tahoe Basin: greater than or equal to 30 miles per hour (mph) wind gusts, relative humidity less than or equal to 20%, and critical fuel moisture levels for 3 hours or greater
   - Outside Basin: greater than or equal to 30 mph wind gusts, relative humidity less than or equal to 15%, and critical fuel moisture levels for 3 hours or greater

   Liberty understands that other conditions such as dry thunderstorms may also have prompted the NWS's Reno office to issue Red Flag Warnings.
b) As referenced in Liberty's response to CalAdvocates-LIB-A2506017-029, Question 5, Liberty's fire science and risk modeling consultant would meet with Liberty to review weather data after the occurrence of weather events such as wind, storm, and precipitation events on its system. Liberty is not aware that it specifically compared weather station data to Red Flag Warning criteria to determine whether Red Flag Warning conditions occurred.
c) See Liberty's response to subpart (b).
d) See Liberty's response to subpart (b).
e) Liberty understands that, within the specified timeframe, the NWS's Reno office issued High Wind Warnings when it determined that the following conditions were forecasted:
   - Below 7,000 ft. elevation: greater than or equal to 40 mph sustained winds and 58 mph wind gusts for one hour or greater
   - Above 7,000 ft. elevation: greater than or equal to 50 mph sustained winds and 75 mph gusts for one hour or greater
f) See Liberty's response to subpart (b). Liberty is not aware that it specifically compared weather station data to High Wind Warning criteria to determine whether High Wind Warning conditions occurred.
g) See Liberty's response to subpart (f).
h) See Liberty's response to subpart (f).

REQUEST NO. 16:

In Liberty's response to data request CalAdvocates-LIB-A2506017-006, question 3(i), Liberty provided an amended "CalAdvocates-LIB-A2506017-006-Q3_Amended.pdf"[8] where each of Liberty's 29 weather stations on November 17, 2020 collected the following data: Dew Point (°F), Fuel Moisture (%), Precipitation (in), Relative Humidity (%), Soil Moisture (%), Soil Temperature (°F), Temperature (°F), Wind Direction (°), Wind Gust (mph), and Wind Speed (mph).

[11] Liberty's response to data request CalAdvocates-LIB-A2506017-014, question 1(a).

a) From its installation on October 20, 2020 to November 17, 2020, explain why Liberty's weather station LIB-3130 (TPZ1261-Eastside Lane) was able to provide Fosberg Fire Weather Index data.[9]
b) From its installation on May 20, 2019 to November 17, 2020, explain why Liberty's weather station LIB-3105 (TPZ1261-Park Ranch) was unable to provide Fosberg Fire Weather Index data.[10]
c) From its installation on May 31, 2019 to November 17, 2020, explain why Liberty's weather station LIB-3106 (TPZ1261-Walker) was unable to provide Fosberg Fire Weather Index data.[11]

RESPONSE:

a) Recording FFWI data required Liberty's weather stations to have sensors for rain gauge, soil moisture, and fuel moisture. Station LIB-3130 was equipped with these sensors from the date of its installation on October 20, 2020 and was able to record FFWI starting on that date.
b) See Liberty's response to subpart (a). Station LIB-3105 was not equipped with the requisite sensors for FFWI reporting at the time of installation. Liberty later purchased these sensors and retrofitted LIB-3105. Western Weather Group was notified around February 17, 2021 that additional sensors had been installed on LIB-3105 and LIB-3105 began recording FFWI on that date.
c) See Liberty's response to subpart (a). Station LIB-3106 was not equipped with the requisite sensors for FFWI reporting at the time of installation. Liberty later purchased these sensors and retrofitted LIB-3106. Western Weather Group was notified around March 10, 2021 that additional sensors had been installed on LIB-3106 and LIB-3106 began recording FFWI on that date.

REQUEST NO. 17:

In Liberty's response to data request CalAdvocates-LIB-A2506017-006, question 3(i), Liberty provided an amended "CalAdvocates-LIB-A2506017-006-Q3_Amended.pdf"[12] which shows that Liberty's weather station LIB-3106 (TPZ1261-Walker) was installed on May 31, 2019.

a) From its installation on May 31, 2019 to June 10, 2019, explain why Liberty's weather station LIB-3106 (TPZ1261-Walker) was unable to provide any data in this time period.[13]
b) How and when did Liberty discover the issue?
c) How and when did Liberty resolve the issue?

RESPONSE:

[12] Mesowest data for LIB26 (LIB-3130) shows a column for "fosberg_fire_weather_index_set_1" which is blank only on November 9, 2020 at 12:10pm. Available at https://mesowest.utah.edu/

[13] Mesowest data for LIB05 (LIB-3105) shows a column for "fosberg_fire_weather_index_set_1" which is blank in its entirety. Available at https://mesowest.utah.edu/

[14] Mesowest data for LIB06 (LIB-3106) shows a column for "fosberg_fire_weather_index_set_1" which is blank in its entirety. Available at https://mesowest.utah.edu/

[15] Liberty's response to data request CalAdvocates-LIB-A2506017-014, question 1(a).

[16] Mesowest data for LIB06 (LIB-3106) shows that data is available from June 11, 2019 to current date. Available athttps://viewer.synopticdata.com/table/lib06/basic-weather/now

a) LIB-3106 recorded weather data beginning on May 31, 2019. As Mesowest is a third-party data reporting platform, Liberty understands the gap in data between May 31, 2019 and June 10, 2019 on Mesowest to likely be a data ingestion issue outside of Liberty's control. Some weather data recorded by LIB-3106 between May 31, 2019 and June 10, 2019 are available at Western Weather Group's publicly accessible website: https://liberty.westernweathergroup.com/search. Additional weather data recorded by LIB-3106 between May 31, 2019 and June 10, 2019 are available to Liberty via Western Weather Group.
b) See Liberty's response to subpart (a).
c) See Liberty's response to subpart (a).

7/12								
Date	Burton Creek	Ward Creek	Meyers	Kingsbury Grade	Jacks Valley	Spooner	Knox 2	
6/9	106	106	150	97	167	104	93	
6/16	116	194	179	88	129	163	85	
6/23	117	113	185	141	91	100	96	
6/30	109	173	167	98	100	140	90	
7/7	107	119	131	144	70	96	80	
7/14	117	172	133	114	93	108	112	
7/21	184	172	101	142	62	128	128	
7/28	140	292	129	133	115	110	128	
8/3	135	153	67	131	83	104	91	
8/10	156	143	99	126	169	111	100	
8/17	128	94	79	98	77	91	104	
8/25	119	120	76	116	107	106	104	
9/3	117	119	130	103	95	89	109	
9/10	105	129	70	100	96	90	85	
9/15	95	125	91	99	98	122	93	
9/22	109	90	57	122	102	99	78	
9/29	108	107	61	92	88	95	92	
10/5	115	109	83	85	98	103	90	88
10/13	82	97	56	91	69	102	82	
10/19	114	114	102	85	118	81	80	
10/28	86	72	72	82	68	91	76	
11/3	101	96	54	72	88	93	88	

2019				Live (%)			
Date	Alder Creek	Knox 2	Spooner	Kingsbury	Meyers	Ward Creek	Burton Creek
	Truckee Donner	Incline Village	Glenbrook	Kingsbury/Roundhill			
7/17	111	136	145		108	114	131
7/26	179	119	159	153	95	181	167
8/6	171	115	147	172	97	150	150
8/14	143	116	146	138	91	151	146
8/21	140	110	142	124	105	156	130
8/28	146	110	139	109	92	156	151
9/4	121	73	117	116	47	148	134
9/10	142	127	126	114	62	108	116
9/17	140	103	108	110	105	165	140
9/24	109	103	107	118	86	119	114
10/16	107	94	100	108	60	117	105
10/29	102	91	99	94	57	104	106
11/13	103	92	97	100	53	99	102

2020 Date	Burton Creek	Ward Creek	Meyers	Kingsbury Grade	Jacks Valley	Spooner	Knox 2	
6/9	16	39	11	13	4	15	13	
6/16	15	24	12	13	7	11	9	
6/23	11	16	9	20	6	8	6	
6/30	12	12	11	11	8	9	7	
7/7	7	22	9	5	3	6	6	
7/14	11	11	8	6	5	6	5	
7/21	10	30	7	7	3	9	10	
7/28	8	8	10	9	6	9	11	
8/3	8	10	9	8	3	9	10	
8/10	9	11	9	7	5	6	5	
8/17	9	8	7	8	4	7	5	
8/24	11	11	12	10	9	9	10	
9/3	8	8	7	10	5	8	6	
9/10	6	9	7	8	7	8	6	
9/15	7	7	9	7	5	8	6	
9/22	8	9	8	8	9	9	5	
9/29	9	9	6	7	11	9	7	
10/5	7	5	7	5	6	3	5	8
10/13	8	10	8	8	6	7	9	
10/19	9	7	6	5	9	4	7	
10/28	10	8	8	8	11	7	7	
11/3	10	9	7	8	8	9	10	

Dead (%)

2019 Date	Alder Creek	Knox 2	Spooner	Kingsbury	Meyers	Ward Creek	Burton Creek
	Truckee Donner	ncline Village	Glenbrook	sbury/Roundhill			
7/17	28	19	17		17	38	12
7/26	9	7	8	8	7	8	12
8/6	9	6	10	10	6	11	11
8/14	9	8	8	7	8	8	9
8/21	8	7	8	7	8	8	8
8/28	9	11	7	9	7	10	9
9/4	3	10	8	8	7	11	9
9/10	11	11	11	8	7	9	9
9/17	37	15	21	23	30	25	14
9/24	21	12	10	12	14	20	16
10/16	15	8	10	12	11	16	14
11/13	15	9	10	12	9	19	16

ATTACHMENT 3

SDG&E's 2020 Wildfire Mitigation Plan, February 7, 2020, Appendix A, Tables 13 and 14

San Diego Gas & Electric Company

Wildfire Mitigation Plan

February 7, 2020



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Executive Summary

Catastrophic wildfires, driven by the change in climate and resulting extreme winds, have ignited in California with increased frequency and severity in recent years. While not the only source of ignitions, several of the recent wildfires have been attributed to electric utility equipment. San Diego Gas & Electric Company's (SDG&E or Company) top priority is the safety of its customers, communities, and workforce. SDG&E strives to be a leader in California and beyond in the prevention and mitigation of utility wildfires.

SDG&E's wildfire prevention and mitigation activities have been ongoing for more than a decade. In the aftermath of the catastrophic October 2007 wildfires in SDG&E's service territory and across Southern California, SDG&E's management dedicated itself to revamping and enhancing its wildfire prevention and mitigation measures across a wide spectrum of disciplines and activities. Many of the initiatives described in this 2020 Wildfire Mitigation Plan (WMP or Plan), such as fire hardening the overhead electric system, are an outgrowth of the efforts that began after the October 2007 wildfires. And many of those initiatives were undertaken without any precedent or road map for SDG&E to follow.

A prime example is SDG&E's ability to forecast fire danger. SDG&E developed an in-house meteorology team to forecast fire danger and enable the Company to undertake advanced preparations for severe weather events. SDG&E built the first of its kind network of dense, utility-owned weather stations to provide detailed weather data across the service territory, which informs day-to-day operational decision-making at all levels of the company. Additionally – and as a last resort when conditions warrant – SDG&E pioneered the use of de-energization (i.e., Public Safety Power Shutoff or PSPS) to ensure public safety. SDG&E has openly shared its experiences, lessons learned, and technological advancements in weather and wildfire mitigation with other investor-owned utilities, state agencies, and stakeholders in the fire community, with the objective of improving prevention across California.

An effective wildfire mitigation program includes a safe and fire-hardened electrical system that is rigorously inspected and maintained. It also utilizes the latest science and technology to create situational awareness tools that enables the utility to anticipate, prepare for, react to, and recover from extreme conditions. In addition, an effective program requires a culture that prioritizes safety over reliability, and partners with stakeholders in public safety, academia, and the private sector, to form a fire-safe community. Community collaboration and customer outreach are essential.

Accordingly, in recent years, SDG&E's wildfire mitigation programs have fallen into three categories:

- Operations and Engineering: includes actions to build, maintain and operate SDG&E's electric system to be fire safe.
- Situational Awareness and Weather Technology: focuses on SDG&E's ability to monitor and understand the fire environment.
- Customer Outreach and Education: includes SDG&E's communication and collaboration with regional stakeholders and customers.

Today, as a result of its efforts across these three categories, SDG&E is often cited as an industry leader in wildfire prevention and mitigation. In its June 2019 report to the Governor and Legislature, the Commission on Catastrophic Wildfire Cost and Recovery found that SDG&E "is widely recognized as a global leader on utility wildfire practices."[1] Similarly, Governor Newsom's Strike Force stated that "SDG&E engaged in a robust fire mitigation and safety program after experiencing devastating fires in its service territory in 2007 and has become a recognized leader in wildfire safety."[2]

But SDG&E does not intend to stand pat with respect to wildfire safety. Indeed, SDG&E remains committed to and focused on enhancing its wildfire prevention and mitigation. For instance, SDG&E has recently begun to incorporate data science into its vegetation management, developing a Vegetation Risk Index of the highest risk trees in its service territory. SDG&E has also been leveraging the historical weather data collected from its weather network to gain a deeper understanding of the severity of wind speeds in its service territory, particularly the 95th and 99th percentile wind speeds at certain locations. In 2019, SDG&E initiated a drone inspection program to obtain enhanced inspection data concerning its electric system. These and other new initiatives that will take shape over the coming three years (and beyond) are discussed in this 2020 WMP. SDG&E also continues to track its past performance, and the 2020 WMP contains detailed information regarding performance metrics.

[1] Commissioner Peterman, *et al.*, "Final Report of the Commission on Catastrophic Wildfire Cost and Recovery," Appendix II, p. 7 (June 17, 2019).

[2] Governor Newsom's Strike Force, "Wildfires and Climate Change: California's Energy Future," p. 11 (April 12, 2019).

Consistent with the California Public Utilities Commission's (Commission or CPUC) WMP Guidelines,[3] SDG&E has modified the structure of its Plan, organizing the information into the categories listed below:

1. Risk assessment and mapping
2. Situational awareness and forecasting
3. Grid design and system hardening
4. Asset management and inspections
5. Vegetation management and inspections
6. Grid operations and protocols
7. Data governance
8. Resource allocation methodology
9. Emergency planning and preparedness
10. Stakeholder cooperation and community engagement

The initiatives in each of these 10 categories are discussed in detail in this 2020 WMP. A constant element in SDG&E's approach to these initiatives, regardless of category, is continuous improvement in wildfire safety. Such improvement drives company-wide fire-awareness and vigilance of the fire environment, prioritizing safe work practices, and keeping SDG&E's neighbors and communities safe.

[3] Rulemaking (R.) 18-10-007, Administrative Law Judge's Ruling on Wildfire Mitigation Plan Templates and Related Material and Allowing Comment, Attachment 1 – WMP Guidelines (December 16, 2019), as clarified by the Wildfire Safety Division (WSD) on January 15, 2020 and January 27, 2020.

1. Persons Responsible for Executing the WMP

Instructions:[4] *Provide an accounting of the responsibilities of the responsible person(s) executing the plan, including:*

1. *Executive level with overall responsibility*
2. *Program owners specific to each component of the plan*

Ensure that the plan components described in (2) include an accounting for each of the WMP sections and subsections.

Wildfire mitigation at SDG&E is a Company-wide, inter-departmental effort involving resources and programs across utility functions. The Vice President of Electric System Operations is the wildfire risk owner and has primary responsibility for owning, executing, and auditing SDG&E's WMP.

The following table outlines the program owners specific to each component of this Plan.

Table SDG&E 1: WMP Program Owners

WMP Section	Program Owner
Section 1 – Persons Responsible for Executing the WMP	Director of Wildfire Mitigation and Vegetation Management
Section 2.1 – Lessons Learned	Director of Wildfire Mitigation and Vegetation Management
Section 2.2 – Recent Performance on Progress Metrics	Director of Wildfire Mitigation and Vegetation Management
Section 2.3 – Recent Performance on Outcome Metrics	Director of Wildfire Mitigation and Vegetation Management
Section 2.4 – Description of Additional Metrics	Director of Wildfire Mitigation and Vegetation Management
Section 2.5 – Description of Program Targets	Director of Wildfire Mitigation and Vegetation Management
Section 2.6 – Detailed Information Supporting Outcome Metrics	Director of Wildfire Mitigation and Vegetation Management; Director of Safety
Section 2.7 – Mapping Recent, Modelled, and Baseline Conditions	Director of Wildfire Mitigation and Vegetation Management; Director of Asset Management
Section 3.1 – Recent Weather Patterns	Director of Fire Science and Climate Adaptation
Section 3.2 – Recent Drivers of Ignition Probability	Director of Fire Science and Climate Adaptation
Section 3.3 – Recent Use of PSPS	Director of Wildfire Mitigation and Vegetation Management
Section 3.4 – Baseline State of Equipment and Wildfire and PSPS Event Risk Reduction Plans	Director of Wildfire Mitigation and Vegetation Management; Director of Fire Science and Climate Adaptation

[4] Text in green italics are instructions, prompts, and clarifications from the WMP Guidelines.

WMP Section	Program Owner
Section 4.1 – Objectives of the Plan	Director of Wildfire Mitigation and Vegetation Management
Section 4.2 – Understanding Major Trends Impacting Ignition Probability and Wildfire Consequence	Director of Fire Science and Climate Adaptation
Section 4.3 – Change in Ignition Probability Drivers	Director of Fire Science and Climate Adaptation
Section 4.4 – Directional Vision for Necessity of PSPS	Director of Wildfire Mitigation and Vegetation Management
Section 5.1 – Wildfire Mitigation Strategy	Director of Wildfire Mitigation and Vegetation Management
Section 5.2 – Wildfire Mitigation Plan Implementation	Director of Wildfire Mitigation and Vegetation Management
Section 5.3.1 – Risk Assessment and Mapping	Director of Fire Science and Climate Adaptation
Section 5.3.2 – Situational Awareness and Forecasting	Director of Fire Science and Climate Adaptation
Section 5.3.3 – Grid Design and System Hardening	Director of Electrical Engineering;
Section 5.3.4 –Asset Management and Inspections	Director of Asset Management
Section 5.3.5 – Vegetation Management Plan	Director of Wildfire Mitigation and Vegetation Management
Section 5.3.6 – Grid Operations and Protocols	Director of Electric Distribution Operations; Director of Electric Grid Operations
Section 5.3.7 – Data Governance	Director of Wildfire Mitigation and Vegetation Management; Director of Fire Science and Climate Adaptation
Section 5.3.8 – Resource Allocation Methodology	Director of Asset Management
Section 5.3.9 – Emergency Planning and Preparedness	Director of Emergency Management; Director of Customer Operations; Director of Electric Regional Operations
Section 5.3.10 – Stakeholder Cooperation and Community Engagement	Director of Customer Programs; Director of Marketing and Communications; Director of Emergency Management
Section 5.4 – Methodology for Enterprise-Wide Safety Risk and Wildfire-Related Risk Assessment	Director of Risk Management
Section 5.5 – Planning for Workforce and Other Limited Resources	Director of Emergency Management; Director of Customer Operations; Director of Electric Regional Operations
Section 5.6.1 – Planned Utility Infrastructure Construction and Upgrades	Director of Wildfire Mitigation and Vegetation Management
Section 5.6.2 – Protocols on PSPS	Director of Wildfire Mitigation and Vegetation Management
Section 6 – GIS Attachments	Director of Asset Management

1.1. Verification

I am an officer of the applicant corporation herein, and am authorized to make this verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 7, 2020 at San Diego, California.

John D. Jenkins
Vice President – Electric System Operations
San Diego Gas & Electric Company

2. Metrics and Underlying Data

Instructions: *Report performance on the following progress and outcome metrics within the utility's service territory over the past five years. Where a utility does not collect its own data for a given metric, that utility shall work with the relevant sources to collect the information for its service territory, and clearly identify the owner and dataset used to provide the response in "Comments" column.*

Progress metrics, listed below, track how much utility wildfire mitigation activity has managed to change the conditions of utility wildfire risk exposure in terms of drivers of ignition probability.

Outcome metrics measure the performance of a utility and its service territory in terms of both leading and lagging indicators of wildfire risk, PSPS risk, and other direct and indirect consequences of wildfire and PSPS, including the potential unintended consequences of wildfire mitigation work.

In the 2019 WMPs, utilities proposed sets of "program targets" that enable tracking implementation of proposed wildfire mitigation activities against the scope of those activities as laid out in the WMPs but do not track the efficacy of those activities. Utilities shall continue to report program targets, however, the primary use of these will be to gauge follow-through on WMPs while recognizing that some WMP initiatives should be adjusted after plan submittal based on new information and lessons learned.

2.1. Lessons Learned: How Tracking Metrics on the 2019 Plan Has Informed the 2020 Plan

Instructions: *Describe how the utility's plan has evolved since the 2019 WMP submission. Outline any major themes and lessons learned from the 2019 plan and subsequent implementation of the initiatives. In particular, focus on how utility performance against the metrics used has informed the utility's 2020 WMP.*

Since submitting its 2019 WMP, SDG&E's wildfire risk mitigation strategy has continued to evolve. With the increasing impacts from a variety of factors such as climate change, and development and population growth in fire-prone areas, catastrophic wildfires continue to pose a threat throughout California and the San Diego region. SDG&E's 2019 WMP described the Company's wildfire mitigation strategies and programs that have been developed and implemented over the past decade, and it also expressed its commitment for continuous improvement. To this end, SDG&E has identified opportunities to refine and enhance existing programs and implement new ones.

Public Safety Power Shutoff

SDG&E has been utilizing PSPS since 2013 as a measure of last resort to prevent catastrophic wildfires and reduce wildfire risk. Over the past year, California has increased the level of focus on mitigating the impact of PSPS events. California faced severe fire potential weather conditions throughout October 2019. In SDG&E's service territory, there were numerous elevated or extreme fire potential index (FPI) days, and several Red Flag Warnings (RFW) issued by the National Weather Service. As a result, SDG&E impacted approximately 27,700

customers with PSPS events in 2019, affecting less than 2% of SDG&E's overall customer base, and less than 10% of customers within the high fire threat district (HFTD). Although the focus on the fire risk mitigation activities identified in its 2019 WMP continues, SDG&E is developing additional activities with the goal of reducing or eliminating to the extent feasible the impact of PSPS events.

Over the last ten years of wildfire mitigation, SDG&E's transmission system hardening initiatives in the HFTD have helped avoid widespread PSPS events impacting entire substations and therefore larger communities within SDG&E's service territory. To date, on the distribution system, the majority of system hardening work has targeted segments of electric circuits with the highest probability of equipment failure and potential for ignitions. In 2020, SDG&E is refining its approach to system hardening to include the goal of reducing PSPS impacts.

Vegetation and Fuels Management

SDG&E's Vegetation Management Program is an important and effective tool in reducing wildfire risk, as evidenced by the reduced number of trees causing outages and reduced number of tree related ignitions. Since the 2019 WMP, the Vegetation Management Program has evolved to include a vegetation risk index (VRI) and a fuels management program.

SDG&E developed the VRI, which identifies tree-related risk by considering the number of trees, height, species, and number of past outages associated with a segment of electric circuit. This index has been instrumental in identifying areas of risk to determine PSPS action. It was developed by integrating tree inventory metrics with SDG&E Meteorology data to identify species with the potential highest risk of impacting overhead electric infrastructure. Using this data, SDG&E created a circuit-based risk index to identify where additional and priority tree operations may be warranted. The VRI can be used to inform where SDG&E applies its enhanced pruning to achieve a 25-foot clearance or where to perform complete tree removals to reduce wildfire risk. SDG&E tracks and quantifies the number of high-risk species located within the HFTD that have been pruned to the expanded clearance and trees removed. As of January 31, 2020, SDG&E has performed enhanced pruning on approximately 4,800 targeted trees within the HFTD and removed approximately 3,700 trees.

In 2019, SDG&E launched a Fuels Management pilot program in close collaboration with environmental agencies and property owners. This pilot focused on thinning native vegetation, removing non-native and dead vegetation near and around electric power lines. This work was completed in select areas within Tier 3 of the HFTD, in some areas of the Cleveland National Forest, and much of the Bureau of Land Management (BLM) lands in SDG&E's service territory. Prior to any thinning or removal of the vegetation, baseline surveys were conducted by trained biologists to confirm there was no impact to sensitive species. SDG&E plans to continue the Fuels Management pilot program during 2020 and the coming years.

Drone Inspections

SDG&E implemented a new Drone Investigation Assessment and Repair (DIAR) program in 2019. This effort began with using drones to inspect distribution lines in the HFTD Tier 3 areas, resulting in the inspection of over 10,000 poles. This program will continue in 2020 and through 2023 as SDG&E continues to evaluate the impacts to customers and the benefits of the program, including with respect to wildfire risk reduction. SDG&E is leveraging the photos accumulated from this work to explore the potential for machine learning to detect issues on its electric facilities.

Weather Data

Weather data has been a key component of SDG&E's wildfire mitigation plan for over ten years. Wind speeds are a main factor when considering risk due to weather. In 2019, SDG&E began further leveraging the historical weather data collected from its weather network to better inform PSPS decision-making. Specifically, SDG&E used 95th and 99th percentile wind speed statistics to gain a deeper understanding of the severity of wind speeds in its service territory and the critical risk they present to specific electric line segments. The 95th percentile wind speed threshold is used to alert decision makers that only 5% of the historical wind speeds recorded at a particular weather station have exceeded the 95% recorded windspeeds. The same is true for the 99th percentile wind speeds, indicating only 1% of the historical wind speeds ever exceeded the 99th percentile threshold. Through its analysis, SDG&E found that wind speeds that exceeded the 95th and 99th percentile threshold were located in areas with a high exposure to vegetation and have historically caused issues on the circuits. This new analysis tool was successfully used during SDG&E's October 2019 PSPS events. These new metrics have helped inform PSPS decision-makers by providing improved localized wind speed data allowing them to better identify and mitigate the greatest wildfire risks during significant weather events.

Program Target Metrics

Program target metrics continue to be used by SDG&E to track the progress of its 2019 wildfire mitigation activities.[5] These metrics help inform the teams working on the various programs and keep the focus on completing the goals for the year. Progress on system hardening and other wildfire mitigation activities goals for the year help drive fire risk reduction. Where applicable, these progress reports track how much work has been completed for the current year, as well as, progress made toward fire risk reduction over multiple years. This helps to better inform progress of overall fire mitigation.

In some cases, it is more informative for progress reports to track types of infrastructure or equipment in addition to programs. For example, SDG&E reports the number of poles completed, or miles of wires completed by program or by overall HFTD. Therefore, SDG&E's progress reports will sometimes reflect these types of metrics to provide a better indication of risk reduction.

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[5] For program target metrics, please refer Appendix A, Table 4.

The metrics tracked in progress reports also help SDG&E understand how much work remains within its wildfire mitigation program. This provides insight into the amount of time needed to complete the work and provides context around potential risk. For example, the Expulsion Fuse Replacement program plans to replace all the expulsion fuses within the HFTD, over 10,000 fuses. In 2019, this program completed 2,490 fuses, or roughly 25%. To complete this program at the current rate, the projected completion is 2022.

The program progress reports also help inform the amount of resources needed to accomplish the wildfire mitigation work. The number of programs and the number of activities in those programs helps to indicate the materials and human resources required. It is especially informative when comparing between the different years. The program progress reports help to gauge the potential for success in meeting the goals.

2.2. Recent Performance on Progress Metrics, Last 5 Years

Instructions for Table 1:
Report performance on the following metrics within the utility's service territory over the past five years. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in the "Comments" column.

Clarification provided for Table 1:
For Table 1: Recent performance on progress metrics, last 5 years, the utility may calculate the "Percent of data requested in SDR and WMP collected in initial submission" by dividing the total number of cells where the utility provides data in the SDR and the WMP by the total number of cells of data requested in both documents. If any narrative requirements are unmet (e.g., for a list and description), this shall be noted in the adjacent comments

Table 1 (Recent Performance on Progress Metrics, last 5 years) is provided in Appendix A.

2.3. Recent Performance on Outcome Metrics, Annual and Normalized for Weather, Last 5 Years

Instructions for Table 2:
Report performance on the following metrics within the utility's service territory over the past five years. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in "Comments" column.
Provide a list of all types of findings and number of findings per type, in total and in number of findings per circuit mile.

Clarification provided for Table 2:
For Table 2: Recent performance on outcome metrics, last 5 years, Metric 7 "Value of assets destroyed by utility-ignited wildfire, listed by asset type" is intended to capture the dollar value of destruction caused by utility-ignited wildfire in its territory, including both 3rd party assets (including structures) and utility infrastructure. Include the total value of damage to all these assets and explain the sources of the

information used in the comments. The WSD recognizes that this will be an estimate. Each utility is expected to use the best available data in its possession, or accessible via third parties, for its utility-ignited wildfires. Sources and methods shall be cited such that the WSD can understand how the utility determined these summary figures.

For Table 2 Metric 8, "Number of structures destroyed by utility-ignited wildfire," include utility and non-utility (meaning belonging to a third party) structures. The term "structures" is one of the metrics that CAL FIRE already uses to report wildfire damage and refers to buildings (e.g., a dwelling, a place of business, etc.). These numbers shall be provided individually for utility and non-utility structures.

Table 2 (Recent Performance on Outcome Metrics, last 5 years) is provided in Appendix A.

2.4. Description of Additional Metrics

Instructions for Table 3:
In addition to the metrics specified above, list and describe all other metrics the utility uses to evaluate wildfire mitigation performance, the utility's performance on those metrics over the last five years, the units reported, the assumptions that underlie the use of those metrics, and how the performance reported could be validated by third parties outside the utility, such as analysts or academic researchers. Identified metrics must be of enough detail and scope to effectively inform the performance (i.e., reduction in ignition probability or wildfire consequence) of each preventive strategy and program.

Table 3 (List and Description of Additional Metrics, last 5 years) is provided in Appendix A.

2.5. Description of Program Targets

Instructions for Table 4:
In addition to the metrics specified above, list and describe all program targets the electrical corporation uses to track utility WMP implementation, the utility's performance on those metrics over the last five years, the units reported, the assumptions that underlie the use of those metrics, and how the performance reported could be validated by third parties outside the utility, such as analysts or academic researchers. Identified metrics must be of enough detail and scope to effectively inform the performance (i.e., reduction in ignition probability or wildfire consequence) of each preventive strategy and program.

Each program target shall be associated with a percent completeness and based upon the contents of the WMP.

Clarification provided for Table 4:
For Table 4: List and description of program targets, last 5 years, data should be only for 2019. Program Targets are targets for utility wildfire mitigation as expressed in the 2019 WMPs. Given that WMPs were new in 2019, this is only relevant over the past year. The 5-year horizon applies to the progress and outcome metrics.

Table 4 (List and Description of Program Targets, last 5 years) is provided in Appendix A.

2.6. Detailed Information Supporting Outcome Metrics

Instructions for Table 5:
Enclose detailed information as requested for the metrics below. Report numbers of accidental deaths attributed to any utility wildfire mitigation activities, as listed in the utility's 2019 WMP filing or otherwise, according to the type of activity in column one, and by the relationship to the utility, for each of the last five years. For fatalities caused by activities beyond these categories, add rows to specify accordingly. The relationship to the utility statuses of full-time employee, contractor, and member of public are mutually exclusive, such that no individual can be counted in more than one category, nor can any individual fatality be attributed to more than one activity.

Report subtotals calculated for each row and column.

Table 5 (Accidental Deaths Due to Utility Wildfire Mitigation Initiatives, last 5 years) is provided in Appendix A.

Instructions for Table 6:
Report numbers of OSHA-reportable injuries attributed to any utility wildfire mitigation initiatives, as listed in the utility's 2019 WMP filing or otherwise, according to the type of activity in column one, and by the identity of the victim, for each of the last five years. For members of the public, all injuries that meet OSHA-reportable standards of severity (i.e., injury or illness resulting in loss of consciousness or requiring medical treatment beyond first aid) shall be included, even if those incidents are not reported to OSHA due to the identity of the victims.

For OSHA-reportable injuries caused by activities beyond these categories, add rows to specify accordingly. The victim identities listed are mutually exclusive, such that no individual victim can be counted as more than one identity, nor can any individual OSHA-reportable injury be attributed to more than one activity. Report subtotals calculated for each row and column.

Table 6 (OSHA-Reportable Injuries Due to Utility Wildfire Mitigation Initiatives, last 5 years) is provided in Appendix A.

Instructions for Table 7:
Report details on methodology used to calculate or model potential impact of ignitions, including list of all input used in impact simulation; data selection and treatment methodologies; assumptions, including Subject Matter Expert (SME) input; equation(s), functions, or other algorithms used to obtain output; output type(s), e.g., wind speed model; and comments.

Table 7 (Methodology for Potential Impact of Ignitions) is provided in Appendix A.

2.7. Mapping Recent, Modelled, and Baseline Conditions

Instructions for Table 8:
Report underlying data for recent conditions (over the last five years) of the utility service territory in a downloadable shapefile GIS format, to include the following layers of data plotted on the utility service territory map as specified below, at a minimum. Provide information for each year; calculate and provide a five-year average. Name and attach files according to the table below.

Table 8 (Map File Requirements for Recent and Modelled Conditions of Utility Service Territory, last 5 years) is provided in Appendix A.

Instructions for Table 9:
Report underlying data for baseline conditions (projected for 2020) of the utility service territory in a downloadable shapefile GIS format and database, to include the following layers of data plotted on the utility service territory map as specified below, at a minimum. Report more granular resolutions where available (e.g., asset-level instead of by circuit mile).

Clarification provided for Table 9:
Table 9, Part 3 "Planned 2020 WMP initiative activity per year," when there is an estimate where a percentage of some asset type is assumed to need replacement (as part of a planned 2020 WMP activity), the planned replacement shall be included in the GIS file for Appendices 6.5 or 6.6, depending upon whether the asset is represented as a line or a point, for each quarter-mile segment of linear data or for each point location of that asset.

Table 9 (Map File Requirements for Baseline Condition of Utility Service Territory Projected for 2020) is provided in Appendix A.

3. Baseline Ignition Probability and Wildfire Risk Exposure

3.1. Recent Weather Patterns, Last 5 Years

Instructions for Table 10:
Report weather measurements based upon the duration and scope of NWS Red Flag Warnings and upon proprietary Fire Potential Index (or other similar fire risk potential measure) for each year. Calculate and report 5-year historical average. Ensure underlying data is provided per Section 2.7.

Table 10 (Weather Patterns, last 5 years) is provided in Appendix A.

3.2. Recent Drivers of Ignition Probability, Last 5 Years

Instructions for Table 11:
Report recent drivers of ignition probability according to whether or not near misses of that type are tracked, the number of incidents per year (e.g., all instances of animal contact regardless of whether they caused an outage, an ignition, or neither), the rate at which those incidents (e.g., object contact, equipment failure, etc.) cause an ignition in the column, and the number of ignitions that those incidents caused by category, for each of last five years.

Calculate and include 5-year historical averages. This requirement applies to all utilities, not only those required to submit annual ignition data. Any utility that does not have complete 2019 ignition data compiled by the WMP deadline shall indicate in the 2019 columns that said information is incomplete. List additional drivers tracked in the "other" row and add additional rows as needed. Ensure underlying data is provided per Section 2.7.

Clarification provided for Table 11:
Table 11: Key recent drivers of ignition probability, last 5 years, shall be completed for transmission lines and distribution lines separately, submitted as Table 11a and Table 11b, respectively.

With respect to identification of "ignition probability drivers," the rows within Table 11 are illustrative and, as explained in the introductory text, utilities are expected to include all ignition drivers that they track. At a minimum, "ignition probability drivers" shall include all permutations of the "Suspected Initiating Event," including two subsequent columns "Equipment/Facility Failure" and "Contact From Object" columns provided in the fire ignition data template provided on page C-8 of D.14-02-015 and reported annually on April 1. The baseline list of ignition probability drivers shall include all types of equipment, facilities, and objects. This page shall be referenced in lieu of the cited SDR Table 24, which does not exist.

Table 11a (Key Recent Drivers of Ignition Probability, last 5 years for transmission lines) and Table 11b (Key Recent Drivers of Ignition Probability, last 5 years for distribution lines) are provided in Appendix A.

3.3. Recent Use of PSPS, Last 5 Years

Instructions for Table 12:
Report use of PSPS according to the number and duration of PSPS events in total and normalized across weather conditions each year (by dividing by the number of RFW circuit mile days). List additional PSPS characteristics tracked in the "other" row and additional rows as needed.

Table 12 (Recent Use of PSPS, last 5 years) is provided in Appendix A.

3.4. Baseline State of Equipment and Wildfire and PSPS Event Risk Reduction Plans

3.4.1. Current baseline state of service territory and utility equipment

Instructions for Table 13:
Provide summary data for the current baseline state of HFTD and non-HFTD service territory in terms of circuit miles; overhead transmission lines, overhead distribution lines, substations, and critical facilities located within the territory; and customers by type, located in urban versus rural versus highly rural areas and including the subset within the Wildland-Urban Interface (WUI).
The totals of the cells for each category of information (e.g., "circuit miles" or "circuit miles in WUI") would be equal to the overall service territory total (e.g., the total of number of customers in urban, rural, and highly rural areas of HFTD plus those in urban, rural, and highly rural areas of non-HFTD would equal the total number of customers of the entire service territory). Ensure underlying data is provided per Section 2.7.

Table 13 (Current Baseline State of Service Territory and Utility Equipment) is provided in Appendix A.

Instructions for Table 14:
Input summary data on number of utility weather stations located in utility service territory by type.

Table 14 (Summary Data on Weather Station Count) is provided in Appendix A.

Instructions for Table 15:
Input summary data on number of utility fault indicators located in utility service territory by type.

Table 15 (Summary Data on Fault Indicator Count) is provided in Appendix A.

3.4.2. Planned additions, removal, and upgrade of utility equipment by end of three-year Plan term

Instructions for Table 16:
Input summary information for the planned additions or removal of utility equipment to be completed by the end of the 3-year plan term in 2022. Report net additions using positive numbers and net removals and undergrounding using negative numbers for circuit miles and numbers of substations.

Table 16 (Location of Planned Utility Equipment Additions or Removal by End of 3-Year Plan Term) is provided in Appendix A.

Instructions for Table 17:
Referring to the program targets discussed above, report plan for hardening upgrades in detail below. Report plan in terms of number of circuit miles or substations to be upgraded for each year, assuming complete implementation of wildfire mitigation activities, for HFTD and non-HFTD service territory for circuit miles of transmission lines, circuit miles of transmission lines located in Wildland-Urban Interface (WUI), circuit miles of distribution lines, circuit miles of distribution lines in WUI, number of substations, and number of substations in the WUI.

Include a list of the hardening initiatives included in the calculations for the below table.

Table 17 (Location of Planned Utility Infrastructure Upgrades) is provided in Appendix A.

3.4.3. Status quo ignition probability drivers by service territory

Instructions for Table 18:
Report 5-year historical average drivers of ignition probability according to:

- *the average number of incidents per year*
- *the likelihood of ignition per incident, meaning, the rate at which those incidents (e.g., object contact, equipment failure, etc.) would be expected to cause an ignition (e.g., if 50% of vegetation contacts result in ignition, then the value for the "Likelihood of ignition per incident" column would be "50%" in that row); and*
- *the 5-year historical average of the number of ignitions from this driver by location in non-HFTD, HFTD Zone 1, HFTD Tier 2, and HFTD Tier 3. List additional risk drivers tracked in the "other" row and additional rows as needed. If changes would be expected for plan years 2 and 3, describe.*

Clarification provided for Table 18:
Table 11: Key drivers of ignition probability, should be completed for transmission lines and distribution lines separately, submitted as Table 18a and Table 18b, respectively.

Table 18a (Key Drivers of Ignition Probability for transmission lines) and Table 18b (Key Drivers of Ignition Probability for distribution lines) are provided in Appendix A.

4. Inputs to the Plan and Directional Vision for Wildfire Risk Exposure

4.1. Objectives of the Plan

Instructions: *The objectives of the plan shall, at a minimum, be consistent with the requirements of California Public Utilities Code §8386(a). Describe utility WMP objectives, categorized by each of the following timeframes:*

1. *Before the upcoming wildfire season, as defined by the California Department of Forestry and Fire Protection (CAL FIRE),*
2. *Before the next annual update,*
3. *Within the next 3 years, and*
4. *Within the next 10 years.*

In accordance with California Public Utilities Code (P.U. Code) § 8386(a), SDG&E constructs, maintains, and operates its electric system in a manner that minimizes the risk of catastrophic wildfire posed by its electric power lines and equipment. SDG&E's overarching WMP objective is to prevent and mitigate the risk of wildfires caused by utility equipment. Building upon over ten years of wildfire prevention and mitigation work, SDG&E's 2020 WMP continues to focus on reducing wildfire risk. Each year, SDG&E identifies ways to enhance its wildfire prevention and mitigation efforts through enhancing or expanding existing programs and developing and implementing new programs. A description of SDG&E's WMP objectives for each of the specified timeframes is provided below.

Before the upcoming wildfire season
Wildfire season has expanded in recent years. Traditionally, wildfire season took place in the Fall. In more recent years, however, it has arrived earlier and has become a year-long season in some years. SDG&E's long-standing approach to minimizing the risk of its equipment causing catastrophic wildfires involves a three-pronged approach, integrating activities in: (1) Operations and Engineering, (2) Situational Awareness and Weather Technology, and (3) Customer Outreach and Communication. The activities include, among other things, inspections and maintenance; follow up for findings from inspections; operational adjustments on the electric system; proactive system hardening; situational awareness; training; and outreach and education of customers. In preparation for the upcoming 2020 wildfire season, SDG&E is focusing on reducing PSPS impacts by identifying various near-term mitigations, such as installing additional switching capabilities, and expanding its microgrids and customer generator programs to support customers during PSPS events.

Before the next annual update

The annual WMP updates allow for new activities to be identified and added or for existing activities to be modified. In this 2020 WMP, SDG&E has introduced numerous initiatives, which will have better defined scope later in 2020. SDG&E's WMP annual update would include information regarding how such initiatives have been refined since the date of this submittal. A key update to the WMP in 2021 will be the PSPS mitigation activities currently under development. PSPS mitigation is focused on reducing power shutoffs for customers that frequently experience PSPS events. The specific mitigation measures will be updated in the next annual update.

Within the next three years

SDG&E has an established practice of continuously looking for opportunities to improve its wildfire mitigation efforts. The Commission has developed a Utility Wildfire Mitigation Maturity Model (Maturity Model) as a method to assess utility wildfire risk reduction capabilities and examine the relative maturity of the wildfire mitigation programs. The Commission believes that the maturity assessment can be used to drive continuous improvement in utility wildfire mitigation when leveraged with requirements to increase maturity over time. While SDG&E will refer to the Maturity Model as a guide towards improving each area of mitigation, it is important to note that the Maturity Model does not represent an absolute assessment of a utility's ability to mitigate and prevent wildfire. The Maturity Model should be part of an iterative process to improve utility wildfire mitigation and prevention efforts over time. The Maturity Model generally highlights maturity to progress in the areas of further automation, review from external stakeholders, and granularity of the initiatives. Along with other areas of improvement, these will be major areas of progress for many of SDG&E's wildfire initiatives.

Within the next 10 years

The WMP is an opportunity to demonstrate how SDG&E has advanced wildfire mitigation in each of the ten categories identified in the Maturity Model. SDG&E generally agrees that capability advancements should be a major focus in each category, however, the specific direction the Maturity Model seems to indicate for some capabilities should be examined further. For example, fully automated systems to inform utilities regarding the risk associated with each asset from flying debris, vegetation, and weather patterns may seem desirable but may take away from sound judgment based on human experience and on-the-ground intelligence. With this in mind, SDG&E sets forth its general plan for each of the ten categories in the table below.

Table SDG&E 2: SDG&E's 10 Year Vision for Wildfire Risk Mitigation

Category	2023	2030
Risk Assessment and Mapping	• Expansion of the Ignition Management Program • Wildfire Risk Reduction Model Enhancements • Creation of the SDG&E Fire Science and Innovation Lab • Upgrading High-Performance Computing Infrastructure	• Increased granularity in risk assessments • Incorporation of broader range of inputs in risk assessment • Increased automation of risk modeling • More real-time updates of risk models
Situational Awareness and Forecasting	• Integration of weather data into NMS for more automated and real-time operational decision-making • Integration and increased automation of broader datasets such as the Vegetation Risk Index, Circuit Risk Index and historical wind conditions into the PSPS Situational Awareness Dashboard • Enhanced fault detection via wireless fault indicators • Weather network modernization and expansion • Fire Science and Innovation Lab	• Increased scope of reliable weather data and improved processes for validating readings • Increased resolution of weather data across the grid • Increased accuracy of weather forecasts • Increased use of external weather data for validation • Greater automation in fire detection capabilities
Grid Design and System Hardening	• Continuation of overhead fire-hardening infrastructure programs • Increased scope of strategic undergrounding • Expansion of covered conductor installation across the system • Enhanced Advanced Protection capabilities • Private LTE Communication Network • Public Safety Power Shutoff Sectionalizing Enhancements • Expansion of the Generator Grant Program to mitigate PSPS impacts • Expansion of microgrid solutions in the new Backup Power for Resilience Program	• Higher granularity in prioritizing initiatives across the grid • Strategic grid design and localization that includes microgrid solutions and location of lines away from highest risk areas • More redundant grid topology and greater sectionalizing capabilities • Increased investment in ignition-preventing equipment and advanced technologies

Category	2023	2030
Asset Management and Inspections	• Continuation of infrastructure inspections per regulatory requirements while exceeding requirements in certain high-risk areas (Tier 3 of HFTD) • Expanded deployment of enhanced inspection technologies such as Infrared inspections of OH distribution and drone assessments • Deployment of new mobile application to enable field employees to submit circuit vulnerabilities (Circuit Ownership)	• Enhanced data collection of wildfire-related attributes at more granular asset levels with greater frequency • Optimized inspection cycles based on risk mitigation efficacy • Enhanced inspection capabilities to identify high risk assets • More robust processes, training and technologies to monitor and validate work performed
Vegetation Management Plan	• Continuation of tree-trimming program • Continued development of SDG&E's robust tree database • Continued implementation of the vegetation management work plan with enhanced clearances in high risk areas (going above regulatory requirements) • Continued testing and deployment of LIDAR technology to enhance vegetation management • Continued development of the Vegetation Risk Index (VRI) to further support risk-informed optimization of vegetation management efforts • Continuation of pole-brushing activates • Establishment of new Fuels Management program	• Increased granularity in vegetation database • Enhanced modeling capabilities to better predict vegetation growth patterns and probability of failure • Optimized vegetation inspection cycles based on risk mitigation efficacy • Enhanced vegetation inspection capabilities to identify high risk areas • Enhanced understanding of individual vegetation strike potential • More robust processes, training and technologies to monitor and validate work performed
Grid Operations and Protocols	• Continued use of various inputs for operational decision-making such as the Fire Potential Index and the Santa Ana Wildfire Threat Index • Continued use of enhanced recloser protocols with more sensitive relay settings to minimize safety risks and potential fire ignitions • Continued use of special work procedures during high risk conditions	• Increased automation in adjusting grid operations based on risk • Enhanced protocols for grid operations and better understanding of associated wildfire risk • Significant decrease in use of PSPS • Enhanced prediction, communication and mitigation of PSPS consequences • Use of advanced technologies to increase efficiency in post-PSPS inspections • Enhanced training, tools and policies to prevent and suppress ignitions related to grid activities

Category	2023	2030
Data Governance	• Increased collaboration with agency stakeholders to provide data in a timely manner by developing an ESRI Cloud Managed Service infrastructure for controlled sharing of information	• Enhanced data analytics capabilities to process large amounts of data and conduct real-time reporting • Establishment of more comprehensive databases, analyses and algorithms with advanced sharing capabilities • Enhanced tracking of near-misses and increased accuracy in estimating potential ignitions • Increased participation in utility-ignited wildfires research
Resource Allocation Methodology	• Establishment of new organization dedicated to overseeing portfolio of wildfire mitigations • Development of more holistic methodologies to optimize wildfire mitigation investments across the system • More granular assessment of risk across the system to determine most appropriate risk reduction efforts	• Increased granularity in estimating risk reduction potential of wildfire mitigation efforts (risk spend efficiencies) • More real-time updates of risk spend efficiencies • Enhanced methodology and process for portfolio-wide assessment of wildfire mitigations • Established process for evaluating and developing new technologies
Emergency Planning and Preparedness	• Continued maintenance of emergency response plans • Enhanced community outreach • Expansion of Emergency Management Operations to include additional personnel dedicated to enhanced after-action review program, coordination of PSPS events and enhancement of technology solutions to support emergency operations • Continued engagement with local stakeholders to prepare for and respond to fire-related events	• Increased stakeholder engagement and use of simulations to stress-test response plans • Increased granularity and customization of response plans • Enhanced customer communication and ability to reach vulnerable populations during emergencies • Enhanced documentation and use of lessons learned to update plans • More formalized review of procedures, benchmarking and stakeholder engagement
Stakeholder Cooperation and Community Engagement	• Continued community outreach and public awareness efforts with year-round wildfire safety education and communication campaign • Continued deployment of Community Resource Centers (CRCs)	• More formalized processes of learning from peers in and outside the State • More successful engagement with communities • Ability to utilize enhanced partnerships with LEP and AFN populations to reduce impacts of PSPS and wildfire mitigation measures to those populations • Broader engagement and deeper planning with emergency and non-emergency planning agencies

4.2. Understanding Major Trends Impacting Ignition Probability and Wildfire Consequence

Instructions: *Describe how the utility assesses wildfire risk in terms of ignition probability and estimated wildfire consequence, including use of Multi-Attribute Risk Score (MARS) and Multi-Attribute Value Function (MAVF) as in the Safety Model and Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP). Include description of how the utility distinguishes between these risks and the risks to safety and reliability. List and describe each "known local condition" that the utility monitors per GO 95, Rule 31.1, including how the condition is monitored and evaluated.*

Wildfire Risk Assessment

SDG&E assessed its wildfire risk for this WMP consistent with the framework approved in the Safety Model Assessment Proceeding (S-MAP) Decision (D.) 18-12-014 and presented its Risk Assessment Mitigation Phase (RAMP) submission, filed on November 27, 2019 in Investigation (I.) 19-11-011 (2019 RAMP). As discussed in the 2019 RAMP, "[t]he Risk Quantification Framework (or MAVF) is a tool for combining all potential consequences of the occurrence of a risk event to create a measurement of value."[6] SDG&E's Risk Quantification Framework, presented in its 2019 RAMP, utilized three attributes – Safety, Reliability, and Financial. Using these three attributes as well as scales and weights, SDG&E calculated a risk score.[7] At a high level, the risk score is determined based on the frequency of a risk event occurring in a given year (e.g., a wildfire) multiplied by average consequences applied to the Risk Quantification Framework.

For the wildfire risk specifically, SDG&E's risk quantification includes those that meet the CPUC Fire Incident Data Collection requirement for wildfire reporting. A wildfire must be reported if all three of the following criteria are met:

- A self-propagating fire of material other than electrical and/or communication facilities;
- The resulting fire traveled greater than one linear meter from the ignition point; and
- The utility has knowledge that the fire occurred.[8]

Based on this definition, SDG&E uses its data to determine the appropriate risk score. Generally, SDG&E does not categorize its risks in terms of attributes (i.e., a safety or reliability risk). Rather, SDG&E uses all its attributes (and the scales and weights) to determine a risk score for each risk on its Enterprise Risk Registry, wildfire being of them.

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[6] 2019 RAMP (Chapter RAMP-C at RAMP-C-3.)

[7] The risk score SDG&E calculates uses multiple attributes (e.g., safety, reliability), as discussed above. While SDG&E does not use the term "Multi-Attribute Risk Score" or MARS, the concept is applied.

[8] *See* California Public Utilities Commission, 2014-2016 Fire Incident Data Collection, available at https://www.cpuc.ca.gov/fireincidentsdata/.

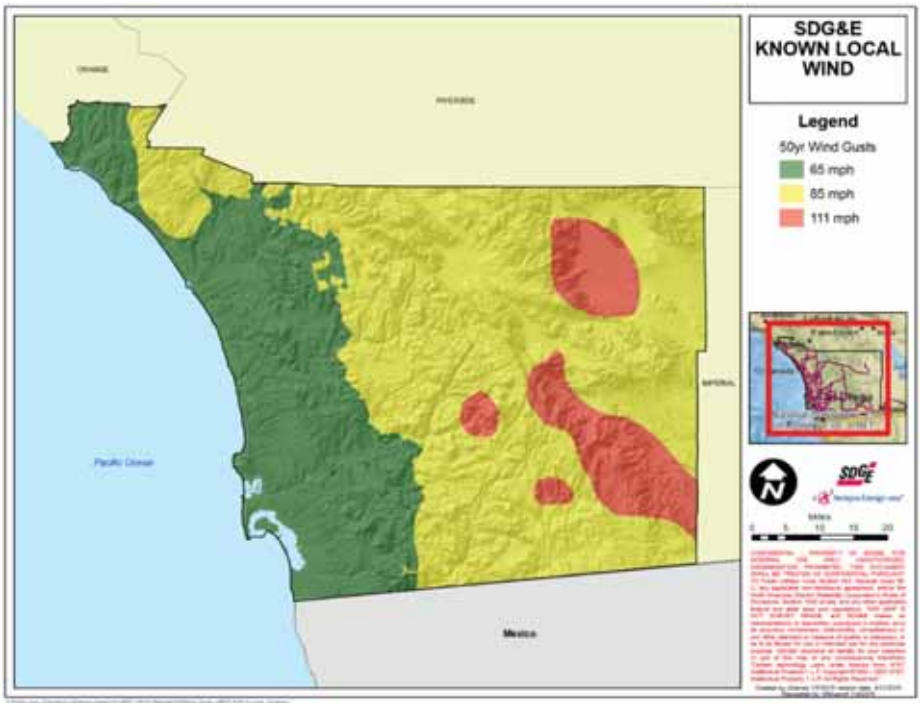
Known Local Conditions

SDG&E leverages its weather network to closely monitor winds throughout its service territory and integrates this information into its local known conditions per Commission General Order (GO) 95, Rule 31.1. SDG&E has also conducted a detailed analysis of potential wind gusts across its service territory to support wildfire hardening efforts. The following explains how these known local conditions were created and evaluated.

In an effort to create the most accurate known local wind conditions map possible, SDG&E's Meteorology department uses a Weather Forecasting and Research (WRF) Atmospheric Model to recreate hourly weather conditions on a 3 kilometer (km) grid for the last 30 years. This is possible through using government datasets to initialize WRF to create what is known as a reanalysis dataset. SDG&E created 30 years of data for a few different purposes. First, data quality degrades beyond 30 years and this was also the extent of the computing power that was available. This reanalysis dataset took approximately 1 million compute core hours on SDG&E's meteorology computing cluster. Once the dataset was created, SDG&E was able to take the highest projected wind gusts for each point on the 3 km grid for each year going back to 1984. This provided a preliminary value, but SDG&E also wanted to add a bias correction to these values based upon the real time data received from the SDG&E Weather Network.

To achieve this, two years of data from every station in SDG&E's weather network was compared to the output from the WRF Model over the same two-year period. This enabled SDG&E to determine model biases for every grid cell on the map, which was then applied to the entire 30-year dataset. Once the full 30 years of bias corrected data was compiled, the 30 years of data was extended to create a 50-year wind. This was achieved by determining the peak wind gusts for each year going back to 1984 and then applying a Generalized Extreme Value Probability Distribution Function (GEV PDF) to the data. This enabled SDG&E's Meteorology team to extend the 30-year wind to a 50-year wind for each grid cell in the map. Once this step was complete, the Meteorology team was then able to conduct analysis on the map to make refinements based upon their subject matter expertise. Having an understanding of the model's tendencies in resolving winds around certain terrain features, the meteorologists were able to refine details of the wind map to bring added value and accuracy to the final version which exists today. The following figure depicts SDG&E's known local wind conditions map as of February 2020.

Figure 1: SDG&E Known Local Wind Conditions Map



In addition:

A. *Describe how the utility monitors and accounts for the contribution of weather to ignition probability and estimated wildfire consequence in its decision-making, including describing any utility-generated Fire Potential Index or other measure (including input variables, equations, the scale or rating system, an explanation of how uncertainties are accounted for, an explanation of how this index is used to inform operational decisions, and an explanation of how trends in index ratings impact medium-term decisions such as maintenance and longer-term decisions such as capital investments, etc.).*

Monitoring Contribution of Weather to Ignition Probability and Estimated Wildfire Consequence

SDG&E focuses on monitoring and understanding the fire environment throughout its service territory and providing specific knowledge for emergency preparedness, emergency response, and risk mitigation efforts across its service territory through situational awareness and development of weather technology, including the continuous development of tools such as the Fire Potential Index (FPI) and Santa Ana Wildfire Threat Index (SAWTI).

The FPI was developed by SDG&E subject matter experts to communicate the wildfire potential on any given day to promote safe and reliable operations. This seven-day forecast product, which is produced daily, classifies the fire potential based on weather and fuels conditions and historical fire occurrences within each of SDG&E's eight operating districts. This is also shared with local fire agencies, emergency responders, and the National Weather Service. The FPI reflects key input variables, such as the state of seasonal grasses across the service territory

(green-up), fuels (ratio of 10-hour dead fuel moisture component to live fuel moisture component), and weather (sustained wind speed and dew point depression). Each of these variables is assigned a numeric value and those individual numeric values are summed to generate a fire potential value from zero (0) to seventeen (17), each of which expresses the degree of fire threat expected for each of the seven days included in the forecast. The numeric values are classified as "normal," "elevated," and "extreme."

The FPI development team, consisting of SDG&E meteorologists and fire coordinators, use a combination of weather stations and external weather data to make accurate fire potential forecasts. The FPI values have been validated by recreating historical values dating back to 2002. The historical results bore a very strong correlation to actual fire events in terms of the severity of past fires. In particular, it provided very accurate information as to when the risks of uncontrolled and large-scale fires were high.

SDG&E expects to tie proactive and reactive operational practices and measures to the FPI values, with the further expectation that SDG&E will be able to reduce the likelihood its facilities and operations will be the source of ignition for a fire during times when the risk of fire as measured by the FPI elevated or extreme. Moving forward, SDG&E will continue enhancing the predictors that contribute to the FPI, including live fuel moisture and green-up, to modernize the data inputs and better leverage the high-performance computing environment.

Fire Potential Index Components

The FPI is comprised of three components (FPI Green-Up, FPI Fuels, FPI Weather), which are computed into a final FPI. These components and the final computation are described below.

FPI Green-Up Component

The state of native grasses, or Green- Up Component, of the FPI is determined using satellite data for various locations. This component is rated on a 0-to-5 scale ranging from very wet (or "lush") to very dry (or "cured"). The scale is tied to the Normalized Difference Vegetation Index (NDVI), which ranges from 0 to 1, as follows:

Very Wet/Lush: 0.65 to 1.00	0.60 to 0.64	0.55 to 0.59	0.50 to 0.54	0.40 to 0.49	Very Dry/Cured 0 to 0.39
0	1	2	3	4	5

FPI Fuels Component

The Fuels Component of the FPI measures the overall state of potential fuels which could support a wildfire. Values are assigned based on the overall state of available fuels (dead or live) for a fire using the following equation: FC = FD / LFM. Where FC represents Fuels Component in the scale below, FD represents 10-hour Dead Fuel Moisture (using a 1-to-3 scale), and LFM represents Live Fuel Moisture (percentage). The product of this equation represents the fuels component that is reflected in the FPI as follows:

Very Wet					Very Dry
1	2	3	4	5	6

FPI Weather Component

The weather component of the FPI represents a combination of sustained wind speeds and dew - point depression as determined using the following scale:

Dewpoint/Wind	≤5 knots	6 to 10	11 to 16	17 to 22	23 to 28	≥29 knots
≥50ºF	4	4	4	5	5	6
40ºF to 49ºF	3	3	4	4	5	5
30ºF to 39ºF	3	3	3	4	4	5
20ºF to 29ºF	3	3	3	3	3	4
10ºF to 19ºF	2	2	2	2	2	3
<10ºF	0	1	1	1	1	2

Final Computed Fire Potential Index

The individual numeric values representing the three variables reflected in the FPI, shown above, are combined and placed on the following scale:

Normal	Elevated	Extreme
≤ 11	12 to 14	≥ 15

SDG&E continually improves the FPI through verification and product enhancement with its team of subject matter experts. In 2020, SDG&E plans to operationalize and release an enhanced version of the FPI which further leverages the analytical capabilities of its high performing computing cluster, incorporating artificial intelligence into the Live Fuel Moisture

Model and adding additional spatial and temporal resolution to the weather components. The figure below provides a view of the updated forecaster interface to generate the enhanced FPI, highlighting forecasting components.

Figure 2: FPI – Updated Forecaster Interface



Fire Potential Index

ME RA EA NE OC NC BC CM

Show Fire Potential JSON:

	Fri (day)	Fri (night)	Sat	Sun	Mon	Tue	Wed	Thu
Max Ws (Avg.)	12.5	15.9	10.0	16.5	13.8	10.2	13.9	11.4
Max Wg (Avg.)	24.3	29.2	18.8	31.4	27.7	20.7	25.5	17.9
Tier 3 Max Wind	10.7	14.2	10.8	18.2	14.4	9.2	11.9	12.0
Max DD (Avg.)	34.9	0.7	35.0	44.3	44.6	32.8	19.9	28.7
Min 10hr DFM	10.7	11.4	13.3	8.9	8.3	24.8	43.5	15.8
Max 10hr DFM	13.8	18.7	30.4	12.8	16.3	59.9	60.0	37.2
Min RH (Avg.)	24.6	97.3	25.4	17.3	17.2	27.8	46.1	30.6
Max RH (Avg.)	97.2	98.5	67.2	29.8	32.1	79.1	98.4	43.5
RH < 3k ft (6am)	98.3	98.3	34.5	17.3	25.8	58.6	97.8	
RH > 3k ft (6am)	98.5	98.5	37.4	21.6	27.1	80.3	86.6	
RH < 3k ft (2pm)	60.8	60.8	56.3	22.1	17.9	50.0	90.8	53.3
RH > 3k ft (2pm)	58.4	58.4	60.8	24.8	20.7	45.1	97.6	35.3
Min 850 RH	7.4	78.7	16.3	8.7	11.3	25.8	37.9	20.4
Max T (Avg.)	53.6	41.7	55.1	58.2	59.7	56.4	50.0	51.4

Additionally, SDG&E, the U. S. Department of Agriculture, the U.S. Forest Service, and the University of California Los Angeles (UCLA), in collaboration with CAL FIRE, the Desert Research Institute, and the National Weather Service unveiled a web-based tool in September 2014 to classify the fire threat potential associated with the Santa Ana winds that are directly linked to the largest and most destructive wildfires in Southern California. The SAWTI categorizes Santa Ana winds based on anticipated fire potential and uses several meteorological and fuel

moisture variables generated from the Weather Research and Forecasting (WRF) Model to forecast the index out to 6 days. In addition to the index, a 30-year climatology of weather and fuels has been developed to help put current and future events into perspective.

The SAWTI calculates the potential for large wildfire activity based on the strength, extent, and duration of the wind, dryness of the air, dryness of the vegetation, and greenness of the grasses. Similar to the hurricane-rating system (category 1-5), the SAWTI compares current environmental data to climatological data and correlates it with historical wildfires to rate the Santa Ana wind event on a scale from "marginal" to "extreme." To help the region prepare for hazardous conditions, information from the SAWTI is issued daily to fire agencies and other first-responders, which has led to specific preparedness and operational decisions based on the likelihood of a catastrophic wildfire fueled by Santa Ana winds. The public also has access to SAWTI to make personal safety decisions.

SDG&E is committed to maintaining the data flow used in SAWTI production for the U.S. Forest Service, which now issues this product daily. As technologies in weather forecasting and fuels predictions evolve, they will be integrated into operations to support the ongoing production of SAWTI.

Additional details on how the Fire Potential Index and Santa Ana Wildfire Threat Index are leveraged in operational decisions is included in detail in Section 5.3.6 below.

B. Describe how the utility monitors and accounts for the contribution of fuel conditions to ignition probability and estimated wildfire consequence in its decision-making, including describing any proprietary fuel condition index (or other measures tracked), the outputs of said index or other measures, and the methodology used for projecting future fuel conditions. Include discussion of measurements and units for live fuel moisture content, dead fuel moisture content, density of each fuel type, and any other variables tracked. Describe the measures and thresholds the utility uses to determine extreme fuel conditions, including what fuel moisture measurements and threshold values the utility considers "extreme" and its strategy for how fuel conditions inform operational decision-making.

Monitoring Contribution of Fuel Conditions to Ignition Probability and Estimated Wildfire Consequence

In addition to the meteorological conditions, the fire potential is also highly dependent on the state of the fuels. Given the complexity of the fuel environment (i.e., fuel type, continuity, loading, etc.), through the development of the SAWTI and FPI, SDG&E worked with the U.S. Forest Service and UCLA to focus more specifically on fuel moisture since that aspect plays a critical role in the spread of wildfires.[9] For the purposes of the FPI and SAWTI, SDG&E has condensed fuel moisture into three parameters: 1) dead fuel moisture, 2) live fuel moisture,

[9] Chuvieco, Emilio, et al. (2004). Combining NDVI and surface temperature for the estimation of live fuel moisture content in forest fire danger rating. Remote Sensing of Environment. 92. 322-331. 10.1016/j.rse.2004.01.019.

and 3) the state of green-up of the annual grasses. Each of these aspects of fuel moisture is complex and is described in detail below and is also published in *The Santa Ana Wildfire Threat Index: Methodology and Operational Implementation*.[10] As part of the development of SDG&E's Fire Potential Modeling, the moisture variables were combined into one term, which is referred to as the fuel moisture component (FMC). While the variables within the FMC often act in concert with each other, there are times when they are out of phase with one another as a result of the variability in precipitation (frequency and amount) that occurs across Southern California during the winter. Through a comprehensive empirical investigation, the governing equation for FMC can be expressed as, or a comparable variation of:

$$\mathrm{FMC} = \left\{0.1\left[\left(\frac{\mathrm{DL}}{\mathrm{LFM}} - 1\right) + G_{\mathrm{ag}}\right]\right\}^{1.7}$$

where DL is the dryness level consisting of the energy release component (ERC) and/or the 10-h dead fuel moisture time lag DFM10hr. Dead fuel refers to nonliving plant material whose moisture content responds only to ambient moisture. Dead fuel is typically grouped into ''time lag'' classes according to diameter as follows: 0.20cm, DFM1hr; 0.64cm, DFM10hr; 2.00cm, DFM100hr; and 6.40cm, DFM1000hr. Live fuel moisture (LFM) is a sampling of the moisture content of the live fuels indigenous to the local region, and G_{ag} is the degree of green-up of the annual grasses. Currently, SDG&E is assuming that all the terms in the FMC have equal weight, but further study may lead to future modifications.

The following describes the components for the FMC in further detail.

Dryness Level (DL)

The DL is a function of ERC and/or DFM10hr calibrated to historical fire occurrence across Southern California with unitless values ranging from 1 to 3. ERC is a relative index of the amount of heat released per unit area in the flaming zone of an initiating fire and is composed of live and dead fuel moisture as well as temperature, humidity, and precipitation.[11] While ERC is a measure of potential energy, it also serves to capture the intermediate- to long-term dryness of the fuels with unitless values generally ranging from 0 to 100 (using NFDRS fuel model G). The DFM10hr, which serves as the primary driver of the dead fuel moisture component in the FPI, represents fuels in which the moisture content is exclusively controlled by environmental conditions.[12] Output values of DFM10hr are in grams per gram expressed as a percentage ranging from 0 to 60. In the case of the DFM10hr, this is the time required for

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[10] Rolinski, T., S. B. Capps, R. G. Fovell, Y. Cao, B. J. D'Agostino, and S. Vanderburg, 2016: The Santa Ana wildfire threat index: Methodology and operational implementation. Wea. Forecasting, 31, 1881–1897, https://doi.org/10.1175/WAF-D-15-0141.1.

[11] Bradshaw, L. S., R. E. Burgan, J. D. Cohen, and J. E. Deeming, 1983: The 1978 National Fire Danger Rating System: Technical documentation. General Tech. Rep. INT-169, Intermountain Forest and Range Experiment Station, U.S. Forest Service, 44 pp.

[12] *See* Bradshaw, et al., above.

dead fuels (0.64–2.54cm in diameter) to lose approximately two-thirds of their initial moisture content.[13] Thus, a DL of 1 indicates that dead fuels are moist, 2 represents average dead fuel dryness, and a 3 indicates that the dead fuels are drier than normal.

Live Fuel Moisture (LFM)

The observed LFM is the moisture content of live fuels (e.g., grasses, shrubs, and trees) expressed as a ratio of the weight of water in the fuel sample to the oven dry weight of the fuel sample.[14] Soil moisture as well as soil and air temperature govern the physiological activity, which results in changes in fuel moisture.[15] LFM is a difficult parameter to evaluate because of the irregularities associated with observed values. For instance, samples of different species of native shrubs are normally taken twice a month by various fire agencies across Southern California and SDG&E has historically provided the responsible fire agencies with the equipment to support this effort. The sample times, however, often differ between agencies, and the equipment used to dry and weigh the samples may vary from place to place.

In addition, sample site locations are irregular in their distribution and observations from these sites may be taken sporadically. This presents a problem when attempting to assess LFM over the SDG&E service territory. Apart from taking fuel samples, there are several ways of estimating LFM using meteorological variables, soil water reserves, solar radiation, etc.[16] In particular, SDG&E developed an approach to modeling the LFM of chamise or greasewood (Adenostoma fasciculatum), a common shrub that grows within the chaparral biome in Southern California and is particularly flammable because of its fine, needlelike leaves and other characteristics.

This strategy makes use of historically observed LFM data from 10 sampling sites across Southern California and soil moisture from the 40–100-cm layer ($SMOIS_{40\text{-}100cm}$) from the North American Land Data Assimilation System, phase 2 (NLDAS-2). At each sampling site, LFM deviations from climatology are predicted using $SMOIS_{40\text{-}100cm}$ departures from its own annual cycle. A key element of the model is the incorporation of a 22-day lag between $SMOIS_{40\text{-}100cm}$ and LFM that improved the model fits. This is because a certain period of time elapses during which water percolates downward through the soil layers and then is drawn back up through the root system of the plant. This time can vary between 4 and 43 days depending on the evaporative conditions, soil structure, and site elevation. An average of this time lag over all the stations equated to 22 days. Current LFM values observed are relatable to gridded NLDAS-2 soil moisture anomalies from about 3 weeks earlier. That approach, although quite skillful, results in site specific equations not easily generalized across Southern California. The SAWTI

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13 *See* Bradshaw, et al., above.

14 Pollet, J., and A. Brown, 2007: Fuel moisture sampling guide. Utah State Office, Bureau of Land Management, Salt Lake City, UT, 32 pp.

15 *See* Pollet and Brown, 2007, above.

16 Castro, F. X., A. Tudela, and M. Sebastiá, 2003: Modeling moisture content in shrubs to predict fire risk in Catalonia (Spain). Agric. For. Meteor., 116, 49–59, doi:https://doi.org/10.1016/S0168-1923(02)00248-4.

index presently makes use of a simplified version of this strategy, applied to all grid points in the domain. For a given day, the model can be expressed as:

$$\mathrm{LFM} = (\mathrm{SMOIS}_{40-100\mathrm{cm}22\mathrm{days}} - \mathrm{SMOIS}_{m}) + 82,$$

where $SMOIS_{40\text{-}100cm22days}$ is the soil moisture of the 40–100-cm layer from 22 days earlier and $SMOIS_m$ is the mean soil moisture from 2009 to 2012 for that same date. The empirically selected constant of 82 roughly approximates the annual mean LFM over a large variety of sites.

In 2019, SDG&E updated the LFM model that is leveraged in the Fire Potential Index, though the Santa Ana Wildfire Threat Index continues to leverage the methodology noted above. The LFM model more recently developed leverages the high-resolution weather data generated by the SDG&E high-performance computing cluster and using an artificial intelligence-based model, correlated the currently weather conditions to that of the past, generating a forecast for LFM across the region on a 2-km grid. Through testing, this methodology has proven more accurate when compared to historically measured values.

Annual Grasses (G_{ag})

Following the onset of significant wetting rains, new grasses will begin to emerge in a process called green-up. While the timing and duration of this process fluctuate from year to year, some degree of green-up usually occurs by December across Southern California. During the green-up phase, grasses will begin to act as a heat sink, thereby preventing new ignitions and/or significantly reducing the rate of spread among new fires. By late spring these grasses begin to cure with the curing phase normally completed by mid-June. G_{ag} is a value that quantifies the said green-up and curing cycles of annual grasses. The value of G_{ag} is observed from the Moderate Resolution Imaging Spectroradiometer (MODIS) Normalized Difference Vegetation Index (NDVI) dataset at a resolution of 250m for select pixels consisting solely of grasslands for input into the FPI and is derived from the same source for the SAWTI. NDVI is further defined by red and near-infrared (NIR) bands in the following equation:

$$\mathrm{NDVI} = \frac{\rho_{\mathrm{NIR}} - \rho_b}{\rho_{\mathrm{NIR}} + \rho_b},$$

where b is the reflectance in band b.[17] It can be shown that NDVI values for Southern California grasslands generally range from about 0.25 to 0.75 for an average rainfall year. There is evidence that NDVI is affected by soil color,[18] which may explain the NDVI differences seen

[17] Clinton, N. E., C. Potter, B. Crabtree, V. Genovese, P. Gross, and P. Gong, 2010: Remote sensing–based time-series analysis of cheatgrass (bromus tectorum L.) phenology. J. Environ. Qual., 39, 955–963, doi:https://doi.org/10.2134/jeq2009.0158.

[18] Elmore, A. J., J. F. Mustard, S. J. Manning, and D. B. Lobell, 2000: Quantifying vegetation change in semiarid environments: Precision and accuracy of spectral mixture analysis and the normalized difference vegetation index. Remote Sens. Environ., 73, 87–102, doi:https://doi.org/10.1016/S0034-4257(00)00100-0.

among the selected Southern California grassland locations. In both the FPI and SAWTI, G_{ag} is given a rating from 0 to 5 based on NDVI data, where 0 is green and 5 is fully cured. When applying the methodology discussed by White et al. (1997) to the general range of Southern California grasslands, green-up is estimated to have occurred when NDVI exceeds 0.50. However, SDG&E has found that this value can be closer to 0.64 for some sites, and therefore NDVI values greater than 0.64 are assigned a value of 0, or green. Furthermore, NDVI values less than or equal to 0.39 are assigned a value of 5. This is because NDVI values are observed to be below 0.39 for all grassland sites during the dry season when grasses are known to be fully cured. A linear relationship exists between NDVI derived values of G_{ag} and fire occurrence in Southern California. For this reason, the transition between green and fully cured (or vice versa) was given a rating of from 1 to 4 in NDVI increments of 0.05. To model NDVI, SDG&E used MODIS-derived NDVI biweekly data observed at 21 stations across Southern California, interpolated to daily frequency using cubic splines. The data availability period was January 2004–June 2012. For ease of implementation, the goal was to create a simple, yet skillful equation to capture the temporal variation of NDVI:

$$\mathrm{NDVI} = \alpha + \beta_1 \cos(2\pi \mathrm{DOY/LOY}) + \beta_2 \mathrm{PRECIP}_{\mathrm{accum}} + \beta_3 \mathrm{RH}_{\mathrm{avg}} + \beta_4 \mathrm{VEG}_{\mathrm{frac}} + \beta_5 \mathrm{SMOIS}_{40-100\mathrm{cm}},$$

where DOY is the 1 January–based day of the year and LOY is the length of the year in days. The regressor $\mathrm{PRECIP}_{\mathrm{accum}}$ is the 1 September–based annually accumulated precipitation (mm), $\mathrm{RH}_{\mathrm{avg}}$ is the 30-day running averaged relative humidity, $\mathrm{VEG}_{\mathrm{frac}}$ is the surface vegetation fraction (0–1), and $\mathrm{SMOIS}_{40\text{-}100\mathrm{cm}}$ is the soil moisture content of the 40–100-cm depth (kgm^{-3}). This equation was the result of the ''random forest'' selection and stepwise regression applied to a large number of meteorological candidate regressors.[19] However, considering the fact that this is a simple universal model with only five regressors applied across Southern California, SDG&E believes it has shown adequate skill overall.[20]

In 2020, SDG&E is planning to further develop the G_{ag} layer that is currently integrated into the FPI. Like the LFM, SDG&E will leverage the high-resolution weather data generated by the SDG&E high-performance computing cluster and, using an artificial intelligence-based model, correlate the current weather conditions to that of the past, generating a forecast for G_{ag} across the region on a 2-km grid.

When SDG&E determines whether fuel conditions are at extreme levels, historical analysis of wildfire conditions are leveraged to determine potential wildfire behavior. Detailed analysis has been conducted through the creation of the FPI and the SAWTI analyzing wildfire behavior under each rating. This information is used to determine the potential for the fuels to contribute to extreme wildfire behavior when preparing for an approaching Santa Ana Wind event.

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19 Cao, Y., 2015: The Santa Ana winds of Southern California in the context of fire weather. Ph.D. thesis, University of California, Los Angeles, 172 pp.

20 *See* Cao, 2015, above.

4.2.1. Service territory fire-threat evaluation and ignition risk trends

Instructions: *Discuss fire-threat evaluation of the service territory to determine whether an expanded High Fire Threat District (HFTD) is warranted (i.e., beyond existing Tier 2 and Tier 3 areas). This section shall include a discussion of any fire threat assessment of its service territory performed by the electrical corporation. In the event that the electrical corporation's assessment determines the fire threat rating for any part of its service territory is insufficient (i.e., the actual fire threat is greater than what is indicated in the CPUC Fire Threat Map and High Fire Threat District designations), the corporation shall identify those areas for consideration of HFTD modification, based on the new information or environmental changes. To the extent this identification relies upon a meteorological or climatological study, a thorough explanation and copy of the study shall be included.*

SDG&E historically identified geographic boundaries that were used for wildfire projects, programs, and operations. In 2008, the CPUC initiated a proceeding that focused on the creation of new statewide fire safety maps.[21] SDG&E participated in these proceedings, which led to the development of what would become known as the HFTD map.[22] The geographic areas delineated by that map allow utilities to prioritize their efforts. The CPUC hosts a webpage that communicates the purpose of the HFTD development and that serves as the official repository of the actual map data.[23]

Since the adoption of those maps by the CPUC in early 2018, SDG&E has modified relevant operational practices to be consistent with the new maps. State law requires each utility to re-evaluate its service territory and identify areas that may pose elevated risk that are not currently identified in the CPUC's existing fire threat map, and where the CPUC should consider expanding the HFTD based on new information or changes in the environment.[24] SDG&E has identified certain wildland urban interface (WUI) and coastal areas that possess higher amounts of native and non-native vegetation, which under certain circumstance, could contribute to a wildfire if an ignition took place under extreme weather conditions. SDG&E continues to assess these areas using historic fire behavior and predictive modeling to determine if these areas warrant inclusion in the HFTD.

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21 R.08-11-005 and R.15-05-006.

22 The CPUC led the development of a statewide fire threat map to designate areas where there is an elevated risk for powerline fires, and where enhanced fire safety regulations would apply. The CPUC fire map, which depicts the HFTD is available here: https://ia.cpuc.ca.gov/firemap/. These high fire threat areas are referred to the HFTD. Tier 2 fire threat areas depict areas where there is an elevated risk (including likelihood and potential impacts on people and property) from utility associated wildfires. Tier 3 fire threat areas depict areas where there is an extreme risk (including likelihood and potential impacts on people and property) from utility associated wildfires. SDG&E implemented the HFTD as required by D.17-12-024. Tiers 2 and 3 of the HFTD are roughly analogous to and replace SDG&E's Fire Threat Zone (FTZ) and High Fire Threat Area (HFRA), respectively.

23 http://www.cpuc.ca.gov/firethreatmaps/

24 P.U. Code § 8386(c)(14).

Instructions for Table 19:
In the "Rank" column, numerically rank the trends anticipated to exhibit the greatest change and have the greatest impact on ignition probability and estimated wildfire consequence (be it to increase or decrease ignition probability and estimated wildfire consequence) in ten years. Rank in order from 1 to 8, where 1 represents the greatest anticipated change or impact on ignition probability and estimated wildfire consequence and 8 is the least anticipated change or impact.

In the "Comments" column, provide a narrative to describe the expected change and expected impact on the utility's network, including whether the trend is expected to significantly increase risk, moderately increase risk, have limited or no impact, moderately decrease risk, or significantly decrease risk. Use quantitative estimates wherever possible. Also outline any programs being implemented to specifically address this trend.

Clarification provided for Table 19:
For Table 19, rows 4-6, the intent is to understand the utility's perspective on how changes in the characteristics and distribution of population that could be impacted by utility ignition will increase or decrease risk, in terms of ignition probability and estimated wildfire consequence given the long-lasting investments in utility infrastructure. This shall be based on the utility's projection for how its service territory will evolve over time. For example, if the utility expects the population in the WUI areas of its service territory (as reported in the appendices) to increase substantially, the consequences of potential wildfires in those areas would increase in terms of community impact.

Table 19 (Macro Trends Impacting Ignition Probability and/or Wildfire Consequence) is provided in Appendix A.

List and describe any additional macro trends impacting ignition probability and estimated wildfire consequence within utility service territory, including trends within the control of the utility, trends within the utility's ability to influence, and externalities (i.e., trends beyond the utility's control, such as population changes within the utility's territory).

Table 19 provides a comprehensive list of macro trends that impact ignition probability and the resulting possibility of wildfires. Climate change impacts are the most significant macro trend, showing that ignitions are resulting in larger and more destructive wildfire across the state. Another macro trend noted in Table 19 is the amount of utility infrastructure in high fire risk areas and population changes in the WUI and HFTD. These related trends increase the probability of ignition and the potential wildfire consequence. With respect to the macro trend of wildfire consequence within the SDG&E's service territory, most significant trends of wildfire consequence are related to the wildfire environment and climate change, coupled with increased population and the resulting structures encroaching into the wildland urban interface. SDG&E is working to mitigate the impacts of these macro trends though enhanced weather technology and situational awareness, aggressive system hardening and community outreach and education, as described in this WMP.

SDG&E identified additional potential ignition drivers in its 2019 RAMP filing, which are listed and discussed in greater detail in the section below.

List and describe all relevant drivers of ignition probability and estimated wildfire consequences and the mitigations that are identified in the Risk Assessment Mitigation Phase (RAMP) and not included in the above, including how these are expected to evolve. Rank these drivers from highest to lowest risk and describe how they are expected to evolve.

The following is a list of relevant drivers of ignition probability and estimated wildfire consequences, which were identified in SDG&E's 2019 RAMP (and not included in Table 19 above), including how these drivers are expected to evolve, ranked from highest to lowest.

- **Contact by Foreign Object:** Foreign objects coming into contact with SDG&E's facilities can present sources of ignition. For example, Mylar balloons are highly conductive and can cause phase-to-phase faulting, on contact. In the worst-case, this can cause the conductor to fail and land in an energized mode, causing arcing and sparking in dry conditions. In addition, vehicular contact can bring down conductors, and sometimes the entire pole, resulting in conductors laying on the ground in an energized mode. Mitigating third party and foreign object contacts is largely out of the control of SDG&E, though in the highest risk fire areas this is being addressed though hardening efforts including strategic undergrounding and the installation of covered conductor.

- **Downed Conductor:** A downed conductor (or "wire down") occurs when a conductor drops or breaks from its designed location on a pole and cross arm and ends up on the ground, sometimes in an energized mode. A wire down can result from a variety of factors, many of which are outside of SDG&E's control. SDG&E has implemented a system hardening program targeting the wire most prone to potential wire down events to decrease this risk.

- **Vegetation Contact:** During storms and severe wind events, branches are shed by trees in the vicinity of SDG&E facilities. These can fall on conductors, leading to conductor failure or, in the case of palm fronds, phase-to-phase contact and a cascade of sparks. In addition, trees that are many feet away from an energized conductor sometimes uproot and fall on the conductor, causing failure or sparking. SDG&E has been expanding upon already aggressive vegetation management practices, leveraging data to support strategic clearance increases in high risk areas.

- **Failure of Third-Party Attachments:** As mandated by the CPUC, SDG&E must allow communication infrastructure providers to attach to utility poles when space is available. These providers may not properly install or inspect their equipment. This has led to contact of these attachments with the electrical facilities, leading to fire-related incidents. SDG&E has implemented an aggressive pole loading program and increased collaboration with telecommunication companies.

- **Lack of Internal or External Coordinated Response:** A well-coordinated response to a downed conductor aids in the suppression of a fire as well as the de-energization of the conductor in a safe manner. Lack of coordination could lead to uncontrolled fire,

electrical exposure to first responders, and possibly injury or death. SDG&E continues to formalize its emergency preparedness and response and expand collaboration with first responders as a mitigation.

- **Not Observing Operational Procedures:** SDG&E revises its operational protocols and procedures based on certain conditions. For example, during fire weather watch or red flag warnings, SDG&E and its contractors may not perform welding or other activities that may generate potential ignition sources. If an employee or contractor does not adhere to the operational procedure, it may cause an adverse consequence. As a mitigation, SDG&E conducts comprehensive trainings and exercises annually to practice procedures related to wildfire mitigations.

4.3. Change in Ignition Probability Drivers

Instructions: *Based on the implementation of the above wildfire mitigation initiatives, explain how the utility sees its ignition probability drivers evolving over the 3 year term of the WMP. Focus on ignition probability and estimated wildfire consequence reduction by ignition probability driver, detailed risk driver, and include a description of how the utility expects to see incidents evolve over the same period, both in total number (of occurrence of a given incident type, whether resulting in a near miss or in an ignition) and in likelihood of causing an ignition by type. Outline methodology for determining ignition probability from events, including data used to determine likelihood of ignition probability, such as past ignition events, number of near misses, and description of events (including vegetation and equipment condition).*

Wildfire mitigation activities begin with assessing the three elements that a fire needs to burn: heat, oxygen, and fuel. To mitigate the risk of ignition and the consequence of ignition, a wildfire mitigation activity must address or enable an educated decision addressing one or more of those elements. All of SDG&E's WMP programs work to address these elements. The fire landscape and threats to customers within SDG&E's service territory are dynamic, and as a result, SDG&E's WMP programs will continue to evolve to remain effective.

The latest fire science forecasts trend towards the continuation of warmer and dryer conditions, which results in a macro trend of fuels being more receptive to ignition and fire growth. If not mitigated, this trend is likely to lead to an increase in ignition from all sources. SDG&E's wildfire mitigation initiatives attempt to address both the likelihood of an ignition and reduction of the consequences of an ignition should one occur. Over the next three years, SDG&E intends to use data gathered through its mitigation initiatives to identify increased areas of risk and educate mitigation activities.

Over the past five years in SDG&E's service territory, the two primary groups of ignition drivers that impact the ignition probability and the consequence of ignition are contact from an outside force on utility infrastructure and equipment failure. Outside forces leading to ignitions comprise items ranging from vegetation to flying patio umbrellas. Electric equipment also has a wide range of ignition sources. Both the ignition probability and the consequence of a fire are impacted by the fuel loading near the ignition point.

To reduce the probability of equipment failure leading to an ignition, SDG&E has, over the past decade, focused on hardening its electric system with programs like FiRM and CNF. Recently, these system hardening efforts expanded to include the replacement of hotline clamps, expulsion fuses, and SCADA capacitors. SDG&E monitors for new emerging ignition concerns using its Ignition Management Program. In addition to all these mitigation activities SDG&E has developed, maintained, and continues to expand its extensive Vegetation Management Program, which inspects and maintains clearances between electric facilities and vegetation. SDG&E also partners with fire agencies, community groups, and landowners to implement fuels management projects in areas that will reduce the likelihood of an ignition becoming a wildfire.

4.4. Directional Vision for Necessity of PSPS

Instructions: *Describe any lessons learned from PSPS since the utility's last WMP submission and expectations for how the utility's PSPS program will evolve over the coming 1, 3, and 10 years. Be specific by including a description of the utility's protocols and thresholds for PSPS implementation. Include a quantitative description of how the circuits and numbers of customers that the utility expects will be impacted by any necessary PSPS events is expected to evolve over time. The description of protocols must be sufficiently detailed and clear to enable a skilled operator to follow the same protocols.*

When calculating anticipated PSPS, consider recent weather extremes, including peak weather conditions over the past 10 years as well as recent weather years and how the utility's current PSPS protocols would be applied to those years.

Safety is SDG&E's top priority and drives its wildfire mitigation efforts. To that end, SDG&E continuously evaluates its wildfire risk management efforts to identify new ways to further mitigate risks and opportunities for improving its overall approach to wildfire mitigation.

SDG&E takes great pride in the reliable service it provides to its customers. SDG&E also has an obligation to operate its system safely. This obligation requires SDG&E to de-energize circuits (i.e., turn off power) when necessary to protect public safety (PSPS). SDG&E is statutorily authorized to do so under P.U. Code §§ 399.2(a) and 451. Further, the Commission has recognized this authority and provided PSPS guidance in D.12-04-024, Commission Resolution ESRB-8, and D.19-05-042. Any decision to de-energize circuits for public safety involves SDG&E's Emergency Operations Center (EOC), Meteorology, Electric System Operations leadership, and field observers.

At its inception, PSPS was identified as a core element of SDG&E's approach to preventing and mitigating wildfire, and this element goes hand-in-hand with the Company's investments in system hardening efforts. SDG&E's system hardening efforts focus on mitigating the failure of SDG&E equipment and building the Company's infrastructure to withstand extreme conditions. PSPS mitigates the risk of debris contacting electric infrastructure during such conditions and causing a wildfire.

SDG&E's utilization of PSPS as a measure of last resort to reduce wildfire risk has evolved significantly over time. In October 2013, SDG&E was in the second year of leveraging its newly operationalized FPI. During the first week of the month, SDG&E was tracking an approaching Santa Ana Wind event which was forecast to be a "16 Extreme" rating based on FPI, the highest rating since the tool had been created. The forecast was verified and SDG&E de-energized a portion of a circuit in unincorporated areas of San Diego County that were experiencing winds above the design limits of the system. There were no utility ignited wildfires during that event, though there was a rapidly growing wildfire that developed in the northwestern portions of SDG&E's service territory referred to as the Deluz Fire. SDG&E spent the following years working closely with academia and the fire agencies, refining its weather models, expanding its weather network, and creating the Santa Ana Wildfire Threat Index. During this time, SDG&E was also developing the initial iterations of its Wildfire Risk Reduction Model to help support future PSPS decision making.

In May 2014, during a time that San Diego is traditionally not climatologically prone to large wildfire, SDG&E implemented what became its largest PSPS to date at that time. A very unusual weather pattern occurred during the second week in May 2014, resulting in temperatures over 100 degrees across the coastal regions of San Diego for several days. This heat wave followed a winter with near record low precipitation. These factors combined with abnormally strong Santa Ana conditions across the San Diego region. SDG&E proactively shut off several areas experiencing winds above the design limits of the electric system. There were no utility caused wildfires during this event, though several large fires erupted in San Diego County.

In December 2017, SDG&E experienced the strongest and most widespread Santa Ana Wind event since the development of its weather network. During this event, there were occurrences of near-misses, where vegetation and other flying debris impacted the electric system, initiating faults at wind speeds below the design criteria of the electric system. Fortunately, none of these faults led to ignitions under the extreme weather conditions. This event served as a catalyst for SDG&E's subject matter experts to take a close look at historical wind speeds and ultimately calculate the 95th and 99th percentile wind speeds for each of its weather stations. Through this work, SDG&E found that there was a wide variation in the 95th and 99th percentile winds across its service territory. Of note, SDG&E learned that all near misses and wind driven faults on its electric system were associated with these high percentiles. This analysis lead to the integration of 95th and 99th percentile wind information as a consideration when determining if PSPS is warranted for a particular circuit or sub circuit.

In 2019, SDG&E's meteorologists, arborists, and data scientists – in an effort to further refine its analytical approach to safely operating the electric system during PSPS – started the process of analyzing all 465,000 trees tracked annually by SDG&E. The result of this analysis was the development and implementation of a Vegetation Risk Index (VRI). Through GIS-based spatial analysis, this new tool considers how many trees have the potential to impact power lines, including the species and height of these trees. This information is combined with outage history, to create a risk index for each circuit/sub-circuit SDG&E operates. This information is

also developed to help inform and determine if a PSPS is warranted for a particular circuit or sub circuit.

The development of the 95th and 99th percentile winds alongside the development of the VRI has significantly increased SDG&E's understanding of risk during extreme weather events. In 2019 SDG&E implemented PSPS using the new tools developed and discovered the net impact is double-edged. From a risk reduction perspective, it was a major success, with no ignitions of consequence and reduced near misses in areas of consequence which is an improvement over SDG&E's 2017 performance. But the new criteria expanded the customers impacted by PSPS to approximately 27,700, SDG&E's largest single PSPS event to date, although still affecting less than 2% of SDG&E's overall customer base, and less than 10% of customers within the HFTD. Going forward, SDG&E will use the lessons learned from the October 2019 PSPS events to develop new strategies with the intent of reducing both wildfire risk and PSPS impacts.

SDG&E considers a wide variety of inputs to determine whether to de-energize portions of its system. SDG&E leverages a multitude of situational awareness data and input from its subject matter experts when considering the need for a PSPS event, though experience with this program has indicated that it is not appropriate to use a prescriptive technique to determine when to use PSPS as wildfire conditions are dynamic and not every situation is the same. In determining whether to employ a PSPS in a given area of its system, SDG&E considers a variety of factors such as:

- Weather conditions
- Vegetation conditions and Vegetation Risk Index
- Field observations and flying/falling debris
- Information from first responders
- Meteorology, including 10 years of history, 99th and 95th percentile winds
- Expected duration of conditions
- Location of any existing fires
- Wildfire activity in other parts of the state affecting resource availability
- Information on temporary construction

Utility operating experience is required to analyze all the various inputs and make the decision on how to manage risk to the communities affected.

As discussed above, over the last few years SDG&E has continued to integrate lessons learned into its PSPS protocols including an understanding of specific climatology in SDG&E's PSPS regions as it relates to possible impacts to the system during RFW/Extreme conditions. SDG&E has seen more significant impacts as a specific region reaches its top wind speeds (i.e., 95th and 99th percentile) and has incorporated that into its PSPS protocols as of the 2019 fire season.

Since PSPS continues to be a key component of the Company's wildfire risk management, SDG&E is examining areas with a high probability to be impacted by PSPS during fire prone

conditions with the intention of reducing the impacts of PSPS to customers. To that end, SDG&E recently formed a dedicated team of internal experts with a diverse background in engineering, meteorology, and risk management to examine the Company's infrastructure in the areas of highest wildfire risk, with the objective of identifying short and long-term strategies to minimize both wildfire risk and the customer impacts of PSPS. The team's analysis will incorporate a variety of risk factors including tree strike potential, customer density, ingress/egress issues, and critical infrastructure among other factors to identify the most appropriate portfolio of mitigations across the high wildfire risk areas. The portfolio of mitigations that the team is looking at scoping includes but is not limited to:

- Strategic undergrounding
- Overhead system hardening, including:
  - Expanded use of covered conductors
  - Additional sectionalizing or circuit reconfigurations
  - Falling conductor protection
- Enhanced vegetation management
- Fuels management
- Providing backup generation either in the form of individual customer generators or microgrid solutions

As the team conducts its assessment and scopes these various mitigation options, the scope of other programs within this WMP will likely be adjusted to balance short and long-term strategies for mitigating wildfire risk. In addition to this team's effort to identify engineering solutions to PSPS impacts, SDG&E formed another team to focus on identifying and establishing customer programs to support the reduction of PSPS impacts. This second team will focus on customer outreach efforts, obtaining feedback from communities, standing up broader grant generator programs among other efforts that focus on mitigating overall customer impacts.

Instructions for Table 20:
Rank order the characteristic of PSPS events (in terms of numbers of customers affected, frequency, scope, and duration) anticipated to change the most and have the greatest impact on reliability (be it to increase or decrease) over the next ten years. Rank in order from 1 to 9, where 1 means greatest anticipated change or impact and 9 means minimal change or impact on ignition probability and estimated wildfire consequence. To the right of the ranked magnitude of impact, indicate whether the impact is to significantly increase reliability, moderately increase reliability, have limited or no impact, moderately decrease reliability, or significantly decrease reliability. For each, include comments describing expected change and expected impact, using quantitative estimates wherever possible.

Table 20 – Anticipated Characteristics of PSPS Use Over Next 10 Years is provided in Appendix A.

5. Wildfire Mitigation Strategy and Programs for 2019 and For Each Year of the Three-Year WMP Term

5.1. Wildfire Mitigation Strategy

Describe organization-wide wildfire mitigation strategy and goals for each of the following time periods:

1. *Before the upcoming wildfire season, as defined by the California Department of Forestry and Fire Protection (CAL FIRE),*
2. *Before the next annual update,*
3. *Within the next 3 years, and*
4. *Within the next 10 years.*

Please refer to Section 4.1 above for a description of SDG&E's overall wildfire mitigation strategy and goals for: before the 2020 wildfire season, before the next annual update, within the next three years, and within the next 10 years.

The description of utility wildfire mitigation strategy shall:

A. *Discuss the utility's approach to determining how to manage wildfire risk (in terms of ignition probability and estimated wildfire consequence) as distinct from managing risks to safety and/or reliability. Describe how this determination is made both for (1) the types of activities needed and (2) the extent of those activities needed to mitigate these two different groups of risks. Describe to what degree the activities needed to manage wildfire risk may be incremental to those needed to address safety and/or reliability risks.*

Determining How to Manage Wildfire Risk

Over the years, SDG&E has fostered a safety culture where wildfire mitigation activities are a prominent focus. Wildfire is the top risk in SDG&E's Enterprise Risk Management assessment. As such, SDG&E's wildfire prevention and mitigation activities are a key component in keeping customers, employees and communities safe. Generally, wildfire mitigation activities are focused on electrical assets which have the potential to cause fires as opposed to those causing a safety or reliability issue unrelated to wildfires. Improved reliability is often a collateral benefit of wildfire mitigation work because the system hardening, fire science, and weather technology prevent more forced outages.

In order to reduce the risk of catastrophic wildfires caused by its electric power lines, SDG&E's mitigation activities encompass infrastructure hardening, undergrounding, vegetation management, fuels management, inspections and patrols focused on high risk fire areas, and customer outreach and education, in conjunction with leveraging the fire science and weather technology SDG&E has developed since 2007.

SDG&E's wildfire mitigation activities are focused mostly within the HFTD and WUI and are often complimentary to the activities associated with safety and reliability outside of HFTD. Some of these activities include increased inspections; infrastructure hardening; undergrounding; operational measures such as patrols prior to RFW days; post PSPS patrols

prior to restoration of outages; additional vegetation management inspections as well as increased clearance of tree pruning.

SDG&E's situational awareness related activities are also mostly focused in the HFTD and WUI. These activities include: forecasting weather; monitoring the wind, fuel, and relative humidity to understand the wildfire risk; monitoring fire cameras; and collaborating with the National Weather Service and others. SDG&E's public outreach and collaboration with its public service partners are another aspect where the activities in the HFTD and WUI are different. Each year, SDG&E spends much time organizing and conducting community outreach and education events to better prepare customers for PSPS events and raise awareness of wildfire risk. Throughout the year, SDG&E diligently works to strengthen collaboration with its public service partners and to determine additional ways to its support customers. The wildfire mitigation measures mentioned here are designed to reduce the risk of ignition and wildfire consequence.

Wildfire mitigation related activities are quite separate from activities outside this scope. Much of SDG&E's safety and reliability related work outside the HFTD is very important and contributes greatly to the Company's mission, however, it has a different focus. For example, SDG&E's outreach and communication with customers is focused on customer satisfaction and mitigating the impacts of outages. Outside the HFTD and WUI, system upgrades are not driven by wildfire risk but are driven by improving the impacts of outages to customers and reducing risk not related to wildfires. An example of an activity is the underground cable replacement program SDG&E runs every year to improve reliability for customers. Over the years, the situational awareness of weather impacts outside HFTD has increased and is monitored for any potential weather impacts especially when forecasted. There are fewer weather stations outside the HFTD and WUI areas as the weather severity is much reduced in those areas.

B. Include a summary of what major investments and implementation of wildfire mitigation initiatives achieved over the past year, any lessons learned, any changed circumstances for the 2020 WMP term (i.e., 2020-2022), and any corresponding adjustment in priorities for the upcoming plan term. Organize summaries of initiatives by the wildfire mitigation categories listed in Section 5.3.

Summary of Major Investments and Implementation of Wildfire Mitigation Initiatives
In the years following the 2007 wildfires in Southern California, SDG&E has made significant investments to address its wildfire risk. As discussed throughout this WMP, these investments have resulted in a number of advancements in the categories of mitigation efforts. The following summarizes the major investments and implementation of wildfire mitigation initiatives achieved over the past year and notes priorities for the upcoming Plan term.

1. **Risk assessment and mapping**
   The Operational Wildfire Risk Reduction Model (WRRM-Ops) was leveraged heavily in 2019 to inform operational decision-making by providing a better understanding of ignition probability and estimations of wildfire consequences along electric lines and equipment. SDG&E plans to further update and evolve the WRRM-Ops platform into a

single visual and configurable live map that can be used to help make operational decisions, including with respect to Public Safety Power Shutoff.

2. **Situational awareness and forecasting**
   Utilization of situational awareness tools such as weather stations, cameras, wireless fault indicators, and the Fire Potential Index have proven beneficial to system planning, emergency operations, and the safe implementation of PSPS. Based on these successes, SDG&E situational awareness networks will be expanded into areas where they can be used to minimize the impacts of PSPS and make communities safer.

3. **Grid design and system hardening**
   In 2019, SDG&E's hardened approximately 150 miles of distribution overhead, 11 miles of distribution underground, 10 miles of transmission overhead, as well as replaced approximately 2,500 fuses, 660 hotline clamps, and provided 65 medical baseline customers on life support with backup generators. In 2020, SDG&E is refining the focus of its system hardening efforts to include reducing the customer impacts of PSPS events. SDG&E's PSPS Mitigation Engineering team will perform a segment-by-segment analysis of circuits prone to PSPS, to identify the highest risk areas within the circuit to apply specific mitigation efforts that can reduce the impacts of shutoffs. This strategy will result in an increase in mitigation strategies such as: strategic undergrounding; overhead system hardening such as covered conductors, sectionalizing or circuit reconfigurations; enhanced vegetation management, and fuels management; and backup generators and microgrid solutions. Previous hardening efforts such as high-risk asset replacement will continue in parallel but will be completed over an extended timeframe.

4. **Asset management and inspections**
   In 2019, SDG&E met or exceeded the requirements of the inspections mandated by GO 165, GO 95, GO 128, and GO 174, and also started a pilot distribution drone assessment program. In 2020, SDG&E will enhance existing inspections by introducing distribution infrared inspections, which allow for the detection of issues invisible to the human eye. SDG&E will also include an expanded distribution and transmission drone inspection program within the HFTD to identify potential issues not visible by traditional ground inspections.

5. **Vegetation management and inspections**
   In 2019, SDG&E's Vegetation Management department inspected approximately 453,000 trees and piloted a 25-foot post-prune clearance where feasible. As of January 31, 2020, SDG&E has performed enhanced pruning on approximately 4,800 targeted trees within the HFTD and removed approximately 3,700 trees. In 2020, SDG&E will continue to increase its tree-trim scope to achieve a 25-foot post-prune clearance for approximately 17,000 of the 81,000 trees that meet the criteria within the HFTD. In addition, SDG&E will expand upon its existing fuel management

program by continuing to develop relationships and collaboration efforts within the fuel management community.

6. **Grid operations and protocols**
   SDG&E previously completed a large deployment of remote distribution sectionalizing devices, focusing heavily on the HFTD. This equipment allows SDG&E to sectionalize various elements of its distribution system to efficiently manage system operations and reliability, which results in quicker restoration times for customers. In 2020, SDG&E plans to continue to validate the internal operating procedures annually prior to fire season and look for innovation in system protection settings for its automated reclosers and other automated sectionalizing devices.

   In 2019, SDG&E started the process of analyzing all 465,000 trees tracked annually to further analyze the approach to safely operate the electric system during PSPS, which resulted in development of the VRI. For 2020, SDG&E has created a PSPS mitigation engineering team that is developing mitigation strategies that will reduce impacts to customers that have been exposed to PSPS in the past. For the work planned in 2020, SDG&E will utilize a combination of strategic undergrounding, remote sectionalizing, covered conductor, overhead hardening, microgrids, and SDG&E provided customer generation to reduce customer impacts.

   Currently, SDG&E has two aerial assets available for the purpose of helping fight fires. SDG&E is in negotiations to purchase a replacement asset.

7. **Data governance**
   Late in 2019, SDG&E started developing an Enterprise Asset Management Platform. This centralized repository for asset data will enable SDG&E to predict and assign asset health indexes on its critical electric assets to identify and compare assets based on their likelihood of failure. For 2020, SDG&E plans to continue this effort and develop a multi-attribute value framework for evaluating capital investments through a data-driven, quantitative risk- and safety-based lens.

8. **Resource allocation methodology**
   Over the past few years, SDG&E established the Asset Integrity Management program and its centralized group, to develop and implement a holistic and sustainable asset management system (people, process and technology) for electric assets with an integrative approach for governance, strategy, analytics and continuous improvement. In 2020, SDG&E will continue with a phased approach on developing the asset management system with a focus on electric transmission, substation and distribution business segments.

9. **Emergency planning and preparedness**
   SDG&E developed its emergency preparedness plan in collaboration with key internal and external stakeholders and lessons learned from past incidents, trainings, and

exercises are incorporated as appropriate. SDG&E updates the emergency plans in a three-year cycle; 2020 is the next scheduled update. SDG&E will update and validate the plan prior to the 2020 wildfire season. Each update of the plan will be developed in collaboration with key internal business units and external public safety partners. SDG&E also plans to install Distribution Communications Reliability Improvements, which include a private long-term evolution (LTE) network that will enhance system protection capability and drive more automation of electric system awareness and reporting of events. This new LTE network will also enhance the push-to-talk radio capabilities in some of the more remote areas in HFTD and enhance the speed and data throughput of SDG&E's fire cameras. The improved communication network and system protection may also allow for more automation of PSPS initiation and PSPS re-energization data gathering and processes.

10. **Stakeholder cooperation and community engagement**
    When mitigating the risk of wildfires and impacts of PSPS events, SDG&E works with customers, elected officials, non-profit support organizations, and first responders as they all play a vital role in achieving wildfire prevention and mitigation. SDG&E works with almost 98 nonprofit readiness and response organizations, as well as close to 260 community-based organizations. As the wildfire mitigation program evolves in 2020, SDG&E will continue to work and build relationships with emergency response agencies, strategic partner organizations and fire suppression agencies. SDG&E will remain open to fostering new, strategic relationships aimed to improve collaboration and public messaging with the foundational goal of keeping our communities safe.

C. List and describe all challenges associated with limited resources and how these challenges are expected to evolve over the next 3 years.

Resource Challenges and Constraints

SDG&E was challenged to acquire sufficient resources to accomplish its 2019 wildfire mitigation goals. Specifically, SDG&E notes that it experienced some resource constraints in some specialized areas of expertise such as qualified electrical workers; certified foresters for vegetation management; GIS experts to analyze data and provide mapping solutions; engineers and designers to produce designs for construction related to system hardening; information technology resources to support data analytics; and operators to support the distribution system switching plans and support PSPS events. These resource challenges were significant due to increased demand across the state, which in turn caused some delays and made SDG&E's WMP goals harder to achieve. Ultimately, SDG&E was able to make adjustments to overcome these challenges and meet its 2019 WMP goals.

Looking forward over the next three years, SDG&E projects that the same or similar resource constraints will continue pose challenges. These constraints may be further exacerbated as a result of the ramp up in wildfire mitigation activities by utilities across California. SDG&E expects to resolve most of the challenges through proper planning and contingency plans should the challenges persist. SDG&E projects resource constraints in the areas of tree trim

crews as the electric utilities ramp up their vegetation management programs. Distribution system operators are also a concern; however, SDG&E has a robust training program and plans to onboard more resources to help meet the Company's needs. Experienced engineering and design resources are limiting factors to completing system hardening in a timely manner.

As described in Section 5.3.3.16 below, SDG&E anticipates it will increase undergrounding of its power lines in the HFTD. This has limitations and challenges because undergrounding in the HFTD generally differs from undergrounding in the non-HFTD in that HFTD areas tend to be more rural, and the roads where the undergrounding would occur are not owned by the City where SDG&E can rely on franchise agreements to place electric circuits underground. SDG&E anticipates the need to acquire underground easements on private roads, tribal lands, and other jurisdictional territory; the need to trench through environmentally sensitive areas; and other permitting delays. Some regulatory or statutory assistance may be required to expedite these resolutions if SDG&E is to meet its undergrounding goals.

There is also an additional challenge of undergrounding service lines from the main road to the house. Through this 2020 WMP, SDG&E seeks to underground such service lines by working directly with customers to determine the best possible routing for the underground service and attachment point to the building. This would involve both the need to underground customer services as well as the customer access point, converting from a weatherhead connection to an underground-fed electrical panel. While there is a model on how this could be accomplished through the Rule 20A tariff and the City of San Diego Surcharge 20SD program, these regulatory mechanisms do not sufficiently address the complexities associated with the conversion of individual services since they each derive their funding to convert services through collaboration between SDG&E and the governing jurisdiction.

SDG&E will need to work with its regulators to develop a mechanism to better address these complexities associated with work on individual customer-owned equipment. Issues which need to be studied include but are not limited to the possible environmental issues, access and land-use issues, jurisdictional panel inspection and permitting issues, and equitable cost sharing amongst all customers. SDG&E ultimately seeks to reduce wildfire risk and mitigate PSPS impacts to customers as much and as quickly as possible but must prudently review all perspectives to best protect all stakeholders involved. The PSPS Mitigation Engineering team is developing criteria for which service lines would qualify for undergrounding.

D. Outline how the utility expects new technologies and innovations to impact the utility's strategy and implementation approach over the next 3 years, including the utility's program for integrating new technologies into the utility's grid.

Technology and Innovations

Technology will continue to play a part in wildfire mitigation in the next three years and beyond. SDG&E's various technology enhancements are explained in greater detail in the following sections, and a few examples are summarized as follows:

- In order to have a more reliable and resilient communication technology, SDG&E is installing a private LTE network under the Distribution Communication Reliability Improvement program. This will enable a faster and more reliable communication network for devices on SDG&E's electric system to detect issues, enhance monitoring tools, and improve communication for employees in the field.
- Advanced system protection solutions will leverage new relays, phasor measurement units, wide area situational awareness tools, and better event reporting methodologies.
- Advanced system protection will implement falling conductor protection, a protection that detects changes in phasor measurements to de-energize broken conductors before they fall to the ground.
- Although it is in its early stages, it is expected for the artificial intelligence capabilities to progress in the areas of change detection to spot issues on the electric system from photos taken of assets. Application of artificial intelligence is also being developed to assist with situational awareness in SDG&E's Fire Science and Climate Adaptation department.
- LiDAR technology is already used in the engineering and post-construction aspects of system hardening. SDG&E is further developing usage of LiDAR in vegetation management having leveraged it in inspection of vegetation near transmission lines.

5.2. Wildfire Mitigation Plan Implementation

Describe the processes and procedures the electrical corporation will use to do all the following:

A. Monitor and audit the implementation of the plan. Include what is being audited, who conducts the audits, what type of data is being collected, and how the data undergoes quality assurance and qualitycontrol.

Monitoring and Auditing the Implementation of WMP
SDG&E's current monitoring process for the WMP occurs at various levels across the Company. At an enterprise level, the Company undergoes an annual risk management process where risk owners and managers update their risk assessments and report to senior leadership and SDG&E's Board of Directors, particularly the Safety Committee of the Board, on the Company's wildfire mitigation activities. As part of that process, the data collected and reported includes risk scores, metrics related to the risk drivers and consequences as well as various other metrics related to the execution progress of the mitigation activities. In addition to this established enterprise process, the Company conducts QA/QC audits within its various programs including the vegetation management program, CMP and construction associated with material change.

In 2019, SDG&E implemented a weekly executive WMP dashboard that monitors and reports on the overall progress of SDG&E's WMP completion efforts. The report begins with the depiction of the seven key WMP metrics proffered to the CPUC as an overall measure as to the effectiveness of SDG&E's WMP. The metrics display data from 2015 through the current year in order to assess trends over time. Next, the report provides completion data (versus planned)

on key programs, which enables leadership oversight on the WMP effort as a whole, while providing the opportunity to identify gaps or deficiencies in implementing the Plan. Finally, the dashboard discusses the progress on newer initiatives such as the pilot Fuels Management Program.

Also, in 2019, SDG&E began the development of a Company-wide data collection program geared to regularly collect progress data for each of the programs and initiatives. This system utilizes an enterprise wide IT solution that has been customized to electronically query program owners about the progress of each WMP program and initiative. Depending on the complexity of program, this query will then be sent to program owners on a weekly, monthly, quarterly or annual basis. Once the data is collected, it will then be articulated in written and graphical forms for leadership review and oversight so that gaps and deficiencies in the programs can be redirected or altered as required.

B. Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies.

2019 WMP Deficiencies

In 2019, SDG&E complied with its filed 2019 Wildfire Mitigation Plan. Only one activity, Electric Equipment Training, did not meet the 2019 SDG&E program goal. This program involves joint inspections of SDG&E facilities with CAL FIRE to increase the understanding of wildfire risks and site-specific hazards. SDG&E offered to train CAL FIRE employees on electrical equipment at the beginning of 2019, but CAL FIRE did not have the resources available to complete the training. CAL FIRE confirmed there was a County staffing issue, and that the County will provide additional staffing in 2020. SDG&E plans to resume joint inspections with CAL FIRE in 2020.

C. Monitor and audit the effectiveness of inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.

Monitoring and Auditing the Effectiveness of Inspections

SDG&E regularly monitors all of its inspection programs and ensures all inspection goals are met. In addition, SDG&E conducts an audit to ascertain the effectiveness of the inspections. This audit is managed by SDG&E's operational and engineering managers, who are responsible for each of SDG&E's electric operations districts. They randomly select 1.5% of the combined (overhead and underground) inspections and assess their conditions to determine if the inspections were properly performed.

D. For all data that is used to drive wildfire-related decisions, including grid operations, capital allocation, community engagement, and other areas, provide a thorough description of the utility's data architecture and flows. List and describe 1) all dashboards and reports directly or indirectly related to ignition probability and estimated wildfire consequences and reduction, and 2) all available GIS data and products. For each, include metadata and a data dictionary that defines all information about the data. For each, also describe how the utility collects data, including a list of all wildfire-related data elements, where it is stored, how it is accessed, and by whom. Explain processes for QA/QC, cleaning and analyzing, normalizing, and utilizing data to drive internal decisions. Include list of internal data standards and cross-reference for they

datasets or map products to which the standards apply.

Data Architecture and Flows

SDG&E collects and maintains several databases and datasets that are useful in assessing the effectiveness of its wildfire mitigation activities and programs at reducing the risk of catastrophic wildfires. SDG&E has documented the data it utilizes to inform resource decisions and measure the effectiveness of its wildfire mitigation programs in its July 30, 2019 Data Collection for WMPs Report.[25] These include databases and datasets related to electric reliability; transmission outages; ignitions; wire downs; corrective maintenance program and intrusive inspections; weather and situational awareness; and vegetation management. The Data Collection Report contains the descriptions of these databases as well as provides a data dictionary for each database. A data flow for SDG&E's weather network data and supercomputer simulations is available in Appendix B to this Plan.

5.3. Detailed Wildfire Mitigation Programs

Instructions: *In this section, describe how the utility's specific programs and initiatives plan to execute the strategy set out in Section 5.1. The specific programs and initiatives are divided into 10 categories, with each providing a space for a narrative description of the utility's initiatives and a summary table for numeric input in the subsequent tables in this section. The initiatives are organized by the following categories provided in this section:*

1. *Risk assessment and mapping*
2. *Situational awareness and forecasting*
3. *Grid design and system hardening*
4. *Asset management and inspections*
5. *Vegetation management and inspections*
6. *Grid operations and protocols*
7. *Data governance*
8. *Resource allocation methodology*
9. *Emergency planning and preparedness*
10. *Stakeholder cooperation and community engagement*

To the extent applicable and relevant, if an electric utility has completed a Safety Model and Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP) as part of its General Rate Case that identifies safety models or programs the electrical corporation has implemented to mitigate ignition probability and estimated wildfire consequence, then the models or programs identified pursuant to this section must comport with those identified in the S-MAP proceeding. Describe any differences with S-MAP and RAMP and provide rationale.

Instructions for Table 21 through Table 30:

List and summarize each initiative using the tables below for each corresponding category. Provide a separate line item for each initiative within each category. Use the initiative rows provided for these initiatives undertaken by the utility and create new rows for initiatives only when absolutely necessary.

[25] *See* R.18-10-007, SDG&E Data Collection for WMP Report (July 30, 2019).

Where the utility plans to conduct additional activities that cannot be categorized into the initiatives below, add a corresponding row to the table in the relevant category and add details on each activity to complete the row according to instructions before.

For each wildfire mitigation activity, report information on:

1. *total per-initiative spend in dollars ($);*
2. *line miles to be treated (as applicable) in miles (mi);*
3. *spend per treated line mile (or, where initiative is not implemented on a per-line-mile basis, per total line miles of the system);*
4. *ignition probability drivers targeted (from the list of ignition probability drivers indicated in utility SDR Table 24 Key drivers of ignition probability, or other as needed);*
5. *risk reduction of the activity according to utility multi-attribute value function (MAVF); and*
6. *risk-spend efficiency in dollars per unit of risk reduction; and*
7. *other risk drivers addressed.*

For the quantitative characteristics of the activities, six values shall be reported for each activity. These include numbers for the plan for 2019, actual activity spending and other calculations for the activity as actually implemented in 2019, the plan for year 1 of this WMP, estimates for years 2 and 3 of this WMP, and a subtotal for the 3-year WMP term ("2020-2022 plan total").
For each activity, also:

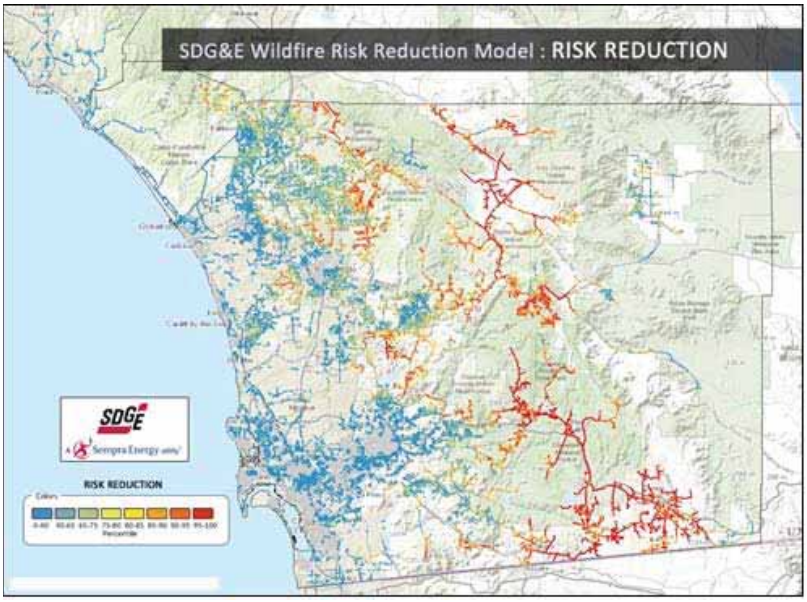
1. *identify whether the program/strategy is existing or new;*
2. *if existing, identify the proceeding where the program/strategy costs have been subjected to Commission review;*
3. *if new, identify any memorandum account where related costs are being tracked and provide an explanation of how double tracking is prevented in the comments;*
4. *indicate whether the program/strategy is implemented in compliance with existing regulations or exceeds current regulatory requirements;*
5. *if a program/strategy is identified as meeting a current regulatory requirement, cite the associated order, rule, or code; include comments as needed to clarify or explain the data provided*

5.3.1. Risk assessment and mapping

Over the last several years, SDG&E has developed and continues to refine a primarily automated risk assessment and mapping methodology referred to as the Wildfire Risk Reduction Model (WRRM). The WRRM project is a collaboration between SDG&E and Technosylva Inc.,[26] who was selected as SDG&E's consultant following an extensive and detailed request for proposals (RFP). There are two versions of WRRM, one focused on long term planning, and another that provides an operational version to support emergency activities. Both versions involve the design, development and implementation of a scientific model and a resulting application software program to allow SDG&E's engineers and emergency operations to analytically evaluate and prioritize proposed fire hardening projects and emergency actions from the standpoint of reducing or eliminating fire risk potential from overhead electric facilities. This effort began almost six years ago and involves over two terabytes (TB) of data,

[26] www.Technosylva.com.

many man-hours of review and analysis, and billions of computer simulations over the last few years.



SDG&E's innovative approach drove the development of this modeling. While these efforts are now being duplicated within the electric utility industry, at the project's outset, similar models had not been established within the utility space. The outputs of the model, along with other factors that include environmental variables, allow SDG&E engineers and operators to determine which projects will provide SDG&E with the best value in regard to cost and reduction of fire risk, while also identifying circuits that pose the greatest risk of wildfire during periods of high fire danger, resulting in a safer electric system for the public at large.

The model incorporates a range of data and resulting risk factors, including:

- Vegetation and fuels data
- Weather and predictive data
- Historical fire occurrence
- Outage history
- Equipment failures (RIRAT & FiRM data)
- Fire behavior analysis
- Fire simulation modeling
- The SDG&E electric distribution network assets
- Electric system conditions and characteristics
- Subjective "values at risk" parameters
- Risk reduction projects

The outcome of the model provides a relative ranking of current risk as well as the expected absolute and percentage of risk reduction following the individual hardening project completion. The actual risk reduction of PSPS has not been directly calculated, though these values could be derived from the available data.

WRRM represents SDG&E's continued commitment to the ongoing development and further refinement of risk related models for the evaluation of hardening projects and the safe operation of the SDG&E system. To date, SDG&E subject matter experts, including fire coordinators and fire scientists analyze the model's performance for all wildfires on the landscape, identifying deviations from the risk and propagation modeling. These findings help drive the future development of the model and refining the model will result in improved and more specific quantifiable outcomes allowing for better decision making in the overall hardening effort. SDG&E stands at the forefront of the development of this important risk related model and leads the industry in the creation of such a model.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Risk Assessment and Mapping initiatives in Sections 5.3.1.1 through 5.3.1.7 below. Table 21 – Risk Assessment and Mapping initiatives is provided in Appendix A.

5.3.1.1. Summarized risk map: Operational Wildfire Risk Reduction Model

SDG&E's WRRM prioritizes long-term system hardening efforts. In developing this model, in collaboration with fire behavior experts, SDG&E leveraged 30 years of high-resolution weather data to establish a climate scenario and failure rates of its assets. SDG&E then simulated virtual wildfires to assess, quantify and prioritize risk mitigation efforts. SDG&E also updated risk algorithms to better capture weather effects on failure modes, and how existing hardware is impacted through the integration of wind factors that are applied at higher wind speeds.

SDG&E has further enhanced this model into an operational system (WRRM-Ops) by developing a fully automated process to ingest daily weather and fuel moisture data from its supercomputers, and to re-calculate risk levels to support emergency operations. This information is now leveraged by SDG&E's subject matter experts to gather intelligence and communicate potential impacts and risk for every potential fire of consequence that occurs in SDG&E's service territory. WRRM-Ops assesses the areas of highest fire danger before a wildfire begins so that preventative measures may be taken to enhance public safety and reliably operate the electric system. This model uses simulations generated from weather conditions, historical fire, and vegetation data to evaluate wildfire risk within SDG&E's service territory.

Lessons learned from this process inform the ongoing development of the modeling system. Most recent enhancements to the system include the integration of vegetation management data and real-time data into the system from the SDG&E weather network and camera network. The system that has been developed here in San Diego is now being deployed broadly across the state of California, enhancing the information available when making decisions on whether and how to update the model.

SDG&E's Wildfire Risk Reduction Model has many capabilities, including production of a summarized risk map showing the overall ignition probability and estimated wildfire

consequence along electric lines and equipment. Over the last several years, SDG&E has worked with fire science experts at Technosylva to validate model performance and make updates to the model.

SDG&E gathers significant intelligence related to wildfire potential from SDG&E's WRRM-Ops model. This model integrates the fire modeling and years of firefighter experience with the latest weather and GIS technology to understand wildfire growth patterns across the region (running 6,000 fire growth simulations per second, simulating 10 million fires in a single night).

WRRM-Ops is also capable of simulating the growth and potential impact of a wildfire anywhere in SDG&E's service territory should an ignition begin. Integrating all of the aforementioned weather data developed by SDG&E, the WRRM-Ops model can conduct an analysis to determine the immediate threats, enabling quick decision-making to help decrease the impacts of wildfire. Because WRRM-Ops has proven to be a beneficial tool for SDG&E, it is now being utilized by utilities, regulators and emergency responders across the state. SDG&E intends to continue prioritizing the ongoing development of WRRM and WRRM-Ops moving forward. This modeling has proven beneficial to both system planning as well as operations. SDG&E established a management team consisting of a fire science meteorologist and a fire science coordinator who are responsible for the ongoing development and quality checks on the model. In particular, the team ensures that the intelligence generated by the model, which is then delivered to SDG&E's engineering teams and operators, is rooted in leading science.

SDG&E has a process in place to validate all wildfire modeling through the experience of its subject matter experts. Through this process, all components of the model will be analyzed to help determine focus areas for future development and enhancement.

SDG&E intends to expand WRRM-Ops beyond the levels described in the 2019 WMP[27] to provide significant enhancements for this technology. These enhancements will include:

- Integration of a tree database, with approximately 500,000 trees that are monitored near SDG&E equipment.
- The ability to adjust weather and fuel related data within the model to improve simulation of real time conditions and assessment of risk.
- Addition of new layers including historical fire perimeters, Alert SDG&E Cameras, granular weather data, weather station locations, and new view options.
- Automatically pulling information from participating agencies when vegetation fires are dispatched and running a simulation to enhance situational awareness.
- The ability to efficiently export information from the program to enhance SDG&E's ability to collaborate pre-incident, during a fire, and post incident.

[27] SDG&E's 2019 WMP at Attachment A, p. 50.

To effectively enhance the state of global fire science in 2020, SDG&E's Fire Science, Fire Coordination, and Meteorology teams will collaborate closely with leading scientists and share all the work that SDG&E has performed over the last decade to better understand Santa Ana Winds and the impacts that they have on utility operations. To that end, SDG&E plans to expand partnerships with academia and fire agencies to further accelerate and share fire modeling capabilities. SDG&E will invest in the development of a data sharing platform, which will enable researchers to access all of SDG&E's weather data.

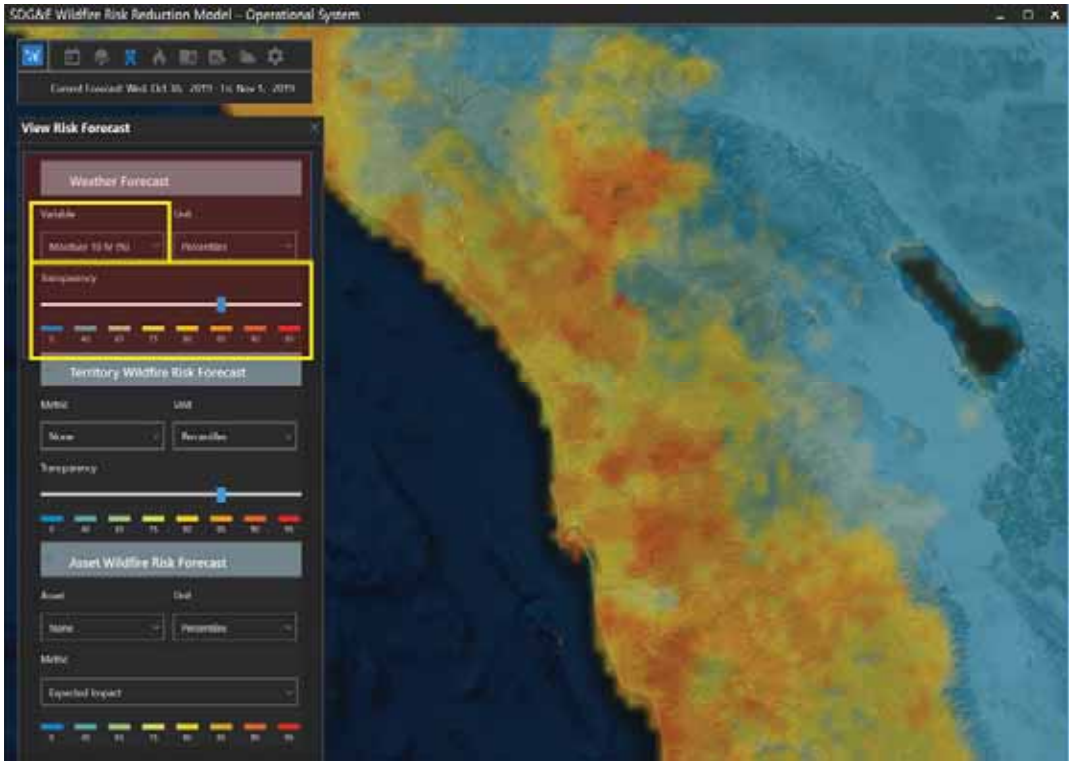
SDG&E strives to further this program by 2021 through continued collaboration with leading scientists as well as the creation of SDG&E's Fire Science and Innovation Lab (discussed in further detail in Section 5.3.7.2 below), which will foster the continued evolution of fuel moisture modeling, weather data, cameras, vegetation management data and LiDAR data and combine these data sources with years of firefighting experience to continuously improve our situational awareness.

Over the next three years, SDG&E plans to further update and evolve the WRRM-Ops platform into a single visual and configurable live map that can be used to help make operational decisions, including PSPS decisions. SDG&E also plans to expand partnerships with academia and fire agencies to further accelerate and share fire modeling capabilities while investing in the development of a data sharing platform which will enable researchers' access to all SDG&E weather data. The successful evolution of this program over the next ten years will depend on SDG&E's collaborations and partnerships. Accordingly, SDG&E will continue to expand partnerships with academia and fire agencies to further accelerate and share fire modeling capabilities.

5.3.1.2. Climate-driven risk map and modelling

For a climate-driven risk map and modelling based on various relevant weather scenarios, please refer to Section 5.3.1.1 above. The figure below is an example of an output from SDG&E's WRRM Model showing a climate-driven risk map.

Figure 3: Example of Climate-Driven Risk Map

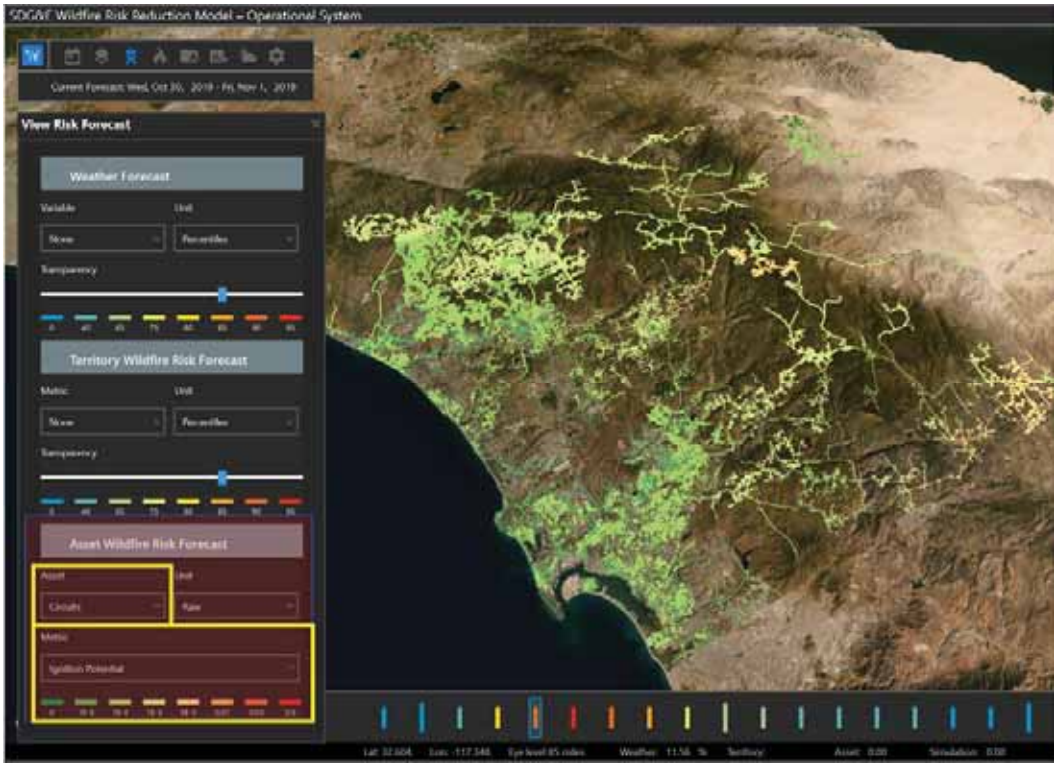


In the image above, SDG&E provides the 10-hour fuel moisture levels that were incorporated into all of its risk calculations for one of the PSPS events that occurred in October 2019. This, along with several other variables that are used to determine environmental conditions are all generated on SDG&E's supercomputers and are integrated into the daily risk calculations. This tool provides the ability to quantify the risk associated with different weather conditions.

5.3.1.3. Ignition probability mapping

Please refer to Section 5.3.1.1 above for ignition probability mapping showing the probability of ignition along SDG&E's electric lines and equipment. The figure below is an example of an output from SDG&E's WRRM Model showing the probability of ignition along SDG&E's electric lines and equipment.

Figure 4: Example of Ignition Probability Map

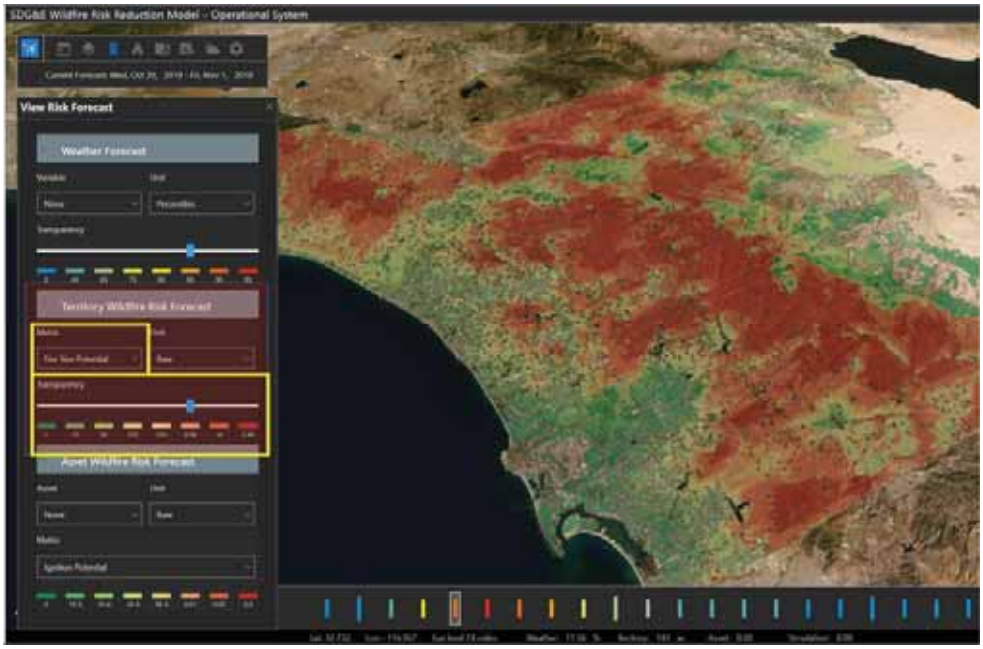


The image above shows the ignition potential that was incorporated into SDG&E's risk calculations for one of the PSPS events that occurred in October 2019. This, along with several other variables, is used to determine the wildfire risk in three hour increments 365 days a year.

5.3.1.4. Initiative mapping and estimation of wildfire and PSPS risk-reduction impact

SDG&E's WRRM Model provides initiative mapping and estimation of wildfire and PSPS risk-reduction impact. Please refer to Section 5.3.1.1 above. The figure below is an example of an output from SDG&E's WRRM Model showing initiative mapping and estimation of wildfire and PSPS risk-reduction impact.

Figure 5: Initiative Mapping and Estimation of Wildfire and PSPS Risk-Reduction Impact

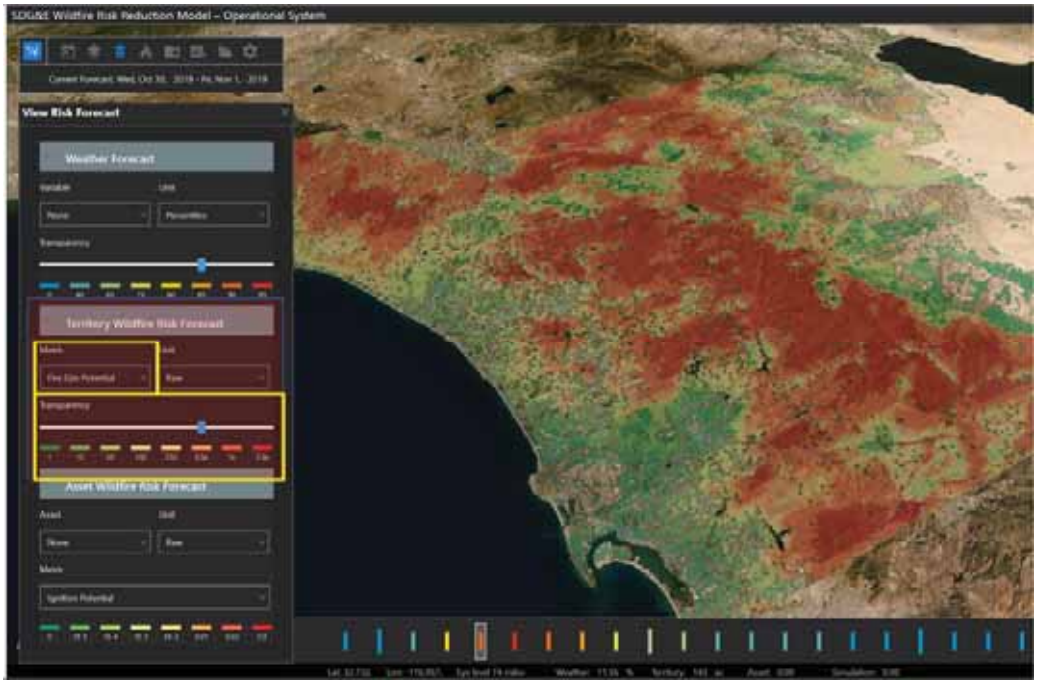


The image above shows the fire size potential for any ignitions that are initiated during one of the PSPS events that occurred in October 2019. This brings situational awareness of the wildfire potential and the risk reduction if PSPS is implemented in these areas.

5.3.1.5. Match drop simulations

Please refer to Section 5.3.1.1 above. The figure below is an example of an output from SDG&E's WRRM Model depicting a match drop simulation showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment.

Figure 6: Example of Match Drop Simulation

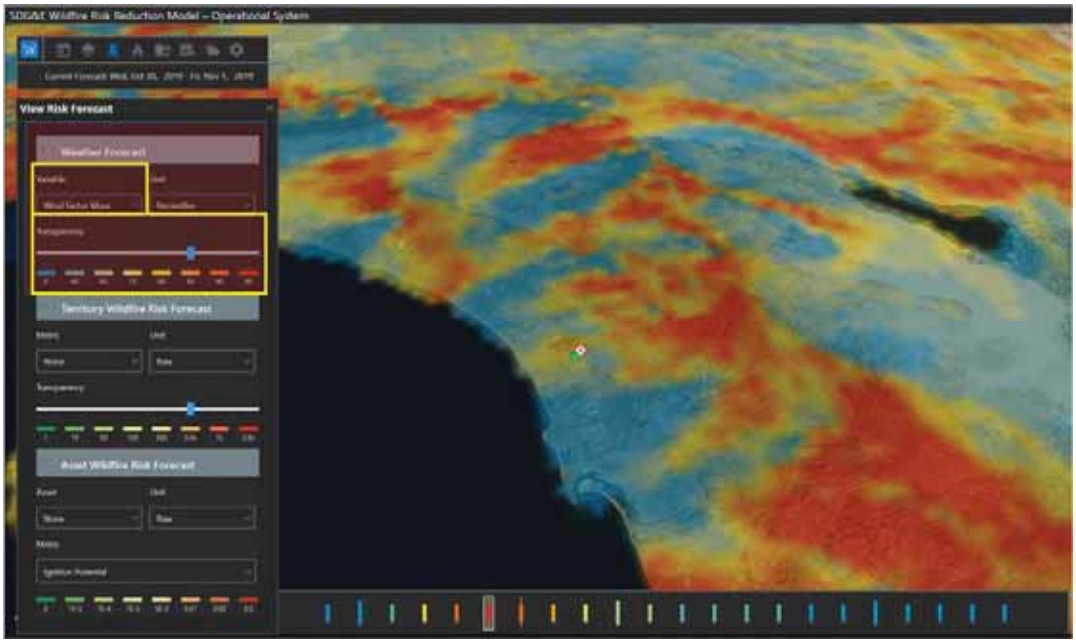


The image above depicts a virtual wildfire in SDG&E's service territory based on one of the PSPS events that occurred in October of 2019. This particular image shows the potential impact and time of arrival to building in the area of the wildfire.

5.3.1.6. Weather-driven risk map and modelling

SDG&E's WRRM Model is able to provide weather-driven risk map and modelling based on various relevant weather scenarios. Please refer to Section 5.3.1.1 above. The figure below is an example of an output from SDG&E's WRRM Model showing such a map.

Figure 7: Example of Weather-Driven Risk Map and Modelling



The image above shows a custom layer, which was developed to identify areas where winds were very strong during one of the PSPS events that occurred in SDG&E's service territory in October 2019. This brings situational awareness to areas that have an increase potential of being impacted by strong winds. This information is incorporated into the risk modeling during an event.

5.3.1.7. High-performance computing infrastructure

SDG&E utilizes three high-performance computing clusters to generate high quality weather data that is incorporated directly into operations. Collectively, nearly 2,000 compute core hours of high-performance computing are used per day to generate operational products, including the SAWTI, FPI, and WRRM-Ops. The forecast data generated by these supercomputers is shared with several partners, including the U.S. Forest Service, which disseminates the data through their public website, and the National Weather Service.

SDG&E plans to continue the production of forecast products as well as prioritize data analytics and modeling for the foreseeable future. As science evolves and new technologies become available, SDG&E will use its computing clusters to integrate the new methodologies in order to maintain forecast reliability and situational awareness. This computing has proven beneficial to system planning and emergency operations making tools possible such as the FPI, SAWTI and WRRM.

SDG&E established a management structure responsible for the ongoing development and quality checks on this program. The program management structure consists of a Data Science Meteorologist and collaborations with the San Diego Supercomputing Center, ensuring that

SDG&E's computing methodologies are rooted in leading science. SDG&E has also initiated a process to monitor and validate all wildfire modeling through the experience of its subject matter experts. Through this process, all components of SDG&E's computing platform will be analyzed to determine focus areas for future development and enhancement.

SDG&E anticipates replacing its existing supercomputers in 2022 since they will then be at the end of their useful lives. The high-performance computing infrastructure is essential to the ongoing development of fire science and big data analytics. Further, the output from the high-performance computing infrastructure is required to enable the continuous evolution of fire science and analytical fire preparedness tools such as the FPI and SAWTI. The replacement of these supercomputers was not included in the 2019 WMP.

Over the next ten years, SDG&E intends to work closely with the San Diego Supercomputing Center to closely monitor data science advancements to ensure that this program remains highly capable of providing the advanced analytics required to operate the utility of today and of the future.

5.3.2. Situational awareness and forecasting

Electric utilities worldwide recognize that the weather has a significant impact on operations. SDG&E is an industry leader in the development and implementation of utility-specific meteorological technology to anticipate, prepare for, respond to, and recover from severe weather and wildfire events. From the nation's original circuit-by-circuit utility-owned network of weather stations to outage prediction modeling, the information provided by SDG&E's team of meteorologists is integral to the safe and reliable operation of the electric system.

Most utilities across the country own or utilize a handful of weather monitoring stations. At over 190 stations, however, the SDG&E weather network was the first utility-owned weather network of this size and density in the nation and has served as a model for other utilities. Each weather station is physically located on distribution and transmission poles and provides 10-minute reads of temperature, humidity, and winds, all which are variables that impact risk of ignition and propagation from utility assets.

This allows real-time conditions to be monitored on every distribution circuit and transmission line across the fire-prone areas of the SDG&E service territory, enabling extremely granular monitoring of the system, down to span level in some of the highest risk areas. This data informs day-to-day operational decision-making at all levels of the company, including Electric Distribution and Transmission Operations, to enhance situational awareness and mitigate the risks associated with wildfires and other adverse weather conditions.

With over 200,000 pieces of weather data collected daily through a fully automated process, the Weather Awareness System was developed as a means of streamlining the information to both SDG&E and the general public. The web-based tool produces a combined weather map that can be used to help make decisions and provides current weather information, as well as

images from mountaintop cameras and forecast intelligence, to enhance situational awareness for the company and community.

The size and density of the SDG&E weather network provides a unique opportunity to pull in actual data for the verification and calibration of weather models. Understanding the value these models could play in safe operations, SDG&E partnered with the University of California system to develop and operate a fully automated and customized suite of weather and fuel moisture models, gathering data from multiple sources such as the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA), to support daily and emergency operations.

Through close collaboration with meteorology and fire science experts in academia and the fire agencies, it was determined that a seven-day forecast horizon was optimal for preparation purposes, with additional granularity and forecast details made available up to three-days before an event. SDG&E has found that these forecast horizons are optimal to support operations and plans to focus on optimizing forecast accuracy rather than investing in expanding the forecast horizon.

This partnership also led to development of models to generate forecasts for important components of the fire environment that could not be measured in real time such as fuel moisture content. This provides SDG&E's in-house subject matter experts with the best automated tools to finalize our daily weather and fire potential forecasts. In 2012, SDG&E launched its first internal high-performance computer cluster to integrate weather data directly into operations. This program has grown over the last five years and today SDG&E operates close to 2,000 compute core hours of high performance computing a day, coupled with advanced analytical techniques to generate new forecasting products. As described in earlier sections of this plan, these advanced analytics have resulted in tools such as the Fire Potential Index, Santa Ana Wildfire Threat Index and Wildfire Risk Reduction Model.

To ensure high quality data, SDG&E trains qualified electric workers to conduct annual calibrations of all its weather stations. SDG&E also has established multiple automated quality assurance and quality control algorithms which analyze the data every ten minutes and automatically alert SDG&E of any quality concerns with the data. In addition to the automated QA/QC process, SDG&E adds additional QA/QC checks of the weather network weather modeling and associated tools daily by subject matter experts.

SDG&E's meteorological innovation and technology allows it to better anticipate, prepare for, respond to, recover from, and ultimately mitigate the exposure to weather related threats. For instance, SDG&E relies on its innovative meteorological information and tools when staging crews prior to a severe weather event. SDG&E will continue to evolve its forecasting capabilities. Moving forward, SDG&E has specific plans to enable adjustments to weather forecasts in real time based on a learning algorithm that are trained of the historical weather data SDG&E has collected over the last decade.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Situational Awareness and Forecasting initiatives in Sections 5.3.2.1 through 5.3.2.7 below. Table 22 – Situational Awareness and Forecasting initiatives is provided in Appendix A.

5.3.2.1. Camera network and advanced weather station integration

SDG&E utilizes over 100 cameras that enhance situational awareness with respect to potential wildfire events. Twenty of these cameras are owned by SDG&E, while 89 cameras are supported by SDG&E in collaboration with the University of California San Diego (UCSD) as part of the High-Performance Wireless Research and Education Network (HPWREN). Of these 89 cameras, 72 are static and 17 are high-definition pan-tilt-zoom "Alert SDG&E Cameras," which are capable of remote directional and zoom control.

The Alert SDG&E Camera network is a state-of-the-art camera network designed to monitor wildfire activity and enhance situational awareness for SDG&E and its first responders and the communities they serve. SDG&E partnered with UCSD and the University of Nevada to deploy this network of 17 live-stream pan-tilt-zoom mountaintop cameras, which allows for quicker identification and triangulation of wildfires. Alert SDG&E Cameras are heavily used by CAL FIRE's Monte Vista Dispatch Center to aid in locating and sizing up wildfires for initial attack prior to the arrival of first responders. SDG&E will continue to fully support the Alert SDG&E Camera network data management process to include image collection, processing, and dissemination.

SDG&E has also closely monitored and tested the capability of fire detection software algorithms that could potentially be used to enhance wildfire detection and provide increased situational awareness to suppression forces across the region. In its experience, SDG&E encountered significant over-detection of wildfire activity from the algorithms, and it thus determined that the technology was not yet optimal for operational deployment. SDG&E has engaged and partnered with the academic community to advance and improve this capability, leveraging over a decade of historical camera images and artificial intelligence techniques. As with all work that SDG&E conducts with wildfire situational awareness, advancements will be made available to all stakeholders in the wildfire suppression community.

The SDG&E weather network, discussed in greater detail in Section 5.3.2.4 below, has been an integral aspect of the SDG&E's wildfire prevention and mitigation efforts over the last decade. The weather information is used to calibrate models such as the FPI and the SDG&E Outage Prediction Model which gives the Company the ability to anticipate when critical fire weather conditions or strong storms are approaching the area, allowing proactive preparedness measures to be taken.

SDG&E intends to continue to prioritize situational awareness platforms into the future such as weather stations and cameras. This situational awareness has proven beneficial to system planning and emergency operations supporting the successful implementation of programs such as PSPS. SDG&E has established a professional meteorology group that is responsible for

the ongoing development and quality checks on the program. The successful implementation of the PSPS program at SDG&E has demonstrated the effectiveness of the weather station and camera networks.

Before the 2020 wildfire season, SDG&E plans to expand its weather network by adding approximately 20 weather stations at strategic locations. It also intends to rebuild approximately 50 of the original weather stations. Before the 2021 WMP annual update, SDG&E intends to continue expanding, rebuilding and refining its weather network to support the safe and reliable operation of the electric system.

In the 2020-2022 time period, SDG&E will further modernize its weather network beyond the levels described in its 2019 WMP. As SDG&E's service territory faces the impacts of a changing climate, SDG&E plans to expand the weather network into high-impact wildland urban interfaces where extreme weather and fire conditions may increase. SDG&E also plans strategic weather station relocations to account for changes on the landscape and an increased understanding of climatological wind patterns in the SDG&E service territory.

By mid-2021, SDG&E expects to increase the number of its owned and operated weather stations to approximately 225. The weather network serves as a data foundation for high-performance computer modeling that supports multiple analytical tools used across the organization. As mentioned above, SDG&E plans to modify its weather system by adding and rebuilding weather stations and replacing aging sensors and equipment with the latest technology. This will include new dataloggers, thermometers, hygrometers, anemometers, batteries, solar panels, modems, and in some cases pyranometers.

SDG&E's subject matter experts and data scientists obtain a lot of value from a long period record of weather observations. To that end, SDG&E intends to continue to support its situational awareness tools throughout the next ten years. The situational awareness networks will be expanded into areas where they can be used to minimize the impacts of PSPS and make our communities safer.

5.3.2.2. Continuous monitoring sensors

SDG&E utilizes continuous monitoring sensors on critical substation equipment, such as high voltage transformers and circuit breakers. These sensors allow for continuous sampling of oil and gas, allowing SDG&E to utilize a condition-based maintenance approach for substation equipment. At this time, SDG&E has not identified an application of continuous monitoring sensors that would mitigate the risk of ignitions on overhead transmission or distribution equipment.

5.3.2.3. Wireless fault indicators

This program will install wireless fault indicators on SDG&E's electric distribution system. Wireless fault indicators are a proven technology that helps narrow the search area to

determine where a system failure has occurred, so SDG&E can quickly identify a search area and dispatch crews to find system failures. This technology is important to SDG&E's operational mitigation measures that decrease wildfire ignition risk.

SDG&E employs measures such as the use of sensitive protection schemes and the removal of reclosing on circuit devices, which increase the frequency of forced outages, decrease the damage caused by system failures, and increases customer impact from "temporary" faults (faults that remove themselves from the system such as a metallic balloon contact). During times of heightened wildfire risk, SDG&E also patrols all infrastructure for damage prior to restoring power. In instances where large areas are de-energized due to sensitive protective relay settings, wireless fault indicators are used to concentrate focus to a much smaller portion of the electric circuit, which allows for: a faster response to the site if an ignition exists; a greater chance of determining and correcting a fault cause (when damage on the overhead electric system is not immediately obvious); and, potentially, faster customer restoration (which could offset customer reliability impacts caused by wildfire mitigation measures).

Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, which is explained in detail in Section 5.3.8 below. All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. For simple jobs, like the installation of wireless fault indicators that do not involve additional structure loading or engineering, the construction field advisor and senior designers ensure quality.

In 2019, SDG&E installed 594 wireless fault indicators, exceeding by 19% its 2019 target of 500 units installed. SDG&E plans on installing approximately 500 additional wireless fault indicators in 2020 and another 500 in 2021. This program is expected to be completed in 2021, with a total of roughly 1,600 units installed from 2019-2021.

Over the next ten years, as technology changes and new innovations are introduced into the industry, SDG&E will continue to evaluate products to enhance its system and potentially incorporate new devices with optimum features. Such new devices may lead to modifications and a request for future installations.

5.3.2.4. Forecast of a fire risk index, fire potential index, or similar

5.3.2.4.1. Fire science and climate adaptation department

In recognition of the drought conditions, increased tree mortality, and ever-changing climate conditions throughout California, SDG&E established a Fire Science and Climate Adaption (FS&CA) department in 2018. The department is comprised of meteorologists, community resiliency experts, fire coordinators, and project management personnel. This department's purpose is responding to and strategizing for SDG&E's fire preparedness activities and programs.

The FS&CA department leads SDG&E's partnerships with academia, government and public safety professionals to innovate and implement more advanced technologies designed to further improve wildfire safety in the region. These advancements comprise SDG&E's new Fire Safe 3.0 initiatives, which include maximizing artificial intelligence and machine learning to improve situational awareness; developing and implementing a new and enhanced Vegetation Risk Index; and satellite enabled wildfire alerts.

In an effort to continuously evaluate and operationalize new and emerging technologies, SDG&E is building a Fire Science and Innovation Lab (FSI Lab). The FSI Lab will bring together leading thinkers and problem solvers in academia, government and the community to create forward-looking solutions to help prevent ignitions, mitigate the impacts of fires, and ultimately help build a more resilient region. With this FSI Lab, SDG&E aims to lead the development of the next generation of fire science and wildfire innovation.

As climate change and community growth continue to impact the region and the state, the FS&CA department must likewise evolve to address and provide situational awareness around emerging threats to utility infrastructure. This team will continuously evaluate new and emerging technologies, operationalizing them as necessary and warranted. Examples of this technology include the integration of artificial intelligence into the SDG&E forecasting system and the development of a satellite-based wildfire detection system. The FS&CA department performs a variety of activities that are accounted for in the department's cost centers and are consistent with SDG&E's 2019 WMP, though SDG&E continuously looks for opportunities to enhance our situational awareness capabilities. These activities are described in greater detail in the Sections below.

SDG&E intends to continue to prioritize the integration of subject matter expertise and the advancement of fire science and climate adaptation moving forward. SDG&E's Director of Fire Science and Climate Adaptation is responsible for demonstrating the effectiveness of Fire Science and Climate Adaptation initiatives.

Before the 2020 wildfire season, the FS&CA department will continue to focus on the collaborations with stakeholders in the community. Before the WMP annual update in 2021, the FS&CA will continue to evolve by creating the FSI Lab. Looking forward three and ten years into the future, the department will be focused on further expanding community partnerships, collaborating with academia and the governmental sectors, while ensuring that SDG&E has the best possible fire science intelligence and information upon which to base its safety decisions.

5.3.2.4.2. Fire potential index

A detailed description of the FPI is included in Section 4.2(A) above. SDG&E will continue to prioritize the integration of the FPI into its operational decision making to mitigate wildfire potential. SDG&E's meteorology team consists of experts in fire science and data science who conduct daily verification of the FPI tool. Through the verification process of the FPI, any

instance of the index not performing as expected is investigated, leading to improvements by the fire science team.

Before the 2020 wildfire season, the SDG&E fire science team will be operationalizing a new forecasting platform to further analyze output from SDG&E's high-performance computing platform when developing the daily FPI forecast. SDG&E is also planning to further expand the availability of the FPI to stakeholders in the wildfire community. Before the WMP annual update in 2021 as well as within the next three and ten years, SDG&E will continue a daily verification of the FPI, and the meteorology team will work to continuously improve the performance of the safety tool.

5.3.2.4.3. Santa Ana wildfire threat index

A detailed description of the SAWTI program is included in Section 4.2 (A) above. SDG&E intends to continue to support the daily operation of the Santa Ana Wildfire Threat Index and continue to share the information daily with the fire agencies for public dissemination. SDG&E's meteorology team conducts verification of the SAWTI though tracking daily of SAWTI values and tracking the occurrence of large wildfire activity. Before the 2020 wildfire season and the WMP annual update in 2021, SDG&E will continue to conduct verification of the SAWTI in collaboration with fire agencies and stakeholders in the wildfire community.

Over the next three years, SDG&E plans to work towards the creation of new artificial intelligence-based fuel moisture modeling, which will be integrated into SAWTI to improve model output. Looking forward over the next ten years, SDG&E will continue to work with academia and the fire agencies to further develop fire science for integration into SAWTI.

5.3.2.4.4. PSPS situational awareness dashboard

SDG&E is currently seeking to expand its operational awareness capabilities to include risk factors of electric system failure and risks related to foreign causes of electric system failure, which serve to inform PSPS decisions. SDG&E also plans to expand its current operational awareness by building visual dashboards that integrate the VRI, historical wind conditions, 95th and 99th percentile wind gusts, and the ability to identify areas that contain vulnerable electric infrastructure. These systems will also have the capability to geolocate infrastructure with poor historical system performance and to identify at-risk infrastructure by extrapolating asset failure analytics. Additionally, SDG&E is seeking to develop, document, and deploy a circuit risk index that will quickly aggregate this data for the purposes of operationally quantifying this risk into a single metric that can be tied to various system isolation points. This program is newly presented in this 2020 WMP.

The PSPS situational awareness dashboard was implemented in 2019, incorporating VRI, historical wind conditions, and some elements of at-risk infrastructure. In 2020, SDG&E's Asset Management department will identify and automate several data sources that generate risk quantification, system performance, system design and nameplate information, and

maintenance data, to begin aggregating these data sources into a single location for use by a circuit risk indexing tool. Once aggregated in 2021-2022, SDG&E will employ data science to find correlations between system performance and various risk factors. This data will be utilized to create a data model that will create components of a Circuit Risk Index, which is currently planned for end-of-year 2022 deployment. SDG&E plans to refine and evolve this program over the next three and ten years depending on what is learned over this Plan cycle.

5.3.2.5. Operating conditions

SDG&E monitors the potential for wildfires throughout its service territory daily, and SDG&E adjusts its operating behaviors accordingly, using its situational awareness capabilities and a formalized escalation approach. This information allows SDG&E to be flexible and successful in its operations.

As conditions for wildfires increase, SDG&E can deploy additional layers of safeguards, or, as a last resort, it might be required to de-energize certain areas of its service territory in the interest of public safety. SDG&E uses a variety of inputs to determine the appropriate operating environment given current and expected wildfire conditions. These tools are used for operational decision-making so that SDG&E personnel can plan and prepare appropriately. Among these inputs for situational awareness are the FPI and SAWTI, which are discussed in detail in Section 4.2(A), Section 5.3.2.4.2, and Section 5.3.2.4.3 above. In addition, SDG&E strategically positions field personnel throughout its service territory based on system conditions, weather, and wildfire potential, which may be considered a threat to SDG&E facilities. Field observers inform operational decisions by providing real-time input regarding onsite conditions, such as debris, vegetation, and system conditions.

SDG&E established Operating Conditions (i.e., Normal, Elevated, Extreme, and Red Flag Warning) to monitor wildfire potential throughout its service territory and, among other things, inform decisions regarding recloser settings, sensitive relay settings, testing procedures, and work restrictions. Each Operating Condition is summarized below:

- **Normal Condition (FPI forecast is in the range of 1 through 11):** declared when SDG&E determines that the burn environment is not conducive for wildfires within its service territory.
- **Elevated Condition (FPI forecast is in the range of 12 to 14):** declared when SDG&E determines that the burn environment has become conducive to wildfires within its service territory.
- **Extreme and RFW Conditions (FPI forecast is 15 or above):** declared when SDG&E determines that a combination of high winds, low relative humidity, and the burn environment will create critical wildfire weather conditions in its service territory.

These Operating Conditions inform how SDG&E operates the system impacting its recloser protocols (see Section 5.3.6.1 below), restrictions on the type of work being performed in high risk locations (see Section 5.3.6.3 below), and the use of contract firefighting resources (see Section 5.3.6.2 below).

5.3.2.6. Weather forecasting and estimating impacts on electric lines and equipment

Please see Section 5.3.2.4.1 above.

5.3.2.7. Network management system situational awareness upgrades

SDG&E's Outage/Distribution Management system uses Oracle's Network Management System (NMS) as the operational tool to manage planned and unplanned outages. Today, SDG&E's weather data, including FPI and wind speed data, are leveraged extensively, through manual processes, to set operational restrictions and make operational decisions. SDG&E plans to building key weather integrations into the NMS system to enable more accurate and real-time operational decision-making to implement reclosing policies, sensitive relay settings policies, and work cancellation decisions during extreme weather events. This program is new and was not included in SDG&E's 2019 WMP.

In 2020, key integrations will be developed to provide NMS visibility into operational conditions to make informed operational decisions related to wildfire risk. In addition, this improved functionality will provide better visibility into active planned and unplanned work in the HFTD, to identify potential risks during events.

In 2021-2022, SDG&E anticipates that the generation of switch plans will be automated to turn off reclosing and enable sensitive relay profiles in the HFTD. These tools will enable the necessary situational awareness to make operational changes during high risk events and provide real-time visibility into current conditions in the field, to make informed operational decisions. In an effort to continuously improve, SDG&E intends to evolve this program over the next three and ten years, however, specific plans are dependent on the outcome in 2021.

5.3.3. Grid design and system hardening

Overview of Grid Design and System Hardening

As discussed in Section 5.1 above, SDG&E's system hardening programs are evolving to address not only the reduction of wildfire risk, but also the mitigation of the scale and impacts of PSPS events. The core of this strategy evolution involves two major components. The first is changing from asset-based scoping to circuit-based scoping. SDG&E's most significantly resourced hardening programs, FiRM and PRiME focused on targeting specific assets with the highest probability of failure in the areas with the greatest impact prioritized through the WRRM model. While these strategies maximized wildfire risk reduction, they did not account for PSPS mitigation. By focusing system hardening on assets instead of circuits, there are small pockets of hardened areas on circuits, but the circuit as a whole is not hardened. When

SDG&E's service territory experienced Red Flag Warning days and the conditions supported a decision to utilize PSPS, these hardened areas were located downstream of remote sectionalizing devices alongside the non-hardened areas and were de-energized for safety.

To address this, SDG&E's PSPS Mitigation Engineering team is scoping projects in the HFTD on a circuit-by-circuit basis based on small wire information (the target of FiRM), at-risk pole information (the target of PRiME), and the WRRM model to understand the impacts as prioritization criteria. In addition, the team is considering historical PSPS information, ingress and egress, vegetation risk, and customer and community impact information. Most importantly, they are proposing mitigations to the circuit as a whole that would maximize the reduction of both wildfire risk and PSPS impacts and exposure to customers.

The second component of SDG&E's system hardening strategy evolution focuses on the mitigation type chosen. Overhead hardening mitigates the majority, but not all of wildfire risk. SDG&E's overhead hardening programs address every line component to significantly reduce the risk of equipment failure. Further, electric infrastructure is built to withstand winds up to 85 to 110 mph, and phase spacing is increased to address the risk of foreign object line contact. Between overhead hardening with high-tensile strength conductor, installing covered conductor, and undergrounding, overhead hardening was calculated to be the most risk spend efficient of these major mitigations because it mitigated much of the wildfire risk for the least amount of cost. When winds are blowing at the 99th percentile, however, that is when the risk of foreign object contact with power lines are highest, and even though these lines are hardened, there is risk in keeping them energized during such weather conditions.

SDG&E's overhead hardening programs and a precise use of PSPS are complimentary mitigations. The hardening programs reduce the risk of equipment failure at all times (catastrophic fires could occur at lower than 99th percentile winds as well), and SDG&E utilized PSPS when the foreign object contact risk was highest (greater than 95th percentile localized wind). This strategy has been effective, as SDG&E has had no utility fires of consequence since 2007, and SDG&E's PSPS events have historically impacted a small percentage of its customer base. Nevertheless, SDG&E has learned lessons from the October 2019 PSPS events and is working to reduce or minimize the PSPS impacts to customers.

SDG&E also continues to analyze equipment failure data, reliability data, and ignition data, together with equipment technology innovation in the industry, to propose programs that target high risk equipment with ignition history. SDG&E's expulsion fuse replacement program, capacitor replacement program, and lightning arrestor replacement programs are all examples of how SDG&E is exploring new technology to reduce the risk of equipment related failures and ignitions.

Alternatives Analysis

Consistent with D.14-12-025, D.16-08-018, and D.18-12-014, SDG&E has considered alternatives to its wildfire risk mitigation activities. Typically, analysis of alternatives occurs when implementing activities to obtain the best mitigation result or product for the cost. The

alternatives analysis for this Wildfire Mitigation Plan considered resource constraints (budget and work force) and whether modifications to what was presented in the 2019 WMP were necessary.

In-Line Disconnect Removal/Replacement Program

SDG&E has different types of equipment throughout its service territory used as sectionalizing devices. One specific sectionalizing device is called an in-line disconnect. These devices provide a sectionalizing location on a distribution circuit and are normally closed (i.e., they are not used in conjunction with a recloser or a voltage regulator as a bypass). During an outage restoration, or in locations with limited clearances, SDG&E has used these devices to assist with sectionalizing efforts to reduce the numbers of customers impacted during an outage, or when requested by field crews to provide isolation points. This specific type of sectionalizing device is not installed directly on the pole like other devices, but rather is installed on the conductor roughly 20 inches away from the pole, similarly to a splice/connector.

With roughly 160 in-line disconnects in the HFTD, SDG&E considered a program to remove these in-line disconnects within the HFTD. This equipment is not CAL FIRE-approved, and it has the potential for an ignition. SDG&E found different means to address the issue and thus dismissed this program. While in-line disconnects can cause sparks upon operation, SDG&E is not aware of in-line disconnects being a source of an ignition while closed and energized. Given that the risk only occurs while operating these disconnects under voltage, SDG&E has implemented work restrictions, as described in Section 5.3.6.3 below, which restricts these types of operation during FPI elevated or higher. With work restrictions, this alternative would be unnecessary, as the risk is otherwise mitigated.

Bridged Fuse Replacement Program

Another type of equipment is a bridged fuse (i.e., a solid blade disconnect), which provides a sectionalizing location on a distribution circuit. During outage restoration or isolation of known damaged equipment, these units have assisted SDG&E operations by reducing the customer impact and providing isolation points for crews to perform construction or maintenance work. These types of sectionalizing devices are installed to replace fuses when coordination from downstream fuses cannot occur. There are roughly 400 bridge fuses within the HFTD in SDG&E's service territory.

SDG&E considered removing these bridged fuses within the HFTD through a formal replacement program. The equipment is not CAL FIRE-approved, and it could potentially become an ignition source. After an operation requiring these devices to be opened and then closed, the limited visibility and existing design of the devices can result in a poor connection. If the contacts are not properly connected and then energized, there is potential for a hot connection that could potentially fail.

SDG&E decided not to move forward with this program because this type of failure has never caused an ignition, so the historical data does not support this type of program. In addition, SDG&E is implementing another distribution inspection mitigation measure, referred to as the

Distribution Infrared inspection program (see Section 5.3.4.4 below), which should detect this type of failure before it happens, thus mitigating much of the same risk as the considered alternative program.

Describe utility approach to the following categories of maintenance of transmission lines, distribution lines, and equipment, respectively:

1. *Routine maintenance programs and protocols (i.e., covering general maintenance approach and programmatic structure),*
2. *Non-routine maintenance, further delineated into:*
    a. *Emergency response maintenance/repair, and*
    b. *Inspection response maintenance/repair.*

A description of SDG&E's approach to routine and non-routine maintenance of transmission lines, distribution lines, and equipment is set forth in Section 5.3.4 below.

Discuss proactive replacement programs versus run-to-failure models for each group, including:

1. *Whether there are specific line elements or equipment that are prioritized for preventive maintenance or replacement,*
2. *How those programs are established,*
3. *What data or information is utilized to make those determinations, and*
4. *What level of subjectivity is implemented in making those determinations*

Overview of Proactive Replacement Programs

Given the wildfire risks associated with faults in the HFTD, SDG&E does not utilize run-to-failure models for its overhead asset classes. Instead, SDG&E utilizes a combination of inspection and maintenance programs to attempt to identify and replace at risk assets before failures occur, as well as proactive replacement programs for aging or obsolete infrastructure in high risk areas. The only run-to-failure model SDG&E utilizes is for underground cable, as there are few ways to inspect the integrity of such infrastructure. If multiple runs of cable failures impact the same customers, however, that criteria can create the need for proactive cable replacement jobs to improve reliability for a neighborhood or community.

The process is described in greater detail in Section 5.3.8 below. At a high level, a business case must be made for the purpose and need of a project or program that considers program benefits including risk reduction, feasibility, costs, impacts, and an alternatives analysis. If the business case is approved, it goes through a quantitative ranking process with other approved programs. Once a budget is set, the project or program will either be funded or not funded and may need to wait additional years for approval.

Wildfire mitigation programs typically start with ignition data, reliability data (near miss data), and PSPS historical data. From there, programs are proposed to mitigate these outcomes. They must pass committee reviews that assess the soundness of arguments and the cost effectiveness of the mitigations, as well as a quantitative prioritization process that focuses on

risk reduction and cost efficiency. A qualitative and quantitative analysis is completed in order for an idea to become a fully implemented project or program.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Grid Design and System Hardening initiatives in Sections 5.3.3.1 through 5.3.3.18 below. Table 23 – Grid Design and System Hardening initiatives is provided in Appendix A.

5.3.3.1. SCADA capacitors

The supervisory control and data acquisition (SCADA) capacitors program will replace existing non-SCADA capacitors with a more modern SCADA switchable capacitor. The current capacitors are designed to provide continuous voltage and power factor correction for the distribution system. During a failure of a capacitor from either mechanical, electrical, or environmental overstress, an internal fault is created resulting in internal pressure and the potential to rupture the casing. This rupture of molted metal has the potential to be an ignition source.

The modernization of these capacitors will introduce a monitoring system to check for imbalances and internal faults and open based on the protection settings. In addition, the SCADA capacitor will provide a method for remote isolation and monitoring of the system providing additional situational awareness during extreme weather conditions. The program will first prioritize replacing fix capacitors within the system to capacitors with switches. Both types of capacitors will be modernized to a SCADA switchable capacitor. Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below.

All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. In addition, SDG&E's QA/QC department performs audits on all wildfire mitigation projects that impact structure loads or conductor clearance to ensure quality. Should any component of a project not meet standards, it is identified as a punch list item that must be resolved before construction contracts are completed and final payments are made to contractors. SDG&E's QA/QC department is independent of SDG&E's Construction Services department that manages the project and contractors. This process ensures SDG&E receives a quality construction product.

This is a new WMP program, which prioritizes construction within the HFTD. Design and construction will begin in 2020 and is anticipated to be completed by 2022. SDG&E is planning on modernizing approximately 100 capacitors in the HFTD, roughly 30 in each 2020 and 2021, and roughly 40 in 2022. SDG&E will start by removing fixed capacitors, which are considered to be the most at-risk capacitors in SDG&E's service territory, followed by switchable capacitors. This program is planned to address 100% of capacitors within the HFTD over the three period of the plan. SDG&E will monitor reliability and ignition data related to capacitor failures. SDG&E

expects that system faults and ignitions associated with capacitor failures would decrease over time as a result of this program.

As technology changes and new innovated ideas are introduced into the industry, over the next ten years SDG&E will continue to evaluate products that may enhance its system and potentially provide an opportunity to acquire new devices with optimum features. Such new devices may lead to modifications and a request for future installations.

5.3.3.2. Advanced protection

The Advanced Protection (AP) program develops and implements advanced protection technologies within electric substations and on the electric distribution system. AP aims to prevent and mitigate the risks of fire incidents, create higher visibility and situational awareness in fire-prone areas, and allow for the implementation of new relay standards in locations where protection coordination is difficult due to lower fault currents attributed to high impedance faults.

More advanced technologies, such as microprocessor-based relays with synchrophasor/phasor measurement unit (PMU) capabilities, real-time automation controllers, auto-sectionalizing equipment, line monitors, direct fiber lines, and wireless communication radios comprise the portfolio of devices SDG&E installs in substations and on distribution circuits to allow for a more comprehensive protection system along with greater situational awareness via SCADA in the fire-prone areas of the HFTD. This portfolio of advanced technology allows SDG&E to implement new protection systems, such as:

- **Falling Conductor Protection (FCP)** designed to trip distribution overhead circuits before broken conductors can reach the ground energized;
- **Sensitive Ground Fault Protection** for detecting high impedance faults resulting from downed overhead conductors that result in very low fault currents;
- **Sensitive Profile Relay Settings** enabled remotely on distribution equipment during red flag events to reduce fault energy and fire risk;
- **High Accuracy Fault Location** for improved response time to any incident on the system;
- **Remote Event Retrieval and Reporting** for real-time and post-event analysis of system disturbances or outages;
- **SCADA Communication** to all field devices being installed for added situational awareness;
- **Increased Sensitivity and Speed of Transmission Protection Systems** to reduce fault energies and provide swifter isolation of transmission system faults; and

- **Protection Integration with Distribution Communications Reliability Improvements (DCRI)** as a means of facilitating the communication infrastructure needs (note: this activity is further described below).

The installation of equipment capable of enabling schemes such as Falling Conductor Protection (FCP) allows for the remaining technologies mentioned in the list above to likewise be enabled. Further, it should be noted that these technologies continue to be researched and developed, and therefore are subject to upgrades to increase functionality. These potential advancements may impact cost forecasts.

Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. Quality checks on this program will be performed through the existing standard practice of field commissioning devices installed on the electric transmission and distribution system to ensure proper operation. Field commissioning includes testing relays, RTUs, line monitors, controllers, and communication systems to ensure they meet calibration tolerances, communication functionality, and protection threshold pickups per issued settings. Devices found out of tolerance during testing will be repaired or replaced in kind.

SDG&E tracks reliability event data as well as ignition data for both transmission and distribution lines. SDG&E's advanced protection program is designed to reduce the risk of transmission or distribution faults leading to an ignition. To evaluate the effectiveness of this mitigation, SDG&E would expect to see the ratio of faults leading to ignition to decrease over time.

Prior to 2015, SDG&E largely invested in the deployment of distribution line devices, such as overhead sectionalizing devices, which facilitated remote SCADA communication and sensitive protection settings profiles. Starting around 2015, SDG&E began researching and developing algorithms and devices capable of more advanced protection functions such as FCP and PMU data streaming, which were deployed in a test mode on four distribution circuits in the back-country region of San Diego County.

From 2015 until 2019, SDG&E learned about the precise requirements to enable and deploy this technology. Primarily, SDG&E found the requirements for highly available, reliable, and fast communication between field devices and controllers required the wide deployment of a standardized, utility owned network to facilitate the needs of this program. In 2019, SDG&E expanded its deployment of advanced protection to eight distribution circuits in the backcountry and tested and validated the communication functionality of its proposed Distribution Communications Reliability Improvements (DCRI). As explained in Section 5.3.3.18.1 below, SDG&E is building the DCRI to meet the precise communication requirements of the program.

From 2020 to 2022, AP aims to replace aging substation infrastructure such as obsolete 138kV, 69kV, and 12kV substation circuit breakers, electro-mechanical relays, and Remote Terminal

Units (RTUs). New circuit breakers incorporating microprocessor-based relays, RTUs, and the latest in communication equipment facilitating the requirements of SDG&E's advanced protection systems will be installed in SDG&E substations within the HFTD. On distribution circuits within the HFTD, AP coordinates with the overhead system hardening programs to strategically install or replace sectionalizing devices, line monitors, direct fiber lines, and communication radios to facilitate the requirements of SDG&E's advanced protection systems.

Over the next 10 years, SDG&E plans to enable the advanced protection functions described herein on all transmission lines, substations, and distribution circuits within the HFTD. By upgrading these facilities with advanced protection devices, SDG&E will advance its existing capabilities with regard to remotely enabled sensitive profile settings, FCP, distribution synchrophasors, remote event retrieval, and fault location.

5.3.3.3. Distribution overhead system hardening

SDG&E's Distribution Overhead System Hardening program combines all of SDG&E's overhead hardening programs, Fire Risk Mitigation (FiRM), Pole Risk Mitigation Engineering (PRiME), and Wire Safety Enhancement (WiSE) into one program. The driver for the consolidation of programs involves the strategy evolution described above in the introduction to Section 5.3.3. Rather than scoping projects by small wire or at-risk poles, SDG&E is taking a comprehensive, circuit-by-circuit approach that will weigh those risk inputs alongside the need to mitigate PSPS impacts.

As discussed in Section 5.3.8.4.2 below, SDG&E has formed a PSPS Mitigation Engineering team that will consider wildfire risk reduction and PSPS mitigation impacts to customers and select the most cost-effective mitigation solutions that maximize the benefit of both goals. The mitigation choices include undergrounding overhead lines, covered conductor, traditional overhead hardening (bare conductor), remote sectionalizing devices, microgrids, and utility provided customer generation. Once the team develops a scope of work that involves either covered conductor installations or traditional overhead hardening installations, it will go to the overhead hardening program. Whether the conductor utilized for hardening is bare or covered, it still involves the same rigorous design and engineering process that involves a LiDAR survey, and a PLS-CADD line design to ensure proper line clearances at all operating temperatures and that steel poles structures will be sized to withstand the maximum known local wind conditions.

For tracking purposes, covered conductor and overhead job packages will be issued separately to enable the tracking of cost and mileage, as well as to account for the differences in RSEs. Overhead hardening mitigates the ignition risk of all overhead equipment failure with a small reduction to foreign object in line risk due to increased phase spacing, and it costs less than covered conductor. Covered Conductor mitigates equipment failure and most foreign objects in line contacts, which creates a greater risk reduction than overhead hardening, but at higher cost. The Distribution Overhead Hardening Program is prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in

Section 5.3.8 below. Projects within this program are being developed and prioritized by the PSPS Mitigation Engineering team described in Section 5.3.8.4.2 below.

SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. In addition, SDG&E's QA/QC department performs an audit on wildfire mitigation projects that impact structure loads or conductor clearance to ensure quality. Should any component of a project not meet standards, it is identified as a punch list item that must be resolved before construction contracts are completed and final payments are made to contractors. SDG&E's QA/QC department is independent of SDG&E's Construction Services department that manages the project and contractors. This process ensures SDG&E receives a quality construction product.

For areas of the electric system that have been mitigated by overhead system hardening, SDG&E would expect to see a decrease in both system faults and ignitions on the hardened lines versus unhardened lines over time. Prior to consolidation, the Distribution Overhead System Hardening program consisted of FiRM, PRiME, and WiSE. In 2013, SDG&E established the FiRM program, an overhead distribution, fire-hardening, and rebuilding effort. The goal of the FiRM program is to fire-harden facilities in the HFTD by replacing aged line elements, utilizing advanced technology, and designing for known local weather conditions, with a specific goal of replacing all small conductor in the HFTD that had been known to have high failure rates. To date, the program has hardened over 400 miles of distribution lines, including 83 miles as part of the 2019 WMP.

SDG&E's PRiME program was developed to assess pole strength and integrity considering loading conditions, third party attachments, localized weather conditions, and remaining pole strength throughout SDG&E's service territory. In 2019, the first full year of the program, PRiME replaced 695 at risk structures as part of the 2019 WMP.

The WiSE program is similar to the FiRM program in that is was created as an overhead rebuilding effort with the goal of replacing small conductors with high failure rates. The difference is that the WiSE program was intended to focus on areas outside the HFTD. In 2019, SDG&E identified certain high fire risk areas of the wildland urban interface and utilized the WiSE program to begin hardening those circuits. WiSE hardened roughly 5 miles of distribution line within the wildland urban interface in 2019.

In 2020, SDG&E is consolidating its prior system hardening programs (e.g., FiRM, PRiME, and WiSE) into the Distribution Overhead Hardening program and will continue to work through its existing planned jobs for these programs. Prior to the 2021 Plan update, SDG&E plans to harden approximately 100 miles of at high risk distribution assets within the HFTD as part of this Overhead System Hardening program. It is also piloting the use of covered conductor in 2020.

Over the three-year period of the Plan, overhead hardening mileage is expected to decline with the increase in strategic undergrounding. The use of covered conductor, however, is planned to increase in 2021 and 2022. The scope of work of the PSPS Mitigation Engineering team is still being developed and could impact the future years of the overhead system hardening forecast. To the extent that there are changes to the Distribution Overhead Hardening program, those updates will be presented in an annual update to this WMP.

Looking forward over the next 10 years, SDG&E's long-term vision is to reduce the risk of wildfires, as well as the customer impacts of PSPS. It is expected that to minimize the use of PSPS, overhead hardening with bare wire will decline in future years in favor of undergrounding and covered conductor options. But hardening with bare wire will still have a place in locations where undergrounding or covered conductor is not feasible, cost effective or warranted by the environmental conditions. Some of the solutions to mitigate the customer impacts of PSPS involve bare wire hardening combined with utility provided customer generators, to mitigate the impacts of the PSPS events.

5.3.3.4. Covered conductor maintenance

Please see Section 5.3.4.1 below, which discusses maintenance of distribution overhead.

5.3.3.5. Crossarm maintenance, repair, and replacement

Crossarm maintenance, repair, and replacement is covered by the detailed CMP inspections discussed in Section 5.3.4.1 below.

5.3.3.6. Pole replacement and reinforcement

The Pole Replacement and Reinforcement program replaces deteriorated wood distribution poles,as well as other asset-related components identified through SDG&E's various inspection programs (e.g., CMP and HFTD Tier 3 Inspections). With respect to poles, damage is attributed to numerous factors including, the loss of original preservative treatment experienced with Penta-Cellon poles, the presence of fungi decay, and bird or termite damage. In addition to poles, any issues that are identified through various inspections are remediated to timely clear potential infractions and vulnerabilities in SDG&E's system. To do this, jobs are created and sent to SDG&E's various districts, where they are then addressed and cleared. This process mainly consists of internal labor and fixing or replacing various equipment, as needed.

Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. All SDG&E pole replacements under this program are audited 100% by SDG&E's Civil/Structural Engineering department. This includes field verifying what was constructed and verifying pole load calculations for compliance. For pole reinforcements, Construction Services performs audits on 10% of those that are reinforced. If there are any issues found, those issues are routed back to the district or contractor who performed the work to be resolved in a timely manner.

All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. In addition, SDG&E's QA/QC department performs a 100% audit on all wildfire mitigation projects that impact structure loads or conductor clearance to ensure quality. Should any component of a project not meet standards, it is identified as a punch list item that must be resolved before construction contracts are completed and final payments are made to contractors. SDG&E's QA/QC department is independent of SDG&E's Construction Services department that manages the project and contractors. This process ensures SDG&E receives a quality construction product.

SDG&E monitors reliability and ignition data due to deteriorated structure failures. The Pole Replacement and Reinforcement program has been successful at mitigating this risk, with only one electrical fault and zero ignitions associated with deteriorated wood poles in the last five years. SDG&E has been executing its GO 165 maintenance program for many years. In 2019, SDG&E replaced 725 structures within the HFTD. SDG&E expects to replace 670 structures within the HFTD in 2020 based on historical inspection results.

In 2020 and 2021, the wood pole intrusive inspections are cycling through structures located in the HFTD based on the inspection cycles (e.g., 3 or 5-year cycles). Pole replacements associated with deteriorated structures found on these intrusive inspections reduce the risk of ignitions by preventing wood pole failures. In addition, replaced poles will be constructed to SDG&E's improved site-specific design criteria, (e.g., wood poles will be replaced with steel poles that meet the known local wind conditions of a particular area). For poles identified for replacement in Tier 3 of the HFTD, SDG&E intends to accelerate the replacement (including the design, engineering, and construction of the new structures) faster than the six-month time frame required by the Commission's General Orders.

This will reduce the risk of wildfire by replacing poles that fail inspection or design criteria on an accelerated schedule within the highest risk areas. Over the three-year period, SDG&E expects to replace 2,010 structures in the HFTD based on historical inspection data.

SDG&E plans to continue its mandated and enhanced inspection programs over the next 10 years. Regular inspections and subsequent remediations are a critical piece of preventing potential equipment failures, faults, and ignitions. Expected structure replacement forecasts are adjusted annually based on the latest inspection data results, and the location and number of assets contained in specific inspection cycles.

5.3.3.7. Expulsion fuse replacement

SDG&E's distribution system is dynamic and can experience events that result in a fault. When the distribution system experiences a fault or overcurrent, there are fuses connected to the system to protect its integrity and isolate the fault. These expulsion fuses are designed to operate by creating a significant expulsion within the fuse, resulting in the fuse opening and

isolating the fault, and in turn limiting further damage to other equipment. Because of this internal expulsion, the fuses are equipped with a venting system that sends a discharge of energy out of the fuse and into the atmosphere. This external discharge has the potential to ignite flammable vegetation.

To mitigate this potential, SDG&E has developed a multi-year program to proactively replace existing branch expulsion fuses within the HFTD with CAL FIRE approved power fuses.[28] There are approximately 11,000 branch expulsion fuses (value includes known expulsion fuses and unknown fuse types) in SDG&E's HFTD, and this new program is designed to lessen the chance for an ignition source in the HFTD by reducing external discharges during fuse operation. Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below.

All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. For simple jobs, like the replacement of fuses that do not involve additional structure loading or engineering, the construction field advisor ensures quality. SDG&E monitors reliability data and ignition data and utilizing the CAL FIRE approved power fuses should reduce the ratio of expulsion fuse operation caused ignitions per fuse operation over time.

In 2019, SDG&E kicked off this program and replaced 2,490 of the approximately 11,000 total population of such fuses in the HFTD, which is nearly 23%. In 2020, SDG&E plans on replacing approximately 3,000 fuses, taking the total replaced to 5,490, which includes 100% of Tier 3 of the HFTD and 50% of the total expulsion fuses within the HFTD. Over the three-year WMP cycle, SDG&E plans on replacing 100% of the fuses within the HFTD, which is roughly 8,500 fuses. Over the next 10 years, as technology changes and new innovated ideas are introduced into the industry, SDG&E will continue to evaluate products to enhance its system and potentially incorporate new devices with optimum features. Such new devices may lead to modifications and a request for future installations.

5.3.3.8. Grid topology improvements to mitigate or reduce PSPS events

5.3.3.8.1. PSPS sectionalizing enhancements

In addition to other PSPS mitigation strategies, this program mitigates the impact to customers and communities involved in PSPS events by installing additional remote sectionalizing devices within the HFTD. In conjunction with weather station data, this program allows PSPS events to be more precise and potentially localized, which reduces the outage impact to customers. Currently, SDG&E has approximately 280 remote sectionalizing devices, which combined with its 190 weather stations sectionalize an average of 500 customers per device. SDG&E is

[28] Power fuses are equipment that have been previously granted an exemption from CAL FIRE.

evaluating locations for these sectionalizing devices and other localized construction (e.g., remove of overhead system and/or reconfiguring circuits to optimize switch installations.

Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. Projects within this program are being developed and prioritized by the PSPS Mitigation Engineering team described in Section 5.3.8.4.2 below. All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E's standards. In addition, SDG&E's QA/QC department performs audit on all wildfire mitigation projects that impact structure loads or conductor clearance to ensure quality. Should any component of a project not meet standards, it is identified as a punch list item that must be resolved before construction contracts are completed and final payments are made to contractors. SDG&E's QA/QC department is independent of SDG&E's Construction Services department that manages the project and contractors. This process ensures SDG&E receives a quality construction product.

Through the PSPS events which have occurred in SDG&E's service territory since 2013, SDG&E has demonstrated how remote sectionalizing devices combined with a dense weather station network can limit the impacts of PSPS only towards those customers with the highest risk. SDG&E has over 270,000 customers located within its HFTD, but because of SDG&E's hardened transmission system, weather station network, and remote sectionalizing devices, only a small percentage of those customers are exposed to PSPS events during the highest risk system conditions, and only if they are the customers exposed to the risk on a particular high wildfire threat day. In 2019, SDG&E installed seven additional switches to further increase its sectionalizing capability and intends to install more in future years, starting with ten additional remote sectionalizing devices in the HFTD in 2020.

Over the next three years, SDG&E plans to install roughly 30 switches. This forecast could increase, however, depending on the circuit-by-circuit analysis results from the PSPS Mitigation Engineering team. If increases are made, they will be documented in the SDG&E's 2021 annual Plan update. Over the next 10 years, SDG&E has a long-term strategy to reduce or minimize the customer impacts of PSPS events, through a combination of strategic undergrounding, overhead hardening, covered conductor, remote sectionalizing, microgrids, and individual customer generation. Remote sectionalizing will continue to have a role in achieving this long-term goal.

5.3.3.8.2. Microgrids

SDG&E's Microgrids program will provide backup power and resilience[29] in the form of microgrids to critical facilities (e.g., fire stations, urgent care centers, evacuation centers, schools, and others) and communities in and near areas impacted by PSPS. These microgrid

[29] The National Academy of Sciences defines "resilience" as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.

projects focus on investing in infrastructure to provide backup power to strategic locations. As part of determining these strategic locations, SDG&E examines potential locations using the following criteria:

- Identify the critical facilities/communities and the impacts (or potential impact) of PSPS events on the critical facilities/communities, and/or the impacts on the surrounding areas; This may include feedback SDG&E receives when working with local communities impacted by PSPS events;
- Determine the proximity of the critical facilities in relation to one another and to SDG&E infrastructure;
- Determine the amount of undergrounding;
- Identify available land and its proximity to the point of interconnection;
- Determine the load profile and electric needs of the critical facilities/communities;
- Determine technology solution (e.g., solar with storage, generator with storage, storage alone); and
- Determine the feasibility of the solution from a cost perspective.

To safely and reliably use microgrids as a resilience tool in the HFTD, the critical facilities/communities fed by the microgrid must be fire hardened in a manner that does not reintroduce the risk (i.e., energized overhead lines), which PSPS was intended to mitigate. In the HFTD, this necessary microgrid fire hardening may translate to underground conversions or covered conductor to harden the area planned for the microgrid.

The appropriateness of microgrid solutions depends on grid topology. Such grid topology may include: 1) a community that typically does not see high risk conditions, but is fed from a circuit that does, and is therefore subject to PSPS because of the circuit configuration; or 2) areas where critical facilities are concentrated in one location but are a long distance away from the main electrical feed. Deploying a microgrid and fire hardening the area making up the microgrid can be more cost effective than hardening the entire distance of the circuit. Consistent with SDG&E's Generator Grant Program which provides generators to customers, these microgrid projects will help mitigate the impacts of PSPS events on customers most affected by extreme fire weather and provide them resilience benefits.

SDG&E recognizes that microgrids are of particular interest to the Legislature and the Commission. The Legislature enacted Senate Bill (SB) 1339, which requires the Commission, in consultation with the California Energy Commission, and the California Independent System Operator, by December 1, 2020, to take a number of specific actions to facilitate the commercialization of microgrids for distribution customers of large electrical corporations. To implement this directive, the Commission initiated a rulemaking to consider all microgrid policy framework issues, including "programs, rules, and rates related to microgrids that will help the

accomplish the state's broader policy goals."[30] SDG&E believes its microgrid projects will aid in achieving broader state policy goals.

Track 1 of the Microgrid and Resiliency OIR required the investor owned utilities (IOUs) to submit both proposals and a report which: 1) describes new proposals and other resiliency strategies for outages ready for implementation by September 2020, and 2) identifies the microgrid-related activities each IOU is planning or proposing for 2020 and beyond, including what additional Commission action or relief is requested for each microgrid-related resiliency activity (Microgrid Report).[31]

On January 21, 2020, SDG&E filed its Microgrid Report, which included specific new proposals for consideration in the Microgrid and Resiliency OIR as well as a report on ongoing resiliency activities, much of which were captured in SDG&E's 2019 WMP. Specifically, SDG&E reported its ongoing resiliency strategies which include three microgrid projects that could potentially be in-service by the end of 2020: Cameron Corners, Ramona Air Attack Base, and Desert Circuit 221.

Microgrid projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. In addition, SDG&E's QA/QC department performs an audit on wildfire mitigation projects that impact structure loads or conductor clearance to ensure quality. Should any component of a project not meet standards, it is identified as a punch list item that must be resolved before construction contracts are completed and final payments are made to contractors. SDG&E's QA/QC department is independent of SDG&E's Construction Services department that manages the project and contractors. This process ensures SDG&E receives a quality construction product.

SDG&E anticipates that through the deployment of microgrids, the number of customers impacted by PSPS events and the severity of those impacts would decrease over time. SDG&E began this program in 2019 as a way to mitigate the impacts of PSPS events on its customers. SDG&E is continuing to analyze the appropriate locations to deploy microgrids and is currently in the process of developing three microgrids, Cameron Corners, Ramona Air Attack Base, and

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[30] R.19-09-009, Order Instituting Rulemaking Regarding Microgrids Pursuant to Senate Bill 1339 (September 12, 2019) at 2 (Microgrid and Resiliency OIR). The Commission amended the Microgrid and Resiliency OIR's caption to include "resiliency strategies" in recognition of the fact that there are other important technologies and activities that may be useful for achieving resiliency goals in addition to microgrids. *See* R.19-09-009, Assigned Commissioner and Administrative Law Judge's Ruling Amending Proceeding Caption to Rulemaking 19-09-009 (December 5, 2019).

[31] R.19-09-009, Assigned Commissioner's Scoping Memo and Ruling for Track 1 (December 20, 2019). On December 30, 2019, the Administrative Law Judge issued a ruling directing the IOUs to answer specific questions about "microgrid-related activities" the utility is "planning or proposing.";

Desert Circuit 221. SDG&E is performing the engineering, designing, and permitting work necessary to move towards construction and commissioning for a potential 2020 implementation.

Cameron Corners is a remote, low-income community located in Tier 3 of the HFTD, in the eastern part of San Diego County. The critical customers that will be served by the microgrid include a medical care facility, CAL FIRE station, telecom central office (switching station), as well as local food establishments, convenience stores and gas (and propane) stations that can provide residents of this remote community with important goods and services during an outage. The microgrid will be designed to support 300 kW of critical load continuously, and the project will consist of a 725 – 884 kW solar photovoltaic array with an approximately 2,000-kWh energy storage resource. The fully renewable microgrid solution will support resiliency at these key facilities and therefore will provide significant benefits to the surrounding rural community. During a de-energization event, SDG&E will be able to island the critical facilities during a PSPS event.

The Ramona Air Attack Base is located in Tier 2 of the HFTD in the northeastern part of San Diego County and is directly adjacent to a low-income community. The critical customers who would be served by the microgrid include CAL FIRE Air Support, United State Forest Service Air Support, and the fire-retardant mixing station. These critical facilities provide stewardship and fire protection for San Diego County and adjacent communities, including tactical coordination with the incident commander on the ground and directing airtankers and helicopters to critical areas for fire retardant and water drops.

Phase 2 of the project may add a nearby waste water treatment facility to the microgrid. The initial project scope will consist of an approximately 2,000-kWh energy storage resource, to support 60 kW of critical load for up to 1.5 days (a new C-130 aircraft has been recently added to the air attack fleet, and the load necessary to maintain service for the aircraft may continue to change over time). The critical facilities will be able to island during a PSPS event.

Desert Circuit 221 serves a small residential, low-income desert community of approximately 230 customers with about 550-kW of peak load in the far eastern part of San Diego County. While the community itself is not in the HFTD, the distribution line feeding the community runs through a Tier 3 HFTD, resulting in relatively frequent PSPS events for this community. The microgrid islands all residential customers and critical customers (i.e., a San Diego County Fire Station and a community center). The project may be sized-similarly to the Cameron Corners project, and during a de-energization event, the community and critical facilities will be able to island during a PSPS event.

Currently, SDG&E plans to add several other microgrids for years 2021 and 2022. The microgrid locations currently under review include: Potrero, Agua Caliente, Valley Center, and Alpine. SDG&E is also evaluating microgrids to support and serve the communities of Jacumba Hot Springs, Cuyamaca and Palomar Mountain. SDG&E is evaluating the potential to reduce or minimize the customer impacts of PSPS events over the next 10 years, through a combination

of strategic undergrounding, overhead hardening, covered conductor, remote sectionalizing, microgrids, and individual customer generation. Microgrids will continue to have a role in achieving this long-term goal. SDG&E is also evaluating off-grid technologies to mitigate costly hardening efforts for long lines with minimal customer loading and mobile battery solutions to support Community Resource Centers.

5.3.3.9. System automation equipment

Please see Section 5.3.3.2 above for a discussion of installation of system automated equipment.

5.3.3.10. Hotline clamps

Through equipment failure analysis related to wire down outages, SDG&E has identified high risk connectors known as "hotline clamps" that SDG&E intends to replace as part of this program. These hotline clamps have been identified because they have been associated with creating a weak connection resulting in a wire down event. This wire down event can lead to an energized wire on the ground or coming into contact with a foreign object, thus becoming an ignition source.

Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. For simple jobs, like the replacement of hotline clamps that do not involve additional structure loading or engineering, the construction field advisor ensures quality.

SDG&E tracks reliability and ignition data. SDG&E expects to see a reduction in wire down events and ignitions caused by connection failures over time as a result of this mitigation. The hotline replacement program was a new program initiated in 2019. SDG&E replaced 694 hotline clamps in 2019 as part of its WMP. In 2020, SDG&E is planning on replacing roughly 1,650 hotline clamps. Within the next three years, SDG&E plans to replace approximately 4,950 hotline clamps, which would bring the program to date total to roughly 5,600 clamps or 65% of the approximately 8,500 clamps located within the HFTD system. SDG&E intends to replace every hotline clamp within the HFTD. At the current pace, SDG&E will complete this program by the year 2024.

5.3.3.11. Mitigation of impact on customers and other residents affected during PSPS events

5.3.3.11.1. Customer resiliency programs

Generator Grant Program – Medical Baseline

In 2019, SDG&E created a Generator Grant Program (GGP) in response to feedback received from residential customers who had been impacted by PSPS events. Certain customers lacked the financial capability to acquire a generator. The GGP was launched as a pilot program earlier in 2019 as a first attempt at reaching these impacted communities on a limited basis. The program is administered by a neutral third-party to grant certain residential customers (e.g., medical baseline customers) the funding to acquire and be able to use a portable generator during outages, in particular PSPS events.

SDG&E understands that, despite the safety benefits, there are inconveniences associated with de-energization, and this program is one way to provide tools to help mitigate the impact while enhancing customer resilience. Nevertheless, SDG&E strongly encourages all customers to take important steps to prepare themselves before the wildfire season, such as creating an emergency kit and a thorough family emergency plan.

The GGP will help a subset of SDG&E's Access and Functional Needs (AFN) customers charge cell phones and other small electronic devices while they enact their personal emergency plans and also demonstrate that SDG&E is starting to look at solutions and test renewable, portable generator options, to aid customers' resiliency during PSPS events.

Community Generators and Critical Infrastructure Generators

SDG&E is considering a potential generator program to benefit communities and critical facilities during PSPS events. SDG&E is in the early stages of evaluating communities prone to PSPS where a large generator could serve as a temporary microgrid to mitigate the impact of PSPS events. Deploying a generator to a community may involve some small-scale capital upgrades, including undergrounding of distribution lines and the installation of sectionalizing devices to ensure the community centers can be safely energized through the generators during high risk events.

SDG&E is also evaluating the potential deployment of small generators to critical facilities that are frequently impacted by PSPS areas. These are new potential generator programs and as such, SDG&E will make every effort to explore both technology and installation options that factor in cost effectiveness, fire risk, customer safety, and reducing customer impact as a result of PSPS events.

Generators for Community Resource Centers

SDG&E plans to implement a program to provide backup power to Community Resource Centers (CRCs) and other community critical infrastructure in areas impacted by PSPS. Mobile Home Parks (MHP) located within the HFTD often express hardship during PSPS events and as

such, will be investigated for potential backup power for resilience measures similar to that of the CRCs. SDG&E's plan to deploy these backup facilities furthers the integration of technology in support of safe and reliable electric operations. Given that CRCs are intended mitigate the impacts of PSPS, SDG&E believes it is critical to provide backup power to such facilities.

SDG&E is also expanding upon or developing new programs and strategies, leveraging backup power for resilience to mitigate the risk associated with PSPS. These programs are specifically related to resilient internet connectivity at fire stations, the expansion of the Community Resource Center Network and the development of a grant program for portable generators targeted at select residential customers. New to the CRCs in 2020, SDG&E is exploring collaboration with community-based organizations (CBOs) and local stakeholders to provide transportation for AFN customers to and from CRCs during PSPS events.

The Generator Grant Programs are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. SDG&E has and will continue to perform customer surveys to gather feedback and improve the Generator Grant Programs and Community Resource Centers. Random sample quality checks are also performed with respect to the GGP, prior to delivery of units.

SDG&E expects this program to reduce the impacts of PSPS events on customers over time. SDG&E will utilize the results from customer surveys and observations through our public safety partners to understand public perception regarding effectiveness of these programs. SDG&E launched the GGP pilot in 2019 and provided 65 generators to certain residential customers in the HFTD. In addition, eight CRCs were established with back up generation to provide communities a place to charge cell phones and mitigate some of the impacts of the PSPS events.

After surveying participants in 2019, SDG&E learned that the program was well-received. Based upon positive feedback received, SDG&E plans to expand the use of the GGP in 2020 as part of its focus on mitigating the impacts of PSPS to customers, including customers with various needs. SDG&E will expand the pilot program into a full program implementation, targeting a subset of customers within the HFTD that are most prone to PSPS events. SDG&E anticipates providing 1,250 generators to customers in 2020 and intends to extend this program over the next three years, taking into account customer feedback and lessons learned. By 2022, SDG&E estimates providing 4,630 generators to customers to mitigate the impacts of PSPS. SDG&E also anticipates further expanding its CRCs in the 2020 through 2022 timeframe in order to support the most impacted communities.

5.3.3.11.2. Expanded generator grant program

As discussed in Section 5.3.3.11.1, SDG&E received positive customer feedback from its pilot GGP and plans to begin a pilot Expanded Generator Grant Program that would offer these portable generator units to an expanded customer base. The first GGP specifically targets medical baseline customers, and as described above will be expanding to meet the needs of

more medical baseline customers. This pilot Expanded GGP will allow all customers with additional needs to apply for portable generator grants to help mitigate the impacts of PSPS events. The pilot Expanded GGP plans to provide approximately 130 generators per year, with half funded through rates and half funded through shareholders. Over this three-year Plan cycle, SDG&E would provide nearly 400 mobile generators to customers in need.

5.3.3.11.3. Whole house generator program

In Section 5.3.3 above, SDG&E discussed its overall fire hardening strategy evolution from asset-based risk reduction to mitigation techniques that not only reduce the risk of wildfires, but also mitigate the customer impacts of PSPS events. SDG&E plans to implement a new Whole House Generator Program to support its long-term vision to reduce or minimize the impacts of PSPS to customers. As previously noted, SDG&E's PSPS Mitigation Engineering team will take a circuit-by-circuit approach in selecting mitigations that will reduce both the risk of wildfire while mitigating the impacts to customers. These mitigations include strategic undergrounding, overhead hardening with covered conductor, overhead hardening with bare conductor, remote sectionalizing, and microgrids, as well as SDG&E-funded whole home generators for customers.

The PSPS Mitigation Engineering team is tasked with the developing the most cost-effective solutions to achieve SDG&E's strategic goals. In rural areas with lots of circuit miles but very low customer density, the cost of hardening programs can be very high relative to the cost of providing generators. In these specific cases, SDG&E plans to continue utilizing PSPS as a last resort measure to protect public safety but will seek to help reduce the PSPS customer impacts by installing whole home generators with automatic transfer switches. SDG&E anticipates installing approximately 300 whole home units in 2020 and expects that to continue in future years of the plan. If the scope of work changes as the PSPS Mitigation Engineering team completes their circuit analysis, these forecasts will be revised in the annual WMP updates.

5.3.3.12. Other corrective action

Please see Section 5.3.4.1 below.

5.3.3.13. Pole loading infrastructure hardening and replacement program

Please see Section 5.3.3.3 Hardening above.

5.3.3.14. Transformers maintenance and replacement

Please see Section 5.3.4.1 and Section 5.3.4.7 below.

5.3.3.15. Transmission tower maintenance and replacement

Please see Section 5.3.4.8 below.

5.3.3.16. Strategic undergrounding

SDGE's Strategic Undergrounding Program was established in 2019. This program began as a small-scale program to target areas of HFTD with the most significant risk, or in areas where it could significantly reduce PSPS impacts. While undergrounding is nearly 100% effective at mitigating both equipment related and foreign object in line related ignition risks, it is expensive relative to overhead hardening options.

SDG&E's 2019 RAMP analysis showed the overhead projects provided a better RSE than undergrounding projects and SDG&E allocated resources accordingly. But given the lessons learned from the October 2019 PSPS events, SDG&E has evolved its wildfire mitigation strategy to focus on a mix of wildfire risk reduction combined with mitigating the impacts of PSPS to customers and eliminating those impacts where feasible. Given this strategy evolution, SDG&E is proposing a significant expansion of undergrounding through this Strategic Undergrounding program, which is informed by the circuit-by-circuit resource allocation strategy described under PSPS Mitigation Engineering in Section 5.3.8.4.2 below.

As part of the initial effort of Strategic Undergrounding program, infrastructure feasibility assessment is ongoing, and pilot projects are in progress to provide a baseline for scope, cost, and schedule for the overall program. Concurrently with the pilot projects, assessment of cost savings and types of construction methods to determine the appropriate design approach to environmentally sensitive locations and potentially non-advantageous terrain (e.g., granite rock, equipment up a hillside) are also being considered. SDG&E has experience undergrounding lines in urban settings where franchise agreements with the cities and counties are in place to help expedite these projects. In the more rural settings, there are challenges associated with undergrounding overhead lines. SDG&E cannot simply follow the existing overhead lines but must go through existing roads.

As discussed in Section 5.2 above, SDG&E anticipates the need to acquire underground easements on private roads, tribal lands, and other jurisdictional territory; the need to trench through environmentally sensitive areas; and other permitting delays. Some regulatory or statutory assistance may be required to expedite these efforts if SDG&E is to meet its undergrounding goals. Depending on the number of specific projects that encounter these constraints, it could impact SDG&E's ability to execute this program at the levels planned in this WMP.

There is also an additional challenge of undergrounding service lines from the main road to the house. Through this 2020 WMP, SDG&E seeks to underground such service lines by working directly with customers to determine the best possible routing for the underground service and attachment point to the building. This would involve both the need to underground customer services as well as the customer access point, converting from a weatherhead connection to an underground-fed electrical panel. While there is a model on how this could be accomplished through the Rule 20A tariff and the City of San Diego Surcharge 20SD program, these regulatory mechanisms do not sufficiently address the complexities associated with the conversion of

individual services since they each derive their funding to convert services through collaboration between SDG&E and the governing jurisdiction.

SDG&E will need to work with regulatory and local authorities to develop a mechanism to better address these complexities associated with work on individual customer-owned equipment. Issues which need to be studied include the possible environmental issues, access and land-use issues, jurisdictional panel inspection and permitting issues, and equitable cost sharing amongst all customers. The PSPS Mitigation Engineering team is developing criteria for which service lines would qualify for undergrounding. SDG&E ultimately seeks to reduce wildfire risk and mitigate PSPS impacts to customers, but all stakeholder perspectives must be taken into account.

The Strategic Undergrounding efforts will focus on locations within Tier 3 and Tier 2 of the HFTD and the WUI. SDG&E is evaluating long-term and short-term solutions to execute in the next 10 years. The current short-term solution is to mitigate PSPS customer impacts by supporting critical infrastructure such as community centers, schools, post offices, hospitals, libraries, fire stations, gas stations, and other essential businesses. The concept is to provide a direct underground (DUG) feed to these collective community services so that they remain powered even in extreme weather conditions.

By the end of the three-year implementation period of this Plan, through the efforts of SDG&E's Strategic Undergrounding program and microgrid program, SDG&E projects that most schools within SDG&E's HFTD that had experienced PSPS events in the past will no longer experience PSPS events, mitigating the impacts to families in those communities. Over the long term, SDG&E's PSPS Mitigation Engineering Team is developing a circuit-by-circuit scope of work with the goal of mitigating PSPS to the greatest number of customers, and to the customers who experience the greatest frequency of PSPS events. Strategic undergrounding will have a large role in accomplishing this goal. Overall, the benefits of this program are that it reduces or minimizes wildfire risk and PSPS impacts; increases resiliency; and key community facilities, such as schools, can remain energized during a PSPS.

The Strategic Undergrounding program is prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. Projects within this program are being developed and prioritized by the PSPS Mitigation Engineering team described in Section 5.3.8.4.2 below.

In 2019, SDG&E installed 2.5 miles of strategic underground cables. In 2020, SDG&E plans to install a total of 25 miles of underground. Over the next three years, SDG&E plans to significantly expand this program by installing approximately 120 miles of underground cables by the end of this Plan period. Strategic Undergrounding is part of SDG&E's strategy to reduce PSPS over time. SDG&E expects this to continue over the next 10 years.

5.3.3.17. Updates to grid topology to minimize the risk of ignition in HFTD

5.3.3.17.1. Overheard transmission fire hardening

SDG&E is committed to fire-hardening its transmission and associated 12kV distribution system located in the HFTD. This hardening effort is a multi-faceted approach that starts with enhanced design criteria that account for greater wind speeds and includes the use of high tensile strength conductor, increased wire-to-wire spacing, and the use of steel poles. Previously, lines were constructed to withstand working loads under stress of 56 miles per hour (mph) wind speeds.

The new electric lines are designed to withstand working loads under the stress of 85 mph wind speeds, and in some specific cases, up to 111 mph, based on known local wind conditions. The new lines are being designed utilizing steel poles instead of wood. Steel poles are a more reliable construction material, giving more confidence in their designed strength, and are more resilient should a fire occur, leading to faster restoration times. These new steel pole facilities are being installed in conjunction with the application of higher strength conductors and increased spacing between lines, exceeding the requirements of GO 95, and resulting in a decrease in the likelihood of energized lines coming into contact with one another or arcing after being struck by flying debris. SDG&E's current design standards now reflect the use of the enhanced design criteria, steel poles over wood poles, high strength conductor, and increased conductor spacing in the HFTD.

SDG&E has been hardening its transmission system within the HFTD since the wildfires that impacted Southern California in 2007. As of the end of 2019, SDG&E has hardened approximately 65% of its 69kV transmission system within the HFTD, which includes over 4,800 steel structures and plans on further investment to continue efforts to fire harden the remainder of the HFTD.

By the time the transmission portion of the Cleveland National Forest project is completed, which is scheduled to occur by the end of 2020, SDG&E will have at least one hardened transmission line into every substation within the HFTD. This not only reduces the risk of ignitions caused by SDG&E's transmission system in the areas of greatest consequence, but it also significantly reduces the risk of transmission-related PSPS events impacting customers at the substation level. SDG&E's hardened transmission system allows SDG&E to take a targeted approach to PSPS decisions utilizing remote sectionalizing on the distribution system, because the substations and transmission lines typically remain energized.

SDG&E notes that the tie lines hardened in accordance with this strategy are driven by Federal Energy Regulatory Commission (FERC)-jurisdictional projects, given that hardening efforts address the 69kV transmission system and the associated 12kV distribution system located in the HFTD. This WMP provides only the CPUC-jurisdictional elements related to this strategy.

Transmission projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. SDG&E has many quality reviews along the process of transmission projects. SDG&E has specifications for LiDAR data quality that is the basis for transmission PLS-CADD designs. SDG&E then has a PLS-CADD design specification and checklist, which is reviewed at multiple design stage gates to by experienced engineers to ensure design quality.

Once a job package is assembled, a QA/QC review team independent of Transmission Engineering and design reviews the package for constructability and completeness before bidding the jobs to construction contractors, reducing contract costs and requests for information. During construction, SDG&E field construction advisors monitor construction contractor progress and audit contractor construction processes to ensure they meet SDG&E's construction specifications. During the project close out phase, SDG&E's QA/QC team that is independent of SDG&E's construction services department will audit the completed construction and create a punch list of items that must be completed by contractors before the contract is deemed complete and final payments are made. Through this process, SDG&E ensures that quality is maintained from design through construction.

SDG&E studies reliability and ignition data over time to determine whether programs have been effective. For this particular program, SDG&E will study reliability data from transmission lines before they were hardened and after they were hardened, normalizing the data by fault events per year to ensure comparable data. SDG&E would expect reductions in both transmission caused faults and ignitions on hardened lines.

Transmission projects take a significant amount of planning, design, and permitting to complete. Even a typical SDG&E transmission project with relatively minimal permitting requirements (advice letter or exempt) typically averages three years from initiation through completion. As a consequence, SDG&E does not plan transmission projects around wildfire seasons. Rather, SDG&E typically manages projects through stage gates of initiation, preliminary design, final design, pre-construction, construction, and close out, according to a schedule.

SDG&E expects to complete construction on approximately 19 miles of transmission and 10 miles of distribution underbuilt on transmission lines (in addition to the transmission hardening occurring on the CNF project) by the end of 2020. These include projects currently in construction in the communities of Kearny Mesa, Otay Mesa and portions of lines located on Camp Pendleton.

Over the three-year period of this Plan, SDG&E plans to harden approximately 66 miles of transmission lines and 41 miles of associated distribution underbuilt on transmission lines within the HFTD. By the end of 2022, SDG&E will have 100% of transmission lines traversing the Tier 3 HFTD hardened, and over 80% of the HFTD overall. SDG&E intends to complete this long-term strategy of fire hardening its transmission system within the HFTD by 2025. Projects for the remaining unhardened lines have been identified and have started the process of being

scoped and approved. The projects scheduled for completion outside this plan period are currently in the preliminary design phase. This represents a total of approximately 50 miles of transmission lines to be constructed from 2023-2025.

5.3.3.17.2. Cleveland National Forest fire hardening

SDG&E currently operates and maintains a network of electric facilities located within the Cleveland National Forest (CNF). In 2016, SDG&E received a Master Special Use Permit (MSUP) to operate and maintain facilities within CNF. Specifically, the MSUP allows SDG&E to develop a series of projects and activities aimed at increasing the safety and reliability of existing electric facilities within and near the CNF. SDG&E has received final approval for these projects and associated permits, and work has been ongoing since 2016.

The projects include the fire-hardening of facilities and select undergrounding of several existing 12kV and 69kV electric facilities spread throughout an approximately 880 square-mile area in the eastern portion of San Diego County. The existing electric lines located within CNF also extend outside of CNF boundaries. Generally, the CNF program will increase the safety and reliability of SDG&E's system by fire-hardening existing electric infrastructure that currently serves the U.S. Forest Service, emergency service facilities (i.e., fire, communication, and other), campgrounds, homes, businesses, and other customers within the CNF and surrounding areas.

The project design was based on various recommendations addressing fire prevention and the U.S. Forest Service's environmental requests. Using an analytical matrix reflecting elements of fire risks and environmental concerns, SDG&E and the U.S. Forest Service collaborated to determine which sections of the electric system should be upgraded. Each segment required a custom solution based on many factors, including the location of the customer being served by the distribution system, the topography of the land, and various biological, cultural, and environmental factors.[32]

Transmission projects, including the CNF project, are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. SDG&E has many quality reviews along the process of transmission projects. SDG&E has specifications for LiDAR data quality that is the basis for transmission PLS-CADD designs. SDG&E then has a PLS-CADD design specification and checklist and is reviewed at multiple design stage gates to by experienced engineers to ensure design quality. During construction, SDG&E field construction advisors monitor construction contractor progress and audit contractor construction processes to ensure they meet SDG&E's construction specifications. During the project close out phase, SDG&E's QA/QC team that is independent of SDG&E's construction services department will audit the completed construction and create a punch list of items that must be completed by contractors before the contract is deemed

[32] The U.S. Forest Service relies on the Project Activity Level (PAL) system, which was designed to help fire and timber resource managers establish the level of industrial precaution for the following day. PAL applies to the Cleveland National Forest.

complete and final payments are made. Through this process, SDG&E ensures that quality is maintained from design through construction.

SDG&E studies reliability and ignition data over time to demonstrate whether programs have been effective. For this particular program, SDG&E will study reliability data from the CNF transmission lines and distribution lines before they were hardened and after they were hardened, normalizing the data by fault events per year to ensure apples to apples comparisons. SDG&E would expect reductions in both transmission caused faults and ignitions on hardened lines.

Construction commenced on the CNF program in late 2016 and is planned to continue through 2021. At the end of 2019, SDG&E has fire-hardened a total of 122 miles of electric transmission and distribution; including approximately 64 miles of transmission and 838 structures replaced with steel and approximately 58 miles of distribution lines and 505 structures replaced with steel. In 2020, SDG&E plans to harden an additional 29 miles of transmission, 50 miles of distribution overhead, and 14 miles of distribution underground.

SDG&E expects to complete the CNF project by the end of 2020. But depending on potential constraints or issues that occur during construction, it is possible that construction on the last of distribution lines or at a minimum close out activities such as the QA/QC reviews may occur in 2021. SDG&E expects that the CNF project will be competed and closed within the three-year period of this Plan.

5.3.3.18. Other

5.3.3.18.1. Distribution communications reliability improvements

SDG&E is deploying a privately-owned LTE network using a licensed radio frequency (RF) spectrum by means of the Distribution Communications Reliability Improvements (DCRI) program. This will enhance the overall reliability of SDG&E's communication network, which is critical for enabling fire prevention and public safety programs. SDG&E's communication network is foundational to the wildfire mitigation enhancements proposed in Advanced Protection (see Section 5.3.3.2 above). For this reason, these two mitigations were grouped together for the purposes of RSE calculations in this document, as well as SDG&E's 2019 RAMP filing. SDG&E's falling conductor protection in particular relies on a robust communications network to operate successfully and falling conductor circuits will continue to be enabled as SDG&E's communication network comes online.

Currently, there are gaps in coverage of third-party communication providers in the rural areas of eastern San Diego County that limit SDG&E's ability to communicate with field personnel during red flag crew deployments and Emergency Operations Center activations. The installation of LTE in Tiers 2 and 3 of the HFTD will mitigate these gaps, allowing for more timely and reliable communication and information from SDG&E's field crews to emergency

management leadership in these critical situations. This is accomplished through the installation of LTE base stations as well as microwave and fiber optic infrastructure.

Communications system improvements are prioritized in accordance with the applications making use of the system. These applications are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. Quality checks on this program will be performed through the existing standard practice of commissioning communications systems to ensure proper operation. These commissioning processes include testing components of the communication system to ensure they meet quality assurance requirements documented during the design process.

DCRI's deployment scheduling has been prioritized to provide coverage for WMP technologies. The communication network provided by the DCRI program enables the Advanced Protection enhancements to work reliably. The Advanced Protection enhancement reduce the risk of transmission and distribution faults leading to ignitions, providing an extra layer of mitigation to all SDG&E electric facilities with Advanced Protection enabled.

As SDG&E builds the LTE network, it will be focused on providing connectivity to support WMP programs. DCRI plans to commission approximately 25 base stations in 2020. Additionally, secondary focus will be given to consolidating applications from other SDG&E owned private networks onto the private LTE network. Over the three-year period of this Plan, DCRI expects to commission 175 base stations enhancing communication in the HFTD. Private LTE coverage will be expanded throughout the entire SDG&E territory.

5.3.3.18.2. Lightning arrestor removal and replacement

In designing its electric distribution system, SDG&E incorporates unique equipment to protect the infrastructure from external forces. This equipment ranges from shields for avian protection to covered conductor. Each type of equipment has its own unique role. One type of device that protects the distribution system from external forces, such as damages caused by the effects of a lightning strike or a surge from a fault, is a lightning arrestor. These devices are installed on the distribution system throughout the SDG&E service territory. Some locations have more installations than others based on the increased probability of lightning strikes, in order to protect other major equipment from abnormal surges and failing. When thermally overloaded, as a result of an excessive increase in energy experienced during an event, these units can become an ignition source. The existing design of arrestors require additional measures to protect the distribution system from becoming an ignition source.

Through SDG&E's effort of continuing to improve and explore alternate solutions and evaluate new technology, a new product was introduced that received CAL FIRE approval. Utilizing this new product, SDG&E is proposing a program to replace these arrestors in strategic locations within the HFTD with a CAL FIRE approved lightning arrestor. The CAL FIRE approved device comes with an external device that operates prior to the arrestor overloading, dramatically reducing the potential of becoming an ignition source.

Distribution equipment replacement projects are prioritized in accordance with SDG&E's wildfire mitigation program prioritization and resource allocation process, as described in Section 5.3.8 below. All SDG&E construction projects utilize field construction advisors who monitor projects during construction to ensure distribution infrastructure is built in accordance with SDG&E standards. For simple jobs, like the replacement of fuses that do not involve additional structure loading or engineering, the construction field advisor ensures quality. SDG&E monitors reliability data and ignition data, utilizing the CAL FIRE approved lightning arrestor should reduce the ratio of lightning arrestor operation caused ignitions per lightning arrestor operation over time.

In 2020, SDG&E plans on finalizing construction standards and constructing at test sites to ensure successful installation, along with designing the required jobs for 2021. SDG&E plans to start construction in 2021 and replace approximately 2,700 lightning arrestors within a three-year period. This new program will begin in 2020 and contemplates ramping up installation to potentially replace all at-risk locations in 10 years.

5.3.4. Asset management and inspections

Instructions: *Explain the rationale for any utility ignition probability-specific inspections (e.g., "enhanced inspections") within the HFTD as deemed necessary over and above the standard inspections. This shall include information about how (i.e., criteria, protocols, etc.) the electrical corporation determines additional inspections are necessary.*

Describe the utility's maintenance protocols relating to maintenance of any electric lines or equipment that could, directly or indirectly, relate to wildfire ignition. Include in the description the threshold by which the utility makes decisions of whether to (1) repair, or (2) replace electric lines and equipment. Describe all electric lines and equipment that the utility "runs-to-failure", those that the utility maintains on a risk-based maintenance plan, and those that are managed by other approaches; describe each approach. Explain the maintenance program that the utility follows and rationale for all lines and equipment.

Overview of Maintenance of Transmission Lines, Distribution Lines, and Equipment
SDG&E maintains its distribution system (and associated equipment) in accordance with GO 165, GO 128, and GO 95. With regards to distribution overhead inspections, SDG&E performs the mandated overhead (OH) visual inspections on a five-year cycle and the intrusive wood pole inspections on a ten-year cycle, per GO 165. In GO 165, patrols must be done on an annual basis for all facilities located in an urban environment and every other year in a rural environment. SDG&E determined that the majority of areas with high wildfire risk were located in rural environments, and in 2010 made it an internal requirement to patrol every distribution facility every year, exceeding the requirements of GO 165.

Also in 2010, as a result of the 2007 wildfires, SDG&E implemented its HFTD Tier 3 inspection program, whereby it performs additional detailed overhead visual inspections in the Tier 3 of the HFTD on a three-year cycle. These inspections use a modified infraction code inspection check list that focuses on conditions that increase the probability of ignition if not remediated.

As part of this WMP, SDG&E will implement new inspection programs to supplement and provide a new perspective to the current visual inspection programs. The infrared inspection program will allow SDG&E inspectors to identify "hot" connections that have the potential to cause wire downs and ignitions upon failure. SDG&E will also establish a drone inspection program that has the ability to provide a top down view perspective of infrastructure as well as detailed zoomed-in photos of connectors and hardware which, provides a more robust inspection than what can be seen from the ground or by helicopter. When conditions are identified that show nonconformance with GO 95, the levels of remediation are classified into the following categories:

- **Emergency:** Inspector is to make as safe as possible and stand by the facility until a supervisor arrives to confirm the severity and call out a construction crew to make immediate repairs.
- **Non-Critical:** All other non-conformances are classified as non-critical and will be remediated within a one-year time frame, unless they are found in Tier 3 of the HFTD where they are remediated within a six-month time frame.

SDG&E maintains its transmission (and associated equipment) in accordance with California Public Resource Code (PRC) Sections 4292 and 4293, GO 95, GO 128, and GO 165. SDG&E annually evaluates its maintenance practice to ensure that inspection intervals meet or exceed regulatory requirements. SDG&E performs OH visual and infrared inspections on all transmission structures on an annual basis, detailed inspections on a three-year basis, and intrusive wood pole inspections on a ten-year cycle.

As stated in the distribution inspection Section 5.3.4.1 below, per GO 165, patrols must be done on an annual basis for all facilities located in an urban environment and every other year in a rural environment. SDG&E performs a visual inspection on all transmission structures, conductor spans, and right-of-way encroachments, regardless of environment, on a yearly basis, exceeding the requirements of GO 165. In addition, SDG&E performs a detailed inspection of structures and components on a three-year cycle which exceeds the requirements GO 165.

SDG&E has been utilizing infrared inspection technology to inspect its transmission structures, conductors, and equipment on a yearly basis to identify any potential hotspots or points of concerns, a methodology which is planned to be implemented on the distribution system. In addition, SDG&E will also implement a drone inspection program for the transmission system that has the ability to provide a top down view perspective of infrastructure as well as detailed zoomed-in photos of connectors and hardware which, provides a more robust inspection than what can be done from the ground or by helicopter. When conditions are identified through any of the above noted inspection techniques that show nonconformance with GO 95, the levels of remediation are classified into categories with timeframes that meet or exceed GO 95, Rule 18.

The highest severity level prescribed to a noted condition requires an immediate response. If noted by an inspector, they are to make as safe as possible and stand by the facility until a supervisor works to schedule a construction crew to make immediate repairs. Upon notification of an emergency event, a supervisor may fill the role of a first responder and will make the site as safe as possible and stand by the facility until a construction crew can make immediate repairs. For inspection and patrols not classified as high severity or emergency replacements, additional severity levels corresponding to three-month, six-month, and 12-month timeframes are provided. All structures located within Tier 3 of the HFTD require a maximum of a six-month timeframe.

These inspection and maintenance programs are discussed in greater detail in Section 5.3.4 below.

Replacement of Assets

Replacement of asset decisions are based on asset condition and risk, when such information is available. The asset replacement strategies currently employed by SDG&E are listed and defined below.

- **Responsive**: This strategy is utilized to replace an asset or equipment when an asset or equipment is operated until it stops functioning per its specifications. This is a reactionary strategy since the asset is only replaced when it fails. This strategy may be costly since it requires immediate follow-up because of a failure and may adversely disrupt current operations. It is used for lower risk assets that do not impact public safety.
- **Time-Based (also known as Interval-Based or Manual Condition-Based)**: This strategy is utilized to replace an asset or equipment that does not meet acceptance criteria found during a cyclical inspection performed routinely. The inspection cycle may be determined by regulatory mandates, equipment manufacturer recommendation, or industry best practice. This strategy may also be referred to as "manual condition-based" replacement since the condition is only assessed at the time of inspection.
- **Condition-Based Monitoring**: This strategy is utilized to replace an asset or equipment when certain attributes of the asset or equipment exceed the defined thresholds as alerted by a continuous monitoring system. This strategy requires continuous monitoring and analysis of the key health data of an asset such as age, location, gassing, number of operations, electrical loading, and temperature.
- **Risk-Based**: This strategy is utilized to replace an asset or equipment based on the probability and consequence of failure. While the automated condition-based strategy considers the health of the asset, which is often a proxy for the likelihood of failure, the risk-based strategy considers the consequence of failure of the assets in addition to the health of the asset. The asset replacement strategies vary by asset class. These replacement strategies promote public safety and meet or exceed regulatory mandates and industry best practices.

For the substation class, time-based and condition-based strategies are predominantly employed to assess the health and need for replacement of assets. The transmission class primarily utilizes time-based strategies to determine asset condition and need for replacement. But some risk-based strategies have been implemented specifically around safety and fire prevention. For the distribution class, a combination of reactive replacement, time-based and risk-based strategies are performed.

SDG&E's Substation System Inspection and Maintenance Program is mandated by the CPUC through GO 174 and promotes safety for SDG&E personnel and contractors by providing a safe operating and construction environment. This is accomplished through routine inspections at reoccurring cycles. Substation System Inspections, while conducted primarily for reliability, also provide incidental wildfire mitigation benefits. Since wildfire mitigation benefits are only incidental, no "enhanced inspections" are performed inside HFTD substations– every SDG&E substation is inspected with the same level of detail and with the same criteria. That level of detail and criteria is described in Section 5.3.4.15 below.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Asset Management and Inspections initiatives in Sections 5.3.4.1 through 5.3.4.15 below. Table 24 – Asset Management and Inspections initiatives is provided in Appendix A.

5.3.4.1. Detailed corrective maintenance program inspections

Commission GO 165 requires SDG&E to perform a service territory-wide inspection of its electric distribution system, which is referred to as the Corrective Maintenance Program (CMP). GO 165 establishes inspection cycles and record-keeping requirements for utility distribution equipment. In general, utilities must patrol their systems once a year in urban areas and in HFTD Tier 2 and Tier 3. These patrols are discussed in Section 5.3.4.11 below.

In addition to the patrols, utilities must conduct detailed inspections at a minimum every three to five years, depending on the type of equipment. For detailed inspections, the utilities' records must specify the condition of inspected equipment, any problems found, and a scheduled date for corrective action. Utilities are also required to perform intrusive inspections of distribution wood poles depending on the age and condition of the pole and prior inspection history.

The CMP helps to mitigate wildfire risk by providing SDG&E additional information about its electric distribution system, including in the HFTD. With this information, SDG&E's corrective actions address infractions before a potential issue can occur. The following table summarizes the top five conditions found on overhead detailed inspections in 2019.

Table SDG&E 3: Top Five Conditions During Overhead Detailed Inspections in 2019

Condition	Count
Damaged/Missing/incorrect Station Pole ID	2,348
Damaged/Missing High Voltage Signs; two-man repair	1,725
Pole Steps Lower than 8ft.	1,005
Damaged/Missing Guy Guard	923
Damaged Ground Molding	900

Distribution Inspection Frequencies

SDG&E's CMP is an inspection program, which consists of eight different inspection categories with various, corresponding inspection cycle intervals per program. These are summarized in the table below. These inspections are required by GO 165 unless otherwise noted.

Table SDG&E 4: SDG&E Distribution System Inspection Cycle Intervals

Inspection Categories	Inspection Cycle Interval (in years)
• **Overhead Detailed** o Electric distribution structures and equipment o Electric distribution equipment on Communication Infrastructure Provider (CIP) poles o Electric distribution equipment on transmission poles	5
• **Underground Detailed**	3-5
o Underground Above Ground Dead-front, Internal and External Inspections (AGDF)	5
o Underground Above Ground Live-front, Internal and External Inspections (AGLF)	5
o Underground Subsurface with Equipment, Internal Inspections (SS3)	3
o Underground Oil and Gas Switch Inspections (SW3)	3
• **Underground Subsurface without Equipment, Internal Inspections (SS10)**[33]	10
• **Wood Pole Intrusive Inspections (POIN)** o Electric distribution wood poles	10
• **Patrol (PATROL)**[34] o Electric distribution both overhead and underground structures and equipment	1

[33] This inspection type is not mandated by GO 165, however, SDG&E continues to perform this type of inspection.

[34] Although GO 165 allows for a two-year cycle, SDG&E patrols rural areas outside of Tier 2 and Tier 3 of the HFTD on a one-year cycle.

Inspection Categories	Inspection Cycle Interval (in years)
o SDG&E-owned or operated streetlights are inspected for structural problems or hazards.	
• **HFTD Tier 3 (Formerly called, QA/QC Inspections)**[35] o High Fire Threat District Tier 3	3
• **Distribution Infrared**[36]	5
• **Drone Assessments**[37] o High Fire Threat District Tier 3 o High Fire Threat District Tier 2	TBD after 1 cycle

The five-year detailed inspections are mandated by GO 165. Upon completion of prescribed actions necessitated by the detailed CMP inspections, SDG&E conducts an audit to ascertain the effectiveness of the inspections. This audit is managed by SDG&E's operational and engineering managers, who are responsible for certain districts. They typically select about 1.5% of the combined (overhead and underground) territories and assess their conditions to see if the appropriate improvements have been properly carried out. This audit work is also discussed in Section 5.3.4.14 below. SDG&E tracks the issues identified through this inspection method. These records can be evaluated to identify the quantity and types of issues found that demonstrate the effectiveness of the program.

Before next wildfire season, before the next Plan update, over the next three years, and over the next 10 years, SDG&E will continue to comply with GO 165.

5.3.4.2. Transmission system inspection

All SDG&E transmission system facilities covered by the transmission inspection practice are routinely inspected using visual and infrared inspection techniques. Infrared and aerial inspections are completed annually on all transmission circuits and are discussed in further detail in Sections 5.3.4.5 and 5.3.4.11 below. Ground-based, detailed inspections are completed on three-year cycles. Non-routine inspections are scheduled depending on operational need. Inspections and patrols of all structures, attachments, and conductor spans are performed to identify facilities and equipment that may not meet PRC §§ 4292 and 4293 or GO 95 and GO 128 rules. When non-conformances are identified through these inspections, secondary assessments are performed based on severity levels assigned. These assessments decide the mitigation measures and timeline for corrective action.

[35] These inspections exceed the requirements of GO 165.
[36] These inspections exceed the requirements of GO 165.
[37] These inspections exceed the requirements of GO 165.

This inspection program mitigates the risk of equipment failure by identifying equipment deterioration, making the repair and/or replacement before failures occur. Equipment failure can lead to electrical faults, which can lead to ignitions. Therefore SDG&E considers its inspection and maintenance programs to be crucial wildfire mitigation activities when performed within the HFTD and wildland urban interface.

Inspection/Patrol Types and Frequencies

To maintain transmission system reliability, SDG&E conducts a variety of inspection types to promote the safety of the general public as well as the personnel engaged in the maintenance and operation of overhead and underground electrical facilities. Inspections and patrols are prioritized based on safety, reliability, and operational need. The types of inspections and patrols that are performed are summarized in the table below.

Table SDG&E 5: Transmission Inspection and Patrol Frequencies

Inspection Types	Inspection Cycle (Years)
Fault/Safety Patrol	As Needed
Detailed Overhead & Underground Inspection/Patrol	Three
Visual and Infrared Overhead Inspection/Patrol	Annual
Special Inspection	As Needed
Climbing Inspection	As Needed
Wood Pole Ground Line Inspection and Treatment	Ten
Miscellaneous Inspection	As Needed

In addition to the inspections/patrols specified in the maintenance practice, SDG&E conducts an additional aerial patrol of 69kV transmission lines in HFTD Tier 3 prior to September 1 each year. Conditions of concern related to fire safety that are identified are addressed, as specified in GO 95 Rule 18.

Access Road Maintenance

Access to transmission facilities is key to performing adequate inspection and maintenance activities. SDG&E performs maintenance of many of its access roads on a two-year cycle, barring any permitting or agency delays. Road segments are tracked electronically to document the date and type of maintenance performed, who performed the maintenance, and which roads have biological or cultural restrictions. This road maintenance program is designed to provide SDG&E inspectors and crews reliable access to transmission structures or facilities. Many public agencies utilize SDG&E's transmission access roads to traverse the back country and respond to wildfires that may be in the area.

The maintenance of these roads and the ability to create new roads when transmission line projects are approved is critical to SDG&E's ability to safely maintain its system and to allow SDG&E and other first responders to quickly respond during emergencies, especially wildfires. While environmental organizations frequently oppose access roads, SDG&E's ability to grade new access roads provides significant safety benefits to SDG&E and the communities it serves, and those benefits strongly outweigh other considerations.

SDG&E has teams dedicated to infrared inspections and patrols, visual and detailed inspections and patrols, and access road maintenance. Each inspection methodology or maintenance method has specific target goals, such as 100% infrared inspections on all energized, overhead tie lines every year. The status of completion for inspection and maintenance programs is reviewed throughout the year and resources within each team are deployed to ensure compliance with our maintenance practice and target inspection cycles.

SDG&E annually evaluates its maintenance practice to confirm inspection and repair intervals meet or exceed regulatory requirements. SDG&E regularly monitors all its inspection programs and ensures all inspection goals are met. Yearly inspections and patrols are performed simultaneously with multiple inspectors and inspection types, validating the quality of the patrols performed. In addition, every quarter, transmission supervisors randomly select 1% of the structures with conditions identified and mitigation measures completed, to field verify the reported conditions have been appropriately addressed. The table below summarizes the top five corrective transmission maintenance orders for 2019.

Table SDG&E 6: Top Five Corrective Transmission Maintenance Orders for 2019[38]

Maintenance Order	Qty
Ceramic Insulators - Rust	49
Anchor Rods – Rust	39
High Voltage/Danger Signs – Missing/Unreadable	39
Foundations – Covered/Washed Out	34
Pole Butts – Damaged/Assessment Required	33

SDG&E tracks the issues identified through each method of inspection and patrol. These records can be evaluated to identify the quantity and types of issues identified to demonstrate the effectiveness of the program.

As conditions allow, prior to the first event of the 2020 wildfire season, SDG&E plans to complete an additional set of transmission visual and infrared inspections on tie lines located within Tier 3 of the HFTD which are likely to be impacted by high winds. SDG&E's transmission infrared inspection program currently completes an infrared patrol on 100% of energized

[38] Represents only maintenance orders created based on findings from 2019 transmission detailed inspections.

structures and tie lines within the HFTD. The transmission visual inspection program completes patrols on 100% of structures and tie lines within the HFTD on a yearly basis. The detailed inspection program completes patrols on 100% of structures and tie lines within the HFTD every three years.

5.3.4.3. Improvement of inspections

Please see Section 5.3.4.9.

5.3.4.4. Infrared inspections of distribution infrastructure

SDG&E is piloting new periodic infrared (IR) inspections for overhead distribution equipment, with the intent of creating a formalized program beginning in 2020. This is a new program presented in this WMP, which will consist of using the same high-grade IR technology currently utilized for transmission and substation inspections to identify thermal hotspots in equipment and connections. SDG&E intends to inspect distribution circuits, with the goal of early detection of potential issues on electrical connections and equipment that cannot be seen during SDG&E's traditional visual inspections.

To perform the inspections, SDG&E assembled a thermography team with thermographers of various levels of certification. Thermographers with a Level III Certification will help oversee the program and will be responsible for performing quality checks on the equipment and the program. This will include periodic review of photos and videos provided by thermography team members for analysis and review. The goal of the IR inspection program is to proactively identify potential issues on electrical connections and equipment that could lead to wire downs or ignitions on SDG&E's distribution system. SDG&E will track the issues identified through this inspection method. These records can be evaluated to identify the quantity and types of issues found that demonstrate the effectiveness of the program.

The IR inspections will generate repair orders to address any infractions discovered as part of the inspection. Overall, these inspections and associated repairs will reduce the potential for equipment failure on SDG&E's overhead system, including wires down, which can cause ignitions. These inspections will be conducted primarily via land but may also be conducted from the air. Given that this is currently a pilot program, repairs resulting from these inspections are not estimated herein. SDG&E will provide forecasts for resulting repairs in the GRC, as appropriate.
SDG&E continues to look for new technologies and mitigations to reduce the risk of utility caused wildfires. Infrared on the distribution system enables the detection of connector failures that is superior to a visual inspection and provides the ability to see the heat from a failing connection before it fails.

SDG&E will pilot this program in 2020 before the start of wildfire season, and if the results demonstrate effectiveness, appropriate inspection cycles will be established for the future. Generally, SDG&E plans to annually inspect approximately 20% of the distribution structures

within the HFTD, on a five-year cycle. The program will start in 2020 and will ramp up to the 20% of structures by 2021. SDG&E will prioritize inspections in Tier 3 of the HFTD, before moving on to Tier 2. Within the next three years, SDG&E plans to ramp up the inspection program to include up to 20% of the structures within the HFTD resulting in a five-year inspection cycle. As the program is implemented, this timeframe will be evaluated based on findings.

5.3.4.5. Infrared inspections of transmission infrastructure

SDG&E currently performs yearly IR inspections for all energized overhead transmission equipment. The purpose of these inspections is to proactively look for potential issues on electrical connections and equipment that cannot be seen during SDG&E's traditional visual inspections. This program utilizes high-grade IR technology to identify thermal hotspots in equipment and connections. The goal of this program is to proactively identify potential issues on electrical connections and equipment that could lead to wire downs or ignitions on SDG&E's transmission system. The number of issues identified for correction will be tracked and will be evaluated to determine effectiveness.

The IR inspections will generate repair orders to address any infractions discovered as part of the IR inspection. Overall, these inspections and associated repairs will reduce the potential for equipment failure on SDG&E's overhead system, including wires down, which can cause ignitions. These inspections will be conducted primarily via air but may also be conducted from the ground.

Transmission inspections are performed on 100% of the transmission lines within the HFTD. To ensure completion, SDG&E's thermographer team will shift resources as needed to meet this yearly cycle.[39] The table below summarizes the top corrective transmission maintenance orders for 2019.

Table SDG&E 7: Top Corrective Transmission Maintenance Orders for 2019[40]

Maintenance Order	Qty
Shield Wire Attachment – Heat Damage	1
Jumper – Heat Damage	1

As conditions allow, prior to the first Red Flag Warning event of the 2020 wildfire season, SDG&E plans to complete an additional set of transmission infrared inspections on tie lines located within Tier 3 of the HFTD which are likely to be impacted by high winds. The transmission infrared inspection program currently completes an infrared patrol on 100% of

[39] SDG&E uses the same thermographer team to perform the IR inspections for both transmission and distribution infrastructure. *See* Section 5.3.4.4 above for a discussion of the composition of the thermographer team as well as their responsibilities.

[40] Represents only maintenance orders created based on findings from 2019 transmission infrared inspections

energized structures and tie lines within the HFTD. The only planned evolution is noted in the section above for evolution prior to the 2020 wildfire season.

5.3.4.6. Intrusive pole inspections – distribution

SDG&E performs wood pole intrusive inspections on a 10-year (average) cycle. Each pole is inspected visually and, if conditions warrant, intrusively. GO 165 requires that any pole 15 years of age or older is inspected intrusively. The form of the intrusive inspection is normally an excavation about the pole base and/or a sound and bore of the pole at ground-line. Treatment is applied at this time in the form of ground-line pastes and/or internal pastes. The 10-year cycle fulfills the requirements of GO 165: 1) all wood poles over 15 years of age are intrusively inspected within 10 years and 2) all poles which previously passed intrusive inspection are to be inspected intrusively again on a 20-year cycle.

Depending on the cavities found, or the amount of rot found, an estimate of the remaining pole strength is determined utilizing industry-wide standards. Depending on the severity of the deterioration, the pole either passes, must be reinforced with a steel truss to provide it another five to ten years of useful life, or replaced. This replacement and reinforcement processes are described in Section 5.3.3.6 above. The following table summarizes the top conditions found during intrusive inspections on distribution poles in 2019.

Table SDG&E 8: Top Conditions Found on Intrusive Inspections on Distribution Poles in 2019

Condition	Count
Climbing Inspection Recommended	696
Restoration Recommended, C-Truss	222
Pole Leaning Badly	112
Restoration Rejected, Replace	96
Pole replacement from POIN	3

5.3.4.7. LiDAR inspections of distribution infrastructure

LiDAR Survey has evolved into a necessary function for overhead transmission and distribution line engineering analysis and design. The transmission department was an early adopter of utilizing LiDAR into its designs. In 2013, with the start of the FiRM program, SDG&E began utilizing LiDAR for the distribution system for clearance and structural adequacy. LiDAR surveys provide the most cost effective, scalable and accurate solution for overhead power line analysis increasing both system reliability and safety.

Ideally, a transmission or distribution line should be susceptible to modeling with a single deployment of LiDAR and subsequent modeling. But in actual experience, transmission and distribution systems are often changing with joint use additions; customer relocations; compliance, reliability and maintenance modifications; conductor creep and pole settling; and external development. Rural transmission lines, particularly those in the HFTD, require

attentive vegetation analysis. As such, it is important that LiDAR is relatively recent, and field verified. Distribution utilizes LiDAR data to perform the following critical functions: post-construction survey, and pre-construction design.

Quality control is often a function of the LiDAR survey postprocessing. LiDAR vendors use relevant statistical sample sizes to verify LiDAR point returns to established physical and photogrammetric controls. SDG&E's specifications establishes the requirements for LiDAR survey including horizontal and vertical accuracy to physical benchmarks with ground control. When quality issues are missed from the LiDAR provider and recognized by SDG&E (or contractor) design staff, these issues are relayed to the LiDAR provider for system-wide auditing. Common issues (missing data, duplicate points, weather data) can be resolved through post-processing calibration and often do not require redeployment of aircraft.

As stated above, LiDAR is a critical component of all overhead line engineering functions and analysis. Its effectiveness has already been well-established. While the deployment technology and processing are continuously changing, the largest change for SDG&E is LiDAR deployment for overhead distribution lines. As SDG&E's fire hardening projects roll out, additional pre-LiDAR and post-LiDAR design and analysis follow. Additionally, pilot vegetation analysis of HFTD projects using LiDAR are underway (see Section 5.3.5.7). SDG&E's overhead hardening programs plan to utilize LIDAR as needed to support its WMP projects and programs.

SDG&E does not anticipate major changes to the use of LiDAR over the next three to ten years and will continue to monitor the advancements in the technology of LiDAR detection and implement new features as deemed useful.

5.3.4.8. LiDAR inspections of transmission infrastructure

As discussed in the previous section, LiDAR Survey has evolved into a necessary function for overhead transmission and distribution line engineering analysis and design. LiDAR acquisition and inspections will continue to support the transmission and distribution fire hardening efforts. SDG&E plans to assess transmission lines for vegetation and clearance compliance with a targeted completion of all HFTD Tier 3 projects by the end 2021. Section and structural usage analysis based on the same LiDAR set, will follow in 2022.

Additionally, Tier 2 transmission projects will be analyzed for vegetation and clearance compliance. Tier 3 projects will finalize section and structural analysis leveraging LiDAR data acquired by the end of 2021. Tier 2 section and structural analysis will be evaluated for necessity depending on the status of other fire-hardening initiatives. LiDAR Inspection will continue to supplement the fire hardening efforts and post-construction analysis. Vegetation and clearance checks will be fully implemented within the HFTD and potentially expand into non-HFTD projects. Results of these analyses will also be used for emergency operations during red flag and other extreme events.

5.3.4.9. Other discretionary inspection of distribution infrastructure beyond requirements

5.3.4.9.1. HFTD Tier 3 inspections

SDG&E has implemented an HFTD Tier 3 Inspection program to perform Quality Assurance/Quality Control (QA/QC) inspections within the HFTD Tier 3 prior to fire season. These additional proactive inspections are scheduled on a three-year cycle, in addition to the GO 165 five-year detailed inspections, exceeding the requirements of GO 165, and are designed to identify potential structural and mechanical problems before they fail. SDG&E has performed HFTD Tier 3 Inspections of its overhead electric distribution poles in high risk fire areas with a focus on identifying areas where maintenance would improve fire safety and reliability, with a goal of mitigating the probability that SDG&E's overhead electric system, facilities, and equipment would be the source of ignition for a fire.

These inspections were conducted from 2010 through 2016 as a result of a settlement agreement adopted in D.10-04-047. In 2017, SDG&E decided to proactively continue the HFTD Tier 3 Inspections as part of its normal program. In 2018, when the CPUC adopted the current statewide fire threat map, SDG&E began applying the QA/QC three-year cycle to the newly defined HFTD Tier 3. From 2016 to 2018, SDG&E performed HFTD Tier 3 Inspections on an average of 15,000 poles annually (approximately one-third of the distribution poles in the HFTD Tier 3) in its then-existing "extreme" and "very high" fire threat areas.

In addition to the inspections, SDG&E performs a system maintenance patrol (as specified by GO 165) for the entire overhead electric distribution system in the HFTD on an annual basis. Safety-related issues identified on those patrols are scheduled for follow-up repair.

For HFTD Tier 3 Inspections, the main purpose is to identify fire safety conditions in the HFTD Tier 3. SDG&E performed 15,176 inspections in the HFTD Tier 3 in 2019. The table below, summarizes the top 5 conditions found from the HFTD Tier 3 Inspections. All conditions found on the SDG&E electric distribution system from the HFTD Tier 3 Inspections in 2019 have been fully resolved. For conditions involving third-party communications providers, SDG&E has provided notifications to those communication companies.

In addition, SDG&E intends to accelerate repairs of these types of conditions found in the Tier 2 and 3 of the HFTD (including the design, engineering, and construction of the new structures) faster than the six-month or twelve-month time frame required by the Commission's General Orders. This will reduce the risk of wildfire on an accelerated schedule within the highest risk areas. The table below shows the top five conditions found on HFTD Tier 3 inspections for 2019.

Table SDG&E 9: Top Five Conditions Found on HFTD Tier 3 Inspections for 2019

Condition Found	Count
Damaged Poles	121
Vegetation	38
3rd Party Communication Issues	36
Damaged Cross-arms	32
Leaning Poles	14

SDG&E measures the effectiveness of inspection programs by the number of significant issues found on inspections. When SDG&E switched from performing detailed inspections once every five years, to adding an additional inspection once every three years in the HFTD (total detailed inspections for Tier 3 structures averages out to be .53 per year so a little over every other year), the rate of issues found dropped from 20% from a five-year cycle down to 3% with the additional inspections.

SDG&E completes HFTD Tier 3 inspections before wildfire season every year. SDG&E plans to continue these inspections for the long-term.

5.3.4.9.2. Drone assessments of distribution infrastructure

SDG&E will enhance its existing inspection efforts by implementing and utilizing drones. This innovative technology is capable of capturing imagery of overhead structures in the HFTD from multiple angles, including from above the structure, which can help identify issues posing a potential ignition risk. Utilizing drones to capture images from above, allows qualified personnel to gain a visual perspective that cannot be achieved from normal ground-based inspections. The imagery data from the drone assessments will be uploaded to a new centralized database application to allow for qualified personnel to identify infractions that could result in a fire hazard. These assessments will then generate repair orders to address the various fire hazard infractions discovered as part of the assessment, which will reduce the risk of ignition caused by equipment or structural failure of SDG&E's overhead system.

The data generated will be analyzed to determine trends and patterns of infractions to quickly identify systemic issues and support more proactive replacements, including more programmatic approaches to reducing ignition risk. Assessments of the images will also enable SDG&E to build a repository of annotated images that will facilitate the development of intelligent image processing capabilities. The annotated images collected during the assessment step showing whether a component is good or damaged, will be used to train and refine a machine learning model over time. After the model is trained to identify potential damages, these algorithms can be used to quickly analyze and prioritize assets that may pose a risk. The technology solution has the potential to greatly increase safety by rapidly detecting potential asset risks before they become public safety issues. In addition, the capability will increase insight, awareness, and confidence in our asset information to support on-going risk mitigation activities. Preventing equipment failure and investing in innovative technology now,

will ultimately allow for more efficient and economical infrastructure maintenance in the future.

SDG&E continues to look for new technologies and mitigations to reduce the risk of utility caused wildfires. Early results from the pilot program initiated in September 2019, show infractions identified that were not detected from the ground. SDG&E began this pilot, learning from the successes that other utilities had with their drone inspection programs. SDG&E completed research and development prior to rolling out its drone assessment program. This was to help ensure SDG&E chose the correct approach and equipment needed to properly capture images by drones on the electric system.

The portion of SDG&E's QA/QC team that is dedicated to the drone project consists of team leads, foremen, and inspectors. All such individuals are experienced journeyman linemen. The structures and their accompanying images are assigned to the image review team for assessment. Once the assessment is complete, the preliminary assessment report goes through a peer check process prior to approval by the team lead. If the final assessment report identifies a potential infraction, the report is then sent to the engineering and design management team where the issues are sorted based on the type of infraction and assigned to the appropriate group to initiate and execute the repair (e.g., vegetation management, CIP, customer service connection, issue requiring engineering/design, etc.).

All issues found that require repair also have an urgency level assigned to them. Once the issue is sorted by urgency level and assigned to the appropriate responsible group, individuals from that group validate the infraction and the standard SDG&E QA/QC process is followed as needed for design review and quality checks are performed during and post-construction/repair.

The process is set up in this manner to ensure quality and consistency of the inspections and urgency/time frames assigned. SDG&E management regularly conducts spot-check audits of the processes and inspection reports to ensure oversight and accountability of the program.

SDG&E tracks the issues identified through this inspection method. These records are evaluated to identify the quantity and types of issues found in order to demonstrate the effectiveness of the program. Information collected will be compared to inspections performed as part of SDG&E's routine inspection efforts along with the cost of implementation of the other programs. In addition, SDG&E will test the algorithms developed by the machine learning technology to validate the use of technology to identify the condition of distribution assets and evaluate the best approach to deploy these algorithms within its existing system. Based on the results, SDG&E may modify the drone program to reduce the human resources needed to execute the program in the future.

SDG&E started a pilot program in 2019, which will continue into 2020, to assess approximately 40,000 distribution structures within the HFTD Tier 3. This pilot program was not included in SDG&E's 2019 WMP. The pilot effort enabled us to develop the standards, processes, and

other materials necessary to effectively implement the program that remains ongoing into the first quarter of 2020. This included developing, requirements for pilot vetting, flight planning, training materials for field personnel, customer outreach and communication procedures, safety and security plans (e.g., program specific fire prevention requirements), software development for the review and markup of images, and workflow processes to properly direct the infraction identified to the appropriate group for repair.

Prior to 2022, SDG&E plans to complete development of all program processes, procedures and technologies, as well as complete the inspections of all its distribution facilities in the HFTD areas. In 2020, SDG&E plans to complete assessment of all the Tier 3 distribution facilities. In 2021, SDG&E will begin assessment of Tier 2 distribution facilities and plans to complete assessment of the entire HFTD (the remaining half of the Tier 2) in 2022. At that point, after the entire assessment of the HFTD is completed, the program will be reevaluated to set up appropriate cycle times, evaluating both the effectiveness of the program at reducing wildfire risk and the overall cost per inspection.

SDG&E will also determine whether to continue utilizing this new technology and the best way to incorporate this assessment approach into its ongoing and route inspection and maintenance programs. As this is a new program, SDG&E will continually assess the effectiveness of the program by reviewing the quantity and quality of issues identified and will adjust the frequency of drone inspections accordingly.

5.3.4.9.3. Circuit ownership

This Circuit Ownership program provides the opportunity for SDG&E's field employees and management of field employees to submit circuit vulnerabilities via a Mobile Data Terminal (MDT) program or mobile application (both iOS and Android). Specifically, this program facilitates supplemental submission of circuit vulnerabilities (in addition to the existing inspection programs) so that they can be timely repaired, to prevent a potential ignition and minimize the risk of wildfire. This program accordingly allows SDG&E to leverage its workforce to self-report identified vulnerabilities related to its system. Each vulnerability is thus evaluated through a consistent method and then prioritized and repaired. While the identified vulnerabilities may not be considered formal infractions, through this program, SDG&E will document and remediate any such findings before issues occur. This program is newly presented herein and was not included in the 2019 WMP.

SDG&E continues to look for new technologies and mitigations to reduce the risk of utility caused wildfires. This pilot program and technology platform will leverage that culture to allow any employee to report infrastructure that looks damaged or out of place. SDG&E will monitor the issues identified through this application and evaluate the impact versus the software update expenses.

A program dashboard was created to establish key performance indicators for each submittal. Management oversight of this dashboard and follow up action items will act as the QA/QC of

the program. SDG&E tracks the issues identified through this inspection method. These records can be evaluated to identify the quantity and types of issues found that demonstrate the effectiveness of the program.

Before next wildfire season, before the next Plan update, over the next three years, and over the next 10 years, this program will continue to be evaluated by management for improvements. Since it is a new program, SDG&E will continue to encourage participation and seek feedback from both front end and back end users.

5.3.4.10. Drone assessments of transmission infrastructure

Like SDG&E's distribution drone assessments, SDG&E will be developing a program to enhance its existing inspection efforts of transmission structures in HFTD areas starting in 2020. While SDG&E currently performs routine aerial inspections of its transmission facilities, the use of drones will further enhance transmission inspections. Drones are capable of capturing imagery of overhead structures in the HFTD from multiple angles and from closer vantage points than observable from a helicopter. SDG&E anticipates that the images collected will help qualified personnel gain a visual perspective that cannot be achieved from normal ground-based or helicopter inspections. The imagery data will be uploaded to the new centralized database application to allow for qualified personnel to identify infractions that could result in a fire hazard. If an infraction is identified during the assessment, a repair order will be generated to address the fire hazard infraction, which will reduce the risk of ignition caused by equipment or structural failure of SDG&E's overhead transmission system.

SDG&E will analyze the data and use it to develop more programmatic approaches to reducing ignition risk, as well as develop intelligent image processing capabilities for transmission facilities as discussed above. SDG&E will develop standards to ensure the consistent and safe collection of images for each facility-type as well as the assessment of the facility for infractions that could present a fire hazard.

SDG&E will focus on inspecting all of its transmission structures in Tier 3 areas in 2020, along with four select circuits in the Tier 2 HFTD that have been identified based on a number of risk criteria, such as age of infrastructure, proximity to wildland vegetation, and weather patterns. SDG&E will then inspect additional structures in the Tier 2 HFTD in 2021 and 2022 and data gathered during this initial deployment will allow SDG&E to evaluate the effectiveness of the program coupled with the cost to ratepayers. SDG&E will implement the same quality checks and audits as are utilized in the distribution drone assessment program. SDG&E will also implement the same evaluation methodology and approach as described above in the distribution drone assessment program.

Prior to the next wildfire season, SDG&E will be developing the program during the first quarter of 2020 and will begin performing inspections of transmission facilities in HFTD areas in second quarter of 2020. SDG&E plans to complete inspections of transmission structures in Tier 3 HFTD in 2020 and select Tier 2 areas in 2020 and 2021. Over the next three years, SDG&E

expects to perform drone inspections of all Tier 3 structures and select Tier 2 tie lines in 2020. In 2021 and 2022, SDG&E will inspect additional Tier 2 transmission structures.

As this is a new program, SDG&E will continually assess the effectiveness of the program by reviewing the quantity and quality of issues identified and will adjust the frequency of drone inspections accordingly. At the end of 2022, SDG&E will evaluate whether to continue to the program and what the appropriate cycle would be to effectively implement the program based on costs to the ratepayers and reduction in potential fire risk to the community.

5.3.4.11. Patrol inspections of distribution poles - CMP

In general, utilities must patrol their systems once a year in urban areas and in HFTD Tier 2 and Tier 3. Patrols in rural areas outside of HFTD Tier 2 and Tier 3 are required to be performed once every two years. As a long-standing practice, however, SDG&E performs patrols in all areas on an annual basis. In addition to the patrols, utilities must conduct detailed inspections at a minimum every three to five years, depending on the type of equipment. These detailed inspections are discussed in Section 5.3.4.1 above. The table below summarizes the top five conditions found on patrols of distribution poles in 2019.

Table SDG&E 10: Top Five Conditions Found on Patrols in 2019

Condition	Count
Damaged/Missing High Voltage Signs; two-man repair	539
Damaged Crossarm	247
SDG&E Leaning Pole or Potential Overload	152
SDG&E/Vegetation Caused Pole Inaccessible or Cannot Locate	146
Private Property Caused Cannot Open, Locate, or Inspect	130

The annual patrol inspections are mandated by GO 165. Upon completion of prescribed actions necessitated by the detailed CMP inspections, SDG&E conducts an audit to ascertain the effectiveness of the inspections. This audit is managed by SDG&E's operational and engineering managers, who are responsible for certain districts. The managers typically select about 1.5% of the combined (overhead and underground) territories and assess their conditions to see if the appropriate improvements have been properly carried out. This audit work is also discussed in Section 5.3.4.14 below.

SDG&E tracks the issues identified through this inspection method. These records can be evaluated to identify the quantity and types of issues found that demonstrate the effectiveness of the program. Before the upcoming wildfire season and next Plan update, as well as over the next three and ten years, SDG&E will continue to comply with GO 165.

5.3.4.12. Patrol inspections of transmission poles

The transmission patrol inspections consist of visual inspection and detailed inspections. Visual inspections are conducted once per year on all overhead tie lines within the HFTD. These inspections, conducted by helicopter, allow for an aerial perspective of overhead structures, conductor spans and right-of-way encroachments. These inspections are designed to identify obvious structural problems and hazards. Structures that cannot be accessed by helicopter (structures in Federal Aviation Administration air space) are driven for the visual patrols. Prior to September 1st of each year, SDG&E performs an additional visual patrol of all 69kV tie lines located within Tier 3 of the HFTD.

Detailed inspections are completed every three years on all overhead lines within the HFTD. Inspection cycles may be adjusted to meet operational needs provided the new target date does not exceed the original three-year date. This detailed inspection of overhead structures and attachments is performed to identify possible safety hazards and system defects while ensuring compliance with PRC Sections 4292 and 4293, GO 95, and GO 128. These inspections also include assessment of access roads, vegetation, right-of-way encroachment and vandalism.

SDG&E works to complete all visual inspections on a yearly basis and all detailed inspections every three years. Additional transmission patrollers will be deployed to tie lines as required to ensure 100% completion of inspections during the planned duration. SDG&E performs multiple visual patrols each year. Two transmission patrollers are utilized simultaneously for these visual patrols to ensure the quality of the inspection. In addition, SDG&E Transmission supervisors perform an audit of 1% of repaired findings to ensure the findings are being properly repaired.

Table SDG&E 11: Top Corrective Transmission Maintenance Orders for 2019[41]

Maintenance Order	Qty
Pole Top – Rotten	2
Bird Nest Removal	2
Splice – Broken	1
Insulator – Damaged	1

SDG&E tracks the issues identified through each method of inspection and patrol. These records can be evaluated to identify the quantity and types of issues identified to demonstrate the effectiveness of the program. As conditions allow, prior to the first event of the 2020 wildfire season, SDG&E plans to complete an additional set of transmission visual inspections on tie lines.

[41] Represents only maintenance orders created based on findings from 2019 transmission visual inspections.

The transmission visual inspection program completes patrols on 100% of structures and tie lines within the HFTD on a yearly basis. The detailed inspection program completes patrols on 100% of structures and tie lines within the HFTD every three years.

5.3.4.13. Pole loading assessment program

Please see Section 5.3.3.3 above.

5.3.4.14. Monitoring and auditing of inspections

SDG&E utilizes various reports to monitor its CMP progress, for both inspections and repairs. In addition, regular monthly meetings are held with various internal construction and operations centers to discuss detailed CMP progress and compliance.

Upon completion of prescribed actions necessitated by the CMP inspections, SDG&E conducts an audit to ascertain the effectiveness of the inspections. This audit is managed by SDG&E's Operational and Engineering managers, who are the ones responsible in each of our districts. They randomly select 1.5% of the combined (overhead and underground) inspections and assess their conditions to see if the appropriate improvements have been properly carried out.

5.3.4.15. Substation system inspection

SDG&E's Substation System Inspection and Maintenance Program is mandated by the CPUC through GO 174 and promotes safety for SDG&E personnel and contractors by providing a safe operating and construction environment. This is accomplished through routine inspections at reoccurring cycles. A security check is planned once per week, and a more detailed inspection is planned monthly or bimonthly, which takes a visual look at equipment and attempts to identify any problems, like oil leaks.

Substation System Inspections, while conducted primarily for reliability, also provide incidental wildfire mitigation benefits. Specifically, this inspection program mitigates the risk of equipment failure, which has the potential to cause ignitions, by identifying equipment deterioration to make the repair or replacement before failures occur. In this instance, equipment failure can lead to fires in oil-filled substation equipment; however, those fires would be contained within the substation footprint. Thus, SDG&E's inspection and maintenance programs have incidental wildfire mitigation benefits when performed within the HFTD and wildland urban interface.[42]

Additional goals of this program include: meeting the requirements of GO 174, achieving a level of station availability satisfactory to SDG&E's health and safety programs and maintenance standards, and assuring compliance with all sections of the California Independent System Operator (CAISO) Transmission Control Agreement (TCA).

[42] Wildland urban interface refers to a zone of transition between wildland (unoccupied land) and human development, which is at risk of wildfire.

Inspection Frequencies

SDG&E's routine substation inspections are completed at reoccurring cycles as described in the table below. Planned frequency is the cycle for which maintenance is regularly initiated. Acceptable frequency is the planned frequency plus the due time or condition tolerance within which maintenance shall be completed to be in compliance with filed maintenance practices. The table below provides the substation inspection frequencies.

Table SDG&E 12: Inspection Frequencies

Inspection	Planned Frequency	Acceptable Frequency
Substation Security Check	Once per week	9 per 12 weeks
Substation Inspection	Once per month (Priority 1); Once per two months (Priority 2)	10 per every 12 months (Priority 1); 5 per every 12 months (Priority 2)
Substation Infrared Inspection	12-month Trigger	Due in 15 months

SDG&E applies the same prioritization criteria to substations inside and outside of the HFTD. Priority 1 substations have an operating voltage above 200kV or have a total of 4 or more transmission lines at or above 69kV. All other substations are categorized as Priority 2. All substations have a Security Check planned once per week.

SDG&E regularly monitors its inspection programs and ensures all inspection goals are met. The supervisor who oversees the Substation Inspection Program regularly conducts spot checks of substations, ensuring the quality of inspections conducted. The substation inspections serve multiple purposes, to gather information on equipment (such as circuit breaker odometer readings) and to identify items that require follow-up.

Table SDG&E 13: Top Five Corrective Substation Maintenance Orders for 2019[43]

Maintenance Order	Qty
Switchyard Vegetation Removal	73
N2 Cylinder Replacement	26
LTC Pass Through Neutral	23
Petro Pipe Repair / Replacement	23
Disconnect Switch Lube & Adjust	21

Substation System Inspections, which provide incidental wildfire mitigation benefits, are conducted primarily for reliability. The substation inspection program has been refined over

[43] Corrective maintenance orders are opened for any item requiring follow-up. SDG&E does not identify the source of the corrective maintenance order (Scheduled Substation Inspection or some other method). Not all of the items in the table above were captured by the substation inspection program alone.

the years, and there are no current plans to change the program before the 2020 wildfire season, the next Plan update, or over the next three to ten years.

5.3.5. Vegetation management and inspections

Instructions: *Explain the rationale for any utility ignition probability-specific inspections (e.g., "enhanced inspections") within the HFTD as deemed necessary over and above the standard inspections. This shall include information about how (i.e., criteria, protocols, etc.) the electrical corporation determines additional inspections are necessary.*

Describe the utility's vegetation treatment protocols relating to treatment of any vegetation that could pose a grow-in or fall-in risk to utility equipment. Include in the description the threshold by which the utility makes decisions of whether to (1) treat, or (2) remove vegetation.

Discuss the overall objectives, strategies, and tactics of the electrical corporation for vegetation management. In the discussion,

1. *Address how the electrical corporation has collaborated with local land managers to leverage opportunities for fuel treatment activities and fire break creation, and compliance with other local, state, and federal forestry and timber regulations.*
2. *Discuss how the electrical corporation identifies and determines which vegetation is at risk of ignition from utility electric lines and equipment.*
3. *Describe how (i.e., criteria, data, protocols, studies, etc.) the utility made the determination to trim any vegetation beyond required clearances in GO 95.*
4. *Describe utility plan to mitigate identified trees with strike potential, including information about how (i.e., criteria, protocols, data, statutes, etc.) the electrical corporation identifies and defines "hazard trees" and "trees with strike potential" based on height and feasible path to strike powerlines or equipment. Describe utility plan to identify reliability/at-risk tree species to trim or remove, where feasible, per location-specific criteria.*
5. *Include a discussion of how the utility's overall vegetation management initiatives address risks that may arise from trimming or removing trees, including but not limited to erosion, wind, flooding, etc.*

As part of its efforts to make its electric system more resistant to wildfires, and to comply with relevant Commission rules and state law, SDG&E designed and actively maintains a vegetation management program aimed at keeping trees and brush clear of electric power lines.[44] SDG&E's vegetation management program involves several components, such as: tracking and maintaining a database of trees and poles that are located close to electric infrastructure; regular patrolling, pruning, and identifying and removing hazardous trees and replacing with the right tree at the right place; pole maintenance with pole brushing and clearing; training first responders in electrical and fire awareness; and red flag operations. These program components are discussed in more detail below.

[44] SDG&E's vegetation management program complies with current regulatory requirements, such as GO 95, Rule 35 and PRC §§ 4292 and 4293, and in some areas, exceeds the minimum regulatory requirements. It also follows the North American Electric Reliability Corporation (NERC) vegetation reliability standard FAC-003-04.

SDG&E's strategy for conducting its vegetation management program focuses on annual routine and enhanced inspections. Routine operations are driven by regulatory requirements following a master schedule that includes the activities of pre-inspection, trimming, auditing, and pole brushing. Enhanced inspections augment the operations by including incremental activity frequency and scoping to address potential line strikes and fire hazard.

For both routine and enhanced activities, SDG&E has identified tree species to target for enhanced trimming and removal. The criteria for determining target species include factors such as growth rate and characteristics, failure potential, outage history, and other environmental factors. Targeted species include eucalyptus, palm, oak, pine, and sycamore. SDG&E's vegetation data indicates these species have the highest relative frequency of tree-related outages. Many of these trees, such as eucalyptus and sycamore, are fast-growing and have a propensity to shed branches during wind conditions.

SDG&E maintains an electronic tree database that tracks the inspection, trimming, and auditing activity of its nearly 460,000 inventory trees. SDG&E defines an inventory tree as one that could encroach the minimum clearance or otherwise impact the electrical facilities within three years of the inspection date. The database includes information pertaining to the tree including species, height, diameter, growth rate, clearance, and other characteristics. This history provides the inspector the information with which to determine which trees require work for the annual cycle. The tree inventory database is updated daily reflecting trees that are added to or removed from the system. SDG&E employs a contracted workforce of ISA-Certified Arborists trained in tree species characteristics and hazard assessment.

SDG&E schedules its enhanced tree inspections within the HFTD to coincide with the post-trim QA/QC activity. The enhanced inspection activity occurs approximately six months after the routine inspection activity. This inspection frequency enables a second look at trees within the annual cycle to ensure conditions have not changed that may result in a tree/line conflict. In areas of the HFTD where the annual, routine pre-inspection activity occurs during the Fall months (September-December), SDG&E performs the additional, enhanced tree inspection activity in the Spring/Summer months in advance of the dangerous Santa Ana wind conditions.

The protocol and scope for both routine and enhanced inspections within the HFTD includes a visual inspection of all trees that have the potential to strike the electrical facilities if they were to fail at ground level. The visual inspection includes a 360-degree hazard inspection of trees from ground level to canopy height to determine tree health, structural integrity, and environmental conditions. Where appropriate, sounding techniques or root examination may also be conducted.

The scope for determining post-trim clearances includes factors such as species, height, growth rate, health, location of defect, site conditions, proper cuts. SDG&E's post-trim clearances are tree-specific applying each applicable factor. The strategy is to ensure a tree cannot grow into the power lines or otherwise make contact either by branch breakout or trunk failure. SDG&E follows the industry standard of directional pruning to achieve this goal. If a tree cannot be

mitigated by pruning, SDG&E may determine that complete removal is necessary. This course may be followed if pruning will lead to the tree's demise, if the remaining tree poses a threat, or if its growth potential cannot be managed.

SDG&E's vegetation management operations are conducted in consideration of the residual state of the environment where the activity occurs. Debris associated with pruning operations are chipped and removed from the site. All debris is removed from water channels to prevent flooding or erosion. SDG&E works with land agencies such as U.S. Forest Service to implement best practices and Forest Practice Rules in the dispersal and removal of green waste associated with tree pruning/removal operations. SDG&E's vegetation management operations are reviewed for environmental compliance in accordance with regulations to prevent negative impact of species and protected habitat.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Vegetation Management and Inspections initiatives in Sections 5.3.5.1 through 5.3.5.20 below. Table 25 – Vegetation Management and Inspections initiatives is provided in Appendix A.

5.3.5.1. Vegetation management – community engagement

In the effort to inform and engage customers, SDG&E has participated in several community town hall meetings centered in communities in its service territory that are subject to enhanced vegetation management operations. These sessions are coordinated and scheduled through SDG&E Public Affairs and Media Relations Departments and include various stakeholders such as homeowner associations (HOAs), public agencies, first-responders, and fire agencies. During these meetings customers are provided detailed information about Company activities, work scope, and potential impacts to property. Customers are educated on the concept of "Right Tree-Right Place," proper planting near power lines, maintaining safe clearances, and fire safety. SDG&E Vegetation Management personnel participate in Company-led tours of its Emergency Operations Center. These tours are attended by community leaders, elected officials, public agencies, and other invested stakeholders to learn the Company's objectives and execution of its fire mitigation activities.

SDG&E has also produced multimedia content on its internet website to illustrate its enhanced vegetation management operations for the public. SDG&E created a 30-minute documentary about its wildfire safety efforts and advancements. The documentary aired in late 2019 on local TV stations, with trailers being shown in strategically located movie theaters within SDG&E's service territory. Part of the documentary covered SDG&E's vegetation management practices and provided education on the need for these efforts. Collateral materials have also been developed to further educate customers about the need and value of vegetation management. These materials provide tips and recommendations to help customers and residents manage vegetation and defensible space around their homes and businesses.

SDG&E utilizes its contract workforce of professional arborists and tree trimmers to directly engage customers on the positive benefits of safe and proper utility line clearance operations.

All vegetation management contractors are trained in positive customer communications, which affords multiple opportunities to interface with customers regarding vegetation management operations. SDG&E leads and participates in Arbor Day events in several of its communities and utilizes a non-profit vendor to educate the public and school-age children on electrical awareness, and safe and proper management of trees near power lines.

SDG&E is developing its customer engagement activities via a centralized team of associated departments to improve customer outreach and awareness of the various wildfire mitigation efforts. This will include identifying the appropriate customer baseline and various forums to engage customers. SDG&E will continue to conduct pre- and post- event customer research to obtain feedback on the quality of the messaging and communication tactics that are employed. Surveys and focus groups will be used to engage customers and solicit reactions to the public education campaign materials created. Surveys are also employed during the community outreach events. Attendees are asked to provide feedback about the event as well as any additional information they would like at future events. This type of feedback helped SDG&E establish its Community Resource Centers.

As discussed in further detail in Section 5.3.5.9 below, SDG&E intends to enhance its vegetation management effectiveness by increasing post trim clearance to 25-feet on SDG&E's most dangerous tree species and removing hazard trees with strike potential. These enhancements have an impact on customers, and customer communication and education will have a large role in SDG&E's ability to execute these vegetation management enhancements.

SDG&E will continue to create content for its public education campaign, outreach activities and broadcast and social media outreach. Initiatives considered for this effort include:

- Expanded collateral materials to proactively support the awareness of mitigation efforts
- An updated vegetation management education video
- Updated content of the annual public education campaign (e.g., bill insert, HFTD newsletter, social media, TV/radio - broadcast media, sdge.com)
- Educational materials for outreach events such as back-country Open Houses and Fire Safety Fairs
- Continue to air the SDG&E documentary on local TV stations during wildfire season
- Content for public awareness stories pitched to the media outlets
- Develop and air public service announcements/TV and radio commercials

Along with the items listed above, customer, community and stakeholder solicited feedback will lead to the development of additional education opportunities. SDG&E also conducts affected customer research after wildfire season events to gather feedback on communications and process optimization, which is evaluated and incorporated into the WMP Annual Update as

appropriate. Furthermore, SDG&E will continue to evolve a diversified portfolio of customer communications, outreach and public education based on lessons learned.

5.3.5.2. Detailed inspections of vegetation around distribution infrastructure - tree trimming

To comply with Commission rules as well as state and federal laws, SDG&E developed and maintains a vegetation management work plan, which is a schedule-based approach to its operations so that applicable lines within its service territory are inspected each year. SDG&E divides its service territory into 133 distinct zones known as Vegetation Management Areas (VMA). SDG&E's activities in each VMA are driven by a master schedule that identifies specific activities that are calendared to take place in each VMA every year. The activities include: pre-inspection, audit of pre-inspection work, tree pruning and removal, pole brushing, post-trim, and brushing audits. These activities are managed within PowerWorkz. Patrol activities are generally termed to include routine inspections and off-cycle, incremental and enhanced inspections throughout the service territory.

During the pre-inspection activity, trees in proximity to SDG&E's power lines are inspected and evaluated and the tree condition in the database is updated accordingly. Each tree is visited on an annual cycle. The annual inspections include routine maintenance and hazard tree assessments to verify that trees will remain compliant for the duration of the cycle and/or pruned according to standards and clearances. Trees that will not maintain compliance, or that have the potential to impact power lines within the annual pruning cycle, are identified and assigned to the tree contractor to work. If a tree requires urgent work, the inspector has the discretion to issue the job to the tree contractor for priority completion. Emergency pruning occurs when a tree requires immediate attention to clear an infraction or poses an imminent threat to the electrical facilities.

SDG&E tree contractors follow American National Standards Institute (ANSI) A300 industry tree standards and the concept of directional pruning, which fosters the health of a tree while maximizing clearance and extending the pruning cycle. All tree branches overhanging conductors are considered a potential risk. Thus, SDG&E removes all branches that cross the vertical plane of the conductors from the conductor to the top of the tree. Once the work is completed, the tree crew updates the tree information and records the work performed in a mobile data terminal (MDT), then uploads this information into the Vegetation Work Management System. Where prudent and achievable, SDG&E prunes trees 12 feet (or more). The post-pruning clearances obtained by the tree contractor are determined by factors such as species, tree growth, wind sway, and proper pruning practices. On average, SDG&E prunes approximately 175,000 trees each year and removes approximately 8,500 non-compatible trees.

The scoping operations for removing trees includes the chipping of all material and removal of the debris off-site. The only material left on site is the larger wood (> 6-8-inch diameter). Any large debris left on slopes is positioned to prevent movement of the material by gravity. All

debris associated with pruning and removal operations is removed from watercourses to prevent flooding or degradation of water quality. Tree removal operations that may occur in sensitive environmental areas are reviewed to determine protocols that must be followed to protect species and habitat.

Within the HFTD, SDG&E performs routine and non-routine hazard tree inspections annually. These inspections are performed by International Society of Arboriculture (ISA) Certified Arborists. Theses inspections include a 360-degree assessment of every tree within the "strike zone" of the conductors. The strike zone includes the area adjacent to power lines both inside and outside the rights-of-way for trees that are tall enough to potentially strike the overhead facilities. SDG&E completes work identified during the non-routine inspections prior to the start of the peak fire season (September 1). SDG&E requires its contractors to perform hazard tree assessment and fire awareness training annually.

SDG&E has historically utilized a contractor workforce to perform its vegetation management program activities of tree pre-inspection, tree pruning and removals, pole brushing, and quality assurance. SDG&E notes there are general concerns regarding the availability of contractors given that all the electric utilities within California are working expeditiously on vegetation management activities. In the future, SDG&E may seek ways to mitigate this potential exposure to resource constraints. Further, SDG&E will likely experience additional upward cost pressures due, in part, to the enactment of Senate Bill 247 (2019). While the exact impacts of this law are still unclear, it may be interpreted that compensation for represented qualified line clearance tree trimmers will significantly increase.

Safety, regulatory requirements, and service reliability dictate the vegetation management methodology of spend and resource allocation. SDG&E must remain compliant year-round by patrolling its entire service territory and inspecting all trees that have the potential of impacting electrical facilities. A master schedule of inter-related vegetation management activities ensures all components of the plan are completed on an annual basis. SDG&E's Vegetation Management tree inventory database contains a rich, multi-year history of all work performed within the system and informs as to the scope of work and number of resources needed to complete all activities.

SDG&E conducts QA/QC audits on a random sample population of all work completed by its contractors to assess work quality and contractual adherence. The audits are performed by a third-party contractor using statistical analysis. SDG&E's Audit Services department also performs an internal audit on all its vegetation management activities. SDG&E will utilize the results of QA/QC auditing to demonstrate the effectiveness of each component of the program. Other metrics that will inform of the effectiveness will include the number of infractions identified during inspections as well as incidents of tree-related outages.

In 2019, as part of its enhanced vegetation management activities, SDG&E integrated a second hazard tree inspection activity throughout the entire HFTD to coincide with the post-trim audit activity. This inspection activity is performed by ISA-Certified Arborists trained tree species

characteristics and hazard tree assessment. SDG&E will continue its second hazard tree inspection activity as a routine component of the post-trim audit activity before the next Plan update. In addition to its contracted workforce personnel, SDG&E plans to hire in-house inspectors (as SDG&E employees) whose responsibility would be to conduct vegetation patrols of the HFTD as well as additional targeted species patrols.

Over this Plan cycle, SDG&E will determine the need to increase the number of internal SDG&E inspectors within the Vegetation Management program and will further engage with the Fire Science & Climate Adaptation Department in the refinement and application of the Vegetation Risk Index. SDG&E will work to develop a comprehensive audit program to assess and quantify the state of compliance of the Vegetation Management program with regulatory requirements over the next 10 years. These audits will inform on overall success of the program, state of compliance, and procedural integrity.

5.3.5.3. Detailed inspections of vegetation around transmission infrastructure

Please see Section 5.3.5.2 above.

5.3.5.4. Emergency response vegetation management

Please see Section 5.3.5.9 above.

5.3.5.5. Fuels management

Protection of SDG&E's electric system from wildfires is critical to system reliability and first responder and public safety. Accordingly, SDG&E (in partnership with fire departments, fire safe councils, and other stakeholders) is implementing a comprehensive fuels management program to reduce wildfire fuel accumulations. This program removes, thins, or treats vegetation along SDG&E rights of way and adjacent fire-prone corridors. The reduction of wildland fuel in these areas has the potential to slow the spread of fire and makes it more likely that firefighting activities are successful at reducing impacts to the surrounding areas. The reduction of fuel loading adjacent to and under power lines also reduces the risk of the smoke column being thick enough for electricity to flow through the column and come to ground.

This program also enables non-profit organizations in the SDG&E service territory to apply for grant awards ranging from $25,000 - $100,000. SDG&E strongly encourages grant proposals to be innovative, collaborative projects in the highest fire threat areas that identify and support wildland fuel treatment initiatives which modify wildland fire behavior with the goal of reducing burn intensity, limiting spread and aiding in suppression efforts.

SDG&E is expanding this program beyond levels described in the 2019 WMP. The expanded efforts are due in part to the progress of the program, developed through partnering with cooperating agencies (e.g., fire departments, Caltrans, local, state and tribal governments, and land management agencies).

SDG&E intends to continue to prioritize the ongoing development of fuel management initiatives moving forward. This work is closely aligned with the priorities of our partners in the fire agencies and local fire safe councils. SDG&E is not planning to conduct specific audits, though SDG&E is in the process implementing some organizational updates to support quality assurance on these programs including a fuels management professional in the Fire Science and Coordination group.

The emerging fuels management program will improve the long-term state of the fuels in San Diego County. The effectiveness of fuel management can be demonstrated through success stories and though published literature, such as the after-action report from the West Fire. The report specifically described the benefits of fuel management in saving homes during that wildfire.

In 2019, SDG&E significantly increased fuel management initiatives along its right of ways. SDG&E targeted high-risk areas by leveraging subject matter expertise from its Fire Science and Coordination team to identify the highest risk regions, and then further refined areas by cross referencing with CAL FIRE's "Extreme" fire risk areas. SDG&E then work with landowners to enhance fuel management efforts in these areas.

SDG&E also reviewed several proposals and awarded four grants for fuel management work within the HFTD in 2019. Rincon Reservation, Pauma Reservation, and La Jolla Reservation were each awarded grants in the amount of $75,000. San Diego Fire Safe Council (FSC) was awarded a $100,000 grant to be distributed to the following three Fire Safe Councils: Wynola FSC, Palomar FSC, and Deer Springs FSC. Each of the proposals that were awarded funding targeted a circuit or tie line within the HFTD for fuel management.

Prior to the 2020 wildfire season and before 2021, SDG&E will continue to expand upon the work that was completed in 2019 to develop additional relationships and collaboration efforts in the fuel management community. SDG&E will closely track the work completed through our Hazard Fuels Management Grant program and will continue to expand upon our efforts to conduct fuel management initiatives on our rights of way.

Over the next three years this program will be focused on expanding community partnerships and collaborating with governmental sectors. SDG&E subject matter experts specializing in fuel management will continue to advise and help guide the program in coordination with fire agency initiatives and goals. Over the next ten years, SDG&E will continue to build upon the work completed over the next three years with the same guiding principles to expand community partnerships, collaborate with academia and the governmental sectors, and ensure that SDG&E has the best possible fuel management program to support regional wildfire safety.

5.3.5.6. Improvement of inspections

Please see Section 5.3.5.9 below.

5.3.5.7. LiDAR inspections of vegetation around distribution infrastructure and vegetation management technology

SDG&E periodically utilizes LiDAR as a tool in its vegetation management operations. This technology augments and enhances the inspection activity by determining the empirical spatial relationship between trees and power lines. SDG&E is researching future use of LiDAR to identify change detection on trees, to serve as an audit tool, and to identify pole movement and equipment condition, although this technology is still in the early phases of development.

SDG&E plans to use LiDAR technology following the routine tree trim activity in portions of the HFTD as an audit tool to confirm safe and compliant clearances between trees and power lines. SDG&E will assess the incremental benefit of LiDAR based on the timeliness of data acquisition and the ability to integrate the technology into its routine activity schedules.

In 2019 SDG&E entered into contract with a vendor that developed a mobile phone app which utilizes LiDAR data and PLS-CADD modeling for field verification of tree clearances, line movement, and position relative to electric infrastructure. Thus far, data modeling and acquisition has been somewhat inconsistent, but SDG&E continues to pilot the use of the app within its routine tree inspection activity.

SDG&E expects to use LiDAR technology to some degree across multiple company initiatives and throughout a larger portion of the service territory before 2021. As the frequency of flights increase, Vegetation Management will utilize the data as an integral component of the HFTD auditing and inspection activities.

Over the next three years, SDG&E will monitor the improvement of LiDAR technology to the extent it can inform not just of relative clearances but also in the identification of tree species, tree hazards, and change detection. The advancement in this arena will increase the benefit of the technology and the integration of tree hazard assessment throughout the service territory. Program evolvement over the next 10 years will depend entirely on the advancement of the technology.

As another tool in the management of its inventory trees, SDG&E has in recent years implemented the use of Tree Growth Regulators (TGR), which is a chemical application that dramatically reduces the new shoot growth of trees. Results have shown that the use of TGR can reduce the frequency of pruning on some species of up to three years. An added benefit of using TGR is that it provides growth reduction, root and leaf enhancement, and in some instances can help with disease and insect protection.

SDG&E has begun to integrate data science into its vegetation management operations. SDG&E is utilizing the information from its tree inventory database, outage history and meteorology data to develop its VRI of the highest tree risk areas of its service territory. The goal of this initiative is to leverage machine learning and artificial intelligence techniques to correlate SDG&E's extensive vegetation and meteorological datasets to gain additional insights on how

atmospheric conditions impact growth rate of certain species and to identify certain high-risk vegetation areas.

5.3.5.8. LiDAR inspections for vegetation around transmission infrastructure

Please see Section 5.3.5.7 above.

5.3.5.9. Other discretionary inspection of vegetation around distribution infrastructure – Enhanced inspections, patrols, and trims

In its 2019 WMP, SDG&E proposed enhancements to its current vegetation management practices related to inspections, patrols, and trimming (specifically in the HFTD) as well as training. SDG&E proposed that, during the annually scheduled routine inspections, the pre-inspection scope for all VMAs would be increased to include trees within the strike zone of transmission and distribution electric facilities. Trees tall enough to strike overhead electric lines will be assessed for hazardous conditions, and tree crown height will be reduced or removed to prevent a line strike from either whole tree failure or limb break out. This would include dead, dying and diseased trees, live trees with a structural defect, and locations with dense tree population that could strike as a result of wind exposure. Greater consideration would be given to environmental conditions that can impact a tree's relationship to the electric facilities, such as wind sway and line sag. The Commission approved SDG&E's enhanced vegetation management proposal on a pilot basis.[45]

This same scope and criteria will be applied during off-cycle tree patrols of all VMAs within SDG&E's service territory. These additional patrols will be timed to occur mid-cycle, with the routine inspection, so that all lines are reviewed twice annually in accordance with the enhanced scope.

SDG&E's tree-trim scope will be increased to achieve a 25-foot clearance post-prune, where feasible, between trees and electric facilities within the HFTD. This is a significant increase over the average 12 feet post-prune clearance that SDG&E currently achieves. There may be some barriers to fully achieving this goal. For instance, environmental agencies, land agencies, and customers may oppose the tree pruning to this new clearance. Nevertheless, SDG&E expects to work through these issues to achieve the desired wildfire risk mitigation.

Given that tree growth is by some degree uncertain and is a product of items outside of SDG&E's control (e.g., weather), additional post-prune clearance provides another layer of mitigation to prevent a vegetation contact with SDG&E's overhead equipment. All tree operations will use the concept of directional pruning, where all branches growing towards the lines will be rolled back to direct the growth away from the lines and to increase the post-trim clearance. These activities are expected to incrementally decrease the risk of tree branches contacting electric facilities, whether by growth encroachment, limb failure, or complete tree failure.

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[45] *See generally* D.19-05-039 at 8-10.

In addition, during elevated or extreme weather events, SDG&E's vegetation management contractors are kept informed of the conditions, allowing them time to relocate crews into safe work areas. In instances of emergency tree pruning during elevated fire conditions, additional fire equipment or support from the contracted, professional fire services may be utilized.

In advance of a forecasted RFW, SDG&E will determine if vegetation management patrols are warranted to reassess tree conditions in advance of, during, or immediately following red flag events. SDG&E's Meteorology team will work with the Fire Coordination and Vegetation Management departments to determine where this activity should occur. These inspections are incremental to the routine cyclical inspections.

Further, SDG&E provides electrical equipment training to CAL FIRE representatives. While CAL FIRE inspections have been jointly performed with SDG&E, this training is intended for CAL FIRE to better understand the operation of the electric system and which equipment should be targeted to best prevent an ignition source. This training can be used by CAL FIRE while they are conducting their day-to-day operations and inspections and is dependent on CAL FIRE's participation. CAL FIRE has communicated it will not be available for training in 2019 but will make themselves available in 2020 and future years.

SDG&E's enhanced vegetation management program is consistent with the intent presented in the 2019 WMP. As SDG&E has implemented enhanced inspections, patrols, and trimming, it has identified additional tools, fleet, and crews are needed to support this program. As such, the costs were expanded as compared to what was estimated in the 2019 WMP.

SDG&E prioritization for spending and resources is dependent on safety, compliance, reliability, and budgeting allocations. As a starting point, SDG&E uses its Master Schedule to determine when and where activities should be performed. Routine operations such as inspection and tree trimming follow an established scope to meet the requirements. Additional and enhanced activities expand on these operations to focus on the higher risk within the HFTD. SDG&E works with its contractors to determine the adequate number of personnel and equipment to complete all routine and enhanced activities.

SDG&E conducts QA/QC audits on a random sample population of all work completed by our contractors to assess work quality and contractual adherence. A third-party contractor performs the audits using statistical analysis. SDG&E will utilize the results of QA/QC auditing to assess the effectiveness of each component of the program. Other metrics that will inform of the effectiveness will include the number of infractions identified during inspections, as well as incidents of tree-related outages. SDG&E will perform post-trim audits on all completed tree trim activities conducted during the off-cycle activities.

Before the upcoming wildfire season, SDG&E is planning to create internal SDG&E inspector positions to augment the contractor workforce to perform the off-cycle HFTD and additional patrol activities for target species, such as Century plant and bamboo. Tree contractors will be

adding to their work force to meet the demand of the increased workload associated with enhanced scoping. Prior to 2021, SDG&E will expand its wildfire mitigation activities with a fuels modification activity which will include the thinning and removal of non-native, flammable vegetation around structures to reduce the risk of ignition due to electrical facilities.

SDG&E will continue to refine and expand the use of its Vegetation Risk Index over the next three years to identify where to target additional trimming and removal activities. SDG&E will work with CAL FIRE to schedule annual training and joint inspection activities. SDG&E will continue to partner and collaborate with fire agencies and stakeholders on fire avoidance and fuel reduction initiatives. Over the next 10 years, SDG&E will continue to build and grow its fuel modification program to include modifying the vegetation cover within its rights-of-way.

5.3.5.10. Other discretionary inspection of vegetation around transmission infrastructure

Please see Section 5.3.5.9 above.

5.3.5.11. Patrol inspections of vegetation around distribution infrastructure

Please see Section 5.3.5.2 above.

5.3.5.12. Patrol inspections of vegetation around transmission infrastructure

Please see Section 5.3.5.2 above.

5.3.5.13. Quality assurance/quality control of inspections

SDG&E utilizes a third-party contractor to perform quality assurance audits of all its vegetation management activities. These audits include a statistical analysis of a representative sampling of all completed work. A minimum random sampling of 10% is audited to determine compliance with scoping requirements. Safety, regulatory requirements, and service reliability dictate the vegetation management methodology of spend and resource allocation. SDG&E works with audit contractor to determine the scope, frequency, and number of resources needed to complete all audit activities.

During the post-prune audit, the Certified Arborist also performs an inspection of all the power lines within the VMA for any trees that will not remain compliant with applicable regulatory requirements for the duration of the annual cycle. SDG&E and the contractor review the results to determine if any additional work is required. SDG&E performs an annual, internal audit of its vegetation management program through its Internal Audit Services Department.

Before the upcoming 2020 wildfire season, SDG&E's audit contractor will hire additional personnel to perform an anticipated increase in audit scope and activities. Before an annual update, SDG&E anticipates completion of 100% audit on all its enhanced HFTD trim and removal activities. By 2022, SDG&E hopes to pilot the use of LiDAR for compliance. Over the

next 10 years, SDG&E will work to develop a comprehensive audit program to assess and quantify the state of compliance of the Vegetation Management program with regulatory requirements. These audits will inform on overall success of the program, state of compliance, and procedural integrity.

5.3.5.14. Recruiting and training of vegetation management personnel

SDG&E Vegetation Management contractors are responsible for developing and conducting training of its personnel. SDG&E does require all its contractors to perform annual training to include hazard tree assessments, customer engagement, fire preparedness and environmental regulations. Through its service agreements, SDG&E requires professional certifications of some of the contract personnel based on activity type or employee level (i.e., Pre-inspectors, Auditors, General Foremen, Supervisors). These certifications include ISA-Certified Arborist and ISA-Utility Specialist.

SDG&E provides training to contractors where scoping activities are changed or modified. SDG&E also provides training to contract leadership. SDG&E documents procedural changes. SDG&E personnel attend and participate in contractor-led training modules. All contractors are required to have personal protective equipment (PPE), including all applicable fire PPE on their vehicles at all times and be trained in the safe and proper use of the equipment. SDG&E also requires tree contractors to have fire PPE staged at each job site and at the ready for use. SDG&E contractors must be enrolled in the ISNetworld safety clearinghouse that scores and tracks contractor safety performance. Contractors must also meet minimum safety thresholds to remain a viable vendor and work for SDG&E.

SDG&E requires its contractors to document employee training and to provide it to SDG&E upon request. SDG&E's Safety Department supports Vegetation Management by utilizing a third-party vendor to perform field safety observations. These observations are documented and reviewed by internal SDG&E personnel for safety adherence.

SDG&E tracks the success and effectiveness of the safety program in a database. SDG&E measures the success of the various training requirements through such measures as the reduction customer complaints, outages, claims, notice of violations, ignitions, and safety incidents. Through SDG&E Safety, Vegetation Management utilizes a predictive analytics software to record and anticipate contractor safety performance.

Prior to 2021 and over the next three to 10 years, SDG&E will engage SDG&E Fire Coordination to provide awareness training to the contractors including fire behavior and the use fire equipment.

5.3.5.15. Remediation of at-risk species

Please see Section 5.3.5.2 and Section 5.3.5.9 above.

5.3.5.16. Removal and remediation of tress with strike potential to electric infrastructure – Hazard tree removal and Right Tree-Right Place

Hazard tree evaluation is a critical component of SDG&E's vegetation management program operations to reduce tree-related outages and fire ignitions. SDG&E has a robust tree removal program that targets problematic species such as eucalyptus and palms. SDG&E follows the industry-established "Right Tree-Right Place" program to assist customers in the selection of compatible tree species with the goal of minimizing interference with electrical infrastructure and maximizing energy savings and environmental benefits. SDG&E also offers free tree replacements if an existing tree cannot be maintained safely near power lines.

SDG&E performs additional off-cycle patrols of select species (such as bamboo and Century plants) that have fast and unpredictable growth rates and are difficult to manage near power lines. These patrols help target and remove problematic species before they become a danger. Because of the potential threat to the power lines from detached fronds, SDG&E also proactively pursues the removal of palms located far outside its rights-of-way.

SDG&E Vegetation Management activities have greatly reduced tree-caused outages over the years. In the early 1990s, prior to industry regulation, SDG&E encountered 400-500 tree-caused outages on an average annual basis. After the establishment of its vegetation program, SDG&E experienced a dramatic reduction in tree-related outages. SDG&E conducts a thorough investigation of all tree-related outages and maintains an investigation database to track and record the events. The information helps identify the mechanics of outages and how to prevent future occurrences.

SDG&E's Vegetation Management department also uses its historical tree removal data to forecast the number of removals it may perform in a given year, including an analysis of known targeted species that are fast-growing and that have a propensity for branch or trunk failure. Environmental factors such as drought and insect infestation continue to impact the urban and rural forest environment. All hazard trees are assessed for risk and prioritized based on severity of condition and activity schedule.

SDG&E's hazard tree removal program is integrated within the routine inspection cycle and its enhanced patrols. Certified Arborists trained in hazard tree evaluation perform these inspections. The scope of these inspections includes a critical look at any tree that could strike the power lines. In addition, the tree trim contractors receive hazard tree training and perform a safety assessment before working on any tree to identify potential defects.

Contractors conduct annual hazard tree training for all field personnel. The Pre-inspection contractor performs an internal review of trees identified for removal. This assessment is used to determine whether the contractor is correctly identifying tree hazards. A third-party contractor performs an audit on 100% of all trees removed to ensure work was completed per scope and contract including an assessment of the efficacy of stump treatment application and facility protection.

SDG&E will develop a customer survey initiative to assess the overall success of its tree replacement program. A measure of effectiveness of the hazard tree removal program can be a reduction in the frequency of tree-outages and ignitions. SDG&E will enhance its tree replacement program with more direct and specialized customer involvement including on-line selection of species and by improving the timeliness of tree replacements.

Prior to the upcoming wildfire season, SDG&E will continue in its approach to hazard tree assessment with multiple, annual inspections within the HFTD. SDG&E will work with contractors to identify the most accurate tools and technology to assist in hazard tree assessment. SDG&E will continue its efforts to increase the number of targeted species removals within the HFTD. SDG&E will establish a metric for increasing the annual number of tree replacements.

SDG&E plans to develop its inspection activity to include internal-company patrollers to perform its enhanced inspection activities such as hazard trees, Century plant, and bamboo patrols by 2021. SDG&E will increase the training requirements of hazard tree inspectors to include Tree Risk Assessment Qualified certification. Over the next three years, SDG&E will work with contractors to identify the safest and most effective practices and equipment in the execution of its hazard tree operations. SDG&E will continue its outreach and collaboration with cities and other stakeholders to increase the number of tree plantings as a sustainability initiative.

SDG&E plans to further evolve this program over the next 10 years by leveraging enhanced VRI and WRRM data to develop a more strategic approach to identify areas of high risk and prioritization of mitigation efforts. Utilize LiDAR more effectively to improvement its assessment of hazard trees. SDG&E will research collaborative opportunities with outside organizations to develop a means of tracking the sustainability of its tree replacement program including assessing the health of its tree replacements and measuring the ancillary environmental benefits.

5.3.5.17. Substation inspections

Please see Section 5.3.5.2 and Section 5.3.5.9 above.

5.3.5.18. Substation vegetation management

Please see Section 5.3.5.2 and Section 5.3.5.9 above.

5.3.5.19. Vegetation inventory system – Tree database

Beginning in 1998, SDG&E developed and implemented an internal vegetation work management system to track and manage trees that are in proximity to its electric infrastructure. SDG&E's database contains records for approximately 460,000 known, specific trees located near its electric power lines. SDG&E's inventory database and work management

systems are collectively referred to as PowerWorkz. PowerWorkz includes an ESRI-based electronic mapping mobile application and server-based workflow tool.

SDG&E's inventory trees comprise trees with the potential of impacting the power lines by encroachment and/or tree failure within three years of the inspection date. SDG&E monitors all trees in its inventory using known species growth rates, with additional consideration given to the amount of rainfall occurring during periods affecting overall tree growth, and past pruning practices. Each inventory tree is assigned a unique alpha-numeric identification number within the electronic database, which allows the activity history of each tree to be tracked. Accordingly, this database allows SDG&E to monitor and identify which trees to address in efforts to reduce vegetation-related ignitions.

The tree inventory database enables a systematic and efficient approach to managing assets, scheduling, activity history, and resource allocation. The database and work management system provide a current view and status of all inventory trees and prioritizes work. All contractors work within the electronic system to provide real-time updates and scheduling as well as robust reporting functionality.

SDG&E has a team of IT analysts, business control, and personnel to support the PowerWorkz management system. Contractors also have access to these personnel to provide software and hardware functionality. SDG&E is currently working with a vendor on the next generation of its electronic work management system to provide greater efficiency and functionality.

SDG&E currently expects to phase-in the new work management system in 2020. Prior to 2021, SDG&E will investigate the integration of its new work management system with other inter-departmental systems to streamline workflows. SDG&E will research opportunities to share its inventory data with external stakeholders for cross-activity initiatives.

Over the next three years, SDG&E plans to research and initiate next-generation hardware for contract field personnel to interface with the electronic work management system. SDG&E will continue to research industry best practices and work management software applications to further streamline and enhance its operations within the next 10 years.

5.3.5.20. Vegetation management to achieve clearances around electric infrastructure – Pole brushing

SDG&E utilizes the same work management system to manage and track the inventory of all poles that require inspection and brush clearing in the State Responsibility Area. The current inventory of such poles comprises approximately 31,000 distribution poles with nonexempt subject hardware. Inspectors determine which poles will require brushing, and which are clear and require no work, updating the record in the database. A work order is assigned to the Pole Brush Contractor to perform the clearing of identified poles requiring brush clearing.

SDG&E currently performs three activities to more effectively manage subject poles annually. These activities include mechanical pole brushing, chemical application, and a re-clearing of pole brushing. Mechanical pole brushing involves clearing all vegetation from around the pole base, removing all tree limbs that encroach the cylinder up to a height of eight feet and remove all encroaching dead or diseased tree limbs from eight feet up to the top of the pole. Mechanical brushing is typically performed in the spring months. The contractor will then apply an Environmental Protection Agency (EPA) approved herbicide, the chemical application. SDG&E treats approximately 10,000 poles with a pre-emergent herbicide to minimize vegetative re-growth and reduce overall maintenance costs. The chemical application is typically done just before the rain season (during the fall and winter months) so that the application is activated and effective.

Not all subject poles can be treated with herbicide due to environmental constraints, which include considerations such as slope, proximity to water, proximity to trees and other vegetation, and customer approval. Following this, re-clearing is performed in summer months by removing any additional flammable vegetation which has grown into, or blown into, the required clearance area since the last maintenance activity occurred. The need to revisit a subject pole multiple times is not uncommon, due to leaf litter blown back into the managed clearance zone during windy conditions and the growth of weeds and grasses that cannot be easily controlled by mechanical clearing or herbicide treatments. Trees adjacent to subject poles also require pruning to keep dead, dying or diseased tree limbs, branches, and foliage from encroaching into the radius of the cleared circle from the ground up to the height of the electrical conductors. This process aims to reduce growth of vegetation to minimize the potential of vegetation-related ignitions.

Pole brushing follows a specific multi-activity, annual schedule in order to remain compliant year-round. The number of subject-poles fluctuates minimally year-to-year so scheduling, spend, and resource allocation remains fairly constant. SDG&E performs an environmental review in advance of all new pole brushing activities to assess impacts to protected habitat and resources. With multiple wildfire initiative projects currently underway, including new pole sets and conversions, the need for pole brushing has increased. Resource allocation and schedules must be reviewed and prioritized accordingly. SDG&E also performs pole brushing on approximately 1500 poles located outside the SRA that are not subject to brushing requirement. These poles are located in portions of the service territory where the surrounding vegetation could propagate a fire.

Like all other vegetation management activities, a QA/QC audit is performed on a random, representative sample of all completed pole-brush work. Additionally, SDG&E conducts internal compliance audits for vegetation management on an annual basis. The relatively few instances of ignitions due to equipment on poles demonstrate the effectiveness of the pole brushing program. SDG&E plans to evolve the program with independent and joint inspections by regulatory authorities such as CAL FIRE.

In 2019, SDG&E replaced approximately 1,100 fuses and 250 hot line clamps attached to poles within the HFTD. This will reduce the risk of equipment-related ignitions and will potentially reduce the number of poles that are subject to pole brushing requirements in PRC § 4292. In 2020 SDG&E plans to replace approximately 1,500 fuses and 700 hot line clamps attached to poles within the HFTD. This will continue to reduce the risk of equipment-related ignitions and will potentially reduce the number of poles that are subject to pole brushing requirements in PRC § 4292.

Pole brush inspection occurs in conjunction with the tree inspection activity. There are opportunities for redundancy and data discrepancy between this and the pole brushing activity which is performed on a different schedule. Within the next three years, SDG&E is planning to revise its procedure to integrate pole brush inspection within the pole brush activity. This will help reduce property visits and customer contacts and improve contractor work efficiency and data integrity.

Over the next 10 years, SDG&E will develop the use of LiDAR to help with equipment change detection and auditing of pole brushing. SDG&E is also investigating inter-departmental processes that could automate notification when equipment is changed out that makes a pole subject to brushing.

5.3.6. Grid operations and protocols

SDG&E operates its system with safety as its top priority. When operating conditions, as described in Section 5.3.2.5 above, reach elevated or extreme levels, SDG&E implements operating protocols that reduce the risk of ignitions on the system. This can be in the form of disabling reclosing, enabling enhanced protection settings, work restrictions, and in the most extreme cases as a last resort, shutting off the power to the specific areas that experience the extreme risk. The Sections below describe these activities in detail.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Grid Operations and Protocols initiatives in Sections 5.3.6.1 through 5.3.6.6 below. Table 26 – Grid Operations and Protocols initiatives is provided in Appendix A.

5.3.6.1. Recloser protocols

SDG&E previously completed a large deployment of overhead distribution reclosers, focusing heavily on the HFTD. A recloser is a switching device that is designed to detect and interrupt momentary faults. The device can reclose automatically and open back up if a fault is still detected. The automated reclosing feature can be disabled, so if a device detects a fault it will trip open and remain open and minimize the potential for an ignition.

These overhead distribution reclosers allow SDG&E to operate its system in a variety of configurations depending on input from its meteorologists, known localized conditions, and its declared Operating Condition (see discussion above in Section 5.3.2.5). They also provide

SDG&E the ability to sectionalize various elements of its distribution system to efficiently manage system operations and reliability, which results in quicker restoration times for customers. Additionally, SDG&E has associated these remote SCADA-controlled sectionalizing devices with specific wind anemometer locations, allowing for targeted applications of PSPS to the areas that pose the most significant real-time system condition risk of wildfire.

Under Normal Conditions, overhead distribution reclosers operate to clear faults by isolating the fewest number of customers while reducing overall exposure to the electric system. Under Elevated Conditions or higher and now most of the year, all distribution reclosing functions are disabled on circuits located within the HFTD but may include other circuits if the burn environment is conducive to large wildfires. This is done so that if a fault occurs on the system, the recloser automatically opens and stays open so the fault only occurs once and is not closed, creating another opportunity for a potential ignition. Disabling reclosing functions is not optimal for reliability but is performed for public safety and wildfire risk reduction when weather conditions are elevated or higher. In addition to disabling the reclosing function, SDG&E recognizes a need to make overhead distribution reclosers operate faster and with greater sensitivity to clear faults in a manner that reduces the energy of the fault as much as possible. By reducing the resultant energy of a fault, the probability of causing significant damage to the surrounding area is reduced. Because of this need, SDG&E has developed the ability to enable more sensitive relay settings on overhead distribution reclosers. These sensitive relay settings improve both the sensitivity of fault detection and the speed at which faults are cleared.

SDG&E's internal operating procedure for reclosing protocols is validated annually prior to fire season. SCADA-controlled sectionalizing devices with specific anemometer locations are validated yearly to ensure all newly installed devices are updated on the procedure, along with the SCADA summary screen. SDG&E's recloser protocols are intended to reduce the chance of a fault leading to an ignition. This includes disabling reclosing and the enabling sensitive settings described in the narrative above. SDG&E would expect the ratio of ignitions/faults to rise over time if SDG&E were to stop following these procedures.

The disabling of reclosing and the enabling of sensitive settings were among the first mitigations SDG&E initiated after the lessons learned from the 2007 fires. These innovative mitigations represented a shift in priority from electric reliability in favor of public safety and wildfire risk reduction. Today, these procedures represent a standard best practice for California utilities. SDG&E continues to look for innovation in system protection settings for its automated reclosers and other automated sectionalizing devices. The enabling of the fast trip settings to reduce fault energy was a recent innovation. To see other innovations and improvements around protection settings and controls, see Advanced Protection above in Section 5.3.3.2.

5.3.6.2. Wildfire infrastructure protection teams – Contract fire resources

SDG&E contracts for wildfire prevention and ignition mitigation services, Contract Fire Resources, which are paired with SDG&E personnel during times of elevated wildfire potential. SDG&E may extend Contract Fire Resources coverage depending on operating conditions or when specific needs arise. These Contract Fire Resources accompany SDG&E or contract construction crews and other electric workers to provide site-specific fire prevention and ignition mitigation during the workday and after hours. During RFW events or when the FPI is "Extreme," additional Contract Fire Resources are deployed with SDG&E personnel to mitigate the risk of fire from emergency work.

The fire prevention personnel that serve as Contract Fire Resources largely mirror the classification of an ICS Type VI Fire Engine, which carries two qualified firefighters, firefighting hoses, valves, and approximately 300 gallons of water. The object of these Contract Fire Resources is to prevent a fire from igniting from work being performed and/or other heat sources that exist on a construction site. The Contract Fire Resource is also trained and equipped to extinguish a fire that may ignite while it is still small and prevent that ignition from becoming a wildfire.

SDG&E intends to continue to prioritize and build upon its decade of success with our Wildfire Infrastructure Protection Teams. At the present time only fires meeting the criteria of D.14-02-015 have data driven documentation. Fires meeting the criteria of the decision and other fires are discussed, appropriate mitigations determined, and those mitigations are implemented immediately to prevent future incidents.

SDG&E reviews standard work practices addressing fire annually. This review process includes identifying at risk work activities and consideration of the use of these Contract Fire Resources during those activities. This program is closely managed through our Fire Science and Coordination team.

Over the last decade, SDG&E has paired Wildfire Infrastructure Protection teams with its field crews conducting work in the highest risk portions of the service territory during high risk fire days to mitigate potential ignitions and focus on the prevention of wildfire. In 2019, due to the increased volume of work in our highest risk areas, SDG&E increased the number of Wildfire Protection teams accompanying our crews to eight during the primary fire season. Outside of June through November, these resources are available on a call when needed basis and accompany crews in performing at risk activities in areas that have a higher risk of wildfire.

SDG&E will continue to maintain and carry the historical success of this program into the 2020 wildfire season. Depending upon environmental conditions and the increase in work activity across the highest risk areas, SDG&E is prepared to expand the program to support the increased need to ensure the wildfire mitigation efforts taking place are being done to the highest wildfire safety standards to prevent potential ignitions.

This program will maintain and may exceed the levels presented in SDG&E's 2019 RAMP. The increases to both the number of days and the number of Contract Fire Resources on property for each of those days that began in 2019, will continue and may increase in 2020 through 2022 due to the high volume of work in the most fire prone portions of our service territory. The Contract Fire Resources role will remain the same and will focus on prevention and ignition mitigation. Contract Fire Resources will continue to be paired with SDG&E field personnel to mitigate the risk of an ignition origination for SDG&E activities. Over the next ten years, we will continue to build upon the work done over the next three years with the same guiding principles to focus on wildfire prevention and ignition mitigation.

5.3.6.3. Other special work procedures

SDG&E has designated the type of work activity that can be performed for each of the Operating Conditions discussed above in Section 5.3.2.5 – Operating Conditions. As conditions increase in severity, activities that present an increased risk of ignition have additional mitigation requirements. Where risk cannot be mitigated, work activity might cease. The following summarizes the work activity guidelines for each Operating Condition:

- **Normal Condition:** normal operating procedures are followed with baseline tools and equipment.
- **Elevated Condition:** certain at-risk work activities may require additional mitigation measures in order to proceed with work. The additional mitigation measures will be documented.
- **Extreme or RFW Condition:** most overhead work activities will cease, except where not performing the work would create a greater risk than doing so. In those cases where at risk work needs to be performed, an SDG&E Fire Coordinator is consulted, and additional mitigation steps are implemented. Status of work, ceased or continued, will be documented.

These guidelines suffice for most routine types of activities performed in the wildland areas, which consist of undeveloped areas with vegetation. For non-routine, or especially hazardous work, SDG&E's Fire Coordination group is consulted to determine whether additional mitigation requirements are needed.

SDG&E intends to continue to prioritize the integration of the Fire Potential Index into operational practices to promote safety. SDG&E conducts annual reviews of these procedures and makes updates as necessary. Other special work procedures restrict work activities on elevated and extreme FPI days. Because of these procedures, SDG&E would expect crew related ignitions to decrease on elevated or higher FPI days.

The operating conditions outlined above dictate the types of work that we perform under normal, elevated, extreme or RFW conditions today. The procedures that govern these operations are regularly reviewed. In 2019, SDG&E further formalized its process of reviewing all wildfire procedures by creating a Training and Plan Enhancement Fire Coordinator. SDG&E

plans to review, update (as needed) and provide training on the documents that govern special work procedures. SDG&E intends to leverage data collected through our ignition management initiatives to inform these procedures moving forward.

5.3.6.4. Protocols for PSPS re-energization

If SDG&E determines it is necessary to employ a PSPS for portions of its system, re-energization will take place after the SDG&E weather network shows that wind speeds have decreased, and SDG&E weather forecasts indicate that winds will not re-accelerate at or above dangerous levels. SDG&E inspects all lines that have been de-energized for damage before re-energization may occur. Although the conditions that initiated a PSPS event may conclude, there are factors that inhibit safe and thorough patrol of lines, such as winds that inhibit flights needed to access remote infrastructure, and a lack of daylight needed to see the infrastructure patrolled. The time needed to conduct the patrol can also vary by several hours. The terrain traversed, the distance, and access to SDG&E facilities may hinder foot patrols. Lastly, the amount and severity of damage found during patrols may also affect restoration times. Once a line is patrolled and all damage has been repaired, the lines are re-energized.

5.3.6.5. PSPS events and mitigation of PSPS impacts

5.3.6.5.1. PSPS protocols

Please see Section 4.4 above for a detailed discussion of SDG&E's PSPS history and protocols.

SDG&E regularly evaluates its PSPS protocols before, during, and after wildfire season to identify areas for improvement and incorporate lessons learned. Consistent with the requirements outlined in Resolution ESRB-8 and D.19-05-042, SDG&E submits PSPS post-event reports with the CPUC so they can evaluate SDG&E's decision-making process.

After PSPS events, SDG&E conducts patrols prior to re-energization to assesses whether there is damage to its system. Typical types of damage found during the re-energization patrols are vegetation contact with conductor, other foreign object in power lines, or damaged equipment. These lines cannot be safely re-energized until crews cleared the debris or made the equipment repairs. SDG&E tracks damages which would have caused a system fault had it occurred while the circuit was energized. Once all the locations are determined, SDG&E can utilize the WRRM model to simulate the spread and damage caused by potential damage.

SDG&E plans to continue to use PSPS as last resort mitigation measure when appropriate. Nevertheless, SDG&E has created a PSPS mitigation engineering team that is developing mitigations intended to reduce impacts to customers that have been exposed to PSPS in the past. For the work planned in 2020, SDG&E will utilize a combination of strategic undergrounding, remote sectionalizing, covered conductor, overhead hardening, microgrids, and SDG&E provided customer generation to reduce customer impacts. The plans for 2020 include mitigations that will eliminate PSPS for eight public schools that had been shut off

previously, as well as eliminate impacts to over 7,000 customers (28% of SDG&E's largest recorded PSPS event) who had seen shutoffs in the past.

Over the three-year period of the plan, SDG&E will continue its strategy shift towards mitigations that reduce both wildfire risk and customer impacts of PSPS events. SDG&E expects to mitigate the impacts to thousands of additional customers, including nearly all public schools (approximately two dozen) that had previously been subject to a PSPS event. SDG&E believes that PSPS will still be a necessary tool of last resort in certain situations in the next ten years. But SDG&E has a long-term aspirational goal to reduce or minimize the customer impacts of PSPS events. SDG&E's grid hardening strategy has targeted reducing these impacts over the next ten years.

5.3.6.5.2. Mitigating the public safety impact of PSPS protocols

SDG&E manages and mitigates the impacts of a PSPS event through collaboration with key stakeholders in the wildfire response community. SDG&E partners on a regular and ongoing basis with the following agencies to address a range of fire prevention and emergency activities:

- **San Diego County Fire Chiefs' Association** – SDG&E provides monthly written and oral updates while seeking feedback and comments on planning, response, recovery, and communications programs;
- **CAL FIRE and the San Diego County Fire Authority** – SDG&E engages in frequent communications related to aerial firefighting and contract management of the year-round Skycrane and Blackhawk programs;
- **County Unified Disaster Council** – SDG&E receives and provides quarterly updates on regional planning and response programs while building relationships with 18 cities, the County of San Diego, and participating Special Districts;
- **County Office of Emergency Services** – SDG&E communicates and meets as needed (no less than quarterly) to discuss and agree on emergency planning, response, recovery, and communications needs;
- **All Fire Agencies in San Diego County** – SDG&E meets annually with fire agencies in San Diego County (including cities, fire districts, military, and tribal) to provide in-service training and exercises on electric and natural gas safety, response, Incident Command integration with utilities, and communications, to coordinate response during wildfire and other emergencies;
- **All Law Enforcement Agencies in San Diego County** – SDG&E engages in various activities including outreach efforts, trainings, and data sharing with the San Diego County Sheriff's department and all municipal law enforcement agencies; and

- **Fire Dispatch Centers** – SDG&E provides bi-annual communications training and requirements related to electric and natural gas incidents and emergencies to fire dispatch centers.

5.3.6.5.3. PSPS communication practices

In advance of the peak of fire season, in accordance with P.U. Code § 8386(c)(16)(B) and D.19-05-039, SDG&E conducts ongoing education campaigns in a minimum of eight languages (English, Spanish, Mandarin, Cantonese, Korean, Tagalog, Vietnamese and Russian) regarding how to be prepared for Public Safety Power Shutoffs and emergencies in the event of a wildfire, natural disaster or major outage.

SDG&E's comprehensive wildfire communication program has been developed, and is continuously refined, in partnership with the California Office of Emergency Services (Cal OES), and other local communication stakeholders such as the San Diego County Office of Emergency Services (County OES), public safety partners, impacted customers surveyed, local tribal councils, critical facilities and infrastructure, the San Diego County AFN Working Group, and other community partners, such as the American Red Cross, 2-1-1 and CERTS.

SDG&E's wildfire communications framework consists of a multi-pronged approach and is divided into three phases – prior to, during, and following the extreme weather event. The purpose of the communications program is to educate and help the public prepare for, respond to, and recover from a PSPS or wildfire event. In the days leading up to a forecasted PSPS, and during an active event, SDG&E establishes and maintains contact with customers, non-account holders, and community stakeholders that it believes may be impacted. SDG&E maintains communication with public safety partners, impacted customers, affected populations (non-customers), critical facilities and infrastructure, Access and Functional Needs (AFN) populations, and community partners.

SDG&E utilizes multiple platforms to communicate through the various stages of an event, including: media outlets, radio, social media channels, the SDG&E website, along with established community-based organization communications networks. Event messaging includes, but is not limited to: event timing, the wildfire mitigation strategies and activities being utilized, and the resources available to help mitigate impacts and support customers through a PSPS or wildfire event. SDG&E also communicates with key stakeholders, public officials, and first responders through a variety of channels and personnel to align with their established communication protocols.

SDG&E has shifted to a year-round wildfire safety education and communication campaign. SDG&E adjusts and refines communications tactics in real time based on customer and stakeholder feedback to ensure ongoing relevancy and effectiveness. Following major communication campaigns, mitigations efforts, or wildfire/PSPS event response, SDG&E conducts research and analytics to evaluate the overall effectiveness of the campaign. SDG&E then incorporates lessons learned into its wildfire communications strategy. The overarching

communications strategy consists of a series of specific outreach campaigns which target all customers and stakeholders in the service territory and enlists multiple tactics to inform residents and businesses in the region. The outreach campaign includes:

- Print Advertising
- Paid Search
- Paid Social Media
- Bill Newsletter
- HFTD Newsletter
- Public Service Wildfire Safety Commercials on local TV and radio outlets
- Wildfire Mitigation Activities/Statistics Collateral
- Open House and Community Fair Posters, Flyers and Emails
- Outage Notification Scripts (email, text, voice)
- PSPS Policies and Procedures
- Educational Outreach through local news media partnerships
- Statewide PSPS Campaign Tactics, such as:
    - Radio Spot/Buy
    - Paid Social/Digital Assets/Buy
    - Website (prepareforpowerdown.com)
- Print advertising for the outreach campaign is provided in eight languages: English, Spanish, Mandarin, Cantonese, Korean, Vietnamese, Tagalog and Russian. The in-language advertising is placed in corresponding in-language community publications.

Throughout the year SDG&E works directly with its public safety partners (e.g., local cities, counties, tribal governments, water and telecom providers and emergency response partners) to educate them on Public Safety Power Shutoffs and collaborate on how to minimize the impact to the region. SDG&E also engages its community partners, such as fire safe councils, planning groups, chambers of commerce and CERTs, and provides these organizations with education on Public Safety Power Shutoff events. SDG&E recognizes that each jurisdiction, utility and emergency response partner have diverse needs and different perspectives, with the common goal of increasing resiliency and minimize impacts of shutoff events; therefore, SDG&E deploys an educational approach that is collaborative and varied. For example, SDG&E holds Public Safety Power Shutoff briefings individually with local elected officials and government staff and holds table top exercises for water and telecom utilities.

Extreme weather conditions can change at any time, and SDG&E's top priority is safety. SDG&E is focused on providing impacted communities with advanced notifications. In the event of a Public Safety Power Shutoff, SDG&E will advise public safety partners, first responders, affected communities, and local municipalities in the impacted areas.

5.3.6.5.3.1. Notice to customers

Depending on conditions, SDG&E will communicate with customers in advance of an event – 48, and 24 hours as well as 1-4 hours in advance when possible, prior to shutting off power; upon starting safety inspections of affected power lines; and upon re-energization, as practicable.[46] SDG&E will also reach out to the AFN populations and the organizations that serve them during the same intervals. SDG&E communicates these notifications to customers in eight languages (English, Spanish, Mandarin, Cantonese, Vietnamese, Korean, Tagalog and Russian). SDG&E has launched an ongoing campaign asking customers to update their contact information and sign up for outage notifications at *sdge.com/MyAccount*.

Additionally, SDG&E has recognized the importance of developing a solution to identify and communicate with all people within a de-energized area, including people who may be visiting the area or not directly listed on utility accounts. In 2019, SDG&E created a self-registration portal that enables people not directly listed on utility accounts to create an authenticated account and opt-in for PSPS notifications by zip code(s). Those people may receive notifications by voice, text and e-mail, and they will use this account to maintain their notification preferences, as well as the ability to opt-out of notifications. Both SDG&E customers and non-account holders can sign up for PSPS notifications at sdge.com/notifications.

SDG&E uses this information to reach its customers using the Emergency Notification System (ENS) through phone, text and/or email in advance of a Public Safety Power Shutoff, if conditions allow, and throughout the event until power is restored. As part of this WMP, SDG&E will invest in enhancements to its Emergency Notification System (ENS) in order to streamline business processes, support situational awareness, and enhance reporting capabilities. In addition, SDG&E is exploring the feasibility of a dedicated PSPS mobile application, which can further improve customer (and non-customer) communications and notifications, including maps of event information, situational awareness, and available resources.

In addition to notifying customers directly, outage updates are provided through social media, local news, radio and SDG&E's website at *sdge.com* and *sdgenews.com*. Anticipated PSPS events may be avoided altogether if weather conditions improve. In such instances, SDG&E will notify customers that weather conditions have improved in their area, and SDG&E does not anticipate the need to turn off power for safety. SDG&E also encourages customers to visit *sdge.com/wildfire-safety* for tips on putting together an emergency preparedness plan for their home or business.

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[46] *See* D.19-05-042 at Appendix A, pp. A-7 to A-8.

In some circumstances, SDG&E may not have an opportunity to provide advance notification to customers when CAL FIRE or a local agency requests a PSPS due to an active wildfire or other emergency response situation. Additionally, if a problem is identified that poses an immediate safety risk, SDG&E may have to turn off the power immediately (e.g., a car crashing into a power pole may require immediate de-energization for safety).

5.3.6.5.3.2. Notice to state, counties, cities, and tribes

SDG&E provides priority advanced notification to its public safety partners about a potential Public Safety Power Shutoff approximately 48-72 hours before a de-energization is anticipated. As a best practice, SDG&E also provides advanced notification to its community partners. By providing advanced notifications to its government and agency contacts, SDG&E alerts them that conditions are being monitored; provides them with anticipated start time, estimated restoration time, the number of medical baseline customers that may be impacted, and access to GIS information of potentially impacted areas; and provides them with three dedicated 24/7 points of contact for information throughout the event. SDG&E continues to communicate with these important public safety partners, and maintains open two-way communication with them as well, throughout the duration of an event.

5.3.6.5.3.3. Notice to customers who provide critical services

SDG&E has identified and maintains direct contact with companies and organizations that provide critical services, such as healthcare, fire stations, schools and universities, water agencies, and communications providers within a potentially impacted area. Via this contact, SDG&E seeks to ensure that its customers providing critical services know that a Public Safety Power Shutoff may occur during extreme weather conditions, so that they can take steps to prepare, such as securing backup generation. Annually, SDG&E asks critical services customers to confirm an appropriate point of contact for these types of notifications, along with the correct contact information, so that SDG&E can provide early warning notifications, when and where possible, depending on conditions. After an event, SDG&E meets with critical customers to understand lessons learned and ways to improve communication and support. SDG&E provides them with three dedicated 24/7 points of contact for information throughout the event.

5.3.6.5.3.4. Notice to medical baseline customers

SDG&E takes additional steps to reach customers enrolled in the Medical Baseline program. Customers are asked to evaluate the safety of their situation and have an emergency plan ready in case of an outage. When communicating with Medical Baseline customers, the Emergency Notification Service captures a positive physical response when the customer is contacted. If a positive response is not obtained, a second live attempt is made through SDG&E's Customer Call Center. If no contact is achieved with the second attempt, SDG&E field personnel are dispatched to the address of record to deliver the message in person.

During a PSPS event, there may be a need to provide additional support to an impacted community. SDG&E may open a Community Resource Center near the affected area, if conditions prolong the estimated outage duration. Community Resource Center activations will be communicated via the SDG&E website, social media, local news and radio and the SDG&E News Center. At these Centers, residents will have access to water, light snacks and charge small electronic devices, as well as receive the most up-to-date information about the power shutoff.

5.3.6.6. Stationed and on-call ignition prevention and suppression resources and services

5.3.6.6.1. Aviation firefighting program

When wildfires occur north of SDG&E's service territory, CAL FIRE may divert aerial firefighting resources to emerging wildfires outside of SDG&E's service territory. This can lead to reduced aerial firefighting capability in the San Diego region. Accordingly, SDG&E has developed and implemented an effective, year-round aerial firefighting program to support the fire agencies in its service territory.

SDG&E has two aerial assets available for the purpose of helping fight fires. SDG&E leases an Erickson S-64 helitanker (Air Crane). Starting in June of 2019, SDG&E also leases a Sikorsky UH-60 Blackhawk helitanker (Blackhawk). Both firefighting assets are Type 1 firefighting helicopters, which are defined as carrying over 700 gallons of water to fight fires. The Air Crane has the capability of dropping up to 2,650 gallons of water, and the Blackhawk has the capability of dropping up to 850 gallons of water. Additionally, the Blackhawk hardware is configured for night vision device flight and will be capable of night firefighting with the appropriate crew and training.

SDG&E has agreements with the County of San Diego, CAL FIRE, and the Orange County Fire Authority for aerial firefighting within SDG&E's service territory. Dispatch of SDG&E's aviation firefighting assets is performed through CAL FIRE and these assets support their initial attack strategy to keep wildfires at less than 10 acres. SDG&E maintains a Flight Operations duty to assist in dispatching the assets 365 days per year. This allows the assets to be launched rapidly once dispatched by CAL FIRE.

SDG&E based its decision to procure aerial resources on a few factors. First, these resources provide very good fire suppression capability to SDG&E's service territory. And they have been successfully utilized in many instances, preventing fires from burning out of control in San Diego County. Second, SDG&E performs capital work in the more rural areas with access issues. In areas of difficult access, aerial resources are a necessary construction tool to be able to set structures and string conductor. During elevated or higher conditions when helicopter work is restricted, they are on call and ready to be dispatched to any active fires in San Diego County.

Aerial operations will be assessed throughout the year to ensure that they meet the need of the firefighting authorities requesting the helicopters. Contractors operating the leased or owned aircraft will be audited by an external aviation auditor every 2 years for aviation operations. Currently, SDG&E is in negotiations to purchase an S-70i (Firehawk) to replace the Blackhawk and anticipates that the transaction will be complete prior to the next Plan update. Over the next three to 10 years, SDG&E will continue to assess the effectiveness of its Aviation Firefighting program and will work with CAL FIRE on any changes for improved firefighting effectiveness.

5.3.6.6.2. Industrial fire brigade

SDG&E has contracted an Industrial Fire Brigade (IFB), which is available 24 hours a day, 365 days a year. The IFB differs from the Contract Fire Resources: whereas the IFB is specially trained to fight fires involving electrical equipment (substations and large transformers) as well as flammable liquids, the Contract Fire Resources are focused on site-specific fire prevention and ignition mitigation. The IFB members are stationed at facilities near the geographical center of SDG&E's service territory and are equipped to handle utility-related fire emergencies.

The IFB incorporates a portable fire suppression trailer equipped with 330 gallons of Class B alcohol resistant firefighting foam, 500 pounds of chemical extinguishing agent, a 500 gallon-per-minute monitor, and hoses designed to work with hydrants or other fire apparatus. SDG&E also provides three additional trailers and training to fire agencies to aide in emergency response to SDG&E facilities as well as other emergencies that may occur in their jurisdictions. The IFB also develops comprehensive pre-emergency response plans for each SDG&E substation and large-scale energy storage facility.

SDG&E intends to continue the IFB program. SDG&E conducts quality checks of the program though annual review with the contractor facilitating the program. Any updates will be made through this renewal process. SDG&E does not currently anticipate any updates or changes to this program.

5.3.7. Data governance

SDG&E has begun the process of updating its IT systems and centralizing data for better access to enhance the state of data analytics and find opportunities for automation. The effort to combine and cross-reference data sources and processes into a centralized enterprise repository yields the opportunity to flag data gaps, discover stale or missing data, and identify data that represents the system truth. These benefits are often difficult to achieve with separate data systems. Identifying these opportunities supports better business processes and more efficient data collection for various use cases that support operations, engineering and risk management.

SDG&E's roadmap includes establishment of a central data repository and foundation for electric engineering and operations data. There are currently multiple repositories, including

Engineering Data Warehouse, Customer Data Warehouse, and databases managed by individual business groups. SDG&E's strategy is to integrate all critical application data into the central repository and to develop logical views of the data. Data integration methods are dependent on the use case – batch or real time, physical or virtual. The end vision is that the data will be combined and leveraged to develop reports, visualizations and predictive models, and to provide inputs to other applications.

As part of building out this data foundation, all data will be catalogued in a central data management tool. This catalogue will include data glossary, data dictionary and data lineage. It is essential that all data in the repository can be trusted, and the key terms are well defined and consistently used across the enterprise. In parallel with building out a central data repository for structured data, SDG&E also plans to build out a repository for imagery data, such as photo imagery and LIDAR information. This repository will be a logical extension of the central data repository. Images will need to be appropriately indexed and tagged with metadata so they can be associated with assets and geospatially referenced.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Data Governance initiatives in Sections 5.3.7.1 through 5.3.7.4 below. Table 27 – Data Governance initiatives is provided in Appendix A.

5.3.7.1. Centralized repository for data

SDG&E is developing an Enterprise Asset Management Platform (EAMP), which is a centralized repository for asset data. The EAMP will enable SDG&E to predict and assign asset health indexes (AHI) on its critical electric assets to identify and compare assets based on its likelihood of failure. An AHI is a score designed to track the condition and performance of an asset by applying predictive analytics to multiple sources of data and used as a basis for asset management strategies. The key benefits of employing AHI include the ability to measure overall health of assets, recognize asset data parameters associated with failure modes, predict failures, relatively compare between assets of same class in a consistent manner. Asset risk is determined when AHI and the associated likelihood of failure consequence are jointly considered. Based on this information, asset strategies would be evaluated, prioritized and implemented to manage the asset in a manner that aligns with SDG&E's overall risk management strategy, supports risk-informed platform for managing assets, and reinforces safe operations, maintenance and proactive replacement strategies.

The EAMP project began in late 2019 starting with critical electric distribution assets by collecting relevant data sources, finding opportunities to practice data governance, and building predictive asset models to inform operational, maintenance and replacement strategies. SDG&E anticipates that future expansions of EAMP may include transmission and substation assets with a manner to compare health indexes and risks in a consistent and uniform manner.

Integrating this asset risk information with other inputs, such as a circuit risk index for situational awareness, will inform the appropriate asset-related operational decision-making

and strategies for enhanced reliability and safe operations of assets on given current and expected conditions. SDG&E believes asset management will provide a means to optimize the its risk, performance, and investments, while meeting or exceeding safety and regulatory objectives. A comprehensive asset management system will provide the access to and integration of data throughout the asset life cycle to develop analysis and a health index for critical assets.

5.3.7.1.1. Asset management

Please see Section 5.3.8.1 Asset Management below.

5.3.7.1.2. Geographic information system data

In response to the increasing desire to have the GIS data of electric facilities available to support statewide emergency preparedness, SDG&E is collaborating with state agency stakeholders to find the best solution to provide the requested information in a timely manner. In 2019, SDG&E developed a process to automate the sharing of PSPS event data with many different entities utilizing ESRI's ArcGIS Online (AGOL) application. This method of sharing PSPS data is used with Cal OES representatives in order to provide them with the requested data in a timely and secure fashion. During PSPS events, SDG&E shares PSPS-related GIS data with Cal OES, County OES, approximately 55 Public Safety Partners, and it also posts the information on SDG&E's PSPS outage webpage.

5.3.7.2. Collaborative research on utility ignition and/or wildfire – Innovation lab and other collaboration

In conjunction with the EOC remodel efforts discussed in Section 5.3.9.4.7, SDG&E plans to establish a Fire Science and Innovation Lab in 2020. The lab will bring together leading thinkers and problem solvers in academia, government, and the community to create forward-looking solutions to help prevent ignitions, mitigate the impacts of fires, and ultimately help build a more resilient region. With this lab, SDG&E aims to lead the development of the next generation of fire science and wildfire innovation.

5.3.7.3. Wildfire-related data and algorithms

To adapt to the effects of the changing climate and the threat of year-round wildfires, SDG&E partnered with academia, government and other professionals to undertake unprecedented initiatives over the last decade to innovate, implement, and share advanced technologies to improve wildfire safety in the region. Initial measures taken have advanced fire potential and weather forecasts, provided real-time situational awareness, and activated leading-edge utility wildfire prevention. Several weather-related analytical tools and associated algorithms have been developed over the last decade. These tools and algorithms are described in greater detail throughout this WMP. These include the Fire Potential Index, Santa Ana Wildfire Threat Index, and fuel modeling, all described in greater detail in Section 4.2, as well as the Operational Wildfire Risk Reduction Model, described in section 5.3.1.1.

5.3.7.4. Tracking and analysis of near miss data

5.3.7.4.1. Ignition management program

In 2019, SDG&E established a pilot Ignition Management Program (IMP). The purpose of this program is to track ignitions and potential ignitions in order to perform root cause analysis on each ignition or potential ignition to detect patterns or correlations. Such ignition or potential ignition events are documented and analyzed. When patterns or correlations are identified, the outcomes are communicated and assigned to mitigation owners from the business unit most logically positioned to eliminate or reduce future events of a similar nature. This data will be used to inform metrics, operational and system hardening in the future.

In 2019, SDG&E employed a Fire Ignition Management Program Coordinator to implement and manage this program, as well as support ongoing quality assurance of the program. Early results of the pilot have shown this program is valuable in understanding and preventing ignitions. While the IMP is still in its early stages, the program has enabled SDG&E to gather focused data on near ignition events and through analysis this data has helped educate fire prevention decisions. SDG&E intends to continue to develop the IMP in 2020. This work is closely aligned with priorities in this WMP and is intended to enhance SDG&E's ignition data and analytics. Further, this program is important to facilitate the enhancement of the data used to inform several WMP initiatives from operational procedures to the prioritization of hardening efforts.

Prior to the upcoming fire season, SDG&E expects to continue learning from the IMP and plans to further expand the program. These expansion efforts will include refining the data gathering procedures and expanding the IT-related support to house and process data associated with findings from the program. Before the WMP update in 2021, SDG&E plans to integrate the findings and analytics from the IMP into the WMP metrics and strategic WMP hardening initiatives. Over the next decade, the Fire Ignition Management Program Coordinator will review the IMP to identify potential enhancements to the program and oversee the implementation of any refinements, as needed.

5.3.7.4.2. Reliability database

SDG&E tracks and maintains customer outage impact data for CPUC annual reporting, other internal and external reporting, and to analyze causes of electric system outages in order to use that information to optimize electric system reliability investments. The data tracked includes any outages in the primary voltage (i.e., 4kV, 12kV, 69kV, 138kV, 230kV, 500kV) electric systems that leads to customer impact. Planned outages and secondary voltage related outages are not tracked within this database. The database tabulates results in terms of industry measurements such as Customers Impacted (CI), Customer Minutes interrupted (CMI), System Average Interruption Duration Index (SAIDI), and System Average Interruption Frequency Index (SAIFI).

5.3.8. Resource allocation methodology

SDG&E's enterprise risk management process, discussed in Section 5.4 below, includes a step focused on risk-informed investment decision-making. As addressed in SDG&E's 2019 RAMP,[47] the capital planning process is the Company's current annual process for prioritizing funding based on risk informed priorities and input from operations. The capital allocation planning sessions begin with input from functional capital committees that comprise subject matter experts who perform high level assessments of the capital requirements based on achieving the highest risk mitigation at the lowest attainable costs. These requirements are presented to a cross-functional team representing each functional area with capital requests.

This committee reviews the resource requirement submissions from all functional areas, and projects are evaluated against priority by assessing a variety of metrics including safety, cost effectiveness, reliability, security, environmental, strategic, and customer experience. Recommendations for capital spending are then presented to an executive committee for approval. Once the capital allocations are approved, each individual operating organization is chartered to manage their respective capital needs within the capital allotted by the plan. This includes re-prioritizations as necessary to address imminent safety concerns as they arise. As with the Company's risk evaluation processes, the capital planning process is continuing to evolve as the Company endeavors to achieve the goal of determining more quantitatively the risk reduction per dollar invested, also referred to as risk spend efficiency or RSE.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Resource Allocation Methodology initiatives in Sections 5.3.8.1 through 5.3.8.4 below. Table 28 – Resource Allocation Methodology initiatives is provided in Appendix A.

5.3.8.1. Asset management

In 2017, SDG&E established its Asset Integrity Management (AIM) program to develop and implement a comprehensive and sustainable asset management system, encompassing people, process, and technology. AIM utilizes an integrative approach to electric assets for governance, strategy, analytics, and continuous improvement. SDG&E is developing the new asset management system to conform with ISO 55000, an international standard that specifies the requirements (ISO 55001) and application (ISO 55002) for the establishment, implementation, maintenance, and improvement of an asset management system. Benefits of such a system may include enhanced asset safety, improved performance, managed risk, demonstrated compliance, and improved efficiencies and effectiveness of asset utilization and operations.

Asset management is a critical element of SDG&E's focus on creating sustainable and high-quality asset safety for electric operations, and optimizing asset utilization, while mitigating asset-related risks. This is also one element of SDG&E's vision for an electric safety

[47] 2019 RAMP, Chapter RAMP-B at B-7 – B-8.

management system, as further discussed below.[48] A comprehensive asset management system, which includes process improvements, data analytics and system solutions, will provide the access to and integration of data throughout the asset life cycle to develop analysis and a health index for critical assets.

SDG&E is also developing an asset health index (AHI) to identify and compare assets based on likelihood of failure. An AHI is a score designed to track the condition and performance of an asset by applying statistical modeling and predictive analytics to multiple sources of data and is used as a basis for asset management strategies. The key benefits of employing AHI include the ability to measure the overall health of assets, recognize asset data parameters associated with failure modes, detect failures, and make relative comparisons between assets of same class in a consistent manner. Asset risk is determined when AHI and the associated asset failure consequence or impact are jointly considered. Based on this asset risk information, asset replacement or rehabilitation strategies would be evaluated, prioritized, and implemented to manage the asset in a manner that aligns with SDG&E's overall risk management strategy, supports risk-informed platform for managing assets, and reinforces safe operations, maintenance and proactive replacement strategies. Integrating this asset risk information with other inputs, such as circuit risk index for situational awareness, especially within fire-prone areas, will inform the appropriate asset-related operational decision-making and strategies for enhanced reliability and safe operations of assets on given current and expected wildfire conditions.

With safety as the Company's highest priority, and with the objective of promoting continuous improvement, the Asset Management department has embarked on a cross-functional project of streamlining an end-to-end process on investment prioritization and allocation. This includes incorporating an enterprise-wide, multi-attribute value framework for evaluating capital investments through a data-driven, quantitative risk- and safety-based lens. This value framework will utilize the Company's strategic values and determine standardized value-based metrics to quantitatively compare projects, and thereby enhance the Company's ability to cross-prioritize across portfolio and optimize investment decisions, including wildfire mitigation investments, while ensuring effective spend of ratepayer funds.

The initial value framework development will be applied to electric transmission and substation capital investments as these will be more manageable in volume and scope compared to electric distribution capital investments. Once developed, this initial value framework will serve as a foundation to build upon for other asset-intensive capital investments and eventually evolve to enterprise-wide value framework. Further development will employ a phased approach with electric distribution investments as next in line and subsequently, other assets supporting the electric system infrastructure.

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48 *See also* SDG&E 2019 RAMP at Chapter RAMP-F (Safety Culture).

The Asset Management department is in the process of developing audit requirements based on the Performance Evaluation criteria of ISO 55000. This process entails defining the audit criteria and scope; identifying auditors to conduct the audits; defining the audit reporting process, and records retention; and resolution of audit results. The product of this development stage is an established Internal Audit program that implements a consistent and objective quality check across the organization. Audit results will be used to identify opportunities for corrective actions and improvements.

The main objective of developing analysis and a health index for critical assets is to enhance performance evaluation and continuous improvement. An AHI will allow SDG&E to measure the overall health of assets, recognize asset data parameters associated with failure modes, detect failures, and relatively compare between assets of same class in a consistent manner, thereby enhancing performance evaluation of assets and any need for preventive measures. Considering AHI and associated asset failure consequence, asset risk is then determined, evaluated and prioritized. With asset risk identification and prioritization, asset strategies (i.e., replacement or rehabilitation) are also evaluated for their effectiveness on risk mitigation and performance, which demonstrates continuous improvement.

The enterprise-wide, multi-attribute value framework for evaluating capital investments is used to demonstrate appraisal of investments in a consistent, transparent, repeatable and standardized manner through data-driven, quantitative risk- and safety-based lens with the appropriate review and approval committees.

The asset management program implementation will employ the ISO 55000's "Plan-Do-Check-Act" (PDCA) cycle, which is a cyclic and iterative four-step management model, to ensure continuous monitoring and improvement of people, process and technology relevant to managing assets safely and reliably.

To date, SDG&E's Asset Management department has achieved several milestones, all of which are ISO 55000 requirements:

- Development of an organizational structure, including executive steering committee, asset management governance, program leadership, asset class owners and managers, implementation and support leaders, and subject matter experts;
- Determination of asset classes and identification of critical asset types within each class based on risk assessments;
- Development of asset management policy, integrated electric strategy, and asset operational plans for electric distribution, transmission and substation operations;
- Initial compilation of asset-related operational and performance metrics for consistent and comprehensive reporting;
- Initial development of alternative replacement strategy analyses and asset health indices for certain critical assets;

- Assessment and design of information systems needed to support electric asset management;
- Launch of development of information system solutions for data integration, asset performance analytics and portfolio optimization;
- Development of value framework utilizing company strategic values and determining value-based metrics for initial application to electric distribution assets;
- Development of high-level asset management processes and identification of sub-processes for integrated governance, strategy, analytics and performance evaluation; and
- Assessment and assignment of roles and responsibilities required for organizational development and implementation of the AIM program.

The AIM will be in the implementation design phase for electric transmission, substation and distribution business segments before the 2020 wildfire season. By 2021, the AIM will likely be in the early stages of executing the implementation plan for electric transmission, substation and distribution business segments, while in planning and implementation design for other assets supporting the electric system infrastructure.

Over the next three years, the AIM is forecasted to further expand due to anticipated incremental data exploratory analyses and data integration of key asset attributes from multiple sources and associated costs of systems needed to further develop AHIs and sustainably support the asset data analytics. Within the next 10 years, SDG&E anticipates implementing AIM enterprise wide.

5.3.8.2. Risk reduction scenario development and analysis

Please see Section 5.4 below. See also SDG&E's 2019 RAMP.

5.3.8.3. Risk spend efficiency analysis

The WMP Guidelines (as clarified by the WSD in its "Follow-Up Clarification From 1/27 Utility Working Group" document) requested RSE calculations on the proposed programs and strategies identified in this WMP for reducing wildfire risk. As explained in SDG&E's 2019 RAMP, "RSEs are numerical values that attempt to portray changes in risk scores per dollar spent."[49] Simplistically, it is the ratio between the pre-mitigation and post-mitigation risk scores divided by the cost.

[49] 2019 RAMP, Chapter RAMP-D at D-1.

Calculating RSEs were also a required element in RAMP submissions[50] and have proven to be a substantial undertaking. Due to timing constraints, SDG&E utilized the same approach regarding RSEs as it did in its 2019 RAMP,[51] filed in late November 2019. More specifically, SDG&E calculated RSEs for a wide variety of activities, including all non-mandated[52] activities, certain mandated controls,[53] and all mitigations,[54] whether they were mandated or not. SDG&E calculated RSEs for all non-mandated activities and all new activities.

Since its November 2019 RAMP submission, however, SDG&E reviewed and updated, where necessary, the RSE calculations for the activities presented in this Plan. SDG&E continues its best efforts related to RSEs and plans to further expand the activities for which an RSE is calculated in future WMP and RAMP filings. Please see Section 5.4 below, as well as SDG&E's 2019 RAMP.

5.3.8.4. Other resource allocation methodology initiatives

5.3.8.4.1. Wildfire mitigation personnel

SDG&E's workforce and organizational structure has evolved significantly since its first fire mitigation efforts. In the infancy of these efforts, SDG&E largely utilized cross-functional teams that, over time, continued to transform into additional formal programs and personnel. In 2019, SDG&E recognized that a new department focusing on fire mitigation, fire mitigation strategies, program measurement, and vegetation management would prove useful in assessing the overall effectiveness and direction of SDG&E's WMP.

In July 2019, SDG&E established the Wildfire Mitigation and Vegetation Management department with existing management personnel already deeply familiar with the WMP. This new department is overseen by the Director of the Wildfire Mitigation and Vegetation Management and contains four groups to address aspects of the overall WMP effort:

- The Wildfire Mitigation Programs group will be involved with the various regulatory proceedings that address wildfire and de-energization as well as legislative and media inquiries.

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50 *See* D.18-12-014.

51 *See* 2019 RAMP, Chapter RAMP-D at D-9 – D-11.

52 For purposes of this discussion, "mandated" refers to activities conducted in order to meet a mandate or law, such as the Code of Federal Regulations (CFR), Public Utilities Code, or a General Order. *See* 2019 RAMP, Chapter RAMP-A at A-16.

53 "Control" is defined in D.18-12-014 at 16 as a "[c]urrently established activity that is modifying risk."

54 "Mitigation" is defined in D.18-12-014 at 17 as an "activity proposed or in process designed to reduce the impact/consequences and/or likelihood/probability of an event."

- The Vegetation Management group will manage the current tree and vegetation management inspection and trim program and will begin to address SDG&E's newly formed fuels management program.
- The WMP Strategic group will develop metrics, lead vision projects, promote new ways to enhance fire safety and explore advancements to further drive improvement and change.
- The WMP Accountability group will be responsible for monitoring fire-related metrics, tracking WMP activities, complying with reporting requirements, provide for governance specifications and procedures, and act in a lead capacity on audits of the WMP programs.

The owners of this Plan, described in Section 1 above, will execute, monitor, review, and address deficiencies in SDG&E's approach to wildfires. The structure is integrated across the entire SDG&E organization as well as through its reporting hierarchy. With regular monthly meetings of each group, this structure allows for wide collaboration and information gathering, as well as the ability to inform, plan, act, and improve within a compressed timeline, when needed. This structure will also allow any operational or strategic changes to be communicated and captured within SDG&E's approach to wildfire mitigation and response.

In 2018, SDG&E created a new group in the FS&CA department to closely monitor the Community Fire Safety Plan and this Plan. This monitoring and continuous improvement process for wildfires at SDG&E can start with any employee or any one of the three groups involved in the governance structure, though this newly formed group, Fire Mitigation and Climate Adaptation, will monitor and track this Plan implementation with the Community Fire Safety Plan. This group meets monthly to review the implementation status of wildfire mitigation and emergency management initiatives as well as to monitor the Plan's performance against metrics. The Community Fire Safety Plan will report the status, including variances, of SDG&E's performance to the Fire Directors Steering Committee.

The Fire Directors Steering Committee will discuss and create plans to address any variances against the Plan, as well as to discuss any new ideas or strategies that could be immediately assigned and implemented. The members of the Fire Directors Steering Committee will implement any necessary corrections or adjustments within existing operational and budgetary constraints. It will also report the status, plans, and variances to the Executive Wildfire Council. The Fire Directors Steering Committee will also make recommendations or request additional funding or resources to address existing variances. The Executive Wildfire Council will address strategic considerations and guide the organization to address wildfire mitigation efforts efficiently.

5.3.8.4.2. PSPS mitigation engineering team

SDG&E continuously evaluates its wildfire risk management efforts to identify new ways to further mitigate risks and opportunities for improving its overall approach to wildfire mitigation.

At its inception, PSPS was identified as a core element of the Company's approach to mitigating wildfire that goes together with the Company's investments in system hardening efforts. SDG&E's system hardening efforts focus on mitigating the failure of its equipment and building the Company's infrastructure to withstand extreme conditions. PSPS mitigates the risk of debris contacting energized electric infrastructure during such conditions.

Since PSPS continues to be a key component of the Company's wildfire risk management, SDG&E is examining areas with a high probability of PSPS in fire prone conditions with the intention of reducing the impacts of PSPS to customers. With a focus on increasing safety and reliability, SDG&E recently formed a dedicated team of experts bringing in a diverse set of skillsets from engineering to meteorology and risk management to look at the Company's infrastructure in the areas of highest wildfire risk with the objective of identifying short and long-term strategies to not only minimize wildfire risk, but also to reduce or minimize the customer impacts of PSPS.

The team's effort will include a segment-by-segment analysis of circuits prone to PSPS to identify highest risk areas within the circuit to target various mitigation efforts that can either eliminate the need for shutoffs or reduce impacts of the shutoffs. The analysis incorporates a variety of risk factors including the WRRM model, tree strike potential, customer density, ingress/egress issues, and critical infrastructure among other factors to identify the most appropriate portfolio of mitigations across the high wildfire risk areas. The portfolio of mitigations that the team is looking at scoping includes but is not limited to:

- Strategic undergrounding
- Overhead system hardening, which may include:
    - Expanded use of covered conductors
    - Bare conductor overhead hardening
    - Additional sectionalizing or circuit reconfigurations
    - Falling conductor protection
- Enhanced vegetation management
- Fuels management
- Providing backup generation either in the form of individual customer generators or microgrid solutions

As the team conducts its assessment and scopes these various mitigation options, the scope of other programs within this WMP will likely be adjusted to balance short and long-term strategies for mitigating wildfire risk.

5.3.9. Emergency planning and preparedness

The mission of the SDG&E's Emergency Management department is to coordinate safe and effective emergency preparedness for the company, SDG&E's customers, and emergency response personnel. That mission extends to safely and efficiently preparing for, responding to, and recovering from all threats and hazards through strategic planning, training, and exercising, and a sustained Quality Assurance and Improvement process.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Emergency Planning and Preparedness initiatives in Sections 5.3.9.1 through 5.3.9.4 below. Table 29 – Emergency Planning and Preparedness initiatives is provided in Appendix A.

5.3.9.1. Overview of emergency preparedness plan

Include a general description of the overall emergency preparedness and response plan, and detail:

1. *A description of how plan is consistent with disaster and emergency preparedness plan prepared pursuant to Public Utilities Code Section 768.6, including:*

Emergency Preparedness and Response Plan

The SDG&E emergency preparedness plan is developed in collaboration with key internal and external stakeholders and lessons learned from past incidents, trainings, and exercises are incorporated as appropriate. SDG&E has a world-class Meteorology department that has set the standard nationwide for forecasting and simulation technology that is leveraged to preposition manpower and equipment before anticipated severe weather. Annually SDG&E Emergency Management and Regional Government Liaisons meet with local city, and county public safety partners to ensure effective communications between SDG&E and the partners. This meeting also includes a review of the emergency preparedness plan and working collaboratively to mitigate any possible issues for the upcoming year. Additionally, this plan is on a three-year planning cycle and the local public safety partners are engaged to review, and comment on the plan.

a. *Plans to prepare for and restore service, including workforce mobilization (including mutual aid and contractors) and prepositioning equipment and employees*

Service Restoration and Workforce Mobilization

Please see Section 5.3.9.4.4.1 below.

b. *Emergency communications, including community outreach, public awareness, and communications efforts before, during, and after a wildfire in English, Spanish, and the top three primary languages used in California other than English or Spanish, as determined by United States Census data*

Emergency Communications

Emergency communications include community outreach through promotional communications and collateral to help promote Wildfire Safety open houses and Community

Fair events. In addition, public awareness communications occur before, during, and after a wildfire.

Before a potential wildfire event

SDG&E maintains a Wildfire Safety Community Awareness campaign to provide education to customers and residents throughout its service territory. This campaign helps the community prepare for the risk of wildfires and encourage customers to take preparatory measures such as updating contact information and signing-up for SDG&E notifications. It is also a collaborative outreach effort with local public safety and community partnerships.

SDG&E provides regular proactive communications to residents and businesses within its service territory. Aside from English and Spanish, communication materials are produced in Mandarin, Cantonese, Tagalog, Korean, Russian, and Vietnamese. These fire-safety and emergency preparedness communications may include, but are not limited to:

- Community events, emergency preparedness workshops for businesses, public participation meetings, and backup generator safety workshops;
- Informational and emergency preparedness mailings to customers in the HFTD;
- Educational and general awareness advertising campaign focused on SDG&E's preparations for the fire season and the preparations SDG&E's customers should make to be ready for emergencies. This campaign includes a series of advertisements in community newspapers in the HFTD and the service territory.
- Educational information disseminated through a bill newsletter or special insert included in customer bills. An electronic version is emailed to paperless customers;
- Various wildfire safety videos including the new SDG&E Fire Safety documentary;
- Distribution of a co-branded "newsletter" with the American Red Cross, the San Diego Office of Emergency Services, and the San Diego County Fire Chiefs' Association;
- The provision of weather information and system-outage status on SDGE.com;
- Dissemination of information regarding emergency-preparedness events via social media, such as Twitter and Facebook;
- Publication of information for SAFE San Diego Education and Outreach events in the community following an emergency.

SDG&E also works closely with its network of over 103 nonprofit community-based organizations to share the fire-safety and emergency communications to their networks via their established communication protocols as well as their social media channels and newsletters.

During wildfire events
Emergency communications protocols are agnostic of the triggering event. SDG&E follows its long-established emergency communication framework. During a wildfire, if SDG&E infrastructure is impacted, communications are immediately initiated to customers tied to that impacted infrastructure by utilizing SDG&E's customer notification system, the Enterprise Notification System (ENS). SDG&E provides situation updates to communities via the broadcast media (radio and TV), social media, outage map, SDG&E app, SDG&E NewsCenter and sdge.com. The emergency broadcasting system, TV and radio is also engaged to provide SDG&E-relevant messaging.

In addition to its routine outreach and communications, SDG&E initiates communication protocols with impacted customers and residents. SDG&E utilizes multiple communication channels to notify impacted community members. The ENS is used to directly contact all potentially impacted customers as well as residents and businesses who have signed up to receive notifications. In partnership with local media, SDG&E provides 24/7 real-time situation updates through the SDG&E NewsCenter and SDG&E personnel is available 24/7 for media interviews when requested during the event. The media is driven to the SDG&E NewsCenter landing page for real-time updates as well. The SDG&E NewsCenter and sdge.com provide event-specific information about impacted areas. Social media is also utilized to broadcast updates and safety information across the region.

SDG&E establishes communications with local water districts, telecommunications infrastructure providers, the San Diego County Office of Education, the San Diego County Office of Emergency Services, and the American Red Cross. Communication protocols are ongoing through the event duration and customer restoration.

After wildfire events
Please see Section 5.3.9.2 below for greater detail regarding SDG&E's communications after wildfire events as well as the customer protections available.

c. Showing that the utility has an adequate and trained workforce to promptly restore service after a major event, taking into account mutual aid and contractors

Adequate and Trained Workforce
Please see Section 5.3.9.4.1 and Section 5.3.9.4.5 below.

5.3.9.2. Overview of customer support in emergencies

2. Customer support in emergencies, including protocols for compliance with requirements adopted by the CPUC regarding activities to support customers during and after a wildfire, including:

a. Outage reporting
b. Support for low income and medical baseline customers
c. Billing adjustments
d. Deposit waivers

e. Extended payment plans
f. Suspension of disconnection and nonpayment fees
g. Repair processing and timing
h. Access to utility representatives

SDG&E provides emergency residential and non-residential customer protections and availability communications for wildfire victims, as ordered by the CPUC.[55] Examples of protections include billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, and specific support for low income and medical baseline customers.[56]

SDG&E will provide descriptions of the protections offered to affected customers on a special landing page on its website, SDG&E.com (with a contact telephone number for more details of eligibility and protections available) and promote the page with social media campaigns. In addition, SDG&E will make every effort possible to contact impacted customers to bring awareness regarding these protections. An Energy Service Specialist (ESS) or an account executive will make these calls.

Customer Protections and Contact
Customers eligible for the wildfire residential and non-residential customer protections described below are those directly impacted by the fires and identified as such by SDG&E or who have self-reported as being impacted. Directly impacted customers would include those without electric service or those needing to re-locate (either temporarily or permanently) due to fire damage.

Description of Adopted Consumer Protections
In Decisions 19-05-039 and 19-07-015, the Commission confirmed that SDG&E should continue to provide certain residential and non-residential customer protections for wildfire victims. These customer protections are described in the following sections and unless otherwise noted, each apply to both residential and non-residential customers.

Outage Reporting
Throughout the lifecycle of an adverse weather event, it is important that the customer is adequately informed and prepared at all times. SDG&E's multi-channel approach utilizes the broadcast media (radio and TV), the SDG&E NewsCenter, dedicated PSPS landing page (sdge.com/ready), the SDG&E outage map (on sdge.com and the SDG&E app), and social media for real-time situational awareness. SDG&E's ENS also provides notifications and updates directly to impacted customers and community members who have signed up to receive PSPS alerts.

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[55] Commission Resolution M-4835 (January 11, 2018). SDG&E filed Advice Letter 3177-E on January 26, 2018 in compliance with Resolution M-4835, which was made effective December 7, 2018. See also Commission Decisions D.19-05-039 and D.19-07-015.

[56] Costs were not identified for this activity because they are not tracked in that manner.

The ENS system provides information in eight languages (English, Spanish, Korean, Vietnamese, Mandarin, Cantonese, Tagalog and Russian). As the event progresses, these notifications become more specific and targeted to customers as the situation warrants. Along with outage updates the channels listed above provide information related to wildfire safety, emergency preparedness, PSPS, and Community Resource Centers.

After adverse weather conditions are forecasted and the National Weather Service issues a Red Flag Warning, SDG&E begins to coordinate with local government agencies, community-based organizations, and emergency responders approximately 72 hours prior to the event. Communications are then initiated with customers via SDG&E's ENS, broadcast media and social media channels. These communications drive traffic to SDG&E's NewsCenter and/or dedicated PSPS landing page for more information and real-time situation updates.

Support for Low Income Customers/Medical Baseline

In support of customer protections, SDG&E takes the following actions for all low-income customers in the fire-impacted areas within SDG&E's service territory to align with the California Alternate Rate for Energy (CARE) and Energy Savings Assistance (ESA) programs as follows:

- Freeze all standard and high-usage reviews for CARE program eligibility standards and high-usage post enrollment verification (PEV) requests for all customers in the impacted areas within SDG&E's service territory.
- Partner with the United Way, the administrator of its Neighbor-to-Neighbor program that provides emergency bill assistance, to increase the bill assistance cap amount for impacted customers from $200 to $400.
- Modify the ESA program by allowing impacted customers to self-certify if: 1) the customer states they lost documentation necessary for income verification of a fire, or 2) if the customer states that individuals displaced by the wildfires reside in the household.
- Immediately following a fire, SDG&E deploys outreach representatives to the field to support American Red Cross and County of San Diego assistance centers. These outreach representatives help customers download the mobile outage map to stay up to date on estimated restoration times, promote and enroll them in programs like CARE and ESA and connect them to the vast array of services provided by San Diego emergency services.
- SDG&E also works with local Community Based Organizations (CBOs) to help connect customers with emergency related information, outage information, and program information. These CBOs also help to refer customers in need to San Diego emergency services for further information and assistance. SDG&E will continue to work with the local CBOs to place an emphasis on the additional measures available to low-income customers.

In addition to the protections for the low-income customers discussed above, SDGE will freeze all recertification for medical baseline customers in the impacted areas within SDG&E's service territory.

Billing Adjustments
SDG&E will provide additional billing assistance for residential customers. Where the customer's residential structure has been destroyed, SDG&E will waive closing bills that include charges from the previous regular read date up until the dates the fires occurred, along with charges from the prior month of billing. For non-residential customers, where the structure has been destroyed, closing bill amounts from the previous regular read date up to the dates on which fires occurred will be waived. However, non-residential customers will be held responsible for charges billed for any months prior to the fires. SDG&E will stop estimated energy usage for billing purposes when a home/unit was unoccupied due to a wildfire.

Deposit Waivers
SDG&E will waive deposit requirements for customers who are seeking to re-establish service at either the same location or a new location.

Extended Payment Plans
SDG&E will extend payment arrangements with a 0% down payment and offers a repayment period of 12 months to all impacted customers, including customers whose employment was impacted by wildfires.

Suspension of Disconnection and Nonpayment Fees
For customers impacted by fires, including customers whose employment was impacted by wildfires, SDG&E will suspend disconnection for non-payment and associated fees, waive the deposit and late fee requirements for affected customers who pay their utility bills late, and not report late payments by customers who are eligible for these protections to credit reporting agencies or to other such services.

SDG&E identifies the premises of customers impacted by the fires that are not capable of receiving utility services and discontinues billing these premises. SDG&E does not currently charge a disconnect charge. Customers impacted by the fires will not be charged a reconnection charge, nor will a deposit be required.

Repair Processing and Timing (Move In – Move Out)
SDG&E initiates best efforts to expedite move-in and move-outs to support customers returning to their homes and establishing service in new locations, and to monitor and track the time from when service requests are submitted to SDG&E to when services are provided to customers. If a customer advises SDG&E that they are relocating to another location due to the damage to their home, SDG&E will make every attempt to have service available to the customer on the requested day. Additionally, SDG&E will track the time from when the service is requested to the time it is completed.

Access to Utility Representatives
Customers and stakeholders have a variety of SDG&E representatives available to them to receive information and communicate concerns. These include representatives in SDG&E's Call Centers, Regional Public Affairs, Business Services, and Fire Coordination.

- **Call Centers:** Any customer, or concerned person, can contact SDG&E's call centers to obtain information before, during, or after an event. SDG&E's call centers monitor events as they approach and adjust resource needs accordingly throughout the event.
- **Regional Public Affairs:** SDG&E has assigned specific personnel to develop and maintain relationships with local elected officials. As an event approaches, the SDG&E representative will establish and maintain contact with their key stakeholder. The SDG&E representative provides answers to questions and addresses concerns.
- **Business Services:** SDG&E has identified key and critical accounts for which it assigns a specific resource to establish and maintain contact during an event. The SDG&E representative reaches out to the customer as the event develops and maintains contact until the event is over.
- **Fire Coordination**: The Fire Coordinators are experienced in fire behavior, fire prevention, and firefighting techniques. The Fire Coordinators serve as the direct link between SDG&E and emergency-response agencies. They also serve as the single point of contact for the fire agency Incident Command System, provide periodic updates to fire emergency personnel and SDG&E personnel, establish radio and communications assignments, assist in the coordination of activities related to de-energizing and re-energizing power lines, and update on-scene personnel, control centers, service dispatch, and the SDG&E regional operations centers as to the status of each incident.

5.3.9.3. Coordination with public safety partners

3. Coordination with Public Safety Partners, such as stationing utility personnel in county Emergency Operations Centers

Throughout the year, SDG&E works with its Public Safety Partners, including local jurisdictions, to ensure coordination exists during Public Safety Power Shutoff events. SDG&E accomplishes this coordination, via the following activities: conducting tours of its Emergency Operations Center for its Public Safety Partners in advance of events; and providing 24/7 contacts to its Public Safety Partners based on Public Safety Partner customer segment (e.g., a dedicated contact for emergency services, jurisdictional and utility partners and fire services). Additionally, emergency services, utility partners and jurisdictional partners have individual SDG&E representatives that provide information year-round in preparation for wildfire season and these representatives are available to answer additional questions and concerns. During PSPS events SDG&E can provide County OES with a government liaison if requested by the County. During the 2019 PSPS season, SDG&E did send a government liaison to County OES and both Cal OES and County OES sent liaisons to SDG&E's EOC.

Additionally, Emergency Management staff regularly attend the San Diego Fire Chiefs Association meetings, Unified Disaster Council meeting, and hosts annual Regional Emergency Manager meetings. Staff also conduct annual trainings with fire and law enforcement personnel on safety (how to be safe in and around gas and electric) and how to incorporate gas and electric field staff into the incident command system.

Describe utility efforts to identify which additional languages are in use within the utility's service territory, including plan to identify and mitigate language access challenges.

Communication in Additional Languages

In addition to English and Spanish, communications material will also be produced in Mandarin, Cantonese, Tagalog, Korean, Russian, and Vietnamese. SDG&E is researching other prevalent languages within the territory. Local population demographics, census and Registrar of Voters information will be among the data considered for additional in-language outreach collateral and activities.

SDG&E also collaborates with the San Diego County Office of Emergency Services Access and Functional Needs Working Group and the Partner Relay Network along with other CBOs to help amplify communications and notifications to their constituents. In some cases, SDG&E seeks to help these CBOs translate the messaging to non-prevalent languages and further amplify communications to their constituents.

5.3.9.4. Emergency planning and preparedness programs

Please see Section 5.3.9 above.

5.3.9.4.1. Adequate and trained workforce for service restoration

Under the Incident Command System (ICS) framework, SDG&E uses a three-pronged approach with respect to its trained workforce for service restoration:

1. Integration of ICS training and exercises for field Utility Incident Commanders, Department Operations Centers, EOC responders, and Executives;
2. Required participation of field operational responders in Utility ICS training and requirement to follow Electric Standard Practice No. 113.1 (ESP 113.1) which specifically addresses wildland fire prevention and fire safety;
3. Annual ICS training of operational leaders, field responders, and supporting personnel including cross-functional training workshops and exercises covering all-hazards as well as the deployment of field training advisors to ensure continuous improvement on practical application in the field.

Additionally, SDG&E actively trains field resources with the appropriate electric distribution and transmission operational skills.

Due to these extensive efforts, SDG&E has a qualified EOC response workforce with over 490 Federal Emergency Management Agency-certified responders, equivalent to more than 10% of the total SDG&E workforce. These responders are certified in the functions of ICS including command, operations, planning, logistics and finance. EOC responders, which include responder executives, are qualified annually in order to maintain their emergency response proficiency. Additionally, SDG&E's EOC collaborates annually with internal and external stakeholder organizations to conduct a Company-wide wildfire workshop, as well as a tabletop or functional exercise prior to the beginning of fire season. Following training, exercises, and activations, the EOC utilizes findings to develop an After-Action Report to highlight positive response elements, areas for improvement, and corrective actions.

5.3.9.4.2. Community outreach, public awareness, and communication efforts

Please see Section 5.3.9.2 (b) above as well as Sections 5.3.10 and 5.3.10.1 below.

5.3.9.4.3. Customer support in emergencies

Please see Section 5.3.9.2 above.

5.3.9.4.3.1. Protocols for compliance with requirements to support customers

Please see Section 5.3.9.2 above.

5.3.9.4.4. Disaster and emergency preparedness plan

5.3.9.4.4.1. Company emergency response plan overview

SDG&E's Emergency Response Plan (CERP) and its risk specific response plans provide a framework by which it can effectively coordinate its pre-incident and response and recovery activities to a given threat or hazard. Pursuant to the CERP, the Utility Incident Commander or Officer-in-Charge (OIC) is ultimately responsible for incident management and support activities respectively. While a Utility Incident Commander or OIC may delegate authority, they cannot delegate the responsibilities outlined in the Wildfire Annex or the CERP.

In addition to the CERP, SDG&E works collaboratively with the local jurisdictions to ensure integration into regional plans. SDG&E representatives are members of the Southern California Catastrophic Earthquake planning committee, Co-chair of the Southern California Lifelines training and exercise committee and are part of a three-year Department of Homeland Security Regional Resiliency Assessment Program sponsored by Cal OES.

Phases of Operation
There are three phases of emergency operations:

- **Pre-Incident:** Pre-incident planning activity in anticipation of an incident occurrence.
- **Response:** Period spanning from when the incident occurs, and a response team is established, until the response team has demobilized and transitioned operations to long-term recovery.
- **Recovery:** Spanning the period from when the response team has demobilized and transitioned to long-term recovery, until all recovery operations have been completed.

Incident Conditions
Certain fire-related criteria initiate SDG&E's notification process. The following are the criteria that trigger such communications:

- Fires during an FPI of 14 or greater;
- Any uncontrolled fire within 1 mile of a transmission line;
- Any fire where SDG&E is potentially related to the cause regardless of the FPI;
- Any fire regardless of FPI that is:
    - Expected to escape initial attack/exceed 10 acres, or
    - Has impacted or may have a direct impact on any SDG&E facilities, or
    - Is expected to draw significant social or media attention

Pre-Incident Planning
Pre-incident planning is a key element in preparing for the risk of wildfire. SDG&E must be prepared to react to mitigate impacts from any wildfire within SDG&E's service territory. If SDG&E becomes aware of a potential incident expected to have adverse impacts on its system, Fire Coordination will consult with the SDG&E Meteorologists daily to come to agreement on fire potential and burning conditions based on the weather forecast, fuel conditions, current fire activity, availability of firefighting resources, and other relevant factors.

If an incident is anticipated, Emergency Management will begin to coordinate pre-incident activities with a day-ahead call focused on assessing real-time and forecasted weather conditions, operational resource needs and response plans, customer and stakeholder notification plans, EOC staffing needs and timing. Emergency Management will also provide projections for incident impacts. During pre-incident planning, assuming there is enough advance warning, SDG&E submits proactive notifications to customers and key external stakeholders.

Annually, SDG&E Emergency Management staff hosts meetings with local County and City representatives to review the CERP and ensure it is integrated with their emergency plans. These meetings provide the opportunity for the local jurisdictions to review the plan and provide feedback for consideration. SDG&E also conducts annual exercises to simulate

compounding incidents (i.e., PSPS with a wildfire) to validate the planning and response training.

Response
Response to and during a wildfire requires immediate assessment and incident characterization, the communication of appropriate situational awareness, and the development of an incident planning cycle to facilitate the collection, assessment and dissemination of relevant wildfire incident information. Should an ignition occur, a Fire Coordinator may deploy to the Incident Command Post (ICP) to provide real-time situational awareness to SDG&E.

The Fire Coordinator serves as the primary point of contact between first responder agencies and the SDG&E Utility Incident Commander. Field operations is responsible for scene safety, along with command and control of the incident to recover the system and restore customers. The EOC's focus is on the incident's big picture of the incident, which involves managing and deconflicting critical information, communicating to customers and key external stakeholders, and providing operational support and strategic and policy-level decision-making. De-mobilization planning remains a focus during the response phase to ensure adequate recovery of the system.

A wildfire may require de-energization of electric distribution circuit(s), and transmission tie line(s) for public or first responder safety. The OIC will carefully examine whether de-energization is required based on input from the field response and EOC responders. This type of de-energization for public or first responder safety is not considered a PSPS as is not triggered by a wind or Red Flag event. Rather, it is in response to unsafe conditions due to wildfire activity and therefore does not follow the PSPS protocols.

Crew Mobilization and Deployment Strategy
During an extreme operating condition or RFW condition, the management of the SDG&E Electric Regional Operations, Electric Distribution Operations and Electric Grid Operations control centers work in collaboration with SDG&E's Meteorology to coordinate the assignment of appropriate and needed resources to each of the affected regional operating districts. At minimum, electric troubleshooters and personnel from the Wildland Fire Prevention resources are made available for immediate response to address fire threats or events. SDG&E may also coordinate and assign additional resources to manage the event. SDG&E may assign Field to observe an area forecasted to experience the most adverse weather conditions. These personnel are under instructions to report flying debris, vegetation damage, or significant conductor movement. Based on these field observations, SDG&E deploys appropriate resources to address the fire threats posed by these conditions.

SDG&E has four mobile command trailers (MCT) and one, state of the art, self-contained Tactical Command Vehicle (TCV), which collectively provide a response space with land, mobile, radio, video, and internet capabilities. Additionally, four tactical communications trailers with internet capabilities are available to support the ICS structure during emergency response and

restoration activities. During the high-risk fire season, these assets are staged in districts located within the HFTD. SDG&E's district personnel are trained annually on the assets operations and maintenance to ensure these assets remain effective and functional.

Recovery and Post Incident Activities

Recovery from a wildfire is just as important as the response to a wildfire. The location, extent, and severity of the wildfire and its impacts to SDG&E's infrastructure and customers are rigorously tracked, assessed, and prioritized to identify mitigation or improvement measures available when recovering for safe and swift restoration. SDG&E integrates into the regional recovery efforts by ensuring there are representatives in any Local Assistance Center or recovery area to provide support and information for our customers.

SDG&E continually reviews its program delivery, decision making processes, and responses to emergencies to ensure improvement and service to our customers. Through its Quality Assurance and After-Action Review process, the planning, response, and recovery processes are evaluated across relevant internal response groups. Observations will address the following areas:

- Plan execution;
- Response structure;
- Activation and mobilization for the incident;
- Circumstances that contributed to, enhanced, or resulted in improvement opportunities in incident management or communications;
- Process execution and effectives;
- Communications strategy;
- Media interactions;
- Logistics support; and
- Financial tracking and support.

Based on lessons learned, emergency response plans are updated, processes and standards are enhanced, and training exercises are designed to stress test lessons learned and improvements to support a continuously improved response. SDG&E will continue to review ongoing recovery operations and use its findings of post incident activities to drive improvements across the organization's resilience, response, and recovery programs. Quality checks on the program will consist of validation of the plans during training and exercises.

The emergency plans are updated in a three-year cycle, with the next scheduled update in 2020. The plan will be updated and validated prior to the 2020 wildfire season. Each update of the plan is developed in collaboration with key internal business units and external public safety partners. The emergency plans will be updated again in 2023.

5.3.9.4.5. Preparedness and planning for service restoration – Mutual assistance and contractors

Mutual assistance is an essential part of the energy industry's contingency planning and restoration process. Utility and electric service companies impacted by a major outage event use mutual assistance to augment the size of their workforce by borrowing restoration workers form other companies. When called up, a utility company will send trained and qualified skilled restoration workers, along with specialized equipment, oversight management and support personnel, to assist the restoration efforts of a fellow utility/electric service company.

SDG&E is a member of multiple emergency associations to facilitate mutual assistance and maintains active mutual assistance agreements with the following organizations: California Utilities Emergency Association (CUEA); Western Regional Mutual Assistance Group; Western Energy Institute; Edison Electric Institute; and the American Gas Association. The decision to deploy a response team or request mutual assistance is facilitated by SDG&E Emergency Management group and determined by the OIC in consultation with key operations directors and executives.

5.3.9.4.6. Protocols in place to learn from wildfire events – After action reports

As an essential part of the ongoing effort to improve its overall emergency readiness and ensure continued safety on every worksite and emergency incident, SDG&E reviews all significant incidents and activations to identify potential improvements. Once fully implemented and mature, this program will establish a comprehensive and measurable After-Action Review (AAR) process to continue building and improving our capabilities in operational planning, and in response to wildfire, PSPS incidents, and all-hazards emergencies.

5.3.9.4.7. Other – Emergency management operations

SDG&E manages emergencies in alignment with the state Standardized Emergency Management System (SEMS) and federal National Incident Management System (NIMS), to coordinate across all levels of utility, government, and agency activity. The Company utilizes a utility-compatible Incident Command System (ICS) structure as an all-hazards framework to manage emergency incidents and events. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure and serves as the mechanism to direct those functions during an emergency response.

The SDG&E Emergency Management organization is responsible for coordinating emergency management activities and activation of the Emergency Operations Center (EOC). The department's mission is to support effective, efficient, and collaborative planning, preparedness, response, and recovery processes for all hazards and risks, including those associated with the Wildfire risk and Red Flag Warning incidents, enterprise wide. Collectively,

this department leads efforts and strategies to prepare for, respond to, and recover from all risks, hazards, and incidents that may impact SDG&E operations.

SDG&E's EOC serves as the location from which centralized emergency management is coordinated. To respond and recover effectively from all hazards and threats, like wildfires, SDG&E established an EOC with cross-functional teams representing every major business line within the company and functioning within a utility-compatible ICS. The activation of the EOC assembles the internal subject matter experts to assess and provide situational awareness to internal and external stakeholders, overarching incident objectives, planning, anticipation, response, communications, and coordination.[57] External Emergency Management partners, such as the County OES and Cal OES are provided with situational awareness up to 24-72 hours in advance or as soon as operationally feasible; additionally, those partners are embedded within SDG&E's EOC during emergency conditions.

SDG&E is further expanding its Emergency Management Operations to include an Operational Field & Emergency Readiness program to manage SDG&E's comprehensive After-Action Review program to continue building and improving its capabilities in operational planning and response to wildfire, PSPS incidents, and emergencies. To address a continued focus on Wildfire, including PSPS events, two new resources will help in developing and implementing internal and external training and exercises, and all risk response plans (cybersecurity, earthquake, natural gas, tsunami, terrorism, active shooter, and other man-made and natural disasters). Additionally, SDG&E will be embedding four Information Technology Specialists in Emergency Management to help support, develop and drive technology solutions to the ever-changing preparedness and response requirements necessary to ensure timely and appropriate decision making.

SDG&E's current EOC is an approximately 6,500 square-foot facility constructed over 20 years ago to serve as SDG&E's central command post in the event of a natural disaster or other significant incident impacting the region's electric and natural gas systems. Over time, the EOC has evolved to serve as the central hub to support the growing demands of SDG&E's wildfire mitigation, situational awareness, and outreach and collaboration initiatives. It also houses SDG&E's meteorology center.

In its Test Year (TY) 2019 GRC, SDG&E sought to remodel the EOC to, among other things, revise existing electrical work to accommodate new equipment and reconfigurations; update the existing workstations to enhance the exchange of information between subject matter experts

[57] To prepare for and support emergencies, GIS is used to provide information about SDG&E's system.

and strategic decision makers; and upgrade audio visual technologies.[58] The final TY 2019 GRC decision authorized the EOC remodeling project for 2019.[59]

Since SDG&E submitted its TY 2019 GRC testimony in 2017, it has become necessary to refresh and expand the EOC beyond what was contemplated at that time and authorized in the final GRC decision.[60] The existing EOC will be rebuilt to facilitate and support SDG&E's ongoing wildfire mitigation, situational awareness, outreach and collaboration, and emergency response efforts. While the EOC supports all emergencies and response efforts, the discussion included herein relates to wildfire operations. This project will include expanding the EOC complex to approximately 15,000 square feet to accommodate the increase in staff and function of the EOC. Staff increases are due to combining the Emergency Management, Fire Science & Climate Adaptation, and Wildfire Mitigation and Vegetation Management departments into the EOC complex to improve planning, coordination, program development and internal/external stakeholder communications.

Additionally, new technologies, equipment, processes and procedures will be developed as part of this EOC complex to further facilitate continued improvement of training and exercises toward building strong core competencies of all employees assigned to the complex and those that respond to the EOC during activations. The new layout will also facilitate the further integration of the ICS structure in the seating layout by providing a collaborative solution. An additional feature of the EOC will be an expanded media room where SDG&E's Public Information team can more effectively track and respond to social media, broadcast on social media, and update SDG&E's website real-time based on the needs and information from the EOC to be more consistent with OneVoice messaging and an improved customer experience.

During PSPS events, SDG&E's employees respond and work within the HFTD, sometimes under dangerous conditions with unreliable communications. This poses the risk of not being able to accurately identify Company vehicles and personnel working in those areas. Additionally, there are times, due to gaps in communications to computers, cell phones, and radios causing a potentially inadequate and potentially unsafe environment for assigned workers in these areas. SDG&E, through Emergency Management and Fleet Services, has implemented a pilot program with Verizon Connect to track vehicles assigned to the HFTD. Additionally, in 2020, SDG&E will implement a "Lone Worker" tracking system utilizing satellite communications equipment to track the individual employee once they leave their vehicle in the HFTD and provide improved communications in the back-country gap areas. These programs will also improve resource management and accountability during PSPS events.

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58 *See* A.17-10-007, SDG&E-22 Direct Testimony of R. Dale Tattersall at RDT-35 and SDG&E-22-CWP Capital Workpapers to Prepared Direct Testimony of Richard D. Tattersall at 53.

59 *See* D.19-09-051 at 434.

60 D.19-09-051 authorized approximately $2.8 million of direct capital expenditures in 2019 (in 2016$) for EOC tenant improvements. SDG&E reevaluated the EOC remodel project that was authorized in D.19-09-051 which resulted in additional, value added features as described in this Plan, incremental costs beyond authorized levels, and an updated in-service date of 2020.

SDG&E's comprehensive After-Action Review program, discussed above, has established a process for learning from past events to improve our overall response and readiness capabilities in operational planning, and in response to wildfire, PSPS incidents, and all-hazards emergencies. Based on a standardized list of capabilities, all training and exercises are designed to strengthen and evaluate progress and gaps. When corrective actions are identified and assigned following events or incidents, they are logged into a database and tracked to completion.

Each component of SDG&E's Emergency Planning and Response programs is evaluated after each emergency activation and annually to ensure organizational and operational effectiveness. Modifications and revisions are made and introduced in new training and exercise programs for the next program year. The current Emergency Management program was revised in 2018. In 2019, SDG&E completed FEMA certification and training of 460 EOC responders, conducted and participated in training and exercises related to PSPS and other company risk factors. See Section 5.3.9.4.1 Adequate and Trained Workforce for Service Restoration.

5.3.10. Stakeholder cooperation and community engagement

SDG&E does not operate alone in mitigating the risk of wildfires and impacts of PSPS events. Customers, elected officials, nonprofit support organizations, and first responders, all play a vital role in achieving wildfire prevention and mitigation in SDG&E's service territory. SDG&E provides an essential service, and it takes its role within the communities it serves very seriously. This is especially true during times of PSPS events, when communities – neighborhoods in which SDG&E's employees, families and friends live – depend on complete, accurate, and timely information for their well-being.

SDG&E's objective is to provide all residents and businesses with information so that they are well-equipped and informed to handle the inherent adversity of a wildfire or PSPS event. To this end, SDG&E has implemented a robust, external communication strategy, which is consistently analyzed to identify areas of improvement. SDG&E also leverages its relationships with community organizations and stakeholders to amplify and disseminate critical, sometimes life-saving information.

The following sections provide greater detail on the importance SDG&E places on active community engagement to ensure it is available and visible for every person it serves. SDG&E initiated several practices and partnerships outlined below over 10 years ago and continues to develop additional ways to benefit its customers. Some of the resources SDG&E offers are newly implemented and will evolve and grow as needed. One thing is consistent – by incorporating public opinion, best practices and lessons learned -- SDG&E can modify the areas which need improvement and build upon the opportunities that work best. Community and stakeholder engagement is a dynamic component of wildfire safety, and it is something SDG&E will continue to adapt, based on community input.

Currently, SDG&E works with almost 98 nonprofit readiness and response organizations, as well as close to 260 community-based organizations. As SDG&E's wildfire program evolves, so will its list of emergency response agencies and strategic partner organizations. SDG&E will remain open to fostering new, strategic relationships aimed to improve collaboration and public messaging. Understanding that all customers should have equal access to information, SDG&E has created dedicated websites for safety information, as well as a landing page that provides resources to assist the AFN communities, particularly for PSPS event.

SDG&E has also found success in partnerships with many emergency response agencies. SDG&E provides electrical equipment training to CAL FIRE representatives and, on all levels, partners with fire agencies, regional dispatch centers, law enforcement and other emergency management agencies, making sure incidents are addressed timely and effectively through comprehensive trainings. Additionally, a grant program was recently introduced through partnerships with fire districts, Caltrans, local, state and tribal governments, and land management agencies, whereby nonprofit organizations are encouraged to identify and support wildland fuel treatment initiatives, which modify wildland fire behavior with the goal of reducing burn intensity, limiting spread and aiding in suppression efforts.

SDG&E understands the importance of productive collaboration and community engagement and is committed to finding new ways to better serve our communities. SDG&E refuses to be stagnant and will continue to identify effective and efficient ways to cooperate with stakeholders and leverage valuable, external relationships to help champion important safety messages.

Consistent with the Commission's WMP Guidelines, SDG&E presents its Stakeholder Cooperation and Community Engagement initiatives in Sections 5.3.10.1 through 5.3.10.4 below. Table 30 – Stakeholder Cooperation and Community Engagement initiatives is provided in Appendix A.

5.3.10.1. Community engagement – Community outreach and public awareness

SDG&E has created a multi-pronged approach to community education, outreach and engagement related to public awareness of fire risk, fire prevention, and emergency preparedness. Plans for community outreach and public awareness before, during, and after a wildfire, including language notification in English, Spanish, Mandarin, Cantonese, Filipino, and Vietnamese, Korean and Russian, will be made where feasible. In-language communications will apply to collateral and print advertising before and after wildfires. These materials have previously educated customers about how to be prepared for wildfires and encouraged them to sign up for outage notifications and updates. SDG&E anticipates continuing this outreach messaging to further prepare customers for PSPS.

Notifications during wildfires are also created in the languages listed above. Pre-drafted and pre-recorded messages have been loaded into the Enterprise Notification System for execution as voice, text and/or email messages. During certain events, the need may arise for customized

messaging during an event, and the Communications team creates those messages and notifications as needed. The key elements of SDG&E's multi-level approach to community education and outreach are described in further detail below.

Fire Safety Stakeholder Collaboration and Communication

In 2009, SDG&E customers and community leaders were invited to participate in a fire safety collaboration process, which was facilitated by a federal mediator. Approximately 40 stakeholders – representing various entities, such as local schools, water districts, disability rights advocates, consumer groups, and fire departments – worked with SDG&E for more than a year to develop a joint fire prevention plan. The process produced more than 100 potential solutions aimed at preventing the occurrence of major fires.

SDG&E has implemented many of these solutions as identified by the stakeholders, including deactivating automatic reclosers, hardening its overhead electric system, replacing wood poles with stronger steel poles and larger conductors, and undergrounding portions of the electrical system, where feasible. In addition, in 2019, SDG&E formed a Wildfire Safety Community Advisory Council to strengthen wildfire prevention and preparedness in the region. The Council will provide insight, ideas, expertise, and recommendations integral to public safety, wildfire matters, community preparedness, regional coordination, the use of emerging technologies, and best practices.

As discussed in the following sections, SDG&E frequently invites community leaders, government agencies, and the public at-large to participate in a collaborative fire-safety process to continue dialogue and partnerships regarding public safety.

Partnering with Organizations Dedicated to Readiness and Response

SDG&E partners with approximately 98 nonprofit organizations dedicated to readiness and response to wildfires and emergencies. Specifically, SDG&E: facilitates coordinated multi-agency preparedness; participates in the annual County of San Diego wildland and Community Emergency Response Team drills; underwrites philanthropic grants to support San Diego County wildfire readiness; and works closely with media and key stakeholders to promote wildfire preparation initiatives in the San Diego region. In 2019, SDG&E began partnering with the County of San Diego Office of Emergency Services Access and Functional Needs (AFN) Working Group and Partner Relay network who help share messaging with some of the vulnerable population within SDG&E's territory. The two groups are comprised of approximately 260 local community-based organizations who work directly with the AFN population. The purpose of the AFN Working Group is to ensure emergency planning efforts in San Diego County reflect the unique needs of the whole community.

This group works to identify the needs of individuals with disabilities and other AFN populations before, during and after disaster strikes, and takes steps to ensure that needs and resources are integrated into emergency management systems. SDG&E is a member of this working group and looks for ways to incorporate some of these unique needs into their PSPS procedures. The Partner Relay network is a broad network of trusted community organizations such as

churches, nonprofit organizations and refugee resettlement organizations, who help disseminate information in various languages to their key stakeholders. SDG&E will continue to look for more ways to partner with organizations dedicated to readiness and response throughout its service territory.

SDG&E is also a member of the CUEA, who serves as a point of contact for critical infrastructure utilities and the Cal OES and other governmental agencies before, during, and after an event.

First Responder Outreach Program
SDG&E works with local emergency response agency leadership to ensure continued awareness of electric and natural gas safety protocols and collaboration on roles and responsibilities for mutual emergency preparedness, including with respect to wildfires. SDG&E works with all local, state, and federal fire agencies, regional dispatch centers, law enforcement and other emergency management partner agencies to ensure effective command, coordination, and communications in preparing for and responding to incidents. This is accomplished through training, exercises, relationship development and utilization of the Utility ICS.

Community Resource Centers
As a result of community meetings held in communities in SDG&E's service area, SDG&E established a network of Community Resource Centers (CRCs) to help communities in real-time during extreme weather events. Currently, SDG&E has identified eight customer-owned facilities located within the HFTD to serve as CRCs during extreme weather events. SDG&E may establish more CRCs should the need arise.[61]

As discussed in Section 5.3.3.15 above, if SDG&E anticipates that power will be off for an extended period, SDG&E may open CRCs in affected areas. The CRC locations selected by SDG&E were identified through a rigorous process, which included input from fire and meteorological experts, as well as consideration of those areas most prone to extreme weather, as indicated by historical data. The CRCs, if activated for a PSPS event that lasts longer than 24 hours, will be powered using a portable back-up generator connected through a manual transfer switch. Once activated, the CRC will operate in roughly 10-hour shifts from 8:00 a.m. through 6:00 p.m. daily, until power to the affected community has been restored. SDG&E subject matter experts collaborate with volunteer staff at an activated CRC to provide, to the extent possible, updates and real-time information directly to the impacted community. Other volunteer organizations provide bottled water and snacks for temporary relief to residents in the area.

Community Outreach
SDG&E proudly supports nonprofit organizations whose programs promote emergency preparedness and safety at home and in communities within its service territory. In 2012, SDG&E began providing funds to charitable organizations committed to regional and local

[61] Further information on CRCs may be found here: https://www.sdge.com/wildfire-safety/community-resource-centers.

emergency preparedness and fire safety, such as 2-1-1 San Diego, the American Red Cross, and the Burn Institute, plus several volunteer fire departments, CERTS, LISTOS, Fire Safe Councils and the Inter-Tribal Long-Term Recovery Foundation. In addition to the organizations committed to regional and local emergency preparedness and fire safety, SDG&E works with more than 200 community-based organizations to promote many of SDG&E's program and service offerings, including: California Alternative Rates for Energy (CARE), Energy Savings Assistance (ESA), Demand Response, Energy Efficiency and more. These organizations help share messaging within their communities and are looked to as trusted sources of information. SDG&E will continue to utilize these partners to share important messaging around emergency preparedness and safety.

In compliance with Resolution ESRB-8, SDG&E held a series of workshops in 2018 regarding its PSPS practices. The purpose of these workshops was to educate stakeholders and obtain feedback from elected officials, community leaders, government agencies, and appropriate tribal organizations. SDG&E has incorporated much of the feedback into its public safety initiatives and continues to maintain an ongoing dialogue and partnerships with these stakeholders.

In 2019, SDG&E hosted six Wildfire Safety Open House events and three Wildfire Safety Fairs. These events brought together more than 30 different internal and external groups focused on wildfire preparedness and safety. SDG&E provided customer education on SDG&E programs and services, system upgrades and projects, generator safety, Meterology, Public Safety Power Shutoffs, outage notifications and Community Resource Centers. External groups that participated in the events included 2-1-1 San Diego, the American Red Cross, local fire departments and other fire agencies, local CERT groups and more. The community events were a success, reaching over 1,200 customers. SDG&E plans to continue to host these open house and fairs events in the upcoming years.

Community Communication

SDG&E provides regular proactive communications to residents and businesses located in the HFTD. Aside from English and Spanish, communications material will also be produced in other languages, including Cantonese, Mandarin, Korean, Tagalog, Russian and Vietnamese. These fire-safety and emergency communications include, but are not limited to:

- Community events, emergency preparedness workshops for businesses, public participation meetings, and backup generator safety workshops;
- Informational and emergency preparedness mailings to customers in the HFTD;
- Educational and general awareness advertising campaign focused on SDG&E's preparations for the fire season and the preparations SDG&E's customers should make to be ready for emergencies. This campaign includes a series of print advertisements that run in community newspapers in the HFTD and the rest of the service territory. These ads also encourage customers to update their contact information and to sign up for outage notifications;

- Educational information disseminated through a bill newsletter or special insert included in customer bills. An electronic version is emailed to paperless customers;
- Distribution of a co-branded "newsletter" with the American Red Cross, the San Diego Office of Emergency Services, and the San Diego County Fire Chiefs' Association;
- Various videos that highlight wildfire safety preparation, including the SDG&E documentary "Everything in Our Power;"
- The provision of weather information and system-outage status on SDGE.com;
- Dissemination of information regarding emergency-preparedness events via social media, such as Twitter and Facebook;
- Publication of information for SAFE San Diego Education and Outreach events in the community following an emergency.

In addition to routine outreach and communications, SDG&E augments its effort to communicate with customers when fire-threat conditions are elevated or extreme. SDG&E has instituted an early warning system advising customers that a RFW has been declared by the National Weather Service and dangerously high winds are expected. SDG&E also establishes communications with local water districts, telecommunications infrastructure providers, the San Diego County Office of Education, the San Diego County Office of Emergency Services, and the American Red Cross as soon as possible following the declaration of a RFW. SDG&E assembles a team of subject matter experts to provide updates on the status of the SDG&E system and weather conditions.

As alert conditions are elevated, SDG&E also contacts Medical Baseline customers, including life support and temperature sensitive customers. Under severe threats of emergencies, where SDG&E cannot contact these customers via our outbound-dialer system, or a Customer Contact Center representative, SDG&E will send field personnel to make personal contact and, failing all else, to leave door hangers alerting the customer of the situation.

Emergency Preparedness Safety Website
SDG&E maintains a publicly accessible website focused on wildfire safety, as well as other safety areas, including natural gas, electric, trees, generator safety, emergency preparedness and outage information. This information and can be found at http://www.sdge.com/safety. SDG&E's emergency preparedness brochures, traffic radio IDs, newspaper advertisements, digital ads, and social media postings via Facebook and Twitter, have been used to drive customers to the Company's wildfire safety section: http://www.sdge.com/wildfire-safety.

SDG&E also created a landing page that provides resources to assist the AFN communities, particularly for PSPS events (https://www.sdge.com/AFN). The page provides information and links for: PSPS notification registration; Emergency plan/kit checklists, generator safety; Medical Baseline program and application; California Alternate Rates for Energy (CARE); Family Electric Rate Assistance (FERA); and Energy Savings Assistance Program (ESA). Additional fire or

weather-related webpages are actively maintained throughout the incident by SDG&E and are accessible using the following addresses: Weather web pages: http://sdgeweather.com; Community Resource Centers: http://www.sdge.com/resource-centers.

SDG&E will continue to conduct pre- and post- event customer research to solicit feedback on the quality of the messaging and communication tactics that are employed. Surveys and focus groups will be used to engage customers and gauge reactions to the public education campaign materials. SDG&E will use the feedback to update materials where appropriate. Surveys are also employed during the community outreach events. Attendees are asked to provide feedback about the event as well as any additional information they would like at future events. This type of feedback helped us establish Community Resource Centers in the past. Post-event surveys will be used to garner feedback on messaging and communications used during PSPS or wildfire events. Applicable lessons learned will also be used to update materials accordingly. This process will be used annually to help update materials and communications in the coming years.

5.3.10.2. Cooperation and best practice sharing with agencies outside California

SDG&E's Emergency Management and Fire Science & Climate Adaptation departments are identified as world-class and innovators both nationally and internationally. SDG&E has hosted numerous knowledge sharing tours of the EOC and weather center for utility personnel from throughout the U.S., as well as international utility partners. In 2019, utility representatives from other states (e.g., Colorado, Texas, North Carolina, New York, and Utah) and countries (e.g., Australia, Costa Rica, and Spain) have sought to learn best practices from SDG&E.

SDG&E prioritizes cooperation and sharing of best practices as an important component of our fire mitigation activities. SDG&E plans to continue these practices and believes that its cooperation and sharing practices have been effective and a contributor to its success in wildfire mitigation activities over the last decade. Prior to the upcoming wildfire season and before the next Plan update, as well as over the next three to ten years, SDG&E plans to continue its practice of cooperation and sharing of best practices outside of California. For 2020, SDG&E already has several events planned.

5.3.10.3. Cooperation with suppression agencies

SDG&E employs a full-time staff of five fire coordinators. The current fire coordinators on staff have over 150 years of fire suppression, prevention, and fire behavior experience collectively. The fire coordinators serve as the direct link between SDG&E and emergency-response agencies. They also serve as SDG&E's single point of contact for fire agencies and utilize Incident Command System protocols during incidents, provide periodic updates to both firefighters and SDG&E personnel, establish radio and communications assignments, assist in the coordination of activities related to de-energizing and re-energizing power lines, and update on-scene personnel, control centers, service dispatch, and the SDG&E regional operations centers as to the status of each incident.

The Fire Coordinators are active in professional forums, seminars, and training throughout the service territory to ensure state-of-the-art fire practices are incorporated into SDG&E operations and practices. They also participate in engineering and operational meetings to advise SDG&E personnel regarding fire threats and prevention. The Fire Coordinators also share information with the firefighting agencies within the SDG&E service territory and, on a rotating basis, provide those agencies with electrical and gas safety training.

In addition, the Fire Coordinators provide wildfire prevention training to SDG&E personnel who work in wildland areas of the service territory. This annual training utilizes SDG&E's Electric Standard Practice No. 113.1 – Operations and Maintenance Wildland Fire Prevention Plan (ESP 113.1) to educate employees about the activities that present a risk of igniting a wildfire. The plan provides a fire risk and mitigation matrix based on work activity and the FPI to set a minimum level of requirements for fire prevention, work restrictions, and fire tools for suppressing small, witnessed ignitions. SDG&E requires that contractors and consultants also undergo wildland fire prevention training, and that they follow SDG&E's ESP 113.1.

SDG&E Fire Coordination also participates in county-wide wildland fire drills that include electric utility scenarios, provide instructors for electric safety for CAL FIRE's Truck Academy and the Heartland Firefighter Recruit Academy training.

The First Responder Outreach Program, as part of the Operational Field and Emergency Readiness Program (OFER), trains fire, law enforcement, and emergency management first responders, on how to safely work utility emergencies with SDG&E. SDG&E Fire Coordinators and OFER Staff work together to teach electric and natural gas safety. In 2019, the First Responder Outreach Program completed 31 train the trainer sessions throughout the county, helping to prepare 581 first responders to safely respond to a utility emergency.

SDG&E participated in an evacuation working group to develop standardized training for all the public safety disciplines involved in evacuations. The participants included SDG&E, CAL FIRE/SD County Fire, San Diego Sheriff's Department, County OES, San Diego Fire and Rescue Department, San Diego Police Department, San Diego Office of Homeland Security, California Highway Patrol, SD County Animal Services and Caltrans. The evacuation working group developed a training presentation, class exercise, and the San Diego Sheriff's Office developed six wildfire training videos in support of the effort, including one video featuring an SDG&E Fire Coordinator discussing utility safety during wildland fires. While SDG&E supports and collaborates with the aforementioned agencies in evacuation planning, it is the responsibility of city and county first responders to develop, prepare, and implement evacuation plans.

Further, as stated in Section 5.3.5.9 above, SDG&E provides electrical equipment training to CAL FIRE representatives so that SDG&E is maintaining proper clearances of vegetation to conductors and equipment prior to the start of the fire season. While CAL FIRE inspections have been jointly performed with SDG&E, this training is intended for CAL FIRE to better understand the operation of the electric system and which equipment should be targeted to best prevent an ignition source. This training can be used by CAL FIRE while they are

conducting their day-to-day operations and inspections and is dependent on CAL FIRE's participation.

SDG&E highly values the partnerships and collaborations that it has built with the fire suppression agencies across its service territory over the last decade and fully intends to maintain and continue to build these relationships. SDG&E does not plan to conduct official audits or quality checks on our cooperation with suppression agencies, however, SDG&E does plan to continue to build upon these foundational relationships.

SDG&E will leverage the Fire Science and Coordination group, and their over 150 years of combined experience in the fire suppression agencies, to evaluate and expand upon our collaborations. As described above, SDG&E closely collaborated with fire suppression agencies in 2019 through training, collaborative community outreach, and emergency response to wildfire activity.

In January 2020, SDG&E received the 2019 CAL FIRE Director's Partnership Award for work done to improve and standardize evacuation procedures countywide. SDG&E's efforts streamlined the process by which response agencies will evacuate communities should the need arise. Interagency cooperation of this type is how local response agencies prepare for the impacts of large-scale emergencies.

Prior to the next wildfire season and Plan update, as well as over the next three and 10 years, SDG&E plans to continue to build and evolve collaborations with fire suppression agencies with the foundational goal of keeping its communities safe.

5.3.10.4. Forest service and fuel reduction cooperation and joint roadmap

Please refer to Section 5.3.5.5 above for a detailed description of SDG&E's forest service and fuel reduction joint roadmap.

5.4. Methodology for Enterprise-Wide Safety Risk and Wildfire-Related Risk Assessment

Instructions: *Describe methodology for identifying and evaluating enterprise wide safety risk and wildfire related risk, and how that methodology is consistent with the methodology used by other electric utilities or electrical corporations. If the risk identification and evaluation methodology is different, the utility shall explain why in this section.*

Risk Framework

SDG&E's risk framework is modeled after an internationally recognized risk management standard, ISO 31000.[62] This framework consists of an enterprise risk management governance

[62] ISO 31000 is a family of standards relating to risk management codified by the International Organization for Standardization.

structure, which addresses the roles of employees at various levels ranging up to SDG&E's Board of Directors, as well as various risk processes and tools.

One such process is SDG&E's six-step enterprise risk management process. The figure below describes SDG&E's enterprise risk management process, by which SDG&E identifies, manages, and mitigates enterprise risks, and aims to provide consistent, transparent, and repeatable results.

Figure 8: Enterprise Risk Management Process



This six-step process is aligned with the Cycla Corporation's 10-Step Evaluation Method, which was adopted by the Commission "as a common yardstick for evaluating maturity, robustness, and thoroughness of utility Risk Assessment and Mitigation Models and risk management frameworks."[63] While the lexicon used by Cycla differs slightly from that of the Company, the content is largely aligned. It is SDG&E's understanding that each of the large energy utilities also use a form of Cycla's Method.

SDG&E performs its enterprise risk management process annually, resulting in an enterprise risk registry (ERR). The Commission defines an ERR as "[a]n inventory of enterprise risks at a snapshot in time that summarizes (for a utility's management and/or stakeholders such as the CPUC) risks that a utility may face. The [ERR] must be refreshed on a regular basis and can reflect the changing nature of a risk; for example, risks that were consolidated together may be separated, new risks may be added, and the level of risks may change over time."[64]

63 D.16-08-018 at 195, Ordering Paragraph 4.

64 D.18-12-014 at 16-17.

Accordingly, SDG&E's identified enterprise-level risks, including safety-related and wildfire-related risks, are presented in its ERR. Each risk has one or more risk owner(s), a member of the senior management team who is ultimately responsible and accountable for the risk, and one or more risk manager(s), who is responsible for ongoing risk assessments and overseeing implementation of risk plans. SDG&E uses input from the risk managers and the risk owners to ultimately finalize its ERR. Therefore, SDG&E's enterprise risk management process is both a "bottoms-up" and "top-down" approach.

In addition, each risk in the ERR has an associated set of mitigations (i.e., projects or programs that reduce the likelihood of the risk and/or negative consequences should the risk occur). Notwithstanding these risk management and mitigation efforts, however, adverse events will occur. When that happens, SDG&E's efforts, including implementation of response plans, development of role and responsibility descriptions and checklists, and facilitation of training and exercises, are designed to prepare the Company to respond safely and effectively to those adverse events that occurred despite mitigation efforts.

Risk Identification & Evaluation

In SDG&E's enterprise risk management process, as explained in the 2019 RAMP,[65] risk identification is the process of finding, recognizing, and describing risks. As the first step in the enterprise risk management process, the Enterprise Risk Management organization works with various business units to update existing risk information and identify enterprise-level risks that have emerged or accelerated since the prior assessment. This part of the process also includes the identification of risk events, their causes, and potential consequences, which is summarized in a Risk Bow Tie. The Risk Bow Tie is "a tool that consists of a Risk Event in the center, a listing of drivers on the left side that potentially lead to the Risk Event occurring, and a listing of Consequences on the right side that show the potential outcomes if the Risk Event occurs."[66] Risk evaluation is also included in SDG&E's enterprise risk management process.[67] It results in a pre-mitigation risk score. As explained in Section 4.2, the methodology or framework utilized by SDG&E to calculate risk scores, including for the Wildfire risk, was adopted in the S-MAP (D.18-12-014) and presented in SDG&E's 2019 RAMP.

The S-MAP puts forth a consistent framework to be applied in future RAMP and GRC filings for identifying and evaluating risk across all California utilities. Thus, SDG&E's approach generally follows a consistent framework with the other utilities. It is important to note that SDG&E is the first utility to apply the new quantitative risk methodology adopted in the S-MAP and is continuing to review opportunities for improvement and lessons learned from the new approach.

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65 2019 RAMP, Chapter RAMP-B at B-4.

66 D.18-12-014 at 16.

67 *See* 2019 RAMP, Chapter RAMP-B at B-6.

Safety Management System
Additionally, SDG&E is working to implement an enterprise-wide Safety Management System (SMS). As discussed in the TY 2019 GRC Decision, SDG&E's Pipeline SMS for gas operations is following the recommendations in American Pipeline Institute (API) 1173.[68] While there is not currently a recommended practice applicable to an SMS for electric operations, in the fall of 2019, SDG&E embarked on an effort to adapt API 1173 principles and approaches to create an SMS to drive continuous improvement in electric operations. This demonstrates SDG&E's commitment to developing an electric SMS. Using API 1173 as a general standard for operational safety for both gas and electric operations requires alignment of risk management (based on ISO 31000), asset management (based on ISO 55000), and emergency management (based on the Incident Command System) with traditional views of safety management (based on OSHA) to support development of a comprehensive and proactive safety program.

5.5. Planning for Workforce and Other Limited Resources

Instructions: *Include a showing that the utility has an adequately sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with the utility.*

Please see Section 5.3.9.4.1 and Section 5.3.9.4.5 above.

5.6. Expected Outcomes of Three-Year Plan

5.6.1. Planned utility infrastructure construction and upgrades

Instructions: *Explain how the utility expects the geographic location of transmission and distribution lines to shift over the three-year plan period and discuss its impact on 1) the utility's risk exposure and 2) the utility's wildfire mitigation strategy. Outline portions of grid within HFTD that are highest cost to serve, by highlighting circuits or portions of circuits that exceed $0.5M per customer in capital cost required to harden. Provide justification for the level of hardening required and why the lowest cost path to harden this equipment exceeds $0.5M per customer, including by describing the various alternatives that were considered to reduce ignition probability and estimated wildfire consequence. For each of these sections of the grid, outline any analysis that was conducted around islanding, serving with microgrids, or providing backup generation, all to reduce the impact of PSPS events and reduce ignition probability and estimated wildfire consequence at the lowest possible cost.*

Discuss how the utility wildfire mitigation strategy influenced its plan for infrastructure construction (in terms of additions or removal of overhead lines, including undergrounding of overhead lines) as detailed in Section 3.4.2. Discuss how the utility wildfire mitigation strategy influenced its plan for upgrades to overhead lines and substations as detailed in the Section 3.4.2.

As previously described in Section 4.4, SDG&E is currently undergoing a shift in its hardening strategy that will refine the scope of its various mitigation efforts within the HFTD. At this time,

[68] D.19-09-051, Findings of Fact 40 at 729.

specific information regarding the level of hardening in each portion of the HFTD is not available as SDG&E's PSPS Mitigation Engineering team has not completed its in-depth segment level analysis of circuits in the HFTD. The team is also evaluating various alternatives to mitigate the probability and consequence of wildfire risk. This in-depth analysis assesses various factors within each segment including customer density, potential egress issues, tree-strike potential among others to determine the most appropriate type of mitigation as well as the level of hardening.

As a part of this effort, SDG&E's team is currently scoping specific activities that provide "quick-wins" in terms of reducing PSPS impacts, as well as wildfire risk in the short-term. This includes identifying opportunities for microgrids, personal generators, short runs of undergrounding, additional sectionalizing, and weather stations, to further reduce the number of customers impacted by PSPS. Early estimates of the potential reduction in PSPS customer impacts could be up to 7,000 customers as a result of these various initiatives. The team has identified opportunities to reduce impacts to community centers, schools, fire stations, police stations, urgent care facilities, water facilities, as well as communication sites. As the team continues to conduct this in-depth analysis, scoping of various initiatives will be refined and an update to this can be provided when better data is available.

Instructions for Table 31:

Assume weather patterns for each year are as consistent with the 5-year historical average and that wildfire mitigation initiatives are implemented according to plan. Report change in drivers of ignition probability based on WMP implementation according to whether or not near misses of that type are tracked, the number of incidents anticipated per year (e.g., all instances of animal contact regardless of whether they caused an outage, an ignition, or neither), the rate at which those incidents (e.g., object contact, equipment failure, etc.) are anticipated to cause an ignition in the column, and the number of ignitions that those incidents are anticipated to cause by category. List additional risk drivers tracked in the "other" row and additional rows as needed.

Table 31 – Change in Drivers of Ignition Probability Taking into Account Planned Initiatives, for each year of plan, is provided in Appendix A.

5.6.2. Protocols on Public Safety Power Shutoff

Describe protocols on Public Safety Power Shut-off (PSPS or de-energization), to include:

1. *Strategy to minimize public safety risk during high wildfire risk conditions and details of the considerations, including but not limited to list and description of community assistance locations and services provided during a de-energization event.*

SDG&E's strategies to minimize public safety risk during high wildfire risk conditions are discussed in Section 4.4, Section 5.3.6.5.2, and Section 5.3.6.5.3 above. Please also see Section 5.3.10.1 for information on Community Resource Centers.

2. *Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization (e.g., decision tree).*

SDG&E's PSPS protocols are set forth in Section 4.4 and Section 5.3.6.5.1 above.

3. *Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol.*

Section 5.3.6.4 above provides an overview of SDG&E's protocols for PSPS re-energization.

4. *Company standards relative to customer communications, including consideration for the need to notify priority essential services – critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies. This section, or an appendix to this section, shall include a complete listing of which entities the electrical corporation considers to be priority essential services. This section shall also include description of strategy and protocols to ensure timely notifications to customers, including access and functional needs populations, in the languages prevalent within the utility's service territory.*

SDG&E's protocols related to PSPS communications adhere to the guidelines set forth in Appendix A of D.19-05-042 and are discussed in Section 5.3.6.5.3 above. Beginning with the advanced warning system, where SDG&E notifies customers of a potential Red Flag Warning, SDG&E starts to notify customers 48 to 78 hours prior to an anticipated PSPS event, beginning with priority essential service partners. Within 24 hours critical infrastructure customers are notified as are priority essential service, critical first responders and public safety partners. The subsequent cadence of communications will follow Appendix A of D.19-05-042.

Customers, and those without SDG&E accounts who are registered to receive notifications, are contacted via the Enterprise Notification System (voice, text, and/or email notifications). Notifications continue through the start and completion of the PSPS event. These notifications are made in English, Spanish, Mandarin, Cantonese, Korean, Vietnamese, Tagalog and Russian.

A list of customers SDG&E deems to provide priority essential services, as of February 7, 2020, is included in Appendix C.

SDG&E began partnering with the County of San Diego Office of Emergency Services AFN Working Group and Partner Relay network to help share messaging with some of the vulnerable population within its territory. The two groups are comprised of approximately 260 community-based organizations who work directly with the AFN population. During a PSPS event both groups of community-based organizations help amplify SDG&E's PSPS notifications by sharing it with their constituents.

In addition to sharing the English version of the PSPS notification message, the Partner Relay network – which is made up of a broad network of trusted community organizations such as churches, nonprofit organizations and refugee resettlement organizations – help to disseminate

the PSPS notification in various languages to their community. SDG&E will continue to look for new ways to partner with organizations dedicated to readiness and response throughout its service territory to help amplify the PSPS notifications that are sent.

SDG&E has also recognized the importance of developing a solution identifying and communicating with all people within a de-energized area, including people who may be visiting the area or not directly listed on utility accounts. In 2019, SDG&E created a self-registration portal that enables people not directly listed on utility accounts to create an authenticated account and opt-in for PSPS notifications by zip code(s). They may receive notifications by voice, text and e-mail. They will use this account to maintain their notification preferences, as well as the ability to opt-out of notifications. Both SDG&E customers and non-account holders can sign up for PSPS notifications at sdge.com/notifications.

5. *Protocols for mitigating the public safety impacts of these protocols, including impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies.*

Please refer to Section 5.3.6.5.3.3 above. During a PSPS event, there may be a need to provide additional support to an impacted community. SDG&E may open a Community Resource Center near the affected area, if conditions prolong the estimated outage duration. Community Resource Center activations will be communicated via the SDG&E website, social media, local news and radio and the SDG&E News Center. At these Centers, residents will have access to water, light snacks and charge small electronic devices, as well as receive the most up-to-date information about the power shutoff.

Additionally, SDG&E communicates the differences between an unplanned outage and a PSPS. Despite SDG&E's best efforts to maintain reliable service, unexpected outages happen. These unplanned outages are caused by various circumstances beyond SDG&E's control, such as traffic accidents, damage to power lines and Mylar balloons caught in overhead wires. In contrast to an unplanned outage, a PSPS occurs after careful planning and analysis of the various threats to public safety. If a PSPS takes place, it will be uniquely identified on our outage map with a different marker. SDG&E encourages the public to learn more about planned and unplanned outages at sdge.com/outage-map.

Finally, a component of SDG&E's communication program for wildfire safety includes contributing to and supporting the statewide Public Safety Power Shutoff campaign established in 2019. The overarching message communicated to the public in SDG&E's service territory is that all Californians need to take important steps to get ready before the wildfire season, such as creating an emergency kit and having a thorough emergency plan. The statewide campaign refers the public to learn more about preparing for the threat of wildfire and PSPS at *www.prepareforpowerdown.com*.

6. Utility GIS Attachments

The GIS attachments related to Table 8 and 9 are available on SDG&E's website at: https://www.sdge.com/node/15241. Certain GIS layer information relating to customer locations, and transmission and substation assets operated at 230 kV and above, are confidential. Customer location data is confidential due to, among other reasons, privacy concerns. The 230 kV and above transmission and substation information is confidential due to cyber and physical security reasons, per NERC Critical Infrastructure Protection standards, as well as FERC Critical Energy Infrastructure Information regulations.

6.1. Recent Weather Patterns

Please see Table 2, Row 3 and Table 10 in Appendix A.

6.2. Recent Drivers of Ignition Probability

Please refer to the attribute tables included in the GIS files.

6.3. Recent Use of PSPS

Please refer to Section 6.1 above.

6.4. Current Baseline State of Service Territory and Utility Equipment

Please refer to the attribute tables included in the GIS files. SDG&E identified 692 census tracts within the service territory including customer information and square mileage. SDG&E also provided GIS layers of the HFTD Tier 2, Tier 3, WUI, and Non-HFTD. SDG&E does not already have and cannot develop a non-manual way of creating a field for each census tract that divides the tract into percentages of HFTD, Non-HFTD, and WUI and is thus unable to provide the data in the requested format. In addition, asset conditions are managed through an SAP database and not a GIS database. SDG&E believes that data could be pulled in as they utilize common structure numbers, but that work will not be complete as of the date of this Plan submission.

6.5. Location of Planned Utility Equipment Additions or Removal

While SDG&E plans to perform fire hardening work within the HFTD and WUI, it has not designed and engineered all of these programs to the point where they can be geospatially located on a map. Once these areas progress through engineering and design, portions of this information can be provided.

6.6. Planned 2020 WMP Initiative Activity by End-2022

While SDG&E plans to perform fire hardening work within the HFTD and WUI, it has not designed and engineered all of these programs to the point where they can be geospatially located on a map. Once these areas progress through engineering and design, portions of this information can be provided.

Appendix A

WMP Tables 1 through 31

TABLE 1: Recent Performance on Progress Metrics, Last 5 Years

Project Metric Name	Annual Performance					Unit(s)
	2015	2016	2017	2018	2019	
Grid condition findings from inspection- Electric *Transmission*	Issues in FTZ / FTZ Circuit Miles in 2015 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.013 0.000 Type 2 0.000 0.298 0.009 Type 3 0.000 0.010 0.000 Issues/ Total Circuit Miles in 2015 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.001 0.035 0.000 Type 2 0.002 0.533 0.031 Type 3 0.003 0.034 0.000	Issues in FTZ / FTZ Circuit Miles in 2016 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.001 0.000 Type 2 0.000 0.044 0.002 Type 3 0.000 0.010 0.000 Issues/ Total Circuit Miles in 2016 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.021 0.000 Type 2 0.001 0.156 0.032 Type 3 0.001 0.023 0.000	Issues in FTZ / FTZ Circuit Miles in 2017 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.002 0.000 Type 2 0.000 0.043 0.010 Type 3 0.000 0.001 0.017 Issues/ Total Circuit Miles in 2017 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.001 0.006 0.000 Type 2 0.001 0.226 0.033 Type 3 0.001 0.009 0.009	Issues in HFTD / HFTD Circuit Miles in 2018 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.009 0.000 Type 2 0.002 0.413 0.029 Type 3 0.000 0.006 0.000 Issues/ Total Circuit Miles in 2018 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.005 0.000 Type 2 0.004 0.445 0.032 Type 3 0.000 0.005 0.000	Issues in HFTD / HFTD Circuit Miles in 2019 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.004 0.000 Type 2 0.000 0.228 0.026 Type 3 0.000 0.009 0.000 Issues/ Total Circuit Miles in 2019 Inspection Type / Level 1 / Level 2 / Level 3 Type 1 0.000 0.004 0.000 Type 2 0.001 0.338 0.026 Type 3 0.004 0.013 0.000	Number of Level 1, 2, and 3 findings per mile of circuit in HFTD, and per total miles of circuit for each of the following inspection types: 1. Patrol inspections 2. Detailed inspections 3. Other inspection types
Grid condition findings from inspection- Electric *Distribution*	Issues in FTZ / FTZ Circuit Miles in 2015 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.008 0.049 NA Detail 0.0014 0.1929 NA QC 0.0006 0.2408 NA Issues/ Total Circuit Miles in 2015 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0070 0.1059 NA Detail 0.0097 0.3856 NA QC 0.0001 0.0505 NA	Issues in FTZ / FTZ Circuit Miles in 2016 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0083 0.0596 NA Detail 0.0049 0.1408 NA QC 0.0003 0.1958 NA Issues/ Total Circuit Miles in 2016 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0055 0.1328 NA Detail 0.0069 0.3575 NA QC 0.0001 0.0411 NA	Issues in FTZ / FTZ Circuit Miles in 2017 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0017 0.0602 NA Detail 0.0011 0.0659 NA QC 0.0009 0.1032 NA Issues/ Total Circuit Miles in 2017 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0058 0.1311 NA Detail 0.0044 0.3005 NA QC 0.0002 0.0217 NA	Issues in HFTD / HFTD Circuit Miles in 2018 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.008 0.043 NA Detail 0.0009 0.0614 NA QC 0.0003 0.1775 NA Issues/ Total Circuit Miles in 2018 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0041 0.1269 NA Detail 0.0074 0.2984 NA QC 0.0001 0.0372 NA	Issues in HFTD/ HFTD Circuit Miles in 2019 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.002 0.1216 NA Detail 0.0011 0.0648 NA QC 0.0003 0.0665 NA Issues/ Total Circuit Miles in 2019 Inspection Type / Level 1 / Level 2 / Level 3 Patrol 0.0031 0.1263 NA Detail 0.0039 0.3770 NA QC 0.0001 0.0140 NA	Number of Level 1, 2, and 3 findings per mile of circuit in HFTD, and per total miles of circuit for each of the following inspection types: 1. Patrol inspections 2. Detailed inspections 3. Other inspection types

TABLE 1: Recent Performance on Progress Metrics, Last 5 Years						
Project Metric Name	Annual Performance					Unit(s)
	2015	2016	2017	2018	2019	
Vegetation clearance findings from inspection	0.8%	0.7%	1.1%	0.1%	0.8%	Percentage of right-of-way with noncompliant clearance based on applicable rules and regulations at the time of inspection, as a percentage of all right-of-way inspected. *NOTE: "Noncompliant" - a tree observed during inspection to have less than the minimum clearance required ("memo" tree) "All right-of-way inspected" – total number of inventory trees % of noncompliance = number of memo trees observed divided by the total number of inventory trees.
Extent of grid modularization	1. FTZ: 0.066 2. Non-FTZ: 0.059	1. FTZ: 0.071 2. Non-FTZ: 0.092	1. FTZ: 0.072 2. Non-FTZ: 0.094	1. HFTD: 0.072 2. Non-HFTD: 0.099	1. HFTD: 0.073 2. Non-HFTD: 0.100	Number of sectionalizing devices per circuit mile plus number of automated grid control equipment in: 1. HFTD 2. Non-HFTD *NOTE: Per Total number of sectionalizing positions (OH and UG, UG can have between 2-5 per device) divided by total miles (OH and UG)
Data collection and reporting	NA	NA	NA	NA	95%	Missing Table 31 and 50% of table 9. The submittal was calculated as providing data for 29.5/31 tables, or 95% complete.

TABLE 2: Recent Performance on Outcome Metrics, Annual and Normalized for Weather, Last 5 Years									
Metric Type	#	Outcome metric name	Annual performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
1. Near misses	1.a.	# of all events that could result in ignition, by type according to utility-provided list (Total)	1,509	1,841	1,751	1,594	1,558	Number per year	(Such as unplanned outages, faults, conventional blown fuses, etc.)
	1.b.	# of all events that could result in ignition, by type according to utility-provided list (Normalized)	0.0003	0.0008	0.0014	0.0020	0.0007	Number per RFW circuit mile day per year	
	1.c.	Number of wires down (total)	59	138	129	96	108	Number of wires down per year	System wide
	1.d.	Number of wires down(normalized)	0	0.00004	0.00004	0.00003	0.00005	Number per RFW circuit mile day per year	
2. Utility inspection findings	2.a.	Number of Level 1 findings that could increase the probability of ignition discovered per circuit mile inspected	0.010 (ED)	0.013(ED)	0.004(ED)	0.009 (ED)	0.003(ED)	Average number of Level 1 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	Substation findings do not increase the probability of ignitions per circuit mile; Substation inspections are conducted primarily for reliability, they have incidental wildfire mitigation benefits.
	2.b.	Number of Level 2 findings	0.483 (ED)	0.396(ED)	0.229(ED)	0.282(ED)	0.253(ED)	Average number of Level 2 findings	
	2.c.	Number of Level 3 findings	0	0	0	0	0	Average number of Level 3 findings	
3. Customer hours of PSPS and other	3.a.	Customer hours of planned outages including PSPS (total)	1010005	862687	1884251	2185302	2395433	Total customer hours of planned outages per year	
	3.b.	Customer hours of planned outages including PSPS (normalized)	0.1703	0.0006	7.14	17.39	30.39	Total customer hours of planned outages per RFW circuit mile day per year	
	3.c.	Customer hours of unplanned outages, not including PSPS (total)	1504042	2058237	2090995	1887418	1617201	Total customer hours of unplanned outages per year	
	3.d.	Customer hours of unplanned outages, not including PSPS (normalized)	80.76	21.79	19.61	30.80	38.65	Total customer hours of unplanned outages per RFW circuit mile day per year	
	3.e.	Increase in System Average Interruption Duration Index (SAIDI)	-12.55	22.75	31.48	3.53	-2.94	Change in minutes compared to the previous year	

TABLE 2: Recent Performance on Outcome Metrics, Annual and Normalized for Weather, Last 5 Years									
Metric Type	#	Outcome metric name	Annual performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
4. Utility ignited wildfire fatalities	4.a.	Fatalities due to utility-ignited wildfire (total)	0	0	0	0	0	Number of fatalities per year	SDG&E is unaware of any utility-ignited wildfire fatalities resulting from utility wildfire mitigation initiatives in the period 2015-2019.
	4.b.	Fatalities due to utility-ignited wildfire (normalized)	0	0	0	0	0	Number of fatalities per RFW circuit mile day per year	
5. Accidental deaths resulting from utility wildfire mitigation initiatives	5.a.	Deaths due to utility wildfire mitigation activities (total)	0	0	0	0	0	Number of fatalities per year	SDG&E is unaware of any accidental deaths resulting from utility wildfire mitigation initiatives in the period 2015-2019.
6. OSHA-reportable injuries from utility wildfire mitigation initiatives	6.a.	OSHA-reportable injuries due to utility wildfire mitigation activities (total)	0	1	0	0	0	Number of OSHA-reportable injuries per year	One contractor OSHA-reportable injury in 2016 related to the FiRM (Fire Risk Mitigation) project. It is the responsibility of the contractor to report the incident to OSHA; SDG&E has no documentation to confirm such a report.
	6.b.	OSHA-reportable injuries due to utility wildfire mitigation activities (normalized)	0	0.001	0	0	0	Number of OSHA-reportable injuries per year per 1000 line miles of grid	
7. Value of assets destroyed by utility-ignited wildfire, listed by asset type	7.a.	Value of assets destroyed by utility-ignited wildfire (total)	0	0	0	$2,900.00	0	Dollars of damage or destruction per year	Value is a round number including material only for one wood 45' pole, and 25kVA transformer. Rounded up, to compenstate for additonal conductor and connectors.
	7.b.	Value of assets destroyed by utility-ignited wildfire (normalized)	0	0	0	0.0437292	0		
8. Structures damaged or destroyed by utility-ignited wildfire	8.a.	Number of structures destroyed by utility-ignited wildfire (total)	0	0	0	1	0	Number of structures destroyed per year	
	8.b.	Number of structures destroyed by utility-ignited wildfire (normalized)	0	0	0	0.0000151	0	Number of structures destroyed per RFW circuit mile day per year	

TABLE 2: Recent Performance on Outcome Metrics, Annual and Normalized for Weather, Last 5 Years									
Metric Type	#	Outcome metric name	Annual performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
9. Acreage burned by utility-ignited wildfire	9.a.	Acreage burned by utility-ignited wildfire (total)	213	7	16	28	8	Acres burned per year	If a fire meets the CPUC definitiof for recorable fire but does not grow beyond .25 acres it was assumed to be .1 acres for consistency
	9.b.	Acreage burned by utility-ignited wildfire (normalized)	0.24580232	0.000225941	0.000180167	0.000422215	0.000236904	Acres burned per RFW circuit mile day per year	
10. Number of utility wildfire ignitions	10.a.	Number of ignitions (total) according to existing ignition data reporting requirement	32	30	23	26	21	Number per year	
	10.b.	Number of ignitions (normalized)	0.036928048	0.000968317	0.00025899	0.000392056	0.000621872	Number per RFW circuit mile day per year	
	10.c.	Number of ignitions in HFTD (subtotal)	19	18	15	13	11	Number in HFTD per year	
	10.c.ii.	Number of ignitions in HFTD Tier 2	13	11	7	7	8	Number in HFTD Tier 2 per year	
	10.c.iii.	Number of ignitions in HFTD Tier 3	6	7	8	6	3	Number in HFTD Tier 3 per year	
	10.d.	Number of ignitions in HFTD (subtotal, normalized)	0.036928048	0.034620045	0.026542035	0.030004039	0.024234032	Number in HFTD per RFW circuit mile day per year	
	10.d.ii.	Number of ignitions in HFTD Tier 2 (normalized)	0.01500202	0.012694017	0.008078011	0.008078011	0.009232012	Number in HFTD Tier 2 per RFW circuit mile day per year	
	10.d.iii.	Number of ignitions in HFTD Tier 3 (normalized)	0.006924009	4.09728E-07	9.09618E-08	1.21809E-07	2.73387E-07	Number in HFTD Tier 3 per RFW circuit mile day per year	
	10.e.	Number of ignitions in non-HFTD (subtotal)	13	12	8	13	10	Number in non-HFTD per year	
	10.f.	Number of ignitions in non-HFTD (normalized)	0.01500202	0.000387327	9.00834E-05	0.000196028	0.000296129	Number in non-HFTD per RFW circuit mile day per year	
11. Critical infrastructure impacted	11.a.	Critical infrastructure impacted by PSPS	NA	NA	NA	NA	76,236	Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per year	
	11.b.	Critical infrastructure impacted by PSPS (normalized)	NA	NA	NA	NA	1.46	Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per RFW circuit mile day per year	

TABLE 3: List and Description of Additional Metrics, Last 5 Years								
Metric	Performance					Units	Third-party validation	Underlying assumptions
	2015	2016	2017	2018	2019			
Number of elevated or extreme FPI and RFW days	FPI: 108 RFW: 4	FPI: 138 RFW: 20	FPI: 169 RFW: 21	FPI: 182 RFW: 12	FPI: 137 RFW: 12	Days	NA	Day ends at 2359L (11:59pm) and begins at 0000L (midnight)
Vegetation Caused Ignitions in HFTD	FPI: 3 RFW:0	FPI: 1 RFW: 0	FPI: 2 RFW: 1	FPI: 0 RFW: 0	FPI: 1 RFW: 0	Days	NA	
Vegetation Caused Outages within HFTD	FPI: 3 RFW: 0	FPI: 7 RFW: 0	FPI: 8 RFW: 2	FPI: 4 RFW: 3	FPI: 9 RFW: 0	Days	NA	
Equipment Caused Ignitions within HFTD	FPI: 2 RFW: 0	FPI: 5 RFW: 0	FPI: 4 RFW: 2	FPI: 2 RFW: 1	FPI: 2 RFW: 0	Days	NA	
Overhead Faults on Circuits within HFTD	FPI: 121 RFW: 0	FPI: 110 RFW: 15	FPI: 145 RFW: 29	FPI: 134 RFW: 28	FPI: 125 RFW:17	Days	NA	
Energized Wire Down Events within HFTD	FPI: 3 RFW: 0	FPI: 7 RFW: 0	FPI: 9 RFW: 0	FPI:7 RFW: 1	FPI:8 RFW: 1	Days	NA	
Number of Non-CALFIRE Rated Fuse Operations within HFTD	FPI: 96 RFW: 1	FPI: 108 RFW:24	FPI: 115 RFW: 16	FPI: 131 RFW: 14	FPI: 83 RFW: 9	Days	NA	

TABLE 4: List and Description of Program Targets, Last 5 Years				
Program target	2019 performance	Units	Underlying assumptions	Third-party validation
Changed operating procedures on days with elevated or higher FPI	137	FPI elevated or higher	Target is 100% of elevated or higher FPI days. Number of elevated or higher FPI days will vary depending on weather conditions.	NA
Disable reclosing and enable sensitive protections on reclosers within HFTD on days with elevated or higher FPI	137	FPI elevated or higher		NA
Electric crews accompanied by fire suppression crews on days with elevated or higher FPI. On extreme days, certain activities are stopped altogether within the HFTD.	137	FPI elevated or higher		NA
Wildfire infrastructure teams join SDG&E electric crews to provide fire suppression capabilities during high risk work on days with elevated or higher FPI. Support re-energization during PSPS events.	137	FPI elevated or higher		NA
Three aerial fire suppression resources available year-round	279	water drops		NA
Three aerial fire suppression resources available year-round	220,453	gallons of water		NA
Perform fuel management on BLM, priority 13, and tier 3 including CNF poles	511	poles treated		NA
10,000 QA/QC Distribution System Inspections	10,000	poles inspected		NA
47,850 Detailed Distribution System Inspections	47,850	poles inspected		NA
300 Substation System Inspections	301	substations inspected		NA
6,730 Transmission System Inspections	6,730	OH structures inspected		NA
10 miles of OH transmission hardened	10	miles hardened		NA
85 miles of OH distribution hardened	83	miles hardened		NA
1.25 miles underground line segments	2.6	miles undergrounded		NA
68 miles hardened within Cleveland National Forest	61	miles hardened		NA
85 miles of high-risk conductor replaced with high tensile strength conductor	82	miles replaced		NA
700 poles hardened	695	poles hardened		NA
2250 expulsion fuses replaced	2490	fuses replaced		NA
500 hotline clamps replaced	660	hotline clamps replaced		NA
5.7 miles of wire safety enhancements	5.7	miles enhanced		NA
8 circuits enabled with falling conductor protection	8	circuits enabled		NA
7 switches installed	7	switches installed		NA
Replace all poles found through the GO195 visual and instrusive inspections within the HFTD	725	poles replaced		NA
Fit all 9 Community Resource Centers with a transfer switch to facilitate backup generation	9	CRC transfer switches installed		NA

TABLE 4: List and Description of Program Targets, Last 5 Years				
Program target	2019 performance	Units	Underlying assumptions	Third-party validation
Offer backup generators to all identified medical baseline customers and train them on its use (79 identified)	79	medical baseline customers offered backup generators	The goal of the program was to offer generators and training on generator use to MBL customers. 14 MBL customers while offered, chose not to participate.	
Maintain inventory of trees within the HFTD	455,000	trees in inventory		
Enhanced 25-foot post prune clearance or complete removal of 81,000 trees along 28 circuits	28	Circuits with enhanced 25-foot clearance complete		
Complete Quality Assurance of HFTD audits	80%	percent complete		
Hazard tree removal	9884	trees removed		
Hazard tree replacement	260	trees replaced		
Mechanical brushing and chemical applications	100%	percent complete		
Re-clear cycle	100%	percent complete		
Provide electric equipment training to CalFire personnel through joint inspections	0	joint inspections		
Expand SDG&E's weather network	191	total weather stations		
Publish fire simulations	29	fire simulations published		
Install 500 wireless fault indicators	594	wireless fault indicators installed		
Add 13 weather stations	13	weather stations		
Install software enhancements on weather stations to allow 30 second reads	105	weather stations with software installed		
Utilize PSPS as a last resort mitigation during the most extreme weather events of the year	3	events including activations of PSPS protocols		
Implement notification in five languages for potential and impending PSPS events utilizing multiple channels of communication	5	languages implemented for PSPS notifications		

TABLE 5: Accidental Deaths Due to Utility Wildfire Mitigation Initiatives, Last 5 Years																
Activity	Victim															Total
	Full-time employee					Contractor					Member of public					
Year	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	
Inspection	0	0	0	0	0	0	0	0			0	0	0	0	0	0
Vegetation management	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Utility fuel management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grid hardening	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

TABLE 6: OSHA-Reportable Injuries Due to Utility Wildfire Mitigation Initiatives, Last 5 Years																
Activity	Victim															Total
	Full-time employee					Contractor					Member of public					
Year	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	
Inspection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetation management	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Utility fuel management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grid hardening	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1

TABLE 7: Methodology for Potential Impact of Ignitions						
List of all data inputs used in impact simulation	Sources of data inputs	Data selection and treatment methodologies	Assumptions, including SME input	Equation(s), functions, or other algorithms used to obtain output	Output type(s), e.g., wind speed model	Comments
Wind Speed	Wx Modeling	NAM, WRF, 2km grid	Best availiable Wx data	WRF	hourly for 84 hours - 2km grid in MPH	Wx = Weather NAM = North American Model WRF = Weather Research & Forecasting Model
Wind Direction	Wx Modeling	NAM, WRF, 2km grid	Best availiable Wx data	WRF	hourly for 84 hours - 2km grid in degrees	
Temperature	Wx Modeling	NAM, WRF, 2km grid	Best availiable Wx data	WRF	hourly for 84 hours - 2km grid in F	
Relative Humidity	Wx Modeling	NAM, WRF, 2km grid	Best availiable Wx data	WRF	hourly for 84 hours - 2km grid in %	
Moisture 1hr (%)	FM Modeling	NAM, WRF, Nelson, 2km grid	Nelson is leading practice	Nelson Fuel Model	hourly for 84 hours - 2km grid in %	FM = Fuel Moisture
Moisture 10hr (%)	FM Modeling	NAM, WRF, Nelson, 2km grid	Nelson is leading practice	Nelson Fuel Model	hourly for 84 hours - 2km grid in %	
Moisture 100hr (%)	FM Modeling	NAM, WRF, Nelson, 2km grid	Nelson is leading practice	Nelson Fuel Model	hourly for 84 hours - 2km grid in %	
Live Fuel Moisture (%)	FM Modeling	NAM, WRF, AI, 2km grid	Leading state-of-science	Custom AI	hourly for 84 hours - 2km grid in %	
Greeness	FM Modeling	NLDAS, 2km grid	Leading state-of-science	Custom Regression	hourly for 84 hours - 2km grid in %	
Energy Release Component	FM Modeling	NAM, WRF, Nelson, 2km grid	NFDRS16 is leading practice	NFDRS	hourly for 84 hours - 2km grid in btu/sqft	FB = Fire Behavior
Flame Length	FB Modeling	Wildfire Analyst	Leading state-of-science	Rothermel	hourly for 84 hours - 2km grid in ft	
Surface Fuel Height	Remote Sensing	N/A	Leading state-of-science	Satellite Image Analysis	static 25ft grid	
Slope	Remote Sensing	N/A	Leading state-of-science	Satellite Image Analysis	static 25ft grid	
Rate of Spread	FB Modeling	Wildfire Analyst	Leading state-of-science	Rothermel	hourly for 84 hours - 2km grid in (ch/h)	
Fuel Type	Remote Sensing	Wildfire Analyst	Leading state-of-science	Satellite Image Analysis	static 25ft grid	
Arrival Time	FB Modeling	Wildfire Analyst	Leading state-of-science	Rothermel	hourly for 84 hours - 2km grid in (h)	
Flame Intensity	FB Modeling	Wildfire Analyst	Leading state-of-science	Rothermel	hourly for 84 hours - 2km grid in (btu/ft/s)	
Structures	Land Use Model	Most recent	Additional structures added through anaysis	N/A	# of structures	
Population	Census Data	Most Recent	N/A	N/A	# of population	
Utility Assetts	GIS	N/A	Updated regularly	N/A	# and type	

TABLE 8: Map File Requirements for Recent and Modelled Conditions of Utility Service Territory, Last 5 Years			
Layer name	Measurements	Units	Attachment Location
Recent weather patterns	Average annual number of Red Flag Warning days per square mile across service territory	Area, days, square mile resolution	6.1
	Average 95th and 99th percentile wind speed and prevailing direction (actual)	Area, miles per hour, at a square mile resolution or better, noting where measurements are actual or interpolated	
Recent drivers of ignition probability	Date of recent ignitions categorized by ignition probability driver	Point, GPS coordinate, days, square mile resolution	6.2
Recent use of PSPS	Duration of PSPS events and area of the grid affected in customer hours per year	Area, customer hours, square mile resolution	6.3

TABLE 9: Map File Requirements for Baseline Condition of Utility Service Territory Projected for 2020			
Layer name	Measurements / variables	Units	Appendix location
Current baseline state of service territory and utility equipment	Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory	Area, square mile resolution per type	6.4
	Urban vs. rural vs. highly rural regions of utility service territory	Area, square mile resolution per type	
	WUI regions of utility service territory	Area, square mile resolution	
	Number and location of critical facilities	Point, GPS coordinate	
	Number and location of customers	Area, number of people, square mile resolution	
	Number and location of customers belonging to access and functional needs populations	Area, number of people, square mile resolution	
	Overhead transmission lines	Line, quarter mile resolution	
	Overhead distribution lines	Line, quarter mile resolution	
	Location of substations	Point, GPS coordinate	
	Location of weather stations	Point, GPS coordinate	
	All utility assets by asset type, model, age, specifications, and condition	Point, GPS coordinate	
Location of planned utility equipment additions or removal	Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory	Line, quarter mile resolution	6.5
	Urban vs. rural vs. highly rural regions of utility service territory	Line, quarter mile resolution	
	WUI regions of utility service territory	Line, quarter mile resolution	
	Circuit miles of overhead transmission lines	Line, quarter mile resolution	
	Circuit miles of overhead distribution lines	Line, quarter mile resolution	
	Location of substations	Point, GPS coordinate	
Planned 2020 WMP initiative activity per year	Location of 2020 WMP initiative activity for each activity as planned to be completed by the end of each year of the plan term	Line, quarter mile resolution	7.6

TABLE 10: Weather Patterns, Last 5 Years							
Weather measurement	2015	2016	2017	2018	2019	5yr Historical Average	Unit(s)
Red Flag Warning days	6816.99	25733.11	57729.96	45604.06	26532.72	32483.37	RFW circuit mile days per year
Days rated at the top 30% of proprietary fire potential index or similar fire risk index measure	0	18271	56522	38960	27531	28256.8	Circuit mile days where proprietary measure rated above top 30% threshold[1] per year
95th percentile wind conditions	27449.61	30047.93	32220.56	30511.59	31338.92	30313.72	Circuit mile days with wind gusts over 95th percentile historical (meaning the prior 10 years, 2005-2014) conditions per year
99th percentile wind conditions	7788.81	4454.58	10260.31	9995.22	9283.79	8356.54	Circuit mile days with wind gusts over 99th percentile historical (meaning the prior 10 years, 2005-2014) conditions per year

[1] Threshold here defined as top 30% of FPI or equivalent scale (e.g., "Extreme" on SCE's FPI; "extreme", 15 or greater, on SDG&E's FPI; and 4 or above on PG&E's FPI), .

*Notes:
- RFW days were calculated using the number of miles of transmission and distribution lines in the HFTD, multiplied by number of days per zone a RFW was in effect.
- FPI days were calculated using the number of days per SDG&E district with an Extreme FPI, multiplied by the number of HFTD transmission and distribution miles within that district
- Percentile wind conditions were calculated using the measured 95th and 99th percentile winds at SDG&E weather stations.

TABLE 11a Distribution: Key Recent Drivers of Ignition Probability, Last 5 Years																				
Incident type by ignition probability driver		Near misses tracked (y/n)?	Number of Incidents per year						Avg % probability of ignition per incident						Ignition per year caused by driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	All types of object contact	Yes	445	498	514	509	538	500.8	4.04%	2.81%	2.92%	2.55%	0.74%	2.56%	18	14	15	13	4	12.8
	Animal contact	Yes	73	79	83	81	98	82.8	0.00%	2.53%	1.20%	1.23%	1.02%	1.21%	0	2	1	1	1	1
	Balloon contact	Yes	70	85	120	112	91	95.6	2.86%	3.53%	4.17%	7.14%	0.00%	3.77%	2	3	5	8	0	3.6
	Veg. contact	Yes	32	52	39	27	50	40	21.88%	7.69%	7.69%	11.11%	0.00%	8.50%	7	4	3	3	0	3.4
	Vehicle contact	Yes	203	198	212	215	222	210	2.96%	2.02%	1.89%	0.00%	1.35%	1.62%	6	4	4	0	3	3.4
	Other	Yes	67	84	60	74	77	72.4	4.48%	1.19%	3.33%	1.35%	0.00%	1.93%	3	1	2	1	0	1.4
All types of equipment / facility failure	All types	Yes	1106	1258	1094	1050	1067	1115	0.63%	0.95%	0.46%	0.57%	0.94%	0.72%	7	12	5	6	10	8
	Capacitor bank failure	Yes	14	7	5	16	10	10.4	0.00%	14.29%	0.00%	0.00%	0.00%	1.92%	0	1	0	0	0	0.2
	Conductor failure - all	Yes	11	15	8	11	16	12.2	27.27%	20.00%	12.50%	0.00%	12.50%	14.75%	3	3	1	0	2	1.8
	Conductor failure - wires down	Yes	31	52	30	39	44	39.2	9.68%	5.77%	3.33%	0.00%	4.55%	4.59%	3	3	1	0	2	1.8
	Fuse failure - all	Yes	552	685	620	539	611	601.4	0.00%	0.00%	0.16%	0.00%	0.16%	0.07%	0	0	1	0	1	0.4
All types of equipment / facility failure	Fuse failure - conventional blown fuse	Yes	528	661	596	515	587	577.4	0.00%	0.00%	0.17%	0.00%	0.17%	0.07%	0	0	1	0	1	0.4
	Lightning arrestor failure	Yes	20	23	27	17	26	22.6	0.00%	8.70%	3.70%	0.00%	0.00%	2.65%	0	2	1	0	0	0.6
	Splice/Clamp/Connector	Yes	35	40	24	35	31	33	5.71%	7.50%	4.17%	0.00%	3.23%	4.24%	2	3	1	0	1	1.4
	Switch failure	Yes	14	21	19	22	15	18.2	7.14%	0.00%	0.00%	4.55%	6.67%	3.30%	1	0	0	1	1	0.6
	Transformer failure	Yes	293	282	257	219	208	251.8	0.34%	0.35%	0.00%	0.46%	0.00%	0.24%	1	1	0	1	0	0.6
Wire-to-wire contact / contamination		Yes	18	16	26	9	9	15.6	0.00%	0.00%	0.00%	11.11%	22.22%	3.85%	0	0	0	1	2	0.6
Vandalism/Theft		Yes	1	1	1	1	1	1	0.00%	100.00%	100.00%	0.00%	0.00%	40.00%	0	1	1	0	0	0.4
Other		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	0	0	1	0.4

TABLE 11b Transmission: Key Recent Drivers of Ignition Probability, Last 5 Years																				
Incident type by ignition probability driver		Near misses tracked (y/n)?	Number of Incidents per year						Avg % probability of ignition per incident						Ignition per year caused by driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	All types of object contact	Yes	35	34	34	32	18	30.6	11.43%	2.94%	2.94%	15.63%	5.56%	7.84%	4	1	1	5	1	2.4
	Animal contact	Yes	15	5	7	1	6	6.8	20.00%	0.00%	0.00%	100.00%	0.00%	11.76%	3	0	0	1	0	0.8
	Balloon contact	Yes	17	24	24	26	10	20.2	5.88%	0.00%	4.17%	0.00%	10.00%	2.97%	1	0	1	0	1	0.6
	Veg. contact	Yes	1	1	0	0	0	0.4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Vehicle contact	Yes	1	3	1	4	1	2	0.00%	0.00%	0.00%	75.00%	0.00%	30.00%	0	0	0	3	0	0.6
	Other	Yes	1	1	2	1	1	1.2	0.00%	100.00%	0.00%	100.00%	0.00%	33.33%	0	1	0	1	0	0.4
All types of equipment / facility failure	All types	Yes	60	27	22	21	15	29	1.67%	0.00%	0.00%	0.00%	0.00%	0.69%	1	0	0	0	0	0.2
	Capacitor bank failure	Yes	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Conductor failure - all	Yes	1	3	3	2	1	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Conductor failure - wires down	Yes	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Fuse failure - all	Yes	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
All types of equipment / facility failure	Fuse failure - conventional blown fuse	Yes	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Lightning arrestor failure	Yes	1	0	0	2	0	0.6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Splice/Clamp/Connector	Yes	1	1	0	1	0	0.6	100.00%	0.00%	0.00%	0.00%	0.00%	33.33%	1	0	0	0	0	0.2
	Switch failure	Yes	4	1	1	0	1	1.4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
	Transformer failure	Yes	0	0	0	0	1	0.2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
Wire-to-wire contact / contamination		Yes	41	20	15	12	12	20	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
Vandalism/Theft		Yes	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0
Other		N/A	12	2	3	4	0	4.2	0.00%	50.00%	0.00%	0.00%	0.00%	9.52%	0	1	0	0	1	0.4

TABLE 12: Recent Use of PSPS, Last 5 Years							
PSPS characteristic	2015	2016	2017	2018	2019	Unit(s)	Calculations
Frequency of PSPS events (total)	0	0	66	59	99	Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability, per year	Count of unique PSPS outages (switch plans) per year
Frequency of PSPS events (normalized)	0	0	0.0006	0.0009	0.0023	Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof in order to reduce ignition probability, per RFW circuit mile day per year	1 RFW / # RFW days per year / total OH circuit miles
Scope of PSPS events (total)	0	0	230	295	177	Circuit-events, measured in number of events multiplied by number of circuits de-energized per year	(Number of PSPS events per year) X (sum of # unique circuits per PSPS event)
Scope of PSPS events (normalized)	0	0	0.0020	0.0048	0.0042	Circuit-events, measured in number of events multiplied by number of circuits targeted for de- energization per RFW circuit mile day per year	3 RFW / # RFW days per year / total OH circuit miles
Duration of PSPS events (total)	0	0	744,542	1,061,637	1,325,490	Customer hours per year	Sum of Customer Minutes Interrupted (CMI) / 60
Duration of PSPS events (normalized)	0	0	7	17	30	Customer hours per RFW circuit mile day per year	5 RFW / # RFW days per year / total OH circuit miles

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TABLE 13: Current Baseline State of Service Territory and Utility Equipment						
Land use	Characteristic tracked	In non- HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3	Comments
Service Territory	Circuit miles	11203		4047	2067	Tracking is not completed by rural/highly rural
	Circuit miles in WUI	6542		0	0	
	Number of critical facilities	8717		1268	515	
	Number of critical facilities in WUI	4409		0	0	
	Number of customers	1,287,181		172896	31181	Number of Meters
	Number of customers in WUI	619,466		0	0	
	Number of customers belonging to access and functional needs populations	47,263		1939	7771	
	Number of customers belonging to access and functional needs populations in WUI	27,079		0	0	
	Circuit miles of overhead transmission lines	1308		794	308	
	Circuit miles of overhead transmission lines in WUI	470		0	0	
	Circuit miles of overhead distribution lines	3002		1828	1658	
	Circuit miles of overhead distribution lines in WUI	1308		0	0	
	Number of substations	155		42	13	
	Number of substations in WUI	64		0	0	
In rural areas	Circuit miles					
	Circuit miles in WUI					
	Number of critical facilities					
	Number of critical facilities in WUI					
	Number of customers					
	Number of customers in WUI					
	Number of customers belonging to access and functional needs populations					
	Number of customers belonging to access and functional needs populations in WUI					
	Circuit miles of overhead transmission lines					
	Circuit miles of overhead transmission lines in WUI					
	Circuit miles of overhead distribution lines					
	Circuit miles of overhead distribution lines in WUI					
	Number of substations					

TABLE 13: Current Baseline State of Service Territory and Utility Equipment						
Land use	Characteristic tracked	In non- HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3	Comments
In highly rural areas	Circuit miles					
	Circuit miles in WUI					
	Number of critical facilities					
	Number of critical facilities in WUI					
	Number of customers					
	Number of customers in WUI					
	Number of customers belonging to access and functional needs populations					
	Number of customers belonging to access and functional needs populations in WUI					
	Circuit miles of overhead transmission lines					
	Circuit miles of overhead transmission lines in WUI					
	Circuit miles of overhead distribution lines					
	Circuit miles of overhead distribution lines in WUI					
	Number of substations					
	Number of substations in WUI					

TABLE 14: Summary Data on Weather Station Count			
Weather station count type	Current Count	Unit(s)	Comments
Number of weather stations (total)	191	Total number located in service territory and operated by utility	
Number of weather stations (normalized)	0.023	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory	Used OH circuit miles - T&D 8336 miles
Number of weather stations in non- HFTD (total)	25	Total number located in non-HFTD service territory and operated by utility	
Number of weather stations in non-HFTD (normalized)	0.007	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory	Used OH circuit miles - T&D 3834 miles
Number of weather stations in HFTD Zone 1 (total)		Total number located in HFTD Zone 1 service territory and operated by utility	
Number of weather stations in HFTD Zone 1 (normalized)		Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory	
Number of weather stations in HFTD Tier 2 (total)	64	Total number located in HFTD Tier 2 service territory and operated by utility	
Number of weather stations in HFTD Tier 2 (normalized)	0.025	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory	Used OH circuit miles - T&D - 2550 miles
Number of weather stations in HFTD Tier 3 (total)	102	Total number located in HFTD Tier 3 service territory and operated by utility	
Number of weather stations in HFTD Tier 3 (normalized)	0.052	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory	Used OH circuit miles - T&D - 1952 miles

TABLE 15: Summary Data on Fault Indicator Count			
Fault indicator count type	**Current Count**	**Unit(s)**	**Comments**
Number of fault indicators (total)	4735	Total number located in service territory and operated by utility	
Number of fault indicators (normalized)	0.275	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory	
Number of fault indicators in non-HFTD (total)	3817	Total number located in non-HFTD service territory and operated by utility	
Number of fault indicators in non-HFTD (normalized)	0.344	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory	
Number of fault indicators in HFTD Zone 1 (total)		Total number located in HFTD Zone 1 service territory and operated by utility	
Number of fault indicators in HFTD Zone 1 (normalized)		Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory	
Number of fault indicators in HFTD Tier 2 (total)	648	Total number located in HFTD Tier 2 service territory and operated by utility	
Number of fault indicators in HFTD Tier 2 (normalized)	0.16	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory	
Number of fault indicators in HFTD Tier 3 (total)	270	Total number located in HFTD Tier 3 service territory and operated by utility	
Number of fault indicators in HFTD Tier 3 (normalized)	0.13	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory	

TABLE 16: Location of Planned Utility Equipment Additions or Removal By End of 3-Year Plan Term					
Land use	Characteristic tracked	Changes by end-2022			
		In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
N/A	Circuit miles of overhead transmission lines	0		59.1	36
	Circuit miles of overhead distribution lines	16.5		116.1	242.4
	Circuit miles of overhead transmission lines in WUI	0		0	0
	Circuit miles of overhead distribution lines in WUI	16.5		0	0
	Number of substations	0		0	0
	Number of substations in WUI	0		0	0
	Number of weather stations	59		64	102
	Number of weather stations in WUI	59		0	0
In rural areas	Circuit miles of overhead transmission lines				
	Circuit miles of overhead distribution lines				
	Circuit miles of overhead transmission lines in WUI				
	Circuit miles of overhead distribution lines in WUI				
	Number of substations				
	Number of substations in WUI				
	Number of weather stations				
	Number of weather stations in WUI				
In highly rural areas	Circuit miles of overhead transmission lines				
	Circuit miles of overhead distribution lines				
	Circuit miles of overhead transmission lines in WUI				
	Circuit miles of overhead distribution lines in WUI				
	Number of substations				
	Number of substations in WUI				
	Number of weather stations				
	Number of weather stations in WUI				

Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.

TABLE 17: Location of Planned Utility Infrastructure Upgrades													
Land use	Characteristic tracked	In non-HFTD			In HFTD Zone 1			In HFTD Tier 2			In HFTD Tier 3		
		2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
Total circuit miles planned for hardening each year, all types and locations		5.5	5.5	5.5				72.5	54.9	47.8	162	66	50.4
Total number of substations planned for hardening each year, all locations		0	0	0				0	0	0	0	0	0
In urban areas	Circuit miles planned for grid hardening of overhead transmission lines	0	0	0				21.5	23.4	14.2	29	7	0
	Circuit miles of overhead transmission lines in WUI to harden	0	0	0				0	0	0	0	0	0
	Circuit miles of overhead distribution lines to harden	5.5	5.5	5.5				51	31.5	33.6	133	59	50.4
	Circuit miles of overhead distribution lines in WUI to harden	5.5	5.5	5.5				0	0	0	0	0	0
	Circuit miles of overhead transmission lines in WUI to harden	0	0	0				0	0	0	0	0	0
	Number of substations to harden	0	0	0				0	0	0	0	0	0
	Number of substations in WUI to harden	0	0	0				0	0	0	0	0	0
In rural areas	Circuit miles of overhead transmission lines to harden												
	Circuit miles of overhead transmission lines in WUI to harden												
	Circuit miles of overhead distribution lines to harden												
	Circuit miles of overhead distribution lines in WUI to harden												
	Circuit miles of overhead transmission lines in WUI to harden												
	Number of substations to harden												
	Number of substations in WUI to harden												
In highly rural areas	Circuit miles of overhead transmission lines to harden												
	Circuit miles of overhead transmission lines in WUI to harden												
	Circuit miles of overhead distribution lines to harden												
	Circuit miles of overhead distribution lines in WUI to harden												
	Circuit miles of overhead transmission lines in WUI to harden												
	Number of substations to harden												
	Number of substations in WUI to harden												
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.													

TABLE 18a Distribution: Key Drivers of Ignition Probability								
Ignition probability drivers		Number of incidents per year (according to 5-year historical average)	Average likelihood of ignition per incident	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
Contact from object	All types of object contact	503.4	2.54%	12.8	5.80		4.20	2.80
	Animal contact	83.8	1.19%	1	0.40		0.40	0.20
	Balloon contact	96.2	3.74%	3.6	2.20		0.60	0.80
	Vegetation contact	40	8.50%	3.4	1.40		1.00	1.00
	Vehicle contact	210.8	1.61%	3.4	1.20		1.60	0.60
	Other	72.6	1.93%	1.4	0.60		0.60	0.20
All types of equipment / facility failure	All types	1116.4	0.72%	8.0	3.00		2.40	2.60
	Capacitor bank failure	10.4	1.92%	0.2	0.00		0.20	0.00
	Conductor failure— all	40.8	4.41%	1.8	0.60		0.60	0.60
	Conductor failure— wires down	39.6	4.55%	1.8	0.60		0.60	0.60
	Fuse failure—all	18.2	2.20%	0.4	0.20		0.00	0.20
	Fuse failure—conventional blown fuse	577.4	0.07%	0.4	0.20		0.00	0.20
	Lightning arrestor failure	22.8	2.63%	0.6	0.00		0.20	0.40
	Splice/Clamp/Connector Failure	33.2	4.22%	1.4	0.80		0.20	0.40
	Switch failure	19	3.16%	0.6	0.00		0.40	0.20
	Transformer failure	251.8	0.32%	0.8	0.20		0.20	0.40
Wire-to-wire contact / contamination		15.6	3.85%	0.6	0.40		0.20	0.00
Other		NA	NA	0.4	0.40		0.00	0.00

*Note: In SDG&E's Territory Zone 1 falls within Tiers 2 and 3. To avoid double counting all fires have been grouped into Tiers 2 and 3

TABLE 18b Transmission: Key Drivers of Ignition Probability								
Ignition probability drivers		Number of incidents per year (according to 5-year historical average)	Average likelihood of ignition per incident	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
Contact from object	All types of object contact	30.6	7.84%	2.4	1.20		1.60	0.20
	Animal contact	6.8	11.76%	0.8	0.40		0.40	0.00
	Balloon contact	20.2	2.97%	0.6	0.20		0.40	0.00
	Vegetation contact	0.4	0.00%	0	0.00		0.00	0.00
	Vehicle contact	2	30.00%	0.6	0.40		0.00	0.20
	Other	1.2	33.33%	0.4	0.00		0.40	0.00
All types of equipment / facility failure	All types	29	0.69%	0.2	0.00		0.00	0.00
	Capacitor bank failure	0	0.00%	0	0.00		0.00	0.00
	Conductor failure— all	2	0.00%	0	0.00		0.00	0.00
	Conductor failure— wires down	0	0.00%	0	0.00		0.00	0.00
	Fuse failure—all	0	0.00%	0	0.00		0.00	0.00
	Fuse failure—conventional blown fuse	0	0.00%	0	0.00		0.00	0.00
	Lightning arrestor failure	0.6	0.00%	0	0.00		0.00	0.00
	Splice/Clamp/Connector Failure	0.6	33.33%	0.2	0.00		0.20	0.00
	Switch failure	1.4	0.00%	0	0.00		0.00	0.00
	Transformer failure	0.2	0.00%	0	0.00		0.00	0.00
Wire-to-wire contact / contamination		20	0.00%	0	0.00		0.00	0.00
Other		4.2	9.52%	0.4	0.20		0.20	0.00

TABLE 19: Macro Trends Impacting Ignition Probability and/or Wildfire Consequence		
Rank	**Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10**	**Comments**
1	Change in ignition probability and estimated wildfire consequence due to climate change	Climate change is already affecting California and San Diego County, and is driving higher wildfire risk for many reasons. Extended droughts
3	Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles	Invasive species such as the bark beetle are not as much of a concern in the San Diego region, but eucalyptus trees and some grasses can be considered invasive and drive vegetation risk for wildfires.
2	Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture	Fuel density and fuel changes as a result of climate change need more research, however fuel moisture will be an issue as lower relative humidity and drought as a result of climate change will created fuels that are at much higher risk of catastrophic fire
8	Population changes (including Access and Functional Needs population) that could be impacted by utility ignition	AFN populations are a very high priority for SDG&E and there are many programs in place that build their resilience and wildfire safety. AFN population vulnerability remains a high priority, but is better addressed at this time than these other risks.
7	Population changes in HFTD that could be impacted by utility ignition	There are two potential impacts of higher population in HFTDs. One impact is that more people will be living in areas with high-wildfire threat, but on the other hand, there is the potential of more urbanization, thus reducing the amount of people living in the WUI.
6	Population changes in WUI that could be impacted by utility ignition	More people moving to WUI increases ignition probability because there is more infrastructure as well as more people in direct course of wildfire. This trend is changing the most quickly relative to others and thus will be the most important looking just ten years out.
5	Utility infrastructure location in HFTD vs non-HFTD	The infrastructure in the HFTD vs. non-HFTD is a area of focus for SDG&E and there are major projects hardening infrastructure in HFTD's.
4	Utility infrastructure location in urban vs rural vs highly rural areas	There are WUI areas in San Diego that are not included as a part of the HFTDs that can be prone to wildfire and thus SDG&E infrastructure in these areas are targeted for risk mitigation.
	*NOTE: Comment on difference in approach to serving customers in urban versus rural versus highly rural areas.	

TABLE 20: Anticipated Characteristics of PSPS Use Over the Next 10 Years			
Rank order 1-9	PSPS characteristic	Significantly increase; increase; no change; decrease; significantly decrease	Comments
1	Number of customers affected by PSPS events (total)	Significantly Decrease	
2	Number of customers affected by PSPS events (normalized by fire weather, e.g., Red Flag Warning line mile days)	Significantly Decrease	
7	Frequency of PSPS events in number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability (total)	Decrease	
8	Frequency of PSPS events in number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	
5	Scope of PSPS events in circuit-events, measured in number of events multiplied by number of circuits targeted for de-energization (total)	Decrease	
6	Scope of PSPS events in circuit-events, measured in number of events multiplied by number of circuits targeted for de-energization (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	
3	Duration of PSPS events in customer hours (total)	Decrease	
4	Duration of PSPS events in customer hours (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	

TABLE 21: Risk Assessment and Mapping Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Wildfire Risk Reduction Model	2019 plan	$300	$500	NA	NA	$0.023	NA	This control was grouped with Public Safety Risk Reduction during high wildfire conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$270		NA	NA	$0.008	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$1,120	$1,680	NA	NA	$0.081	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$1,440	$2,160	NA	NA	$0.104	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$1,760	$2,640	NA	NA	$0.127	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$4,320	$6,480	NA	NA	$0.313	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
High Performance Computing Infrastructure	2019 plan	NA	NA	NA	NA	NA	NA	This control was grouped with Public Safety Risk Reduction during high wildfire conditions for purposes of RSE calculations		NA	New	NA	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA	NA	NA	NA			NA	New	NA	NA	Meets and exceeds	P.U. Code § 451	
	2020	0	0	NA	NA	$0.000	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	0	0	NA	NA	$0.000	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$7,500	$9,500	NA	NA	$0.492	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$7,500	$9,500	NA	NA	$0.492	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	

TABLE 22: Situational Awareness and Forecasting Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Camera Networks and Advanced Weather Station Integration	2019 plan	*	*	NA	NA	NA	Increased response speed to ignitions	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	*2019 WMP plan costs were combined with Fire Science and Climate Adaptation.
	2019 actual	$559		NA		$0.032				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$700	$850	NA	NA	$0.045				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$700	$850	NA	NA	$0.045				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$700	$850	NA	NA	$0.045				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$2,100	$2,550	NA	NA	$0.135				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Wireless Fault Indicators	2019 plan	$480	$720	NA	NA	$0.035	Mitigates customer impacts of sensitive settings	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$797		NA		$0.023		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$570	$690	NA	NA	$0.036		0%	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$570	$690	NA	NA	$0.036		0%	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	NA	NA	$0.000		0%	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$1,140	$1,380	NA	NA	$0.073		0%	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 22: Situational Awareness and Forecasting Initiatives

Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Fire Science and Climate Adaptation Department (O&M)	2019 plan	$1,600	$2,400	NA	NA	$0.116	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$862		NA		$0.025	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$2,000	$3,000	NA	NA	$0.145	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$2,000	$3,000	NA	NA	$0.145	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$2,000	$3,000	NA	NA	$0.145	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$6,000	$9,000	NA	NA	$0.434	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Fire Science and Climate Adaptation Department (Capital)	2019 plan	NA	NA	NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$3,600	$5,400	NA	NA	$0.260	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$0	$0	NA	NA	$0.000	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	NA	NA	$0.000	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$3,600	$5,400	NA	NA	$0.260	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 22: Situational Awareness and Forecasting Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Situational Awareness Dashboard (Capital)	2019 plan	NA	NA	NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	NA	NA	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA			NA	NA	NA	NA	Meets and exceeds	P.U. Code § 451	
	2020	$1,900	$2,300	NA	NA	$0.122	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$1,900	$2,300	NA	NA	$0.122	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$1,900	$2,300	NA	NA	$0.122	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$5,700	$6,900	NA	NA	$0.365	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
Situational Awareness Dashboard (O&M)	2019 plan	NA	NA	NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	NA	NA	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA			NA	NA	NA	NA	Meets and exceeds	P.U. Code § 451	
	2020	$285	$345	NA	NA	$0.018	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$285	$345	NA	NA	$0.018	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$285	$345	NA	NA	$0.018	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$855	$1,035	NA	NA	$0.055	NA			NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	

TABLE 22: Situational Awareness and Forecasting Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Operating Conditions	2019 plan	Base	Base	NA	NA	NA	Crew and all ignition probability from faults	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
NMS Situational Awareness Upgrades	2019 plan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA	NA	NA	NA	NA	NA	NA	Meets and exceeds	P.U. Code § 451	
	2020	$475	$575	NA	NA	$0.030	NA	0%	0	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$475	$575	NA	NA	$0.030	NA	0%	0	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$475	$575	NA	NA	$0.030	NA	0%	0	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$1,425	$1,725	NA	NA	$0.091	NA	0%	0	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	

TABLE 22A: Situational Awareness and Forecasting Initiatives			
Initiative Activity	Year	Weather Stations Installed	
		Low	High
Camera Networks and Advanced Weather Station Integration	2019 Plan	11	15
	2019 Actual	13	
	2020	18	22
	2021	18	22
	2022	18	22
	2020-20222 Plan Totals	54	66
Initiative Activity	Year	Wireless Fault Indicators Installed	
		Low	High
Wireless Fault Indicators	2019 plan	450	550
	2019 actual	594	
	2020	450	550
	2021	450	550
	2022	0	0
	2020-2022 Plan Total	900	1100

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
SCADA Capacitor Program	2019 plan	NA	NA	NA	NA	NA	Equipment failure, capacitor	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$1,425	$1,725	NA	NA	$0.091		0.26%	140.4	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$1,425	$1,725	NA	NA	$0.091		0.02%	10.4	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$1,805	$2,185	NA	NA	$0.115		0.02%	10.1	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$4,655	$5,635	NA	NA	$0.298		0.30%	48.8	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Advanced Protection	2019 plan	$2,400	$3,600	NA	NA	$0.174	Reduces % chance fault becomes an ignition	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$3,400		NA	NA	$0.197		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$4,800	$5,800	NA	NA	$0.307		1.68%	24.8	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$8,200	$10,000	NA	NA	$0.527		1.85%	24.8	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$8,200	$10,000	NA	NA	$0.527		2.30%	24.8	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$21,200	$25,800	NA	NA	$1.360		5.83%	24.8	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Distribution Overhead Fire Hardening (OH)	2019 plan	$65,700	$85,100	112.8	146.7	$581	Equipment Failure All	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$120,611		122.9		$981		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$69,600	$104,400	81.6	122.4	$853		1.23%	22.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$9,600	$14,400	11.2	16.8	$857		0.21%	22.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$5,760	$8,640	6.7	10.1	$857		0.14%	22.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$84,960	$127,440	99.5	149.3	$854		1.58%	22.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Distribution Overhead Fire Hardening (Covered Conductor)	2019 plan	0	0	0	0	0	Equipment Failure All, Foreign Object in Line, all but large vegetation, vehicle contacts	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	0		0		NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$857	$1,285	0.8	1.2	$1,071		0.05%	20.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$8,640	$12,960	8	12	$1,080		0.20%	20.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$8,640	$12,960	8	12	$1,080		0.18%	20.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$18,137	$27,205	16.8	25.2	$1,080		0.42%	20.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Pole Replacement and Reinforcement	2019 plan	$10,600	$16,000	NA	NA	$0.770	Equipment failure, all except for wires	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$11,705		NA		$0.339		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$9,561	$11,575	NA	NA	$0.612		1.2%	24.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$9,561	$11,575	NA	NA	$0.612		1.1%	24.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$9,561	$11,575	NA	NA	$0.612		0.9%	24.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$28,683	$34,725	NA	NA	$1.835		3.1%	24.7	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Expulsion Fuse Replacement Program	2019 plan	$7,800	$11,600	NA	NA	$0.561	Fuse Operation	NA	NA	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$3,716		NA		$0.108		NA	NA	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020	$2,990	$4,484	NA	NA	$0.216		0.24%	107.7	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$3,986	$5,980	NA	NA	$0.288		0.08%	24.5	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$1,522	$2,284	NA	NA	$0.110		0.03%	23.9	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$8,498	$12,748	NA	NA	$0.615		0.35%	53.0	NA	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
PSPS Enhancements - Sectionalizing Devices	2019 plan	$400	$700	NA	NA	$0.032	PSPS impacts	NA	NA	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$1,303		NA	NA	$0.038		NA	NA	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020	$400	$700	NA	NA	$0.032		0	0	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$400	$700	NA	NA	$0.032		0	0	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$400	$700	NA	NA	$0.032		0	0	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$1,200	$2,100	NA	NA	$0.096		0	0	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
Hotline Clamp Replacement Program	2019 plan	$1,200	$1,800	NA	NA	$0.087	Equipment failure, Wire Down	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$922		NA		$0.027		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$2,400	$3,600	NA	NA	$0.174		0.12%	65.9	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$2,400	$3,600	NA	NA	$0.174		0.12%	64.0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$2,400	$3,600	NA	NA	$0.174		0.02%	8.2	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$7,200	$10,800	NA	NA	$0.521		0.25%	46.0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Microgrids	2019 plan	$2,400	$3,600	NA	NA	$0.174	PSPS impacts	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$188		NA	NA	$0.005		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$10,260	$12,420	NA	NA	$0.656		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$7,600	$9,200	NA	NA	$0.486		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$7,600	$9,200	NA	NA	$0.486		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$25,460	$30,820	NA	NA	$1.629		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Customer Resilliancy Programs	2019 plan	$500	$900	NA	NA	$0.041	PSPS impacts	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$1,458		NA	NA	$0.042				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$4,950	$5,470	NA	NA	$0.302				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$5,472	$6,472	NA	NA	$0.346				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$7,530	$8,730	NA	NA	$0.471				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$17,952	$20,672	NA	NA	$1.118				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Generator Grant Program - Expanded	2019 plan	NA	NA	NA	NA	NA	PSPS impacts	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$200	$300	NA	NA	$0.014		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$200	$300	NA	NA	$0.014		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$200	$300	NA	NA	$0.014		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$600	$900	NA	NA	$0.043		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Whole Home Generators	2019 plan	NA	NA	NA	NA	NA	PSPS impacts	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$7,600	$9,200	NA	NA	$0.486		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$7,600	$9,200	NA	NA	$0.486		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$7,600	$9,200	NA	NA	$0.486		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$22,800	$27,600	NA	NA	$1.459		0	0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Undergrounding of Electric Lines and/or Equipment	2019 plan	$1,200	$1,800	1.2	1.8	$1,000	All equipment failure and foreign object in lines	NA	NA	Reliability	Existing	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$4,727		2.6		$1,818.08		NA	NA	Reliability	Existing	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020	$24,800	$37,200	8	12	$3,100		0.46%	21.6	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$125,600	$188,400	40	60	$3,140		2.15%	21.6	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$150,400	$225,600	48	72	$3,133		2.57%	21.6	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$300,800	$451,200	96	144	$3,133		5.18%	21.6	Reliability	New	NA	FRMMA	Meets and exceeds	P.U. Code § 451	
Overhead Transmission and Distribution Fire Hardening (Transmission OH)	2019 plan	FERC	FERC	6	8	NA	Equipment Failure All	NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2019 actual	FERC		7		NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2020	FERC	FERC	17.1	21.4	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2021	FERC	FERC	21.2	27.6	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2022	FERC	FERC	16.4	20.5	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2020-2022 Plan Total	FERC	FERC	54.7	69.5	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Overhead Transmission and Distribution Fire Hardening (Transmission UG)	2019 plan	FERC	FERC	2	4	NA	All equipment failure and foreign object in lines	NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2019 actual	FERC		3		NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2020	FERC	FERC	0.0	0.0	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2021	FERC	FERC	4.8	7.2	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2022	FERC	FERC			NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
	2020-2022 Plan Total	FERC	FERC	4.8	7.2	NA		NA FERC	NA FERC	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	G.O. 95	
Overhead Transmission and Distribution Fire Hardening (Distribution Underbuilt)	2019 plan	$4,400	$6,600	8	12	NA	Equipment Failure All	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	G.O. 95	
	2019 actual	$2,964		10		NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	G.O. 95	
	2020	$5,219	$6,523	10.9	13.6	$479		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	G.O. 95	
	2021	$12,236	$15,294	19.4	24.2	$631		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	G.O. 95	
	2022	$5,396	$6,744	7.0	8.8	$768		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	G.O. 95	
	2020-2022 Plan Total	$22,851	$28,561	37.3	46.6	$613		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	G.O. 95	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
CNF Fire Hardening (Transmission OH)	2019 plan	FERC	FERC	25	31	NA	Equipment Failure All	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	FERC		25		NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	FERC	FERC	23.2	34.8	NA		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	FERC	FERC	0	0	NA		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	FERC	FERC	0	0	NA		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	FERC	FERC	23.2	34.8	NA		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
CNF Fire Hardening (Distribution OH Associated with Transmission)	2019 plan	$47,700	$58,300	20	24	$2,409	Equipment Failure All	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$12,793		26.4		$485		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$14,000	$21,000	20	30	$660		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$0	$0	0	0	$0		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	0	0	$0		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$14,000	$21,000	20	30	$700		NA FERC	NA FERC	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
CNF Fire Hardening (Distribution OH)	2019 plan	$47,700	$58,300	20	24	$2,409	Equipment Failure All	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$28,190		26.4		$1,068		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$14,000	$21,000	20	30	$661		1.07%	24.2	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$8,570	$10,570	0.0	2.0	$9,570		0.03%	24.2	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	0	0	$0		0.00%	0.0	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$22,570	$31,570	20.0	32.0	$1,041		1.10%	24.2	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
CNF Fire Hardening (Distribution UG)	2019 plan	NA		15	19	NA	All equipment failure and foreign object in lines	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$27,664		8.7		NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$24,000	$36,000	11.2	16.8	$2,143		See CNF OH	See CNF OH	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$0	$1,860	0	1	$1,860		See CNF OH	See CNF OH	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	0	0	NA		See CNF OH	See CNF OH	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$24,000	$37,860	11.2	17.8	$2,133		See CNF OH	See CNF OH	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 23: Grid Design and System Hardening Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Lightning Arrestor Replacement Program	2019 plan	NA	NA	NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020	$0	$0	NA	NA	$0.000	NA	0	0	NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$950	$1,150	NA	NA	$0.061	NA	0.6%	259.7	NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$1,900	$2,300	NA	NA	$0.122	NA	0.6%	259.7	NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$2,850	$3,450	NA	NA	$0.182	NA	0.6%	259.7	NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
LTE Communication Network	2019 plan	$8,800	$13,200	NA	NA	$0.637	NA	This was grouped with Advanced Protection for the purposes of RSE calculation		NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$7,086		NA	NA	$0.205	NA			NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020	$25,200	$37,800	NA	NA	$1.823	NA			NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2021	$25,200	$37,800	NA	NA	$1.823	NA			NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2022	$33,200	$49,800	NA	NA	$2.402	NA			NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$83,600	$125,400	NA	NA	$6.049	NA			NA	Existing	TY 2019 GRC	FRMMA	Meets and exceeds	P.U. Code § 451	

TABLE 23A: Grid Design and System Hardening Initiatives

Initiative Activity	Year	SCADA Caps installed	
		Low	High
SCADA Capacitor Program	2019 Plan	NA	NA
	2019 Actual	NA	
	2020	27	33
	2021	27	33
	2022	34	42
	2020-20222 Plan Totals	88	108

Initiative Activity	Year	Circuits Enabled		Substations Enabled	
		Low	High	Low	High
Advanced Protection	2019 Plan	6	10	New Metric for post-2019 work	
	2019 Actual	8			
	2020	6	10	4	8
	2021	7	11	6	10
	2022	12	18	4	8
	2020-20222 Plan Totals	25	39	14	26

TABLE 23A: Grid Design and System Hardening Initiatives

OH Hardening 2019 Program Summary		Total per initiative spend		Line Miles to be treated	
		Low	High	Low	High
2019 Plan	FiRM	$49,500	$60,500	81	99
	PRiME	$14,400	$21,600	27.8	41.7
	WiSE	$1,800	$3,000	4	6
	Total	$65,700	$85,100	112.8	146.7
2019 Actual	FiRM	$89,300		83	
	PRiME	$30,880		34.2	
	WiSE	$4,698		5.7	
	Total	$124,878		122.9	

Initiative Activity	Year	Poles Replaced	
		Low	High
Pole Replacement and Reinforcement	2019 Plan	659	1023
	2019 Actual	725	
	2020	600	740
	2021	600	740
	2022	600	740
	2020-20222 Plan Totals	1800	2220

TABLE 23A: Grid Design and System Hardening Initiatives			
Initiative Activity	Year	Total Fuses Replaced	
		Low	High
Expulsion Fuse Replacement Program	2019 Plan	1800	2700
	2019 Actual	2490	
	2020	2400	3600
	2021	3200	4800
	2022	1228	1842
	2020-20222 Plan Totals	6828	10242
Initiative Activity	Year	Sectionalizing Devices Installed	
		Low	High
PSPS Enhancements - Sectionalizing Devices	2019 Plan	6	8
	2019 Actual	7	
	2020	8	12
	2021	8	12
	2022	8	12
	2020-20222 Plan Totals	24	36

TABLE 23A: Grid Design and System Hardening Initiatives

Initiative Activity	Year	Total Hot Line Clamps Replaced	
		Low	High
Hot Line Clamp Replacement Program	2019 Plan	400	600
	2019 Actual	660	
	2020	1320	1980
	2021	1320	1980
	2022	1320	1980
	2020-20222 Plan Totals	3960	5940

Initiative Activity	Year	Micro Grids Installed		Comments
		Low	High	
Micro Grids	2019 Plan	0	1	*Substantial progress was made on the Cameron Quarters Micro Grid Project, it will be completed in 2020.
	2019 Actual	*0		
	2020	2	4	
	2021	2	4	
	2022	0	2	
	2020-20222 Plan Totals	4	10	

Initiative Activity	Year	Generators Provided		Community Resource Centers		Community and Critical Infrastructure Generator Lease	
		Low	High	Low	High	Low	High
Customer Resilliancy Programs	2019 Plan	50	80	8	11	NA	NA
	2019 Actual	65		8		NA	
	2020	1000	1500	8	10	3	5
	2021	1200	1800	10	12	3	5
	2022	1600	2160	10	14	3	5
	2020-20222 Plan Totals	3800	5460	28	36	9	15

TABLE 23A: Grid Design and System Hardening Initiatives			
Initiative Activity	Year	Generators Provided	
		Low	High
Generator Grant Program Expanded	2019 Plan	NA	NA
	2019 Actual	NA	
	2020	104	156
	2021	104	156
	2022	104	156
	2020-20222 Plan Totals	312	468
Initiative Activity	Year	Generators Provided	
		Low	High
Whole House Generators	2019 Plan	NA	NA
	2019 Actual	NA	
	2020	240	360
	2021	240	360
	2022	240	360
	2020-20222 Plan Totals	720	1080

TABLE 23A: Grid Design and System Hardening Initiatives			
Initiative Activity	Year	Lightning Arrestors Replaced	
		Low	High
Lightning Arrestor Replacement Program	2019 Plan	NA	NA
	2019 Actual	NA	
	2020	0	0
	2021	836	1012
	2022	1672	2024
	2020-20222 Plan Totals	2508	3036
Initiative Activity	Year	Base Stations Installed	
		Low	High
LTE Communication Network	2019 Plan	NA	
	2019 Actual		
	2020	20	30
	2021	52	78
	2022	68	102
	2020-20222 Plan Totals	140	210

TABLE 24: Asset Management and Inspections Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
SDG&E Corrective Maintenance Program (HFTD)	2019 plan	Base	Base	NA	NA	NA	All equipment failure related (less hot connections)	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets	GO165	*SDG&E's corrective maintenance program inspection costs were not broken out in the previous WMP. SDG&E plans to track inspection costs within the HFTD going forward.
	2019 actual	*Base		NA		NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets	GO165	
	2020	$1,242	$1,862	NA	NA	$0.090		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets	GO165	
	2021	$1,010	$1,514	NA	NA	$0.073		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets	GO165	
	2022	$506	$758	NA	NA	$0.037		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets	GO165	
	2020-2022 Plan Total	$2,757	$4,135	NA	NA	$0.199		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets	GO165	
Transmission System Inspections	2019 plan	FERC	FERC	NA	NA	NA	All equipment failure	NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds	California Public Resources Code (PRC) §§ 4292 and 4293, as well as GO 95 and GO 128 rules.	
	2019 actual	FERC		NA	NA	NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds		
	2020	FERC	FERC	NA	NA	NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds		
	2021	FERC	FERC	NA	NA	NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds		
	2022	FERC	FERC	NA	NA	NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds		
	2020-2022 Plan Total	FERC	FERC	NA	NA	NA		NA	NA	Reliability	Existing	FERC TO5Filing	NA	Meets and exceeds		

TABLE 24: Asset Management and Inspections Initiatives

Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Infrared Corona	2019 plan	NA	NA	NA	NA	NA	Hot Connection Equipment Failure	*		Reliability	NA	NA	FRMMA	Exceeds	GO165	*RSE values for SDG&E's enhanced inspection programs were grouped in the November RAMP filing
	2019 actual	$98		NA		NA				Reliability	NA	NA	FRMMA	Exceeds	GO165	
	2020	$221	$268	NA	NA	$0.014				Reliability	New	NA	FRMMA	Exceeds	GO165	
	2021	$221	$268	NA	NA	$0.014				Reliability	New	NA	FRMMA	Exceeds	GO165	
	2022	$221	$268	NA	NA	$0.014				Reliability	New	NA	FRMMA	Exceeds	GO165	
	2020-2022 Plan Total	$663	$804	NA	NA	$0.042				Reliability	New	NA	FRMMA	Exceeds	GO165	
HFTD Tier 3 Inspections	2019 plan	*Base	Base	NA	NA	NA	All equipment failure related (less hot connections)	*		Reliability	Existing	TY 2019 GRC	NA	Exceeds	GO165	*RSE values for SDG&E's enhanced inspection programs were grouped in the November RAMP filing
	2019 actual	Base		NA	NA	NA				Reliability	Existing	TY 2019 GRC	NA	Exceeds	GO165	
	2020	$333	$403	NA	NA	$0.021				Reliability	Existing	TY 2019 GRC	NA	Exceeds	GO165	
	2021	$333	$403	NA	NA	$0.021				Reliability	Existing	TY 2019 GRC	NA	Exceeds	GO165	
	2022	$333	$403	NA	NA	$0.021				Reliability	Existing	TY 2019 GRC	NA	Exceeds	GO165	
	2020-2022 Plan Total	$999	$1,209	NA	NA	$0.064				Reliability	Existing	TY 2019 GRC	NA	Exceeds	GO165	
Drone Inspections (capital)	2019 plan	NA	NA	NA	NA	NA	All equipment failure related (less hot connections)	*		Reliability	NA	NA	NA	Meets and exceeds	GO 165, GO 95	*RSE values for SDG&E's enhanced inspection programs were grouped in the November RAMP filing, RSE value is listed in Pole Replacement and Reinforcement
	2019 actual	NA		NA		NA				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2020	$2,880	$4,320	NA	NA	$0.208				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2021	$1,944	$2,916	NA	NA	$0.141				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2022	$1,944	$2,916	NA	NA	$0.141				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2020-2022 Plan Total	$6,768	$10,152	NA	NA	$0.490				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	

TABLE 24: Asset Management and Inspections Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Drone Inspections (O&M) *Flights & Assessments	2019 plan	NA	NA	NA	NA	NA	All equipment failure related (less hot connections)	*		Reliability	NA	NA	NA	Meets and exceeds	GO 165, GO 95	*RSE values for SDG&E's enhanced inspection programs were grouped in the November RAMP filing, RSE value is listed in Pole Replacement and Reinforcement
	2019 actual	$13,474		NA		NA				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2020	$21,000	$25,700	NA	NA	$1.352				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2021	$19,200	$22,400	NA	NA	$1.204				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2022	$12,500	$17,800	NA	NA	$0.877				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2020-2022 Plan Total	$52,700	$65,900	NA	NA	$3.432				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
Drone Inspections (O&M) *Enigineering & Construction	2019 plan	NA	NA	NA	NA	NA	All equipment failure related (less hot connections)	*		Reliability	NA	NA	NA	Meets and exceeds	GO 165, GO 95	*RSE values for SDG&E's enhanced inspection programs were grouped in the November RAMP filing, RSE value is listed in Pole Replacement and Reinforcement
	2019 actual	NA		NA		NA				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2020	$25,500	$28,800	NA	NA	$1.571				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2021	$23,000	$25,600	NA	NA	$1.406				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2022	$18,200	$21,350	NA	NA	$1.145				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	
	2020-2022 Plan Total	$66,700	$75,750	NA	NA	$4.123				Reliability	New	NA	FRMMA	Meets and exceeds	GO 165, GO 95	

TABLE 24: Asset Management and Inspections Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Circuit Ownership	2019 plan	NA	NA	NA	NA	NA	All equipment failure related (less hot connections)	*		Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	*RSE values for SDG&E's enhanced inspection programs were grouped in the November RAMP filing, RSE value is listed in Pole Replacement and Reinforcement
	2019 actual	NA		NA		NA				Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$475	$575	NA	NA	$0.030				Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$475	$575	NA	NA	$0.030				Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$475	$575	NA	NA	$0.030				Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$1,425	$1,725	NA	NA	$0.091				Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Substation System Inspections	2019 plan	Base	Base	NA	NA	NA	All equipment failure	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	GO174	
	2019 actual	Base		NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	GO174	
	2020	Base	Base	NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	GO174	
	2021	Base	Base	NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	GO174	
	2022	Base	Base	NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	GO174	
	2020-2022 Plan Total	Base	Base	NA	NA	NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	GO174	

TABLE 24A: Asset Management and Inspections Initiatives

Initiative Activity	Year	5 year Detailed Inspections		Annual Patrols		Wood Pole Intrusive Inspections	
		Low	High	Low	High	Low	High
SDG&E Corrective Maintenance Program (HFTD)	2019 Plan	16,000	17,000	85,000	87,000	18,000	20,000
	2019 Actual	16,329		86,401		19,729	
	2020	17,000	18,000	85,000	87,000	17,000	19,000
	2021	22,000	23,000	85,000	87,000	7,000	9,000
	2022	18,000	19,000	85,000	87,000	300	500
	2020-20222 Plan Totals	57,000	60,000	255,000	261,000	24,300	28,500

Initiative Activity	Year	Transmission Visual Inspections		Transmission Infrared Inspections		Transmission Detailed Inspections		Additional Transmission Aerial 69kV Tier 3 Visual Inspection	
		Low	High	Low	High	Low	High	Low	High
Transmission System Inspections	2019 Plan	94	140	90	136	29	45	21	33
	2019 Actual	116		112		37		27	
	2020	94	140	90	136	33	49	21	33
	2021	94	140	90	136	30	46	21	33
	2022	94	140	90	136	30	46	21	33
	2020-20222 Plan Totals	282	420	270	408	93	141	63	99

TABLE 24A: Asset Management and Inspections Initiatives

Initiative Activity	Year	Infrared/Corona Inspections	
		Low	High
Infrared Corona	2019 Plan	NA	NA
	2019 Actual	NA	
	2020	7000	10000
	2021	7000	10000
	2022	7000	10000
	2020-20222 Plan Totals	21000	30000

Initiative Activity	Year	QA/QC Inspections	
		Low	High
HFTD Tier 3 Inspections	2019 Plan	11000	12000
	2019 Actual	15176	
	2020	11000	12000
	2021	11000	12000
	2022	12000	13000
	2020-20222 Plan Totals	34000	37000

TABLE 24A: Asset Management and Inspections Initiatives

Initiative Activity	Year	Drone Inspections Completed	
		Low	High
Drone Inspections	2019 Plan	9000	11000
	2019 Actual	10400	
	2020	28000	38000
	2021	18000	21,500
	2022	15000	18000
	2020-20222 Plan Totals	61000	77500

Initiative Activity	Year	Substation Inspections	
		Low	High
Substation System Inspections	2019 Plan	300	360
	2019 Actual	301	
	2020	300	360
	2021	300	360
	2022	300	360
	2020-20222 Plan Totals	900	1080

TABLE 25A: Vegetation Management and Inspections Initiatives			
Initiative Activity	Year	Trees Inspected	
		Low	High
Tree Trimming	2019 Plan	450,000	460,000
	2019 Actual	453,330	
	2020	450,000	460,000
	2021	450,000	460,000
	2022	450,000	460,000
	2020-2022 Plan Totals	1,350,000	1,380,000
Initiative Activity	Year	Trees Trimmed to 25' clearance or removed	
		Low	High
Enhanced Inspections Patrols and Trimming	2019 Plan	7000	8000
	2019 Actual	8310	
	2020	14000	20000
	2021	14000	20000
	2022	14000	20000
	2020-2022 Plan Totals	42000	60000

TABLE 25A: Vegetation Management and Inspections Initiatives			
Initiative Activity	Year	Poles Brushed	
		Low	High
Pole Brushing	2019 Plan	32000	39000
	2019 Actual	34000	
	2020	32000	39000
	2021	32000	39000
	2022	32000	39000
	2020-2022 Plan Totals	96000	117000
Initiative Activity	Year	Poles cleared	
		Low	High
Fuels Management	2019 Plan	400	600
	2019 Actual	511	
	2020	400	600
	2021	400	600
	2022	400	600
	2020-2022 Plan Totals	1200	1800

TABLE 25: Vegetation Management and Inspections Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Tree Trimming	2019 plan	*Base	Base	NA	NA	NA	Vegetation Contact	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	*In SDGE's 2019 WMP, Tree Trimming was listed as part of base business and costs for the program were not provided. Going forward, SDG&E will be providing these costs.
	2019 actual	$33,957		NA		NA		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$22,220	$33,330	NA	NA	$1.608		50%	122.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$22,220	$33,330	NA	NA	$1.608		50%	122.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$22,220	$33,330	NA	NA	$1.608		50%	122.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$66,660	$99,990	NA	NA	$4.823		50%	122.5	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 25: Vegetation Management and Inspections Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Fuels Management Program	2019 plan	$400	$600	NA	NA	$0.029	Reduces chance fault becomes an ignition, reduces initial propagation	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$5,093		NA		$0.147		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$4,000	$6,000	NA	NA	$0.289		0.4%	5.2	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$4,000	$6,000	NA	NA	$0.289		0.4%	5.2	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$4,000	$6,000	NA	NA	$0.289		0.4%	5.2	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$12,000	$18,000	NA	NA	$0.868		0.4%	5.2	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 25: Vegetation Management and Inspections Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Enhanced Inspections Patrols and Trimming	2019 plan	$2,400	$3,600	NA	NA	$0.174	Vegetation Contact	NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$7,396		NA		$0.214		NA	NA	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$18,882	$28,324	NA	NA	$1.366		5.0%	14.41	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$18,882	$28,324	NA	NA	$1.366		5.0%	14.41	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$18,882	$28,324	NA	NA	$1.366		5.0%	14.41	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$56,646	$84,972	NA	NA	$4.098		5.0%	14.41	Reliability	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 25: Vegetation Management and Inspections Initiatives																	
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Pole Brushing	2019 plan	*Base	Base	NA	NA	NA	Reduces chances that a fault will lead to an ignition	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	*In SDGE's 2019 WMP, Pole Brushing was listed as part of base business and costs for the program were not provided. Going forward, SDG&E will be providing these costs.
	2019 actual	$3,884		NA		NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$4,754	$7,131	NA	NA	$0.344		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$4,754	$7,131	NA	NA	$0.344		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$4,754	$7,131	NA	NA	$0.344		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$14,262	$21,393	NA	NA	$1.032		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 26: Grid Operations and Protocols Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Recloser Protocols	2019 plan	*Base	Base	NA	NA	NA	Reduces chance of fault leading to an ignition	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	Base		NA		NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Wildfire Infrastructure Protection Teams	2019 plan	$700	$1,100	NA	NA	$0.052	Employee Caused Ignitions	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	CFR cost estimates can fluctuate based on the actual conditions that accompany fire season. The Primary contract calls for 8 CFRs a day but in reality there are usually more ordered. Additionally, CFRs used during Extreme weather events and other fire related activations are not included in the above estimates
	2019 actual	$1,790		NA		$0.10		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$1,334	$2,002	NA	NA	$0.097		0.76%	31.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$1,334	$2,002	NA	NA	$0.097		0.76%	31.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$1,334	$2,002	NA	NA	$0.097		0.76%	31.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$4,003	$6,005	NA	NA	$0.290		0.76%	31.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 26: Grid Operations and Protocols Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Other Special Work Procedures	2019 plan	Base	Base	NA	NA	NA	Employee Caused Ignitions	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	Base		NA		NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	Base	Base	NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Strategy for Minimizing Public Safety Risk During High Wildfire Conditions	2019 plan	Base	Base	NA	NA	NA	All	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.	
	2019 actual	Base		NA		NA	All	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.	
	2020	Base	Base	NA	NA	NA	All	50%	118.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.	
	2021	Base	Base	NA	NA	NA	All	50%	118.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.	
	2022	Base	Base	NA	NA	NA	All	50%	118.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.	
	2020-2022 Plan Total	Base	Base	NA	NA	NA	All	50%	118.0	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code §§ 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8.	

TABLE 26: Grid Operations and Protocols Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Mitigating the Public Safety Impact of PSPS Protocols	2019 plan	Base	Base	NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2019 actual	Base		NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2020	Base	Base	NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2021	Base	Base	NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2022	Base	Base	NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2020-2022 Plan Total	Base	Base	NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
Communication Practices (Capital)	2019 plan	NA	NA	NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2019 actual	NA		NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2020	$2,000	$4,000	NA	NA	$0.17	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2021	$0	$0	NA	NA	$0.00	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	

TABLE 26: Grid Operations and Protocols Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
	2022	$0	$0	NA	NA	$0.00	NA	calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2020-2022 Plan Total	$2,000	$4,000	NA	NA	$0.17	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	

TABLE 26: Grid Operations and Protocols Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Communication Practices (O&M)	2019 plan	$2,000	$3,000	NA	NA	$0.15	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2019 actual	$3,057		NA		$0.18	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2020	$4,458	$5,397	NA	NA	$0.29	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2021	$4,458	$5,397	NA	NA	$0.29	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2022	$4,458	$5,397	NA	NA	$0.29	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
	2020-2022 Plan Total	$13,374	$16,191	NA	NA	$0.86	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 399.2(a) and 451, D.12-04-024, and Commission Resolution ESRB-8	
Aviation Firefighting Program (Capital)	2019 plan	NA	NA	NA	NA	NA	Fire Suppression	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$5,760	$8,640	NA	NA	$0.417		See Aviation Firefighting Program (O&M)		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$11,520	$17,280	NA	NA	$0.833				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	NA	NA	$0.000				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$17,280	$25,920	NA	NA	$1.250				NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 26: Grid Operations and Protocols Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Aviation Firefighting Program (O&M)	2019 plan	$6,000	$9,000	NA	NA	$0.434	Fire Suppression	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$3,938		NA		$0.114		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$7,202	$8,719	NA	NA	$0.461		5.0%	31.5	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$7,202	$8,719	NA	NA	$0.461		5.0%	31.5	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$7,202	$8,719	NA	NA	$0.461		5.0%	31.5	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$21,606	$26,157	NA	NA	$1.382		5.0%	31.5	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Industrial Fire Brigade	2019 plan	Base	Base	NA	NA	NA	Fire Suppression	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	Base		NA	NA	NA		NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$270	$406	NA	NA	$0.020		0.1%	22.9	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$270	$406	NA	NA	$0.020		0.1%	22.9	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$270	$406	NA	NA	$0.020		0.1%	22.9	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$811	$1,217	NA	NA	$0.059		0.1%	22.9	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 27: Data Governance Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Geographic Information Systems	2019 plan	Base	Base	NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	Base		NA		NA	NA	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	Base	Base	NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	Base	Base	NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	Base	Base	NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	Base	Base	NA	NA	NA	NA	NA	NA	NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Ignition Management Program	2019 plan	Base	Base	NA	NA	NA	NA	This was grouped with OH hardening (BC and CC) and Undergrounding for the purpose of calculating RSE's		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$285	$345	NA	NA	$0.018	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$285	$345	NA	NA	$0.018	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$258	$345	NA	NA	$0.017	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$828	$1,035	NA	NA	$0.054	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 28: Resource Allocation Methodology Initiatives																
Initiative Activity	Year	Total per initiative spend (Capital)		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Asset Management (capital)	2019 plan	NA	NA	NA	NA	NA	NA	This was grouped with OH hardening (BC and CC) and Undergrounding for the purpose of calculating RSE's		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$8,774	$10,621	NA	NA	$0.561	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$2,500	$5,000	NA	NA	$0.217	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$3,000	$7,500	NA	NA	$0.304	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$14,274	$23,121	NA	NA	$1.082	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 28: Resource Allocation Methodology Initiatives																
Initiative Activity	Year	Total per initiative spend (Capital)		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Asset Management (O&M)	2019 plan	$1,200	$1,800	NA	NA	$0.087	NA	This was grouped with OH hardening (BC and CC) and Undergrounding for the purpose of calculating RSE's		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$107		NA		$0.003	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$400	$500	NA	NA	$0.026	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$500	$600	NA	NA	$0.032	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$500	$600	NA	NA	$0.032	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$1,400	$1,700	NA	NA	$0.090	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 28: Resource Allocation Methodology Initiatives																
Initiative Activity	Year	Total per initiative spend (Capital)		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Wildfire Mitigation Personnel	2019 plan	NA	NA	NA	NA	NA	NA	This was grouped with OH hardening (BC and CC) and Undergrounding for the purpose of calculating RSE's		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$1,663	$2,013	NA	NA	$0.106	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$1,663	$2,013	NA	NA	$0.106	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$1,663	$2,013	NA	NA	$0.106	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$4,989	$6,039	NA	NA	$0.319	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 28: Resource Allocation Methodology Initiatives																
Initiative Activity	Year	Total per initiative spend (Capital)		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
PSPS Mitigation Engineering Team	2019 plan	NA	NA	NA	NA	NA	NA	This was grouped with OH hardening (BC and CC) and Undergrounding for the purpose of calculating RSE's		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	* Costs for this team have been grouped with Wildfire Mitigation Personnel
	2019 actual	NA		NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	*		NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 29: Emergency Planning and Preparedness Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Customer Support in Emergencies	2019 plan	*		NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	* Costs for this program are included in Emergency Management Operations
	2019 actual			NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Disaster and Emergency Preparedness Plan	2019 plan	*		NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	* Costs for this program are included in Emergency Management Operations
	2019 actual			NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total			NA	NA	NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

TABLE 29: Emergency Planning and Preparedness Initiatives																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with regulations	Cite Associated rule	Comments
		Low	High	Low	High											
Emergency Management Operations (O&M)	2019 plan	$4,000	$6,000	NA	NA	$0.289	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	$4,727		NA		$0.137	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$4,088	$4,654	NA	NA	$0.253	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$4,088	$4,654	NA	NA	$0.253	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$4,088	$4,654	NA	NA	$0.253	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$12,264	$13,962	NA	NA	$0.759	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
Emergency Management Operations (Capital)	2019 plan	NA	NA	NA	NA	NA	NA	This control was grouped with Strategy for Minimizing Public Safety Risk During High Wildfire Conditions for purposes of RSE calculations		NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2019 actual	NA		NA		NA	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020	$3,600	$5,400	NA	NA	$0.260	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2021	$0	$0	NA	NA	$0.000	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2022	$0	$0	NA	NA	$0.000	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	
	2020-2022 Plan Total	$3,600	$5,400	NA	NA	$0.260	NA			NA	Existing	TY 2019 GRC	NA	Meets and exceeds	P.U. Code § 451	

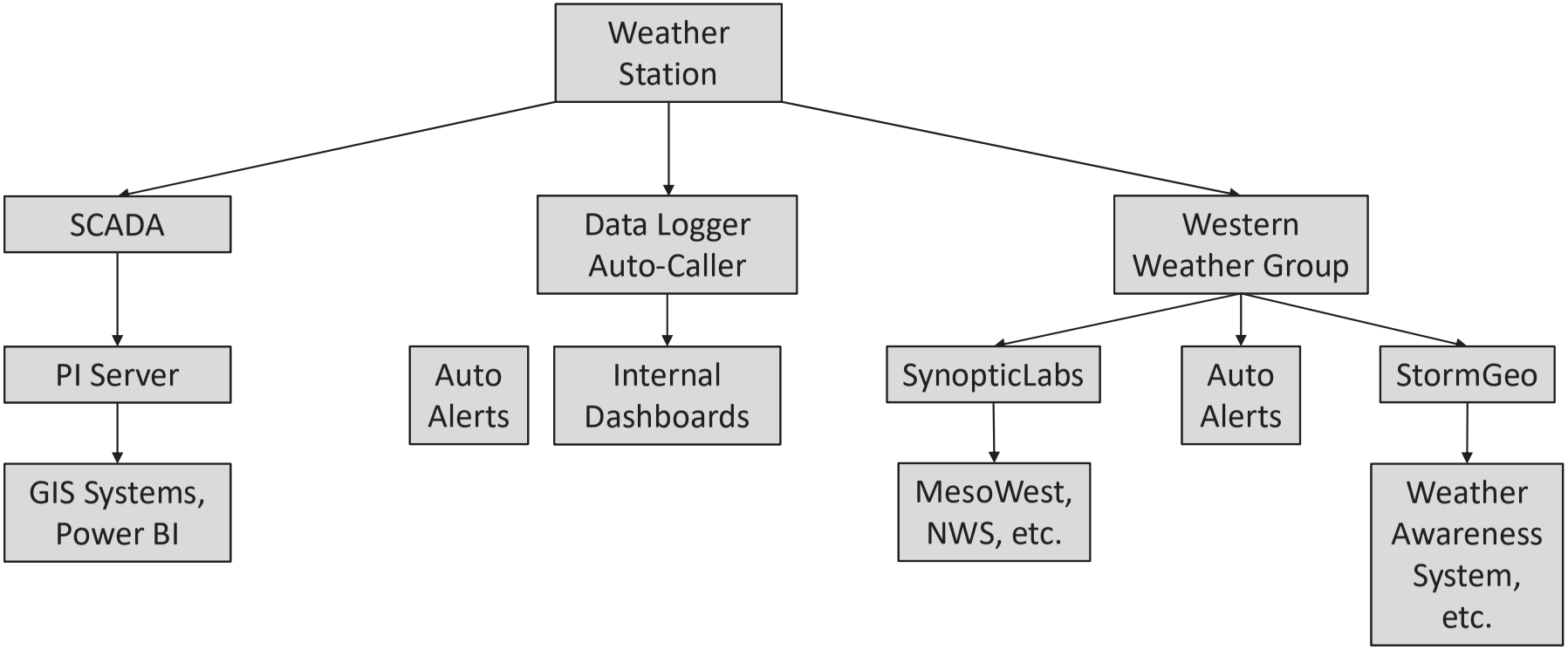
TABLE 30																
Initiative Activity	Year	Total per initiative spend		Line Miles to be treated		Spend per treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing/ What Proceeding	If New: Memorandum account	In / Exceeding Compliance with	Cite Associated rule	Comments
		Low	High	Low	High											
Community Engagement - See Table 26 Customer Communications and Mitigating the Public Safety Impact of PSPS Protocols																

TABLE 31: Change in Drivers of Ignition Probability Taking Into Account Planned Initiatives, For Each Year of Plan											
Incident type by ignition probability driver		Near misses tracked (y/n)?	Number of Incidents per year			Avg % probability of ignition per incident			Number of Ignitions per year		
			2020	2021	2022	2020	2021	2022	2020	2021	2022
Contact from object	All types of object contact	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Animal contact	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Balloon contact	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Veg. contact	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vehicle contact	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
All types of equipment / facility failure	All types	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Capacitor bank failure	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Conductor failure - all	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Conductor failure - wires down	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fuse failure - all	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fuse failure - conventional blown fuse	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lightning arrestor failure	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Splice/Clamp/Connector	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Switch failure	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Transformer failure	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wire-to-wire contact / contamination		Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vandalism/Theft		Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other											

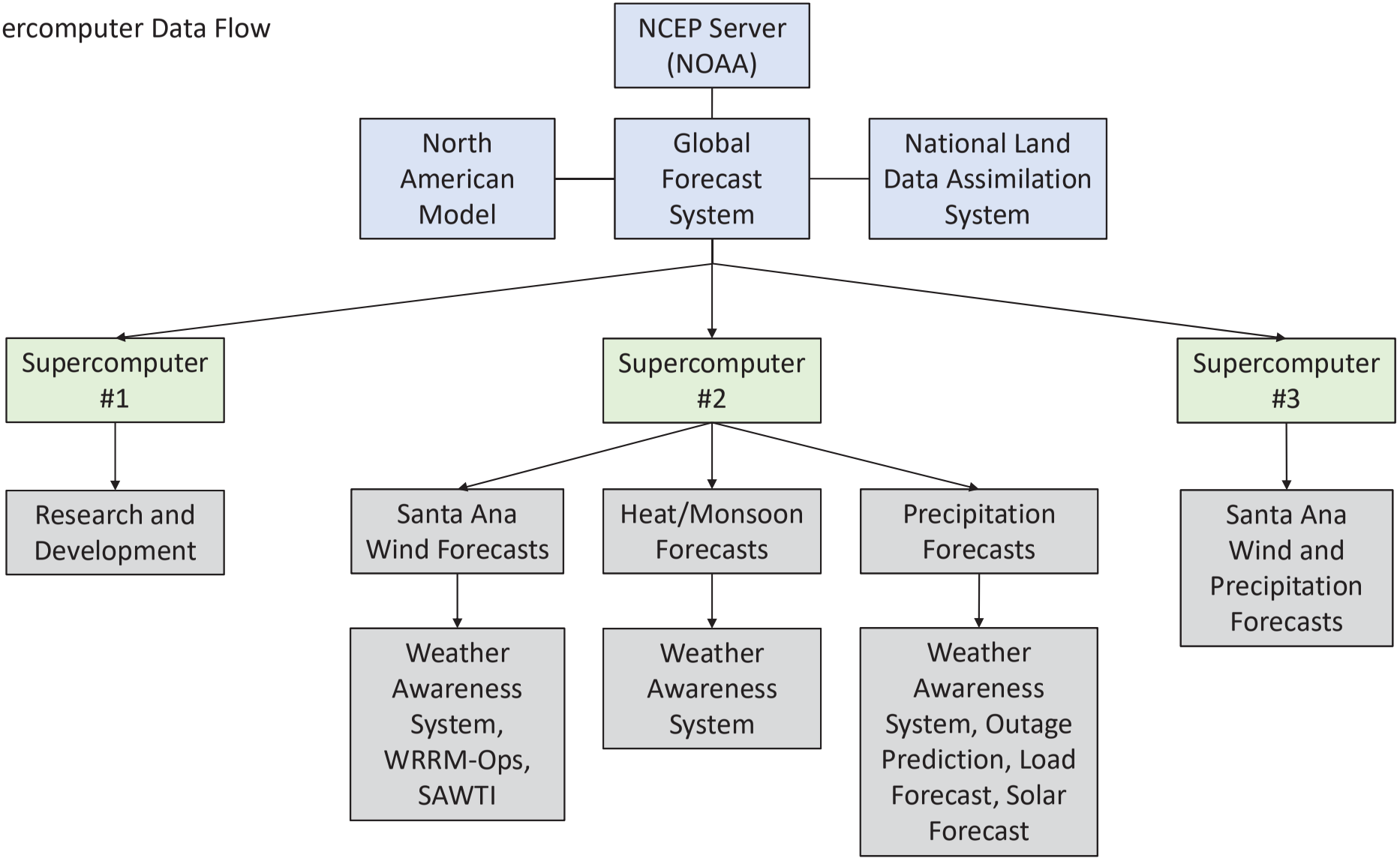
Appendix B

Data Flow for SDG&E's Weather Network Data and Supercomputer Simulations

Weather Network Data Flow



Supercomputer Data Flow



Website Data Flow

Weather Awareness System

- sdgeweather.com
- Hosted and managed by MJD Interactive

Components:

- Current weather data (StormGeo)
- Forecast data (SDG&E Meteorology)
- Radar (StormGeo)
- Lightning (StormGeo)
- FPI (SeaSpace, SDG&E Meteorology)
- OPI (ADS, SeaSpace, SDG&E Meteorology)

Weather Station Site

- weather.sdgeweather.com
- Hosted and managed by StormGeo

Components:

- Current weather data (StormGeo)
- Forecast data (ADS)
- Radar (StormGeo)

Appendix C

List of Priority Essential Services

Appendix C

A listing of entities that SDG&E considers to be priority essential services is provided in Appendix C. This list is current as of February 2020 and given the dynamic nature of some categories, is subject to change.

Priority Essential Services SDG&E Customer List

Entity Name	Category
SAN DIEGO BLOOD BANK	BLOOD BANKS
AMERICAN RED CROSS	BLOOD BANKS
DYNAMIC DESIGN PHARMA INC	CHEMICAL
FIZZIQUE LLC	CHEMICAL
METACRINE INC	CHEMICAL
NATURAL THOUGHTS INC	CHEMICAL
NEOMPS INC	CHEMICAL
ACADIA PHARMACEUTICALS	CHEMICAL
AMERICAN FIRE COATING INC	CHEMICAL
TAO OF MAN LLC	CHEMICAL
RECYCLED AGGREGATE MATERIALS	CHEMICAL
FX LABS	CHEMICAL
COMBI BLOCKS INCORPORATION	CHEMICAL
ILLUMINA INC	CHEMICAL
AMERIWEST TECH INC	CHEMICAL
LIFE TECHNOLOGIES	CHEMICAL
TOTAL POWER INC	CHEMICAL
SENTE	CHEMICAL
NEWOPP BIO PHARMACEUTICALS	CHEMICAL
KUNHUA CHEN	CHEMICAL
CP KELCO	CHEMICAL
GREATSOIL LLC	CHEMICAL
EPICUREN DISCOVERY INC	CHEMICAL
SHIRE PHARMACEUTICAL COMPANY	CHEMICAL
BRENNTAG PACIFIC INC	CHEMICAL
GLOBAL PLASTICS LP	CHEMICAL
XCOVERY BETTA PHARMA INC	CHEMICAL
INTERNATIONAL STEM CELL CORP	CHEMICAL
SUNREZ CORP	CHEMICAL
STRATUM MEDICAL INC	CHEMICAL
OTONOMY	CHEMICAL
STA PHARMACETICAL US LLC	CHEMICAL
PACK LAB INC	CHEMICAL
COOLA SUN CARE	CHEMICAL
ALL ONE GOD FAITH INC	CHEMICAL
AZTEC PERLITE COMPANY INC	CHEMICAL
ALICHEM	CHEMICAL
KBI BIOPHARMA INC	CHEMICAL

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CALASIA PHARMACEUTICALS	CHEMICAL
NICOPHARM PHARMACEUTICAL SOL	CHEMICAL
EMERALD HEALTH PHARMA	CHEMICAL
SYNTHETIC PROTEOMICS INC	CHEMICAL
GINOLIS INC	CHEMICAL
JAMES S PYER	CHEMICAL
PROMETHEUS LABS INC	CHEMICAL
CHONTECH INC	CHEMICAL
RECYCLING TECH KNOWLEDGE	CHEMICAL
AMERICAN PHARMA CORP	CHEMICAL
NEURELIS INC	CHEMICAL
SCANTIBODIES LAB INC	CHEMICAL
SHELBY J STANFILL	CHEMICAL
PROCHEM SPECIALTY PROD	CHEMICAL
BIOTICS RESEARCH CORP	CHEMICAL
XTRACTA PHARMA	CHEMICAL
O A L ASSOC INC	CHEMICAL
FOODAROM USA INC	CHEMICAL
PURETY COSMETICS	CHEMICAL
AMPLYX PHARMACEUTICALS	CHEMICAL
PLANT DEVAS INC	CHEMICAL
ABOVCHEM LLC	CHEMICAL
CW SAN DIEGO LLC	CHEMICAL
GREEN-GO RECYCLING INC	CHEMICAL
SPOERRI INC	CHEMICAL
BIO D PRODUCTS	CHEMICAL
RHINO LININGS USA INC	CHEMICAL
DUN EDWARDS CORP	CHEMICAL
ARA CHEM	CHEMICAL
ARGONAUT MANUFACTURING SRV	CHEMICAL
AMERICAN POWDER COAT LLC	CHEMICAL
INVIVOSCRIBE TECH	CHEMICAL
INNOMINATA	CHEMICAL
HYDRO AGRI	CHEMICAL
ARENA PHARMACEUTICALS INC	CHEMICAL
CARLSBAD MANUFACTURING CORP	CHEMICAL
AA BLOCKS LLC	CHEMICAL
ANGIONETICS INC	CHEMICAL
AMERICAN PEPTIDE COMPANY INC	CHEMICAL

Appendix C

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Priority Essential Services SDG&E Customer List

GABRIEL COSTILLA	CHEMICAL
SALIS INTERNATIONAL INC	CHEMICAL
EPIGEN BIOSCIENCES INC	CHEMICAL
HYDROGENICS USA INC	CHEMICAL
ELEMENTARY DESIGN	CHEMICAL
INNOVATIVE BIOSCIENCES INC	CHEMICAL
STAR HEALTH LLC	CHEMICAL
WESTAIR GASES & EQUIPMENT	CHEMICAL
ATLAS CHEMICAL CO	CHEMICAL
WONDFO USA CORPORATION LTD	CHEMICAL
NITTO BIO PHARMA	CHEMICAL
AVISTA TECHNOLOGIES INC	CHEMICAL
VERTEX PHARMACEUTICALS LLC	CHEMICAL
RETROPHIN INC	CHEMICAL
ALDILA GOLF DBA VICTORY ARCH	CHEMICAL
PACIFIC BIOPHARMA LOGISTICS	CHEMICAL
BEN REDLICH	CHEMICAL
STEMELL INC	CHEMICAL
XERIS PHARMACEUTICALS INC	CHEMICAL
HARRELLS LLC	CHEMICAL
PHASEBIO PHARMACEUTICALS INC	CHEMICAL
PFENEX INC	CHEMICAL
PATHWAY GENOMICS CORP	CHEMICAL
PARKER HANNIFIN CORP	CHEMICAL
LATITUDE PHARM INC	CHEMICAL
EBERT COMPOSITES CORP	CHEMICAL
CALIFIA PHARMA INC	CHEMICAL
STEROGENE BIO SEPR INC	CHEMICAL
CARLSBAD TECHNOLOGY INC	CHEMICAL
J & D LABORATORIES INC	CHEMICAL
VERSUM MATERIALS US LLC	CHEMICAL
H AND M DIST INC	CHEMICAL
JACOB RUBENSTEIN	CHEMICAL
MC BRADFORD INC	CHEMICAL
STEGO INDUSTRIES LLC	CHEMICAL
INNOVUS PHARMACEUTICALS INC	CHEMICAL
QPEX BIOPHARMA	CHEMICAL
ARMOR CONTRACT GLAZING	CHEMICAL
IMMUNO ACTIVA	CHEMICAL

Appendix C

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Priority Essential Services SDG&E Customer List

CAROMATECH INC	CHEMICAL
COLORESCIENCE INC	CHEMICAL
AT SCIENTIFIC	CHEMICAL
SENSIENT COLORS LLC	CHEMICAL
INOVA DIAGNOSTICS	CHEMICAL
PHARMAFIND	CHEMICAL
CA BOTANA INT'L INC	CHEMICAL
SCRIPPS LABORATORIES INC	CHEMICAL
QUIDEL CORP	CHEMICAL
CURTIS TECHNOLOGY INC	CHEMICAL
IRISYS LLC	CHEMICAL
BELOTECA INC	CHEMICAL
RENEO PHARMACEUTICALS INC	CHEMICAL
SUN BUM LLC	CHEMICAL
EMERGING PHARMACIES LLC	CHEMICAL
BIOFUELS ENERGY LLC	CHEMICAL
NEW LEAF BIOFUEL LLC	CHEMICAL
REJUVENATION THERAPEUTICS	CHEMICAL
INK SYSTEMS INC	CHEMICAL
JESSUP SERVICES	CHEMICAL
BIOMAX HEALTH PRODUCTS INC	CHEMICAL
ENERGY SUSPENSION	CHEMICAL
ENERGY SUSPENSIONS	CHEMICAL
BIOSETTIA INC	CHEMICAL
TENOVA PHARMACEUTICALS	CHEMICAL
NEURMEDIX	CHEMICAL
HEMPEL USA INC	CHEMICAL
FOLEXPORT INC	CHEMICAL
TRIPLE BEST LLC	CHEMICAL
TARSAL PHARMACEUTICALS	CHEMICAL
SENTISS PHARMACEUTICALS	CHEMICAL
SYNTHETIC GENOMICS	CHEMICAL
BIOFILM INCORPORATED	CHEMICAL
WESTBRIDGE AGRICULTURAL	CHEMICAL
ARTIFICIAL TURF SUPPLY LLC	CHEMICAL
TRICITY PAINT	CHEMICAL
SPECIALTY MANUFACTURING INC	CHEMICAL
PLASTIFAB INC	CHEMICAL
ALLERMED LABS INC	CHEMICAL

Appendix C

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Priority Essential Services SDG&E Customer List

BIOMED REALTY LP	CHEMICAL
AVISYN PHARMA INC	CHEMICAL
SUNSET PHARMECUTICALS INC	CHEMICAL
INTERNATIONAL BUS ENT	CHEMICAL
XEN BIOFLUIDX INC	CHEMICAL
HOCKING INTERNATIONAL LABS	CHEMICAL
DIVERSIFIED NANO SOLUTIONS	CHEMICAL
AIRGAS WEST INC	CHEMICAL
LEEMARC INDUSTRIES	CHEMICAL
NATURAL ALTERNATIVES INTNL	CHEMICAL
ACADIA PHARMACEUTICALS	CHEMICAL
CLINIQA CORP	CHEMICAL
AT&T MOBILITY	COMMUNICATIONS
T-MOBILE WEST LLC	COMMUNICATIONS
LEVEL 3 COMMUNICATIONS	COMMUNICATIONS
XO COMMUNICATIONS	COMMUNICATIONS
SPRINT NEXTEL CORPORATION	COMMUNICATIONS
AT&T SERVICES INC	COMMUNICATIONS
COX COMMUNICATIONS CALIF LLC	COMMUNICATIONS
VERIZON WIRELESS	COMMUNICATIONS
CALIFORNIA COX PCS	COMMUNICATIONS
COX COMMUNICATIONS INC	COMMUNICATIONS
AT&T	COMMUNICATIONS
WILLIAMS COMMUNICATIONS	COMMUNICATIONS
VOICE STREAM WIRELESS	COMMUNICATIONS
T W TELECOM	COMMUNICATIONS
CRICKET COMMUNICATIONS INC	COMMUNICATIONS
CHARTER COMMUNICATIONS HLDG	COMMUNICATIONS
SPECTRASITE COMMUNICATIONS	COMMUNICATIONS
ATC TOWER CORP	COMMUNICATIONS
CRICKET COMMNICATIONS INC	COMMUNICATIONS
TELEPORT COMMUNICATIONS	COMMUNICATIONS
U S SPRINT CO	COMMUNICATIONS
T-MOBILE USA INC	COMMUNICATIONS
A T & T COMM OF CA INC	COMMUNICATIONS
DAVITA INC	DIALYSIS CENTERS
SAN DIEGO DIALYSIS SRV	DIALYSIS CENTERS
FRESENIUS MEDICAL CARE	DIALYSIS CENTERS
INNOVATIVE DIALYSIS OF LJ	DIALYSIS CENTERS

Appendix C

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HOME DIALYSIS THERAPIES SD	DIALYSIS CENTERS
RENAL ADVANTAGE INC	DIALYSIS CENTERS
AMERICAN ACCESS CARE OF SD	DIALYSIS CENTERS
SATELLITE HEALTH CARE	DIALYSIS CENTERS
LP SCRIPPS LOT I LLC	DIALYSIS CENTERS
NORTH COUNTY KIDNEY CTR	DIALYSIS CENTERS
DIALYSIS NEWCO INC	DIALYSIS CENTERS
FMC SAN JUAN CAPISTRANO LLC	DIALYSIS CENTERS
BIO-MEDICAL APPL OF CALIF	DIALYSIS CENTERS
SAN DIEGO DIALYSIS SVC	DIALYSIS CENTERS
SAN DIEGO DIALYSIS CTR	DIALYSIS CENTERS
CITY OF CORONADO	EMERGENCY OPERATING CNTRS
CITY OF ENCINITAS	EMERGENCY OPERATING CNTRS
CITY OF CHULA VISTA	EMERGENCY OPERATING CNTRS
CITY OF SAN MARCOS	EMERGENCY OPERATING CNTRS
CITY OF SOLANA BEACH	EMERGENCY OPERATING CNTRS
US BORDER PATROL	FEDERAL ACCOUNTS
NAVY EXCHANGE	FEDERAL ACCOUNTS
C O MCAS MIRAMAR	FEDERAL ACCOUNTS
NAVY WARNER SPRINGS TRNG GRP	FEDERAL ACCOUNTS
CMDR NAVAL SPEC WARFARE GRP1	FEDERAL ACCOUNTS
NAVFAC SOUTHWEST	FEDERAL ACCOUNTS
COMMANDER NAVY REGION SW	FEDERAL ACCOUNTS
NAVY RESOURCE MGMT OFFICE	FEDERAL ACCOUNTS
USMC MAINTNCE OFFICER	FEDERAL ACCOUNTS
USN CMDG OFF CODE N8	FEDERAL ACCOUNTS
GSA	FEDERAL ACCOUNTS
NATIONAL MARINE FISHERIES	FEDERAL ACCOUNTS
MCAS MIRAMAR RESERVE CENTER	FEDERAL ACCOUNTS
USN CMDG OFF CODE 5	FEDERAL ACCOUNTS
NAVAL MEDICAL CENTER	FEDERAL ACCOUNTS
US NAVY SHIP SUPPORT UNIT SD	FEDERAL ACCOUNTS
MCAS MIRAMAR EXCHANGE	FEDERAL ACCOUNTS
CBP AIR	FEDERAL ACCOUNTS
MCAS MIRAMAR COMMISSARY	FEDERAL ACCOUNTS
US IMM & NAT SER	FEDERAL ACCOUNTS
NAVY REGIONL PLANT EQUIP OFC	FEDERAL ACCOUNTS
CUSTOMS & BORDER PROTECTION	FEDERAL ACCOUNTS
NOAA MARINE OPS PACIFIC	FEDERAL ACCOUNTS

Appendix C

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C O NAVAL CONSOLID BRIG	FEDERAL ACCOUNTS
FAA	FEDERAL ACCOUNTS
US RADIO STA CODE 611	FEDERAL ACCOUNTS
US COAST GUARD	FEDERAL ACCOUNTS
USMC CPEN M00681	FEDERAL ACCOUNTS
STATE OF CALIFORNIA	FIRE STATIONS
CITY OF OCEANSIDE	FIRE STATIONS
CITY OF SAN DIEGO	FIRE STATIONS
CITY OF SANTEE	FIRE STATIONS
CITY OF LA MESA	FIRE STATIONS
LAKESIDE FIRE PROTECTION DIS	FIRE STATIONS
PAUMA BAND MSN INDIANS	FIRE STATIONS
BLACK CONTRACTORS ASSOC SD	FIRE STATIONS
RANCHO SANTA FE FIRE DIST	FIRE STATIONS
CALIFORNIA DEPT FORESTRY	FIRE STATIONS
CITY OF POWAY	FIRE STATIONS
CITY OF DEL MAR	FIRE STATIONS
ORANGE COUNTY FIRE AUTHORITY	FIRE STATIONS
CAMPO FIRE DEPT	FIRE STATIONS
SAN MIGUEL FIRE PRO DST	FIRE STATIONS
RHO STA FE FIRE DEPT	FIRE STATIONS
USDA-FOREST SERVICE	FIRE STATIONS
CAMPO IND RES/FIRE STN	FIRE STATIONS
SYCUAN KUYEYAAY INDIANS	FIRE STATIONS
LAKESIDE FIRE PROTECTN	FIRE STATIONS
RANCHO SANTA FE ASSOC	FIRE STATIONS
RHO SANTA FE FIRE DEP	FIRE STATIONS
RSF FIRE PROTECTION DISTRICT	FIRE STATIONS
POTRERO COMM CTR FOUNDATION	FIRE STATIONS
BARONA FIRE DEPARTMENT	FIRE STATIONS
BO SUNNYSIDE FIRE PROTECTION	FIRE STATIONS
LAKESIDE FIRE DEPT	FIRE STATIONS
SAN PASQUAL ACADEMY	FIRE STATIONS
STATE OF CALIFORNIA DEPT	FIRE STATIONS
U S FOREST SERVICE	FIRE STATIONS
CITY OF EL CAJON	FIRE STATIONS
MANZANITA FIRE DEPT	FIRE STATIONS
ALPINE FIRE PROTECTION DIST	FIRE STATIONS
CITY OF LAGUNA NIGUEL	FIRE STATIONS

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CAPSTONE FIRE MANAGEMENT INC	FIRE STATIONS
JULIAN COMM SERV DIST	FIRE STATIONS
JULIAN VOLUNTEER FIRE CO	FIRE STATIONS
JULIAN CUYMCA FIRE DIST	FIRE STATIONS
BORREGO SPGS FIRE DEPT	FIRE STATIONS
VLY CTR FIRE PROTECTION	FIRE STATIONS
DEER SPRINGS FIRE PROTECTION	FIRE STATIONS
NORTH COUNTY FIRE	FIRE STATIONS
SN MIGUEL FIRE PRO DIST	FIRE STATIONS
SANTA YSABEL BAND OF DIEGUEN	FIRE STATIONS
DE LUZ VOLL FIRE DEPT	FIRE STATIONS
R R IVY	FIRE STATIONS
STATE OF CALIF	FIRE STATIONS
VIEJAS BAND OF KUMEYAAY IND	FIRE STATIONS
SD CITY FIRE FIGHTERS	FIRE STATIONS
ELFIN FOREST VLNTEER FD	FIRE STATIONS
DEER SPGS VOL FIRE DEPT	FIRE STATIONS
SAN DIEGO RURAL FIRE PROTECT	FIRE STATIONS
MOUNTAIN HEALTH & COMM SRVCS	HEALTHCARE/PUBLIC HEALTH
GIL Q GALLOWAY MD INC	HEALTHCARE/PUBLIC HEALTH
SEVA PROPERTY HOLDINGS LLC	HEALTHCARE/PUBLIC HEALTH
ALVARADO PKWY INSTITUTE	HEALTHCARE/PUBLIC HEALTH
EXODUS RECOVERY INC	HEALTHCARE/PUBLIC HEALTH
SERVING SENIORS	HEALTHCARE/PUBLIC HEALTH
SAN DIEGO FACE & NECK	HEALTHCARE/PUBLIC HEALTH
EMERALD TRIUNE HOME HEALTH	HEALTHCARE/PUBLIC HEALTH
LA MAESTRA FOUNDATION	HEALTHCARE/PUBLIC HEALTH
SAN DIEGO ENDOSCOPY CTR	HEALTHCARE/PUBLIC HEALTH
ALTERNATIVES PREGNANCY	HEALTHCARE/PUBLIC HEALTH
ST PAULS EPISCOPAL HOME	HEALTHCARE/PUBLIC HEALTH
BEST START BIRTH CENTER	HEALTHCARE/PUBLIC HEALTH
BENJAMIN CAMACHO	HEALTHCARE/PUBLIC HEALTH
JOHN QIAN MD INC	HEALTHCARE/PUBLIC HEALTH
AESTHETICARE MED CORP	HEALTHCARE/PUBLIC HEALTH
GARDEN VIEW COURT LLC	HEALTHCARE/PUBLIC HEALTH
MSN AMBULATORY SURGICAL	HEALTHCARE/PUBLIC HEALTH
AT HOME CARE SOLUTIONS	HEALTHCARE/PUBLIC HEALTH
SPECIALTY OBSTETRICS OF SD	HEALTHCARE/PUBLIC HEALTH
SC PROFESSIONAL PLAZA LLC	HEALTHCARE/PUBLIC HEALTH

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W A T INVESTMENTS LLC	HEALTHCARE/PUBLIC HEALTH
LAGUNA NIGUEL SURGERY CENTER	HEALTHCARE/PUBLIC HEALTH
EYE PHYSICIANS MED GRP	HEALTHCARE/PUBLIC HEALTH
NAVAJO LLC	HEALTHCARE/PUBLIC HEALTH
TOGETHER WE GROW	HEALTHCARE/PUBLIC HEALTH
AIJ INC	HEALTHCARE/PUBLIC HEALTH
AMBULATORY CARE SURGERY CTR	HEALTHCARE/PUBLIC HEALTH
DEL MAR MEDICAL IMAGING	HEALTHCARE/PUBLIC HEALTH
SOUTH EAST MEDICAL CENTER	HEALTHCARE/PUBLIC HEALTH
KARI J KNOWLES	HEALTHCARE/PUBLIC HEALTH
SAN DIEGO FERTILITY CENTER	HEALTHCARE/PUBLIC HEALTH
TRIUMSHIRE MANAGEMENT INC	HEALTHCARE/PUBLIC HEALTH
ROCHELLE MCLEAN	HEALTHCARE/PUBLIC HEALTH
NORTH COUNTY SURGERY CENTER	HEALTHCARE/PUBLIC HEALTH
CAMINO HEALTH CENTERS	HEALTHCARE/PUBLIC HEALTH
R K MASSENGILL MD	HEALTHCARE/PUBLIC HEALTH
CARMEL VALLEY ENDODONTICS	HEALTHCARE/PUBLIC HEALTH
GROSSMONT SURGERY CTR	HEALTHCARE/PUBLIC HEALTH
JASON CARPADAKIS	HEALTHCARE/PUBLIC HEALTH
FRIENDSHIP DEVELOPMENT SVCS	HEALTHCARE/PUBLIC HEALTH
STUART B KIPPER MD	HEALTHCARE/PUBLIC HEALTH
SD COMPREHENSIVE PAINMGMT	HEALTHCARE/PUBLIC HEALTH
LA JOLLA ORTHOPAEDIC SURGERY	HEALTHCARE/PUBLIC HEALTH
PRICE CHARITIES	HEALTHCARE/PUBLIC HEALTH
SEVILLE PLAZA PROPCO LLC	HEALTHCARE/PUBLIC HEALTH
ALICIA SURGERY CENTER LLC	HEALTHCARE/PUBLIC HEALTH
THERAPY SPECIALISTS	HEALTHCARE/PUBLIC HEALTH
ESCONDIDO CARE CTR	HEALTHCARE/PUBLIC HEALTH
ASSISTED HEALTH SYSTEMS	HEALTHCARE/PUBLIC HEALTH
CLEARCHOICE SAN DIEGO	HEALTHCARE/PUBLIC HEALTH
RAZAVI CORP	HEALTHCARE/PUBLIC HEALTH
CATH CHARITIES DIOCESE OF SD	HEALTHCARE/PUBLIC HEALTH
JAMES A DAVIES MD	HEALTHCARE/PUBLIC HEALTH
SURGICAL CENTER OF SAN DIEGO	HEALTHCARE/PUBLIC HEALTH
LA MAESTRA FAMILY CLINIC INC	HEALTHCARE/PUBLIC HEALTH
THE A R C OF SAN DIEGO	HEALTHCARE/PUBLIC HEALTH
LINDA VISTA HEALTH CARE CTR	HEALTHCARE/PUBLIC HEALTH
NORTH COAST SURGERY CTR	HEALTHCARE/PUBLIC HEALTH
THE CTR FOR ENDOSCOPY	HEALTHCARE/PUBLIC HEALTH

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NO CTY GASTROENTEROLOGY	HEALTHCARE/PUBLIC HEALTH
PACIFIC SURGERY CENTER	HEALTHCARE/PUBLIC HEALTH
DR TAWFILIS	HEALTHCARE/PUBLIC HEALTH
UCMP LLC	HEALTHCARE/PUBLIC HEALTH
UTC SURGI CENTER	HEALTHCARE/PUBLIC HEALTH
COAST SURGERY CENTER	HEALTHCARE/PUBLIC HEALTH
SOLUTIONS IN RECOVERY	HEALTHCARE/PUBLIC HEALTH
LUIS A CONTRERAS	HEALTHCARE/PUBLIC HEALTH
HERALD CHRISTIAN HEALTH CNTR	HEALTHCARE/PUBLIC HEALTH
CENTRO DE SALUD DE SY	HEALTHCARE/PUBLIC HEALTH
MISSION MEDICAL INVES LLC	HEALTHCARE/PUBLIC HEALTH
NEW RESTORATION MINISTRIES	HEALTHCARE/PUBLIC HEALTH
SAN CLEMENTE MEDICAL BLDG	HEALTHCARE/PUBLIC HEALTH
S C MEDICAL PLAZA	HEALTHCARE/PUBLIC HEALTH
SCHOEMANN PLASTIC SURGERY	HEALTHCARE/PUBLIC HEALTH
THE VINE	HEALTHCARE/PUBLIC HEALTH
MUNISH BATRA MDPC	HEALTHCARE/PUBLIC HEALTH
ALFA SURGERY CENTER LLC	HEALTHCARE/PUBLIC HEALTH
CRESTWOOD BEHAVIORAL HEALTH	HEALTHCARE/PUBLIC HEALTH
PACIFIC ONCOLOGY	HEALTHCARE/PUBLIC HEALTH
CPMS MEDICAL GROUP INC	HEALTHCARE/PUBLIC HEALTH
SD MUSCULOSKELETAL INSTITUTE	HEALTHCARE/PUBLIC HEALTH
EYE SURGERY CTR	HEALTHCARE/PUBLIC HEALTH
BORREGO COMM HLTH FOUNDATION	HEALTHCARE/PUBLIC HEALTH
SURGE CENTER OF SD LLC	HEALTHCARE/PUBLIC HEALTH
CARLSBAD VILLAGE ORTHO	HEALTHCARE/PUBLIC HEALTH
UCSD	HEALTHCARE/PUBLIC HEALTH
OTAY LAKES SURGERY CENTER	HEALTHCARE/PUBLIC HEALTH
DEL RIO MEDICAL & DENTAL PLZ	HEALTHCARE/PUBLIC HEALTH
SO CALIFORNIA LIVER CENTERS	HEALTHCARE/PUBLIC HEALTH
SACRED HEART HLTHCR PROV INC	HEALTHCARE/PUBLIC HEALTH
CALIFORNIA FERTILITY EXPERTS	HEALTHCARE/PUBLIC HEALTH
VISTA COMMUNITY CLINIC	HEALTHCARE/PUBLIC HEALTH
ENCOMPASS FAMILY & INTERNAL	HEALTHCARE/PUBLIC HEALTH
CAL CTR FOR REPRODUCTIVE SCI	HEALTHCARE/PUBLIC HEALTH
EGOSCUE	HEALTHCARE/PUBLIC HEALTH
MISSION VALLEY OPSC LP	HEALTHCARE/PUBLIC HEALTH
NORTH CTY HEALTH SERV	HEALTHCARE/PUBLIC HEALTH
AL NOUR CENTER INC	HOSPICE FACILITIES

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MARGUERITE HOLDINGS LLC	HOSPICE FACILITIES
ANC CORPORATION	HOSPICE FACILITIES
SH & PC-SD LLC	HOSPICE FACILITIES
STONECREST CA HOLDING LLC	HOSPICE FACILITIES
THE ELIZABETH HOSPICE	HOSPICE FACILITIES
ESC CHIROPRACTIC OFFICE	HOSPICE FACILITIES
HOME OF GUIDING HANDS	HOSPICE FACILITIES
UNI CARE HOME HEALTH INC	HOSPICE FACILITIES
UNICARE HOSPICE INC	HOSPICE FACILITIES
TERI INC	HOSPICE FACILITIES
ARDENT HOSPICE& PAL CARE INC	HOSPICE FACILITIES
HOSPICE OF THE COAST INC	HOSPICE FACILITIES
CULTURE OF LIFE FAMILY SVCS	HOSPICE FACILITIES
WESTCOAST HEALTHCARE LLC	HOSPICE FACILITIES
DUNYA ANTWAN	HOSPICE FACILITIES
PHILIP D SZOLD MD INC	HOSPICE FACILITIES
VITAS HEALTHCARE	HOSPICE FACILITIES
PT LOMA CONVALESCENT HSPTL	HOSPITALS
SHARP MEMORIAL HOSPITAL	HOSPITALS
SCRIPPS MERCY HOSP	HOSPITALS
SADDLEBACK MEMORIAL MED CTR	HOSPITALS
VENCOR HOSPITALS OF CALIFORN	HOSPITALS
SHARP CHULA VISTA M C	HOSPITALS
MISSION HOSPITAL	HOSPITALS
VA MEDICAL CTR	HOSPITALS
SCRIPPS MERCY HOSP - CV	HOSPITALS
SCRIPPS MEM - ENCINITAS	HOSPITALS
PALOMAR HEALTH	HOSPITALS
SHARP CORONADO HOSPITAL	HOSPITALS
UCSD MEDICAL CENTER	HOSPITALS
ALVARADO HOSPITAL LLC	HOSPITALS
GROSSMONT HOSPITAL CORP	HOSPITALS
PARADISE VALLEY HOSP	HOSPITALS
KAISER PERMANENTE	HOSPITALS
TRI CITY MEDICAL CTR	HOSPITALS
SCRIPPS MEM HOSP - LJ	HOSPITALS
SCRIPPS-GREEN HOSPITAL	HOSPITALS
RADY CHILDREN'S HOSPITAL-SD	HOSPITALS
SHARP HEALTHCARE	HOSPITALS

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CO OF SAN DIEGO	POLICE STATIONS
LOS COYOTES INDIAN RESVRN	POLICE STATIONS
COUNTY OF ORANGE	POLICE STATIONS
SD UNIFIED PORT DIST	POLICE STATIONS
CITY OF NATIONAL CITY	POLICE STATIONS
CALIF HIGHWAY PATROL	POLICE STATIONS
CITY OF LEMON GROVE	POLICE STATIONS
CITY OF VISTA	POLICE STATIONS
CALTRANS	POLICE STATIONS
SD UNIF SCH DIST	SCHOOLS
GRSMT UN HI SCH DIST	SCHOOLS
LA MESA SPR VLY SCH DIS	SCHOOLS
OCEANSIDE UNIF SCH DIST	SCHOOLS
SOUTH BAY UN SCH DIST	SCHOOLS
SWTR UN HI SCH DIST	SCHOOLS
LAKESIDE UN SCH DIST	SCHOOLS
SAN MARCOS UNIF SCH DIS	SCHOOLS
LEMON GROVE SCH DIST	SCHOOLS
MT EMPIRE UNIF SCH DIST	SCHOOLS
JAMUL-DULZURA SCH DIST	SCHOOLS
VISTA UNIF SCH DIST	SCHOOLS
ALBERT EINSTEIN ACADEMY	SCHOOLS
POWAY UNIF SCHOOL DIST	SCHOOLS
SOUTHWESTERN COMM COLLEGE	SCHOOLS
SO ORANGE CNTY COM COL DIST	SCHOOLS
HELIX CHARTER HIGH SCHOOL	SCHOOLS
HIGH TECH HIGH	SCHOOLS
CHULA VISTA ELEM SCH DIST	SCHOOLS
GOMPERS CHARTER MIDDLE SCH	SCHOOLS
SD CNTY OFC OF EDUCATN	SCHOOLS
POWAY UNIF SCH DIST	SCHOOLS
CAJON VLY UN SCH DIST	SCHOOLS
THERESA HESSLING CHART PROJ	SCHOOLS
CAPISTRANO UNIF SCHOOL DIST	SCHOOLS
ESCONDIDO UN HI SCH DIS	SCHOOLS
ESCONDIDO UN SCH DIST	SCHOOLS
NATIONAL SCHOOL DIST	SCHOOLS
ESCONDIDO CHARTER	SCHOOLS
PALOMAR COMM COLLEGE	SCHOOLS

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KING CHAVEZ PRIM A&A ACADEMY	SCHOOLS
SOLANA BEACH SCH DIST	SCHOOLS
ESCONDIDO CHARTER HIGH SCHL	SCHOOLS
BONSALL UNION SCHOOL DIST	SCHOOLS
ALPINE UNION SCH DIST	SCHOOLS
DEHESA SCHOOL DISTRICT	SCHOOLS
NATIONAL UNIVERSITY	SCHOOLS
RHO STA FE SCHOOL DIST	SCHOOLS
SADLBK VLY UNF SCH DST	SCHOOLS
DARNALL SCHOOL	SCHOOLS
SANTEE SCH DIST	SCHOOLS
HARRIET TUBMAN VLG CHARTER	SCHOOLS
MIRACOSTA COMM COL DIST	SCHOOLS
SAN PASQUAL UN SCHL DIS	SCHOOLS
HERITAGE DIGITAL ACADEMY	SCHOOLS
CARDIFF SCHOOL DIST	SCHOOLS
GRSMT CUY COM COLL DIST	SCHOOLS
ENCINITAS UN SCH DIST	SCHOOLS
VLY CTR PAUMA UNIF SCH DIST	SCHOOLS
SDCCD	SCHOOLS
MCGILL SCHOOL OF SUCCESS	SCHOOLS
SAN DIEGUITO HI SCH DIS	SCHOOLS
RAMONA UNIF SCH DIST	SCHOOLS
SPENCER VALLEY SCHOOL	SCHOOLS
JULIAN UNION SCHOOL DISTRICT	SCHOOLS
JULIAN U HIGH SCH DIST	SCHOOLS
SAN YSIDRO SCH DIST	SCHOOLS
CARLSBAD UNIF SCH DIST	SCHOOLS
BORREGO UNIF SCH DIST	SCHOOLS
WARNER UN SCH DIST	SCHOOLS
SPRINGALL ACADEMY	SCHOOLS
CORONADO UNIF SCH DIST	SCHOOLS
JULIAN CHARTER SCHOOL	SCHOOLS
MISSION SAN ANTONIO	SCHOOLS
VALLECITOS SCHOOL	SCHOOLS
FALLBROOK UN SCH DIST	SCHOOLS
L J COUNTRY DAY SCHOOL	SCHOOLS
DEL MAR UNION SCH DIST	SCHOOLS
FALLBROOK UN HI SCH DIS	SCHOOLS

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SD CNTY OFC OF EDUCATION	SCHOOLS
GUAJOME PARK ACADEMY	SCHOOLS
FRANCIS W PARKER SCHOOL	SCHOOLS
GRSMT COMM COLL DIST	SCHOOLS
MAR VISTA ADULT SCHOOL	SCHOOLS
SDG&E	SDGE CRITICAL
SDG&E/PACIFIC BELL DLP	SDGE CRITICAL
SDGE	SDGE CRITICAL
SDGE LOAD RESEARCH	SDGE CRITICAL
SDGE/ESCO SUB	SDGE CRITICAL
SDG&E 087500000	SDGE CRITICAL
SDG&E 018461260	SDGE CRITICAL
SDGE/SCE	SDGE CRITICAL
SDG&E 018461240	SDGE CRITICAL
SDG&E 018461241	SDGE CRITICAL
SDG&E 058210000	SDGE CRITICAL
SDG&E 018461211	SDGE CRITICAL
SDG&E 392124100	SDGE CRITICAL
SDG&E 085700000	SDGE CRITICAL
SDG&E 018461310	SDGE CRITICAL
SDG&E 088730000	SDGE CRITICAL
SDGE TES	SDGE CRITICAL
SDG&E 536400000	SDGE CRITICAL
SDG&E SAMPSON SUB UNIT2	SDGE CRITICAL
SDG&E 055200000	SDGE CRITICAL
SDG&E 018461220	SDGE CRITICAL
SDG&E 018461100	SDGE CRITICAL
SDG&E 018461221	SDGE CRITICAL
SDG&E 018461230	SDGE CRITICAL
SDG&E 593021300	SDGE CRITICAL
SDG&E 393515400	SDGE CRITICAL
SDG&E 592124100	SDGE CRITICAL
SDG&E 018461330	SDGE CRITICAL
SDG&E 018461311	SDGE CRITICAL
SDG&E 393515100	SDGE CRITICAL
SDG&E 393511100	SDGE CRITICAL
SDG&E 018461210	SDGE CRITICAL
SDG&E 050600000	SDGE CRITICAL
SDG&E CO OF SAN DIEGO DLP	SDGE CRITICAL

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SDG&E MAG TAPE ID101339	SDGE CRITICAL
SDG&E - SDSU DLP	SDGE CRITICAL
SDG&E 018461270	SDGE CRITICAL
SDG&E 018461380	SDGE CRITICAL
SDG&E 085520000	SDGE CRITICAL
SDGE PRP COMP USE	SDGE CRITICAL
SDG&E 056600000	SDGE CRITICAL
SDGE/OTAY MESA MTRSTA	SDGE CRITICAL
SDG&E 056210000	SDGE CRITICAL
SDG&E 018461740	SDGE CRITICAL
SDG&E 018461500	SDGE CRITICAL
SDG&E 018410400	SDGE CRITICAL
SDG&E 058360000	SDGE CRITICAL
SDG&E 058450000	SDGE CRITICAL
SDG&E SCRIPPS SUB BK 31	SDGE CRITICAL
SDG&E 018461780	SDGE CRITICAL
SDGL CAPITAL LLC	SDGE CRITICAL
SDGE IHD 11	SDGE CRITICAL
SDGE/YARD	SDGE CRITICAL
SDG&E 018461732	SDGE CRITICAL
SDG&E Q HR METER	SDGE CRITICAL
SDG&E KW METER	SDGE CRITICAL
SDG&E CYL 20	SDGE CRITICAL
SUNRISE ASSISTED LIVING	SKLLED NURSING/NURSING HM
BAYSIDE HEALTCARE INC	SKLLED NURSING/NURSING HM
OLIVE HOLDINGS LLC	SKLLED NURSING/NURSING HM
ASD6 LLC	SKLLED NURSING/NURSING HM
ANCHOR DOWN OWNER ASSC INC	SKLLED NURSING/NURSING HM
PALOMAR HEIGHTS CARE CTR	SKLLED NURSING/NURSING HM
REO VISTA HEALTH CARE CENTER	SKLLED NURSING/NURSING HM
ANZA HEALTHCARE INC	SKLLED NURSING/NURSING HM
WEST ESCONDIDO HEALTHCARE	SKLLED NURSING/NURSING HM
GOLDEN LIVING INC	SKLLED NURSING/NURSING HM
MONTERA MSL LLC	SKLLED NURSING/NURSING HM
G H C OF NAT CITY 2 LLC	SKLLED NURSING/NURSING HM
GHC OF SANTEE LLC	SKLLED NURSING/NURSING HM
BRIAN STORRS	SKLLED NURSING/NURSING HM
AAA HOME HEALTH INC	SKLLED NURSING/NURSING HM
XIANG SIX LLC	SKLLED NURSING/NURSING HM

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CITY HEIGHTS HEALTH ASSOC	SKLLED NURSING/NURSING HM
COASTAL THERAPY GROUP	SKLLED NURSING/NURSING HM
GHC OF LA MESA LLC	SKLLED NURSING/NURSING HM
GHC OF NATIONAL CITY I LLC	SKLLED NURSING/NURSING HM
EMERITUS SENIOR LIVING	SKLLED NURSING/NURSING HM
MTN SHADOWS SUPPORT GRP	SKLLED NURSING/NURSING HM
ST PAUL HEALTH CARE CTR	SKLLED NURSING/NURSING HM
CASA PACIFICA ADHC	SKLLED NURSING/NURSING HM
GHC OF KEARNY MESA LLC	SKLLED NURSING/NURSING HM
WINDSOR CARE CTR NC INC	SKLLED NURSING/NURSING HM
JEFFERSON HEALTHCARE INC	SKLLED NURSING/NURSING HM
COVENANT CARE CALIFORNIA LLC	SKLLED NURSING/NURSING HM
REDWOOD SNR HOMES & SERVICES	SKLLED NURSING/NURSING HM
INTERIM HEALTH CARE	SKLLED NURSING/NURSING HM
ALZHEIMER'S FAMILY CTR	SKLLED NURSING/NURSING HM
ESCONDIDO MEDICAL INVESTORS	SKLLED NURSING/NURSING HM
ACCENTCARE HOME HEALTH OF CA	SKLLED NURSING/NURSING HM
FRONT PORCH	SKLLED NURSING/NURSING HM
HERITAGE POINTE	SKLLED NURSING/NURSING HM
LIFE HEALTH SERVICES	SKLLED NURSING/NURSING HM
EC OPCO LAS VILLAS DEL CB LP	SKLLED NURSING/NURSING HM
SEVEN OAKS CARE CENTER	SKLLED NURSING/NURSING HM
MISSION TRAILS HEALTH CARE	SKLLED NURSING/NURSING HM
CHARLES W MATHIS	SKLLED NURSING/NURSING HM
ALPINE SPECIAL TREATMENT CTR	SKLLED NURSING/NURSING HM
THE ROYAL HOME	SKLLED NURSING/NURSING HM
REGUS GROUP	SKLLED NURSING/NURSING HM
CLAYDELLE HEALTHCARE INC	SKLLED NURSING/NURSING HM
GABRIEL PERPETUA	SKLLED NURSING/NURSING HM
JACOB HEALTH CARE CTR	SKLLED NURSING/NURSING HM
VISTA POST ACUTE CENTER LLC	SKLLED NURSING/NURSING HM
ENCINITAS HERITAGE PRTNR LLC	SKLLED NURSING/NURSING HM
BRIGHTSTAR LLC	SKLLED NURSING/NURSING HM
CA DEPT OF VETERAN AFFAIRS	SKLLED NURSING/NURSING HM
ITALIAN MAPLE LLC	SKLLED NURSING/NURSING HM
POMERADO OPERATIONS LLC	SKLLED NURSING/NURSING HM
FRIENDSHIP MANOR LKSIDE	SKLLED NURSING/NURSING HM
CASA PALMERA	SKLLED NURSING/NURSING HM
HILLCREST MANOR SANITARIUM	SKLLED NURSING/NURSING HM

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CASA DE LAS CAMPANAS	SKLLED NURSING/NURSING HM
NAUTILUS HEALTHCARE INC	SKLLED NURSING/NURSING HM
VILLA RHO BRDO HEALTH	SKLLED NURSING/NURSING HM
SAMUEL HOROWITZ INC	SKLLED NURSING/NURSING HM
VILLAGE SQ HEALTHCARE CTR	SKLLED NURSING/NURSING HM
PARKWAY OPERATIONS LLC	SKLLED NURSING/NURSING HM
AEGIS ASSISTED LIVING LLC	SKLLED NURSING/NURSING HM
SUN & SEA ASSISTED LIVING	SKLLED NURSING/NURSING HM
GENTIVA	SKLLED NURSING/NURSING HM
VIBRA HOSPITAL OF SAN DIEGO	SKLLED NURSING/NURSING HM
FALLBROOK HEALTHCARE LLC	SKLLED NURSING/NURSING HM
EAST COUNTY TRANSITIONAL	SKLLED NURSING/NURSING HM
SO CAL PRESBYTERIAN HMS	SKLLED NURSING/NURSING HM
CAPISTRANO BEACH CARE CENTER	SKLLED NURSING/NURSING HM
IGLESIA DEL SENOR JESUS	SKLLED NURSING/NURSING HM
WINDSOR CARE CTR OF SD	SKLLED NURSING/NURSING HM
BERNARDO HEIGHTS HEALTH CARE	SKLLED NURSING/NURSING HM
MYRNA F ARCELAO	SKLLED NURSING/NURSING HM
HEBREW HOME	SKLLED NURSING/NURSING HM
FCAW FOUR POINTS LLC	SKLLED NURSING/NURSING HM
BIRCH HOLDINGS LLC	SKLLED NURSING/NURSING HM
SEACREST VILLAGE RB	SKLLED NURSING/NURSING HM
AMERICAN HEALTH SVCS OF SD	SKLLED NURSING/NURSING HM
BALBOA HEALTHCARE INC	SKLLED NURSING/NURSING HM
ABSOLUTE CARE HEALTH SYSTEMS	SKLLED NURSING/NURSING HM
GLENN M BALFOUR MD	SKLLED NURSING/NURSING HM
MAXIM HEALTHCARE SERVICES	SKLLED NURSING/NURSING HM
ASPIRE HOME HEALTH CARE INC	SKLLED NURSING/NURSING HM
CCW LA JOLLA LLC	SKLLED NURSING/NURSING HM
COMMUNITY CONV HOSPITAL	SKLLED NURSING/NURSING HM
FIVE STAR QUALITY CARE	SKLLED NURSING/NURSING HM
EC OPCO GROSSMONT GARDENS LP	SKLLED NURSING/NURSING HM
BAYVIEW O P CHURCH	SKLLED NURSING/NURSING HM
BORREGO COMM HLTH FOUND	SKLLED NURSING/NURSING HM
VISTA KNOLL	SKLLED NURSING/NURSING HM
ARBA GROUP FACILITIES OPERAT	SKLLED NURSING/NURSING HM
GRANITE HILLS H C	SKLLED NURSING/NURSING HM
GHC OF LAKESIDE LLC	SKLLED NURSING/NURSING HM
PORTSIDE HEALTHCARE INC	SKLLED NURSING/NURSING HM

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JEFFREY PINE HLDNGS LLC	SKLLED NURSING/NURSING HM
MODERN HOME HEALTH CARE INC	SKLLED NURSING/NURSING HM
PACIFICA EASTLAKE LLC	SKLLED NURSING/NURSING HM
AETAS HEALTH SERVICES	SKLLED NURSING/NURSING HM
LUMBER CYCLE	SKLLED NURSING/NURSING HM
LINERS CORP	SKLLED NURSING/NURSING HM
LEMON GROVE HEALTH ASSOC LLC	SKLLED NURSING/NURSING HM
PAC REGENT CONDO ASSOC	SKLLED NURSING/NURSING HM
MEADOWBROOK VILLAGE	SKLLED NURSING/NURSING HM
CASA PACIFICA	SKLLED NURSING/NURSING HM
CHURCH OF JESUS CHRIST	SKLLED NURSING/NURSING HM
MOUNT MIGUEL COVNT VLG	SKLLED NURSING/NURSING HM
PARKSIDE HEALTHCARE INC	SKLLED NURSING/NURSING HM
AB HOME CARE	SKLLED NURSING/NURSING HM
AMERICARE ADHC INC	SKLLED NURSING/NURSING HM
BRIGHTON PLACE EAST	SKLLED NURSING/NURSING HM
BRIGHTON PLACE SVC	SKLLED NURSING/NURSING HM
THE MUSIC THERAPY CENTER INC	SKLLED NURSING/NURSING HM
ADVANTAGE HEALTH SYSTEMS	SKLLED NURSING/NURSING HM
SUNLAND HOME FOUNDATION	SKLLED NURSING/NURSING HM
SD CHRISTIAN FOUNDATION	SKLLED NURSING/NURSING HM
SAN DIEGO NEW CHURCH	SKLLED NURSING/NURSING HM
JAMES R EASTERLY	SKLLED NURSING/NURSING HM
VISTA DEL MAR CARE CTR	SKLLED NURSING/NURSING HM
CLAIREMONT HEALTHCARE CENTRE	SKLLED NURSING/NURSING HM
EIAD H HADDAD	SKLLED NURSING/NURSING HM
LOVING CARE LLC	SKLLED NURSING/NURSING HM
ELM HOLDINGS LLC	SKLLED NURSING/NURSING HM
YVONNE V LUNA	SKLLED NURSING/NURSING HM
POPLAR HOLDINGS LLC	SKLLED NURSING/NURSING HM
PEPPERBUSH HOLDINGS LLC	SKLLED NURSING/NURSING HM
VOLUNTEERS OF AMERICA	SKLLED NURSING/NURSING HM
KINGDOM HALL	SKLLED NURSING/NURSING HM
THE POOR SISTERS OF NAZ	SKLLED NURSING/NURSING HM
EL DORADO CARE CENTER	SKLLED NURSING/NURSING HM
PREGNANCY CARE CENTER	SKLLED NURSING/NURSING HM
CRESCENT HEALTH CARE	SKLLED NURSING/NURSING HM
MISSION HOME HEALTH INC	SKLLED NURSING/NURSING HM
KOA HOLDINGS LLC	SKLLED NURSING/NURSING HM

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CONTINUING LIFE COMM LLC	SKLLED NURSING/NURSING HM
KATHLEEN PLEASANTS	SKLLED NURSING/NURSING HM
SAN DIEGO HOME HEALTH CARE	SKLLED NURSING/NURSING HM
ANGELICUM HOME HEALTH INC	SKLLED NURSING/NURSING HM
PALA BAND OF MISSION INDIANS	TRIBE
MESA GRANDE INDIAN HOUSING	TRIBE
LA JOLLA BAND OF INDIANS	TRIBE
SYCUAN BAND OF KUMEYAAY	TRIBE
MANZANITA BAND MSN INDIANS	TRIBE
BARONA TRIBAL WATER	TRIBE
BARONA TRIBAL GAMING AUTH	TRIBE
CAMPO INDIAN RESERVATN	TRIBE
CAMPO BAND MSN INDIANS	TRIBE
CAMPO MATERIALS	TRIBE
SYCUAN BAND KUMEYAAY INDIANS	TRIBE
SYCUAN CHURCH	TRIBE
SYCUAN HEALTH CENTER	TRIBE
SYCUAN	TRIBE
SYCUAN DAYCARE	TRIBE
MESA GRANDE BAND MSN INDIANS	TRIBE
HARRAHS RINCON CASINO & RSRT	TRIBE
BARONA CHURCH	TRIBE
BARONA BAND MSN INDIANS	TRIBE
BARONA COMMUNITY CTR	TRIBE
BARONA TRIBAL COUNCIL	TRIBE
VALLEY VIEW CASINO	TRIBE
LA POSTA BAND OF MSN INDIANS	TRIBE
LOS COYOTES GREENHOUSE	TRIBE
MANZANITA INDIAN RES	TRIBE
MANZANITA ACTIVITY CTR	TRIBE
KUMEYAAY WIND LLC	TRIBE
SYCUAN TRIBAL DEVELOPMENT CO	TRIBE
RINCON INDIAN RESERVATION	TRIBE
SAN PASQ BAND OF DIEGUENO MI	TRIBE
PAUMA TRIBAL HALL	TRIBE
PAUMA TRIBE	TRIBE
PALA ENTERTAINMENT CENTER	TRIBE
RINCON GAMING ENTERPRISE	TRIBE
CAMPO BAND OF MSN INDIANS	TRIBE

Appendix C

A listing of entities that SDG&E considers to be priority essential services is provided in Appendix C. This list is current as of February 2020 and given the dynamic nature of some categories, is subject to change.

Priority Essential Services SDG&E Customer List

CASINO PAUMA	TRIBE
LS POWER ASSOCIATES LP	UTILITIES
OTAY MESA ENERGY CENTER LLC	UTILITIES
SOUTHERN CALIFORNIA EDISON	UTILITIES
ORANGE GROVE ENERGY LP	UTILITIES
CARLSBAD ENERGY CENTER LLC	UTILITIES
ESC ENERGY CENTER LLC	UTILITIES
CALPEAK POWER LLC	UTILITIES
CV ENERGY CENTER LLC	UTILITIES
CITY OF CARLSBAD	WATER & WASTEWATER SYSTMS
VLY CENTER MUN WTR DIST	WATER & WASTEWATER SYSTMS
PADRE DAM MUN WTR DIST	WATER & WASTEWATER SYSTMS
CITY OF S J CAPISTRANO	WATER & WASTEWATER SYSTMS
CITY OF DANA POINT	WATER & WASTEWATER SYSTMS
GOLDEN ACORN CASINO	WATER & WASTEWATER SYSTMS
STA MARGARITA WTR DIST	WATER & WASTEWATER SYSTMS
MOULTON NIGUEL WTR DIST	WATER & WASTEWATER SYSTMS
OTAY WATER DISTRICT	WATER & WASTEWATER SYSTMS
HELIX WATER DISTRICT	WATER & WASTEWATER SYSTMS
CAL DEPT OF FISH & GAME	WATER & WASTEWATER SYSTMS
SDCWA	WATER & WASTEWATER SYSTMS
OLIVENHAIN MUN WTR DIST	WATER & WASTEWATER SYSTMS
RAMONA MUN WTR DIST	WATER & WASTEWATER SYSTMS
RINCON DEL DIABLO MWD	WATER & WASTEWATER SYSTMS
CITY OF ESCONDIDO	WATER & WASTEWATER SYSTMS
JACUMBA COMM SERV DIST	WATER & WASTEWATER SYSTMS
LAKESIDE IRRIG DIST	WATER & WASTEWATER SYSTMS
ZOOLOGICAL SOCIETY SAN DIEGO	WATER & WASTEWATER SYSTMS
POSEIDON RSRCS (CHANNELSIDE)	WATER & WASTEWATER SYSTMS
CITY OF MISSION VIEJO	WATER & WASTEWATER SYSTMS
WEST CUCA MUTUAL WATER CO	WATER & WASTEWATER SYSTMS
LEUCADIA CNTY WATER DIST	WATER & WASTEWATER SYSTMS
VALLECITOS WTR DIST	WATER & WASTEWATER SYSTMS
LAKESIDE WATER DISTRICT	WATER & WASTEWATER SYSTMS
SAN ELIJO JNT PWR AUTH	WATER & WASTEWATER SYSTMS
P V MUTUAL WATER CO	WATER & WASTEWATER SYSTMS
SWEETWATER AUTHORITY	WATER & WASTEWATER SYSTMS
SAN DIEGUITO WATER DIST	WATER & WASTEWATER SYSTMS
RANCHO SANTA TERESA WATER	WATER & WASTEWATER SYSTMS

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HARRISON PARK MUTUAL WATER	WATER & WASTEWATER SYSTMS
BOY SCOUTS - SDIC	WATER & WASTEWATER SYSTMS
BORREGO WATER DISTRICT	WATER & WASTEWATER SYSTMS
RANCHO PAUMA MUTUAL WATER CO	WATER & WASTEWATER SYSTMS
SO COAST WATER DISTRICT	WATER & WASTEWATER SYSTMS
STATE OF CA/PARKS & REC	WATER & WASTEWATER SYSTMS
LOS TULES MUT WATER CO	WATER & WASTEWATER SYSTMS
VISTA IRRIGATION DIST	WATER & WASTEWATER SYSTMS
SUMMIT EST MUTUAL WATER	WATER & WASTEWATER SYSTMS
PALOMAR MTN MUN WTR DST	WATER & WASTEWATER SYSTMS
DESCANSO COMM WATR DIST	WATER & WASTEWATER SYSTMS
YUIMA MUN WATER DIST	WATER & WASTEWATER SYSTMS
RANCHO PAUMA MNT WTR CO	WATER & WASTEWATER SYSTMS
RANCHO PAUMA MUT WTR CO	WATER & WASTEWATER SYSTMS
PAUMA VALLEY COMMUNITY	WATER & WASTEWATER SYSTMS
BORDEN RANCHES	WATER & WASTEWATER SYSTMS
LAZY H WATER COMPANY	WATER & WASTEWATER SYSTMS
PAUMA VLY WATER CO	WATER & WASTEWATER SYSTMS
FPUD - SANITARY	WATER & WASTEWATER SYSTMS
SERJ MUTUAL WATER COMPANY	WATER & WASTEWATER SYSTMS
RHO PAUMA MUTUAL WATER CO	WATER & WASTEWATER SYSTMS
RAINBOW MUN WTR DIST	WATER & WASTEWATER SYSTMS
MESA GRANDE B O M I FIRE DPT	WATER & WASTEWATER SYSTMS
CITY OF IMPERIAL BEACH	WATER & WASTEWATER SYSTMS
BARONA TRIBAL OFC	WATER & WASTEWATER SYSTMS
CITY OF SAN CLEMENTE	WATER & WASTEWATER SYSTMS
QUEST HAVEN MUN WTR	WATER & WASTEWATER SYSTMS
CPUC	Public Safety Partner
CALFIRE	Public Safety Partner
SD County OES	Public Safety Partner
SD County Sheriff	Critical First Responder
SD Sheriff Dispatch	Critical First Responder
North Comm Dispatch	Critical First Responder
Heartland Fire Dispatch	Critical First Responder
San Diego Fire Dispatch	Critical First Responder
Monte Vista Fire Dispatch	Critical First Responder
City of Carlsbad	Critical First Responder
City of Carlsbad	Critical First Responder
City of Chula Vista	Critical First Responder

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Priority Essential Services SDG&E Customer List

City of Chula Vista	Critical First Responder
City of Coronado	Critical First Responder
City of Coronado	Critical First Responder
City of El Cajon	Critical First Responder
City of El Cajon	Critical First Responder
City of La Mesa	Critical First Responder
City of La Mesa	Critical First Responder
City of Lemon Grove	Critical First Responder
City of Lemon Grove	Critical First Responder
City of Encinitas	Critical First Responder
City of Encinitas	Critical First Responder
City of Del Mar	Critical First Responder
City of Solana Beach	Critical First Responder
City of Escondido	Critical First Responder
City of Imperial Beach	Critical First Responder
City of Imperial Beach	Critical First Responder
City of National City	Critical First Responder
City of Oceanside	Critical First Responder
City of Poway	Critical First Responder
City of Poway	Critical First Responder
City of San Diego	Critical First Responder
City of San Marcos	Critical First Responder
City of San Marcos	Critical First Responder
City of Santee	Critical First Responder
City of Santee	Critical First Responder
City of Vista	Critical First Responder
City of Vista	Critical First Responder
City of Aliso Viejo	Critical First Responder
City of Aliso Viejo	Critical First Responder
City of Dana Point	Critical First Responder
City of Dana Point	Critical First Responder
City of Laguna Beach	Critical First Responder
City of Laguna Hills	Critical First Responder
City of Laguna Niguel	Critical First Responder
City of Mission Viejo	Critical First Responder
City of Rancho Santa Margarita	Critical First Responder
City of San Clemente	Critical First Responder
City of San Juan Capistrano	Critical First Responder
Orange County OES	Public Safety Partner

Appendix C
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Priority Essential Services SDG&E Customer List

Orange County Fire Authority	Critical First Responder

TABLE 13: Current Baseline State of Service Territory and Utility Equipment						
Land use	Characteristic tracked	In non- HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3	Comments
Service Territory	Circuit miles	11203		4047	2067	Tracking is not completed by rural/highly rural
	Circuit miles in WUI	6542		0	0	
	Number of critical facilities	8717		1268	515	
	Number of critical facilities in WUI	4409		0	0	
	Number of customers	1,287,181		172896	31181	Number of Meters
	Number of customers in WUI	619,466		0	0	
	Number of customers belonging to access and functional needs populations	47,263		1939	7771	
	Number of customers belonging to access and functional needs populations in WUI	27,079		0	0	
	Circuit miles of overhead transmission lines	1308		794	308	
	Circuit miles of overhead transmission lines in WUI	470		0	0	
	Circuit miles of overhead distribution lines	3002		1828	1658	
	Circuit miles of overhead distribution lines in WUI	1308		0	0	
	Number of substations	155		42	13	
	Number of substations in WUI	64		0	0	
In rural areas	Circuit miles					
	Circuit miles in WUI					
	Number of critical facilities					
	Number of critical facilities in WUI					
	Number of customers					
	Number of customers in WUI					
	Number of customers belonging to access and functional needs populations					
	Number of customers belonging to access and functional needs populations in WUI					
	Circuit miles of overhead transmission lines					
	Circuit miles of overhead transmission lines in WUI					
	Circuit miles of overhead distribution lines					
	Circuit miles of overhead distribution lines in WUI					
	Number of substations					

TABLE 13: Current Baseline State of Service Territory and Utility Equipment						
Land use	Characteristic tracked	In non- HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3	Comments
In highly rural areas	Circuit miles					
	Circuit miles in WUI					
	Number of critical facilities					
	Number of critical facilities in WUI					
	Number of customers					
	Number of customers in WUI					
	Number of customers belonging to access and functional needs populations					
	Number of customers belonging to access and functional needs populations in WUI					
	Circuit miles of overhead transmission lines					
	Circuit miles of overhead transmission lines in WUI					
	Circuit miles of overhead distribution lines					
	Circuit miles of overhead distribution lines in WUI					
	Number of substations					
	Number of substations in WUI					

TABLE 14: Summary Data on Weather Station Count			
Weather station count type	Current Count	Unit(s)	Comments
Number of weather stations (total)	191	Total number located in service territory and operated by utility	
Number of weather stations (normalized)	0.023	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory	Used OH circuit miles - T&D 8336 miles
Number of weather stations in non- HFTD (total)	25	Total number located in non-HFTD service territory and operated by utility	
Number of weather stations in non-HFTD (normalized)	0.007	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory	Used OH circuit miles - T&D 3834 miles
Number of weather stations in HFTD Zone 1 (total)		Total number located in HFTD Zone 1 service territory and operated by utility	
Number of weather stations in HFTD Zone 1 (normalized)		Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory	
Number of weather stations in HFTD Tier 2 (total)	64	Total number located in HFTD Tier 2 service territory and operated by utility	
Number of weather stations in HFTD Tier 2 (normalized)	0.025	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory	Used OH circuit miles - T&D - 2550 miles
Number of weather stations in HFTD Tier 3 (total)	102	Total number located in HFTD Tier 3 service territory and operated by utility	
Number of weather stations in HFTD Tier 3 (normalized)	0.052	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory	Used OH circuit miles - T&D - 1952 miles

ATTACHMENT 4

SCE's 2020 Wildfire Mitigation Plan, February 7, 2020, Appendix A, Tables 13 and 14

SOUTHERN CALIFORNIA EDISON®

An *EDISON INTERNATIONAL*® Company

(U 338-E)

Southern California Edison

2020-2022 Wildfire Mitigation Plan

Rosemead CA
February 7, 2020

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Executive Summary

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EXECUTIVE SUMMARY

Southern California Edison (SCE)[1] is dedicated to the safety of the communities we serve. In this filing, we set forth our second comprehensive Wildfire Mitigation Plan (WMP) covering the years 2020 through 2022. This WMP builds on SCE's 2019 WMP, its successes, and lessons learned.

As in SCE's 2019 WMP, the 2020-2022 plan includes infrastructure hardening, vegetation management, detailed inspections and remediations, and situational awareness. SCE's WMP also emphasizes Public Safety Power Shutoff (PSPS) resilience and community engagement, particularly for under-represented groups and our access and functional needs (AFN) customers.

The 2020-2022 plan increases the use of data, advanced risk analytics and innovative technologies to help the company prioritize the activities with the greatest potential to mitigate wildfire risks and improve public safety. While SCE has considerably matured in our wildfire mitigation capabilities, we will continue to look for opportunities to improve.

We want to thank California's leadership — lawmakers and various agency personnel — for addressing this critically important public safety issue. SCE is proud of our partnership with local governments, first responders and the general public, in reducing the risk of potentially devastating wildfires.

SCE'S FOUNDATIONAL STRATEGY FOR WILDFIRE MITIGATION REMAINS SOUND

The primary objective of SCE's WMP is to protect public safety, and includes an actionable, measurable, and adaptive plan for 2020 through 2022 to reduce the risk of potential wildfire-causing ignitions associated with SCE's electrical infrastructure in High Fire Risk Areas (HFRA) through enhanced system hardening, situational awareness, and operational practices.

Additional key objectives include reducing the customer impact of PSPS; implementing measures that increase resiliency and safeguard SCE's electric system against wildfires irrespective of ignition source; improving fire agencies' ability to detect and respond to emerging fires; improving coordination between utility, state, and local emergency management personnel; reducing the impact of wildfires and wildfire mitigation efforts on the public; and effectively engaging the public about how to prepare for, prevent, and mitigate wildfires in SCE's HFRA.

[1] *See* Appendix A for a list of acronyms.

The 2020-2022 WMP represents a natural extension and refinement of the 2019 WMP. SCE's analysis of 2019 ignitions within our service area reaffirmed the foundational strategy that SCE developed in our Grid Safety and Resiliency Program (GSRP) Application (A.18-09-002) in 2018, as noted in our Assembly Bill (AB) 1054 Advice Letter filing to the California Public Utilities Commission (CPUC or Commission) on January 31, 2020.

SCE's 2020-2022 WMP includes 69 specific activities, a net increase of 11 since our 2019 WMP, targeting further improvements in several areas. SCE has put forward a comprehensive and detailed WMP and we are committing and reallocating significant resources to further reduce the risk of wildfires. Each of these activities in our plan plays a critical role in our wildfire mitigation portfolio and they are designed to work hand-in-hand to mitigate wildfire risks and improve community resilience. Highlights include:

- Infrastructure Hardening: Covered conductor deployment represents the bulk of SCE's infrastructure-hardening effort. We are planning to deploy at least 700 circuit miles of covered conductor in 2020, a ramp-up from 151 circuit miles achieved in 2018 and 372 circuit miles achieved in 2019 (original target in 2019 was 96 circuit miles). We have an aggressive plan to deploy up to 4,500 circuit miles of covered conductor by the end of 2022. We continue to target deployment in the highest-risk areas based on continual improvements to our risk-informed analyses, and will also consider areas where covered conductor can mitigate the need for PSPS events in the near-term. We are including selective undergrounding in areas that meet specific criteria (e.g., PSPS-impacted circuits and areas with limited egress routes), and installation is expected to commence in 2021 after completing design, engineering, and permitting requirements. The 2020-2022 WMP will also continue efforts on resiliency hardening with application of fire-resistant wrap to protect existing wood poles, installation of additional composite poles, and further expansion of fusing and sectionalization.

- Vegetation Management: Vegetation management programs will largely continue our 2019 efforts. We will expand brush clearing around poles to reduce fire spread risk, target overhangs, and continue tree removals under the Hazard Tree Management Program (HTMP) to mitigate risk of ignition from vegetation and trees that could fall into our lines. We will also continue our work on increasing and maintaining clearance distances to prevent tree-line contact.

- Inspections and Remediation: In 2019, we inspected 100% of the overhead assets in our HFRA. In the 2020-2022 WMP, our objective is to prioritize the re-inspection of structures that represent the highest risk based on the probability of ignition and consequence. These structures will be inspected annually, going beyond the current regulatory requirement of five-year inspection cycles for distribution assets and three-year inspection cycles for transmission assets until other mitigation measures are in place to warrant further adjustments. We will utilize both

ground and aerial inspections for such transmission and distribution assets to obtain 360-degree views of our structures and equipment. For remediations, SCE today follows pre-established regulatory compliance timelines based on inspection results. A more impactful and effective approach would be to use a more granular risk-informed prioritization method, which SCE has proposed in this WMP. The current regulatory construct does not accommodate this level of discretion, but we strongly believe that this shift will provide SCE the flexibility needed to appropriately allocate resources to activities that have higher wildfire risk reduction potential. We will work with the CPUC and Wildfire Safety Division (WSD) on this proposal for the ability to make these risk-informed trade-offs.

- Situational Awareness: The deployment of high-definition (HD) cameras is considered complete. The 161 HD cameras installed to date provide visual coverage of more than 90% of our HFRA, reaching a practical saturation point given the terrain and topography in these areas. SCE has also completed installing 482 weather stations. Weather stations have proven critical for weather modeling and forecasting, particularly to inform our PSPS program and allow more targeted de-energizations. We will expand the program and install additional weather stations, to reach an average of two weather stations per circuit in our HFRA by 2024, at a pace of 375 weather stations annually.

- PSPS: We recognize and appreciate the impact of PSPS events on our customers, and we do not take lightly any decision to proactively de-energize portions of the grid. Though the frequency and scope of PSPS events are expected to lessen as we deploy more of our WMP activities, PSPS will have to remain available as a tool to mitigate wildfire risk during severe weather and high Fire Potential Index (FPI) events.

SCE's sectionalization capability to isolate circuit segments, and our reliance on real-time weather data and field conditions prior to activating PSPS events have helped us reduce the number of customers impacted by PSPS in our service area. For example, during the statewide October 2019 PSPS events, SCE was able to limit the cumulative impact to approximately 2% of our customers. Though a longer or more intense fire season could potentially increase PSPS frequency, scale, and duration, we are rapidly developing circuit-specific plans to reduce the impacts we observed in 2019. We are expanding this planning to circuits that may be subject to PSPS based on historical weather scenarios. For each circuit, we apply a multipronged approach that includes:

1. consideration of system hardening and more granular situational awareness that will potentially reduce the frequency of PSPS events (for example, targeted covered conductor installations may allow for a risk-informed increase in wind thresholds on heavily impacted circuits);
2. using existing isolation equipment and/or installing additional sectionalization equipment to reduce the scope of PSPS events (number of customers de-energized); and

3. providing solutions to reduce the impact of PSPS events on our customers, such as additional Community Resource Centers (CRCs) and assistance with backup generation. We are also actively pursuing microgrid opportunities where they are technologically and economically feasible. Moreover, we have increased community outreach, communications, and education.

SCE continues to reassess its performance as it gains new and additional information about factors affecting the nature of wildfire and related risks. This WMP will not be static and will be adjusted and improved as necessary and appropriate. Any modification will be communicated transparently through AB 1054 quarterly filings, annual updates, and any WMP Off-Ramp Reports.

More than a Sequel: SCE is Advancing New Technologies and Data Analytics Capabilities

Data capture, data analysis, technology, and automation are increasingly part of SCE's wildfire mitigation planning and implementation, as well as our broader operations. New wildfire initiatives launched in 2018 and 2019 captured additional data that has been used to improve analyses at more granular levels and inform our WMP.

SCE also launched new tools, machine learning capabilities, and new technology — some have reached operational maturity while others present promising opportunities. In 2019, Light Detection and Ranging technology (LiDAR) proved to be a useful tool for vegetation inspections and has since become a standard component of the vegetation management toolset. We also completed a pilot to evaluate fire-retardant wraps around poles and are currently implementing this initiative.

Going forward, SCE is evaluating several technology solutions for early or advance detection of fault conditions. Distribution Fault Anticipation (DFA) technology evaluation has produced encouraging results for advance detection of incipient fault conditions and hard-to-detect system anomalies. An Open Phase Detection (OPD) Pilot has been initiated and could yield a potential solution to reliably and efficiently sense open phase conditions and de-energize a line prior to a severed conductor hitting the ground. SCE is also evaluating Early Fault Detection (EFD) technology that uses radio frequency emitted from equipment to not only detect, but also pin-point locations of emerging issues.

SCE is commissioning a new state-of-the-art technology using a HD/Radiometric Helicopter-Mounted Imager — an infrared technology — for real-time or post-flight inspections. The technology picks up heat signatures that indicate damaged equipment. In addition, SCE is investing in machine learning and artificial intelligence capabilities for inspections to

automatically identify and flag equipment deviations and anomalies to qualified personnel based on visual imagery.

To further inform PSPS activations, SCE has expanded and improved its FPI by incorporating weather forecasts and fuel loading to account for the large and diverse geographic area of our service area. The FPI is used in conjunction with wind thresholds to identify areas that are likely to have significant fire activity that could threaten communities and SCE infrastructure. SCE will refine its FPI models by including historical weather and vegetation data, fuel types, and a precipitation decay function to account for different fuel scenario and seasonality effects.

RISK ANALYSIS GUIDES SCE'S PLANNING AND PRIORITIZATION

Another significant advancement has been moving beyond enterprise-level risk models to asset-level risk models. By targeting specific assets and locations with higher risk profiles, we can more effectively allocate constrained labor resources to reduce risk beyond what is expected from system level averages. We are also incorporating risk analysis in our approach to PSPS events and resilience.

In 2018, SCE utilized its enterprise-level risk model to determine the large-scale programs that we need to undertake across our service area. For example, based partly on system-level risk spend efficiency (RSE) estimates, we determined that in general, the Wildfire Covered Conductor Program (WCCP) would reduce wildfire risks at a lower cost compared to other measures such as undergrounding, and that shifting resources to WCCP from traditional infrastructure replacement programs in the near term was warranted.

Deployed in 2019, the asset-level Wildfire Risk Model (WRM) estimates probability and consequence of ignitions using advanced analytics. The WRM's probability module uses machine learning capability to estimate the probability of an ignition from inherent equipment failure, current asset characteristics, or contact from a foreign object. The WRM's consequence module uses a fire propagation model that incorporates weather and fuel conditions along with other factors such as topography and housing and population density. The resulting ignition risk scores for each asset or circuit-segment location are used to target WCCP deployment, prioritize remediation of inspection findings, and guide our vegetation clearing activities.

In 2020, we are transitioning to risk modeling that integrates wildfire ignition probability and fire spread prediction calculations, incorporates more granular weather forecasts along with detailed vegetation, population and structure data, and accommodates dynamic updates. Over the 2020-2022 WMP period, we expect to expand wildfire mitigation prioritization to equipment, structures, and vegetation inspections along with weather station installations.

SCE's 2020-2022 WMP includes RSEs for our proposed wildfire mitigation activities calculated using our enterprise-level risk model. SCE notes that while an RSE is a valuable contributing metric to inform the development of the overall WMP, it is important to recognize that RSEs are not, and should not, be the only factors used to develop a risk mitigation plan. The RSE metric does not take into account certain operational realities, including planning and execution lead times, resource constraints, work management efficiencies, an activity's total risk reduction potential on targeted areas of the system, and regulatory compliance requirements. SCE considers these additional factors while determining the type and volume of work undertaken to reduce wildfire risks in a timely manner, while managing customer impact of mitigation measures.

Our risk analysis mindset extends beyond ignition and fire consequence risk associated with electric infrastructure. For example, in undertaking PSPS resilience, we are prioritizing circuits and circuit-segments based on risk analysis that accounts for frequency of PSPS events, total number of customers, types of customer (for example, critical care, medical baseline, low income), critical facilities, and sectionalizing ability, among other things.

SCE Supports A Capability Maturity Model with Modifications

SCE has made great strides in developing our wildfire mitigation capabilities, going beyond minimum regulatory requirements in several key areas, increasingly relying on data and advanced analytics to plan and prioritize resource allocation for wildfire risk mitigation, and establishing robust operational processes for planning, preparedness and customer/stakeholder engagement.

The requirements outlined in the Dec. 16, 2019 Administrative Law Judge's Ruling on WMP Templates and Related Material and Allowing Comment (ALJ Ruling)[2] included a survey comprised of nearly 250 questions, spanning 52 capabilities grouped into 10 categories as part of the first Wildfire Mitigation Capability Maturity Model. SCE supports the development and utilization of a wildfire mitigation capability maturity model to "help to identify and share best practices amongst the utilities and to establish a continually improving suite of best practices and lessons learned to combat the growing risk of utility-caused wildfires."[3]

Our responses to these questions for 2020 maturity reflect the enhancements we made in 2019. We recognize that there are always opportunities to improve and we will continue to focus on those opportunities. SCE's assessment of our expected 2023 capability maturity assumes full deployment of the proposed 2020-2022 WMP. SCE anticipates improvements in our capabilities

[2] Order Instituting Rulemaking (R.)18-10-007.

[3] ALJ Ruling, Attachment 3 (Utility Wildfire Mitigation Maturity Model), p. 2.

in several areas such as risk mapping, grid design, system hardening, and resource allocation with incorporation of the dynamic asset level risk modeling capability.

In some areas, we do not show a change in a survey score between 2020 and 2022. This is partly a function of a 2020 measurement baseline that already includes recent capability improvements achieved by SCE. For example, we have made considerable progress in inspections and maintenance, vegetation management, emergency planning and preparedness, and stakeholder cooperation and community engagement capabilities. Though we continually look for ways to refine and improve, we will be prioritizing other areas for increased maturity. Moreover, in some capability dimensions, the mechanics of the scoring system require relatively large steps, and longer timelines are needed to improve along the current maturity model scales.

In addition, we do not believe some of the higher levels of capabilities provided in the maturity model survey should be the highest priority for advancing wildfire safety. For example, there is limited value in increasing the frequency of weather data update from every 10 minutes to at least every minute. As another example, SCE manually patrols de-energized lines after PSPS events before deciding to re-energize. This systematically helps ensure the greatest degree of public safety and, therefore, should not be automated for the foreseeable future.

It is unclear at this point how the survey results will be aggregated to determine overall maturity for any utility and in turn, how these scores will inform improvements to future WMPs. SCE agrees however, that "the maturity assessment is not designed to assess performance or regulatory compliance, which should be conducted separately."[4]

We understand and appreciate that the maturity model was developed under a compressed time constraint for the purpose of including in the ALJ Ruling to evaluate utilities' wildfire mitigation capabilities. The inaugural process with shortened timelines did not allow for incorporation of participant comments or the benefit of receiving detailed clarifications from the WSD. This posed significant challenges as many questions in the survey are either subject to interpretation or did not align with how SCE approaches wildfire mitigation specifically, and grid design and operations broadly. Regardless, SCE has put in significant effort to accurately respond to the maturity model survey and is providing an accompanying document with comments about our interpretation and the basis of our response to each question.

SCE looks forward to a public process working with the WSD to modify and refine this survey and the scoring mechanism for subsequent cycles to better align with a shared understanding of the necessary evolution of wildfire mitigation capabilities in California. Greater clarity about the

[4] ALJ Ruling, Attachment 3 (Utility Wildfire Mitigation Maturity Model), p. 2.

survey purpose and application over time will be essential as SCE continues to look for ways to improve its own wildfire mitigation and PSPS resilience capabilities.

It is also critically important to note that the maturity model assumes moving beyond minimum regulatory requirements. An assessment of the current regulatory structure and processes for scope and funding approval of risk mitigation activities to achieve higher levels of maturity is necessary as well.

SCE Drives Improvements Through Appropriate Use of Metrics

Metrics and underlying data are critical components to evaluate the effectiveness and compliance of the WMP programs. The ALJ Ruling defines three sets of metrics: Progress Metrics, Outcome Metrics, and Program Targets, and requires utilities to report performance on specific metrics over the past five years. SCE strongly supports collecting, monitoring, and analyzing metrics information. The emphasis should be on short- and long-term metrics that are relevant to the key objectives of wildfire risk mitigation, and there should be a clear distinction between metrics that can help inform future wildfire mitigation plans, and metrics that can help monitor progress per approved WMPs.

In its 2019 WMP, SCE established activity and metric goals to evaluate compliance and the efficacy of its WMP. As SCE has stated in previous filings and submittals, tracking Program Targets for approved WMPs are the best means of determining progress, and these are the only metrics that can help assess WMP compliance in the near-term. Progress and Outcome metrics, on the other hand, should help inform the effectiveness of wildfire mitigation activities and identify improvements and changes necessary, but should not be used to measure progress per approved plans. Prudent grid operations, maintenance, and upgrades will not eliminate risk entirely; but over time and cumulatively, will result in an overall reduction of Progress and Outcome Metrics, such as fire ignition events associated with SCE's electrical infrastructure.

SCE Worked Diligently To Respond To The New WMP Guidelines

The ALJ Ruling resulted in sweeping new WMP Guidelines (Guidelines) spanning operational, business, and system processes. The Guidelines require significant amounts of data and new information that were not part of the 2019 WMP process.

SCE's objective is to fulfill all the requirements if the data and information can be obtained, and to provide notice of availability in iterations once the remaining data is able to be gathered. The timeline of less than eight weeks and the breadth and depth of requested information necessitated this approach. In our filing, SCE has clearly indicated the data provided, any data we are unable to provide at this time and when that data is expected to be available. In addition, some of the requested Geographic Information System (GIS) data is sensitive and will be submitted as confidential to the WSD. In some instances, where SCE does not typically collect

and compile data consistent with the new requirements or specified formats, we have provided relevant information related to the requirement and clearly identified any deviation.

The data SCE provided to meet the compressed schedule of the ALJ Ruling should be considered preliminary. If there are any changes based on further review, SCE will promptly notify the Commission of these changes.

SCE notes that our recorded and forecast capital expenditures and Operations and Maintenance (O&M) expenses included in its 2020-2022 WMP are different from the capital expenditures and O&M expenses set forth in direct testimony supporting its 2021 General Rate Case (GRC) and the 2019 WMP. They reflect the latest available information on SCE's historical costs, updated forecasts since previous filings, and updated or new wildfire mitigations activities based on lessons learned after the GRC was filed (e.g., October PSPS events).[5]

CONCLUSION

SCE looks forward to working with the Commission to better understand and help refine the requirements for future WMP and WMP-related filings so as to focus our collective efforts on data and analyses that improve the effectiveness of wildfire risk mitigation, reduce the impact of wildfires and PSPS events on customers, and support a transparent and practical process for WMP approvals and evaluation.

Last year, we made significant progress through implementation of our aggressive 2019 WMP, including hardening of the grid, increasing inspections and repairs, improving our ability to monitor our system and the weather, trimming and removing hazardous trees, expanding public engagement and communication, and utilizing big data to improve the automated sensing of our system and equipment.

SCE's 2020-2022 WMP builds on the success of our 2019 efforts and expands current programs, including the application and exploration of a variety of innovative, new technologies. We are committed to preventing devastating wildfires and protecting the safety of our customers and communities.

[5] *See* Section 5.1.14 for a comparison of our 2021 GRC and 2020-2022 WMP forecast costs for years 2020-2022.

Chapter 1

Persons Responsible for Executing the WMP

CONTENTS

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1 PERSONS RESPONSIBLE FOR EXECUTING THE WMP

Provide an accounting of the responsibilities of the responsible person(s) executing the plan, including:
1. Executive level with overall responsibility
2. Program owners specific to each component of the plan
Ensure that the plan components described in (2) include an accounting for each of the WMP sections and subsections [1]

Due to the broad nature of the work being outlined in this WMP, multiple Organizational Units within SCE are responsible for executing some of the specific wildfire activities. The accountable areas include Transmission & Distribution (T&D), Customer Service, Safety, Security, & Business Resiliency, and Generation. Overarching execution and oversight of this WMP will be overseen by the Grid Resiliency & Public Safety Program Management Office (PMO) under the direction of Phil Herrington, Senior Vice President of the T&D Organizational Unit.

The program owners of the components of SCE's wildfire mitigation strategies and programs are outlined below by the WMP initiatives and subsections in Section 5.3. SCE's wildfire mitigation programs are described in detail in Section 5.3, so these sections are the key focal areas that, for example, the data and descriptions included in Chapters 2 through 4 support. Certain subsections in Section 5.3 do not have specific wildfire activities but also have important supporting roles and are included in Table SCE 1-1.[2] below and reference multiple organizational units due to the cross-functional nature of several of those sections.

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[1] At the beginning of most chapters and in various sections of this WMP, SCE has included the Guidelines instructions given that they are expansive and duplicative in certain areas. Not all Guidelines instructions are included as some, such as those in Chapter 3, only instruct on how to fill out the tables without requiring additional information. In these instances, SCE includes an overview of the table information. All Guidelines instructions are italicized to differentiate and for ease of reference. Also, in some instances, for example Chapter 4, SCE provides a complete description of a subject area that has related requirements throughout the Guidelines. Instead of explaining a common subject area in pieces, SCE has included them together at their first instance to provide a complete and understandable description of that subject area, and refers to those sections where the Guidelines instruct to include related and, in many instances, duplicative information.

[2] In this WMP, SCE has included several of its own tables and figures separate from Tables 1-31 included in the Guidelines. Because the Guidelines tables are numbered in sequence without regard to the WMP numerical sections, SCE's tables and figures are labeled Table SCE and Figure SCE and then the first number in the section they appear, i.e., Table SCE-1, Table SCE-5, etc., in order to differentiate between the tables required in the Guidelines and SCE's tables and for consistency regarding figures.

Table SCE 1-1
2020 Wildfire Mitigation Initiatives by Operating Unit and Department

Wildfire Mitigation Initiatives	Operating Unit and Department
5.3.1 – Risk Assessment and Mapping	Enterprise Risk Management, T&D (Asset Management, Strategy & Engineering; Transmission, Substation & Operations), Finance
5.3.2 – Situational Awareness and Forecasting • Weather Stations (SA-1) • Distribution Fault Anticipation (DFA) (AT-2.1) • Early Fault Detection (EFD) Evaluation (AT-7) • Transmission Open Phase Detection (SH-8) • Fire Potential Index (FPI) Phase II (SA-2) • Fuel Sampling Program (SA-5) • Surface and Canopy Fuels Mapping (SA-6) • Remote Sensing / Satellite Fuel Moisture (SA-7) • Fire Science Enhancements (SA-8) • High-Performing Computer Cluster (HPCC) Weather Modeling System (SA-3) • Asset Reliability & Risk Analytics Capability (SA-4) • Expansion of Risk Analysis (RA-1)	Safety, Security & Business Resiliency (Business Resiliency), T&D (Asset Management, Strategy & Engineering; Transmission, Substation & Operations)
5.3.3 – Grid Design and System Hardening • Alternative Technology Pilots – Meter Alarming for Down Energized Conductor (MADEC) (AT-1) • Alternative Technology Evaluations – Rapid Earth Fault Current Limiter – Ground Fault Neutralizer (GFN) (AT-3.1) • Alternative Technology Evaluations – Rapid Earth Fault Current Limiter – Resonance Grounded Substation with Arc Suppression Coil (AT-3.2) • Alternative Technology Evaluations – Rapid Earth Fault Current Limiter – Isolation Transformer Coil (AT-3.3) • Alternative Technology Evaluations – Distribution Open Phase Detection (AT-3.4) • High Impedance Relay Evaluations (AT-8) • Circuit Breaker Relay Hardware for Fast Curve (SH-6)	T&D (Distribution; Transmission, Substation & Operations; Asset Management, Strategy & Engineering), Generation

Wildfire Mitigation Initiatives	Operating Unit and Department
• Covered Conductor (SH-1) • Tree Attachment Remediation (SH-10) • Alternative Technology Implementation – Vibration Dampers (AT-4) • WCCP Fire Resistant Poles (SH-3) • Branch Line Protection Strategy (SH-4) • PSPS-Driven Grid Hardening Work (SH-7) • Microgrid Assessment (PSPS-8) • Installation of System Automation Equipment – RAR/RCS (SH-5) • Remediations – Distribution (SH-12.1) • Remediations – Transmission (SH-12.2) • Remediations – Generation (SH-12.3) • Undergrounding Overhead Conductor (SH-2) • Transmission Overhead Standards (TOH) Review (SH-9) • Legacy Facilities (SH-11)	
5.3.4 – Asset Management and Inspections • Infrared Inspection of Energized Overhead Distribution Facilities and Equipment (IN-3) • Infrared Inspection, Corona Scanning, and High Definition Imagery of Energized Overhead Transmission Facilities and Equipment (IN-4) • Distribution High Fire Risk Informed Inspections in HFRA (IN-1.1) • Asset Defect Detection Using Machine Learning Object Detection (AT-5) • Aerial Inspections – Distribution (IN-6.1) • Advanced Unmanned Aerial System Study (AT-2.2) • Unmanned Aerial (UAS) Operations Training (OP-3) • Transmission High Fire Risk Informed Inspections in HFRA (IN-1.2) • Aerial Inspections – Transmission (IN-6.2) • Assessment of Partial Discharge for Transmission Facilities (AT-6) • Quality Oversight / Quality Control (IN-2) • Failure Modes and Effects Analysis (FMEA) (IN-7) • Generation High Fire Risk Informed Inspections in HFRA (IN-5)	T&D (Distribution; Transmission, Substation & Operations; Asset Management, Strategy & Engineering; Compliance & Operational Support), Generation

Wildfire Mitigation Initiatives	Operating Unit and Department
5.3.5 – Vegetation Management and Inspections • Expanded Pole Brushing (VM-2) • Expanded Clearances for Legacy Facilities (VM-3) • Vegetation Management Quality Control (VM-5) • Hazard Tree Management Program (VM-1) • Drought Relief Initiative (DRI) Inspections and Mitigations (VM-4)	T&D (Compliance & Operational Support), Generation
5.3.6 – Grid Operations and Protocols • Annual SOB 322 Review (OP-1) • Community Resource Centers (PSPS-2) • Customer Resiliency Equipment Incentives (PSPS-3) • Income Qualified Critical Care (IQCC) Customer Battery Backup Incentive Program (PSPS-4) • MICOP Partnership (PSPS-5) • Independent Living Centers Partnership (PSPS-6) • Community Outreach (PSPS-7) • Wildfire Infrastructure Protection Team Additional Staffing (OP-2) • De-Energization Notifications (PSPS-1.1 – 1.4)	Safety, Security & Business Resiliency (Business Resiliency), T&D (Asset Management, Strategy & Engineering; Transmission, Substation & Operations), Customer Service (Business Customer Division; Customer Service Operations), Corporate Communications, Corporate Affairs (Local Public Affairs)
5.3.7 – Data Governance	Finance, Enterprise Risk Management, Information Technology
5.3.8 – Resource Allocation Methodology	Finance, Enterprise Risk Management, T&D (Asset Management, Strategy & Engineering; Transmission, Substation & Operations; Distribution; Compliance & Operational Support; Grid Resiliency & Public Safety PMO), Generation, Safety, Security & Business Resiliency (Business Resiliency), Customer Service (Business Customer Division; Customer Service Operations)
5.3.9 – Emergency Planning and Preparedness • SCE Emergency Response Training (DEP-2) • Customer Education and Engagement (DEP-1.1-1.3)	Safety, Security & Business Resiliency (Business Resiliency), Customer Service (Business Customer Division; Customer

Wildfire Mitigation Initiatives	Operating Unit and Department
• IOU Customer Engagement (DEP-3) • Customer Research and Education (DEP-4)	Service Operations), Corporate Affairs (Local Public Affairs), T&D (Transmission, Substation & Operations), Corporate Communications
5.3.10 – Stakeholder Cooperation and Community Engagement	Safety, Security & Business Resiliency (Business Resiliency), Customer Service (Business Customer Division; Customer Service Operations), Corporate Affairs (Local Public Affairs), T&D (Transmission, Substation & Operations), Corporate Communications

1.1 VERIFICATION

Complete the following verification for the WMP submission:

RULE 1.11 VERIFICATION

I am an officer of the applicant corporation herein, and am authorized to make this verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 7th day of February, 2020 at Rosemead, California.



Philip R. Herrington
Senior Vice President, Transmission & Distribution
SOUTHERN CALIFORNIA EDISON COMPANY
2244 Walnut Grove Avenue
Rosemead, CA 91770

Chapter 2

Metrics and Underlying Data

CONTENTS

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2 METRICS AND UNDERLYING DATA

Instructions: Report performance on the following progress and outcome metrics within the utility's service territory over the past five years. Where a utility does not collect its own data for a given metric, that utility shall work with the relevant sources to collect the information for its service territory, and clearly identify the owner and dataset used to provide the response in "Comments" column.

Progress metrics, listed below, track how much utility wildfire mitigation activity has managed to change the conditions of utility wildfire risk exposure in terms of drivers of ignition probability.

Outcome metrics measure the performance of a utility and its service territory in terms of both leading and lagging indicators of wildfire risk, PSPS risk, and other direct and indirect consequences of wildfire and PSPS, including the potential unintended consequences of wildfire mitigation work.

In the 2019 WMPs, utilities proposed sets of "program targets" that enable tracking implementation of proposed wildfire mitigation activities against the scope of those activities as laid out in the WMPs but do not track the efficacy of those activities. Utilities shall continue to report program targets, however, the primary use of these will be to gauge follow-through on WMPs while recognizing that some WMP initiatives should be adjusted after plan submittal based on new information and lessons learned.

2.1 LESSONS LEARNED: HOW TRACKING METRICS ON THE 2019 PLAN HAS INFORMED THE 2020 PLAN

Describe how the utility's plan has evolved since the 2019 WMP submission. Outline any major themes and lessons learned from the 2019 plan and subsequent implementation of the initiatives. In particular, focus on how utility performance against the metrics used has informed the utility's 2020 WMP.

SCE has put forward a comprehensive WMP for 2020 through 2022 that builds on its 2019 successes, lessons learned, and community needs. Since submitting the 2019 WMP, metrics have proven valuable as a formal mechanism to develop goals, track performance trends, demonstrate the efficacy of mitigation activities, and inform the Commission, stakeholders, and the public of SCE's wildfire strategies and programs. Lessons learned from tracking metrics in 2019 are further described in the subsections below.

2.1.1 2019 WMP Metrics: Tracking Mitigation Activities

In its 2019 WMP, SCE defined 58 performance activities and metrics to track the progress of its five wildfire mitigation work streams and demonstrate its compliance with the plan. The 58 activity and metric goals represent the Program Targets for each wildfire mitigation initiative using the updated definitions in the WMP Guidelines. SCE used controllable and quantifiable

metrics to inform substantial compliance with its 2019 WMP. These metrics provided internal and external value by clearly establishing performance thresholds. For activities that were newly established in 2019, demonstration of a process to complete the work stream was determined as an effective measure for tracking performance. Capturing and compiling the data to track these mitigation measures has been primarily a manual process to date, but SCE is implementing new tools and technologies to assist with data capture and tracking of mitigation activities. SCE plans to further automate its tracking processes over this WMP period. One of the key lessons learned from tracking metrics is the importance of providing the Commission, stakeholders, and the public an understanding of SCE's ability to effectively execute wildfire mitigation work, adjust plans due to challenges, and inform of modifications to its wildfire programs. As shown in Table 4,[1] SCE substantially met and, in many cases, exceeded its 2019 Program Targets. Using 2019 as a baseline year, SCE has established similar Program Targets to track performance and compliance with this WMP for 2020 as outlined in Section 5.1.13 (Table SCE 5-1). SCE completed various pilot programs as part of the 2019 WMP and has utilized the observations and results from these to inform the 2020-2022 WMP. As further described in Chapter 5, SCE modified and refined several wildfire mitigation activities based on the results and findings of tracking 2019 WMP Program Targets.

In the 2019 WMP, in addition to the Program Targets that demonstrate compliance, SCE also identified leading indicators to track trends that could provide valuable insights to develop future mitigation strategies. SCE described three indicators: (1) wire down on circuits in HFRA; (2) ignitions on circuits in HFRA; and (3) counts of all faults on circuits in HFRA. Pursuant to the Guidelines, these indicators would now be classified as Progress and Outcome Metrics. These indicators or metrics were not new measures SCE collected specifically for the 2019 WMP. For example, SCE has collected ignition data since May 2014 and fault data since 2006 and the combination of these two data sources is informative in establishing a baseline that ultimately should show a decline over time as wildfire mitigations are deployed in SCE's HFRA.

In 2019, SCE completed several risk mitigation activities such as inspecting all assets in the HFRA and installing 372 miles of covered conductor that are expected to reduce these three indicators and ignition risks. But as explained in SCE's previous filings and comments, year-to-year fluctuations in these indicators can be caused by many factors including adverse weather conditions and other factors outside SCE's control. Therefore, these are key indictors to measure the effectiveness of SCE's wildfire mitigation programs over longer-term horizons and inform future WMPs.

[1] The Guidelines include 31 tables that are required to be populated. Due to the size of these tables, SCE has included them in Excel on its WMP website. All references to Tables 1-31 should be directed to the Excel file labeled "SCE 2020-2022 WMP Tables 1-31.xlsx" on SCE's WMP website. In this Excel file, SCE has included a tab with its major assumptions. For example, all data being provided, unless otherwise stated in the Comment column of the tables, are data for SCE's HFRA.

2.1.2 Moving from Tracking Mitigation Activities to Measuring Effectiveness

The 2019 WMP metrics have provided a valuable mechanism to 1) develop goals that help prioritize wildfire work and 2) establish databases to track performance trends and demonstrate the efficacy of mitigation activities.

Program Targets are useful to set performance targets and track the progress of newly developed wildfire mitigation activities for planning and prioritization. As many of the wildfire activities were new and above what is typically planned for routine utility operations, having awareness across the company of the additional wildfire activities has helped to plan comprehensively, allocate resources efficiently, and make timely decisions. Monitoring and reporting Program Targets and lessons learned at SCE's operational and senior leadership levels on a regular basis has helped escalate and resolve issues, re-allocate resources, and provide overall support for managing all wildfire mitigation work.

Data that demonstrates the efficacy of wildfire mitigation activities such as ignitions, faults and wire down events proposed by SCE, are very important, and as noted previously, observations and analyses over time will help SCE better correlate mitigations with actual outcomes. SCE's operational and senior management routinely review and discuss data related to ignition, fault, and wire down events in SCE's service territory, along with events outside SCE territory, that guides improved data collection, root cause assessments, and ultimately refinements to its wildfire mitigation strategies and programs.

Phase 2 of R.18-10-007 (Phase 2) provided an opportunity to explore and further refine what was initially identified in SCE's 2019 WMP as indicators. It also helped identify additional relevant and available data that could be useful for tracking trends and the efficacy of wildfire mitigation activities over the long term. SCE recognizes and supports the Commission's desire to move towards outcome-based metrics to assess effectiveness of the mitigation efforts, and accordingly proposed six discrete and focused metrics in its July 30, 2019 Report on Data Collection for WMP Report (July 30, 2019 Data Report). These metrics were:

- Wire down events within HFTD Areas
- Equipment caused ignitions in HFTD Areas
- Vegetation caused ignitions in HFTD Areas
- Faults on Circuits in HFTD Areas
- Number of Conventional Blown Fuse Events
- Number of National Fire Danger Rating System (NFDRS) "Very Dry" and "Dry" days

SCE's proposed metrics, above, can drive effective, feasible trend analyses and root cause assessments utilizing available systems and data to reduce wildfire risk, assess SCE's wildfire mitigation strategies and programs, and improve future WMPs. SCE also provided datasets for its proposed metrics to further inform the Commission and stakeholders of available information.

The Guidelines, WMP Metrics attachment, and Supplemental Data Request (SDR), which includes outcomes associated with wildfires, introduced a diverse and large set of performance metrics.

SCE is committed to reporting and analyzing Progress and Outcome Metrics over the long term and meeting all requirements. SCE will proactively coordinate with external agencies to develop methods to allow timely and efficient access to information SCE does not manage, to the extent feasible. SCE posits that some of these metrics do not align with advancing wildfire safety. SCE looks forward to collaborating with the WSD and stakeholders to evolve the metrics that focus on rapidly advancing wildfire safety and demonstrating the effectiveness of its wildfire mitigation strategies and programs.

2.2 Recent Performance on Progress Metrics, Last 5 Years

Table 1 provides a five-year history, where applicable, of Progress Metrics as defined by the Guidelines. The comment section for each metric in the table provides details of the source and data that was used or explanations for why certain data is not available.

See Table 1 "Recent performance on progress metrics, last 5 years" for more detail.

2.3 Recent Performance on Outcome Metrics, Annual and Normalized for Weather, Last 5 Years

Table 2 provides a five-year history, where applicable, of Outcome Metrics as defined by the Guidelines. Comments are included in the table to provide additional details about the data provided or indicate if the data is not available or not applicable for the past 5 years. By providing the information that contains the term "utility-ignited" in this table regarding wildfire statistics, SCE is not admitting that: 1) the provided numbers are the actual number of deaths caused, structures destroyed, acres burned, or value of assets destroyed; 2) SCE's facilities caused any of these wildfires, or; 3) SCE has any responsibility for any damage, loss, fatality, or injury caused by these wildfires. In many instances, the cause of wildfires is still under investigation and even where an Authority Having Jurisdiction (AHJ) has issued a report on the cause, SCE may dispute the conclusions of such a report.

See Table 2 "Recent performance on outcome metrics, last 5 years" for more detail.

2.4 Description of Additional Metrics

Table 3 provides additional Progress and Outcome Metrics not requested through the WMP data templates that SCE has historically tracked or has begun to track as of 2019. Included in this section are further extrapolations of fault data quantified by frequency of such occurrences. These metrics provide SCE with additional data associated with internal or external risk factors (i.e., different causes for faults) that could lead to ignitions. These additional measurements enhance SCE's ability to plan, assess, prioritize, and refine ignition risk mitigation initiatives.

See Table 3 "Recent performance on additional metrics, last 5 years" for more detail.

2.5 Description of Program Targets

Table 4 provides details of wildfire mitigation activity and metric goals (or Program Targets)

included in its 2019 WMP. In the table, the 2019 Program Targets are identified according to the identification numbers defined in SCE's 2019 WMP (which could be different from the 2020 Program Target identification number). Table 4 includes the previously submitted Program Targets and the 2019 performance including the variance against planned completion.

Of the 58 activities for which performance was measured based on 2019 WMP targets, SCE exceeded its target in 29% and reached the target in 64% of the initiatives. For the remaining 7%, or four programs, SCE did not meet its initial 2019 plans due to resource constraints, operational challenges and reprioritization of activities to address emergent issues such as PSPS events, and in some instances missed the year-end due date by only a few days. SCE has and is continuing to analyze operational data and modify its planning and deployment approaches to help improve performance in 2020 and beyond. SCE has prioritized completing the previously targeted work that is not yet complete.

See Table 4 "List and description of program targets, last 5 years" for more detail.

2.6 Detailed Information Supporting Outcome Metrics

In Tables 5 and 6, SCE provides the requested data related to accidental deaths and OSHA-reportable injuries, respectively, due to utility wildfire activities. SCE notes the following related to the data provided in these tables:

- SCE does not track OSHA-reportable contractor and public incidents, as there is no direct employment relationship and no requirement to report to OSHA. However, SCE does track CPUC-reportable incidents, which have similar thresholds for identification and reporting (i.e., fatality or personal injury rising to the level of in-patient hospitalization, and in connection with utility assets). To provide a more complete data set, SCE provides data in Table 6 related to the "Contractor" and "Member of the Public" columns that correspond to CPUC-reportable incidents.

- Historically, SCE has not tracked reportable incidents separately by wildfire mitigation-related work and non-wildfire work. Therefore, to provide the requested data, SCE assessed each OSHA-reportable employee incident and each CPUC-reportable contractor and public incident over the historical period and determined that the work activities that had reportable incidents were not related to wildfire mitigation efforts.[2]

Going forward, SCE will create a process to flag applicable wildfire work-related incidents as part of its ongoing safety reporting efforts.

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[2] In late 2018, when SCE initiated its Enhanced Overhead Inspection (EOI) effort to support wildfire mitigation, some employee and contractor incident tracking was captured as related to EOI work; however, none of those incidents rose to the level of an OSHA- or CPUC-reportable event and, therefore, were not included in Tables 5 and 6.

See Table 5 “Accidental deaths due to utility wildfire mitigation initiatives, last 5 years” and Table 6 “OSHA-reportable injuries due to utility wildfire mitigation initiatives, last 5 years” for more detail.

Table 7 provides details of the current methods used to estimate impact of potential ignitions. The data and methods are reflective of the Reax Engineering (Reax) fire-modeling methodology further described in Section 5.3.1.

See Table 7 “Methodology for potential impact of ignitions” for more detail.

2.7 Mapping Recent, Modelled, and Baseline Conditions

SCE is providing non-confidential and confidential modeled and asset data in GIS shapefiles to the WSD.[3] Below, SCE describes the data it is providing, what data is not currently available but will be provided at a later time, and what data SCE believes it will be unable to provide.

See Table 8 “Map file requirements for recent and modelled conditions of utility service territory, last 5 years” and Attachments 6.1 through 6.3 for more detail.

Attachment 6.1 - Recent weather patterns (non-confidential)

- Average annual number of Red Flag Warning (RFW) days per square mile across service territory
- Average 95th and 99th percentile wind speed and prevailing direction (modeled)

Attachment 6.2 - Recent drivers of ignition probability (non-confidential)

- Date of recent ignitions categorized by ignition probability driver

Attachment 6.3 - Recent use of PSPS (non-confidential)

- Duration of PSPS events and area of the grid affected in customer hours per year

See Table 9 “Map file requirements for baseline condition of utility service territory projected for 2020” and Attachments 6.4 through 6.6 for more detail.

Attachment 6.4 - Current baseline state of service territory and utility equipment

- Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory (non-confidential)
- Urban vs. rural vs. highly rural regions of utility service territory (non-confidential)
- Wildland Urban Interface (WUI) regions of utility service territory (non-confidential)

[3] The GIS shapefiles that are non-confidential can be found on SCE’s WMP website.

- Number and location of critical facilities (confidential)
- Number and location of customers (non-confidential)
- Number and location of customers belonging to access and functional needs populations (non-confidential)
- Overhead transmission lines (confidential)
- Overhead distribution lines (non-confidential)
- Location of substations (confidential)
- Location of weather stations (non-confidential)
- All utility assets by asset type, model, age, specifications, and condition (confidential)

SCE is providing the WSD confidential geospatial location data for the following assets for which it regularly tracks in its asset management databases and GIS tools: substations, conductors, structures (towers, poles, vaults, padmounts, etc.), transformers, switches (Remote Automatic Reclosers (RARs), Pole Switches, Remote Control Switches (RCSs), etc.), fuses, and distribution line capacitor banks. SCE needs additional time to gather and correlate confidential information about model, age, and specifications and will supplement with additional information at a later time. Currently, asset condition data is generally limited to inspection and remediation activities related to the asset types noted above but are tracked in multiple systems depending on operational area of responsibility. Additional time is also necessary to merge and correlate these data sources and provide the most recent inspection and remediation data. SCE anticipates these confidential datasets will be provided to WSD by the end of March 2020.[4]

The following equipment are not currently tracked in SCE's asset management database or GIS applications: crossarms, insulators, arresters, guy wires, splices, clamps, and connectors. However, as part of SCE's Pole Loading Program (PLP), SCE has captured data for crossarms, insulators, and guy wires (both down and span) in its SPIDA software application, for poles that have been pole loaded. Additionally, SCE collected data on splices through its EOI effort and the PLP but notes these are currently not systematically updated after overhead lines are reconductored. SCE anticipates this confidential data will be provided to WSD by the end of March 2020.

Attachment 6.5 - Location of planned utility equipment additions or removal (confidential)

[4] Confidential data that SCE has but is not able to gather, compile and organize by February 7, 2020, will be submitted in iterations to WSD as the data becomes available. SCE will inform the WSD when the remaining confidential data will be available. SCE also plans to use the WSD's instructions in Resolution WSD-001 for Discovery and Document Maintenance to inform when remaining non-confidential data is available on SCE's WMP website.

- Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory
- Urban vs. rural vs. highly rural regions of utility service territory
- WUI regions of utility service territory
- Circuit miles of overhead transmission lines
- Circuit miles of overhead distribution lines
- Location of substations

SCE does not routinely track planned additions, removals, or upgrades by circuit mile, population density, or WUI. While SCE has a number of planned distribution projects over the next few years, they are not far enough along in the project lifecycle to have a complete list of affected structures (new or existing), circuit path/route geometries, and/or geospatial coordinates. Therefore, SCE is unable to map the distribution projects in GIS and subdivide as requested.

The planned work with a well-developed scope and geospatial properties are typically major, longer lifecycle transmission and substation projects that have detailed engineering and/or a Certificate of Public Convenience and Necessity (CPCN) or Permit To Construct (PTC) from the Commission. Therefore, the only planned work that SCE included here are (1) transmission projects that have known, planned geospatial geometries (circuit path/route) that can be uploaded to GIS tools and then divided by population density, WUI, and HFTD Tier/Zone and (2) known, planned substation projects (of which SCE has one in the next three years, Safari Substation).

Although SCE plans to install at least 1,125 weather stations and will strive for approximately 1,425 additional weather stations between 2020 and 2022, actual site/structure locations have not yet been determined and SCE is therefore unable to provide the locational attributes as requested.

Attachment 6.6 - Planned 2020-2022 WMP initiative activity per year (confidential)

- This confidential shapefile provides the location of 2020-2022 WMP wildfire mitigation activities planned to be completed by the end of each year of the plan term

The wildfire mitigation activities included in Attachment 6.6 GIS files are not exhaustive (see Section 5.1 for a more detailed list of WMP activities). Rather, the activities identified in Attachment 6.6 are select planned infrastructure hardening activities that are far enough into the planning/scoping process such that SCE has enough known structure/geospatial data to process them in GIS and provide an output by population density, WUI, and HFTD tier/zone by circuit mile or, where noted, by individual structure/location as requested. Importantly, these planned wildfire mitigation projects can change in scope, schedule, and priority due to a number of factors, including, but not limited to, improvements to risk modeling, scope/duration/frequency of PSPS events, emergency repairs/upgrades, permitting, environmental constraints, and other factors. The planned hardening activities included are

installation of covered conductor, current limiting fuses (CLFs), RARs, and tree attachment (TA) remediation.

The planned covered conductor deployment for 2020-2022 (included in the Attachment 6.6 shapefile) is based on a risk-informed priority methodology conducted in late 2019 and subject to change based on continuous improvements to SCE's risk modeling methods, as further described in Chapter 4. The covered conductor is noted by circuit miles of overhead distribution. The planned CLFs installations only reflect those scoped for 2020 for which SCE has known structure locations and geospatial coordinates at this time. CLF activities are noted by unit and location, not by circuit mile. Additional CLF upgrades will occur later in 2020 and possibly in 2021, but those locations are not known at this time. SCE has scoped all planned RARs installations and have planned locations for all devices, currently being installed through 2020. RARs are noted by unit and location, not by circuit mile. The TA remediation work only reflects scoped locations through 2020 for which SCE has known structure locations and/or geospatial coordinates. Additional TA work for 2021-2022 has not been scoped yet. TA remediation is noted by structure and location of overhead distribution, not by circuit mile.

Chapter 3

Baseline Ignition Probability and Wildfire Risk Exposure

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3 BASELINE IGNITION PROBABILITY AND WILDFIRE RISK EXPOSURE

As California's wildfire risk has grown in recent years, so have SCE's efforts in improving ignition risk analysis capability and wildfire risk mitigation by investing in targeted activities to reduce risk exposure. In 2019, SCE rolled out operational FPI datasets that consider current circuit configurations (wildfire risk exposure) for all its HFRA. Additionally, SCE has taken steps to analyze five-year ignition data to calculate and forecast ignition probability based on specific drivers. Collectively, these two measures enable SCE to more accurately estimate wildfire risk exposure and identify the sources of such risk. SCE has also matured its wildfire mitigation tools such as PSPS and grid hardening initiatives that help California reduce its overall wildfire risk. SCE plans on continuing to refine and expand its wildfire fire mitigation activities through this WMP period and beyond.

3.1 RECENT WEATHER PATTERNS, LAST 5 YEARS

In Table 10, SCE provides data on weather patterns over the last five years based on the descriptions in the Guidelines and SCE's interpretation of them along with other related information described below.

The first row in Table 10 is populated with historical data on Red Flag Warnings (RFW) by circuit mile days per year. The RFW circuit-mile days are based on all overhead distribution and transmission circuits that traverse through the National Weather Service (NWS) Fire Weather Zone (FWZ)[1] from a 2015-2019 historical database of RFW events from the NWS. The overhead lengths of distribution and transmission circuits are calculated within each FWZ polygon (area divided geospatially into over approximately 1,000 space areas). All circuit lengths within that FWZ polygon are then multiplied by the number of days (or fraction of days) that a particular polygon had an RFW in effect.

The Guidelines require that SCE use RFW circuit mile days per year data to normalize data required in other tables. SCE recommends the Commission consider using the National Fire Danger Rating System (NFDRS), which all fire agencies use to determine daily fire danger risk, instead of RFW data. NFDRS is a system that allows fire managers to estimate today's or tomorrow's fire danger for a given area. It combines existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's protection needs. Fire danger ratings are typically reflective of the general conditions over an extended area, often tens of thousands of acres, where a possible wildfire could start. Fire danger ratings describe conditions that reflect the potential, over a large area, for a fire to ignite, spread and require suppression action.

The Guidelines also require SCE provide days rated as "Extreme" on SCE's proprietary FPI, which

[1] https://www.weather.gov/gis/FireZones

is the number of days (or fraction of days) that an overhead distribution or transmission line within SCE's HFRA had an FPI of 15 or higher, where 15 represents SCE's lower boundary for an extreme indicator of fire potential. The number of days is multiplied by the length of the associated HFRA overhead circuit. SCE's FPI calculation capability was initiated in late 2018 and was not implemented across SCE's HFRA until March 2019, and therefore the information in Table 10 for 2019 uses FPI data from March to December 2019. From March to May 2019, FPI was based on previous circuits from SCE's prior HFRA. Since then, SCE updated its circuit configurations primarily based on revised HFRA boundaries and load balancing activities and the FPI data for this time period reflects the updated circuitry. Accordingly, the historical HFRA circuit level FPI data is limited to June 2019 through December 2019. Combining these two datasets would be inconsistent and would skew results and, therefore, SCE did not provide this information. As such, the information in Table 10 for 2019 uses FPI data from March to December 2019

The WMP Guidelines also require SCE to provide the 95th and 99th percentile wind conditions in circuit mile days. SCE's 95th and 99th percentile wind values for each circuit were determined by looking at the historical modeled wind gust data (taken at the centroid of each circuit) from 2009-2014. Then, SCE determined the number of days that an overhead distribution and transmission circuit in HFRA reached or exceeded its 95th or 99th percentile wind gust speed. The number of days is multiplied by the length of the associated HFRA overhead circuit to get 95th and 99th percentile wind conditions in circuit mile days.

See Table 10 "Weather patterns, last 5 years" for more detail.

3.2 Recent Drivers of Ignition Probability, Last 5 Years

To calculate the recent drivers of ignition probability, SCE utilized the following data sources:

- SCE's Outage Management System (OMS) and Outage Database and Reliability Metrics (ODRM)
- Wire down data to determine if the conductor failure led to a wire down event
- Repair work records (from SCE's asset data in SAP) to identify failures
- CPUC reportable fire data

The data from these sources was aggregated to populate Table 11. Pursuant to the WMP Clarification Document issued on January 15, 2020, SCE partitioned Table 11 into distribution (Table 11a) and transmission (Table 11b). Tables 11a and 11b reflect incident type data across SCE's system-wide territory, and not limited to SCE's HFRA. For purposes of this WMP, SCE defines distribution as voltage below 50 kV and transmission as voltage above 50 kV.

To populate the "number of ignitions per year from this driver" in Tables 11a and 11b, SCE used

CPUC reportable data filed for 2015 through 2018, and preliminary data for 2019.[2] The CPUC reportable data contains date and time, latitude and longitude, voltage, location, suspected initiating event, and driver and sub-driver (e.g., animal contact, balloon contact, and transformer failure) categories. SCE mapped the suspected initiating event to the driver and sub-driver categories for 2015 through 2019.

See Tables 11a and 11b "Key recent drivers of ignition probability, last 5 years" for more detail.

3.3 Recent Use of PSPS, Last 5 Years

During high-risk fire weather conditions that pose unacceptable levels of wildfire risk to the public based on wind, temperature, humidity levels, ground fuel capacity and the state of the grid, SCE initiates PSPS as a proactive measure to mitigate the risk. There are various initiatives listed throughout SCE's 2020-2022 WMP which target the reduction in frequency of PSPS and mitigate the customer impact during a PSPS event. These initiatives include, but are not limited to, SCE continuing to conduct high fire risk-informed inspections (HFRI), prioritizing maintenance and remediation efforts, installing covered conductor, augmenting weather forecasting and modeling, using advanced risk modelling and ignition probability tracking, conducting vegetation management, updating circuit breaker and relay settings, upgrading remote switching and sectionalizing capabilities, deploying trained and qualified personnel to monitor field conditions as well as other operationalized initiatives in HFRA. Notwithstanding these significant undertakings to help ensure public and employee safety, extreme weather events can pose high ignition and public safety risks, necessitating PSPS. Sections 4.4, 5.3.6, 5.3.9, and 5.6.2 provide more detail on SCE's PSPS protocols and thresholds, mitigation activities to reduce the impact of PSPS events, customer wildfire preparedness communication and education, and SCE's long-term PSPS strategy.

Table 12 represents the frequency, scope, and duration of PSPS events in total and normalized by year (by dividing by the number of RFW circuit-mile days and as further clarified above in Section 3.1). A combination of data from SCE's OMS and data recorded by documentation specialists during actual PSPS events was used. SCE did not execute any preemptive power shutoffs in 2015 and 2016. Over the past five years, SCE first exercised PSPS as a mean of mitigating wildfire risk on December 7, 2017. PSPS activity was minimal in 2017 and 2018, with an increase in 2019 resulting from the implementation of a more robust PSPS program as part of SCE's 2019 WMP.

See Table 12 "Recent use of PSPS, last 5 years" for more detail.

[2] 2019 data is preliminary because it has not yet been reviewed through SCE's data quality review process.

3.4 Baseline State of Equipment and Wildfire and PSPS Event Risk Reduction Plans

3.4.1 Current Baseline State of Service Territory and Utility Equipment

Table 13 lists the current baseline state of SCE's service territory in terms of overhead circuit miles for distribution and transmission lines, substations (only in-service, not including third-party owned), and critical facilities. The table also lists the number of customers in WUI zones and by HFRA tier/zone. SCE retains a small portion of HFRA located outside of the CPUC's HFTD (SCE's non-CPUC HFRA), and operationally treats these areas as Tier 2. These areas have been added to the HFTD Tier 2 populations.[3] HFTD Zone 1 cells only reflect values found outside of HFTD Tier 2 and Tier 3 areas. Zone 1 areas that are wholly contained within Tier 2 and Tier 3 areas are reflected in those respective tiers. The WUI area delineation is based on a GIS layer published by the University of Wisconsin-Madison.

SCE does not track all customers that are designated as AFN customers. As such, data provided for the AFN population only includes SCE customers enrolled in the California Alternate Rates for Energy (CARE) / Family Electric Rate Assistance Program (FERA)[4] and/or Medical Baseline[5] programs.

See Table 13 "Current baseline state of service territory and utility equipment" for more detail.

Table 14 provides the number of utility weather stations located in SCE's service territory. Weather stations are equipment containing sensors that capture and transmit weather data, including wind speed and direction, temperature, relative humidity, and solar irradiance. Real-time weather information is used to monitor weather and improve/validate weather models. This information is also used to implement SCE's PSPS protocols and in certain situations will allow SCE to be more surgical in PSPS de-energizations. All weather stations listed in Table 14 are in SCE's service territory and are operated by SCE. The number of units listed is categorized by HFTD tier and normalized by dividing the number of units by the number of circuit miles in overhead primary circuits for both transmission and distribution lines. Weather stations located in SCE's non-CPUC HFRA are included in the HFTD Tier 2 populations. HFTD Zone 1 cells only reflect values found outside of HFTD Tier 2 and Tier 3 (there are no weather stations in Zone 1). Zone 1 areas that are wholly contained within Tier 2 and Tier 3 areas are reflected in those respective tiers.

See Table 14 "Summary data of weather station count" for more detail.

Table 15 summarizes data for fault indicators for overhead distribution circuits and the

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[3] *See* Section 4.2.1 for SCE's description and analysis supporting its HFRA.

[4] https://www.sce.com/residential/assistance/care-fera

[5] https://www.sce.com/residential/assistance/medical-baseline

categorization of installations by tier/zone, including fault indicators in non-HFTD areas. The fault indicators included in this table are either mechanical (i.e., they provide a visual cue to the Troubleman trying to locate the fault) or remote-electronic (i.e., provide presence of fault current remotely via a field computer application). As noted above, fault indicators located in SCE's non-CPUC HFRA are included in the HFTD Tier 2 populations. HFTD Zone 1 cells only reflect values found outside of HFTD Tier 2 and Tier 3 (there are no fault indicators in Zone 1); Zone 1 areas that are wholly contained within Tier 2 and Tier 3 areas are reflected in those respective tiers. For the normalization calculations, the denominators include the mileage of overhead primary circuits at distribution voltages in the corresponding HFTD areas.

See Table 15 "Summary data on fault indicator count" for more detail.

3.4.2 Planned Additions, Removal, and Upgrade of Utility Equipment by End of 3-Year Plan Term

Table 16 provides planned additions, removals, and upgrades of utility equipment by the end of the three-year plan term. For the reasons explained in Section 2.7, the only planned work included in Table 16 are transmission and substation projects that have known, planned geospatial geometries.

As noted above, planned additions, removals, and upgrades located in SCE's non-CPUC HFRA are included in the HFTD Tier 2 populations. HFTD Zone 1 cells only reflect values found outside of HFTD Tier 2 and Tier 3. Zone 1 areas that are wholly contained within Tier 2 and Tier 3 areas are reflected in those respective Tiers.

See Table 16 "Location of planned utility equipment additions or removal by end of 3-year plan term" for more detail.

SCE interprets the requirements for Table 17 to include all SCE's wildfire mitigation activities. SCE does not have geospatial information for all its wildfire hardening efforts. As such, Table 17 includes select planned infrastructure hardening activities with known geospatial properties that enable processing in GIS tools. These properties enable SCE to produce the results as requested by circuit mile or, where noted, by individual structure/location. As noted above, mitigation activities located in SCE's non-CPUC HFRA are included in the HFTD Tier 2 populations. HFTD Zone 1 cells only reflect values found outside of HFTD Tier 2 and Tier 3. Zone 1 areas that are wholly contained within Tier 2 and Tier 3 areas are reflected in those respective Tiers. The following planned hardening activities are included in Table 17: covered conductor, CLFs, RARs, and TA remediation.

Covered conductor deployment plans are based on SCE's current risk-informed priority methodology, further described in Section 5.3.3.3 for 2020-2022. Covered conductor scope is measured as circuit miles of overhead distribution. A relatively small amount of covered conductor scope is in non-HFTD areas. These are typically sections that meet one of the following criteria: (1) small circuit segments or spans that extend from Tier 2 or Tier 3 into non-HFTD areas due to engineering or constructability requirements unique to that location or (2) possess other drivers that warrant the installation of covered conductor (e.g., an area with high winds and high

tree count in vegetation management inventory).

CLF installations only reflect those scoped for 2020, for which SCE has known structure locations and geospatial coordinates. Additional CLF upgrades are likely to occur later in 2020 and possibly into 2021, but those locations are not known at this time. CLFs are noted by unit and location, not by circuit mile. CLFs scoped in non-HFTD protect the downstream portion of the lines that traverse HFRA.

SCE has scoped all planned RARs installations and have planned locations for all devices currently being installed through 2020. RARs are noted by unit and location, not by circuit mile. RARs scoped in non-HFTD protect lines that traverse HFRA and are often placed strategically there to isolate communities in HFRA from those that are not (which may limit PSPS impacts) while helping ensure the entire line traversing HFRA is protected.

The planned TA remediation work only reflects scoped locations through 2020 for which SCE has known structure locations and/or geospatial coordinates. Additional TA remediation work may be scoped for 2021 and 2022, depending on where covered conductor is installed. TA remediation is noted by structure/location, not by circuit mile. There are a relatively small amount of TA structures located in non-HFTD areas.

The wildfire mitigation activities included in this table are not exhaustive (see Section 5.1.13 for a complete list of SCE's WMP activities). Rather, they are activities far enough in the planning/scoping process where SCE has enough known structure/geospatial data to process in GIS and organize by population density, WUI, and HFTD tier/zone, as requested. Planned wildfire mitigation projects can change in scope, schedule, and priority at any time due to several factors, including, but not limited to, risk methodology improvements, weather, emergency repairs/upgrades, safety concerns, permit requirements, environmental requirements, and other factors.

See Table 17 "Location of planned utility infrastructure upgrades" for more detail.

3.4.3 Status Quo Ignition Probability Drivers by Service Territory

For Tables 18a and 18b, SCE used the ignition probability driver data populated in Tables 11a and 11b. This data was averaged and organized into the different HFTD tiers/zones. As in Tables 11a and 11b, SCE separated distribution and transmission data into Tables 18a and 18b, respectively. The data sources are the same as those used for Tables 11a and 11b.

See Tables 18a and 18b "Key drivers of ignition probability" for more detail.

Chapter 4

Inputs to the Plan and Directional Vision for Wildfire Risk Exposure

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4 INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WILDFIRE RISK EXPOSURE

SCE's 2020-2022 WMP strategies and programs are based on several inputs, not the least of which are the improvements driven by the successes and challenges of SCE's 2019 wildfire mitigation efforts. In fact, and as described in Advice Letter 4120-E, SCE modified some of its wildfire mitigation programs in 2019 as well. SCE expects to continue to make necessary changes as it learns from implementing its wildfire programs, new research, benchmarking, collaboration with other utilities, its customers, first responders, government agencies, and other stakeholders. These inputs and other important factors such as management and subject matter expert (SME) judgment and risk analysis, informed SCE's wildfire strategies and programs presented in this WMP. As further explained below and in subsequent chapters, SCE expects to reduce ignitions in its HFRA, reduce the impact of PSPS, and increase public safety over this WMP period.

SCE's long-term vision is to significantly reduce ignitions that could lead to devastating wildfires, and substantially mitigate impacts related to implementing its wildfire programs including PSPS. We also strive to safeguard SCE's electric system against wildfires irrespective of ignition source and improve system resiliency where operationally feasible. In subsequent chapters, SCE describes how it will reduce wildfire risk exposure and take measurable steps to reduce the impact of PSPS.

4.1 THE OBJECTIVES OF THE PLAN

The objectives of the plan shall, at a minimum, be consistent with the requirements of California Public Utilities Code §8386(a). Describe utility WMP objectives, categorized by each of the following timeframes:

1. *Before the upcoming wildfire season, as defined by the California Department of Forestry and Fire Protection (CAL FIRE)*
2. *Before the next annual update*
3. *Within the next 3 years, and*
4. *Within the next 10 years.*

Safety is the first of SCE's core values and this is demonstrated through its commitment to creating and maintaining a safe environment for its customers, workforce and the communities it serves. SCE's primary objective in this WMP is to set forth an actionable, measurable, and adaptive plan for 2020 to 2022 to reduce the risk of potential wildfire-causing ignitions associated with SCE's electrical equipment within SCE's HFRA. This and the following additional objectives of this WMP reflects SCE's commitment to protect public safety and are consistent with the requirements of California Public Utilities (PU) Code Section 8386(a) to construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic

wildfire posed by those electrical lines and equipment:

- Implementing measures that safeguard SCE's electric system against wildfires and improve system resiliency;
- Minimizing PSPS impact to its customers and communities;
- Improving fire agencies' ability to detect and respond to emerging fires;
- Improving coordination with utility emergency management personnel;
- Reducing the impact of wildfires and wildfire mitigation efforts on the public; and
- Engaging the public about how to prepare for, prevent, and mitigate wildfires in SCE's HFRA

According to CAL FIRE, the 2020 fire season may start earlier as the outlook estimates that the large-fire potential may increase to "above normal" this spring across Southern California due to the possibility of near to above normal numbers of offshore wind events.[1] The "Grassfire Season" may be a few weeks earlier than usual and begin in April 2020 with resource demand likely centered on foothill and urban interface regions. While the historical wildfire season typically begins in the May/June time period, CAL FIRE has also previously acknowledged that climate change is rendering the term "fire season" obsolete as wildfires now burn on a year-round basis across the state of California.[2] In Chapter 5, SCE provides more details on the WMP Program Targets that will be pursued by SCE in the upcoming wildfire season. SCE's hardening initiatives are being prioritized based on risk analyses which will enable SCE to complete more work in the higher-risk areas prior to the traditional start of the fire season. Similarly, SCE is prioritizing certain situational awareness and operational enhancements in preparation for the 2020 wildfire season. This includes implementing several initiatives to reduce the impact of PSPS, prior to the peak fire season. Likewise, SCE's expansion of its weather station network will prioritize circuits that do not have weather stations in addition to circuits on PSPS monitoring and de-energization lists to enable further granular weather forecasting in areas more susceptible to de-energization.

Chapter 5 of this WMP also describes the programs and activities SCE intends to complete by year-end 2020. SCE's objective is to meet or exceed its wildfire mitigation initiatives' 2020 Program Targets including, but not limited to, operational practices, inspections, system hardening, vegetation management, situational awareness, new technologies, PSPS, and post-incident recovery, restoration, and remediation strategies and programs. SCE also includes forecasts of its programs and activities it intends to complete over the 3-year period of this WMP.

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[1] The United States Forest Service (USFS) (Predictive Services), that issues the rolling four-month Fire Season Outlook prediction, also describes, in its February 1, 2020 issuance for Southern and Central California, the expected "below normal" winter precipitation as another factor in predicting a potentially earlier start to the 2020 fire season in Southern California.

[2] *See* CAL FIRE 2018 Strategic Fire Plan, p. 10.

SCE's covered conductor deployment will go beyond 2022 and is expected to reach substantial completion by 2024, subject to supply chain and skilled labor resource availability. SCE is attempting to accelerate and expand this program to install more covered conductor in HFRA, this year and within the next four years, beyond the amount originally contemplated in SCE's GSRP. SCE is targeting the proactive replacement of up to approximately 7,500 circuit miles of existing bare distribution primary overhead conductor in HFRA by 2024.

4.2 Understanding Major Trends Impacting Ignition Probability and Wildfire Consequence

Describe how the utility assesses wildfire risk in terms of ignition probability and estimated wildfire consequence, including use of Multi-Attribute Risk Score (MARS) and Multi-Attribute Value Function (MAVF) as in the Safety Model and Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP). Include description of how the utility distinguishes between these risks and the risks to safety and reliability. List and describe each "known local condition" that the utility monitors per GO 95, Rule 31.1, including how the condition is monitored and evaluated. In addition:

A. Describe how the utility monitors and accounts for the contribution of weather to ignition probability and estimated wildfire consequence in its decision-making, including describing any utility-generated Fire Potential Index or other measure (including input variables, equations, the scale or rating system, an explanation of how uncertainties are accounted for, an explanation of how this index is used to inform operational decisions, and an explanation of how trends in index ratings impact medium-term decisions such as maintenance and longer-term decisions such as capital investments, etc.).

B. Describe how the utility monitors and accounts for the contribution of fuel conditions to ignition probability and estimated wildfire consequence in its decision-making, including describing any proprietary fuel condition index (or other measures tracked), the outputs of said index or other measures, and the methodology used for projecting future fuel conditions. Include discussion of measurements and units for live fuel moisture content, dead fuel moisture content, density of each fuel type, and any other variables tracked. Describe the measures and thresholds the utility uses to determine extreme fuel conditions, including what fuel moisture measurements and threshold values the utility considers "extreme" and its strategy for how fuel conditions inform operational decision-making.

Enterprise-Wide Safety and Wildfire Risk

SCE follows a comprehensive risk management evaluation protocol to assess and mitigate enterprise-wide safety risks. This process includes the CPUC's adopted risk-mitigation procedures: the S-MAP and RAMP. The purpose of the S-MAP is to: (1) allow parties to understand the models the utilities propose to use to prioritize programs and projects intended to mitigate risks and (2) allow the CPUC to establish standards and requirements for those models. In each utility's RAMP report, the utility describes how it plans to assess its risks, and to

mitigate and minimize such risks. Each utility's RAMP report should be consistent with the direction provided in the S-MAP. The RAMP submission, as clarified or modified in the RAMP proceeding, is then incorporated into the large IOU's GRC filings.

Pursuant to SCE's 2018 RAMP, SCE deployed a multi-attribute probabilistic risk evaluation model to assess safety risks (including safety-related risks and the associated probability and consequences of potential events). As part of this process, SCE utilized a risk-informed decision-making process to identify, evaluate, mitigate, and monitor enterprise risks, including risks associated with wildfires. This process enables SCE to explicitly include risk considerations in its decision-making for work identification, prioritization, and funding and resource allocation. Senior leaders employ the framework to review the risk analyses and mitigation plans in place to manage enterprise risks. Though risk management has always been an essential part of the management toolkit for strategic, business, and operational planning, over the last few years, risk-informed planning has become a much more explicit and essential component of decision-making.

In its 2018 RAMP report, SCE identified nine top safety risks, wildfire being one among them. For each risk, SCE analyzed existing controls and identified potential mitigations. As described below, some of the identified mitigations for wildfire risk drivers may also mitigate other safety risks such as contact with energized equipment. In those cases where a wildfire-related mitigation also addresses a different safety risk, the deployment of a mitigation primarily for wildfire purposes will be taken into consideration in the future planning of what is needed to address the other non-wildfire safety risks.

Based on feedback received from parties in response to SCE's 2018 RAMP and its 2019 WMP, SCE incorporated a number of improvements to its wildfire risk modeling framework in this 2020-2022 WMP filing. In terms of risk assessment, this feedback included (1) accounting for wildfire risk associated with transmission assets; (2) a re-evaluation of the methodology used for calculating risk spend efficiency for projects to normalize the benefits between mitigations with longer and shorter term effective useful lives; and (3) to refine the granularity of the risk analysis by circuit or line segment to improve an assessment of the performance of SCE's WCCP. SCE has worked diligently to address all of these concerns. Consistent with the S-MAP framework, SCE's 2020-2022 WMP employs a MAVF and a risk bowtie approach, which links mitigations to drivers and/or outcomes for safety, reliability, and financial dimensions for enterprise level risk analysis, and as discussed below, more granular asset level models for deploying mitigations within programs.

SCE annually identifies and evaluates the key risks that the enterprise and its customers face, with a focus on safety risks, such as wildfire risk, utilizing a multi-step process from both a top-down and bottoms-up approach, as described below:

- Top-down review of enterprise-level risks: This effort is aimed at assessing the breadth of activities ongoing at SCE, in the state, and in the utility industry to identify key risks. It

includes a review of industry trends and research, public policy efforts, legislative activities, key CPUC and other regulatory proceedings, major SCE initiatives, and critical business functions. The team also compiles feedback on current and emerging enterprise-level risks through company-wide surveys and direct discussions with SCE leadership.

- Bottom-up review of SCE Enterprise Risk Register: SCE maintains an enterprise risk register that captures and assesses risks from across the enterprise, based on interviews and feedback from working groups throughout the organization.
- Consolidation and aggregation: SCE aggregates the risks identified through the above processes to evaluate which risks have potential major safety consequences, including consolidation of duplicate and similar risks.
- Review and refinement with senior leadership: Through leadership review and assessment, further refinements are made as appropriate.

Known Local Conditions

SCE does account for known local conditions in its service territory in developing work scope. As described in Section 4.3.1, below, SCE conducted a detailed analysis of its historical non-CPUC designated HFRA in 2019 and determined that a small portion of this area has similar wildfire risk profile as the High Fire Threat District (HFTD) Tier 2 area. As such, SCE currently treats this portion of non-CPUC HFRAs as a Tier 2 HFTD. In addition, in 2013, SCE completed a territory-wide wind study, which was used to define high wind areas (above the 8 pounds per square foot specified in GO 95) as known local conditions for use in pole loading calculations. SCE implemented the results of this wind study in 2014.

SCE also uses the Santa Ana Winds Threat Index (SAWTi) issued by United States Forest Service (USFS), which categorizes Santa Ana wind severity with respect to the potential for large fires to occur. The SAWTi assesses weather and fuel conditions to generate a threat level associated with Santa Ana wind events and extends out six days showing four threat levels that range from Marginal to Extreme. The SAWTi covers much of the southern portion of SCE's service territory. SCE uses it to gauge the overall severity of forecasted or ongoing Santa Ana wind events across affected SCE districts and as additional validation of the Fire Weather Watches and RFW provided by the National Weather Service.

Weather Conditions

Weather conditions play a significant role in the initiation, spread, and intensity of wildfires. Therefore, weather data serve as key inputs into fire spread modeling to calculate probability and consequence of ignitions. See Section 4.3 for more details. In addition, SCE calculates an FPI based on weather and fuel condition forecasts to assess the likelihood of significant fire activity occurring within the service territory. See Section 5.3.2.4 for more details.

Fuel Conditions

Fuel conditions also play a critical role in the initiation, spread, and intensity of wildfires.

Currently, SCE has several methods and tools to monitor and track moisture amounts in the vegetation that contributes most to significant wildfire activity. Fuel moisture (dead and live vegetation) is expressed as a percentage of the water amount compared to the dry weight of the vegetation. For dead vegetation, less than 10% moisture represents fuels that will burn actively whereas moisture for live vegetation that is less prone to burning is generally 80% or more. In 2019, SCE launched a fuels sampling program to fill in known gaps in live fuel moisture observational data. Physical samples of native living plants are collected bi-weekly to determine the dryness and ultimately the combustibility of the vegetation. This data is tracked to determine moistening/drying trends that affect wildfire activity. In addition, SCE has several models that project moisture amounts in dead vegetation. This information is combined with the bi-weekly live fuel sampling to provide a holistic understanding of the fuels environment and serve as inputs into the FPI.

4.2.1 Service Territory Fire Threat Evaluation and Ignition Risk Trends

Discuss fire-threat evaluation of the service territory to determine whether an expanded High Fire Threat District (HFTD) is warranted (i.e., beyond existing Tier 2 and Tier 3 areas). This section shall include a discussion of any fire threat assessment of its service territory performed by the electrical corporation. In the event that the electrical corporation's assessment determines the fire threat rating for any part of its service territory is insufficient (i.e., the actual fire threat is greater than what is indicated in the CPUC Fire Threat Map and High Fire Threat District designations), the corporation shall identify those areas for consideration of HFTD modification, based on the new information or environmental changes. To the extent this identification relies upon a meteorological or climatological study, a thorough explanation and copy of the study shall be included.

4.2.1.1 Evolution of SCE's Historical High Fire Risk Areas

SCE has maintained HFRA designations that were based on a combination of its historical map boundaries (based on past fire management and response experiences), CAL FIRE's Fire Hazard Severity Zone (FHSZ) maps, and most recently, the CPUC's HFTD maps released in January 2018. SCE has since considered Zone 1, Tier 2 and Tier 3 (collectively, the HFTD), and non-CPUC historical high fire risk areas, to collectively be "HFRA." In the fall of 2018, SCE filed its Grid Safety & Resiliency Program (GSRP) application and in February of 2019, SCE submitted its 2019 Wildfire Mitigation Plan (WMP). Both SCE's GSRP and 2019 WMP made explicit that from an operational perspective, SCE's internally-designated HFRA consisted of (1) Zone 1, (2) CPUC-designated Tier 2 and Tier 3 HFTD maps (27% of SCE's service territory), and (3) various areas outside of the HFTD that SCE traditionally considered to be at elevated risk of wildfires (8% of SCE's service territory; cumulatively 35%). As discussed in those proceedings, SCE initially included both areas as a prudent approach from a risk perspective while a thorough analysis of the non-HFTD HRFA was pending.

SCE's 2019 WMP described how SCE has historically defined those areas collectively as its "HFRA," and how it has generally employed the same elevated wildfire threat mitigation

strategies, standards, programs and activities in both CPUC-designated HFTD and non-CPUC HFRA. In other words, SCE has generally treated all its designated HFRA consistently, with appropriate risk-based prioritization of some areas over others for certain programs and activities. SCE's 2019 WMP also described that, at the time of its submittal, SCE was in the process of conducting a rigorous review of its non-CPUC HFRA areas to assess whether it was appropriate to either continue to classify each of those 1,141 granular subareas as HFRA. That analysis (i.e., whether to "remove" or "retain" each non-CPUC-HFTD HFRA polygon) is now complete. From an operational perspective, SCE will treat "removed" areas as non-high-fire risk areas (i.e., all the inspection and maintenance schedules and other programs aimed at HFRA will not apply to these areas). "Retained" areas will be treated as HFRA (i.e., all the inspection and maintenance schedules and other programs aimed at HFRA will apply to these areas).

In August 2019, SCE filed a Petition for Modification (PFM) of D.17-12-024, in which SCE proposed retaining less than 1% of the non-CPUC HFRA to be treated as CPUC HFTD Tier 2 and requested the Commission formally include these areas in its HFTD. Included with the PFM is the detailed report on the results of SCE's HFRA Evaluation. SCE is currently awaiting the Commission's decision on this PFM and respectfully requests the Commission issue a decision before or in concert with this 2020-2022 WMP process. In this WMP, and as noted previously, SCE has included the retained portion in its HFRA and is treating these areas as Tier 2.

4.2.1.2 Evaluation of SCE's Non-CPUC High Fire Risk Areas

In the fall of 2018, a team consisting of SCE employees with subject matter expertise in fire management/response, fire behavior/fuels, meteorology, maintenance/inspection, grid operations, vegetation management, and geospatial analysis began a project to evaluate SCE's non-CPUC HFRA polygons. The following summarizes the results of the comprehensive evaluation performed by this team.

As detailed in SCE's HFRA Evaluation, Retained Non-CPUC HFRA Final Report (HFRA Report),[3] SCE proposes to retain less than 1% of its non-CPUC-HFRA polygons and treat them as HFTD Tier 2 areas. This percentage includes 40 polygons in SCE's service territory and 3 polygons outside of SCE's service territory, as set forth in the HFRA Report. Specifically, the HFRA Report includes, for each of these 43 polygons:

- A satellite-based GIS geospatial map – the map shows, in color, an overlay of overhead electrical equipment, HFTD areas (e.g., orange is Tier 2 and red is Tier 3), non-HFTD areas (i.e., the polygon at issue), and historical fires.
- Results of wildfire simulations – SCE hired Reax to run a fire-risk simulation in the vicinity of overhead lines that run through SCE's previous non-CPUC HFRA. The Monte Carlo-based modeling simulated fire ignition points randomly selected within 100 meters of

[3] See Appendix C in SCE's PFM of Decision 17-12-024.

overhead electric facilities, and relied on several inputs including fuel, topography, housing density, historical fires, and extreme fire weather conditions (weather scenarios) over the last 20 years.

The HFRA Report also includes the following information for each retained polygon, all of which is relevant to the risk analysis:

- Electrical facilities description – contains an accounting of the length of overhead and underground circuit miles for both transmission and distribution level equipment for each of the retained polygons.
- Historical fire information – enumerates the previous fires experienced in each of the retained polygons since 2000 and their most recent fires, if applicable.
- Vegetation management activity – sets forth the number of identified trees needing trimming in the area (which indicates how active the vegetation management is in the area).
- Tree mortality area designation – identifies whether or not the retained polygon contains tree mortality areas.
- Fuel sources – contains a list of vegetation fuel types within each retained polygon.
- Conclusions – sets forth clear justifications for SCE's HFRA retention decision for each retained polygon.

SCE proposed excluding greater than 99% of the service territory contained within non-CPUC HFRA polygons from SCE's previous HFRA (i.e., greater than 99% of the 8% previously constituting SCE's non-CPUC HFRA service territory). Therefore, with the inclusion of the less than 1% of its service territory, SCE's HFRA will now be in very close alignment with that of the CPUC HFTD maps.

4.2.1.3 Impacts of HFRA Boundary Changes

Figure SCE 4-2 provides a before and after snapshot of the HFRA boundary change.

Figure SCE 4-2
Impacts of HFRA Boundary Changes

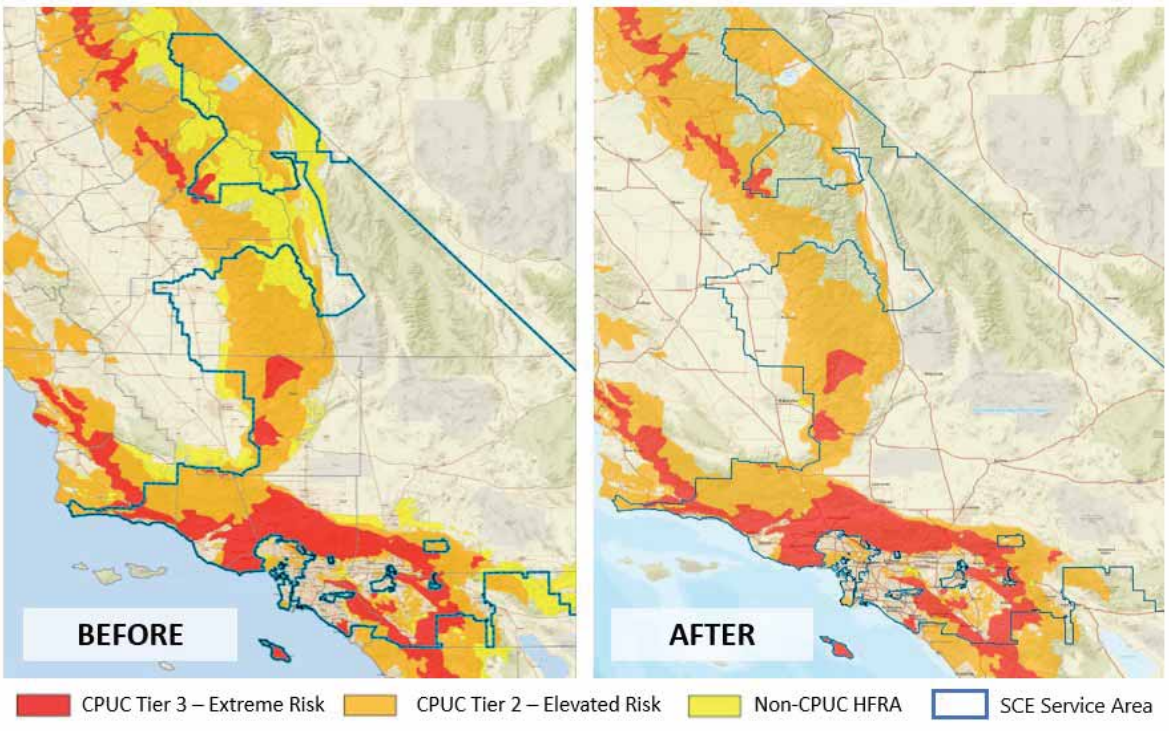


Table SCE 4-2 summarizes the impacts of the HFRA boundary change by area. For a description of the boundary change impact on individual mitigations or hardening activities, please refer to Advice Letter 4030-E filed on July 5, 2019.

Table SCE 4-2
Impacts of the HFRA Boundary Change by Area

	Before HFRA Evaluation		After HFRA Evaluation	
	Area (Square Miles)	Percent of Service Territory	Area (Square Miles)	Percent of Service Territory
Tier 3 of the HFTD--Extreme Risk	4,708	9%	4,708	9%
Tier 2 of the HFTD --Elevated Risk	9,571	18%	9,571	18%
SCE HFRA Not in HFTD	4,212	8%	124	<1%
Total	18,493	35%	14,403	27%

4.2.1.4 Macro Trends Impacting Utility Ignited Ignition Probability and Estimated Wildfire Consequence by Year 10

In the "Rank" column, numerically rank the trends anticipated to exhibit the greatest change and have the greatest impact on ignition probability and estimated wildfire consequence (be it to increase or decrease ignition probability and estimated wildfire consequence) in ten years. Rank in order from 1 to 8, where 1 represents the greatest anticipated change or impact on ignition probability and estimated wildfire consequence and is the least anticipated change or impact.

In the "Comments" column, provide a narrative to describe the expected change and expected impact on the utility's network, including whether the trend is expected to significantly increase risk, moderately increase risk, have limited or no impact, moderately decrease risk, or significantly decrease risk. Use quantitative estimates wherever possible. Also outline any programs being implemented to specifically address this trend.

In Table 19, SCE ranked the macro trends largely based on the fire triangle (i.e., heat, fuel and oxygen), as these factors have the largest impact on ignition probability and wildfire consequence. In the Comments column, SCE describes the science and assumptions it used in its ranking. SCE had not previously projected these macro trends out ten years as it relates to wildfire safety and has based its responses on high-level SME judgment. SCE believes climate change would have the largest impact on ignition probability and wildfire consequence as it is a main driver of fuel density and moisture.

List and describe any additional macro trends impacting ignition probability and estimated wildfire consequence within utility service territory, including trends within the control of the utility, trends within the utility's ability to influence, and externalities (i.e., trends beyond the utility's control, such as population changes within the utility's territory).

List and describe all relevant drivers of ignition probability and estimated wildfire consequences and the mitigations that are identified in the Risk Assessment Mitigation Phase (RAMP) and not included in the above, including how these are expected to evolve. Rank these drivers from highest to lowest risk and describe how they are expected to evolve

SCE used the bowtie framework (included in SCE's RAMP report) to model wildfire risk, which included describing and quantifying the various direct drivers and sub-drivers of ignition. Chapter 12 of SCE's RAMP report refers to the impact of more extreme wildfire events as well as other catastrophic events such as extreme rain events and/or heat events. As SCE's modelling capabilities and understanding of the wildfire risk matures, more scenario analysis can be utilized to further understand the different macro trends impacting ignition probability and wildfire consequence.

See Table 19: "Macro trends impacting ignition probability and/or wildfire consequence" for more details.

4.3 CHANGE IN IGNITION PROBABILITY DRIVERS

Based on the implementation of the above wildfire mitigation initiatives, explain how the utility sees its ignition probability drivers evolving over the 3 year term of the WMP. Focus on ignition probability and estimated wildfire consequence reduction by ignition probability driver, detailed risk driver, and include a description of how the utility expects to see incidents evolve over the same period, both in total number (of occurrence of a given incident type, whether resulting in a near miss or in an ignition) and in likelihood of causing an ignition by type. Outline methodology for determining ignition probability from events, including data used to determine likelihood of ignition probability, such as past ignition events,
number of near misses, and description of events (including vegetation and equipment condition).

As noted in the Executive Summary, in 2019, SCE deployed the WRM to estimate the amount of risk expected at individual locations. As described in Section 4.2, SCE used the RAMP methodology to perform overall portfolio system-wide risk analysis, while the more granular WRM helped SCE prioritize the deployment of wildfire mitigation to areas in order of the highest risk. The WRM utilizes a similar risk bowtie approach as described in RAMP, but builds upon that approach by localizing the drivers, outcomes, and consequences to specific circuit and circuit segments. The output of this model is a risk score that identifies high risk locations where specified, targeted mitigations could be considered. In 2019, SCE used the WRM to re-prioritize the deployment of covered conductor to higher risk locations. Over the next three years, covered conductor deployment will increase from 151 circuit miles in 2018 and 372 circuit miles in 2019, to 700-1000 circuit miles in 2020, 1,400 circuit miles in 2021, and 1,600 circuit miles in 2022, ultimately reducing system risk between 45% to 65%. SCE also used the WRM to inform SCE's HFRI Program. Once operational, this program will utilize WRM outputs to inspect higher risk areas more frequently.

The WRM is comprised of three components: a Probability of Failure/Ignition Likelihood module, a Fire Propagation module, and an Impact module. The propagation and impact modules are integrated to produce a single consequence variable used by the WRM.

4.3.1 Probability of Ignition Module

The Probability of Failure/Ignition Likelihood module uses predictive models developed by SCE to identify assets most likely to be associated with an ignition. The probability of an ignition is the combined probability of spark with probability of fire.

4.3.1.1 Probability of a Spark

SCE's probability of a spark model has three primary components: probability of a spark caused by an equipment failure (EFF), probability of a spark caused by contact from a foreign object (CFO), and the probability of a spark caused by an identified maintenance item (e.g., a Priority 2 notification).

SCE used machine learning algorithms to assess the likelihood or probability that a piece of equipment will experience a fault resulting in a spark from either an EFF or a CFO, and the probability that fault will result in an ignition event. SCE used an extensive series of input variables including historical asset performance, weather, environmental, and geographical data to develop the predictive models. The Probability of Failure/Ignition Likelihood module contains individual sub-models for each type of asset (wire, transformer, etc.), and thus total ignition probability at a structure (pole or tower) is calculated as the sum of the probabilities of ignition across the assets at that location.

SCE calculated the probability of a spark caused by an identified maintenance item (e.g., Priority 2) using a failure modes and effects analysis as the number of equipment failures that occur specifically on equipment that had a previously identified maintenance item is very limited. Moreover, because maintenance items are typically repaired before failure, the inherent risk of failure before replacement must be estimated theoretically.

4.3.1.2 Probability of a Spark Turning into a Fire

The probability of a spark resulting in a fire is a function of the FPI. FPI is an internal tool used to estimate wildfire potential based on forecasted weather and fuel conditions. For more details on SCE's FPI, see Section 5.3.2.4. In 2020, SCE will begin refining its current FPI by integrating historical weather and vegetation data into the index. In parallel, SCE will work on the development and testing of a new FPI which will incorporate more information about fuel conditions. As SCE is still advancing its FPI, currently and for 2020, SCE assumes a 100% conversion rate from spark to fire.

4.3.2 Fire Propagation Module

The fire propagation module of the WRM replaces the broader "outcome" scenarios presented in SCE's GSRP, RAMP and 2019 WMP filings by forecasting specific fire attributes, namely:

- Fire volume and flame length
- Fire progression, area, and direction
- Potential structures impacted by a fire based on the sample fire scars

In early 2019, SCE contracted with Reax, a recognized expert in areas ranging from fire investigation and building code fire to wildfire computer modeling, to develop improved wildfire consequence information using the firm's wildfire simulation tools. Fire propagation characteristics are provided by Reax using its ELMFIRE fire modeling technology. This technology utilized a twenty-year fire weather climatology to develop historical fire-weather days across SCE's service territory. The model includes high resolution, hourly gridded fields of relative humidity, temperature, dead fuel moisture, and wind speed/direction (weather scenarios) as inputs to a Monte Carlo simulation using hundreds of thousands of ignition locations distributed

randomly within an extended perimeter, or "buffer" surround SCE overhead facilities in HFRA. Based on these simulations, fire volume – the spatial integration of fire area and flame length – were tabulated and recorded to develop sample fire scars. This process was repeated across SCE's service territory for hundreds of thousands of combinations of ignition location and ignition time. Outputs of these simulations were used to quantify the consequence as the product of fire volume and the number of impacted structures within the weighted average overlay of simulated fire scars localized to 300 meter by 300 meter Reax grid squares.

The figures below illustrate an example. The figure on the left illustrates SCE overhead facilities. The figure on the right illustrates match-drop ignition locations randomly distributed within a buffer surrounding SCE overhead facilities.

Figure SCE 4-3.2

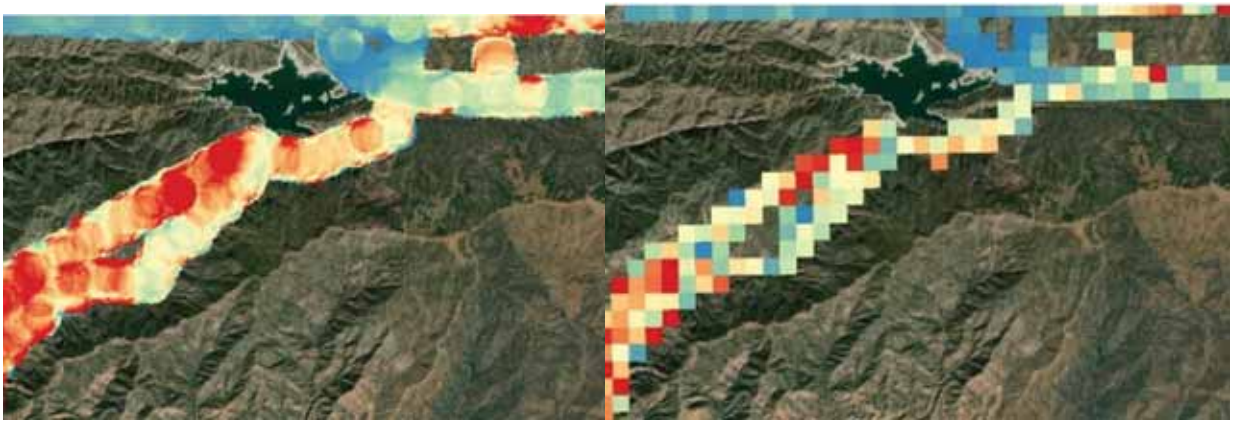


4.3.3 Fire Impact Module

For the Fire Impact module, SCE enhanced the Reax consequence output to consider not only the number of structures impacted, but also impacts to safety, such as serious injuries and fatalities, acres of property burned, as well as suppression and restoration costs. Reax uses the weighted average of the fire propagation simulations spreading from each of the points to estimate the number of structures and population that could be impacted for each simulated fire. Using U.S. Census housing density data, the six-hour fire simulation estimates the structure density for each pixel within the perimeter of the simulation. The granularity of this model enables SCE to estimate the scope of the potentially impacted structures based on the specific burn area simulated, instead of relying on higher level housing density information. SCE has continued to refine the consequence module to create risk flags to assess population egress – the ability of a population to evacuate an area – and social vulnerability – the ability of a population to withstand the economic impacts associated with a fire event. These risk flags are estimated outside of the Reax fire propagation module.

The model outputs are generated as raster files with a resolution of 30 meters. These raster files depict fire area, volume, number of structures impacted, and risk surrounding the modeled ignition point (see the figures below). In order to simplify the analysis, these risk boundaries are smoothed using a kernel density interpolation technique to create 300-meter by 300-meter average "Reax squares."

Figure SCE 4-3.3



In 2020, SCE is adopting a GIS-enabled software platform known as Technosylva to enhance SCE's ability to model wildfire risk. One of the tools provided by Technosylva is the Wildfire Risk Reduction Model (WRRM),[4] which integrates wildfire ignition probability developed for the WRM with Technosylva fire spread predictions to calculate the expected risk. Similar to the methodology employed by Reax, the WRRM will conduct Monte Carlo simulations to estimate the potential impact of fire ignition and propagation to structures, population, utility assets, and critical facilities using a set of historical and projected fire weather data. However, WRRM improves upon Reax in several ways. This tool will integrate with SCE's weather forecast model, using a customized version of the Weather Research and Forecasting model calibrated to two-kilometer by two-kilometer wind and weather conditions SCE's service territory granular two-kilometer by two-kilometer wind and weather conditions. This analysis will use a pre-defined set of weather scenarios, reflecting the most common conditions for fire ignition and propagation and will run multiple simulations for each asset. SCE expects to run several scenarios for each ignition point using different fire propagation and weather scenarios simulations, resulting in hundreds of millions of simulations throughout SCE's service territory. SCE intends to re-run this simulation on an annual, or semi-annual basis based on updated and calibrated information from previous fire weather seasons. The WRRM will also rely on more granular vegetation, structure,

[4] For clarity, SCE's current WRM is different than Technosylva's WRRM despite similar names and acronyms.

and population data than currently used in Reax to estimate potential consequences. The ability to run multiple scenarios in a myriad of weather and wind conditions along with improved population, structure, weather, and vegetation datasets will vastly improve SCE's ability to design and target mitigations to high risk areas. The Technosylva WRRM will also rely on more granular vegetation, structure, and population data than currently used in Reax to estimate potential consequences.

In addition to developing risk scores for known current weather conditions, SCE plans to enhance the WRRM to develop future-facing "what if" climate scenarios based on future projected climate conditions. SCE intends to work with the California Energy Commission (CEC) and stakeholders in other proceedings, such as the Commission's Climate Change Adaptation Order Instituting Ratemaking (R.18-04-019), to better understand climate models that may need to be developed through an iterative working process. These longer-term future-facing models are anticipated to be used to inform SCE's wildfire mitigation strategies and programs. SCE is also working to further develop additional risk flags in the WRRM to identify quantitative and qualitative considerations to improve the risk model including, for example, developing improved assessments of population egress and fire suppression capabilities in local areas.

The WRRM will integrate with two other Technosylva tools that SCE is employing, FireSim and FireCast that are further discussed in Section 5.3.2. WRRM will share weather and vegetation data with FireCast and FireSim to ensure consistency between real-time operational planning and system-wide mitigation deployment.

4.4 Directional Vision for Necessity of PSPS

Describe any lessons learned from PSPS since the utility's last WMP submission and expectations for how the utility's PSPS program will evolve over the coming 1, 3, and 10 years. Be specific by including a description of the utility's protocols and thresholds for PSPS implementation. Include a quantitative description of how the circuits and numbers of customers that the utility expects will be impacted by any necessary PSPS events is expected to evolve over time. The description of protocols must be sufficiently detailed and clear to enable a skilled operator to follow the same protocols.

SCE has defined protocols that dictate the need for activation of a PSPS Incident Management Team (IMT). When wind and fire potential (quantified by SCE's FPI) forecasts are at or above Elevated Fire Weather Threat levels, SCE activates IMTs to report to its Emergency Operations Center. Each team is trained and qualified on the Incident Command System (ICS), the federally recognized emergency response methodology. SCE has teams on-call 24 hours a day, 7 days a week, 365 days a year.

Three days ahead of a forecasted PSPS event, SCE's PSPS IMT initiates notifications, if weather conditions can be predicted this far in advance, to public safety partners and city/state agencies in the potentially impacted area. Two days before forecast conditions are expected to impact a specific circuit, SCE's protocol dictates the initiation of notification to customers on that circuit via their preferred method of communication (e.g., text, e-mail, or phone). They are again scheduled to be notified one day before the forecasted conditions.

During this time, SCE also deploys field resources to pre-patrol each circuit that is forecasted to be in scope for PSPS de-energization consideration. This requires a qualified electrical worker (QEW) to visually inspect the entire length of the overhead circuit that traverses HFRA to verify if the circuit can withstand incoming weather and to provide other up-to-date intelligence on field conditions to SCE's IMT. If concerning maintenance items are discovered on a circuit in scope, repairs are expedited (if possible) before the impending wind event. Where possible, every circuit that is in scope for the upcoming event should have a pre-patrol performed, unless it was already patrolled within the last seven days.

Prior to each PSPS event, SCE implements required modified operational procedures that minimize or eliminate the potential for a spark to occur. When circuits are forecasted to exceed pre-determined thresholds, SCE implements fast curve settings protective relays, which are designed to limit the fault energy and more quickly de-energize the line should a fault occur. SCE also implements operating restrictions and blocks reclosers on these lines so that if a line relays, it cannot automatically reclose. In this situation, the line has to be patrolled and the potential safety hazard removed before the circuit can be re-energized.

Two hours before the start of the event, SCE's IMT coordinates with field resources to ensure that a QEW is physically present for live field observation (LFO). The purpose of this LFO is to monitor a circuit for any possible signs of failure or prevailing environmental conditions such as potential damage from wind gusts, airborne vegetation, or flying debris. If observed conditions are concerning enough, QEWs are empowered to recommend immediate de-energization to the Incident Commander.

LFOs are just one of many inputs that SCE's IMT considers, while evaluating the potential for PSPS de-energization of a circuit. Other inputs include specific concerns from state and local fire authorities, emergency management personnel, and law enforcement regarding public safety issues. The expected impact that de-energizing circuits will have on public safety (through impacts on essential services such as public safety agencies, water pumps, traffic controls, etc.) is also an input to the final recommendation by the PSPS IMT. The decision to de-energize must be authorized by the IMT's Incident Commander.

SCE's de-energization decisions are made on a circuit-by-circuit basis, often on a sub-circuit level, and are taken only when current conditions in the immediate area warrant action. De-energization wind speed triggers are unique to each circuit and are dynamic based on evolving environmental and circuit-specific characteristics. Some factors that are taken into consideration

when setting de-energization triggers include wind speed, FPI, ignition consequence modeling, circuit conditions, length of conductor, and other technical characteristics for the applicable circuit. The IMT takes characteristics such as a higher FPI, multiple historical outages or outstanding maintenance items into account when determining if wind speed thresholds for recommending de-energization should be lowered.

Lessons learned from PSPS events and SCE's protocols for PSPS implementation are captured in SCE's required ESRB-8 filings after each PSPS event. These reports can be found on SCE's website at www.sce.com/wildfire under "Reports to the CPUC." Recent lessons learned focus on the need for greater stakeholder communications during PSPS events to include coordination with public safety partners and local governments, and the need for greater understanding of impacts from a PSPS event to include enhanced outage notification during PSPS events.

Setting aside variability in weather conditions, SCE anticipates de-energization events to decrease in coming years. However, PSPS events will still be required in some cases for the safety of customers and communities. SCE is targeting ignition risk mitigation efforts on circuits most impacted by PSPS in 2018 and 2019. Continuous improvement in operational practices (e.g., optimizing circuit-specific activation and de-energization thresholds), expanded grid hardening activities (e.g., targeted installation of covered conductor and additional automated sectionalizing devices), and enhanced situational awareness capabilities through expansion of SCE's network of weather stations will also facilitate reducing PSPS events over time.

In parallel, SCE is actively pursuing customer care initiatives to help decrease the impact of PSPS events on its customers. Examples of these initiatives include deployment of Community Crew Vehicles (CCVs), activation of Community Resource Centers (CRCs) and engagement with impacted communities to help bolster preparedness. The mitigations SCE is undertaking are discussed in more detail in Section 5.3.6.

Table 20 provides SCE's estimates about the use of PSPS protocols and specific impacts to the public over the coming decade. Forecasts in this table assume unchanged Tier 2 and Tier 3 areas, low population and load growth, and undetermined climate change on fire weather in SCE's service territory.

SCE's forecasts also assume that 2019 represents an average year for future fire-weather threats. If fire weather threats worsen in frequency and intensity compared to 2019, the expected frequency and impact of PSPS events in SCE's HFRA may be adversely impacted.

See Table 20: "Anticipated characteristics of PSPS use over next 10 years" for more details.

Chapter 5

Wildfire Mitigation Strategy and Programs for 2019 and for Each Year of the 3-Year WMP Term

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5 Wildfire Mitigation Strategy and Programs for 2019 and for Each Year of the 3-Year WMP Term

5.1 Wildfire Mitigation Strategy

Describe organization-wide wildfire mitigation strategy and goals for each of the following time periods:

1. *Before the upcoming wildfire season, as defined by the California Department of Forestry and Fire Protection (CAL FIRE),*
2. *Before the next annual update,*
3. *Within the next 3 years, and*
4. *Within the next 10 years.*

The description of utility wildfire mitigation strategy shall:

A. Discuss the utility's approach to determining how to manage wildfire risk (in terms of ignition probability and estimated wildfire consequence) as distinct from managing risks to safety and/or reliability. Describe how this determination is made both for (1) the types of activities needed and (2) the extent of those activities needed to mitigate these two different groups of risks. Describe to what degree the activities needed to manage wildfire risk may be incremental to those needed to address safety and/or reliability risks.

B. Include a summary of what major investments and implementation of wildfire mitigation initiatives achieved over the past year, any lessons learned, any changed circumstances for the 2020 WMP term (i.e., 2020-2022), and any corresponding adjustment in priorities for the upcoming plan term. Organize summaries of initiatives by the wildfire mitigation categories listed in Section 5.3.

C. List and describe all challenges associated with limited resources and how these challenges are expected to evolve over the next 3 years.

D. Outline how the utility expects new technologies and innovations to impact the utility's strategy and implementation approach over the next 3 years, including the utility's program for integrating new technologies into the utility's grid.

Fire risk management and mitigation has been an integral part of SCE's operational practices for years. Since 2017, however, large catastrophic fires have emphasized that the safety of SCE's communities requires additional measures to address a higher level of wildfire risk not contemplated by existing state standards or traditional utility fire mitigation practices. Accordingly, SCE undertook a large effort starting in late 2017 to assess, test, and benchmark several enhanced wildfire mitigation measures and approaches and began deploying these in

2018. In 2019, as described in SCE's 2019 WMP and subsequent December 2, 2019 Reports on Possible Off Ramps Advice Letter (Advice 4120-E or Off Ramp Report), SCE accelerated and expanded its wildfire mitigation activities, making modifications and refinements based on emergent events, additional analysis, and lessons learned from its successes and trials during implementation. These efforts were challenging as SCE established new processes, tools, and protocols to implement its wildfire mitigation strategies and programs. SCE was largely successful in meeting the goals for the 58 activities in its 2019 WMP. SCE continued to improve many facets of its wildfire programs in 2019 including improved and more granular risk analyses, and modifications to its PSPS program to reduce the frequency and impact of de-energization.

The primary objective of this WMP is to set forth an actionable, measurable, and adaptive plan for 2020 to 2022 to reduce the risk of ignitions associated with SCE's electrical infrastructure in HFRA. Consistent with SCE's first WMP, this WMP's fundamental underlying objective is protecting public safety by, among other things, further hardening SCE's electric system against wildfires and improve system resiliency, minimizing the customer impact of PSPS, improving fire agencies' ability to detect and respond to emerging fires in coordination with utility emergency management personnel, and effectively communicating with customers, community groups, and other stakeholders about how to prepare for, prevent, and mitigate wildfires in SCE's HFRA.

SCE's 2020-2022 WMP is not static. As SCE learns from its experiences and gains new information about factors affecting wildfire risk, SCE will reassess its wildfire mitigation strategy to continually focus on improved ways to mitigate the highest wildfire risks. Accordingly, consistent with the requirements in PU Code Section 8386, this WMP sets forth SCE's 2020-2022 plan to minimize wildfire risk by prudently operating and maintaining its grid. While these collective efforts are designed to mitigate the risk of fire ignition events associated with SCE's electrical infrastructure, the risk of ignition will not be eliminated. Over time and cumulatively, the success of the individual programs and activities in this WMP are expected to result in an overall reduction of controllable fire ignition events associated with SCE's electrical infrastructure.

Below are summaries of SCE's initiatives organized by the wildfire mitigation categories listed in Section 5.3, including goals achieved and lessons learned. For more details, see the associated sections in this WMP, SCE's most recent 2019 WMP progress update filed in the Senate Bill (SB) 901 OIR and SCE's Off Ramp Report.

5.1.1 Risk Assessment and Mapping

In its 2019 WMP, SCE committed to evolving its risk modeling beyond the portfolio level analysis described in GSRP and RAMP to better inform decisions to target the deployment of wildfire mitigation on a more granular level. Thus, as described in Chapter 4, SCE has progressed its modeling capabilities beyond the analysis of historical ignition data to a more dynamic approach with its WRM and will further advance with the implementation of the WRRM.

SCE's wildfire mitigation programs for risk assessment and mapping are further described in Section 5.3.1.

5.1.2 Situational Awareness and Forecasting

A key component of SCE's wildfire mitigation strategy is to enhance situational awareness capabilities regarding potential wildfire conditions and develop appropriate operational plans, including minimizing the use of PSPS to mitigate wildfire risk. Importantly, these efforts help both fire agencies and SCE emergency management staff in assessing and responding to wildfires. SCE has installed 161 HD cameras, reaching 90% coverage of its Tier 2 and Tier 3 HFRA. The deployment of HD cameras has reached a saturation point and due to geographical limitations, additional cameras will not provide any additional benefits. SCE has also completed the deployment of 482 weather stations and will continue to deploy more, primarily in HFRA to enable more targeted PSPS and improve its weather modeling capabilities. Furthermore, SCE is increasing staffing of fire management personnel and meteorologists to improve situational awareness, and support planning and operational decisions to reduce wildfire risk.

Partnering with the University of California San Diego (UCSD) and coordinating with state, county and local fire agencies to identify optimal placement of HD cameras was valuable and effective. In addition, encouraging vendors to negotiate tower agreements early helped avoid schedule delays. Among the lessons learned was the need to consider inclement weather, remote terrain, and accessibility issues (e.g., snow, mud, etc.) when establishing the schedule for weather station installations.

Situational Awareness and Forecasting are further described in Section 5.3.2

5.1.3 Grid Design and System Hardening

In 2019, SCE continued to make significant investments in grid hardening including replacing hundreds of miles of bare conductor with covered conductor, replacing wood poles with fire resistant poles where appropriate, installing more fast-acting fuses, and remote controlled sectionalizing devices in HFRA. These grid hardening measures that focus on reducing ignition risk also improve reliability by reducing the frequency and impact of faults resulting from contact from objects. The increased resistance to faults and conductor insulation may also reduce the frequency of wire down, wire-to-wire contact, and wire contact with energized equipment incidents.

Installing covered conductor on its overhead lines in HFRA continues to be one of the major wildfire risk mitigation activities in this WMP given its risk reduction potential and cost effectiveness compared to other measures such as undergrounding. As mentioned previously, SCE is prioritizing and targeting system hardening mitigations in higher risk areas within HFRA.

SCE is also refining its strategy for deploying sectionalizing devices. In 2019, RARs were installed and/or relocated around the HFRA boundary to improve electric service for customers located outside of HFRA during PSPS or other outage events. Further analysis showed that sectionalizing devices, including Remote Controlled Switches (RCS), in certain locations are a more cost-effective and feasible alternative to RARs to achieve the same granular sectionalizing capability. In this WMP period, SCE will continue to install remote controlled switches to further sectionalize its circuitry in HFRA.

Based on analysis of recent PSPS events, SCE has identified opportunities to reassess, and potentially modify circuit designs and configurations to reduce the number of customers affected during a PSPS event. This includes replacing small segments of bare conductor with covered conductor, targeted undergrounding projects, and/or adding switching devices (and potentially circuit ties) to improve flexibility for circuit reconfigurations and load transfers. These circuit modifications help minimize the impact to customers who are located in 1) non-HFRA that are fed from circuits that also serve HFRA and 2) underground circuits within HFRA that are fed from circuitry that also contains overhead facilities within HFRA.

Through fire testing and technical evaluations in 2019, SCE learned that a fire-resistant wrap/barrier is capable of withstanding temperatures exceeding 2,100 degrees Fahrenheit. Applying a protective layer to new wood poles has proved to be an effective measure to protect them from the typical conditions a wood pole may be subjected to during a passing wildfire (after an ignition has occurred). This fire-resistant pole-wrapping technology is a cost-effective alternative to installing fire-resistant composite poles when the probability of an ignition at the pole is low (i.e., no electrical equipment on the pole and/or not a woodpecker area). In 2020, SCE will continue installing the fire-resistant wrap/barrier on new treated wood poles in HFRA when these criteria are met. Installation of this fire-resistant protective wrap/barrier to wood poles in combination with fire-resistant composite poles will allow SCE to lower costs while meeting the need of hardening its grid.

Also in 2019, SCE completed technology pilots or evaluations of ridge pin construction (used only in limited scenarios), bolted wedge connectors (implemented into standards for new construction and rebuilds), substation class electronic fuses (will not expand their use at this time), single phase reclosers (will continue to evaluate), CAL FIRE exempt surge arresters (incorporated into standards for new arrestor applications in HFRA).

SCE is continuing to explore other advanced or alternative technologies such as infrared technology, machine learning and artificial intelligence to complement grid hardening activities. SCE is using infrared technology to scan circuitry and connectors to detect anomalies for targeting replacements. SCE has also identified a potential opportunity to leverage machine learning object detection on equipment inspection photos to help detect conditions requiring remediation and streamline inspection processes (Section 5.3.4.9.1.1 further describes asset defect detection using machine learning). SCE is exploring the use of artificial intelligence/machine learning to identify patterns and support future predictive maintenance. SCE expects to advance these technologies over this WMP period.

Grid Design and System Hardening activities are further described in Section 5.3.3.

5.1.4 Asset Management and Inspections

SCE's inspection and maintenance programs are foundational to help ensure safety and reliability of its grid. Historically, SCE inspected and maintained electrical equipment and structures regularly to reduce safety and reliability risks, but these programs were designed to meet

compliance requirements. Given the increased wildfire risk, SCE developed and implemented new inspection and maintenance initiatives to combat this heightened threat. In 2019, SCE inspected all distribution, transmission, and generation assets located in HFRA, and developed new wildfire risk criteria as part of its Enhanced Overhead Inspection (EOI) initiative. Acceleration of approximately 450,000 ground-based inspections (all structures in SCE's original HFRA), typically performed over a 5-year cycle, were completed in approximately five months. This schedule helped identify structure and equipment conditions that could lead to faults faster, but also created challenges for remediating these findings within compliance timeframes. The regulatory requirements for remediation are time-based and limited in ability to distinguish between the different levels of risks posed by different types and locations of the findings. In 2020, SCE plans to make two further modifications to its inspection and maintenance programs informed by risk analysis. First, assets that pose higher risks (for both probability of ignition and fire consequence) will be inspected more frequently. Second, SCE wants to set remediation schedules based on risk assessment of the finding. SCE looks forward to working with the CPUC and the WSD on these changes that would mature its asset management capability beyond minimum regulatory requirements and help SCE allocate constrained resources to maximize risk reduction.

SCE has learned some valuable lessons from its 2019 inspection programs. For example, in March 2019, a crossarm failed resulting in a downed powerline which appears to have caused a small fire. Upon further inspection, it was determined that the bottom of the crossarm as viewed from the ground in a recent ground-based inspection was in good condition, but the top of the crossarm showed significant deterioration. SCE expeditiously modified its inspection strategy and deployed aerial inspections to complement ground inspections on all transmission and distribution assets in its HFRA to inspect pole tops, wooden crossarms, steel structures, and all conductor/hardware. Aerial inspections paired with ground inspections offer a more comprehensive 360-degree perspective of the structures and equipment that may not be easily visible from the ground. The aerial inspections program deploys various types of sensors and collects different types of information, including HD photos, videos, LiDAR data, infrared data, and corona data which are used to identify issues, analyze risks, prioritize and ultimately remediate the findings. Given the urgency of completing aerial inspections under compressed timeframes, the supporting business processes used quick-to-deploy technology solutions. SCE is building comprehensive technology and data management solutions to support the aerial inspections business processes as it transitions from a quick-launch initiative to a steady-state activity.

When the 2019 WMP was submitted, SCE included a plan to scan its transmission assets in HFRA using infrared technology when they were operating at or above 40% of their rated line capacity to adequately identify anomalies. However, such operating conditions are intermittent and are often correlated with hot weather, when the ambient conditions can mask equipment-related data. After evaluating additional data, SCE identified that due to NERC/FERC reliability standards and because of seasonal loading variations, most of the transmission system operates well below 40% of rated line capacity for much of the year. Accordingly, SCE evaluated the ability to take infrared images on lines operating at lower rating capacities and discovered that such images

effectively captured anomalies on lines operating well below the initially set 40% load threshold.[1]

Asset Management & Inspections are further described in Section 5.3.4.

5.1.5 Vegetation Management and Inspections

SCE's Vegetation Management Program has been in place for many years conducted in accordance with General Order (GO) 95 compliance requirements. This program emphasizes inspection and maintenance of vegetation clearance near electrical facilities to help reduce ignitions and outages stemming from vegetation contact with energized electrical infrastructure. SCE's vegetation management strategy addresses potential ignition risk by preventing fall-ins, grown-ins and blow-ins. SCE's vegetation management programs include tree removals, maintaining clearance distances, pole brush clearing, and, in more recent years, weed abatement.

In response to California's increased wildfire risks, SCE's Vegetation Management Program was modified to include supplemental vegetation inspections during the summer growth season in HFRA through Operation Santa Ana and the Drought Relief Initiative (DRI) as described in Section 5.3.5. In 2018, SCE expanded the program even further by adding SCE's Hazard Tree Management Program (HTMP); expanded clearances at time of maintenance; and pole brush clearing. In 2020, SCE is focusing on improving and strengthening its vegetation management work scheduling, crew management, and will strengthen its quality control and quality assurance activities.

SCE also plans to deploy an Integrated Vegetation Management (IVM) platform that will facilitate better collaboration with arborists, environmental and utility regulators, and customers to achieve the right trim at the right time. This platform will integrate disparate vegetation management tools and systems to improve work planning and scheduling, notification of work, and reporting. Additional benefits include improved risk-informed allocation of resources that should lead to reduced time between target trim date and actual trim date and a reduced number of visits per site. The integrated program will initially focus on DRI and HTMP and then be rolled out across all wildfire related vegetation activities by 2022.

In 2019, SCE faced resource challenges in a tight labor market and increased costs caused in part by growing demand across the state for new vegetation clearance requirements. Statutes requiring increased wages for qualified line clearance trimmers, which became effective in 2020, will also create upward cost pressure. SCE also experienced and continues to experience challenges with gaining support from property owners and agencies that do not agree with the value and efficacy of vegetation management for wildfire mitigation or perceive potential environmental and aesthetic impacts as outweighing that value.

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[1] *See* SCE's Advice Letter 4120-E (submitted in conformance with D.19-05-036), pp. 11-12 (December 2, 2019), https://library.sce.com/content/dam/sce-doclib/public/regulatory/filings/pending/electric/ELECTRIC_4120-E.pdf.

Vegetation Management and Inspections are further described in Section 5.3.5.

5.1.6 Grid Operations and Protocols

SCE's grid hardening and other wildfire mitigation activities should, over time, reduce the need for PSPS. Hardening the grid in SCE's HFRA is a multi-year effort and PSPS events may still occur (during transition and possibly even later depending on climate and weather changes). Thus, SCE is committed to aggressively pursuing mitigations to minimize the impacts of PSPS on communities.

SCE considers initiating PSPS events based on several factors including but not limited to QEW observations in the field; specific concerns from state and local fire authorities, emergency management personnel, and law enforcement regarding public safety issues; the expected public safety impact of de-energizing circuits (such as impacts on essential services such as public safety agencies, water pumps, traffic controls, etc.); and extreme weather conditions such as when wind speeds and the FPI exceed certain threshold values. These thresholds are based upon a number of risk factors, such as the condition of physical assets that comprise a given circuit and historical wind speeds.

Beginning in 2020, SCE plans to implement additional and expanded initiatives to further reduce impacts to customers.

Grid Operations and Protocols are further described in Section 5.3.6.

5.1.7 Data Governance

Traditionally organizations across SCE have addressed data governance at the system and initiative level largely focused on data quality, security, and compliance. While these programs and processes have been largely successful, in 2019, SCE established new processes and tools to help manage large datasets associated with its wildfire mitigation initiatives including, for example, inspection data (including aerial images), remediation data, and risk information critical to effectively plan, prioritize, and manage work. SCE plans to invest in automation, machine learning, and artificial intelligence over this WMP period, focusing on data architecture, management, and stewardship. These refinements will help integrate wildfire data in areas including vegetation management, asset inspections, and PSPS. Ultimately, the integration of these datasets will allow for greater insights from advanced analytics of asset health for improved risk modeling and prediction.

In 2020, SCE will continue developing its foundational data governance strategy and will also develop a data quality framework and methodology for measuring and managing master data quality. Ongoing development of SCE's data governance strategy and its implementation will continue for a number of years until it is fully realized.

Data Governance is further described in Section 5.3.7.

5.1.8 Resource Allocation Methodology

Wildfire mitigation activities have considerably increased the overall scope of utility work and pose challenges to resource allocation. In many cases, the same crews that support wildfire mitigation activities are responsible for executing SCE's traditional infrastructure replacement work. Despite the importance of traditional infrastructure replacement work, SCE will pursue them at a slower pace in order to accomplish crucial wildfire mitigation work.

Resource Allocation Methodology is further described in Section 5.3.8.

5.1.9 Emergency Planning and Preparedness

SCE has a robust emergency management structure for hazards, including wildfires. Its emergency preparedness and response plans consider numerous hazards that potentially impact SCE's service territory and/or the electric grid, including earthquakes, cybersecurity, and wildfires. Further, SCE delivers a robust FEMA-based ICS (Incident Command System) training program that follows the National Incident Management System (NIMS) model for employees identified as IMT members and has trained over 500 employees to-date.

SCE's wildfire mitigation programs for Emergency Planning and Preparedness are further described in Section 5.3.9.

5.1.10 Stakeholder Cooperation and Community Engagement

SCE is committed to keeping its customer and key stakeholders informed on the company's WMP activities, PSPS protocols, and general emergency preparedness. In 2019, SCE conducted over 350 meetings and presentations with local government and tribal officials, community organizations, and the general public. In 2020, SCE will concentrate its efforts on communities that were impacted by multiple PSPS de-energizations.

SCE's wildfire mitigation programs for Stakeholder Cooperation and Community Engagement are further described in Section 5.3.10.

5.1.11 New Technologies and Innovations

SCE actively monitors advancements by partner utilities, academia, and industry to incorporate new technologies and asset management strategies into its standards. SCE pilots new technologies on a limited scale to gain an understanding of the technical and construction requirements and, if successful, works to deploy these technologies on a wider scale across the HFRA or service territory. For example, SCE is currently exploring the use of unmanned aerial systems (drones) and, as mentioned earlier, detection technologies using artificial intelligence and machine learning to compliment SCE's manual inspection process (Section 5.3.4.9.1.1 further describes asset defect detection using machine learning).

SCE's wildfire mitigation programs for New Technologies and Innovations are further described throughout the WMP.

5.1.12 Alternative Mitigations Considered

In the spirit of continuous improvement, SCE routinely evaluates its wildfire mitigation strategies

and programs and considers alternative mitigations with improving data, data models, other analytical tools, and guidance from the Commission. Brief summaries of alternative mitigations for certain wildfire initiatives are described below.

Covered Conductor:
SCE's risk analysis showed that installation of covered conductor, in most cases, provides greater overall risk reduction value than underground conversion. Covered conductor achieves many of the same fire mitigation benefits as converting overhead wire to underground cable, but at a fraction of the time and cost to implement. It also has similar public safety benefits but does not suffer from the troubleshooting and restoration delays associated with underground systems, meaning faster repairs and shorter outage times for customers. SCE is planning, however, to implement underground conversion of overhead wire in select areas over this WMP period as further described in Section 5.3.3.

High Definition (HD) Cameras:
Though SCE has access to fire progression images through other public means (e.g., monitoring news channels and 911 calls) and can dispatch fire crews to determine fire severity, SCE selected to deploy HD cameras to expedite obtain information gathering regarding fire progression. Moreover, SCE understands from SDG&E's experience that the fire agencies also find the HD cameras beneficial for their fire containment and public protection efforts since no other agency or public entity has installed such devices.

Weather Stations:
Weather forecasting information is available through public information such as the Remote Automatic Weather Stations, National Weather Service, and the Federal Aviation Administration. However, these alternatives are less accurate than SCE's own weather stations and would limit SCE's ability to make better informed operational decisions using more granular and real-time weather information in today's higher-risk fire environment.

Sectionalizing Devices:
SCE does not underestimate the impact PSPS events have on its customers. As such it considers methods and technologies that could reduce the number of impacted customers. The deployment of RARs and RCSs are good examples of technologies that are being used to sectionalize the grid and allow load to remain energized, this leverages existing infrastructure and is, in most cases, more cost effective than a microgrid.

Pole Replacements:
Wildfires are a major threat to the integrity of traditional wooden poles. SCE has evaluated alternative pole materials such as composite and steel in addition to fire resistant wraps. As mentioned earlier, SCE determined a combination of these pole types provides the most cost-effective way to harden the grid.

5.1.13 2020 Program Targets
In Table SCE 5-1, SCE includes its 2020 Program Targets for its 2020-2022 WMP initiatives. SCE

set program targets after accounting for potential resource constraints and other execution risks identified in 2019. However, SCE will strive to complete additional work in certain areas to mitigate wildfire risk as quickly as possible. For these areas, as noted in the table below, SCE has included upper ranges beyond the Program Target and only 2020 Program Targets are included in the table below. SCE has provided its current forecasts of wildfire mitigation work scope for 2021 and 2022 in the relevant tables and will assign Programs Targets for these years during the annual WMP updates process based on lessons learned and progress made in the previous year.

All WMP initiatives are further described throughout Section 5.3.

Table SCE 5-1
2020 Program Targets

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
Risk Analysis	RA-1	Expansion of Risk Analysis Section 5.3.2.7	Implement Wildfire Risk Reduction Model (WRRM) module of Technosylva
Operational Practices	OP-1	Annual SOB 322 Review Section 5.3.6.1.1	Review and update SOB 322 to reflect lessons learned from past elevated fire weather threats/PSPS events and integrate, where applicable, new and improved situational awareness data, improved threat indicators, and applicable regulatory requirements in an effort to reduce wildfire risk and the impact of outages on customers.
	OP-2	Wildfire Infrastructure Protection Team Additional Staffing Section 5.3.6.5.7	Hire additional resources including: a senior compliance manager, two compliance advisors, a project/program advisor, a data specialist and a fire-weather meteorologist. PSPS Operations will also be staffed to provide dedicated operational, project management, and compliance capabilities.
	OP-3	Unmanned Aerial (UAS) Operations Training Section 5.3.4.9.2.2	Increase the number of UAS operators by an additional 50 crews

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
Inspections	IN-1.1	Distribution High Fire Risk Informed Inspections in HFRA Section 5.3.4.9.1	Inspect 105,000 structures in HFRA
	IN-1.2	Transmission High Fire Risk Informed Inspections in HFRA Section 5.3.4.10.1	Inspect 22,500 structures in HFRA
	IN-2	Quality Oversight / Quality Control Section 5.3.4.14	Perform quality control and oversight of inspections of 15,000 transmission, distribution, and generation structures in HFRA
	IN-3	Infrared Inspection of Energized Overhead Distribution Facilities and Equipment Section 5.3.4.4	Inspect 50% of distribution circuits in HFRA
	IN-4	Infrared Inspection, Corona Scanning, and High-Definition Imagery of Energized Overhead Transmission facilities and Equipment Section 5.3.4.5	Inspect 1,000 transmission circuit miles in HFRA
	IN-5	Generation High Fire Risk Informed Inspections in HFRA Section 5.3.4.16	Perform inspection of 200 generation-related assets
	IN-6.1	Aerial Inspections – Distribution Section 5.3.4.9.2	Inspect 165,000 structures in HFRA
	IN-6.2	Aerial Inspections – Transmission Section 5.3.4.10.2	Inspect 33,500 structures in HFRA
	IN-7	Failure Modes and Effects Analysis (FMEA) Section 5.3.4.15.1	Complete FMEA study for substation assets in HFRA and prepare final report
System Hardening	SH-1	Covered Conductor Section 5.3.3.3.1	Install 700 circuit miles of covered conductor in HFRA. 700 circuit miles is SCE's program target.

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
			SCE will strive to complete 1,000 circuit miles subject to resource constraints and other execution risks
	SH-2	Undergrounding Overhead Conductor Section 5.3.3.16	Refine evaluation methodology for targeted undergrounding as a wildfire mitigation activity
	SH-3	WCCP Fire Resistant Poles Section 5.3.3.6.1	Replace 5,200 poles with fire resistant poles in HFRA SCE will strive to replace 11,700 poles with fire resistant poles in HFRA subject to pole loading assessment results, resource constraints and other execution risks
	SH-4	Branch Line Protection Strategy Section 5.3.3.7	Install/replace fuses at 3,025 locations
	SH-5	Installation of System Automation Equipment – RAR/RCS Section 5.3.3.9	Install 45 RARs/RCSs
	SH-6	Circuit Breaker Relay Hardware for Fast Curve Section 5.3.3.2.7	Replace/upgrade 55 relay units in HFRA SCE will strive to replace up to 110 relay units in HFRA. These targets are subject to resource constraints and other execution risks
	SH-7	PSPS-Driven Grid Hardening Work Section 5.3.3.8.1	Review 50% of all distribution circuits within HFRA to determine if modifications may improve sectionalizing capability within HFRA
	SH-8	Transmission Open Phase Detection Section 5.3.2.2.3	Continue deployment of transmission open phase detection on six additional

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
			transmission/sub-transmission circuits
	SH-9	Transmission Overhead Standards (TOH) Review Section 5.3.3.18	Review transmission standards to determine if there are any changes that can be made to help reduce wildfire threats, especially during extreme wind events
	SH-10	Tree Attachment Remediation Section 5.3.3.3.2	Remediate 325 tree attachments SCE will strive to complete 481 tree attachment remediations subject to resource constraints and other execution risks
	SH-11	Legacy Facilities Section 5.3.3.19	Evaluate risk, scope, and alternatives for identified circuits; evaluation of additional system hardening mitigation for wildlife fault protection and grounding/lightning arresters
	SH-12.1	Remediations – Distribution Section 5.3.3.12.1	Remediate 100% of notifications with ignition risk in accordance with CPUC requirements, non-inclusive of notifications which meet the criteria of a valid exception
	SH-12.2	Remediations – Transmission Section 5.3.3.12.2.	Remediate 100% of notifications with ignition risk in accordance with CPUC requirements, non-inclusive of notifications which meet the criteria of a valid exception
	SH-12.3	Remediations – Generation Section 5.3.3.12.3	Remediate 100% of notifications with ignition risk in accordance with CPUC requirements, non-inclusive of notifications which meet the criteria of a valid exception
Vegetation Management	VM-1	Hazard Tree Management Program Section 5.3.5.16.1	Assess 75,000 trees for hazardous conditions and perform prescribed mitigations in

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
			accordance with program guidelines and schedules
	VM-2	Expanded Pole Brushing Section 5.3.5.5.1	Perform brush clearance of 200,000 poles SCE will strive to perform brush clearance for 300,000 poles subject to resource constraints and other execution risks
	VM-3	Expanded Clearances for Legacy Facilities Section 5.3.5.5.2	Perform assessments of all identified facilities in HFRA. Establish enhanced buffers at 30% of identified facilities
	VM-4	Drought Relief Initiative (DRI) Inspections and Mitigations Section 5.3.5.16.2	Perform DRI annual inspection scope and complete prescribed mitigations in accordance with internal DRI program guidelines
	VM-5	Vegetation Management Quality Control Section 5.3.5.13	Perform 3,000 risk-based HFRA circuit mile vegetation management Quality Control inspections
Situational Awareness	SA-1	Weather Stations Section 5.3.2.1	Install 375 Weather Stations SCE will strive for installation of 475 Weather Stations subject to resource constraints and other execution risks
	SA-2	Fire Potential Index (FPI) Phase II Section 5.3.2.4.1	Refine the current FPI by integrating historical weather and vegetation data into the index
	SA-3	High-Performing Computer Cluster (HPCC) Weather Modeling System Section 5.3.2.6.	Complete installation of second HPCC
	SA-4	Asset Reliability & Risk Analytics Capability Section 5.3.2.7	Implement FireCast and FireSim modules of Technosylva
	SA-5	Fuel Sampling Program Section 5.3.2.4.2	Perform updated fuel sampling in HFRA in areas deemed

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
			appropriate once every two weeks (weather permitting)
	SA-6	Surface and Canopy Fuels Mapping Section 5.3.2.4.3	Initiate surface and canopy fuels mapping across HFRA
	SA-7	Remote Sensing / Satellite Fuel Moisture Section 5.3.2.4.4	Initiate procurement process for remote sensing technology for future implementation
	SA-8	Fire Science Enhancements Section 5.3.2.4.5	Implement enhanced forecasting capability and improved fuel modeling
Public Safety Power Shutoff	PSPS-1.1	De-Energization Notifications Section 5.3.6.7	Notify applicable public safety agencies and local governments of possible de-energization
	PSPS-1.2	De-Energization Notifications Section 5.3.6.7	Notify Cal OES through the State Warning Center of possible de-energization
	PSPS-1.3	De-Energization Notifications Section 5.3.6.7	Notify the CPUC of possible de-energization
	PSPS-1.4	De-Energization Notifications Section 5.3.6.7	Enhance Emergency Outage Notification System (EONS) to include Zip Code level alerting to include in-language notifications to align with its existing notification abilities for SCE customers
	PSPS-2	Community Resource Centers Section 5.3.6.5.1	Have 23 sites available across SCE service territory for customers impacted by a PSPS
	PSPS-3	Customer Resiliency Equipment Incentives Section 5.3.6.5.2	Develop a customer resiliency equipment incentive pilot program that provides financial support to customers willing to increase resiliency within its HFRA One customer will be implemented for this pilot in 2020.

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
	PSPS-4	Income Qualified Critical Care (IQCC) Customer Battery Backup Incentive Program Section 5.3.6.5.3	Outreach to eligible customers (low income, critical care, Tier 2/3) to provide portable battery back-up solution. SCE has identified approximately 2,500 customers that it will target for the program in 2020 with efforts to begin second quarter.
	PSPS-5	MICOP Partnership Section 5.3.6.5.4	Enable communications with indigenous populations and measure the number of customers contacted
	PSPS-6	Independent Living Centers Partnership Section 5.3.6.5.5	Conduct outreach activities and workshops/trainings to provide preparedness education and assistance in applying for the Medical Baseline Program and measure the number of customers contacted
	PSPS-7	Community Outreach Section 5.3.6.5.6	Minimum of five Community Crew Vehicles (CCVs) ready to be deployed during times when weather and fuel conditions are at critical levels. Communicate with customers in a local targeted way using a variety of channels to ensure timely delivery of notifications
	PSPS-8	Microgrid Assessment Section 5.3.3.8.2	1) Execute RFP for six resiliency microgrid projects 2) Depending on RFP results, implementation of up to 6 resiliency microgrid projects shown to be technically feasible and cost-effective
Emergency Preparedness	DEP-1.1	Customer Education and Engagement – Dear Neighbor Letter	Send ~915,000 letters with information about PSPS, emergency preparedness, and SCE's wildfire mitigation plan to

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
		Section 5.3.9.2	customer accounts in HFRA and ~3,200,000 letters to customer accounts in non-HFRA
	DEP-1.2	Customer Education and Engagement – Community Meetings Section 5.3.9.2	Host 8-12 community meetings in areas impacted by 2019 PSPS plus other meetings including online as determined to share information about PSPS, emergency preparedness, and SCE's wildfire mitigation plan
	DEP-1.3	Customer Education and Engagement – Marketing Campaign Section 5.3.9.2	Marketing campaign to reach 5,000,000 Customer Accounts (goal of 40% awareness about the purpose of PSPS, emergency preparedness, and SCE's wildfire mitigation plan)
	DEP-2	SCE Emergency Response Training Section 5.3.9.1	Hold SCE IMT member training on de-energization protocols, determine additional staffing needs and train, exercise and qualify new staff
	DEP-3	IOU Customer Engagement Section Section 5.3.9.2	Participate in statewide multi-channel and multi-lingual campaign using digital ads, social media ads, and radio ads to provide customers with important and consistent messaging about wildfire mitigation activities happening across the state
	DEP-4	Customer Research and Education Section 5.3.9.2	Develop/implement various research activities that gauge customer awareness, preparedness for, and satisfaction with outage experiences; to include but not be limited to: town hall meetings, online & telephone surveys, focus groups, and assessments of programs &

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
			services to prepare customers before and after PSPS outages
Alternative Technology	AT-1	Alternative Technology Pilots – Meter Alarming for Down Energized Conductor (MADEC) Section 5.3.3.2.2	Evaluating algorithm improvements specific to the detection of downed energized covered conductor, which may behave differently than bare conductor
	AT-2.1	Distribution Fault Anticipation (DFA) Section 5.3.2.2.1	Evaluate technology performance on fault anticipation technology and future deployment
	AT-2.2	Advanced Unmanned Aerial Systems Study Section 5.3.4.9.2.1	Conduct additional EVLOS demonstration UAS flights using lessons learned from 2019 study and validate aerial patrol findings via truck, foot, or helicopter
	AT-3.1	Alternative Technology Evaluations: Rapid Earth Fault Current Limiter - Ground Fault Neutralizer (GFN) Section 5.3.3.2.3.1	Initiate engineering design and order equipment for a GFN field installation
	AT-3.2	Alternative Technology Evaluations: Rapid Earth Fault Current Limiter – Resonant Grounding with Arc Suppression Coil Section 5.3.3.2.3.2	Initiate engineering design to convert a typical substation to resonant grounding
	AT-3.3	Alternative Technology Evaluations: Rapid Earth Fault Current Limiter - Isolation Transformer Section 5.3.3.2.3.3	Install one Rapid Earth Fault Current Limiter - Isolation Transformer
	AT-3.4	Alternative Technology Evaluations – Distribution Open Phase Detection Section 5.3.3.2.4	Complete pilot installation for five circuit locations

Program Category	2020-2022 WMP Identifier	Initiative/Activity	2020 Program Target
	AT-4	Alternative Technology Implementation – Vibration Dampers Section 5.3.3.3.3	Evaluate damper technologies for both small and large diameter covered conductor applications and develop standards for small and large diameter covered conductors
	AT-5	Asset Defect Detection Using Machine Learning Object Detection Section 5.3.4.9.1.1	Begin standardization of data collection for Machine Learning (ML) by cataloging and tagging inspection imagery metadata for ML. Investigate SCE use cases and evaluate feasibility of ML to support objective evaluation of assets.
	AT-6	Assessment of Partial Discharge for Transmission Facilities Section 5.3.4.10.2.1	Evaluate use of a Partial Discharge assessment technology to assess the health of in-service transmission assets
	AT-7	Early Fault Detection (EFD) Evaluation Section 5.3.2.2.2	Develop installation standards, install, and commission at least 10 EFD sensors. Gather data to determine requirements to support the potential for larger system deployments. SCE will strive to complete an additional 90 sensors for evaluation subject to resource constraints and other execution risks
	AT-8	High Impedance Relay Evaluations Section 5.3.3.2.5	Investigate and deploy two controllers/relays with a High Impedance (Hi-Z) element in HFRA

5.1.14 2020-2022 WMP Costs Summary

SCE's recorded and forecast capital expenditures and O&M expenses included in its 2020-2022 WMP are different from the capital expenditures and O&M expenses set forth in direct testimony supporting its 2021 GRC and the 2019 WMP. This is because the expenditures reflect the latest

available information on SCE's historical costs, updated forecasts since previous filings, and updated or new wildfire mitigations activities based on lessons learned after the 2021 GRC was filed (e.g., October PSPS events).[2] The WMP cost forecasts represent SCE's best estimates of scope and costs at the time of filing and are subject to change. As an example, for vegetation management, there are considerable uncertainties associated with the scope of work in HFRA (number of trees trimmed or removed to increase line clearance distances). Moreover, SCE's cost estimates for this activity has not yet accounted for the impacts of SB 247.

Table SCE 5-2 provides a summary of forecast changes between wildfire mitigation activities described in the 2020-2022 WMP and those outlined in SCE's 2021 GRC.[3]

Table SCE 5-2
2021 GRC and 2020-2022 WMP Cost Comparison for Years 2020-2022

GRC/WMP (Nominal Dollars, in Millions)	Capital	O&M
2021 GRC (Amended Nov 2019)	$ 2,607.6	$ 894.0
2020-2022 WMP	$ 2,652.3	$ 1,170.9

In addition to the 2020-2022 WMP forecast costs in Table SCE 5-2, SCE has recently been made aware of cost pressures from its contractors due to higher wildfire liability insurance costs. While SCE is still gaining clarity on the potential magnitude of this incremental cost, it anticipates this cost pressure could be in the range of multiple tens of millions of dollars per year on top of the

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[2] SCE's 2021 GRC was filed in August 2019, and SCE submitted supplemental wildfire mitigation-related testimony in November 2019. The cost forecasts supporting those submissions pre-date, by definition, the cost forecast set forth herein. SCE is committed to transparency on any potential forecast discrepancies (as shown in Table SCE 5-2) but notes that no formal "update" is required in the 2021 GRC (which is the operative CPUC cost recovery proceeding). For 2020 wildfire mitigation plan-related costs, the Commission has authorized SCE to track those costs in various memorandum accounts, and they will be examined on a recorded basis for reasonableness and cost recovery in "Track 3" of SCE's 2021 GRC, pursuant to the November 25, 2019 Scoping Memorandum in A.19-08-013. 2021-2022 wildfire mitigation forecast costs will be examined for reasonableness and cost recovery in "Track 1" of SCE's 2021 GRC, pursuant to that that same Scoping Memorandum. It is important to note that in the pending 2021 GRC SCE has proposed a "Wildfire Risk Reduction Memorandum Balancing Account," which, if adopted, for rate setting purposes would "true-up" relevant recorded costs as compared to forecast approved costs. AB 1054 includes a CapEx exclusion of $1.6575 billion from equity rate base.

[3] Costs in Tables 21-30 include SCE activities in HFRA that are not considered specific wildfire mitigation activities. Accordingly, the summed costs in Tables 21-30 will not match with the forecast costs of wildfire mitigation activities in Table SCE 5-2.

cost summarized in the table above. SCE is actively working with its contracted service partners to gain clarity and transparency on this emerging cost pressure.

5.2 Wildfire Mitigation Plan Implementation

Describe the processes and procedures the electrical corporation will use to do all the following:

A. Monitor and audit the implementation of the plan. Include what is being audited, who conducts the audits, what type of data is being collected, and how the data undergoes quality assurance and quality control.
B. Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies.
C. Monitor and audit the effectiveness of inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.
D. For all data that is used to drive wildfire-related decisions, including grid operations, capital allocation, community engagement, and other areas, provide a thorough description of the utility's data architecture and flows. List and describe 1) all dashboards and reports directly or indirectly related to ignition probability and estimated wildfire consequences and reduction, and 2) all available GIS data and products. For data, including a list of all wildfire-related data elements, where it is stored, how it is accessed, and by whom. Explain processes for QA/QC, cleaning and analyzing, normalizing, and utilizing data to drive internal decisions. Include list of internal data standards and cross-reference for they datasets or map products to which the standards apply.

5.2.1 Monitor and Audit the Implementation of the Plan and Effectiveness of Inspections

SCE exercises comprehensive and rigorous oversight of its WMP through programmatic processes that monitor and audit the implementation of the plan and the effectiveness of inspections.

SCE developed a performance dashboard to track progress of wildfire mitigation metrics and activities discussed in its 2019 WMP. SCE collects data regularly from existing data repositories throughout the organization (e.g., number of weather stations and HD cameras installed, circuit miles of covered conductor deployed) and displays the data as a heat map in the performance dashboard indicating implementation status as Complete, Ahead of Plan, On Track, At Risk, or Off Track. SCE SMEs assist with performing quality control checks to validate the data. The performance dashboard is updated regularly and sent to SCE senior leadership for awareness and review. Items that are Off Track or trending negatively, will be bring these to the attention of senior management to discuss implementation risks, ways to improve performance, and/or plans to get back on track.

SCE's Transmission and Distribution (T&D) organization unit has a Compliance and Quality (C&Q) group that develops quality control (QC) and quality assurance (QA) processes to ensure that mitigation activities are proceeding as planned. C&Q performs independent testing and assessment of wildfire and non-wildfire activities to drive continuous improvement throughout the organization. As described in Section 5.3.4.14, this group performs field validations of inspections completed by T&D work crews under the WMP. SCE's Vegetation Management uses external resources to perform QC (e.g., review if a tree trim met the correct clearance distance).

SCE's Audit Services Department (ASD) assesses WMP implementation independently of the responsible operating unit. Audits are determined via a risk assessment informed by SCE's Board of Directors (Board), senior management and regulatory requirements. ASD conducts risk-informed audits of SCE's electrical line and equipment inspection program to provide reasonable assurance that SCE facilities are being appropriately inspected and identified conditions are timely remediated according to applicable requirements. ASD includes field inspection reviews of structures inspected, a desktop review of inspection processes and procedures, and a review of inspections evaluated under C&Q processes. ASD also assesses whether any potentially significant issues observed in the field are timely communicated to T&D operations and appropriately remediated. ASD tracks corrective actions using industry standard auditing software in accordance with the International Standards for the Professional Practice of Internal Auditing.

Ultimately, the Board provides oversight for all aspects of SCE's business including safety, and Board committees have responsibility for oversight of specific areas. The Board's Safety and Operations Committee (Committee) oversees SCE's safety performance, culture, goals, risks and significant safety-related incidents involving employees, contractors, or members of the public. The Committee members take an active role in overseeing SCE's safety and operational practices, including oversight of SCE's WMP.

5.2.2 Identify and Correct Deficiencies

SCE field crews (SCE & contract) executing work in HFRA, management reviewing results or trends, and internal auditors are empowered to suggest improvement opportunities. Field crews and grid operations staff are closest to the work and play an instrumental role in implementing SCE's wildfire mitigation programs and ensuring that work is safely executed, data is captured correctly, concerns are reported, and work methods and analyses are continually improved.

Program and mitigation activity owners, and the Program Management Office (PMO), monitor leading and lagging metrics to monitor progress, review the concerns raised by stakeholders, or issues identified through QA/QC processes and audits, and recommend appropriate corrective actions to the responsible organizations. The responsible organization for each mitigation activity is accountable for implementing these corrective actions. These organizations work with the PMO to report out progress and corrective actions to executive leadership.

5.2.3 Data Architecture and Flows

SCE uses multiple systems to drive wildfire-related decisions and operations. Systems that support key functions such as grid operations, community engagement, inspections and maintenance, vegetation management, and asset risk management are listed below with their associated data architectures and flows.

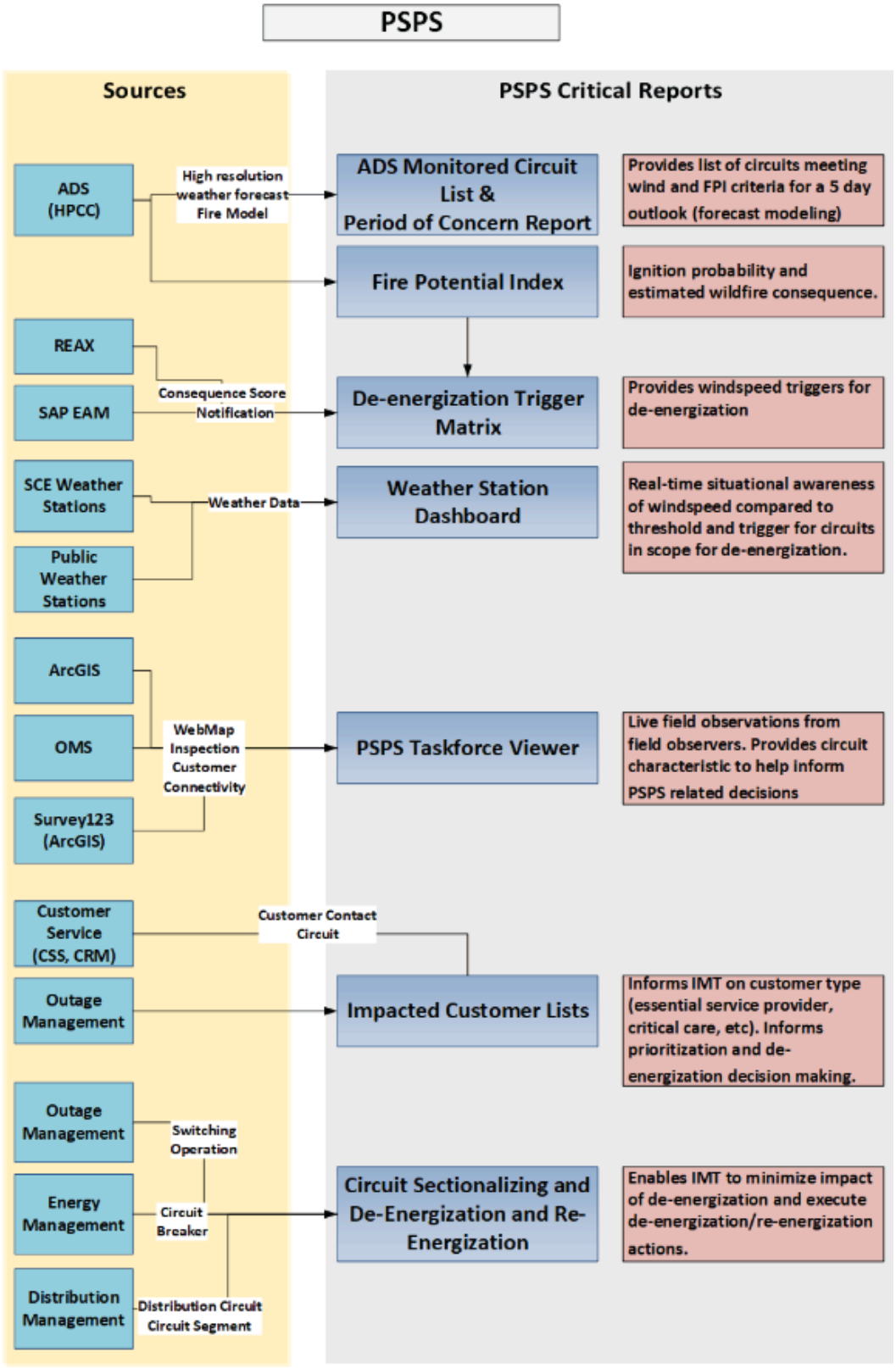
<u>Grid Operations and Community Engagement (Data Flows Supporting PSPS)</u>

SCE's Grid Operations' systems (e.g., Distribution Management System, Energy Management System, Outage Management System Weather Stations) are used for circuit monitoring,

switching, and executing de-energization and re-energization of circuits to support the overall PSPS data flow.

Community engagement is managed using SCE's Customer Service System (CSS), Customer Relationship Systems (CRM), and OMS. These systems are also part of the PSPS data flow. The data architecture and flows that support SCE's community engagement processes are depicted below in Figure SCE 5-1:

Figure SCE 5-1
PSPS Data Architecture Flow



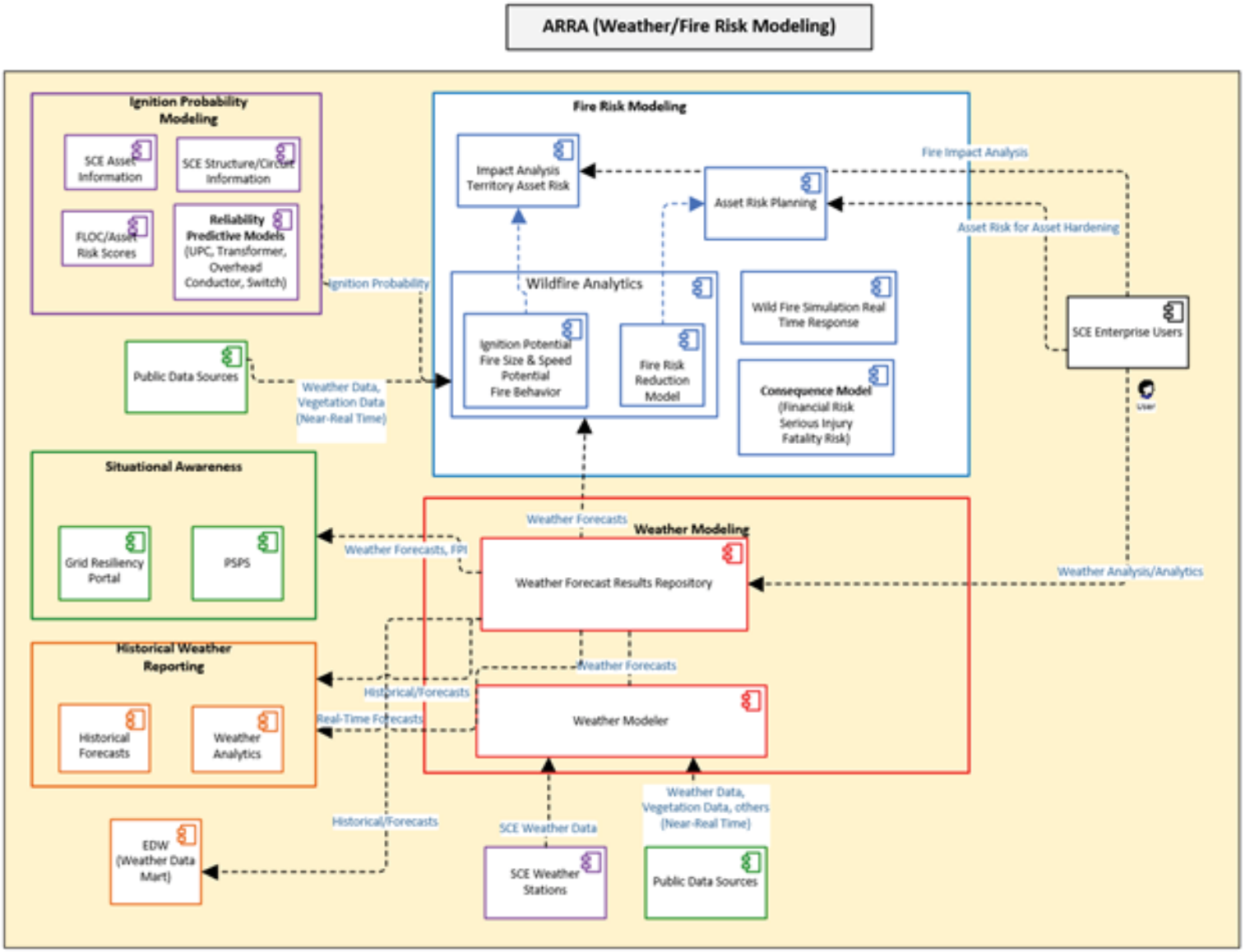
SCE plans on deploying process orchestration, automation and data pipelines to enable faster decision making and less manual reporting during PSPS events. Data is critical to decision making during PSPS events and this program will focus on developing automated date pipelines to critical data across the system. Connecting data across key PSPS activities currently requires manual effort and manual QC as managing a PSPS event requires data from across multiple systems that are not currently integrated. This program will focus on creating automated data pipelines and enhance dashboards to inform PSPS decision making. The initial focus will be on improving the communication pipeline to ensure SCE can accelerate its ability to inform customers of potential events with a goal to deliver necessary automation before the 2020 PSPS season.

For PSPS protocols, refer to Section 5.3.6.

Risk-Informed Work Prioritization

Currently, SCE uses a variety of resources to forecast weather and fire occurrences, including the use of third-party data by SCE meteorologists. SCE also has an advance analytics group to derive an asset risk score that serves as a key driver for determining where to prioritize execution of wildfire mitigations. The asset risk score is based on outputs from weather models (currently generated by Atmospheric Data Solution for SCE), ignition probability models (generated in-house) and the fire-risk models (generated in-house currently using Reax). The data architecture and flow to support SCE's current processes for modeling weather, ignition probability, and fire consequence are depicted below in Figure SCE 5-2.

Figure SCE 5-2
Data Architecture Flow for Modeling Weather, Ignition Probability, and Fire Consequence

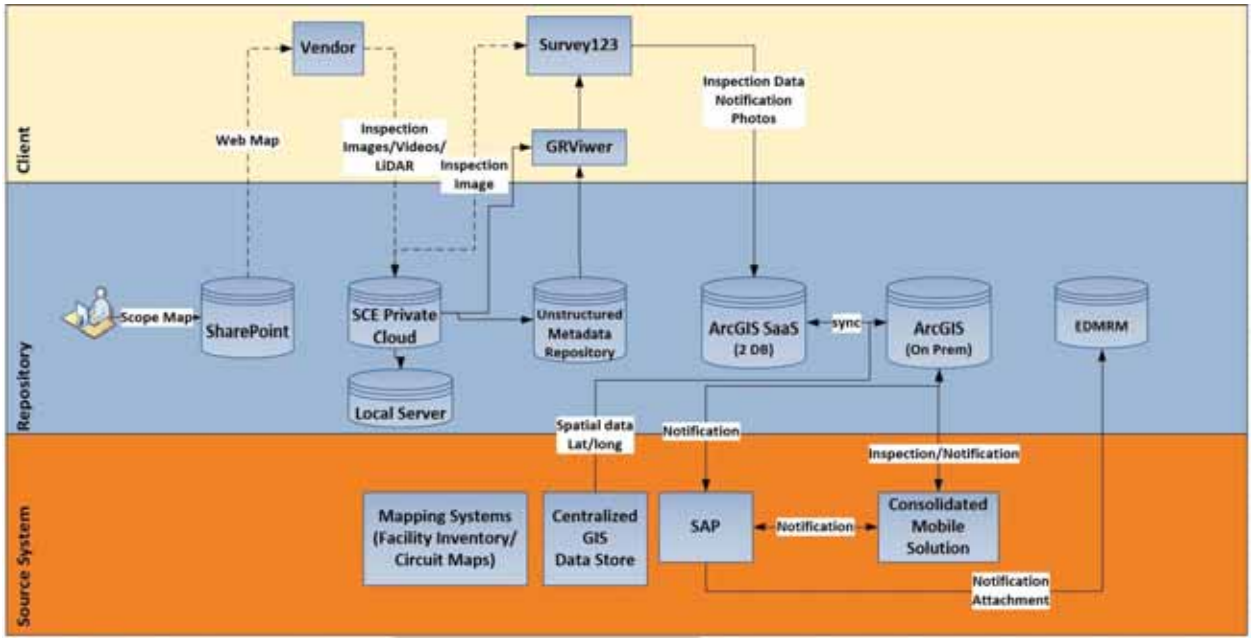


For a description of SCE's capital (resource) allocation methodology, refer to Section5.3.8.

Aerial Inspections

SCE assigns inspection work to aerial vendors using SCE's main asset source system, SAP, and mapping systems. Aerial vendors fly the lines and capture aerial imagery. This data is stored in SCE's private Azure cloud and is also synced to SCE's source systems on local servers. SCE's inspectors use ArcGIS web applications (e.g., Client-Survey123) to access images in performing their inspections and recommend necessary remediations that are automatically integrated into SAP. The data architecture and flows to support this are depicted below in Figure SCE 5-3:

Figure SCE 5-3
Data Architecture Flow for Aerial Inspections



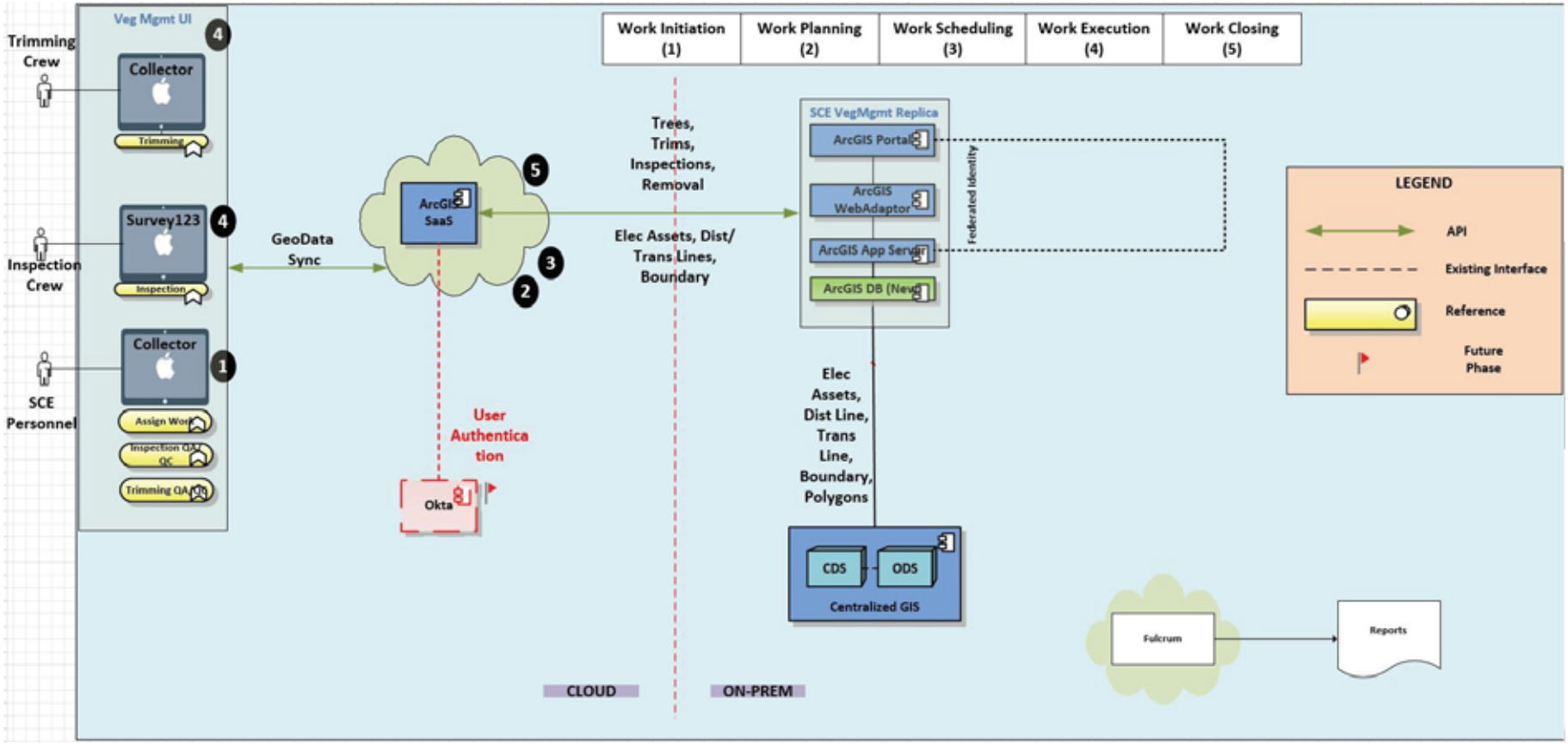
For a description of SCE's Distribution Aerial Inspections Program, refer to Section 5.3.4.9.2.

Vegetation Management

SCE has multiple databases that support SCE's vegetation management operations. Below, is a brief description of these databases and Figure SCE 5-4 displays the data architecture and flows.

1. For SCE's routine vegetation management, SCE uses mobile apps on ArcGIS Online (AGOL)
2. For SCE's HTMP, LiDAR Program, Power Delivery Program, Distribution Pole Brushing Program, and Supplemental Patrols, SCE uses Fulcrum, a SaaS platform
3. For SCE's DRI, Weed Abatement Program, and its storm emergency programs, SCE uses different databases

Figure SCE 5-4
Data Architecture Flow for Vegetation Management

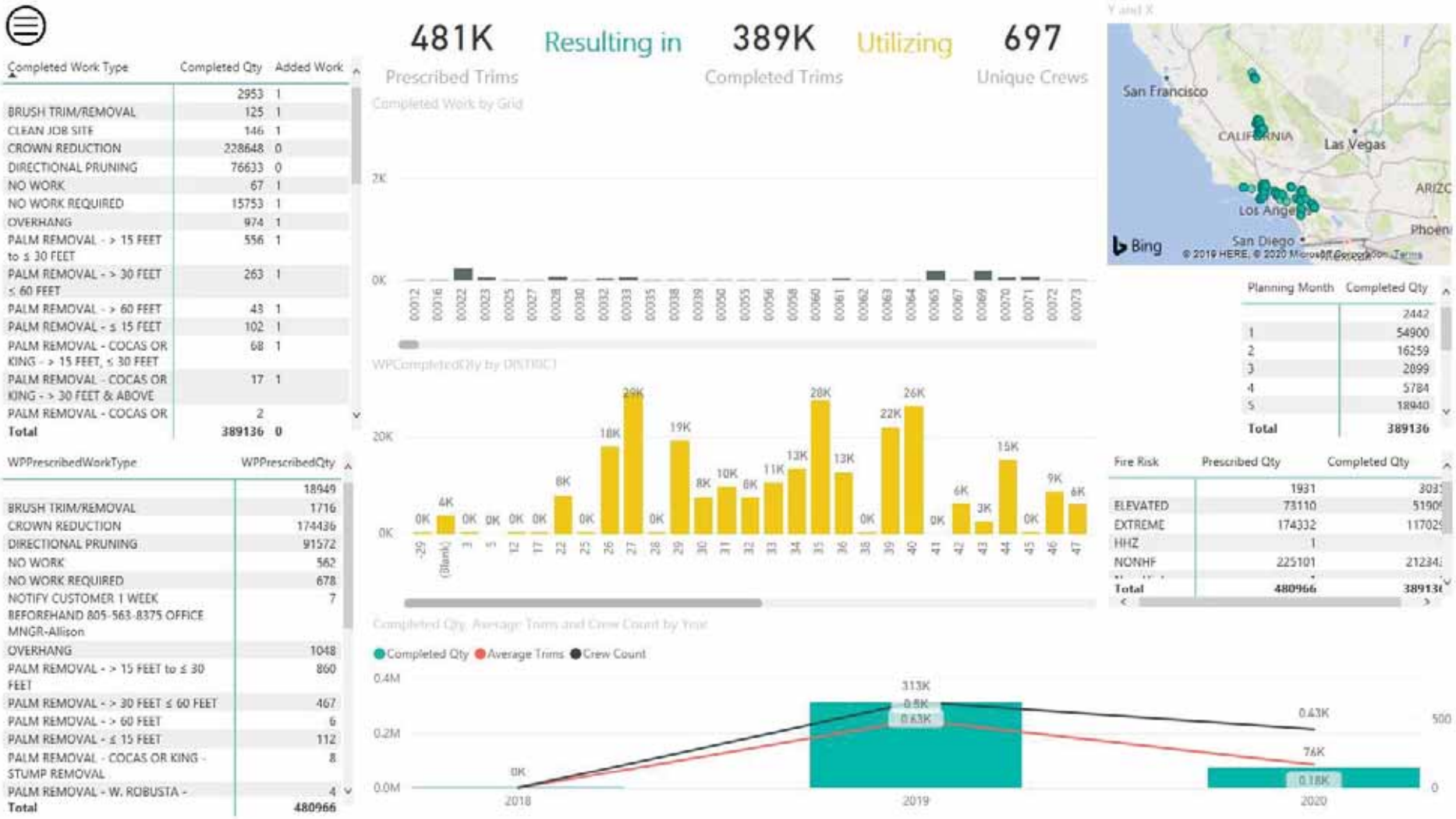


SCE intends to deploy an IVM platform that includes process orchestration, automation, mobile tools and an integrated repository across all vegetation management programs. This system integration will improve data accuracy by: 1) assisting with maintaining updated vegetation management data, without a large backlog of paperwork to process; 2) eliminating data errors from manual data entry; 3) obtaining real-time information on work task items such as status, crew assignment, work dates; and 4) reducing manual intervention in overseeing vegetation management work and obtain visibility into the individual tasks. As mentioned earlier, this program will initially focus on hazard tree and DRI activities, with an expected goal to extend to all wildfire-related vegetation activities through this WMP period.

Vegetation Management – Trims Completed Dashboard

A snapshot of the Trims Completed dashboard, shown below in Table SCE 5-7, illustrates how SCE informs the development of the status, expectations, and results of its vegetation work. Vegetation management and resource planners use this dashboard to help plan and monitor work and take corrective actions when necessary. Key columns are captured in Table SCE 5-3.

Figure SCE 5-5
Vegetation Management Trims Completed Dashboard



Completed Work Type	Completed Qty	Added Work
	2953	1
BRUSH TRIM/REMOVAL	125	1
CLEAN JOB SITE	146	1
CROWN REDUCTION	228648	0
DIRECTIONAL PRUNING	76633	0
NO WORK	67	1
NO WORK REQUIRED	15753	1
OVERHANG	974	1
PALM REMOVAL - > 15 FEET to ≤ 30 FEET	556	1
PALM REMOVAL - > 30 FEET ≤ 60 FEET	263	1
PALM REMOVAL - > 60 FEET	43	1
PALM REMOVAL - ≤ 15 FEET	102	1
PALM REMOVAL - COCAS OR KING - > 15 FEET, ≤ 30 FEET	68	1
PALM REMOVAL - COCAS OR KING - > 30 FEET & ABOVE	17	1
PALM REMOVAL - COCAS OR	2	
Total	**389136**	**0**

WPPrescribedWorkType	WPPrescribedQty
	18949
BRUSH TRIM/REMOVAL	1716
CROWN REDUCTION	174436
DIRECTIONAL PRUNING	91572
NO WORK	562
NO WORK REQUIRED	678
NOTIFY CUSTOMER 1 WEEK BEFOREHAND 805-563-8375 OFFICE MNGR-Allison	7
OVERHANG	1048
PALM REMOVAL - > 15 FEET to ≤ 30 FEET	860
PALM REMOVAL - > 30 FEET ≤ 60 FEET	467
PALM REMOVAL - > 60 FEET	6
PALM REMOVAL - ≤ 15 FEET	112
PALM REMOVAL - COCAS OR KING - STUMP REMOVAL	8
PALM REMOVAL - W. ROBUSTA -	4
Total	**480966**

Planning Month	Completed Qty
	2442
1	54900
2	16259
3	2099
4	5784
5	18940
Total	**389136**

Fire Risk	Prescribed Qty	Completed Qty
	1931	3031
ELEVATED	73110	51909
EXTREME	174332	117029
HHZ	1	
NONHF	225101	212343
Total	**480966**	**389136**

Table SCE 5-3
Vegetation Management Trims Completed Dashboard Key Columns

Column Name	Column Description
Prescribed Trims	Quantity of identified incoming work units for vegetation trimming
Completed Trims	Quantity of completed work units for vegetation trimming.
Crews	SCE tree trimming contractors/crews
Work Type	Type of work performed during trimming (e.g., brush trim, crown reduction, pruning)
Fire Risk	Fire risk type (e.g., Elevated, Extreme, etc.)
District	District Number
Prescribed Quantity	Incoming trimming work grouped by fire risk type
Trimmer Assigned Work	Trimming work assigned to SCE contractors
Inspections	Inspection activity undertaken by SCE arborists/contractors
Clearance Type	Clearance type
Inspector	Person performing the inspection
Species	Type of tree species

For a description of SCE's Vegetation Management program, refer to Section 5.3.5.

Dashboards and Reports

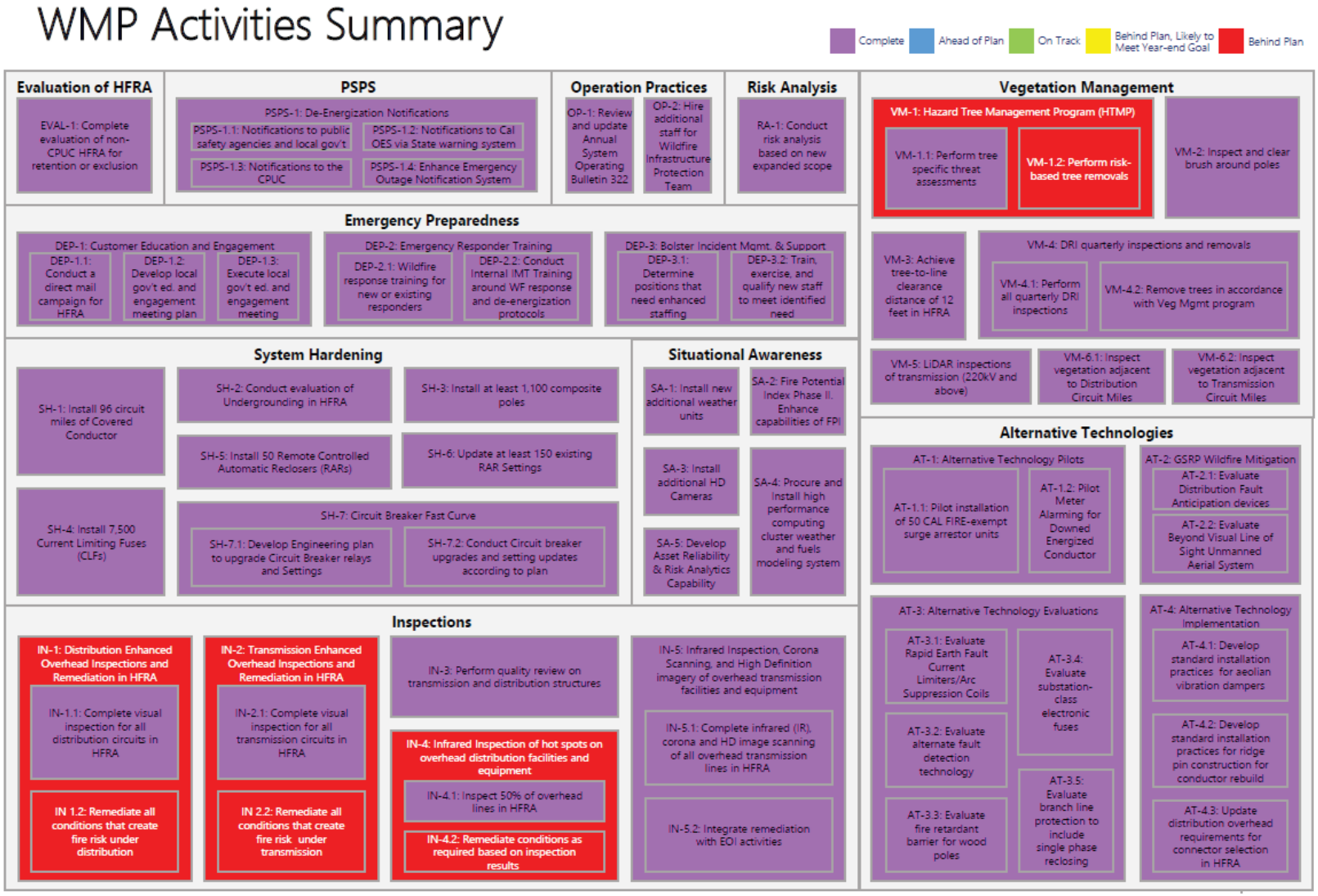
SCE has various reports and dashboards directly or indirectly related to ignition probability and estimated wildfire consequences and reduction. Ad hoc dashboards and reports are also created to support the program. Below are some of the key dashboards that are used:

Wildfire Mitigation Status Executive Dashboard

Below in Figure SCE 5-6 is the executive dashboard SCE used to track and report wildfire mitigation activities from SCE's 2019 WMP. SCE's most recent status update of its 2019 WMP was filed January 31, 2020.[4]

[4] Advice Letter 4153-E: Southern California Edison Company's Quarterly Advice Letter Pursuant to Assembly Bill 1054 Regarding the Implementation of Its Approved Wildfire Mitigation Plan and Its Safety Recommendations (January 31, 2020), https://library.sce.com/content/dam/sce-doclib/public/regulatory/filings/pending/electric/ELECTRIC_4153-E.pdf

Figure SCE 5-6
Wildfire Mitigation Executive Dashboard



Consequence Score Dataset

In lieu of a report, a consequence score dataset is used to calculate Asset Risk Score. Table SCE 5-4 is provided below:

Table SCE 5-4
Consequence Score Dataset

GESW_ID	CIRCT_NAME	COND_TYPE	VOLTAGE	FinancialImpact	Serious Injury	Fatality	Mars Financial	MARS Injury	MARS Fatality	AnimalFire	BalloonFire	CFO_OtherFire	VegFire	VehicleHit Fire	Capacitor Fire	Conductor Fire	Crossarm Fire	EFF_OtherFires	InsulatorFire	Slice/Clamp/ConnectorFire	TransformerFire	Unknown Fire	TotalFireFrequency	Total MARS Score
45388003	RIM	Overhead Primary Conductor	12	667343.6996	6.25E-03	7.53E-04	1.33E-02	6.16E-03	4.78E-03	4.56E-05	9.78E-05	4.42E-05	2.25E-04	1.00E-04	1.15E-05	5.77E-05	5.13E-06	4.77E-05	2.87E-05	3.10E-05	7.11E-06	1.24E-04	8.26E-04	6.07E-03
25012786	ALPINE	Overhead Primary Conductor	2.4	667028.9841	6.21E-03	7.48E-04	0.01334	6.12E-03	4.75E-03	4.65E-05	9.98E-05	4.51E-05	2.46E-04	4.70E-05	7.32E-05	5.88E-05	5.24E-06	4.87E-05	2.93E-05	3.17E-05	7.26E-06	1.42E-04	8.81E-04	6.05E-03
45388676	RIM	Overhead Primary Conductor	12	659469.709	6.18E-03	7.44E-04	1.32E-02	6.09E-03	4.72E-03	4.50E-05	9.67E-05	4.37E-05	2.22E-04	9.91E-05	1.13E-05	5.70E-05	5.07E-06	4.72E-05	2.83E-05	3.07E-05	7.03E-06	1.22E-04	8.16E-04	6.00E-03
45388645	RIM	Overhead Primary Conductor	12	612145.8637	5.73E-03	6.91E-04	1.22E-02	5.65E-03	4.38E-03	4.18E-05	8.97E-05	4.06E-05	2.06E-04	9.20E-05	1.05E-05	5.29E-05	4.71E-06	4.38E-05	2.63E-05	2.85E-05	6.52E-06	1.14E-04	7.57E-04	5.57E-03
144008761	RIM	Overhead Primary Conductor	12	572989.2342	5.37E-03	6.47E-04	1.15E-02	5.29E-03	4.10E-03	3.91E-05	8.40E-05	3.80E-05	1.93E-04	8.61E-05	9.84E-06	4.95E-05	4.41E-06	4.10E-05	2.46E-05	2.66E-05	6.11E-06	1.06E-04	7.09E-04	5.21E-03
45389208	RIM	Overhead Primary Conductor	12	541407.8421	5.07E-03	6.11E-04	1.08E-02	5.00E-03	3.88E-03	3.70E-05	7.94E-05	3.59E-05	1.83E-04	8.14E-05	9.29E-06	4.68E-05	4.16E-06	3.87E-05	2.33E-05	2.52E-05	5.77E-06	1.00E-04	6.70E-04	4.93E-03
15420663	BOUQUET	Overhead Primary Conductor	16	128019.7767	9.28E-03	1.12E-03	2.56E-03	9.14E-03	7.10E-03	4.75E-05	1.02E-04	4.61E-05	8.99E-05	4.80E-05	1.19E-05	1.08E-04	1.40E-05	4.98E-05	2.99E-05	3.24E-05	7.42E-06	7.58E-05	6.63E-04	4.70E-03
164249625	ALPINE	Overhead Primary Conductor	2.4	486593.8844	4.78E-03	5.75E-04	9.73E-03	4.71E-03	3.65E-03	4.26E-05	9.13E-05	4.13E-05	2.25E-04	4.30E-05	6.70E-05	5.38E-05	4.79E-06	4.46E-05	2.68E-05	2.90E-05	6.64E-06	1.30E-04	8.06E-04	4.52E-03
25012848	ALPINE	Overhead Primary Conductor	2.4	474895.5706	4.56E-03	5.50E-04	9.50E-03	4.49E-03	3.49E-03	5.32E-05	1.14E-04	5.17E-05	2.81E-04	5.38E-05	8.38E-05	6.73E-05	5.99E-06	5.57E-05	3.35E-05	3.62E-05	8.30E-06	1.63E-04	1.01E-03	4.37E-03
15423148	BOUQUET	Overhead Primary Conductor	16	125456.9242	8.36E-03	1.01E-03	2.51E-03	8.24E-03	6.40E-03	4.41E-05	9.47E-05	4.28E-05	8.35E-05	4.46E-05	1.11E-05	1.00E-04	1.30E-05	4.62E-05	2.78E-05	3.00E-05	6.89E-06	7.04E-05	6.15E-04	4.29E-03
53307510	HIGH SCHOOL	Overhead Primary Conductor	2.4	479991.055	4.25E-03	5.12E-04	9.60E-03	4.19E-03	3.25E-03	4.03E-05	8.66E-05	3.92E-05	2.71E-04	4.07E-05	1.01E-05	5.10E-05	4.54E-06	4.22E-05	2.54E-05	2.75E-05	6.29E-06	1.28E-04	7.72E-04	4.26E-03
45390059	RIM	Overhead Primary Conductor	12	468564.3275	4.07E-03	4.91E-04	9.37E-03	4.01E-03	3.12E-03	3.51E-05	7.53E-05	3.41E-05	1.73E-04	7.72E-05	8.82E-06	4.44E-05	3.95E-06	3.68E-05	2.21E-05	2.39E-05	5.48E-06	9.53E-05	6.36E-04	4.12E-03
53307544	HIGH SCHOOL	Overhead Primary Conductor	2.4	461950.06	4.07E-03	4.91E-04	9.24E-03	4.01E-03	3.11E-03	3.88E-05	8.33E-05	3.77E-05	2.61E-04	3.92E-05	9.76E-06	4.91E-05	4.37E-06	4.07E-05	2.44E-05	2.64E-05	6.06E-06	1.23E-04	7.43E-04	4.09E-03
15421544	BOUQUET	Overhead Primary Conductor	16	114642.2386	7.95E-03	9.58E-04	2.29E-03	7.83E-03	6.08E-03	4.79E-05	1.03E-04	4.65E-05	9.07E-05	4.84E-05	1.20E-05	1.09E-04	1.41E-05	5.02E-05	3.02E-05	3.26E-05	7.48E-06	7.65E-05	6.68E-04	4.05E-03
15422868	BOUQUET	Overhead Primary Conductor	16	119250.5673	7.87E-03	9.48E-04	2.39E-03	7.75E-03	6.02E-03	5.03E-05	1.08E-04	4.89E-05	9.52E-05	5.08E-05	1.26E-05	1.14E-04	1.48E-05	5.27E-05	3.17E-05	3.43E-05	7.85E-06	8.03E-05	7.02E-04	4.04E-03
45388937	RIM	Overhead Primary Conductor	12	448464.8841	3.99E-03	4.81E-04	8.97E-03	3.93E-03	3.05E-03	5.20E-05	1.12E-04	5.05E-05	2.57E-04	1.14E-04	1.31E-05	6.58E-05	5.86E-06	5.45E-05	3.27E-05	3.54E-05	8.12E-06	1.41E-04	9.42E-04	3.99E-03
53308128	HIGH SCHOOL	Overhead Primary Conductor	2.4	450978.9148	3.95E-03	4.76E-04	9.02E-03	3.90E-03	3.02E-03	3.94E-05	8.46E-05	3.83E-05	2.65E-04	3.98E-05	9.91E-06	4.99E-05	4.44E-06	4.13E-05	2.48E-05	2.68E-05	6.15E-06	1.25E-04	7.55E-04	3.98E-03
21871191	DAVENPORT	Overhead Primary Conductor	16	185602.1026	6.97E-03	8.40E-04	3.71E-03	6.87E-03	5.33E-03	9.05E-05	1.23E-04	5.57E-05	1.08E-04	9.86E-05	1.44E-05	7.25E-05	1.69E-05	8.35E-05	3.61E-05	3.90E-05	1.43E-05	9.15E-05	8.44E-04	3.98E-03
45389997	RIM	Overhead Primary Conductor	12	454335.8787	3.88E-03	4.68E-04	9.09E-03	3.83E-03	2.97E-03	3.06E-05	6.56E-05	2.97E-05	1.51E-04	6.73E-05	7.69E-06	3.87E-05	3.44E-06	3.20E-05	1.92E-05	2.08E-05	4.77E-06	8.31E-05	5.54E-04	3.97E-03
15422477	BOUQUET	Overhead Primary Conductor	16	119535.1291	7.61E-03	9.16E-04	2.39E-03	7.50E-03	5.82E-03	5.49E-05	1.18E-04	5.33E-05	1.04E-04	5.55E-05	1.38E-05	1.25E-04	1.62E-05	5.75E-05	3.46E-05	3.74E-05	8.57E-06	8.76E-05	7.66E-04	3.93E-03
21284600	RICARDO	Overhead Primary Conductor	16	128574.7516	7.46E-03	8.98E-04	2.57E-03	7.35E-03	5.70E-03	5.84E-05	1.25E-04	5.67E-05	1.79E-04	5.90E-05	1.47E-05	7.38E-05	6.57E-06	1.18E-04	1.29E-04	3.97E-05	9.11E-06	9.31E-05	9.62E-04	3.91E-03
13041453	ARLENE	Overhead Primary Conductor	16	102404.9493	7.55E-03	9.10E-04	2.05E-03	7.44E-03	5.77E-03	4.39E-05	9.42E-05	4.26E-05	8.31E-05	4.44E-05	1.10E-05	1.90E-04	4.95E-06	4.60E-05	1.12E-04	2.99E-05	6.85E-06	7.01E-05	7.79E-04	3.82E-03
25013008	ALPINE	Overhead Primary Conductor	2.4	388802.1734	4.24E-03	5.11E-04	7.78E-03	4.18E-03	3.24E-03	4.49E-05	9.64E-05	4.36E-05	2.37E-04	4.54E-05	7.07E-05	5.68E-05	5.06E-06	4.70E-05	2.83E-05	3.06E-05	7.01E-06	1.37E-04	8.50E-04	3.80E-03
13027570	ARLENE	Overhead Primary Conductor	16	100420.7124	7.53E-03	9.08E-04	2.01E-03	7.42E-03	5.76E-03	4.34E-05	9.32E-05	4.22E-05	8.22E-05	4.39E-05	1.09E-05	1.88E-04	4.89E-06	4.55E-05	1.11E-04	2.96E-05	6.78E-06	6.93E-05	7.70E-04	3.80E-03
35996776	MACIEL	Overhead Primary Conductor	12	65739.62276	7.91E-03	9.53E-04	1.31E-03	7.79E-03	6.05E-03	3.11E-05	6.66E-05	1.67E-04	5.87E-05	3.14E-05	7.80E-06	1.28E-04	3.50E-06	3.25E-05	1.95E-05	2.11E-05	4.84E-06	4.95E-05	6.21E-04	3.79E-03
25012605	ALPINE	Overhead Primary Conductor	2.4	395652.8436	4.09E-03	4.93E-04	7.91E-03	4.03E-03	3.13E-03	3.45E-05	7.41E-05	3.35E-05	1.82E-04	3.49E-05	5.44E-05	4.37E-05	3.89E-06	3.62E-05	2.17E-05	2.35E-05	5.39E-06	1.06E-04	6.54E-04	3.77E-03
43730587	CONINE	Overhead Primary Conductor	12	127931.2529	7.13E-03	8.59E-04	2.56E-03	7.03E-03	5.46E-03	3.17E-05	6.81E-05	3.08E-05	1.61E-04	1.02E-04	7.98E-06	4.01E-05	3.57E-06	3.32E-05	2.00E-05	2.16E-05	4.95E-06	5.06E-05	5.75E-04	3.76E-03
25013229	ALPINE	Overhead Primary Conductor	2.4	391653.2296	4.11E-03	4.95E-04	7.83E-03	4.05E-03	3.14E-03	4.00E-05	8.59E-05	3.89E-05	2.11E-04	4.04E-05	6.30E-05	5.06E-05	4.51E-06	4.19E-05	2.52E-05	2.72E-05	6.24E-06	1.23E-04	7.58E-04	3.76E-03
15420190	BOUQUET	Overhead Primary Conductor	16	113477.3832	7.21E-03	8.68E-04	2.27E-03	7.10E-03	5.51E-03	4.31E-05	9.24E-05	4.18E-05	8.15E-05	4.35E-05	1.08E-05	9.76E-05	1.27E-05	4.51E-05	2.71E-05	2.93E-05	6.72E-06	6.87E-05	6.00E-04	3.72E-03

The Asset Risk Score is based on factors that include Circuit Voltage, Fatality Consequence, Injury Consequence Financial Consequence and frequency of causes such as vehicle hit, conductor and crossarm. The key columns in the consequence score dataset are listed below in Table SCE 5-5:

Table SCE 5-5
Consequence Score Dataset Key Columns

Column Name	Column Description
GESW_ID	GE Small World Id
CIRCT_NAME	Circuit name
COND_TYPE	Conductor Type
VOLTAGE	Circuit Voltage
Financial Impact	Financial consequence
Serious Injury	Serious Injury Consequence
Fatality	Fatality Consequence
Mars Financial	Financial consequence conversion to multi attribute risk score
MARS Injury	Injury consequence conversion to multi attribute risk score
MARS Fatality	Fatality consequence conversion to multi attribute risk score
AnimalFire	Frequency of fire caused by animal contact
BalloonFire	Frequency of fire caused by balloon contact
CFO_OtherFire	Frequency of fire caused by contact from object
VegFire	Frequency of fire caused by vegetation contact
VehicleHitFire	Frequency of fire caused by car collisions
CapacitorFire	Frequency of fire caused by capacitor fault
ConductorFire	Frequency of fire caused by conductor fault
CrossarmFire	Frequency of fire caused by crossarm failure
EFF_OtherFires	Frequency of fire caused by other
InsulatorFire	Frequency of fire caused by insulator failure
Slice/Clamp/ConnectorFire	Frequency of fire caused by slice, clamp or connector fault
TransformerFire	Frequency of fire caused by transformer fault
UnknownFire	Frequency of fire by unknown causes
Total Fire Frequency	Total frequency of fire
Total MARS Score	All consequences aggregated into a multi attribute risk score

PSPS Monitored Circuit List

The monitored circuit list report is used to identify the list of circuits that are being considered for PSPS and the circuits that are approaching PSPS criteria (below the orange line). PSPS criteria is based on a number of factors, including weather and Fire Potential Index (FPI). This report is developed by SCE's expert metrology staff using the weather and fuel forecast and circuit spatial data. The red highlights indicate circuit specific wind and FPI values that are exceeding established thresholds. A snapshot of this is provided below in Table SCE 5-6:

This report is used to inform the decision to activate an Incident Management Team (IMT) and

to initiate notifications. These thresholds do not determine if a circuit should be de-energized. For a detailed description of SCE's de-energization protocol, please refer to Section 4.4.

Table SCE 5-6
PSPS Monitored Circuit List Template

Monitored Circuit List Template

Circuit	Downstream Circuits	Shared Structures	D_S_T	Date_Time Starting	Date_Time Ending	Switching Center	Substation	County	District	Weather Stations		Sustained Wind Threshold	Gust Threshold	99th pct Sustained	99th pct Gust	Peak Wind Forecast	Peak Gust Forecast	Peak FPI
Circuit 1	Insert Downstream Circuits	Insert Shared Structures	D_S_T	mm/dd/yy 00:00	mm/dd/yy 00:00	Insert SC	Insert Substation	Insert County	District	Insert Applicable WS	Insert Applicable WS	Value	Value	Value	Value	Value	Value	Value
Circuit 2	Insert Downstream Circuits	Insert Shared Structures	D_S_T	mm/dd/yy 00:00	mm/dd/yy 00:00	Insert SC	Insert Substation	Insert County	District	Insert Applicable WS	Insert Applicable WS	Value	Value	Value	Value	Value	Value	Value
Circuit 3	Insert Downstream Circuits	Insert Shared Structures	D_S_T	mm/dd/yy 00:00	mm/dd/yy 00:00	Insert SC	Insert Substation	Insert County	District	Insert Applicable WS	Insert Applicable WS	Value	Value	Value	Value	Value	Value	Value
Circuit 1	Insert Downstream Circuits	Insert Shared Structures	D_S_T	mm/dd/yy 00:00	mm/dd/yy 00:00	Insert SC	Insert Substation	Insert County	District	Insert Applicable WS	Insert Applicable WS	Value	Value	Value	Value	Value	Value	Value
Circuit 2	Insert Downstream Circuits	Insert Shared Structures	D_S_T	mm/dd/yy 00:00	mm/dd/yy 00:00	Insert SC	Insert Substation	Insert County	District	Insert Applicable WS	Insert Applicable WS	Value	Value	Value	Value	Value	Value	Value
Circuit 3	Insert Downstream Circuits	Insert Shared Structures	D_S_T	mm/dd/yy 00:00	mm/dd/yy 00:00	Insert SC	Insert Substation	Insert County	District	Insert Applicable WS	Insert Applicable WS	Value	Value	Value	Value	Value	Value	Value

The key fields used for this list are listed below in Table SCE 5-7:

Table SCE 5-7
PSPS Monitored Circuit List Key Fields

Column Name	Column Description
Circuit	Impacted Circuit Name
Downstream Circuits	Impacted Downstream Circuits
D_ST_T	Circuit Type (Distribution/Subtrans/Trans)
Date Time Starting	Period Of concern start time
Date Time Ending	Period Of concern end time
Switching Center	Switching Center for the impacted circuit
Substation	Feeder Substation
County	County Name
District	District Number
Weather Stations	Weather station Structure Location
Sustained Wind Threshold	Sustained Wind Threshold
Gust Threshold	Gust Threshold
99th pct Sustained	99th pct Sustained Wind Threshold (Top 1% of historical values)
99th pct Gust	99th pct Gust Threshold (Top 1% of historical values)
Peak Wind Forecast	Peak Wind Forecast
Peak Gust Forecast	Peak Gust Forecast
Peak FPI	Peak Fire Potential Index

All available GIS data and products

SCE uses internal and external GIS layers in AGOL to support situational awareness and communications during PSPS events or other hazardous events. These layers allow SCE to build tools such as REST services, web maps, survey forms, and dashboards to inform internal and external stakeholders as the event unfolds. Additionally, SCE uses these GIS layers to conduct spatial analysis to calculate impacts to SCE's asset during and after event.

For a relevant data dictionary, see SCE's Report on Data Collection for Wildfire Mitigation Plans Report filed on July 30, 2019 in docket R.18-10-007. Further details of key wildfire related data elements used to support the Wildfire Mitigation Program, where it is stored, how it is accessed, and by whom is referenced in Section 5.3.7.

For more details on SCE's Arc GIS layers, see Appendices B and C and refer to Section 2.7 and Chapter 6 regarding GIS files SCE is providing as part of this WMP.

Data QA/QC Process

To maintain data integrity, SCE currently uses a combination of automation and manual checks within its existing processes. Corrections to asset and location data in the HFRA, resulting from EOI, are analyzed with available datasets and prioritized for remediation in SCE's asset correction

processes. The exceptions from the automated interfaces are reviewed and addressed periodically depending on the criticality of the record involved.

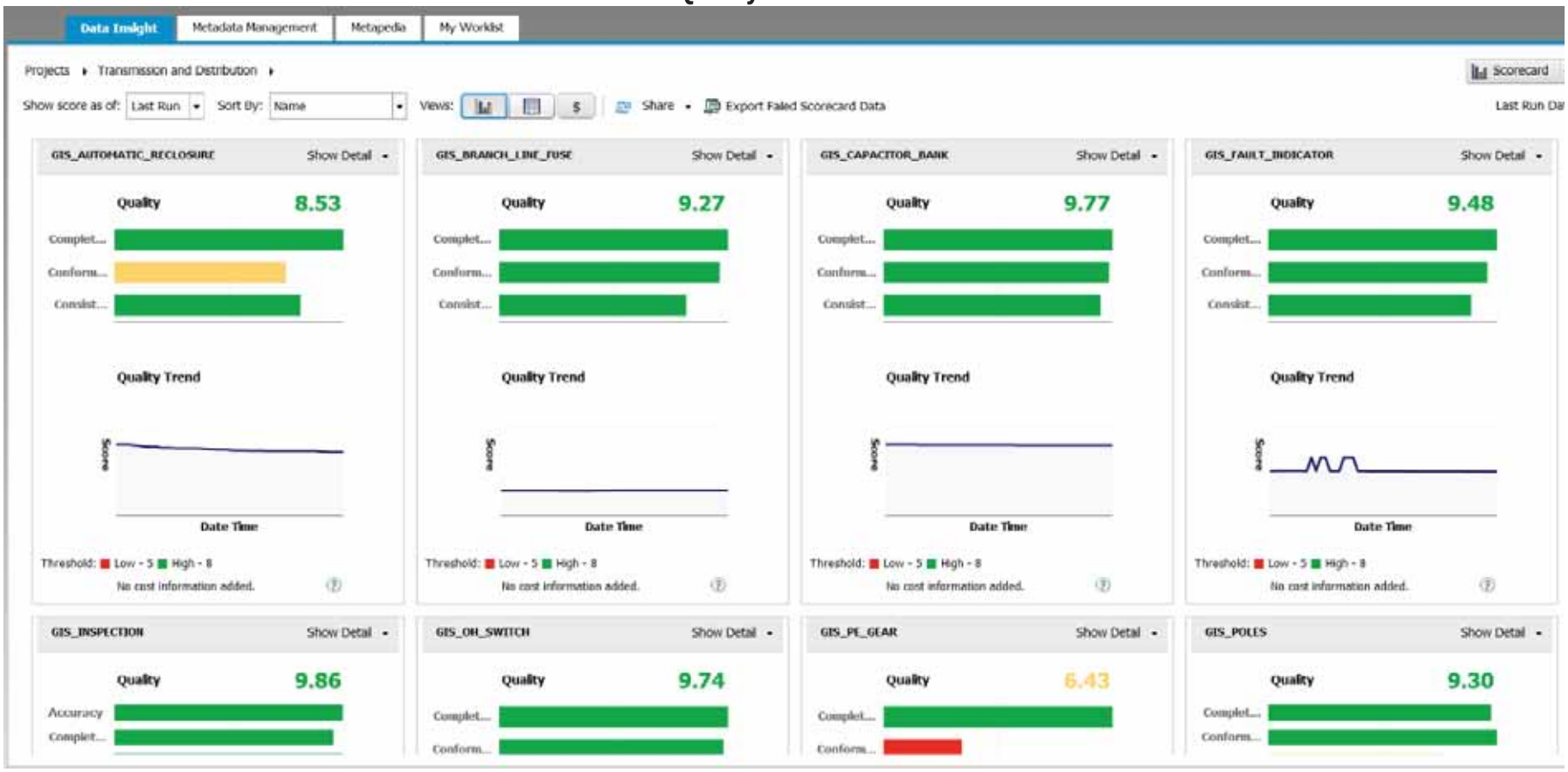
SCE is implementing a Data Quality Remediation framework for key master data and transactional datasets. This framework includes data quality remediation dashboards to monitor and address data quality issues, by enriching and reconciling information flows from business transactions for auditability and data sharing. Data quality is measured based on business capability rules, which are used to validate the completeness and accuracy of data in a system, and the consistency and integrity of data between systems, which are used for reconciliation processes.

SCE's critical business functions rely on electrical assets and their connectivity. To ensure accuracy of the connectivity in the transmission and distribution network, it is important to ensure integrity of the data between the systems. Every asset has an identifier that is referenced in consuming applications, and any discrepancy in data creation or modification can result in data quality issues.

The Data Quality Remediation framework builds on an understanding of SCE's business processes on data creation and data management. In the initial assessment stage, the current state of data quality is evaluated based on rules and tolerance limits set by business SMEs. Once the data quality score is determined, a gap analysis is performed to find the root causes of any data quality issue as part of the design remediation phase. Causes can range from business process failure to system-related issues, such as when there are inconsistencies between data entry practices across different systems for the same types of records. SCE then plans and implements corrective actions based on discussions with business stakeholders.

The scorecard below in Figure SCE 5-7 shows aspects of the data quality state of electrical assets. This score card is generated at the assessment stage and monitored through the design and remediation stages to track the data quality improvement.

Figure SCE 5-7
Data Quality Scorecard



The key factors that contribute to the Data Quality Score are Completeness (all the fields that define the record are completed), Conformity (aligns with the business rules for the data) and Consistency (how often the records meet completeness and conformity standards).

This framework has been implemented for some, but not all, data areas. Going forward, SCE is working toward a standardized process to monitor the data quality and increase awareness of data quality issues across the enterprise. SCE plans to incrementally expand the use of this framework and the related dashboards for other key datasets over the next 3 years.

5.3 Detailed Wildfire Mitigation Programs

In this section, describe how the utility's specific programs and initiatives plan to execute the strategy set out in Section 5.1. The specific programs and initiatives are divided into 10 categories, with each providing a space for a narrative description of the utility's initiatives and a summary table for numeric input in the subsequent tables in this section. The initiatives are organized by the following categories provided in this section:

1. Risk assessment and mapping
2. Situational awareness and forecasting
3. Grid design and system hardening
4. Asset management and inspections
5. Vegetation management and inspections
6. Grid operations and protocols
7. Data governance
8. Resource allocation methodology
9. Emergency planning and preparedness
10. Stakeholder cooperation and community engagement

To the extent applicable and relevant, if an electric utility has completed a Safety Model and Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP) as part of its General Rate Case that identifies safety models or programs the electrical corporation has implemented to mitigate ignition probability and estimated wildfire consequence, then the models or programs identified pursuant to this section must comport with those identified in the S-MAP proceeding. Describe any differences with S-MAP and RAMP and provide rationale.

SCE's wildfire risk models have evolved significantly over the past two years. Detailed descriptions of these models can be found elsewhere in this WMP (for the asset level wildfire risk model, see Section 4.3 for the RAMP, GSRP, 2021 GRC, and 2019 WMP models).

Both the RAMP model and the asset level wildfire risk model (WRM) are used in this 2020-2022 WMP. SCE intends to improve both models in the coming year. As required by the ALJ Ruling, the RSEs presented throughout this WMP are calculated using a modified RAMP MAVF (SCE's MARS), as described in the next section. The WRM is currently being used to target mitigation deployment to higher risk locations based on structure level ignition risk and circuit segment level consequence risk. Thus, the RSE calculation relies on a system average risk reduction, which, in the first few years, understates the risk reduction benefits of the scope of work actually deployed.

SCE's goal is to deploy system hardening measures that reduce the risk of ignitions associated electrical infrastructure as quickly as possible. As further explained in the Risk Spend Efficiency Analysis in Section 5.3.8 Resource Allocation Methodology, RSEs are not, and should not be, the only factor used to develop a risk mitigation plan. The RSE metric does not take into account certain operational realities that SCE must consider in its WMP. As described in SCE's 2021 GRC, the scope of work proposed in this WMP takes expected resource constraints into account even

after planning to reallocate resources from other areas (e.g., moving resources away from traditional reliability-focused infrastructure replacement, especially in non-high fire areas, and into wildfire mitigation programs). Moreover, programs with higher RSEs such as PSPS are not necessarily the preferred long-term solution over covered conductor installation with comparatively lower RSEs. (SCE did, however, considered RSEs, the overall expected risk reduction, planning and execution lead times, resource availability, customer impact, and other operational factors in developing its WMP).

SCE plans to revise and improve its MAVF in 2020 for use in its 2021 WMP update, and in its 2022 RAMP (MARS 2.0). Feedback received for SCE's 2018 RAMP Report, 2021 GRC, 2020-2022 WMP, along with any developments in the S-MAP proceedings will guide these revisions and improvements. Additionally, SCE will also consider feedback given to PG&E and SDG&E for their RAMP Reports. SCE is improving its asset level risk model by adding asset types, and a new fire propagation and consequence module with its implementation of an enhanced GIS enabled risk modeling Sections 4.3, 5.3.1 and 5.3.2 further describe enhancements SCE is adopting to model wildfire risk.

As resources become available and wildfire risks are sufficiently mitigated, SCE will consider shifting resources back to traditional infrastructure replacement programs. SCE will assess portfolio level options using risk-informed analyses (including MARS 2.0) that considers safety (including but not limited to wildfire), reliability, and cost. Once the portfolio-level decisions are made, the improved asset level risk model will be used to target where each risk mitigation activity (including reliability and safety including wildfire) should be deployed.

5.3.1 Risk Assessment Mapping

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description for the utility's programs, the utility's rationale behind each of the elements of this program, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each program, how the utility plans to demonstrate over time whether each component is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds. Include descriptions across each of the following initiatives. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell in the row.

1. *A summarized risk map showing the overall ignition probability and estimated wildfire consequence along electric lines and equipment*
2. *Climate-driven risk map and modelling based on various relevant weather scenarios*
3. *Ignition probability mapping showing the probability of ignition along the electric lines and equipment*
4. *Initiative mapping and estimation of wildfire and PSPS risk-reduction impact*
5. *Match drop simulations showing the potential wildfire consequence of ignitions that occur*

along the electric lines and equipment

6. *Weather-driven risk map and modelling based on various relevant weather scenarios*
7. *Other / not listed [only if an initiative cannot feasibly be classified within those listed above*

For each of the above initiatives, describe the utility's current program and provide an explanation of how the utility expects to evolve the utility's program over each of the following time periods:

1. *Before the upcoming wildfire season,*
2. *Before the next annual update,*
3. *Within the next 3 years, and*
4. *Within the next 10 years*

5.3.1.1 A summarized risk map showing the overall ignition probability and estimated wildfire consequence along electric lines and equipment

SCE has developed a method to visually display the highest priority work based on wildfire ignition risk along SCE electrical lines and equipment within HFRA using a number of geospatial resources (see examples in Chapter 4). One of SCE's primary resources used to display this project data in a geospatial format is known as the "Scope Mapping Tool." Risk data can be displayed along with inspection results and maintenance notifications in these geospatial layers to inform the prioritization of asset maintenance, upgrades, and equipment replacement.
While the Scope Mapping Tool is used to streamline asset and work management activities across SCE's service territory, SCE does not have plans at this time to expand the ignition probability and estimate beyond HFRA boundaries.

5.3.1.2 Climate-driven risk map and modelling based on various relevant weather scenarios

In 2020, SCE will implement the WRRM, which will run multiple simulations based on different weather scenarios. The WRRM is discussed in depth in Section 4.3.3.

5.3.1.3 Ignition probability mapping showing the probability of ignition along the electric lines and equipment

In 2019, SCE developed the WRM, which assesses the risk of ignition at the circuit and circuit segment level. See Section 4.3 for a detailed description of SCE's WRM.

5.3.1.4 Initiative mapping and estimation of wildfire and PSPS risk-reduction impact

SCE utilized an Excel-based tool to estimate the relative risk reduction impact for each applicable mitigation (see Sections 5.3.2 through 5.3.10, Tables 21-30 for details on each activity and results from the risk reduction tool, where applicable). The methodology used in the 2020-2022 WMP is similar to that used in SCE's 2018 RAMP report and the 2021 GRC to assess the risk reduction attributed to the wildfire mitigation portfolio.

Based on the Guidelines, SCE adjusted its RAMP model by adding: (1) useful life; and (2) incremental RSE by year. SCE assessed the useful life of each of the scored mitigations by taking into account the full benefit stream of the mitigation into the future. This is different from the 2018 RAMP model calculation, which only focused on the years 2018-2023, and differentiates

expected risk reduction benefit from different activities. As an example, capital-intensive mitigations such as covered conductor or undergrounding may have useful lives of 40+ years.

Instead of calculating the cumulative RSE by year, SCE has adjusted its model to calculate the RSE by the year's incremental deployment. The impact is that there will be no co-mingling or stacking of mitigation benefits for each deployment year from the previous year.

SCE used data, analysis, and subject matter expertise to determine mitigation effectiveness at the risk driver or consequence level and useful life of the programs and exposure (e.g., the total number of overhead circuit miles in HFRA).

In this WMP period, SCE plans to further refine its risk-informed planning processes by developing the capability to assess the relative RSE of mitigation portfolios under various scenarios. The results if such analyses can be used in conjunction with other operational considerations to drive decisions on activity scope determination and resource allocation. Additionally, SCE intends to expand its analysis to understand the impact of multiple mitigations in the same location.

5.3.1.5 Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment

Fire simulations near each HFRA circuit and segment are currently provided by Reax. In 2020 and for the foreseeable future, the fire simulations will be provided by the WRRM. See Section 4.3 for a description of Reax's and the WRRM's fire simulations.

5.3.1.6 Weather-driven risk map and modelling based on various relevant weather scenarios

The Reax analysis uses a pre-defined set of weather scenarios reflecting the most common conditions of fire ignition and propagation while running multiple simulations for each location. In transitioning to the WRRM, SCE will develop weather scenario simulations based on historical analysis of fire and climatology for SCE's service territory.

See Section 5.3.2 for additional detail on fuels sampling and WRRM implementation.

See Table 21 "Risk assessment and mapping" for more detail on the initiatives above.

5.3.2 Situational Awareness and Forecasting

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of the utility's equipment or facilities causing wildfires. Include a description of its initiatives, the utility's rationale behind each of the elements of the initiatives, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each initiative, how the utility plans to demonstrate over time whether each component of the initiatives is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds.
Include descriptions across each of the following initiatives. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell in the row.

1. *Advanced weather monitoring and weather stations*
2. *monitoring sensors*
3. *Fault indicators for detecting faults on electric lines and equipment*
4. *Forecast of a fire risk index, fire potential index, or similar*
5. *Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions*
6. *Weather forecasting and estimating impacts on electric lines and equipment*
7. *Other / not listed [only if an initiative cannot feasibly be classified within those listed above]*

For each of the above initiatives, describe the utility's current program and provide an explanation of how the utility expects to evolve the utility's program over each of the following time periods:

1. *Before the upcoming wildfire season,*
2. *Before the next annual update,*
3. *Within the next 3 years, and*
4. *Within the next 10 years*

Program Overview:
Situational is essential for SCE's operational decision-making and service delivery, enabling it to plan proactively and appropriately modify work procedures to improve the safety of its workers and the communities it serves. It gives SCE visibility to critical system operations, weather and hazardous conditions across the service territory at higher levels of granularity, and other externalities that affect the daily operation of the grid. Situational awareness also enables SCE to improve response time before and during emergencies such as wildfires, which reduces impacts to customers.

Additionally, situational awareness is an integral part of emergency management, and it is imperative that SCE has a detailed understanding of current conditions across its service territory prior to and during emergency events.

By the end of 2019, SCE completed installation of 161 HD cameras, providing 90% coverage of its

Tier 2 and Tier 3 HFRA. This enables fire agencies and SCE fire management personnel with early detection, confirmation and situational awareness of wildfire activity. These cameras also enable first responder agencies to assess emerging wildfire threats more quickly, helping to mitigate potential safety risk to the public. In SCE's assessment, due to geographical limitations, the deployment of HD cameras has reached a saturation point. SCE does not currently have plans to install more HD cameras as installing more cameras will not provide additional benefits. Work associated with HD cameras in 2020-2022 will focus on data storage and access and routine operations and maintenance.

SCE's Watch Office monitors activities on a 24/7 basis, notifies response teams when action is needed and updates SCE's management on evolving events. The Watch Office is co-located within the Emergency Operations Center (EOC), which was upgraded in 2016 and serves as the training center for SCE's Incident Management Teams. Meteorologists and Geographic and Information System (GIS) specialists at the newly established Situational Awareness Center, monitor evolving weather and other conditions that might lead to fire events or other hazardous conditions.

SCE is using more detailed circuit-level information to enhance its situational awareness capabilities to better assess how weather conditions might impact public safety and utility infrastructure in HFRA. One high performance computing cluster (HPPC) was operationalized in 2019 and an additional HPCC will be operationalized in 2020 which support a proprietary and specialized high-resolution weather model specific to SCE's service territory. SCE is also significantly expanding its deployment of weather stations to enhance the high-resolution weather model and provide real-time data near circuits in HFRA. This data will be collected and analyzed for potential weather impacts to PSPS circuits.

Situational Awareness Long Term Strategy:

Situational awareness by converting of raw environmental data into actionable intelligence is critical for strategic planning, operational response, mitigation practices and other efforts across the company. SCE will continue to advance its situational awareness program by implementing advanced tools and technology that will not only inform PSPS decisions and wildfire response, but also drive other risk reduction and mitigation initiatives for all-hazard threats such as climate change. As SCE continues to add data collection points, it will rely on tools and technology to help aggregate and synthesize this data and perform predictive analyses to inform planning and operational decisions.

Fire science is a critical component of SCE's situational awareness program. SCE is integrating environmental science and technology to help understand antecedent conditions that lead to the initiation, spread and intensity of wildfire activity. In addition, the fire science team will build new partnerships and leverage existing relationships with government, academia and the private sector to further the understanding of wildfires.

In the long-term, the fire science team will seek to make improvements to SCE's modeling capabilities, fuels sampling and fire spread modeling by adding data inputs and by incorporating

technologies such as machine learning and remote sensing. For example, in order to increase the resolution of existing weather forecast and fire spread modeling, inputs such as vegetation moisture and weather data must be constantly evaluated and adapted. The increased number of weather stations and fuel sampling locations (as referenced below in Sections 5.3.2.1 and 5.3.2.4.2, respectively) will help improve trend analytics and long-term forecasting techniques, which would include 3-6 months of advance forecasting to determine the start and end of fire season. Developing and maturing SCE's fire and environmental science capability will also help support climate change and severe weather analysis and adaptation planning.

Meteorological Resources:

SCE meteorologists are trained professionals with specialization in critical fire-weather conditions. This team uses the aforementioned forecasting tools and weather station data to develop comprehensive weather forecasts starting four to seven days in advance of any predicted severe weather event. This information is provided to impacted departments and incident management personnel and is critical in shaping response and mitigation activities for potential wildfire events. Given the importance of this information for identifying circuits and locations that can be potentially impacted so that field personnel can be dispatched to at-risk locations to monitor real-time conditions, SCE continues to refine its forecasting capability.

5.3.2.1 Advanced weather monitoring and weather stations (SA-1)

The size of SCE's service territory in HFRA and its diverse topography necessitate granular weather data, which requires a dense network of weather stations to monitor location-specific, real-time conditions in HFRA to enable operational decision making. For example, Southern California's mountains have rapid elevation changes and differing canyon orientations, which create localized weather zones.

Additional weather station data help enhance the resolution of existing weather models and provide real-time information to assist in making key operational decisions during wildfire risk conditions. The data provided by the weather stations allows SCE to effectively monitor weather conditions at the circuit level and inform critical operational decisions during elevated weather conditions, such as deploying the PSPS protocol. For this reason, SCE intends to accelerate additional weather station installations across HFRA.

While there are numerous public weather stations, SCE utilizes data from trusted and validated sources to determine where to site additional weather stations. Weather stations are placed in locations with varied elevations (i.e., on ridge or hill tops, and valley or canyon locations). Circuits that have longer length, diverse topography and varied weather characteristics will require more weather stations. Section 5.3.6.5 describes SCE's methodology for identifying circuits most frequently impacted by PSPS which could be candidates for additional weather stations.

These additional weather stations will also provide data that will be used to optimize SCE's weather models. Statistical analyses that uses historical weather data can be used in post-processing to deliver increasingly accurate wind forecasts.

SCE installed 125 weather stations in 2018 to enhance existing weather models in key HFRA locations. In 2019, SCE installed an additional 357 weather stations focusing primarily on circuits that are in HFRA.

SCE plans to install a minimum of 375 weather stations in HFRA in 2020. Circuits that do not have a weather station currently installed will be prioritized first. Next, SCE will prioritize circuits that most frequently reached PSPS monitoring thresholds which may result in some circuits having more than one weather station. This will enable SCE to potentially be more granular in PSPS de-energization decisions when only portions of circuits with sectionalizing devices are experiencing high FPI conditions.

In addition, SCE will be developing and implementing a new robust software to manage new installations, fixes, and maintenance of its weather stations. This software application will move the utility from a manual paper process to a digital solution with the ability to retrieve, store, and access information more efficiently.

SCE will be piloting vehicle-mounted weather stations to provide real time observations in locations where pole-mounted weather stations do not yet exist. Utilizing vehicle-mounted weather stations will improve the precision of de-energization and limit associated customer impacts.

In the long term, SCE's intent is to ensure all circuits in HFRA have at least one or more weather station that will provide input to predictive weather modeling. SCE will be analyzing the coverage of weather stations each year to determine if more are needed in specific areas. In addition, previously installed weather stations will continue to be monitored and maintained to ensure they are working and providing accurate data.

5.3.2.2 Continuous monitoring sensors

SCE traditionally utilizes protective relays to detect and isolate abnormal events such as faults. Relays are set to continuously monitor the operating conditions of the protected system or equipment by taking real time currents and/or voltages information to detect abnormal system conditions such as overload, under voltage, and under frequency. If the real time quantities are outside of the relay set parameters, the protective relay will initiate tripping of the power circuit breakers to isolate the abnormalities in a timely manner. However, the complexity of the power grid means there are many pre-fault conditions that are below the trigger of the conventional power system relays. Accordingly, SCE is expanding the exploration and deployment of technologies that will advance the real-time monitoring of the system health and enable proactive maintenance to prevent degrading equipment conditions from evolving into an actual failure with a risk of potential ignitions that can cause a wildfire. In the paragraphs below, SCE will provide brief descriptions of these technologies.

5.3.2.2.1 Distributed Fault Anticipation (DFA) pilot study (AT-2.1):

DFA is a predictive algorithm that uses electrical system measurements to recognize current and voltage signatures indicative of pending equipment failures.

In 2019, SCE developed a plan to engineer, design, and commission 60 DFA units monitoring HFRA circuits as part of a pilot program. 24 DFA units were fully operational by the end of 2019, with the remaining 36 units fully installed, commissioned and operational by January 31, 2020.

The next phase of the pilot will include the analysis of DFA data in conjunction with existing software/tools to identify maintenance, inspection, patrol, and operational impacts for these piloted circuits. SCE intends to perform an in-depth performance evaluation to determine the effectiveness of DFA technology.

Depending on the pilot evaluation, and possibly new technologies, deployments of DFA or similar technology may be adopted as a program in the near future. As planned, deployment activities are targeted to ramp up in 2021, though this may be accelerated, delayed, or terminated based on other factors such as pilot performance, competing technology options and prioritization of work efforts.

5.3.2.2.2 Early Fault Detection (EFD) Evaluation (AT-7):

EFD systems are capable of detecting conditions on the electric system which may cause a fault or possibly increase the collateral damage associated with a fault event. This type of technology provides complementary benefits to the DFA systems and could work in concert with the DFA to not only detect potential system anomalies, but to more accurately pinpoint the source of the potential defects. EFD hardware is installed on poles whereas the DFA hardware is installed inside the substation.

In 2020, SCE plans to develop installation standards, install and commission at least 10 EFD sensors with up to an additional 90 sensors in scope for evaluation depending on lessons learned, costs and material availability. During the assessment period, SCE will gather performance data on EFD and determine requirements for potential larger system deployments. SCE's current plan is to complete installation and commissioning for the pilot devices by the end of 2021 and allow sufficient time in 2022 for evaluation and development of potential next steps for this emerging technology.

Similarly, as in the DFA technology evaluation, the deployments of EFD or similar technology may be accelerated, delayed or even terminated based on other factors such as pilot performance, competing technology options and prioritization of work efforts.

5.3.2.2.3 Transmission Open Phase Detection (SH-8)

In 2019, SCE evaluated and deployed a protection scheme to detect an open phase (broken conductor) condition on its transmission system. SCE validated the open phase detection scheme by utilizing RSCAD (a power system simulations software) to model a transmission line and replicate an open phase condition. Through simulations testing, SCE optimized the open phase detection scheme and successfully detected an open phase condition, allowing de-energization of the line before it could contact a grounded object resulting in a fault event.

In 2020, SCE plans to continue the deployment of transmission open phase detection on six more transmission and sub-transmission lines. The open phase detection element is currently in the "alarm only" mode; however, SCE plans to transition to "trip" mode once the protection scheme has been fully validated. Beyond 2020, SCE intends to evaluate the feasibility of deploying open phase detection on lines with three or more terminals.

5.3.2.3 Fault indicators for detecting faults on electric lines and equipment

Fault indicators have historically been installed to assist in locating faulted circuit conditions. SCE is leveraging the advances in fault indicator technology to provide better intelligence of its grid operations. Remote fault indicators have been deployed as part of SCE's Grid Modernization program to provide line current measurement at device locations are not included in this WMP. As with other new smart grid devices, these new technologies will continue to evolve in the coming years and SCE will continue to track these improvements and adjust its application of these technologies to maximize their wildfire risk reduction benefits.

5.3.2.4 Forecast of a fire risk index, fire potential index, or similar

5.3.2.4.1 Fire Potential Index Phase II (SA-2)

FPI is an internal tool used to estimate wildfire potential based on actual weather and fuel conditions. Inputs include wind speed, the dryness of the air near the ground, and vegetation moisture. The FPI is used in conjunction with wind thresholds to identify areas that are likely to have significant fire activity which could threaten communities and SCE infrastructure. The FPI is currently the best method for assessing fire potential across SCE's extensive service territory due to its customization options for addressing specific fire thresholds across different weather climates.

In 2019, SCE began Phase II of the FPI project to increase capabilities by adding more granular weather data and expanding coverage to all of SCE's service territory. FPI went from being calculated at the district level to being calculated at the circuit level at a three-hour temporal resolution out to five days. This level of data helped to identify circuits that could be impacted the most during critical weather events, reducing the number of customers affected by possible de-energization.

In 2020, SCE will begin refining the current FPI by integrating historical weather and vegetation data into the index. This will facilitate better calibration and evaluation of current events in historical context for better-informed decision making. In parallel, SCE will work on the development and testing of a new FPI which will incorporate more information about fuel conditions such as quantities and types of fuels (e.g., brush, grass, timber). Implementation and verification of this new FPI will occur in the 2021-2022 time period.

In parallel with using the current FPI, SCE will seek to identify and correct any potential weaknesses in the newly developed FPI. New FPIs will only be installed after testing and verification are completed.

5.3.2.4.2 Fuel Sampling Program – (SA-5)

Physical samples of living vegetation in SCE's service territory are collected by various fire agencies to determine the degree of fuel combustibility. Due to the sporadic nature of that sampling, both spatially and temporally, SCE initiated its own fuel sampling program as part of its enhanced situational awareness capabilities described in the 2019 WMP to fill in existing data gaps help inform PSPS decision-making.

With the help of the Los Angeles County Fire Department (LACFD), SCE conducted a three-month pilot study to determine the feasibility of modifying its enhanced situational awareness capabilities to include a fuel sampling program. The study consisted of a vendor physically sampling native vegetation at three locations across Los Angeles County. The sampling and lab methodologies were refined throughout the study period so that the results matched those from the LACFD. The pilot study produced improved vegetation condition data and SCE subsequently launched its fuel sampling program.

SCE will continue to expand (2020) and mature (2021-2022) its fuel sampling program to better understand vegetation conditions that can potentially turn a spark into a catastrophic wildfire. Collected vegetation samples will help SCE improve its situational awareness and its in-house wildfire risk models. Fuel sampling will occur every two weeks (weather permitting) across multiple locations within four major regions of the SCE service territory. These regions include: The Inland Empire, Northern Los Angeles County, Eastern Sierra, and the Western Sierra. Sampling will include collecting portions of the native vegetation such as chamise and sagebrush. The vegetation will be weighed, dried, and weighed again to determine moisture content. Results will be posted in the National Fuel Moisture Database, which is available to the public.

The fuels sampling program will continue to mature over the next 10 years, but it is unlikely to expand unless other data gaps are identified. Maturity of the program will come in the form of an increasing dataset. This will allow for the development of trends and statistics which will be useful in better analyzing historical wildfires and develop three to six months ahead fire season outlooks.

5.3.2.4.3 Surface and Canopy Fuels Mapping - (SA-6)

Accurate assessments of vegetation conditions including details about surface and canopy fuels are vital to the success of fire spread modeling. Currently, a basic generic dataset called LandFire is being used, but this dataset has certain limitations that affect model outputs. SCE will work to make improvements to this dataset by means of remote sensing and on-site validation of fuel conditions. Updates will include more precise vegetation mapping and updated land disturbances.

Currently, SCE is using its vendor's most up-to-date land surface data which is coarse in resolution and does not include recent landscape disturbances. Therefore, in order to improve SCE's fire spread modeling results, SCE plans to have vendors perform an extensive and detailed mapping of surface and canopy fuels in its HFRA during the 2020-2022 time period using a blend of LiDAR and non-LiDAR technology. In addition, careful attention will be paid to address fuel conditions

around powerlines and to more accurately map the urban wildland interface regions, which will help with risk analysis.
Vegetation and fuels mapping will need to occur periodically over the next 10 years. This will likely involve some of the same methodologies and technologies that are used in the 2020-2022 time period. However, SCE will explore new emerging technologies that could be implemented during this period.

5.3.2.4.4 Remote Sensing (SA-7)

For the purpose of increasing situational awareness specifically related to wildfires, SCE is pursuing the use of remote sensing technology using satellite imagery, wildfire detection and HPCC model improvement between 2020-2022. Remote sensing technology can also provide processing of imagery into vegetation indexes specifically designed for SCE territory to monitor the health of the environment. In addition, this information will provide imagery that is frequently updated as compared to current imagery datasets. This will provide SCE the ability to see changes in the territory over a weekly basis, which will assist with restoration efforts in areas affected by fires/natural events.

Activities in 2020 include solidifying use cases such as lower atmospheric profiling and identifying vendors who can perform the necessary functions to support this and other defined projects. 2021 and 2022 activities will be centered on data collection, data processing and data analytics.

5.3.2.4.5 Fire Science Enhancements (SA-8)

Enhancements to the Fire Science program are critical to wildfire mitigation. Most of these enhancements are centered around weather and fuel modeling capabilities such as ensemble forecasting and the move toward sub-kilometer output. These enhancements will enable SCE to make more precise decisions regarding proactive de-energizations as well as in assessing priorities for grid hardening.

2019 activities included the development of FPI output, initially at the district level and then at circuit level, which was used to help identify areas that could be impacted by potential proactive de-energization decisions.

2020 activities will include working on a new FPI as well as on ensemble forecasting methods. 2021-2022 activities will consist of developing sub-kilometer weather and fuels output across the region.

Activities over the long term will include continued refinement of weather and fuel modeling. The current historical data set of 40 years will be expanded to include additional years, making the model more robust. Forecasts will also be produced at a higher resolution (less than 2km). SCE will also continue partnerships with academia, government, and with other private industry stakeholders to monitor scientific progress that can potentially be incorporated into its processes.

5.3.2.5 Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions

A critical component of SCE's PSPS protocol is to assess the potential for extreme fire risk conditions with the help of line patrols and live field observations (monitoring). Monitoring activities are performed by troublemen, senior patrolman, line crews and other supporting resources. Operationally, SCE deploys line patrol crews to assess circuit conditions prior to de-energization and before restoring service to confirm it is safe to re-energize.

In 2019, SCE deployed resources to perform live field observations (monitoring) on 390 unique distribution circuits and 128 unique sub-transmission circuits during activations. Many of these circuits were monitored multiple times during the various activations.

SCE will continue to deploy resources to perform live field observations (monitoring) for future events. The use of additional situational awareness devices (weather stations and HD cameras) may further influence where resources are stationed. As processes, procedures and technology evolve, they will be considered to determine when and where personnel performing live field observations are necessary.

5.3.2.6 Weather forecasting and estimating impacts on electric lines and equipment (SA-3)

High resolution weather and fuel modeling provides vital information for daily grid operations and PSPS activations. This information includes variables such as wind speed, humidity, precipitation and various vegetation moisture parameters, some of which are critical inputs into the FPI. This data helps determine circuits that are at risk for potential proactive de-energization and serves as inputs into fire spread modeling applications.

SCE purchased two High-Performance Computing Clusters (HPCCs) in 2019 for the purpose of producing high resolution weather and fuels information for meteorology and fire science, along with installing the Weather Research and Forecasting model (WRF) and housing the associated hardware at the Irvine and Alhambra datacenters. One HPCC was moved to SCE's Irvine datacenter and the second HPCC is scheduled to be moved to SCE's Alhambra datacenter and operationalized in 2020.

SCE's HPCCs will support full integration of all weather and fuel model products, full redundancy capability, and the development of a 40-year historical weather and fuels dataset. This historical data will provide valuable insight into the nature of wildfire behavior and will allow SCE to relate weather and fuel parameters to fire occurrences. In addition, weather and fuel model output will be used to run fire spread models which will determine potential risks of past, current and future event scenarios.

Between 2021-2022, SCE plans to procure and install a third HPCC to run customized climate models as well as make significant improvements to current modeling capabilities. Specifically, this HPCC will be used to test and train models to improve forecasts of vegetation conditions and forecast weather at a sub-kilometer level. Stochastic ensemble forecasting and machine learning techniques will also be incorporated to improve the current weather and fuel models. These

improvements will help to produce more accurate weather and fire potential forecasts which will allow SCE to make better informed operational decisions.

As datasets from sources such as weather stations and historical model runs expand, SCE plans to further refine its modeling capabilities, both in terms of accuracy and granularity, utilizing the expanded data and information. In addition, downstream models such as fuel models and long-range forecasts of Santa Ana winds and fire seasons will become more reliable and subsequently, more effective in reducing wildfire risk.

5.3.2.7 Asset and Reliability & Risk Analytics Capability (RA-1, SA-4)

Expansion of Risk Analysis and Wildfire Risk Reduction Model (RA-1):
As discussed in Sections 4.3 and 5.3.1, in 2020, SCE expects to implement the WRRM. SCE will integrate the WRRM's fire spread modeling capabilities with SCE's asset predictive models to enhance SCE's ability to model wildfire risk. In the long term, SCE will integrate asset condition data and daily weather data into its predictive models to provide near-real-time forecast and prediction of asset health condition and wildfire-related risk values.

FireCast, and FireSim (SA-4):
FireCast: FireCast is an application that provides a 3-day forecast of potential fire ignitions across the SCE service territory by using weather forecasts to run millions of simulations daily to derive both territory wide and utility asset risk forecasts as well as fire potential. The forecasts are embodied in a 4-D mapping application that facilitates review and analysis of risk metrics.

FireSim: FireSim provides real-time simulation modeling to derive potential fire impacts for active suppression response or weather event planning. This application leverages available weather and risk forecasts with real-time capabilities.

2019 activities included the development of various use-cases which included several on-site meetings with the vendor. In addition, FireCast and FireSim applications were customized specifically for the SCE service territory (defining domain, incorporating SCE assets, etc.) and provided to the SCE Fire Scientist.

SCE will test and validate FireCast and FireSim using any future fire events and move towards integrating these components as a tool for PSPS activation decision making. Eventually FireCast and FireSim will become fully integrated into the decision-making process during PSPS proactive de-energization events.

See Table 22 "Situational awareness and forecasting" for more details on the initiatives above.

5.3.3. Grid Design and System Hardening

Overview of System Hardening and Operational Practices:
SCE has developed a robust system hardening program to reduce wildfire risks (i.e., reduce the number of ignitions) and enhance system resiliency (i.e., reduce electrical infrastructure damage and improve power restoration time during and after a fire event) in its service territory. SCE conducts ongoing assessment and refinement of its grid hardening programs to identify technologies and protocols that may reduce the probability of an ignition event or reduce public exposure to hazardous conditions during periods of high fire risk. When SCE identifies a potential grid hardening alternative, it will pilot limited deployments to validate the effectiveness of new technology in mitigating wildfire ignitions in its service territory. PSPS, however, will still remain an available tool in the long term for extreme conditions.

Significant investments in system hardening require a commensurate evolution of operational practices. SCE has established operational protocols specifically for wildfire risk reduction, and intends to adapt them to ensure safe, reliable, and effective grid operation as the wildfire threat evolves. The use of operational protocols that mitigate wildfire risk, such as PSPS, are required to bridge the longer-lead time of completing system hardening across HFRA in SCE's service territory.

The following sections detail SCE's commitment and approach to system hardening and advancing new technologies and operational practices to meet today's needs and plan for the future.

Short-term Strategy (2020-2022):
In the coming years, SCE will continue to refine and expand its system hardening activities outlined in its 2019 WMP. SCE has extensive plans to replace bare overhead conductor with covered conductor and increase its installation of fire-resistant poles in HFRA (for example, see Table 23 "Grid Design and System Hardening" for planned number of covered conductor line miles to be installed).

To help reduce the PSPS impact on customers, SCE identified overhead circuits in HFRA portions of which could potentially be undergrounded. SCE's undergrounding program will be a multi-year effort with a target construction start in 2021 for the first six miles of the plan. SCE will continue to assess and develop its undergrounding plan to not only reduce PSPS impacts and ignition risk but also address potential egress issues in HFRA.

In 2019, SCE evaluated a fire-resistant (FR) wrap for wood poles. The evaluation successfully showed through various fire scenarios that FR wrap protected the wood from structural damage. A FR wrapped wood pole is created by applying surface treatments, such as wrapping an intumescent shield around the pole. The use of FR poles will enhance the resiliency of SCE's infrastructure in HFRA and help with rapid restoration. SCE is confident in the product's ability to significantly increase the likelihood of a wood pole surviving a wildfire. In 2020, SCE will deploy FR wrap wood poles in HFRA in combination with FR composite poles based on material

availability. Further, in 2020, SCE will continue to investigate this technology for improvement and to identify what activities need to take place post fire exposure to these poles.

While the primary focus of the 2019 WMP was on SCE's distribution system, the 2020-2022 WMP will incorporate additional activities focused on the sub-transmission and transmission systems. Learning from recent California fire ignitions that were attributed to utility equipment, SCE plans to evaluate and update its engineering design standards, as needed, to improve the performance of sub-transmission and transmission linear and structural assets under extreme wind events. Additionally, SCE plans to further pilot a transmission, open phase detection system that aims to detect and de-energize a detached transmission line before it hits the ground.

SCE also evaluates emergent technologies for system hardening. In the 2019 WMP, SCE described emergent technologies it was evaluating in the AT-1 to AT-4 activities.[5] SCE expects some of these evaluations, pilots, and studies to transition to implementation efforts during the 2020-2022 WMP cycle. For example, in 2019, SCE piloted CAL FIRE exempt spark prevention surge arresters at target locations. Based on its evaluation of the successful performance of these pilot units, SCE revised its Distribution Design Standards (DDS) and Distribution Overhead (DOH) construction standard manuals to include the CAL FIRE exempt spark prevention surge arresters. Inventory levels of the new arresters are being created for future work efforts and SCE intends to standardize on the use of the exempt arrests in HFRA applications for new or replace arrester installations.

In 2020, SCE plans to evaluate technologies such as Rapid Earth Fault Current Limiter (REFCL), Open Phase Detection (OPD), Early Fault Detection (EFD) and other alternative technologies for studies and pilots. To the extent that SCE pursues such programs and activities at larger scale, they will be set forth in future years' annual updates.

Long-term Strategy (2023-2030):
Future system hardening activities will be shaped by successes in advanced technology and informed by changes to wildfire risk factors, such as climate change, land use changes, fuel management, and other environmental considerations. While SCE expects covered conductor and fire-resistant poles to be program mainstays for years to come, undergrounding efforts are also expected to expand. Advancements in material science, construction methods, and improvements in the way SCE designs its system are also expected to increase system resiliency. Using its Asset Risk and Reliability Analytics framework and planned improvements in its asset management systems, SCE aspires to have a balanced mix of hardening activities that can be targeted to specific applications and based on unique locational risks.

In addition to carrying out existing system hardening programs, SCE plans to continue evaluating

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[5] Southern California Edison Company's 2019 WMP, Section 4.7, Alternative Technologies, pp. 71-74 (February 6, 2019), http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M263/K645/263645320.PDF.

emerging technologies that can reduce the probability of an ignition event and/or reduce public exposure to a hazardous condition during periods of high fire risk. SCE hopes that technologies currently under evaluation, as outlined in the Alternative Technology section in this chapter, can pass rigorous pilot testing to become new deployable system hardening programs. Given SCE's past success with emerging technologies, SCE is committed to continually evaluating potential wildfire mitigation programs and activities to further improve its grid design and system hardening well into the future.

The longer 10-year plan will be further solidified as the effectiveness of the current mitigation strategy is evaluated over the next few years. During the next decade, systems like DFA, or other new technologies, may offer improvements for detecting and locating incipient system failures with potential ignitions risks and allow SCE to take action to mitigate these ignition drivers.

5.3.3.1 Capacitor Maintenance and Replacement Program

SCE's historic capacitor bank maintenance program is primarily focused on helping with voltage support provided by the capacitor installations and the related system reactive power compensation. In addition to voltage support, during times of high electricity demand, capacitors can play a critical role in helping avoid or limit overload conditions on distribution circuits.

As part of inspections, capacitor banks requiring replacement or repair are recorded and prioritized for follow-up work. Aging increases the potential for capacitor bank equipment failures. This program targets updating capacitor bank hardware based on field inspections to help avoid failure events, an important secondary benefit related to wildfire risks.

In 2019, SCE continued to develop a monitoring system to help detect capacitor bank issues, such as failed capacitor switches and blown fuses, to improve capacitor bank maintenance and inspection efforts. This monitoring system will continue to be refined in 2020 to aid with maintenance and inspections of capacitor applications. Over the coming three years, SCE expects to refine its ability to remotely monitor capacitor performance to improve its inspection and maintenance efforts. The industry has developed guidance for fusing to minimize the impacts of capacitor unit failure modes. SCE uses this guidance to select fuses for its capacitor banks. SCE engineers will continue to work with industry leading manufacturers to identify options that minimize ignition risks from capacitor equipment failures. As such, SCE does not view this activity as a wildfire mitigation effort but will continue to operate maintenance plans as described in further detail in SCE's 2021 GRC (Exhibit SCE-02, Vol. 3).

5.3.3.2 Circuit Breaker Maintenance and Installation to De-energize Lines Upon Detecting a Fault

5.3.3.2.1 Circuit Breaker Maintenance

SCE believes through its experience that its existing circuit breaker maintenance plans have been effective at providing reliable circuit breaker operation. As such, SCE does not view this activity as a wildfire mitigation effort but will continue to operate maintenance plans as described in further detail in SCE's 2021 GRC (Exhibit SCE-02, Vol. 3).

Because SCE's circuit breaker maintenance program covers its entire territory, SCE used an average maintenance cost per distribution voltage circuit breaker along with typical maintenance cycle times to develop estimates associated to circuit breakers with feeder circuits in HFRA (values provided in Table 23).

5.3.3.2.2 Meter Alarming for Down Energized Conductor (MADEC) Pilot (AT-1)

In 2019, SCE implemented a machine learning algorithm and a process, MADEC, for identifying and isolating distribution circuits when hazardous downed energized conductors are identified. The MADEC system has been activated for full operations across SCE's system for both HFRA and non-HFRA circuitry and is intended to minimize public exposure to potentially energized conductors and related wildfire ignitions events.

In 2020, SCE intends to further advance the detection algorithm for faster identification of downed energized covered conductors and explore other possible algorithm advancements. The detection algorithm can be improved as events are captured and included into the detection model.

5.3.3.2.3 Rapid Earth Fault Current Limiter (REFCL)

Through the past decade, research in Australia has led to the development of special protective technology for distribution system ground faults that are expected to greatly reduce the ignition probability. This technology is known as Rapid Earth Fault Current Limiters (REFCLs).

REFCL is a system that quickly detects a ground fault (does not work for phase faults) and reduces the fault current to a level that would prevent an ignition even if there is direct contact of energized conductor with dry grass.

In 2019, SCE performed a detailed technology feasibility assessment on how REFCL could be applied to its distribution systems. The assessment indicated that a large portion of the SCE's distribution electric system can accommodate system and protection design changes that could allow the implementation of this technology. REFCL offers improvements for minimizing ignition events from single line to ground faults. Additional system grounding changes may impact primary connected customers and would require a collection of electric system modifications. Based on the findings of the feasibility assessment, SCE concluded that this technology has enough wildfire mitigation benefit to justify REFCL pilot projects.

In general, there are three variants of this technology applications to rapidly reduced the fault current to a very low level where ignition would not occur. These three variants are Ground Fault Neutralizer, Arc Suppression Coil, and Isolation Transformers. This system can also be tied to a CB/RAR to isolate the fault.

5.3.3.2.3.1 REFCL - Ground Fault Neutralizer (AT-3.1)

One of the more robust variants of this technology is the application of a Ground Fault Neutralizer (GFN), which consists of an arc suppression coil in parallel with an inverter to cancel out the

residual fault current. This type of REFCL application is the dominant technology applied by Australian utilities to comply with their operating requirements.

Australian utilities commonly have 3-wire distribution systems whereas SCE has a mixture of 3-wire and 4-wire systems. REFCL technologies are presently only available for 3-wire systems. Initial review of this technology shows benefits for ignition prevention are possible for some of SCE's circuitry in HFRA.

In 2019, SCE performed a detailed technology feasibility assessment on whether and how REFCL could be applied to its distribution systems. The assessment indicated that a large portion of the SCE's distribution electric system can have system and protection changes that could allow the implementation of this technology. REFCL offers improvements for minimizing ignition events from single line to ground faults. System grounding changes may impact primary connected customers and would require a collection of electric system modifications. Based on the findings of the feasibility assessment, SCE concluded that this technology has enough wildfire mitigation benefit to justify REFCL pilot projects.

For 2020, SCE plans to initiate design for a GFN field installation what would include site selection, material specifications, development of operating policies, development of engineering design documents and construction requirements, identification of industry vendors for GFN devices and development of remediations for expected challenges learned from Australian utility installations. SCE is targeting construction in 2021 for GFN.

5.3.3.2.3.2 REFCL – Resonant Grounding with Arc Suppression Coil (AT-3.2)

Arc Suppression Coil (ASC) offers a simpler alternative for ignition reduction in smaller systems when compared with a GFN. In the ASC application of REFCL technology, one takes advantage of a resonant grounding design that has been used by European utilities for reliability benefits for many years. In this application, there are less equipment and complexities with installation of ASC compared to GFN.

For 2020, SCE plans to initiate design for an ASC field installation to convert a typical substation to resonant grounding. This design will include substation site selection, material specifications, development of operating policies, development of engineering design documents and construction requirements, identification of industry vendors for ASC devices, and development of remediations to expected challenges learned from Australian utility installations. SCE is targeting construction in 2021 for the ASC installation.

5.3.3.2.3.3 REFCL - Isolation Transformer (AT-3.3)

In addition to application of the GFN or ASC devices at substations, SCE is also exploring the use of isolation transformer equipment on distribution circuits to achieve the desired rapid fault current reduction operating requirements. The use of ungrounded or isolation transformers in small overhead systems has been shown to meet these requirements.

For 2020, SCE intends to initiate a pilot installation at one location and develop the operating

practices and construction requirements associated with application of these systems. SCE's evaluation of its existing system shows that development of a small distribution class ASC or similar device may be required for widespread application of isolation transformer technology in order to align with REFCL operating limits. Efforts in 2020 and 2021 will focus on possible development of a distribution class ASC for this application.

5.3.3.2.4 Distribution Open Phase Detection (AT-3.4)

SCE is investigating a distribution Open Phase Detection (OPD) scheme to determine open conductor conditions. This will allow the protection system to isolate a separated conductor prior to the wire contacting the ground, while leveraging existing distribution hardware in HFRA.

In 2019, SCE evaluated the feasibility of performing a Distribution OPD pilot. In addition, SCE installed devices called Remote Sectionalizing Reclosers (RSRs), which include three phase voltage sensing and relaying capabilities that can be leveraged for detecting open conductor conditions. The circuitry between an interrupting device, like an RAR, and the end point RSR is monitored by the OPD scheme. Site reviews of five RARs were performed where RSR devices had been previously applied as circuit ties. These five locations were selected for 2020 pilot installation efforts for advancing the distribution OPD scheme.

In 2020, SCE will perform a pilot focused on determining the effectiveness of the Distribution OPD scheme and anticipated costs with potential larger deployment for five circuit locations. These pilot installations will focus on locations utilizing existing RAR and RSR devices to provide telemetry monitoring and interrupting capability. SCE expects to configure the equipment for alarming, rather than tripping, for at least the initial portion of the pilot. The pilot project installations will be monitored to determine effectiveness and inform further development and deployment actions for subsequent years.

5.3.3.2.5 High Impedance Relay Evaluations (AT-8)

SCE aims to develop a layered protection scheme to minimize wildfire ignition risks. Today, SCE deploys legacy protection schemes (phase and ground overcurrent) which are extremely effective in clearing faults in non-HFRA. In 2018 and 2019, SCE incorporated the addition of Fast Curve settings onto the existing protection scheme for circuits in HFRA, enhancing the ability to isolate faults quickly.

In 2020, SCE plans to investigate and deploy two controllers/relays with a High Impedance (Hi-Z) element in HFRA. The Hi-Z protection element will be monitored and evaluated for desired and non-desired operations, and a performance report shall be developed. In 2021 and beyond, SCE envisions leveraging an array of distribution protection schemes to detect and isolate faulted conditions in HFRA.

5.3.3.2.6 Circuit Breaker Replacements

SCE replaces circuit breakers on its distribution and transmission system through the substation Infrastructure Replacement (IR) program at a rate of approximately 220 circuit breakers per year, as detailed in SCE's 2021 GRC (SCE-02, Vol. 3). The circuit breakers are replaced to maintain

system reliability by reducing the probability of a circuit breaker failure due to age.

SCE's existing circuit breaker replacement plans have been effective to date in providing reliable circuit breaker operation. As such, SCE does not view this activity as a wildfire mitigation effort but will continue to execute replacement plans as outlined in its 2021 GRC. SCE has provided substation IR circuit breaker plan data for feeder circuits in HFRA (Table 23). It is important to note that circuit breaker replacement plans are subject to change for various reasons including, for example, outage coordination schedules, resource constraints, reprioritization of projects, and project bundling.

5.3.3.2.7 Circuit Breaker Relay Installs (CB Fast Curve Settings SH-6)

An activity that SCE considers to be a wildfire mitigation activity is deployment of Fast Curve settings at the substation circuit breaker (CB) relay. Fast Curve settings for CB relays are intended to provide quicker fault detection and clearing of HFRA circuits. Fast Curve settings reduce fault energy by increasing the speed with which a relay reacts to most fault currents. Compared to conventional settings, SCE believes reducing fault durations anticipated with Fast Curve operating settings is expected to reduce heating, arcing, and sparking for many faults. To allow SCE the capability to toggle between normal and Fast Curve operating setting during high fire threat weather requires CB relays to be newer microprocessor-type relays. Further details on this activity can be found in SCE's 2018 GSRP filing.

SCE met its 2019 WMP goal of updating settings for existing, compatible microprocessor CB relays, as well as developed a 2020-2022 plan to upgrade non-compatible and/or older vintage electromechanical and microprocessor CB relays for HFRA feeder circuits.

SCE intends to execute the CB relay Fast Curve plan it developed in 2019 and complete deployment by year-end 2022, which includes a total of 210 relay upgrades. In 2020, SCE plans to replace/upgrade 55 relay units in HFRA. SCE has already identified additional relays targeted by the activity and planned for their replacement under the Substation Infrastructure Replacement (Substation IR) program (SCE's 2021 GRC Exhibit SCE-02, Volume 3). For these planned Substation IR-driven relay replacement projects, SCE will include Fast Curve settings on targeted CB relays for HFRA feeder circuits.

5.3.3.3 Covered Conductor Installation

5.3.3.3.1 Covered Conductor Installation (SH-1)

Installation of covered conductor is mainly driven by SCE's Wildfire Covered Conductor Program (WCCP), which is a multi-year program started in 2018 as part of GSRP. This program is aimed at reducing the risk of fire ignitions by replacing bare overhead conductor with covered conductor in HFRA. The increased use of covered conductor is anticipated to significantly reduce contact-from-object and wire-to-wire ignition risks as well as indirectly reduce the frequency of wire down events by reducing the number of faults. SCE's analysis of its historical fire data indicated that contact-from-object and wire-to-wire faults in SCE's HFRA were associated with approximately 60% of suspected wildfire-initiating events. SCE's risk analysis demonstrates that

application of covered conductor continues to be an effective approach to reduce ignitions associated with these two ignition drivers in HFRA.

The benefits of utilizing covered conductor to reduce the wildfire ignition risk, in combination with other mitigation measures, such as advanced protective relays, and automatic reclosers with Fast Curve settings, and CLFs, significantly outweigh the increased cost of installing covered conductor over bare conductor. Covered conductor also offers significantly better safety protection for the public in the limited cases of high impedance faults, as tests and studies have demonstrated that incidental contacts with energized conductor that is covered do not result in injuries.

In addition to replacing bare conductor with covered conductor, the WCCP will allow SCE to complete a number of system hardening improvements on the distribution system. Where appropriate, pole replacements and transformer replacements driven by this reconductoring program will be replaced with fire-resistant poles and ester fluid transformers, respectively. Additionally, SCE will install wildlife protection, such as protective covering for dead-end, termination, fuse, arrester, and transformer bushing to combat contact-related faults. Another benefit of WCCP is removing vintage splices, such as automatic and pre-formed types, which are more likely to fail under mechanical or electrical high stress events.

In addition to WCCP-driven covered conductor installations, SCE's standards require bare conductor it identifies for replacement, as well as any new construction, in HFRA to be replaced with covered conductor. Typically, SCE identifies bare conductor requiring replacement outside of the WCCP through its existing inspection programs.

In 2019, SCE installed 372 circuit miles of covered conductor, exceeding its 2019 WMP goal of installing at least 96 circuit miles in HFRA. Some of the key lessons learned from this were related to weather, permitting, and material availability, among other constraints on the speed of installation. In 2020, SCE plans to install 700 circuit miles of covered conductor in HFRA. SCE plans to further coordinate construction windows in areas prone to winter weather events, communicate with internal and external stakeholders during the early design phase to attain permits in a timely manner, and closely monitor material availability to identify any shortages or surplus at sites where work is planned. SCE will strive to install up to 1,000 circuit miles of covered conductor in 2020 in HFRA.

Given the significant wildfire mitigation benefits, SCE is targeting the proactive replacement of up to approximately 4,000 circuit miles of existing, bare, distribution primary overhead conductor in HFRA between 2020 and the end of 2022 as shown in Table 23. This accelerated deployment will help to significantly reduce the fire-ignition risk more expeditiously. The scoping and design work conducted in 2019 has enabled SCE to significantly ramp-up the covered conductor installations targeted for 2020 to 2022.

To prioritize the covered conductor installations, SCE is developing predictive models at the asset level to quantify the probability of an ignition, together with the HFRA wildfire consequence, to

calculate the risk of wildfire at the circuit segment level. This level of understanding of wildfire risk will help SCE prioritize the highest risk circuit segments in HFRA.

SCE plans to complete its covered conductor installations under the WCCP by the end of 2024, at which point 70% of the overhead wire originally in scope, as part of the 2018 GSRP, is anticipated to be replaced with covered conductor. SCE expects to replace the remaining 30% of overhead wire in HFRA through existing SCE programs, as needed by program tenets, in the years to come.

5.3.3.3.2 Tree Attachment Remediation (SH-10)

Older construction in SCE's forested service area made use of existing trees to carry conductor rather than a separate utility pole. These are called "tree attachments." SCE's observations in regions with a high concentration of tree attachments indicate faults and damages are related to branches falling from the tree to which utility equipment is attached. Consequently, SCE believes it is prudent to remove tree attachments. In 2019, SCE remediated 101 tree attachments and plans to remediate a minimum of 325 tree attachments in 2020 and will strive to complete 481. Beyond 2020, SCE plans to remediate 689 tree attachments in 2021, and 788 tree attachments in 2022. SCE will remediate these tree attachments by relocating them to a pole typically in concert with covered conductor deployment (i.e., WCCP).

Other considerations for heavily forested areas:
In forested areas with dense vegetation, SCE may use spacer cable system construction in conjunction with covered conductor. Spacer cable is a more compact construction and has a steel messenger wire that support the weight of the covered conductor. This design can generally, within reason, withstand falling tree branches without damaging the covered conductor.

SCE may use aerial bundled cable in limited areas as an alternative to covered conductor, likely in areas with narrower spaces and areas with dense vegetation that cannot be trimmed. Aerial bundled cable is more complicated to make connections with, making it more suited for long runs with few equipment and tap lines. Additionally, the increased weight of aerial bundled cable will lead to shorter spans and more pole replacements. Both covered conductor and aerial bundled cable have comparable benefits regarding preventing contact from objects; however, covered conductor is more economical for most applications.

5.3.3.3.3 Vibration Dampers (AT-4)

Vibration dampers are hardware attached to conductors (usually near insulators) to inhibit conductor abrasion and fatigue from vibration. Vibration dampers are specifically meant to reduce Aeolian vibration, which manifests with non-turbulent winds, where wind speeds are below 15 mph. The use of dampers can prevent the conductor, conductor connections and attachments from degrading due to vibration.

In 2019, SCE met the 2019 WMP goal of developing standard installation practices for Aeolian vibration dampers. SCE expanded its conductor resiliency effort with vibration damper applications for existing conductors by developing standard installation practices for bare

conductors. This standard was published in SCE's Distribution Overhead Construction Standard. This improvement is anticipated to help in long term integrity of some electric system components.

While damper applications for bare wire have been heavily studied by the industry, damper applications for covered conductor have not. For this reason, dampers are not readily available for covered conductor. Current designs of damper technologies, such as spiral vibration dampers and Stockbridge dampers have the following limitations:

- Spiral vibration dampers are only effective for small diameter conductors (less than 0.76 inches). Because the covering increases the diameter of the covered conductors, a very limited number of covered conductor sizes meet this criterion; and
- Stockbridge dampers are not well suited to distribution applications due to the need to analyze every span for effective damper placement. The design of the clamping mechanism on current Stockbridge dampers may also damage the covered conductor's covering.

Due to these limitations, further assessment of vibration dampers for covered conductor applications is required in 2020 and may extend into future years.

5.3.3.4 Covered Conductor Maintenance

SCE largely uses the same inspection and maintenance process for covered conductor as used for bare conductor. The inspection schedule is the same and the visual check is similar. The additional inspection requirements for covered conductor include verifying that the proper covering for exposed conductor is installed and inspecting the condition of the insulation material on the covered conductor. These requirements are necessary since installing covered conductor first requires stripping the covered conductor to make connections and then re-covering any exposed portion of the conductor.

5.3.3.5 Crossarm Maintenance, Repair, and Replacement

SCE does not have a dedicated crossarm maintenance program. However, most, if not all, existing crossarms will be replaced with composite crossarms as part of SCE's WCCP efforts since insulators need to be replaced when reconductoring to covered conductor. In addition, SCE will continue to inspect crossarms through its High Fire Risk Informed inspections and aerial inspection programs in HFRA to identify damaged or deteriorated crossarms requiring replacement. Per its standards, SCE will replace wood crossarms identified by these inspections with composite crossarms. Details about SCE's inspection programs can be found in Section 5.3.4.

5.3.3.6 Distribution Pole Replacement and Reinforcement, Including Composite Poles

5.3.3.6.1 WCCP Fire Resistant Poles (SH-3)

As described in SCE's 2021 GRC (SCE-04, Vol. 5A), WCCP will require pole upgrades in certain circumstances. Covered conductor is heavier and has a larger cross-sectional area than bare conductor. Accordingly, implementing WCCP will require SCE to determine the adequacy of existing poles to support this extra weight and associated wind loading due to the larger cross-

sectional area. As part of this re-conductoring work, SCE will conduct a pole loading assessment on existing poles where covered conductor is to be installed to determine if pole replacement is required. If the pole loading analysis shows that GO 95-mandated minimum safety factors would not be maintained after installing covered conductor, SCE will install new fire-resistant poles (e.g., a FR composite pole or FR wrapped wood pole) to support the new covered conductor. A fire-resistant pole is either a composite pole with a fire-protective shield or a treated wood pole with a fire-retardant intumescent wrap.

In 2019, SCE installed 1,421 FR poles as part of the WCCP, meeting its 2019 WMP goal of installing at least 1,100 FR poles in HFRA.

As part of the WCCP, SCE anticipates it will replace approximately up to 47,000 existing wood poles in HFRA from 2020 to 2022. At locations with pole-top electrical equipment or known woodpecker problem areas, SCE will apply FR composite poles subject to material availability. In all other applications, SCE plans to use FR wrapped wood poles subject to material availability.

SCE plans to complete its FR pole installations under the WCCP by the end of 2024. Thereafter, SCE will replace wood poles with FR poles in HFRA through other existing programs.

5.3.3.6.2 Deteriorated Pole Program

As discussed later in Section 5.3.4.6, GO 165 requires intrusive inspections on all poles by the time they are 25 years old and then re-inspected at least once every 20 years. SCE completed its first cycle of intrusive inspections in 2009 and continues intrusive inspections through this program.

SCE's Deteriorated Pole Program, which was established pursuant to the distribution pole inspection program in compliance with GO 165, replaces poles throughout SCE's service territory based on the results of these inspections. It also replaces deteriorated poles identified in the normal course of business based on their external condition The Deteriorated Pole Program prioritizes these poles according to the nature and extent of degradation.

The Deteriorated Pole Program pole replacements are considered part of SCE's normal maintenance program and are not considered a WMP initiative. However, in HFRA, degraded poles will be replaced with FR poles using the same strategy as WCCP (i.e,. combination of FR composite and FR wraps). All FR poles in HFRA will be tracked as part of the SH-3 Program Target.

5.3.3.6.3 Poles Identified During Inspections

SCE's inspection programs outlined in Chapter 5.3.4 can result in pole replacements for various reasons, including safety, reliability, and compliance. Values in Table 23 are provided using open notifications and work orders initiated by the inspection programs and planned for replacement based on their respective priority levels. The number of poles replaced each year can change based on inspection determinations made on the field. SCE does not consider pole replacements to be a WMP initiative but will continue to do this as part of SCE's compliance obligation and system hardening goals.

5.3.3.7 Expulsion Fuse Replacement (Branch Line Protection Strategy SH-4)

In 2018, SCE focused its efforts on a branch line protection strategy in HFRA to minimize fault energy using CLFs. Its initial efforts focused on circuit topology updates with the installation of branch line protection where fuses did not already exist. SCE's 2020 efforts will now focus on updating existing conventional fuses to CLF designs after the pending completion of the project for new fusing installations. The fuse replacements will predominantly target expulsion type fuses and fuses with historical performance issues, such as vintage liquid fuses. Liquid fuses are generally not considered expulsion fuses, though the activity is similar in nature and planned to be grouped into this category.

In 2019, SCE met its goal of installing CLFs for at least 7,500 locations for HFRA circuitry. SCE installed CLFs at 7,765 locations as part of a targeted fuse installation effort.

In 2020, SCE plans to install/replace fuses at 3,025 locations. Over the next 3 years, SCE expects to replace existing conventional branch line fusing with updated protective devices in its HFRA, namely either CLFs or branch line reclosers. In some cases, CAL FIRE exempt classified expulsion fuses may be used in circuit designs, such as conditions with higher circuit loading where higher amperage CLFs are either not available or does not offer a greater technical advantage.

Additionally, branch line recloser technology or application criteria may evolve in future years, potentially replacing or working in conjunction with the branch line fusing applied as part of these efforts.

5.3.3.8 Grid Topology Improvements to Mitigate or Reduce PSPS Events

5.3.3.8.1 PSPS-Driven Grid Hardening Work (SH-7)

As a result of PSPS events in 2019, SCE identified opportunities to reassess and potentially modify configurations on circuits that have experienced multiple PSPS events to reduce the number of affected customers. SCE plans to accomplish this by replacing targeted segments of bare conductor with covered conductor, installing small undergrounding projects, and/or adding switching devices to allow for circuit reconfigurations/load transfers or further minimize the circuitry that needs to be de-energized. These circuit modifications will minimize the impact to its customers located in 1) non-HFRA that are fed from circuits that traverse HFRA and 2) certain underground areas within HFRA that are fed from overhead circuitry within HFRA.

SCE is continuing its scoping efforts to identify locations that can benefit from circuit modifications and will continue to design and execute these projects as they are identified. To date, SCE has identified approximately 30 potential locations where additional circuit modifications may improve sectionalizing capability within HFRA. Design and execution of this work was initiated in late November 2019.

SCE is currently using super-computing capabilities to develop a 40-year data set of historical high-resolution weather and fuel forecast models for HFRA. In future years, SCE plans to use this data set to help prioritize circuits for wildfire mitigation activities by examining the number of

times each circuit breached PSPS criteria over a given historical period. This will help SCE forecast which circuits may be most likely to exceed PSPS criteria. Using this output, in combination with the most recent PSPS de-energization data, SCE will identify opportunities to reduce PSPS impacts through operational practices, grid hardening techniques, or microgrids, where appropriate. In 2020, SCE plans to review 50% of all distribution circuits within HFRA to determine if modifications may improve sectionalizing capability.

5.3.3.8.2 Microgrids (PSPS-8)

The CPUC opened the Microgrids and Resiliency Strategies OIR (R.19-09-009) proceeding to comply with the statutory mandates of SB 1339 to facilitate the commercialization of microgrids for distribution customers of large electrical corporations and to address the CPUC's goal of deploying resiliency planning in areas that are prone to outage events and wildfires.[6] The CPUC has adopted the U.S. Department of Energy's definition of a microgrid in this proceeding, which is "a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode."[7] When properly designed and located, microgrids open up the possibility of continuing electrical service in lower-risk fire areas that would otherwise be affected by PSPS events that are targeting adjacent or nearby HFRA.

Microgrids may serve a single customer behind-the-meter (BTM) or multiple customers in-front-of-the-meter (FTM). The former is more common today given fewer regulatory barriers and technical complexities relative to the latter. In the long term, as these barriers and complexities are addressed, the FTM microgrids may prove, in certain instances, to be a valuable resiliency tool. The CPUC aims to address barriers to deploying FTM microgrids through the Microgrid OIR. SCE is in the process of determining where such microgrids and to what scale could be deployed on a pilot basis and how to compare microgrid effectiveness with other mitigation options. As further detailed in its proposals in the Microgrid OIR, SCE plans to conduct microgrid pilots in 2020. As SCE gains experience and lessons learned from its 2020 pilots, SCE expects to update, modify, and refine the microgrid candidate selection approach. Details on SCE's PSPS

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6 Genevieve Shiroma, *Assigned Commissioner's Scoping Memo and Ruling for Track 1* (December 20, 2019), http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M322/K210/322210423.PDF.

7 Dan T. Ton and Merrill A. Smith, *The U.S. Department of Energy's Microgrid Initiative,* pp. 84-94 (The Electricity Journal, Volume 25, Issue 8, October 2012), https://www.energy.gov/sites/prod/files/2016/06/f32/The%20US%20Department%20of%20Energy's%20Microgrid%20Initiative.pdf.

Microgrid Pilot may be found in SCE's filing for Rulemaking 19-09-009.[8]

SCE summarizes its microgrid approach in this WMP because it essentially is a wildfire-focused initiative. Similar to how PSPS-specific policy issues should be resolved in the PSPS OIR, microgrid-specific policy issues should be resolved in the Microgrids OIR. Developing and installing microgrid solutions is complex, requires a detailed understanding of local system configurations, air quality requirements, policy objectives, regulatory requirements, etc., all of which are better suited to be addressed in the separate Microgrid OIR. SCE anticipates microgrid solutions can help improve grid resiliency and reduce the impacts of de-energization, making it a part of SCE's overall wildfire strategy. To the extent that SCE determines alternative solutions are more cost effective or the CPUC enacts policy changes that impact SCE's Microgrid Pilot, SCE will inform the WSD and those changes and requirements will automatically apply to this WMP once adopted.

In addition to microgrids, SCE is exploring options to further expand the "Resiliency Zone" concept. As some mitigations (including the expansion of microgrids) may take time, SCE is in the early stages of assessing opportunities to provide electricity to centrally located community resources serving local customers during a PSPS event. SCE is developing criteria to explore where such resiliency zones would be best located and what types of technology or operational strategies would best support this effort. For example, energizing a remote area in SCE's HFRA that have limited egress routes where customers may need to obtain access to basic services (e.g. fuel, groceries, food), Resiliency Zone solutions may reduce impacts to customers. A small, centralized area of the community may be energized during a PSPS event, only where it is safe to do so, and connected to electrical services that are fed from underground infrastructure. This strategy does not supersede any other program or SCE's generator policy but is intended to be an incremental step to longer-term strategies.

5.3.3.9 Installation of System Automation Equipment (Remote Controlled Automatic Reclosers Settings Update SH-5)

For the 2020-2022 WMP, SCE is expanding its system automation equipment strategy to target both RARs and additional sectionalizing devices to provide important isolating capabilities that could minimize the frequency of customer outages during PSPS and other outage events. In certain cases, these other sectionalizing devices, including RCSs, can be a cost-effective alternative, in certain situations, to RARs for more granular sectionalizing than previously anticipated.

SCE successfully met its 2019 WMP target of at least 50 RAR installations for HFRA circuitry with benefits for further circuit segmentation and energy reductions detailed in the GSRP filing by installing 55 RARs in 2019. During scoping of RAR projects, however, SCE identified additional

[8] Southern California Edison Company's (U 338-E) Comments on Track 1 Microgrid and Resiliency Strategies Staff Proposal (January 30, 2020), http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M325/K544/325544944.PDF

scenarios where RARs are not the best devices to achieve the desired outcomes. In particular, to improve sectionalizing capabilities related to PSPS events, SCE plans to apply RCSs and other sectionalizing devices, such as manually operated switches, instead of RARs in certain situations. For example, situations with small overhead line sections served from underground sources may benefit from the application of an underground RCS installation to segment the overhead line based on operating conditions. SCE will continue to install RARs for mainline circuit protection and reliability improvements, as appropriate.

In 2020, SCE plans to install 45 devices consisting of both RARs and RCSs. Note that SCE's 2020 RAR installation program will complete the original target as defined in its GSRP filing. For 2021 SCE intends to transition sectionalizing device installations into normal work processes instead of a dedicated program.

5.3.3.10 Maintenance, Repair, and Replacement of Connectors, Including Hotline Clamps

SCE does not have a program explicitly to target connector maintenance, repair and replacement, but rather identifies scope through other work activities. Connector replacement can be identified during repair work, traditional inspections, or other means such as infrared scanning. SCE is piloting Distribution Fault Anticipation (DFA) and Early Fault Detection (EFD) technologies to improve its identification and alerting of its maintenance crews when connector maintenance, repair, or replacement is needed. SCE is using infrared to scan circuitry and connectors and identify those that need maintenance, repair, or replacement. These efforts will continue through 2020. Over the short (3 years) and long term (10 years), SCE will replace vintage connectors during its re-conductoring efforts, such as its covered conductor installation.

5.3.3.11 Mitigation of Impact on Customers and Other Residents Affected During PSPS Event

A few of the grid design and system hardening initiatives that SCE is undertaking to reduce the impact of PSPS events are described in the preceding sub-sections of Section 5.3.3. Many of these activities contribute to reducing the number and duration of PSPS de-energizations. In Section 5.3.6, SCE describes the various operational response practices it is using to mitigate PSPS impacts during these events. These include but are not limited to SCE's exploration into using microgrids and incentive programs to encourage customers to use their existing or planned solar installations to provide supplemental power. Programs like these can help with system hardening and mitigating the impact of PSPS events on customers and other residents by offering localized energy redundancy.

5.3.3.12 Other Corrective Action

SCE historically conducts maintenance based on findings from its inspection programs. SCE performs "other corrective actions" for various reasons, including safety, reliability, and compliance. SCE does not consider other corrective actions to be a WMP initiative but will continue to do this as part of SCE's role as a prudent operator of the grid.

Planned maintenance work identified through HFRA inspections is comprised of repairs to SCE's equipment and structures recorded as Priority 2 and Priority 3 items (i.e., level 2 and level 3). These repairs can be performed by inspectors or qualified electrical workers and are prioritized

based on the established due date. Unplanned activities, also referred to as breakdown maintenance, include the repair of SCE equipment and structures that are damaged, compromised, or have failed in service. These items are typically identified as Priority 1 conditions and are usually performed in response to damage caused by equipment failures, degradation, metallic balloons, animals, or other causes. Repairs to these conditions are either completed or made safe to the public within 24 hours of identification. SCE considers opportunities to use more fire-resistant materials in HFRA, such as composite poles and crossarms, and its latest engineering standards, which have higher fault resistance, when performing these remediations while also focused on safety and reliability for customers.

Current programs use compliance dates and three-tier maintenance prioritization that is assigned by inspector and approved by a separate gatekeeper with additional validation. Once approved by a gatekeeper, SCE remediates items by due date and risk analyses unless constrained.

In, 2019 SCE's ground-based EOI effort was designed to identify and remediate immediate or probable wildfire risk, and involved the inspection of over approximately 385,000 distribution structures and approximately 41,000 transmission and transmission-telecommunications structures within SCE's HFRA. It was implemented through a phased approach based on a historical data-driven probability risk analysis. SCE's EOI effort was designed to be executed in two phases, with priority placed on the highest risk assets in SCE's HFRA. The first phase of inspections was substantially completed by January 31, 2019 and addressed approximately 109,000 structures with higher risk ranking based on historical system events. The second phase was substantially completed by May 31, 2019 and addressed the remaining 277,000 structures within 1,315 circuits in SCE's HFRA. Also, in 2019, SCE identified certain span conditions that pose a fire risk. As also part of its EOI effort, in 2019, SCE identified certain-span conditions that pose a fire risk. These span conditions included, for example, long spans, angled spans, and spans that transition from vertical to horizontal configurations.

While this approach has served its purpose on meeting the strict compliance requirements, it is not effective in allocating the limited resources to address the risks to the public. Going forward, SCE believes the Commission should direct utilities to switch to a program that prioritizes risks rather than compliance due dates, focusing on items that have higher fire risk.

5.3.3.12.1 Distribution Remediation (SH-12.1)

The primary activities involved in SCE's distribution EOI effort included inspecting all distribution primary voltage-level structures based on identified ignition risk reduction criteria. During an EOI inspection, there was a physical visit to the structure being inspected and then a thorough visual inspection from the ground occurs at the actual location. SCE also identified certain overhead conductor span conditions – such as sagging lines or spans that made directional changes[9] that could pose a greater fire risk.

[9] These are spans that deviated from tangent line construction

As a result of ground-based inspections on over 385,000 structures, approximately 96,000 notifications were generated to address issues on distribution assets. The breakdown of those findings by priority category is as follows:

- 606 Priority 1 notifications
- 55,180 Priority 2 notifications
- 40,056 Priority 3 notifications

The identified repairs were assigned due dates consistent with the high-fire tiered area and prioritized based on earliest compliance date. Of the approximate 96,000 notifications, 10,000 were for vegetation trimming and the majority (83,000) are associated with electrical assets that required repair or replacement. In 2019, all Priority 1 notifications were completed and the great majority of Priority 2 notifications that were due in 2019 and not encumbered by access restriction and/or permitting requirement were completed with the exception of 282 notifications that were subject to delays caused by inclement weather and other factors. SCE will continue to work towards remediating the issues identified through the 2018-2019 ground-based EOI inspections in HFRA. In 2020, SCE plans to remediate 100% of notifications with ignition risk in accordance with CPUC requirements, non-inclusive of notifications which meet the criteria of a valid exception Additionally, SCE is evaluating assets for inclusion in its risk modeling efforts to determine a risk-informed approach for this work.

5.3.3.12.2 Transmission Remediations (SH-12.2)

Similar to distribution remediations, planned maintenance work identified through HFRA inspections is comprised of repairs to SCE's equipment and structures recorded as Priority 2 and Priority 3 items (i.e., level 2 and level 3). These repairs can be performed by inspectors or qualified electrical workers for electrical assets and cable splicers for telecom assets and prioritized based on the established due date. Unplanned activities, also referred to as breakdown maintenance, include the repair of SCE equipment and structures that are damaged, compromised, or have failed in service. These items are typically identified as Priority 1 conditions and are performed in response to damage caused by equipment failures, degradation, metallic balloons, animals, or other causes. Repairs to these conditions are either completed or made safe to the public within 24 hours of identification.

SCE performed inspections of all relevant transmission and transmission-telecommunications assets in HFRA for a total of over approximately 41,000 inspections in 2019. Items requiring remediation were documented and scheduled for maintenance or repair, based upon the risk of the condition. After the gatekeeping process, over 3,000 electrical notifications and over 9,500 vegetation related notifications requiring remediation were identified including:

- 48 Priority 1 notifications
- 12,000 Priority 2 notifications
- 1,700 Priority 3 notifications

Most of the notifications were tied to vegetation issues (due to their location in heavily vegetated areas) with a small percentage, about 10% tied to asset issues that required repair/replacement. All Priority 1 and over 9,000 Priority 2 notifications were completed in 2019.

SCE has 3,400 P2 notifications remaining to be completed. SCE is prioritizing the P2 notifications that were due in 2019 but not completed. Most of the P2 notifications are due in 2020 as they occurred in Tier 2 areas. Priority 3 notifications have been rolled into other programs, including routine vegetation management or targeted programs to address within their compliance due dates and to improve productivity.

SCE plans to remediate 100% of notifications with ignition risk in accordance with CPUC requirements, non-inclusive of notifications which meet the criteria of a valid exception. SCE will work towards integrating this inspection program into current inspection routines at these facilities to ensure consistent practices across the organization, following improvements from its transmission and distribution programs. Additionally, SCE is evaluating different assets for inclusion in risk modeling efforts to determine a risk-informed approach for this work.

5.3.3.12.3 Generation Remediations (SH-12.3)

In March 2019, SCE began inspecting generation assets in HFRA. These inspections included ignition-focused assessments of low-voltage ancillary assets and their associated overhead lines, supporting structures, and any exposed wiring or threats from vegetation that required additional mitigation. In addition, high-voltage facilities were inspected to ensure that all overhead connections from the last inspection of these structures had been evaluated and assessed for vegetation clearance buffers, using relevant criteria from transmission and distribution inspections. Remediation work stemming from these inspection efforts was prioritized according to the risk/severity of the identified condition including, for example, asset corrections and infrastructure repairs or replacement, as well as vegetation management, and in some cases civil repairs to critical assets that cannot be accessed.

SCE performed inspections of all relevant generation assets in HFRA for a total of 449 inspections in 2019. Items requiring remediation were documented and scheduled for maintenance or repair, based upon the risk of the condition. After the gatekeeping process, a total of 243 notifications requiring remediation were identified including:

- 1 Priority 1 notification
- 88 Priority 2 notifications
- 154 Priority 3 notifications

Most of the notifications were tied to vegetation issues (due to their location in heavily vegetated areas) with a small percentage, about 10%, tied to asset issues that required repair or replacement. All Priority 1 and 2 notifications that were due in 2019 and did not have a GO 95 exception due to permitting or other constraints was completed in 2019.

A small number of P2 notifications remain to be completed in 2020. The maintenance

notifications (Priority 3) are being rolled into other programs, including routine vegetation management or targeted programs to address their issues. In 2020, SCE plans to remediate 100% of notifications with ignition risk in accordance with CPUC requirements, non-inclusive of notifications which meet the criteria of a valid exception. SCE will work towards integrating this inspection program into the current inspection routines at these facilities to ensure consistent practices across the organization, following improvements from transmission and distribution programs. Additionally, SCE is evaluating different assets for inclusion in risk modeling efforts to determine a risk-informed approach for this work. This activity will continue through at least another full inspection cycle to determine trends, assess risks, and evaluate the need for further inspections and their frequency.

As SCE improves the quality of its data and the quality of its risk-informed analyses, the program will be re-evaluated to determine the appropriate inspection frequency for the long-term.

5.3.3.13 Pole Loading Infrastructure Hardening and Replacement Program Based on Pole Loading Assessment Program

As described further in Section 5.3.4.13, the Pole Loading Program (PLP) is an assessment and remediation program identifying poles that do not meet the safety factor requirements of GO 95 and SCE's internal design and construction standards for repair or replacement. PLP's goal is to assess the structural loading capabilities of the approximately 1.4 million wood, composite, and lightweight steel poles in SCE's service territory to meet current design standards by 2021, and to continue remediating pole overloading issues by 2025.

All poles that require replacement are prioritized based on their safety factor and on whether the pole is in HFRA. In HFRA, pole loading program poles will be replaced with FR poles. PLP is not a WMP initiative but will continue as part of SCE's role as the prudent operator of the grid.

5.3.3.14 Transformers Maintenance and Replacement

Through the WCCP program, SCE will include a number of complementary system hardening improvements on the distribution system. SCE will replace existing overhead distribution transformers that are filled with mineral oil to new transformers filled with ester fluid, thus reducing the flammability and lessen than environmental impact in case of spillage. At the same time, SCE will also install transformer bushing covers where appropriate. These system hardening measures are intended to reduce certain equipment and contact from object ignition drivers, respectively. Otherwise, SCE does not currently consider transformer maintenance to be a WMP initiative but will continue to do this as part of SCE's role as the prudent operator of the grid and evaluate whether any other targeted transformer maintenance or replacement is needed to mitigate wildfire risk.

5.3.3.15 Transmission Structure Maintenance and Replacement

SCE's historic transmission maintenance program, which includes towers, poles, conductor, and other transmission assets, is informed by compliance programs that help ensure safety and reliability. As part of SCE's inspections programs, transmission structures requiring maintenance are recorded and scheduled for follow-up work. SCE does not consider its structure maintenance

programs to be a WMP initiative but will continue to do this as part of SCE's role as the prudent operator of the grid.

5.3.3.16 Undergrounding of Electric Lines and/or Equipment (SH-2)

In 2019, SCE evaluated undergrounding as a potential wildfire mitigation in its HFRA. SCE evaluated circuit segments on the basis of multiple criteria including wildfire risk scoring, PSPS impacts, and local SCE knowledge of terrain and topography to identify potential undergrounding candidates. SCE also reviewed egress in areas that may be challenging to evacuate should a fire occur as well as areas where customers may require electric service to provide essential public health and safety services.

SCE's first step in its 2019 undergrounding evaluation utilized wildfire risk scores at a circuit segment level to rank all the circuit segments in HFRA based on the risk mitigation effectiveness of targeted undergrounding. Through discussion with SCE's Field Engineering and Planning groups, SCE identified four districts to further analyze, each containing a relatively high concentration of high-ranking segments.

Once these districts were selected for analysis, SCE assembled a cross-functional working team with experts from Enterprise Risk Management, Asset Management & Strategy, Field Engineering, Distribution Planning, and local District personnel. Each of these working teams reviewed the feasibility of undergrounding and compared with the effectiveness of other mitigations. After collecting input from these cross-functional working teams, SCE's Field Engineering personnel completed additional analysis of undergrounding constructability and cost. SCE also considered the possible mitigation of PSPS impacts on customers. It evaluated opportunities to modify circuit configurations, including the use of targeted undergrounding, on circuits that have experienced multiple PSPS events to reduce the number of customers affected. At the conclusion of this process, SCE identified a short list of potentially feasible undergrounding projects for 2021.

SCE met its 2019 WMP goal to conduct an undergrounding evaluation in HFRA and identified scope to support the installation of at least six miles of targeted undergrounding in 2021. In 2019, SCE also completed approximately 0.3 miles of undergrounding in HFRA using the Rule 20 Tariff.

In 2020, SCE will continue to refine its evaluation methodology for undergrounding in addition to working with local communities to pursue undergrounding in HFRA using Tariff Rule 20. The evaluation methodology is anticipated to incorporate factors such as wildfire risk reduction by removing overhead primary conductors, mitigation of PSPS frequency and impacts, and further consideration of pole removal from egress routes. Beyond 2020, SCE intends to complete the six miles of undergrounding scope in 2021 and eleven miles in 2022.

5.3.3.17 Updates to Grid Topology to Minimize Risk of Ignition in HFTDs

As described in Sections 5.3.3.8.1 and 5.3.3.9, SCE is pursuing various steps to further sectionalize portions of the grid to mitigate the impact of faults on SCE's ignition risk as well as PSPS and other

outage events on customers. Separately, the fusing program is intended to reduce the risk of fire ignitions associated with SCE's distribution lines and equipment by reducing fault energy. Typically, CLFs are selected for this application because they can provide faster fault clearing for most faults and a reduced fault energy, compared conventional fuses. However, in rare instances, fault current levels and device coordination may require the application of conventional fuses or Branch Line Fuses (BLFs). In addition to the fault energy reduction, the placement of BLFs is expected to improve electric circuit reliability by segmenting faulted circuits to smaller line sections.

SCE expects to complete its BLF installations in 2020. Thereafter, installation of BLFs would follow normal work scope as new branch circuits are created or where grid improvements are identified. For more information on BLF see Section 5.3.3.7.

5.3.3.18 TOH Review (SH-9)

While SCE's 2019 wildfire mitigation strategies and programs included initiatives for its distribution and transmission systems, SCE's distribution system received greater focus largely because of historical ignition sources being predominately from its distribution system. In 2020, SCE will proactively review its transmission and sub-transmission construction and design standards for opportunities to further reduce the likelihood of electric system-related ignitions and identify potential improvements to help reduce wildfire threats, especially during extreme wind events. Example topics of this review include grounding and clearances for transmission and sub-transmission facilities, and closer examination of switch configurations, insulated guy wires, and avian protection. Findings from this review may increase the insulation effectiveness between energized and grounded sub-transmission equipment, reducing the likelihood of generating an arc. SCE will develop a report of its findings along with any identified actions for design improvements. If SCE's findings determine that modifications are needed in 2020 it will inform the Commission through any required filings such as the Off Ramp Report. SCE expects to continue to review and assess them throughout this WMP period and beyond.

5.3.3.19 Legacy Facilities (SH-11)

Findings from the 2019 EOI effort on distribution and generation assets uncovered areas to explore further for legacy facilities, many in proximity to historic hydroelectric generation facilities in HFRA. The age of these facilities, proximity to densely forested areas, and their unique configuration pose challenges to address additional mitigation opportunities. In one such case, the 2019 inspection findings required immediate measures to de-energize a line and seek an alternate source to provide reliable power to a high hazard dam facility and a small (<10 kW) microgrid, solar plus storage solution was deployed. Other facilities and circuits have been identified for further evaluation. SCE plans to conduct a risk-based analysis of these lines and develop site-specific remediation options to either mitigate in place (potentially with covered conductor), reconfigure, rebuild, or provide alternative means of power supply where feasible.

Other system hardening activities that may provide additional wildfire risk reduction benefits for these legacy facilities will also be explored. These include, but or not limited to, evaluation and possible deployment of additional avian and wildlife protection measures, assessment of existing

grounding grids and lightning arrester systems to ensure their adequacy, and incorporation of these facilities into existing programs moving forward.

In 2020, SCE plans to evaluate certain legacy facilities including substations and Generation facilities to assess any potential fire risks and develop an execution strategy to mitigate any findings.

See Table 23 “Grid design and system hardening” for more detail on the initiatives above.

5.3.4 Asset Management and Inspections

Explain the rationale for any utility ignition probability-specific inspections (e.g., "enhanced inspections") within the HFTD as deemed necessary over and above the standard inspections. This shall include information about how (i.e., criteria, protocols, etc.) the electrical corporation determines additional inspections are necessary.

Describe the utility's maintenance protocols relating to maintenance of any electric lines or equipment that could, directly or indirectly, relate to wildfire ignition. Include in the description the threshold by which the utility makes decisions of whether to (1) repair, or (2) replace electric lines and equipment. Describe all electric lines and equipment that the utility "runs-to-failure", those that the utility maintains on a risk-based maintenance plan, and those that are managed by other approaches; describe each approach. Explain the maintenance program that the utility follows and rationale for all lines and equipment.

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description for the utility's programs, the utility's rationale behind each of the elements of this program, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each program, how the utility plans to demonstrate over time whether each component is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds.

Include descriptions across each of the following initiatives. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell in the row.

1. Detailed inspections of distribution electric lines and equipment
2. Detailed inspections of transmission electric lines and equipment
3. Improvement of inspections
4. Infrared inspections of distribution electric lines and equipment
5. Infrared inspections of transmission electric lines and equipment
6. Intrusive pole inspections
7. LiDAR inspections of distribution electric lines and equipment
8. LiDAR inspections of transmission electric lines and equipment
9. Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations
10. Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations
11. Patrol inspections of distribution electric lines and equipment
12. Patrol inspections of transmission electric lines and equipment
13. Pole loading assessment program to determine safety factor
14. Quality assurance / quality control of inspections

15. Substation inspections
16. Other / not listed [only if an initiative cannot feasibly be classified within those listed above]

Inspecting electrical equipment is a critical component of asset management and delivery of safe and reliable power. SCE has established various inspection and maintenance programs to not only meet compliance requirements but go beyond minimum requirements when deemed appropriate to help reduce fire risks. These programs are listed below and explained in more detail in subsequent sections.

SCE has system-wide inspection programs that include HFRA in SCE's service territory and help reduce wildfire risks. These programs include:

- Detailed Inspections of distribution electric lines and equipment
- Detailed inspections of transmission electric lines and equipment
- Intrusive pole inspections
- Patrol inspections of distribution electric lines and equipment
- Patrol inspections of transmission electric lines and equipment
- Pole loading assessment program to determine safety factor
- Quality assurance/quality control of inspections
- Substation inspections
- Remediation protocol

SCE has also established several inspection programs which are specific to reducing wildfire risk and which go beyond mandated rules and regulations. These programs include:

- Infrared inspections of distribution electric lines and equipment
- Infrared inspections of transmission electric lines and equipment
- HFRI of distribution electric lines and equipment
- Distribution aerial inspections
- HFRI of transmission electric lines and equipment
- Transmission aerial inspections
- Substation Failure Modes and Effects Analysis
- HFRI of generation assets

More information about these activities is specified below in Sections 5.3.4.1 through 5.3.4.16. Overall, SCE's inspections and maintenance strategy in the next 10 years (2020-2030) is to integrate its inspection activities with its asset management strategies to help ensure that individual asset strategies and inspection activities work cohesively to promote reliability, affordability and safety, including fire safety.

Given the significant risk of wildfires potentially associated with electrical infrastructure, in late 2018, SCE considered it prudent to inspect all of its distribution and transmission structures in

HFRA as quickly as feasible with the specific intent of finding asset conditions that could potentially cause a spark or ignition. Asset conditions can change after an inspection for several reasons, many outside the utility's control. Instead of waiting five years (for distribution) and three years (for transmission) to complete the cycle per regulatory requirements, SCE, through its EOI effort in 2018 and 2019, inspected all of its distribution and transmission structures within HFRA in a matter of months and prior to the start of the 2019 wildfire season.

SCE launched its Inspection Redesign initiative following its EOI effort to examine its current inspection programs and find ways to improve SCE's approach. The Inspection Redesign is focused on detailed distribution and aerial inspection programs; however, the effort will evolve to cover additional inspection programs.

Through the Inspection Redesign initiative, SCE developed new training and a custom mobile inspection application that uses intelligent guided surveys to enable Electrical Service Inspectors (ESIs) to perform risk-informed inspections in HFRA beginning in 2020 that meet the requirements for both wildfire-focused inspections (formerly known as EOI), distribution Overhead Detail Inspections (ODI), transmission inspections, and generation inspections. This new program is referred to as SCE's High Fire Risk Informed Inspection (or HFRI) Program and is focused on inspections in HFRA. SCE will continue its traditional inspection programs outside of HFRA. The custom mobile inspection application enables ESIs to conduct a single inspection in a HFRA or non-HFRA that assesses ignition risk and meets all compliance obligations. Further, the tool features a data capture element that will provide high-quality information about asset conditions which will subsequently be processed and analyzed by SCE's data scientists. In the future, artificial intelligence and machine learning technologies will use this information for improved risk modeling. In 2020, the new application will further allow SCE to, among other things, achieve a steady-state, risk-informed scheduling process, and implement assisted photo capture tools and data quality metrics.

The long-term vision of the Inspection Redesign initiative is to support the company's continuing transition from a compliance-focused inspection approach to a more risk-informed approach. Thus, the initiative will focus on finding ways for SCE to both increase data collection and data analytics to inform and improve SCE's inspection programs.

5.3.4.1 Detailed Inspections of Distribution Electric Lines and Equipment

SCE performs routine inspections of SCE's overhead distribution electric system in compliance with GO 165. GO 165 requires SCE to perform a visual detail inspection of all overhead distribution electric assets every five-years. To achieve this, the ODI program inspects approximately one-fifth of SCE's service territory annually, including high fire and non-high fire assets. Since the program is run system-wide, however, the number of inspections of assets in HFRA shifts slightly each year. SCE prioritizes the ODI program and has dedicated resources and funds to the program to help ensure compliance with GO 165. This program is part of SCE's portfolio of standard inspection activities.

SCE monitors the compliance and effectiveness of the program through several means, which include reports measuring inspection rates, reports tracking compliance, and QA and QC inspections. This inspection activity documents and records items that require repair or replacement. Furthermore, the inspectors prioritize maintenance in accordance with applicable GOs.

SCE's ODI program in 2019 conducted 50,577 inspections within HFRA, and discovered:

- Over 19,000 Priority 2 conditions requiring remediation
- Over 2,000 vegetation-related issues
- Over 1,800 customer-related issues, such as:
  - Customers attaching facilities on utility poles
  - Customers restricting access to utility facilities
- Over 6,600 issues created by communications companies, which include, but are not limited to:
  - Communication wires touching or near electric facilities
  - Slack guy wire
  - Low service drops

Starting in 2020, SCE will re-inspect approximately 37% of its HFRA distribution assets annually through the new HFRI program to help ensure that any deterioration in asset condition in higher risk areas are promptly identified for timely remediation. These inspections are discussed in more detail in Section 5.3.4.9.1 of this chapter. Some near-term activities that SCE is looking at revising in its inspection programs are:

- Developing risk-informed inspection programs, where certain assets would be inspected at more frequent intervals than those required by GO 165, such as performing ODI once every three years for higher risk assets instead of once every five years
- Developing response inspection programs, which are inspections initiated in response to outside forces, such as an earthquake, or winter storm
- Deploying two-person find and fix inspection crews to remediate high-priority work in an accelerated timeframe

5.3.4.2 Detailed Inspections of Transmission Electric Lines and Equipment

SCE performs detailed routine inspections of SCE's overhead transmission electric system in compliance with GO 165, the North American Electric Reliability Corporation (NERC), Western Electricity Coordinating Council (WECC) and California Independent System Operator (CAISO) rules and regulations. SCE's Transmission Inspection and Maintenance Program (TIMP) requires a visual detail inspection every three years of all overhead transmission and sub-transmission electric assets. To achieve this goal, SCE inspects approximately one-third of its service territory annually, including HFRA and non-HFRA assets. Given that SCE performs inspections systemwide each year, the number of inspections of assets in high fire areas shifts slightly each year. Resource allocation and work prioritization is driven by GO 165 compliance requirements. SCE monitors the compliance and effectiveness of the program through several means, including reports

measuring inspection rates, reports tracking compliance, and QA/QC inspections.

SCE's TIMP program in 2019 conducted 41,942 inspections within HFRA, and identified:

- 48 Priority 1 notifications that have been remediated
- Over 3,000 Priority 2 conditions, which required electrical crews to remediate
- Over 9,500 vegetation-related issues

The difference between the planned inspections and the actual inspections in 2019 shown on Table 24, initiative activity 10.1, was caused by assets incorrectly identified as distribution only, non-SCE structures, or structures not located in HFRA.

SCE will ensure that all TIMP compliance-due date inspections in 2020-2022 are performed per applicable rules and regulations and SCE's internal standards. SCE modified the inspection cycles for some of its transmission overhead inspection assets to exceed compliance requirements such that, in 2020 and beyond, SCE will annually inspect approximately 47% of its HFRA transmission assets. These inspections are discussed in more detail in Section 5.3.4.10.1. Some near-term work in the TIMP that SCE is looking at revising includes:

- Developing a risk-informed inspection program, where certain assets would be inspected at more frequent intervals than required currently by SCE's program
- Developing response inspection programs, which are inspections initiated in response to outside forces, such as an earthquake or a winter storm

5.3.4.3 Improvement of Inspections

In order to continually improve, after the 2019 EOI effort, SCE decided to diversify its training activities in order to include a greater focus on classroom training and job shadowing. For example, in 2019, SCE conducted classroom training for ODI inspectors to ensure that the inspectors understood the new inspection requirements and tools. SCE is continuing to refine its training programs based on feedback from the field and its QC program. Further, T&D's C&Q evaluates inspection approaches and procedures periodically for potential improvements.

5.3.4.4 Infrared Inspections of Distribution Electric Lines and Equipment (IN-3)

SCE conducts infrared inspections of SCE's overhead distribution electric system in HFRA, annually inspecting approximately 50% of the circuit miles in these locations. SCE performs these inspections to detect conditions that pose a fire, safety, and reliability risk but may not be visible to the human eye. SCE monitors internal compliance and effectiveness of the program through reports tracking progress and inspection findings.

In 2016, SCE conducted a small pilot study to determine the usefulness of infrared inspections, that was inconclusive due to the limited sample size. In 2017, SCE conducted a larger, more detailed and statistical study of infrared inspections. This study revealed that infrared inspections can detect degraded conditions not visible to the naked eye. After the 2017 pilot, SCE inspected all high fire miles that were not inspected as part of the pilot. Based upon the data from those inspections in 2017 and 2018, SCE made the decision in 2019 to begin performing infrared inspections for 50% of HFRA circuit miles every year, so that each HFRA circuit mile

receives an infrared inspection every other year.

SCE's distribution infrared inspection program inspected 4,962 circuit miles in SCE's HFRA in 2019 and identified:

- 23 Priority 1 conditions, which have been remediated
- Over 58 Priority 2 conditions, which have been remediated

In 2020 and beyond, SCE plans to inspect lines on the HFRA on a two-year cycle. SCE will also use the information learned from the 2017 to 2019 infrared inspections to determine whether future refinements to the infrared inspection cycles or criteria are appropriate.

5.3.4.5 Infrared Inspections of Transmission Electric Lines and Equipment (IN-4)

In 2019, SCE started a program to perform infrared and corona inspections of its overhead transmission system. SCE performed these inspections to detect conditions that pose a fire, safety, and reliability risk, but are not visible to the human eye. SCE monitors internal compliance and effectiveness through reports tracking progress and inspection findings.

In 2019, SCE's transmission infrared and corona inspection program inspected 6,700 circuit miles in SCE's HFRA and found approximately 200 conditions that required electrical crews to remediate:

- 22 Priority 1 conditions, which have been remediated
- 55 Priority 2 conditions, to be scheduled based upon priority and compliance requirements
- 127 Priority 3 conditions, to be scheduled based upon priority and compliance requirements

In 2020, SCE will perform infrared and corona scans on approximately 1,000 HFRA circuit miles (approximately 20% of its transmission HFRA circuits). SCE will use the information learned from the 2019 and 2020 infrared and corona inspections to determine the inspection volume and cadence for these Transmission aerial inspections in future years.

5.3.4.6 Intrusive Pole Inspections (IPI)

In 1997, the IPI program was established in accordance with GO 165, to evaluate SCE's wood poles using visual and internal examination of the poles to identify and document damage or decay requiring remediation. GO 165 requires intrusive inspections for all poles at least 15-years in service or older, to be completed using a 10-year cycle from the initial intrusive inspection. If the pole has passed the initial intrusive inspection within the first 25-years of age, GO 165 requires subsequent intrusive inspections on a 20-year cycle. SCE completes intrusive inspections on a 10-year cycle, which is in line with industry benchmarking and is approved by the Commission.

Intrusive inspections involve drilling into the pole's interior to identify and measure the extent of internal decay, if any. The result is recorded as the Remaining Section Modulus (RSM) and is utilized in pole loading calculations in compliance with GO 95, Rule 44.2. Inspectors will apply a

preservative to poles that pass the intrusive inspection to reduce the likelihood of future decay when the conditions warrant it. Inspectors may also perform a visual inspection on poles that are in the inspection grid but that are younger than 10 years old to look for signs of obvious external damage or high priority conditions that warrant immediate attention. The inspector analyzes the integrity of the pole and classifies it for repair or replacement, as necessary. Approximately 10,000 poles are identified for repair or replacement each year through this program across SCE's service territory. SCE monitors the compliance and effectiveness of this program through reports measuring inspection rates, tracking compliance, and measuring the results of inspections.

SCE's IPI program intrusively inspected over 21,000 poles in 2019 in HFRA and discovered:

- Approximately 5 Priority 1 pole replacements (all completed)
- Over 2,000 Priority 2 pole replacements

SCE will continue to perform intrusive inspections on a ten-year cycle.

5.3.4.7 LiDAR Inspections of Distribution Electric Lines and Equipment

LiDAR is conducted under the Aerial Inspection program; refer to Section 5.3.4.9.2 (Aerial Inspections).

5.3.4.8 LiDAR Inspections of Transmission Electric Lines and Equipment

LiDAR is conducted under the Aerial Inspection program; refer to Section 5.3.4.10.2 (Aerial Inspections).

5.3.4.9 Other Discretionary Inspection of Distribution Electric Lines and Equipment, Beyond Inspections Mandated by Rules and Regulations

5.3.4.9.1 High Fire Risk Informed Inspections of Distribution Electric Lines and Equipment (IN-1.1)

As noted in Section 5.3.4.1 Detailed Inspections of Distribution Electric Lines and Equipment, SCE performs routine inspections of SCE's overhead distribution electric system in compliance with GO 165. In 2019, SCE laid the groundwork to incorporate risk into its ODI program starting in 2020 by increasing the annual inspection population in HFRA from approximately 20% to 37%. The additional 17% goes above and beyond the requirements of GO 165. The population for the extra inspections was determined using a risk framework to help ensure that any deterioration in asset condition in higher risk areas are promptly identified for timely remediation. SCE has allocated additional resources to the ODI program to perform this incremental work. The monitoring performed for routine ODI inspections will extend to these additional inspections.

In 2019, SCE performed additional detailed ground-based inspection of its electric distribution assets through its EOI effort.

SCE completed 455,515 additional detailed ground-based inspections of its electric distribution assets primarily in its HFRA in 2019 and identified:

- Over 600 Priority 1 conditions, that required electrical crews to remediate

- Over 65,000 Priority 2 conditions, that required electrical crews to remediate
- Over 16,000 vegetation-related issues

SCE took away several lessons from its 2019 EOI effort, including:

- Moving from a compliance-based to risk-informed approach enhances SCE's ability to identify and remediate conditions that could lead to high fire risk ignitions
- Adopting digital tools (iPads, electronic reporting dashboards, etc.), in conjunction with an expedited software development approach and close partnership with end users, enabled speedy and effective implementation
- Initiating aerial inspections to identify conditions not visible from the ground improved inspections

SCE will conduct at least 50,000 HFRI in 2020. Also, as noted above, SCE is continuing to improve its inspection programs to incorporate more risk-informed approaches and lessons learned from the 2019 and 2020 inspections. This may result in SCE conducting additional HFRI in 2020 and modifying the number of additional inspections in 2021 and 2022.

5.3.4.9.1.1 Asset Defect Detection Using Machine Learning Object Detection (AT-5)

SCE has identified a potential opportunity to use ML object detection to help detect defects from equipment inspection photos and streamline inspection processes. For example, in 2019, EOI produced large quantities of high-resolution images that are currently being reviewed and processed by QEWs. ML can help reduce image processing times, and SCE is currently deploying a cloud-based analytics platform to support ML model development. One potential use case is object and defect detection from inspection photos to help streamline inspection processes. SCE is expanding its capability and exploring the use of artificial intelligence (AI) and ML to identify patterns and support future predictive maintenance.

In 2020, SCE will standardize data collection in its inspection programs for future ML. SCE is developing various tools and processes in its ML efforts to evaluate the feasibility of supporting objective evaluation of inspection assets. As part of its effort, SCE has identified several potential ML vendors and will evaluate their immediate capabilities as it also develops in-house capabilities. The primary goal will be to prioritize inspection resources and improve defect identification rates.

For 2021, SCE plans to demonstrate in-house developed models that identify assets from inspection imagery and explore the identification of defects within these detected assets. Partnering with industry vendors, such as EPRI, will also be a key activity.

SCE will also explore additional data sources such as LiDAR and Remote Sensing to improve its ML models for defect identification. Depending on the success of ML, SCE plans to pilot the defect detection capabilities during its 2022 inspection efforts. SCE will continue to develop ML models to see if it is possible to determine the severity of a defect and classify its risk. Lastly, SCE aims to utilize the collected, image meta-data to provide a holistic 360-degree view of an asset for additional analytics as integration into future inspection processes.

5.3.4.9.2 Distribution Aerial Inspections (IN-6.1)

SCE launched a robust aerial inspection effort in April 2019, which supplements SCE's ground-based inspections. Aerial inspections offer a more comprehensive inspection of SCE's infrastructure, including a different perspective of the pole top, the wooden crossarms, the steel structures, and all conductor/hardware that may not be easily visible from the ground. These inspections have resulted in the accumulation of vast amounts of remote sensing data that SCE analyzes for risk/issue identification, prioritization, and subsequent remediation. The program deploys various types of sensors and collects different types of data across the initiatives, including, for example, HD photos, videos, and LiDAR.

Given the urgency, in 2019, of completing aerial inspections under compressed timeframes, the supporting business processes used quick-to-deploy technology solutions. SCE plans to build comprehensive technology and data management solutions to support the aerial inspections processes as they transition from using the quick-launch initiatives of today to steady-state functions going forward. SCE expects the following benefits from building out comprehensive technology and data management solutions:

- Ability to live-stream high-definition (HD) video
- Geo-tagging of image frames with UAS location
- Storage of high-volume video and HD imagery data
- Ability to receive and display HD video content with minimal lag
- Support hazard/defect identification with ML and AI
- Enable search and access to video content based on location and asset attributes

SCE completed 113,900 aerial-based inspections of its electric distribution assets primarily in its HFRA in 2019 and identified:

- Over 100 Priority 1 conditions, which have been remediated.
- Over 7,000 Priority 2 conditions, which required electrical crews to remediate
- Over 6,000 vegetation related issues

SCE plans to perform approximately 165,000 distribution aerial inspections in 2020. Additionally, SCE plans to incorporate lessons learned from 2019 and 2020 to determine the appropriate size, scope, and frequency of aerial inspections moving forward. The inspections in 2019 were instructive in identifying an opportunity to implement a consistent storage mechanism that would, for example, in the future, give SCE the ability to quickly tag photos for processing by ML technologies. Also, SCE identified the opportunity to store data in a way that is useful for other users and use cases (e.g., LiDAR data has multiple uses including for inspection programs and vegetation management programs.).

SCE will focus on developing advanced analytics capabilities to improve its aerial inspection programs. To do this, SCE plans to develop stronger data governance standards and data platforms to ensure the data quality necessary to support advanced data processing and analytics by its ML and AI technologies. Specifically, SCE is focused on deploying a suite of technology services and a data repository for image data collected from aerial programs that will enable ML

and AI to perform image processing and notification generation. This effort will focus on deploying a repository for image data based on established specifications with automated rules for rejection and acceptance. Labeling tools will be deployed to both identify assets on structures and discrepant conditions requiring notifications. This will enable the training of ML algorithms for asset identification, asset degradation condition, and the development of AI to perform inspections from image data for further review by qualified personnel. This will speed up the time it takes to process and review the vast amounts of image data being collected from aerial programs. This effort will also focus on the infrastructure needs to retrieve data from the field in an expedited manner. Finally, this effort will build the necessary ML and AI algorithms to process the images automatically. The initial focus will be to build the image standards and rules for labeling with a goal to deliver the ML and AI capabilities by end of 2022.

5.3.4.9.2.1 Advanced Unmanned Aerial Systems Study (AT-2.2)

SCE developed a demonstration project to study the efficacy of using aerial drones to patrol overhead lines associated with PSPS events. The focus was on augmenting traditional patrol methods via truck, foot, or helicopter, to further reduce wildfire risk by detecting equipment risks that are more difficult to find by these other means and expedite power restoration to minimize the impact of outages on customers.

In 2019, SCE completed its initial evaluation of Beyond Visual Line of Sight (BVLOS) Unmanned Aerial System (UAS a.k.a. 'drone') capabilities by conducting demonstration flights utilizing Extended Visual Line of Sight (EVLOS), a precursor to BVLOS that utilizes multiple visual observers along the vehicle's path to maintain visual contact with the drone. The study was successful in that all planned circuit segments were flown and yielded abundant data and learning that serve as a springboard for the next phase of the study.

First, significant regulatory barriers exist that make BVLOS drone flights difficult to achieve in the commercial environment, particularly in areas with congested and restricted airspace—a hallmark of SCE's service territory.

Second, Southern California—and California is general—has some of the most diverse geography and landscape in the United States, much of which is served by SCE. This diversity, particularly extreme elevation changes and heavily forested areas, present challenges for live streaming data and aircraft control. Drone endurance—the amount of time a vehicle can stay airborne to achieve its mission—needs to improve for UAS patrols to be conducted effectively and efficiently. Video quality and zoom, combined with shooting angles and distance above structures, need to be improved for Troublemen and Patrolmen to feel confident to make an 'all-clear' decision from a desktop vantage point.

Third, UAS operations at SCE quickly evolved in 2019 with the introduction of aerial inspections to augment its EOI effort. Therefore, there is additional momentum to further accelerate the state of UAS operations at SCE for wildfire prevention, mitigation and response efforts. Much was learned in the first phase of the Advanced UAS Study, and it is clear that additional

demonstration flights are needed to not only prove the viability and effectiveness of using UAS compared to traditional patrolling methods, but also to advance aircraft detect-and-avoid and communication technologies that are prerequisites for BVLOS.

To address these challenges and prepare SCE's operations and workforce for such advanced UAS operations, SCE is planning to conduct additional demonstration flights in 2020. In 2021 and beyond, subject to lessons learned in 2020, SCE plans to evaluate communication technologies that advance aircraft detect-and-avoid and control capabilities that will mitigate vehicle communication challenges, improve video streaming capabilities, and improve airspace safety. Once these technologies are proven, SCE would like to obtain a BVLOS waiver on a limited number of circuit miles, leveraging the technologies noted above and using these as test cases to advance BVLOS across the company—to more circuits across diverse voltages, construction types, altitudes, and geographies.

5.3.4.9.2.2 UAS Operations Training (OP-3)

UAS are an important tool SCE utilizes to perform remote sensing activities related to wildfire mitigation. As use cases for UAS increase across the enterprise, it is imperative that SCE maintain a baseline level of frontline employees who can quickly respond to emergent and ongoing mitigation activities. SCE plans to create a formal training and certification process for select employees across multiple organizational units to ensure skilled UAS operators with knowledge of the wires-environment that can be rapidly deployed across the service territory in response to wildfire prevention, mitigation, and response activities. While SCE anticipates the need for both internal and external UAS resources for the period of this WMP, SCE intends to increase the number SCE employees who are FAA-certified UAS operators. SCE intends to increase its internal workforce of UAS operators in 2020 by 50.

5.3.4.10 Other Discretionary Inspection of Transmission Electric Lines and Equipment, Beyond Inspections Mandated by Rules and Regulations

5.3.4.10.1 High Fire Risk Informed Inspections of Transmission Electric Lines and Equipment Overview (IN-1.2)

As noted in Section 5.3.4.2, SCE performs routine inspections of SCE's overhead transmission electric system in compliance with GO 165. In 2019, as SCE realized the need to shift towards more risk-informed inspections, SCE increased its normal inspection population in HFRA from approximately 33% annually to 47% for 2020. The additional 20% is above and beyond the requirement for SCE's typical inspection procedures and GO 165. The population for the extra inspections was determined using a risk-informed framework. SCE has prioritized these inspections and is working to increase the staffing and secure the funds needed to run the program. The monitoring performed for routine TIMP inspections will extend to these additional inspections. In 2019, SCE performed additional detail ground-based inspection of its electric transmission assets through its EOI effort.

SCE's additional detail ground-based inspections of its electric transmission assets for 2019 included over 42,000 inspections primarily in its HFRA and identified:

- Over 40 Priority 1 conditions, which have been remediated
- Over 3,000 Priority 2 conditions, that required electrical crews to remediate
- Over 9,500 vegetation-related issues

SCE will conduct at least 22,500 HFRI in 2020. Also, as noted above, SCE is continuing to improve its inspection programs to incorporate more risk-informed approaches and lessons learned from the 2019 and 2020 inspections. This may result in SCE conducting additional High-Fire Risk Informed inspections in 2020 and modifying the number of additional inspections in 2021 and 2022.

5.3.4.10.2 Transmission Aerial Inspections (IN-6.2)

The background on SCE's aerial inspection program, lessons learned from 2019, and how the program will evolve over time is described in Section 5.3.4.9.2. Below is a high-level overview of SCE's transmission aerial inspections performed in 2019:

SCE completed 38,998 aerial-based inspections of its electric transmission assets primarily in its HFRA in 2019 and identified:

- 59 Priority 1 conditions, which have been remediated
- Over 6,607 Priority 2 conditions, that required electrical crews to remediate
- Over 2,322 vegetation related issues

SCE plans to conduct approximately 33,500 transmission aerial inspections in 2020 and intends to incorporate lessons learned from 2019 and 2020 to determine the appropriate size, scope, and frequency of aerial inspections moving forward.

5.3.4.10.2.1 Assessment of Partial Discharge Transmission Facilities (AT-6)

SCE has identified a radio frequency (RF) detection technology that has the potential to determine the health of transmission assets by remotely detecting partial discharge. As equipment deteriorates, it may produce more and more partial discharge either in the form of arcing, leaking, or tracking. The partial discharge can be detected via RF emissions allowing SCE to investigate and respond to failing equipment prior to an in-service failure.

In 2020, SCE will assess this technology to determine if it can effectively detect partial discharge leading to reduced in-service failures. The assessment may lead to a pilot program and potentially broader use for asset health assessment.

5.3.4.11 Patrol Inspections of Distribution Electric Lines and Equipment

SCE performs routine patrols of SCE's overhead distribution electric system in compliance with GO 165. GO 165 requires SCE to perform an annual patrol inspection of all overhead distribution electric assets that are located in SCE's HFRA. Patrols are performed within specified grids and qualified inspectors visually inspect SCE's overhead and above-ground underground electrical distribution facilities to identify and document obvious safety and reliability conditions that require corrective action. Annual patrols are performed primarily from ground vehicles but can also be completed by foot or aircraft. Like other inspection programs, these inspectors document

and prioritize items for follow-up corrective action. If an inspector notices a Priority 1 condition, as defined by GO 95 Rule 18, the inspector will request for a Troubleman to come to the site, assess the condition, and ensure the safety of the site. The Troubleman will record and document the condition(s) observed.

In 2019, SCE performed over 7,000 distribution patrol inspections of grids (blocks of area) containing assets within SCE's HFRA.

SCE plans to conduct all required patrol inspections in 2020 and beyond. SCE is also looking at making near-term changes to its distribution patrol program by:

- Moving towards a risk-informed inspection program based upon lessons learned from 2019 and 2020 inspections, such that certain inspections could be performed at more frequent intervals than those required by GO 165
- Revising the inspection tool utilized by the inspectors

5.3.4.12 Patrol Inspections of Transmission Electric Lines and Equipment

SCE performs routine patrol inspections of SCE's overhead transmission electric system in compliance with GO 165, NERC, WECC and CAISO rules and regulations. SCE's TIMP inspectors perform patrol inspections of approximately two-thirds of SCE's service territory annually, including high fire and non-high fire assets. The number of inspections of assets in HFRA shifts each year slightly as this program is run systemwide. Inspections are also performed after unplanned events, such as extreme weather, fires, and equipment malfunctions. Resource allocation and work prioritization is driven by compliance requirements. This program is part of SCE's general portfolio of inspection activities. To track the compliance and effectiveness of the program, SCE produces reports measuring inspection rates, tracks compliance and conducts QA/QC inspections. During 2019, patrol inspections that were due for compliance inspections, were performed at the same time as the high fire inspections and the findings are captured in section 5.3.4.2. For circuits that traversed both in and out of the HFRA, SCE separately inspected the assets of the circuits outside of the HFRA to complete the detailed circuit inspection.

SCE plans to conduct all required patrol inspections in 2020 and beyond. SCE is also looking at making near-term changes to its distribution patrol program by:

- Moving towards a risk-informed inspection program based upon lessons learned from 2019 and 2020 inspections, such that certain inspections could be performed at more frequent intervals than those required
- Revising the inspection tool utilized by the inspectors

5.3.4.13 Pole Loading Assessment Program to Determine Safety Factor

The PLP is an assessment and remediation program to identify poles that do not meet the safety factor requirements of GO 95 and SCE's internal design and construction standards for repair or replacement. The PLP's goal is to assess the structural loading capabilities of the approximately 1.4 million wood, composite, and light-weight steel poles in SCE's service territory to meet current design standards by 2021, and to continue remediating pole overloading issues by 2025. This program is designed to verify that the structural integrity of existing poles is sufficient to

withstand anticipated wind loads acting on poles, including wind loading in high wind areas within SCE's service territory. The PLP prioritized assessment of poles in HFRA. Although the Commission requires a design wind pressure of 6 pounds per square foot (with 0.5 inches of radial ice) or 8 pounds per square foot (no ice), SCE adopted higher wind loading design standards of 12, 18, and 24 pounds per square foot in addition to the standards for 6 and 8 pounds. SCE made these determinations based on meteorological studies in areas with higher wind velocities. The wind-loading criteria employed by SCE is based on specific line locations and potential wind speeds at those locations. SCE will continue to assess pole conditions and replace poles, and where applicable, utilize the higher wind loading criteria outlined above. See Section 5.3.3.13 for a description of pole replacements resulting from Pole Loading Program assessments.

In 2019, SCE performed 15,902 pole loading assessments in high fire areas. The remaining 2020 high fire area scope consists of approximately 2,400 poles that are difficult to access. The PLP is a one-time assessment of poles in SCE's service territory targeted for completion in 2021. After 2021, when designing to add facilities to a pole, a pole loading calculation will occur at that time to ensure the pole does not get overloaded.

5.3.4.14 Quality Assurance/Quality Control of Inspections (IN-2)

SCE's C&Q group performs an independent evaluation of activities that impact the safe, reliable, and affordable delivery of electricity. The group partners with organizations throughout the T&D organizational unit to correct quality gaps. The C&Q group assesses compliance with GO 95/128/165/174 and various SCE maintenance, inspection, and construction standards. This group typically performs over 25,000 inspections per year.

Current QC programs include inspection of distribution overhead and underground construction by SCE and contract crews. Any conditions identified by the QC program as requiring remediation will be remediated per compliance requirements or SCE internal standards. C&Q also assesses the performance quality of compliance-driven inspections programs such as ODI, Underground Detail Inspection (UDI), and IPI. In addition, the group performs quality assessments of vendor-performed pole loading calculations and assesses the performance quality of vendor-performed steel stub pole repairs.

In 2019, C&Q performed field validations of approximately 17,000 EOI inspections that were completed as part of the EOI effort in HFRA. SCE surpassed the initial goal of 7,500 due to its decision to perform additional quality reviews in areas considered to have high risk attributes. The QC inspections exceeded the requirements of GO 165.

In 2020, C&Q is finalizing and implementing a new risk-informed quality program, which will include QC assessments for inspections of distribution, transmission, and generation-related facilities in HFRA. C&Q will perform QC inspections of completed inspections for approximately 15,000 transmission, distribution, and generation structures in HFRA. The QC inspection scope will be based on risk-stratified sampling to assess the accuracy of the overhead inspections.

5.3.4.15 Substation Inspections

SCE maintains public and worker safety, and regulatory compliance, by completing scheduled inspections of its substations through its Substation Inspection & Maintenance Program (SIMP) in conformance to GO 174 and NERC reliability standards. For substation inspections per GO 174, SCE visually inspects the substation equipment and facility conditions, and documents anomalies as notifications. These notifications may or may not result in additional work.

SCE also performs maintenance and equipment testing as part of the SIMP in line with prudent utility practices. In 2019, SCE increased its inspection frequency on distribution relays in SCE's HFRA (aligning with Bulk Electric System (BES) compliance relays) by reducing the time between inspections from 12 years to six years. Additionally, SCE performed circuit breaker, relay, and battery inspections due in 2019 at the beginning of the year.

In 2019, SCE conducted 5,591 Substation inspections in accordance with the requirements of GO 174, as well as approximately 12,000 circuit breaker inspections and approximately 16,000 relay inspections as a part of regular maintenance programs. SCE will continue to perform Substation inspections in 2020 and through this WMP period.

5.3.4.15.1 Substation Failure Modes and Effects Analysis (FMEA) (IN-7)

In 2020, SCE plans to complete the FMEA study for substation assets in HFRA. The objectives of the FMEA are to:

- Identify risks associated with substation assets that could potentially ignite a wildfire (e.g., catastrophic equipment failure, vegetation or animal contact with substation equipment)
- Critically assess the adequacy of SCE's SIMP in mitigating these risks
- Determine if additional inspection and/or maintenance activities are warranted from a wildfire risk mitigation perspective

The results of the FMEA study will be used to inform potential plans for incremental substation-related work activities in 2021 and beyond, and potentially drive additional substation inspection and/or maintenance activities beyond SIMP that need to be completed in 2021 and 2022.

5.3.4.16 Generation High Fire Risk Informed Inspections in HFRA (IN-5)

In March 2019, SCE began implementing inspections of relevant generation-related assets in HFRA. These inspections included ignition-focused assessments of low-voltage ancillary assets and their associated overhead lines, supporting structures, and any exposed wiring and/or threats from vegetation that require additional mitigation. In addition, high-voltage facilities were inspected to ensure that all overhead connections from the last inspection(s) of transmission and distribution structures had been evaluated and assessed for vegetation clearance buffers, using relevant criteria from transmission and distribution inspections.

SCE performed inspections of all relevant generation assets in HFRA for a total of 449 inspections in 2019. Items requiring remediation were documented and scheduled for maintenance or repair, based upon the risk of the condition. After the gatekeeping process, a total of 243 notifications requiring remediation were identified including:

- 1 Priority 1 notification
- 88 Priority 2 notifications
- 154 Priority 3 notifications

In 2020, SCE will inspect at least 200 Generation-related assets. SCE will also work towards integrating this inspection program into the current inspection routines at these facilities to streamline field efforts. In addition, any improvements made to transmission and distribution inspection efforts will be incorporated, as applicable, to ensure consistent practices across the organization. SCE is also evaluating incorporating these assets into risk modeling efforts to determine a risk-informed approach for this work. The activity will continue through at least another full inspection cycle (currently proposed as a two-year cycle) to determine trends, assess risks, and evaluate the need for further inspections and their frequency for the long-term.

See Table 24 "Asset management and inspections" for more details on the initiatives above.

5.3.5 Vegetation Management and Inspections

Explain the rationale for any utility ignition probability-specific inspections (e.g., "enhanced inspections") within the HFTD as deemed necessary over and above the standard inspections. This shall include information about how (i.e., criteria, protocols, etc.) the electrical corporation determines additional inspections are necessary.

Describe the utility's vegetation treatment protocols relating to treatment of any vegetation that could pose a grow-in or fall-in risk to utility equipment. Include in the description the threshold by which the utility makes decisions of whether to (1) treat, or (2) remove vegetation.
Discuss the overall objectives, strategies, and tactics of the electrical corporation for vegetation management. In the discussion,

1. *Address how the electrical corporation has collaborated with local land managers to leverage opportunities for fuel treatment activities and fire break creation, and compliance with other local, state, and federal forestry and timber regulations.*
2. *Discuss how the electrical corporation identifies and determines which vegetation is at risk of ignition from utility electric lines and equipment.*
3. *Describe how (i.e., criteria, data, protocols, studies, etc.) the utility made the determination to trim any vegetation beyond required clearances in GO 95.*
4. *Describe utility plan to mitigate identified trees with strike potential, including information about how (i.e., criteria, protocols, data, statutes, etc.) the electrical corporation identifies and defines "hazard trees" and "trees with strike potential" based on height and feasible path to strike powerlines or equipment. Describe utility plan to identify reliability/at-risk tree species to trim or remove, where feasible, per location-specific criteria.*
5. *Include a discussion of how the utility's overall vegetation management initiatives address risks that may arise from trimming or removing trees, including but not limited to erosion, wind, flooding, etc.*

A full description of enhanced inspections is located in Section 5.3.4. This section will focus on SCE's Vegetation Management Program.

SCE's Vegetation Management Program has been in place for many years with the objective of meeting the requirements of GO 95, as well as other compliance requirements. These activities help minimize faults arising from vegetation contact with energized electrical facilities that result in ignitions and outages. The program includes pre-inspection and pruning that emphasize maintaining clearance compliance on trees located in proximity to SCE's electric facilities. In addition, the program performs activities such as tree removal, pole clearing, and in more recent years, weed abatement. In response to recent regulatory direction and the increased wildfire risk that California is currently experiencing, SCE's Vegetation Management Program expanded to include additional mitigation activities to reduce ignition risk that may result in wildfires.

SCE expanded its vegetation management activities within HFRA as the ignition probability increases when vegetation makes contact with utility equipment, and the probability for ignition

events are expected to be higher in HFRA than in non-HFRA.

SCE's distribution and transmission lines are inspected annually for compliance with internal, state, and federal vegetation management requirements, during which vegetation may be scheduled for pruning or removal to maintain compliance. The pruning takes into consideration a tree's anticipated growth over twelve months and clearance distance are greater in HFRA than in non-HRFA. Fast-growing species, or trees in HFRA, may need additional inspections or removal to maintain compliance. Supplemental inspections and patrols target the areas of highest risk, typically during the summer growth season. SCE engages contractors to inspect, prune, and remove trees, and to abate weeds. SCE has implemented new processes, procedures, and guidelines, including technological advances and operational improvements, to respond to changes in vegetation management-related regulatory direction and increasing wildfire risk and increase the effectiveness of vegetation management activities. In addition, SCE has implemented evaluation methods that assess the risks of individual trees in order to prioritize work based on relative risk. These are described in greater detail below.

Vegetation Grow-In and Fall-In Risks

Vegetation grow-in and fall-in risks are mitigated by SCE's Transmission Vegetation Management Plan (TVMP), Distribution Vegetation Management Plan (DVMP) and HTMP. These vegetation risks will also be mitigated by SCE's Integrated Vegetation Management Plan (IVM), which is still in its early stages of development.

For distribution line voltages between 2.4 kV to 69 kV, vegetation in grow-in zones (i.e., beneath the conductors), blow-in zones (i.e., within general blow-in proximity to conductors), and side grow-in zones (i.e., adjacent to conductors) is cleared to maintain the clearance distances required by regulations. This includes, where achievable, the CPUC-recommended expanded clearances at the time of maintenance as described in Section 5.3.5.20. All fast-growing species in grow-in zones are removed if the species has the capacity to encroach into the clearance distance at the time of tree maturity; SCE has identified trees species in its service territory as either fast, medium or slow growing. Additionally, where practical and achievable, SCE removes vegetation in the drop-in zone (e.g., overhangs) within HFRA and removes or makes safe palms that have the potential to dislodge fronds.

For transmission line voltages greater than 115 kV, SCE has a "wire-zone" which is defined as the area directly beneath the conductors and includes the distance of the conductors at maximum sway condition (line dynamics). Within this zone, fast-growing species are removed if the species has the capability to encroach into the clearance distance at tree maturity. Additionally, SCE will allow only low-growing trees, shrubs and grasses within wire-zones in Tier 2 and Tier 3 HFRA. SCE is still in the process of implementing this internal standard.

For SCE's transmission and distribution vegetation management programs related to regulatory compliance (e.g., GO 95 Rule 35, CAL FIRE PRC 4293 and NERC Reliability Standard FAC-003), SCE primarily manages vegetation through pruning. SCE performs removals for fast-growing species that meet specific criteria, trees that are identified as dead, rotten, diseased, etc., trees within

the compliance clearance zones in accordance with GO95 Rule 35, or if brought to the attention of SCE.

SCE is in the early stages of developing its Integrated Vegetation Management Plan (IVM). The goal of IVM is to develop sustainable shrub or grassy areas that do not interfere with overhead power lines, pose a fire hazard, or restrict access on SCE transmission rights-of-way (ROW) or applicable distribution easements. IVM promotes desirable, stable, low-growing plant habitat that will resist invasion from tall growing tree species through appropriate, environmentally sound, and cost-effective control methods. These methods can include a combination of chemical, biological, cultural, mechanical, and/or manual treatments. This approach can reduce costs over the long-term and reduce the risk of outages and fires, while improving wildlife habitat.

SCE's HTMP identifies and defines "hazard trees" and "reliability trees" as trees with strike potential based on height and feasible path to strike powerlines or equipment. The HTMP assesses any tree in the HFRA utility strike zone (USZ) with the potential to strike the conductors should the tree or portion of the tree fail (e.g., any tree in the USZ that is taller than it is closer). Trees that are determined to potentially threaten electrical facilities and require management are included in SCE's tree inventory for tracking purposes. Tree management may include heavy topping, removal of limbs, or the removal of the entire tree. Evaluation and management of any potential risks that may arise from the work, such as erosion and wind shear, are included with post tree removal, inspection, and quality reviews.

Objectives, Strategies, and Tactics for Vegetation Management

The Vegetation Management Program strategy is to remove fast-growing species, as applicable, and maintain vegetation in accordance with regulation clearance distances, in addition to preventing grow-ins, blow-ins and side grow-ins. SCE's trim distances are based on the CPUC's recommended clearance distances. The Vegetation Management Program has evolved steadily from a compliance-oriented operation to one that increasingly incorporates risk management practices to evaluate vegetation management issues and prioritize work. In 2018, SCE initiated a comprehensive redesign of its Vegetation Management Department to enhance oversight and improve reporting capabilities. From 2018 to 2019, SCE improved governance plans and management oversight of vegetation management practices and the functions necessary to support the processes defined in these plans. These processes include the protocols and requirements for pre-inspections, contract management, public outreach, safety, post-work verification, and managing events. As part of this redesign, SCE, in 2020, will add staffing, implement program enhancements in areas such as work scheduling and issue management, and emphasize quality control and quality assurance activities.

SCE collaborates with local land managers in forested areas through regular discussions that take place prior to, and at the start of pruning and removal activities. These collaborative efforts allow SCE to educate land managers about its wildfire mitigation efforts and in turn SCE understands local timber disposal and sale regulations for that area. Additional efforts may be needed, however, to obtain advanced commitment from land managers. For example, SCE conducted educational presentations in 2019 to local representatives of the United States Forest Service

(USFS). At a location in Inyo National Forest that was targeted for an HTMP assessment based on a concurrent fuel reduction project undertaken by USFS, the proposed measures met with resistance due to the volume of trees requiring remediation. SCE has observed similar resistance to DRI removals and deeper pruning distances in Los Angeles County areas subject to Coastal Commission regulations, including an area that had recently been through a wildfire.

SCE communicates with local communities and residents about its vegetation management plans. SCE will continue to inform communities about its vegetation management activities that will occur in local areas through the distribution of printed materials, attendance at community outreach meetings, and meetings with local officials.

Initiative Description and Implementation Overview

The following are descriptions and implementation overviews for Vegetation Management initiatives, which are summarized in Table 25.

5.3.5.1 Additional Efforts to Manage Community and Environmental Impacts

Additional efforts to manage community and environmental impacts include meeting with the city and/or the homeowner associations, scheduling and staffing public meetings, and preparing and distributing educational materials. These activities are based on the specific needs and demands of a community and may also include the use of targeted social media campaigns to increase the local public's awareness of vegetation management work taking place in the community. Finally, SCE manages impacts to the community by adjusting the pace of vegetation work to limit the number of pruning crews or the hours worked; however, these localized demands increasingly inhibit SCE's ability to keep pace with its schedule. Beginning in 2020, SCE will work with individual communities to identify how to reduce or eliminate these barriers in a way that satisfies both parties.

5.3.5.2 Detailed inspections of vegetation around distribution electric lines and equipment

SCE annually inspects for clearance around distribution conductors. These inspections are performed in accordance with SCE's DVMP, which conforms to regulatory requirements of the CPUC's GO 95 Rule 35, Rule 35 Appendix E, PRC 4292 and PRC 4293. Pre-inspections are performed to verify that clearance requirements are in accordance with regulatory requirements and program standards, and that clearance will be maintained through the annual inspection cycle. Independent quality assurance reviews and quality control inspections are performed to validate work quality and program effectiveness and to drive continuous improvement. In addition to annual inspections, for certain fast-growing species, SCE conducts additional inspections as needed to verify that there is no encroachment into the required clearance distance. For these compliance inspections, only trees that require trimming, or have been trimmed in the past, are added or maintained in the Work Management System as described in 5.3.5.19.

5.3.5.3 Detailed inspections of vegetation around transmission electric lines and equipment

SCE annually inspects for clearance around transmission conductors. These inspections are performed in accordance with SCE's TVMP, which conforms to regulatory requirements of the

CPUC's GO 95 Rule 35, Rule 35 Appendix E, PRC 4292, PRC 4293 and FAC-003-4, as applicable. Pre-inspections are performed to verify that clearance requirements are in accordance with regulatory requirements and program standards, and that clearance will be maintained through the appropriate inspection cycle. Independent quality assurance reviews and quality control inspections are performed to validate work quality and program effectiveness and to drive continuous improvement (in Section 5.2, SCE describes its monitor and audit process for the WMP). For these compliance inspections, only trees that require trimming, or have been trimmed in the past, are added or maintained in the Work Management System as described in 5.3.5.19.

5.3.5.4 Emergency response vegetation management due to red flag warning or other urgent conditions

Red flag warnings and conditions do not typically drive additional vegetation scope, as the impacted locations are typically too vast for a targeted response to be practical or of value. PSPS monitoring triggers general inspections of SCE facilities or assets. To the extent a vegetation hazard is identified during these inspections, crews may be called out to perform necessary pruning and/or removals. For scheduled work, a red flag warning may trigger additional steps or limitations beyond the use of fire suppression materials that are always required in HFRA. For example, during a PSPS "period of concern", all non-emergency work that may cause sparks, such as pruning, is ceased until the period is over.

5.3.5.5 Fuel management and reduction of "slash" from vegetation management activities

SCE reduces slash (e.g., cut limbs and other woody debris) from vegetation management activities by chipping and then hauling the material away to be disposed or recycled by pruning/removal contractors. Some of SCE's vegetation programs, such as DRI, send its debris to a biomass plant.

SCE's weed abatement program focuses on SCE-owned property and transmission ROWs, keeping them clear of brush and other live fuel plants.

5.3.5.5.1 Expanded Pole Brushing (VM-2)

SCE continues to expand its pole brushing (pole brush clearance around poles) activities to inspect and clear brush to a 10-foot radial clearance on distribution poles in HFRA, beyond those requiring brushing per PRC Section 4292.

Expanded pole brushing was a goal in the 2019 WMP. SCE's goal was to perform 25,000 additional pole brushes beyond the quantity required for its PRC 4292 pole population. SCE exceeded its 2019 pole brushing goal by performing 89,347 pole brushes beyond those required by PRC 4292. SCE estimates that the quantity of distribution poles that will be brushed in 2020 and subsequent years will be between 200,000 to 300,000 each year.

5.3.5.5.2 Expanded Clearances for Legacy Facilities: (VM-3)

In addition, SCE is evaluating several legacy facilities, many in proximity to historic hydroelectric generation facilities, as recommended in findings from the 2019 inspection efforts. The age of these facilities, proximity to densely forested areas, and (as designed at the time) the smaller

setback distances and easements pose challenges to address additional mitigation opportunities. Addressing the State's recommended CAL FIRE clearances pursuant to PRC 4291 and PRC 4293 at these facilities will require a multi-year program of assessments, seeking agency approvals, and remediation. In 2020, SCE plans to perform assessments of all identified facilities in HFRA and establish enhanced buffers at 30% of identified facilities.

5.3.5.6 Improvement of inspections

SCE's TVMP and DVMP are developed to meet and often exceed the regulation requirements. SCE's QC Program performs inspection sampling to determine the overall effectiveness of the vegetation management program and the effectiveness and performance of SCE's vegetation contract workforce. Based on the results of QC inspections, SCE provides timely feedback to contractors in order to drive continuous improvement. SCE delivers annual training to SCE Vegetation Operations personnel and contractors (typically the lead personnel). SCE will evaluate the performance of the inspectors used for HTMP as part of its QC process in 2020 and beyond. See also QA/QC process in 5.3.5.13.

5.3.5.7 LiDAR inspections of vegetation around distribution electric lines and equipment

LiDAR inspections are typically not performed around distribution electric lines and equipment.

5.3.5.8 LiDAR inspections of vegetation around transmission electric lines and equipment

SCE utilizes LiDAR technology to inspect select transmission and sub-transmission lines with respect to FAC 003-4, GO 95-Rule 35 and PRC Section 4293, to maintain appropriate clearances between SCE's lines and vegetation. LiDAR technology measures the distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor. Differences in laser return times can then be used to make digital three-dimensional representations of the target. LiDAR technology is effective at assessing vegetation clearances, particularly in rugged and hard-to-access areas where foot patrols may not be feasible.

LiDAR technology was successfully implemented and operationalized in 2019. SCE had a goal in its 2019 WMP to perform LiDAR on 1,000 HFRA circuit miles, which SCE exceeded by performing LiDAR on 1,570 circuit miles. The data acquired from the 2019 LiDAR inspections is currently being evaluated and will be used to determine when future LiDAR flights may be required based on vegetation density. SCE will continue using LiDAR technology as needed for vegetation management.

5.3.5.9 Other Discretionary Inspections of Vegetation Around Distribution Electric Lines and Equipment, Beyond Inspections Mandated by Rules and Regulations

See Sections 5.3.5.16.1 and 5.3.5.16.2 for inspections related to HTMP and DRI.

5.3.5.10 Other Discretionary Inspections of Vegetation Around Transmission Electric Lines and Equipment, Beyond Inspections Mandated by Rules and Regulations

See Sections 5.3.5.9.1 and 5.3.5.16.2 for other discretionary vegetation inspections.

5.3.5.11 Patrol Inspections of Vegetation Around Distribution Electric Lines and Equipment

SCE performs supplemental vegetation inspections in HFRA, such as Canyon Patrols, At-Risk Circuit Patrols, and Operation Santa Ana. Canyon Patrols are performed annually to verify that certain circuits located in canyons are free from vegetation encroachments into the minimum vegetation clearance distance. At-Risk Patrols are performed on circuits that have a history of multiple vegetation-caused circuit interruptions. Operation Santa Ana is a joint patrol effort with state and local fire authorities to perform patrols of overhead powerlines in the HFRA. These patrols focus on electrical facilities and adherence to PRC Section 4292 and 4293 vegetation-related requirements.

5.3.5.12 Patrol Inspections of Vegetation Around Transmission Electric Lines and Equipment

See Section 5.3.5.11, above.

5.3.5.13 Quality Assurance / Quality Control of Inspections (VM-5)

SCE has a three-tiered, in-depth, oversight strategy to assess program effectiveness, contractor and subcontractor performance, and to drive continuous improvement on both the program and individual performance levels. The approach includes activities such as comprehensive internal work verification, independent QC and several QA assessments.

QC of HFRA circuit miles was a performance metric in the 2019 WMP. SCE's 2019 goal was to perform QC of 450 Distribution circuit miles and 400 Transmission circuit miles. SCE exceeded its 2019 assessment goal by performing QC of 2,155 Distribution circuit miles and 870 Transmission circuit miles. SCE plans to perform QC of 3,000 risk-informed HFRA circuit mile inspections per year in years 2020 to 2022.

5.3.5.14 Recruiting and Training of Vegetation Management Personnel

SCE continues to expand its vegetation management workforce. Historically, Vegetation Management has been an operational activity. In 2019, a "Compliance and Operational Support" department was added to Vegetation Management to drive program enhancements and efficiencies. In late 2019, the Program was reorganized into four distinct departments: Operations; Resource Planning and Performance Management; Long Range and Strategic Planning; and Compliance. The reorganization also generated new positions and vacancies for which SCE is now actively recruiting and staffing. SCE will continue to evaluate the effectiveness of the reorganization and adjust as needed. SCE provides annual training to all Vegetation Management operations personnel and contractors, where participants acquire a better understanding of the regulations, how to implement any SCE-specific requirements, and additional efforts and commitments made by SCE for vegetation management through programs such as the WMP.

5.3.5.15 Remediation of At-Risk Species

In addition to its criteria for mitigating trees that are at risk of striking SCE's facilities, SCE's HTMP has a separate set of criteria for mitigating palms that have the potential to strike SCE's facilities.

SCE's vegetation management program manages work based on regulatory clearance requirements and growth-rates (fast, medium and slow) where additional measures are needed for fast-growing species, as applicable. All fast-growing species in grow-in zones (area directly beneath the line) are removed, if possible, if the species has the capacity to encroach into the clearance distance at the time of tree maturity. Where practical and achievable, SCE removes vegetation in the drop-in zone (e.g., overhangs) within HFRA and removes or makes safe palms that have the potential to dislodge fronds; however, SCE is still in the process of implementing these activities.

5.3.5.16 Removal and remediation of trees with strike potential to electric lines and equipment

5.3.5.16.1 Hazard Tree (VM-1)

The decision to recommend removal of trees that are not dead or dying is based on the professional opinion of a certified arborist. SCE's hazard tree risk assessment methodology is based upon the American National Standards Institute (ANSI) standard A300 for tree care operations and the International Society of Arboriculture (ISA) Tree Risk Assessment Qualification Training Manual, which provides more hazard tree detail than contained in the CAL FIRE Powerline Fire Prevention Field Guide. SCE's assessment methodology considers the tree attributes, the site conditions, impact to the infrastructure, and the likelihood of failure.

HTMP assessments are performed by trained and knowledgeable individuals. In HFRA, SCE defines all trees within the USZ that have the potential to strike the conductors or fall within the Minimum Violation Clearance Distance (MVCD) as "subject trees". After assessment, a subject tree can remain a "subject tree" or be classified as a "hazard tree" or "reliability tree". A hazard tree has conditions within the tree that poses an expected risk to electrical facilities. A reliability tree is considered a healthy tree but is located in an area where site conditions pose an expected risk. Both hazard and reliability trees are risk-ranked and removed based on expected risk to the infrastructure. SCE utilizes a HTMP Tree Risk Calculator developed using industry methodology to determine a risk score for each tree assessed (variables included in risk score discussed below). SCE then prioritizes the appropriate management based on the risk score of each individual tree. Tree management may include heavy topping, removal of limbs, or the removal of the entire tree. Post-inspection of all work prescribed by a tree assessment inspector is performed by an independent quality control contractor. Evaluation and management of any potential risks that may arise from the work, such as erosion and wind shear, are included with post tree removal, inspection, and quality reviews.

CAL FIRE's Powerline Fire Prevention Field Guide (CAL FIRE Field Guide) discusses tree defect attributes for root rot, leaning trees, exposed root systems and heart rot. SCE's HTMP tree-risk calculator includes criteria for leaning trees and the same tree defects contained in the CAL FIRE Field Guide, yet contains a more comprehensive list of tree defects that includes, but is not limited to: codominant tops (small, moderate, large); insect or mistletoe infestation (nuisance, moderate, severe); rot (minor, moderate, prevalent, major); and, exposed or girdling roots (minor, moderate, serious).

The certified arborist evaluates these site conditions and tree defects in proximity to the target and SCE's infrastructure and derives a "likelihood of failure" and "likelihood of impact." Likelihood of failure includes attributes for tree height, tree age, site conditions, tree lean, and tree defects. Likelihood of impact includes attributes for line voltage impact and fire impact. SCE will continue assessing the structural condition of trees in HFRA that are not dead or dying but could nevertheless fall into, or otherwise impact, electrical facilities and potentially lead to ignitions and outages.

Hazard tree assessments and removals were a goal in the 2019 WMP. SCE's goal was to perform 125,000 assessments and to perform 7,500 removals. SCE achieved its 2019 assessment goal by performing 129,485 risk-based tree assessments. Of the 129,485 assessments performed, 16,078 trees (12.4%) were prescribed for removal which exceeded SCEs target removal quantity of 7,500 trees. However, despite identifying 16,078 trees for removal, SCE was unable to achieve its removal targets due to the inability to gain timely permission to perform the removals and slower-than-expected onboarding of contractors needed to perform the required removals. SCE was able to remove 5,917 (4.6%) trees in 2019. For 2020, the HTMP assessment volume targets decreased from 125,000 in the 2019 WMP to 75,000 in the 2020-2022 WMP, primarily due to the following three reasons:

1. In 2019, SCE faced significant challenges with attracting and retaining ISA-certified professionals to perform assessments, given the high demand for arborists in California and nationally.
2. Additionally, the productivity rate of trees assessed per day varied greatly due to differences in terrain and tree density. Although SCE was able to achieve its 2019 goal of 125,000 assessments, it required regularly relocating assessors from lower productivity areas to forested areas where higher productivity could be achieved. While all areas assessed included circuits that represented significant wildfire risk, there will be less flexibility with locations as areas are completed.
3. Finally, the delays in tree removal in 2019 have resulted in an inventory of over 10,000 trees that now require management. Tree pruning/removal crews are also in high demand across the state and draw from the same pool as those who perform compliance distance trimming, creating labor constraints. Given the limitations on the actual mitigation, there is no benefit in pursuing higher volumes through increased resources.

The 2020-2022 target of 75,000 assessments per year was set based on the average number of assessors with established availability and achievable assessment productivity.

The tree-specific risk assessment identifies if the tree should be mitigated to remove an expected risk. SCE will include, for tracking purposes, trees in its tree inventory that are considered potentially threatening to electrical facilities and require management such as heavy topping, removal of limbs, or the removal of the entire tree. An independent QC contractor performs post-inspection of all work prescribed by a tree assessment inspector. Post-tree removal, inspection and quality review includes evaluation and management of any potential risks that

may arise from the work, such as erosion and wind shear.

5.3.5.16.2 Drought Relief Initiative (DRI) (VM-4)

SCE established this initiative due to an epidemic of dead and dying trees brought on by climate change and years of drought. Under its DRI, SCE conducts periodic inspections in Tier 2 and Tier 3 HFRA for tree mortality to identify and remove dead, dying, or diseased trees affected by drought conditions. As part of SCE's ongoing DRI program, SCE performs all annual inspections in accordance with program requirements and removes 94% of active inventory within six months. Active inventory reflect trees for which SCE has both access and authorization to perform the removal. DRI assessments and removals was a goal in the 2019 WMP, and SCE performed all required assessments and completed 13,627 removals.

5.3.5.17 Substation inspections

SCE performs substation inspections in accordance with CPUC GO 174 requirements. Although not specifically referenced in GO 174, SCE monitors substations for vegetation management and conducts inspections of substation perimeter fencing for encroachment.

5.3.5.18 Substation vegetation management

SCE manages vegetation in proximity to substation equipment, as well as outside the fence line for encroachment or fall in risk by performing pruning, removal, and weed abatement

5.3.5.19 Vegetation inventory system

SCE maintains several Work Management Systems (WMS) for Vegetation Management, including Collector/Survey 123 for compliance inspections and FULCRUM for HTMP. These WMS are centralized and updated daily with inspection results. The WMS for compliance, at a minimum, keeps inventory of the species, GPS location, species growth rates (slow, medium, fast), and inspection/trim history. The WMS for HTMP keeps inventory of the species, GPS location, tree identification (i.e., subject, hazard, reliability tree) and applicable documentation on the assessment performed by the qualified tree-risk assessor.

SCE is focused on deploying an integrated vegetation management platform that includes process orchestration, automation, mobile tools and an integrated repository across all programs that will allow for collaboration with customers, arborists, environmental regulators, and utility regulators to achieve the right trim at the right time. Integrating programs onto a single platform will enhance efficiency, risk modeling, communication, reporting, planning and scheduling. The program will be initially focus on hazard tree and DRI with an expected goal of delivering across all wildfire related vegetation activities by end of 2022.

5.3.5.20 Vegetation management to achieve clearances around electric lines and equipment

Vegetation management activities to maintain clearance distances from transmission and distribution lines and equipment are conducted in HFRA and non-HFRA. In HFRA, this work includes three distinct activities:

1. Expanding clearances, where achievable, to 12 feet for lines under 72 kV, 20 feet for lines

under 110 kV, and 30 feet for lines over 110 kV (initial deeper trim for any particular tree). SCE has adopted this standard in HFRA based on recommended clearances in D.17-12-024. This activity not only increases the amount of trimming on trees that were previously trimmed, but increases the number of trees that need to be trimmed or removed.

2. Maintaining 12, 20, or 30 feet clearances from SCE's lines for trees that have previously been trimmed to these distances, and
3. Maintaining 4 feet clearances per D.17-12-024 minimum requirements where SCE cannot achieve deeper trims due to operational constraints.

All three of these activities in HFRA are for wildfire mitigation and reducing the probability and consequence of potential ignitions. SCE's line clearance forecasts include these three activities in HFRA. The forecasts included are subject to change as there are considerable uncertainties associated with the scope of work (number of trees trimmed or removed). Although risk analysis is guiding some line clearance activities, the line clearance scope in HFRA is driven by Commission requirement and recommendations to mitigate wildfire risks and not informed by RSE estimates.

As discussed earlier, SCE performs annual inspections for clearance around conductors in accordance with applicable regulations such as GO 95 and SCE's TVMP and DVMP. Independent parties perform QA reviews and QC inspections to validate work quality and adherence to internal program and regulatory requirements.

Vegetation Management Long-Term Strategy

SCE's Vegetation Management Program will continue to evolve over the next 10 years and many factors will be considered, such as enhancing work practices from lessons learned and exploring new technologies and methods. These improvements will be focused on reducing ignition risk related to vegetation near SCE's facilities in HFRA. SCE anticipates that over time it will:

1) consider and likely adopt more comprehensive use of technology such as LiDAR to add efficiency or replace current foot patrols and more predictive analytics capability such as artificial intelligence to improve its risk prioritization and resource allocation methods;
2) further integrate programs across and potentially outside the organization to minimize vegetation-related work that can overlap across large geographic areas;
3) continually implement enhancements to how SCE identifies, tracks, and remediates fast-growing tree species; and
4) likely implement an integrated vegetation management software solution.

SCE also anticipates continued resource challenges for certified arborists and tree crews and is developing programs, collaborations, and partnerships to help reduce these constraints.

See Table 25 "Vegetation management and inspections" for more details on the initiatives above.

5.3.6 Grid Operations and Protocols

For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description of the utility's initiatives, the utility's rationale behind each

of the elements of the initiatives, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each initiative, how the utility plans to demonstrate over time whether each component of the initiatives is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds.

Grid Operations is responsible for monitoring and operating SCE's electric system. During significant events, Grid Operations personnel are responsible for the real-time operation of the system and coordinating activities with external agencies such as fire agencies and emergency response personnel. Grid Operations is also responsible for applying System Operating Bulletins (SOB), which encompass operating protocols, remedial actions, communication and notification protocols, ratings and limits of lines and equipment, and system protection schemes. Qualified employees (e.g., Troublemen, Senior Patrolmen, Foremen, or Field Supervisors) may contact Grid Operations at any time to request a line or line segment be temporarily de-energized or place sectionalizing equipment into "non-automatic" recloser settings to promote public and employee/contractor safety. To reduce power line ignitions during extreme weather conditions, overhead transmission, sub-transmission, and distribution lines and line sections are subject to operating restrictions described in Section 5.3.3.

5.3.6.1 Automatic recloser operations

SCE deploys certain protective devices, such as remote-controlled automatic reclosers (RAR) and circuit breaker (CB) relays, on overhead systems in HFRA to enable recloser relay blocking and Fast Curve settings in response to weather events. These deployments are conducted in accordance with SCE's SOB 322 and the protective devices are configured in response to weather events such as RFWs declared by the National Weather Service, as well as Fire Weather Threat (FWT) and Thunderstorm Threat (TT) declared by SCE's Incident Commander, and other high wildfire risk conditions.

At the onset of SCE's system hardening efforts, as described in Section 5.3.3, SCE's goal was to maintain reclose functionality for portions of circuits outside of the HFRA by installing RARs, where feasible, just outside the HFRA boundaries to provide Fast Curve setting capabilities. This would reduce fault energy, strengthen reliability benefits, and increase PSPS sectionalizing abilities by providing the capability to de-energize the circuitry within the HFRA independently from non-HFRA circuitry.

During the scoping effort, SCE identified several scenarios where overhead RARs do not completely eliminate exposed energized conductors in SCE's HFRA during a PSPS event. For example, in situations where a line is first underground when entering into the HFRA and then rises to overhead, an overhead RAR mitigates fire risk for the overhead line downstream from the RAR, but would not effectively mitigate fire risk associated with upstream overhead equipment, such as disconnect switches, jumpers and overhead conductor. Additionally, many circuits that were primarily located outside of HFRA only crossed into HFRA for a handful of spans. In these cases, the RAR would provide limited or no ability to de-energize conductors on portions

of the circuits traversing HFRA during a PSPS event. To overcome these barriers in using RARs, SCE installed a mix of overhead and underground RCSs and applied Fast Curve settings at the substation CB to provide fault energy reduction. These actions facilitated additional "sectionalization," which is key to eliminating all energized conductors within impacted HFRA during a PSPS event.

5.3.6.1.1 Annual SOB 322 Review (OP-1)

Historically, Grid Operations performed an annual review of SOB 322 and made updates as needed to provide better guidance to system operators, substation operators, and field line employees on the safe operation of circuits that traverse HFRA during an elevated weather threat. However, over the past few years, it became clear that SOB 322 needed to be updated more frequently. The evolving wildfire threat, together with lessons learned from actual weather threats and PSPS events and its desire to integrate more risk-based operational protocols, led SCE to take a continuous improvement approach to revising SOB 322. In 2019, SOB 322 became more of a living document, which was reviewed on a continuous basis through the year and revised (published) several times to increase operational effectiveness and safety while also minimizing the impact of outages on SCE customers. Although a significant amount of organizational change management support was needed to ensure the understanding, adoption, and execution of the new or modified operating procedures, SCE feels this is the best approach given the current environment.

SCE completed the 2019 WMP goal of reviewing and updating SOB 322 to reflect lessons learned from past elevated fire weather threats and integrate, where applicable, new and improved data from its situational awareness resources. Table SCE 5-8 summarizes the SOB 322 revisions.

Table SCE 5-8
SOB 322 Revisions

Revision Category	Revision Description
Fire Weather Threat Declarations and Definitions	• Created an Elevated Fire Weather Threat (EFWT), enabling operating restrictions prior to issuance of a Red Flag Warning • Changed declaration of an EFWT to be by switching center and county (not across the entire county) • Created protocol around using a PSPS Watch List during EFWT declaration, which would place operating restrictions on only the lines listed rather than the switching center and county as a whole, thereby reducing outage impacts on customers not impacted by identified weather threats • Replaced Elevated Fire Weather Threat (EFWT) with FWT to disassociate the general threat declaration from varying wildfire/storm threat levels • Created a new TT which will be treated similarly to an RFW

Revision Category	Revision Description
Operational Enhancements and Clarifications	• For safety purposes, clarified that only certain devices shall be operated to de-energize lines or line segments for PSPS • Clarified when single-phase switching and normal switching protocols are allowed • Added additional process flow diagrams that clarify the operation of reclosers and outage management procedures • Added new requirement to open all downstream RARs during extended PSPS outages
Transmission Protocols	• Added transmission lines as being in scope and subject to operating restrictions, including considerations for PSPS • Revised the list of transmission circuits that traverse HFRA • Added that operating restrictions on transmission circuits would not be automatic when an RFW or FWT has been declared, and requires a more detailed assessment • Provided guidance on manually blocking non-automated transmission reclosers • Added new protocol for PSPS proximity threat, which places operating restrictions on transmission lines that are in proximity to distribution lines listed on the PSPS monitor list • Added that transmission line operating restrictions could be included under a TT • Expanded to include blocking transmission reclosers for the Switching Center/county affected during an FWT declaration
Roles and Responsibilities	• Added requirement for Grid Control Center (GCC) manager to review transmission lines subject to SOB 322 • Added new role to IMT to focus on transmission reliability during events • Added step for GCC transmission dispatcher to notify the reliability coordinator, CAISO and neighboring entities when PSPS has been initiated for transmission lines • Shifted some GCC manager duties to the IMT Incident Commander
Miscellaneous Updates, Clarifications, Resources	• Changed reference of PSPS monitoring to PSPS live field observations • Added PSPS circuit watch list to SharePoint for easy reference • Added language on the PSPS proximity tool, responsibility for updating the tool, and overall use of the tool during real time operations • Changed Red Flag Fire Prevention Program to Work Restrictions During Fire Weather Conditions Program • Added clarity on default resources if online versions are unavailable • Moved, expanded, or retitled various sections to improve flow and/or organization

Every weather threat event, whether SCE proactively de-energizes lines or not, is an opportunity to learn and improve the protocol. SCE desires to learn from these events, while also formalizing and standardizing protocols, where possible, to gain as much consistency and rigor in its operational protocols, knowing that every event is different and, at times, requires flexibility for unforeseen conditions to ensure safe operation. SCE will continue to revise the protocol to include, as applicable, new and improved situational awareness data, improved threat indicators, and applicable regulatory requirements.

5.3.6.2 Crew-accompanying ignition prevention and suppression resources and services

Except in limited cases where required for planned project work operating under a federal or state license or permit (e.g., USFS Master Special Use Permit), SCE does not utilize crew-accompanying ignition prevention and suppression resources and services. In all other instances, SCE mitigates the risk for crew-caused ignitions by employing the work restrictions protocol described in this section.

Under the prior work methods, emergency and non-emergency work could proceed during all fire weather conditions, including extreme as long as the crews had mitigations (water backpack, shovel, etc.) in place. The requirement to carry this mitigation equipment was triggered by the RFW.

In the new protocol, mitigations (water backpack, shovel, etc.) are still required when working on impacted circuits during moderate fire level threat (earlier trigger than RFW). Additionally, all work must be cancelled and rescheduled for impacted circuits under elevated fire weather threat. Mitigations are no longer tied to RFW and are aligned with FWT. This allows SCE to be more precise and focused on where restrictions are applied.

5.3.6.3 Personnel work procedures and training in conditions of elevated fire risk

During significant events, Grid Operations personnel act as SCE's accountable representatives in matters concerning the real-time operation of the system and coordinate activities with external agencies such as emergency response personnel. Grid Operations is also responsible for applying System Operating Bulletins (SOB), which encompass operating protocols, remedial actions, communication and notification protocols, ratings and limits of lines and equipment, and system protection schemes. Qualified employees (e.g., Troublemen, Senior Patrolmen, Foremen, or Field Supervisors) may contact Grid Operations at any time to request a line or line segment be temporarily de-energized or place sectionalizing equipment into "non-automatic" recloser settings to promote public and employee/contractor safety.

SCE also developed the Work Restrictions During Elevated Fire Conditions Program, (formerly known as the Red Flag Fire Prevention Program), to restrict or delay field work. This program applies to both SCE employees and contractors and is intended to reduce their risk of causing an ignition during the normal course of work in HRFA when the weather and fuel conditions are more susceptible to fire ignitions.

5.3.6.4 Protocols for PSPS re-energization

When fire risk conditions subside to safe levels and safe conditions are validated by field resources, SCE will begin patrolling impacted circuits to check for any condition that could potentially present a public safety hazard when re-energizing circuits. Once field resources confirm that it is safe to re-energize the circuit(s), power will be restored, and public safety partners and customers will be notified of re-energization. The order in which circuits are re-energized will depend on many factors including, but not limited to, customer safety and well-being, consideration of affected essential services, damage to electrical and other infrastructure, and circuit design/topology.

5.3.6.5 PSPS Events and Mitigation of PSPS impacts

SCE's trained and qualified IMTs manage PSPS events out of SCE's Emergency Operations Center (EOC). SCE also utilizes operational resources to plan, oversee and execute field deployments in support of PSPS protocols (*e.g.,* pre-patrols, live field observations and re-energization patrols) and may deploy mobile generators to critical infrastructure, public safety partners or customer locations during an event.

SCE is committed to aggressively pursuing mitigations to minimize the PSPS impacts felt by the public. For example, SCE will utilize engineering analysis to identify opportunities, such as installing additional sectionalizing devices or automating existing ones, that will keep customers energized during PSPS events, wherever possible. SCE is also exploring a microgrid pilot program (see Section 5.3.3.8.2). In locations where customers are directly fed by overhead circuits in HFRA and cannot be isolated, SCE will continue raising risk tolerance by performing grid hardening activities that increase de-energization wind speed triggers. Examples of these grid hardening efforts include targeted installation of covered conductor and circuit undergrounding, which are described in greater detail below. Although PSPS events may be less frequent over time as SCE increases its system hardening, PSPS will have to remain available as a tool for wildfire mitigation.

New PSPS Mitigation Approach: Circuit-specific Evaluation and Planning

Beginning in 2020, SCE plans to implement a circuit-specific evaluation and planning that would result in the development of a circuit-specific mitigation plan for each circuit impacted by PSPS. This approach would first prioritize circuits for mitigation by considering factors such as the nature of the PSPS outages and the types of customers impacted. Secondly, each circuit would be individually evaluated for potential mitigations. The circuit evaluation process involves the evaluation of grid hardening mitigations to reduce the frequency of PSPS events, the evaluation of solutions to keep certain locations energized during PSPS events, with the ultimate goal to reduce the impact of PSPS on as many customers as possible.

For all PSPS-impacted circuits: Evaluation of grid hardening mitigations to reduce the frequency of PSPS events

SCE initiates PSPS events when wind speeds exceed certain threshold values. Thresholds are based upon a number of risk factors, such as the condition of the physical assets that comprise a given circuit. To reduce the expected likelihood of PSPS events, SCE will evaluate whether a given

circuit has opportunities to replace or repair particular assets to improve the overall integrity of the circuit and raise the trigger for the circuit. The specific mitigations deployed to reduce PSPS events are generally the same mitigations deployed to reduce wildfire ignition risk and may include the following: accelerating minor repairs that would otherwise be scheduled according to a 6-month or 12-month compliance obligation, replacing/upgrading assets to improve resiliency, remediating long spans, and deploying covered conductor. In the long-term, SCE plans to deploy such grid hardening technologies throughout the system. For this effort, deployment is prioritized to specifically target communities most impacted by PSPS. The specific types of mitigations may evolve as SCE's risk models evolve and are updated to improve the PSPS trigger calculations.

For select locations: Evaluation of solutions to keep certain locations energized during PSPS events.

This evaluation applies to the same two specific types of locations discussed in the PSPS Resiliency Microgrid Pilot[10] namely: (1) a location within the HFRA that has underground service, or (2) a location outside of the HFRA that is served by an overhead line running through HFRA. SCE will evaluate each PSPS-impacted circuit for such locations. When locations are identified, SCE will evaluate a range of potential options, including the following:

- Evaluate opportunities for switching procedures using the existing system. Such procedures will reduce the number of customers impacted by PSPS events.
- Evaluate opportunities to deploy lower cost projects to reduce customers impacted. For many circuits, SCE can reduce the number of customers that must be de-energized during an event by increasing the sectionalization of the circuit. SCE will evaluate each PSPS-impacted circuit for such opportunities and has already deployed a number of assets to increase sectionalization.
- Evaluate higher-cost capital projects. Such projects could include deploying a microgrid, deploying temporary backup generation (to provide power to the entire circuit segment), or deploying a new underground circuit. SCE will evaluate the cost-effectiveness of such projects. Given their higher capital cost, SCE expects that a small number of such projects will be deployed.
- Evaluate customer-side solutions. SCE is exploring additional customer programs, including programs designed to provide generation to targeted facilities that provide support for a community. In particular, SCE is exploring the potential to provide back-up generation, to not only designated Community Resource Centers, described below, but also for certain commercial and government customers that provide important services to the community. To the extent the grid-side mitigations described above are not feasible, SCE intends to deploy customer-side solutions, where possible, to benefit those communities.

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[10] *See* SCE's Resiliency Proposal and Response to ALJ Ruling, filed January 21, 2020, p. 6, http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M325/K544/325544944.PDF

5.3.6.5.1 Community Resource Centers (PSPS-2)

SCE has augmented its mobile Community Crew Vehicles by partnering with facilities around the territory and establishing Community Resource Centers (CRCs). These CRCs are located both outside the HFRA (urban), and within the HFRA (remote), with the main difference being that the urban sites will not be impacted by the de-energized circuit, while the remote CRC would be impacted and rely on site resiliency (backup generation capability). SCE is currently under contract with Transform Holdco LLC (THC), parent company for Sears and Kmart stores, to utilize designated stores (urban) as CRCs during PSPS events. In addition to the retail stores, SCE will continue to onboard new CRCs (remote) in HFRA (Tier 2 & 3), including sites with backup generation capability.

SCE's original CRC strategy included a total of 15 urban and 35 remote CRCs by 2021. In 2020, SCE plans to have 23 sites available across SCE's service territory for customers impacted by a PSPS. SCE is reassessing this strategy to include improved coverage based on weather and circuit data history. SCE anticipates that the final CRC recommendation will be approved in early 2020 (post-2020-2022 WMP submission) followed by activities to establish the CRCs.

SCE's CRC refresh strategy will include "pop-ups." Pop-up sites are locations that become available through communities and agencies, often on an as-needed basis with limited pre-planning. These sites could be indoor facilities not under contract between SCE and the third party, offered to SCE for PSPS use, and can include parking lots, as well as established indoor facilities.

SCE has enabled (ready for activation) 13 CRCs and is continuing to expand the list. SCE continues to learn from the 2019 wildfire season and related PSPS activity, including identifying the need for improved external coordination and additional resources, such as, but not limited to, blankets, bulk water, ice, etc. SCE will incorporate these lessons learned into its CRCs that get rolled out in 2020.

5.3.6.5.2 Customer Resiliency Equipment Incentives (PSPS-3)

SCE is developing a customer resiliency equipment incentive program that provides financial support to customers willing to increase resiliency within HFRA. This program targets customers who already have solar and storage, or will be adding such capabilities to their sites, and are willing to island and redirect the energy in the storage battery to a designated building on site for use during PSPS or other emergencies. These facilities are required to be open to the public during PSPS events or other emergencies. The majority of customers that have these features at their sites are larger entities such as schools, local government facilities, and large retailers. The islanding allows the use of the designated building as a powered CRC in HFRA. SCE is currently in the process of setting up a pilot for this program based on two types of customers: 1) customers that already installed solar and storage capabilities (retrofit design) and 2) customers that have solar and are in the process of adding storage (upfront design). The purpose for the two configurations is to learn about the complexity of the islanding design,

costs, and customer participation. SCE plans to learn from its pilots in 2020 to determine what modifications may be needed in 2021 and beyond. In 2020, SCE plans to implement one pilot.

5.3.6.5.3 Income Qualified Critical Care (IQCC) Customer Battery Backup Incentive Program (PSPS-4)

In 2019, SCE began developing an incentive program for its IQCC Medical Baseline customers that would fully fund the cost of a battery-powered portable backup solution to operate critical medical equipment for up to 24 hours during power outages due to PSPS events or other emergencies. Subsequently, in October 2019, Governor Newsom signed SB 167 into law, which authorizes electrical corporations to deploy backup electrical resources or provide financial assistance for backup electrical resources to those customers receiving medical baseline allowances and who meet specified requirements. Given the emphasis on assisting these customers during a PSPS event, priority will be given to income qualified critical care customers living in SCE's HFRA. In 2020, SCE plans to identify approximately 2,500 customers that it will target for this program.

5.3.6.5.4 MICOP Partnership (PSPS-5)

In 2019, SCE expanded its partnership with the nonprofit organization Mixteco/Indigena Community Organizing Project (MICOP) to develop and conduct culturally appropriate and in-language outreach to educate indigenous communities in Ventura County about emergency preparedness and PSPS.

MICOP will utilize its local radio station, Radio Indigena 94.1 FM, to broadcast public service announcements (PSAs) and informative segments to educate indigenous individuals who have limited English proficiency and are living and working in the Oxnard area on how to prepare for emergencies and potential PSPS events. On-air content will be delivered in three indigenous languages: Mixteco, Purapecha, and Zapoteco. MICOP will also coordinate direct education and outreach with community members including agricultural farm workers, and through MICOP-hosted community meetings, health fairs and local school events. Direct outreach began in the fourth quarter of 2019. SCE expects this partnership to improve its ability to provide important wildfire safety information to this population. SCE will evaluate and assess the effectiveness of this partnership in reaching and informing the growing indigenous population in its HFRA to determine if any modifications are needed and (although SCE anticipates it will) whether to continue it into 2021 and beyond. The planned Access and Functional Needs (AFN) outreach activities will be closely monitored and adjusted as needed through regular meetings with the nonprofit. Progress reports will help to determine sustained and future outreach efforts beyond 2020.

5.3.6.5.5 Independent Living Centers Partnership (PSPS-6)

In 2019, SCE established partnerships with seven 2-1-1 service providers[11] and eight designated independent living centers (ILC) across the service territory to prepare access and functional needs (AFN) communities for PSPS. The ILCs are dedicated to increasing independence, access and equal opportunity for people with disabilities. Collectively, they provide direct services to Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, Santa Barbara and Ventura Counties.

These partnerships will incorporate and leverage the subject matter expertise of AFN advocates and members of the AFN community to ensure education and outreach are appropriate, accessible and impactful. Outreach will promote enrollment of medical baseline and critical care customers to augment advance notifications for PSPS events and will include at least 10 workshops/trainings to provide preparedness education and assistance in applying for the Medical Baseline Program.

The planned AFN outreach activities will be closely monitored and adjusted as needed through regular meetings with individual ILCs, as well as larger convenings with all eight ILCs. These monitoring activities, along with progress reports submitted by each nonprofit, will help to determine sustained and future outreach efforts beyond 2020.

5.3.6.5.6 Community Outreach (PSPS-7)

To minimize the impacts to customers that are affected by PSPS activations, SCE will coordinate with local emergency management agencies (when possible) to deploy community response vehicles to affected communities. These vehicles provide customers access to basic amenities such as water, snacks and portable charging devices along with trained staff that can provide real-time information on PSPS events. SCE has designed and outfitted five cargo transit vans as Community Crew Vehicles (CCVs) with the required equipment and technology to enable SCE staff to transport water, snacks, portable charging devices, lights, and other amenities.

SCE is also employing a variety of targeted communication channels to ensure that customers are notified in a timely manner. For example, Nextdoor, a neighborhood online forum to exchange helpful information, goods, and services has 2.5 to 3.0 million verified users in SCE's service territory that can be targeted by region, county, city, circuit, or neighborhood. The Nextdoor public agency platform allows city, county, state and now, private utility organizations to build strong ties with the neighborhoods they serve, improving service delivery and civic engagement. With unique mapping and targeting features, public agencies can effectively communicate with real residents. This social platform and potentially others will provide SCE with an opportunity to engage customers who are already having conversations about SCE and its programs. SCE made its first Nextdoor post in December 2019 and will continue to work on

[11] 211.org is a free and confidential service (with 180 languages supported) that helps people across North America find local resources they need 24 hours a day, seven days a week, http://211.org/

refining its customer notification strategy in 2020 and through this WMP period.

5.3.6.5.7 Wildfire Infrastructure Protection Team Additional Staffing (OP-2)

In 2018, due to SCE's newly established protocols that introduced more rigorous requirements related to PSPS activations, SCE added specialized fire science and meteorology staff to augment existing Business Resiliency resources and response efforts. These fire science and meteorology staff develop and implement critical wildfire mitigation programs and initiatives, including applying the latest research, science, and technology to help minimize the risk of utility-caused ignitions across SCE's service territory. Meteorologists previously maintained collateral responsibilities to support other areas of the company but due to emerging threats and conditions related to wildfire, it became evident that staff size needed to be increased and dedicated to solely 24-hour wildfire response activity.

SCE met the 2019 WMP goal of hiring one additional meteorologist to assist with the increased demand for weather monitoring and forecasting in response to PSPS conditions. Due to the frequency and magnitude of PSPS activity in 2019, SCE hired two additional meteorologists, one fire scientist and one fire management officer to support SCE's situational awareness capabilities. Meteorology staff play a critical role in forecasting PSPS events which ultimately determines the activation of PSPS IMTs and significant mobilization of SCE staff and resources. Many external agencies including cities, counties and public safety agencies make staffing decisions and mobilize resources based on SCE's weather forecasting and PSPS decisions. Due to the high-stakes nature of PSPS protocols and the potentially impacted customers, it is imperative that SCE maintain a team of qualified meteorology and fire science staff who are providing accurate and reliable data that drive the PSPS decision making process.

In 2019, to further support the execution and efficiency of PSPS, an Advanced Circuit Evaluation (ACE) team, staffed by six technical specialists, was established to aid in monitoring real-time conditions to develop ongoing circuit-specific switching plans. These switching plans are used to help mitigate impact to customers during PSPS events. To organize work streams and provide tracking and reporting of initiative requirements, a Project Manager was added to the team. This team will also directly support the PSPS IMT and task forces during activation to drive continuity of operations event management during events.

In December of 2019, SCE established a dedicated Wildfire/PSPS Response group within the Business Resiliency Department to provide direct support for PSPS and wildfire mitigation efforts. This includes supporting high impact work activities for advancing the PSPS protocol, supporting implementation of enhanced situational awareness tools such as super computers, high-resolution forecasting, HD cameras, weather stations and developing processes and procedures in alignment with company standards and best practices. To support this new group, SCE will onboard additional resources including: a senior compliance manager, two compliance advisors, a data specialist and a fire meteorologist. These resources will develop several additional capabilities around PSPS IMT programs and processes, enhancing situational awareness tools and technologies, and building external engagement and compliance.

To enhance existing operational practices, a new PSPS Operations Department will be staffed in 2020. This department will be led by a principal manager and staffed with functional area managers, technical specialists, advisors, and support staff that will have responsibility for: executive engagement, cross-organizational coordination, circuit switching plan development, operational compliance, training, continuous improvement, project management, and related initiatives. The ACE Team, described above, will report to this new department.

5.3.6.5.8 Self-Generation Incentive Program (SGIP) Resiliency

The Self-Generation Incentive Program (SGIP) provides incentives to support existing, new, and emerging distributed energy resources, by providing rebates for qualifying distributed energy systems, such as renewable generation and energy storage, that are installed on the customer's side of the utility meter. Updates to the SGIP can provide assistance to enhance the resiliency of eligible customers affected by PSPS events by providing backup power. Commission Decision (D.)19-09-027 established a new "equity resiliency budget" set-aside for customers participating in one of two low-income solar generation programs or vulnerable households that are located in Tier 2 and Tier 3 HFRA, as well as for critical service facilities serving those areas. Customers eligible for the equity resiliency incentive will receive a $1 per-Watt-hour incentive for energy storage projects. As part of D.19-09-027, SCE will transfer $34 million of its total SGIP budget to the new equity resiliency budget and will begin accepting customer applications for equity resiliency incentives in 2020.[12]

On January 16, 2020, the Commission adopted D.20-01-021 that authorized statewide annual ratepayer collections of $166 million annually through 2024 for the SGIP program. This decision prioritized allocation of funds to benefit customers affected by PSPS events or located in areas with extreme wildfire risk, including adopting a resiliency adder and a renewable generation adder to promote critical resiliency needs during PSPS events. The Commission also directed utilities to prioritize customer applications for the equity resiliency budget in order to further expedite support for customers affected by wildfire and PSPS-related outages.

5.3.6.5.9 Mobile Generator Deployment

SCE continues to work collaboratively with local governments, first responders and essential service providers to provide awareness of PSPS and to educate them on the importance of developing a resiliency plan that addresses back-up power needs for their facilities which provide critical life and safety functions. Many of these customers are required by law or industry standard to have back-up generation in place to sustain critical operations in the event of a power outage, regardless of outage type. Other customers not required to have back-up generation are encouraged to consider adding this capability if they feel they have critical needs that must continue in a power outage.

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[12] For more information, see SCE's Advice Letter AL 4127-E (December 17, 2019), https://library.sce.com/content/dam/sce-doclib/public/regulatory/filings/pending/electric/ELECTRIC_4127-E.pdf

However, if essential service providers are unable to sustain critical life/safety operations during an extended power outage, SCE will consider requests to provide temporary mobile backup generation. Through the existing PSPS communication plan, SCE will coordinate closely with the emergency management community at the county level to identify and prioritize back-up generation needs requested by the county. Absent prioritization from the County, SCE will generally prioritize requests in the following categories as shown in Table SCE 5-9:

Table SCE 5-9
Prioritization of Mobile Generator Deployment

Priority Order	Essential Service Provider Category
1. Life Safety Emergencies	Hospitals Skilled Nursing Facilities Public Safety Agencies
2. Public Health Emergencies	Water/Wastewater
3. Communication Failures	Telecommunications

Other community needs (e.g., warming/cooling centers, community centers, etc.) that may impact the public health and safety may be considered for back up generation at the request of the County.

If the Incident Commander determines there is a critical need for temporary back-up generation for one of the essential service providers noted above, the PSPS Task Force, which resides under the Operations Section of the Incident Command Structure, will be responsible for determining the appropriate sizing and installation requirements, and work with the Logistics Section of the IMT, contract partners, vendors and the appropriate internal T&D field crews to coordinate deployment and installation. Once the event has concluded and power has been restored, this same task force will confirm the generator is removed and returned to the vendor.

5.3.6.6 Stationed and on-call ignition prevention and suppression resources and services

SCE does not utilize stationed and on-call ignition prevention and suppression resources and services. As stated previously, SCE provides workers with basic fire suppression equipment and training to extinguish incipient-stage ignitions. SCE also restricts work during elevated fire weather conditions and relies on the expertise of its fire agency partners to support fire suppression activities throughout its service territory.

5.3.6.7 De-Energization Notifications (PSPS 1.1 – 1.4)

SCE is committed to full compliance of all notification requirements as outlined by the Commission in Rulemaking 18-12-005. SCE understands its stakeholders have different needs and require varying methods of alerting and warning to ensure proper notification. For example, first responders, public safety partners, and local governments require as much lead time as practical to begin contacting constituents and preparing to respond to potential de-energization. To support this need, SCE generally provides priority notification to these agencies upon

activation of the EOC, typically 72 hours before a potential PSPS event. Additional alerting and warning update notifications are made again at 24-hour intervals with these agencies to maintain operational coordination. SCE begins initial alerting and warning messaging to remaining customers up to 48 hours in advance of a potential PSPS event. Notifications are then made to these customers in 24-hour intervals to maintain situational awareness and provide updated information regarding the ongoing potential PSPS event. All PSPS event notifications to key stakeholders, including public safety partners and customers, are delivered via voice, email, and TTY (telecommunication device for the hearing impaired) formats as per the preference of the recipient. Notifications are offered in multiple languages. Requirements are summarized below in Table SCE 5-10.

Table SCE 5-10
De-Energization Notification Requirements

Stakeholder	Initial Notification (Alert)	Update Notification (Alert)	Imminent Shut down (Warning) [13]	De-Energized (Statement)	Preparing for Re-Energization (Statement)	Re-Energized (Statement)	PSPS Averted (Statement)
First/Emergency Responders/Public Safety Partners	72 hours before	48 & 24 hours before	1-4 hours	When De-Energization Occurs	Before Re-energization Occurs	When Re-Energization Occurs	When circuits are no longer being considered for PSPS
Critical Infrastructure Providers	48 hours before	24 hours before	1-4 hours	When De-Energization Occurs	Before Re-energization Occurs	When Re-Energization Occurs	When circuits are no longer being considered for PSPS
Customers	48 hours before	24 hours before	1-4 hours	When De-Energization Occurs	Before Re-energization Occurs	When Re-Energization Occurs	When circuits are no longer being considered for PSPS
*SCE will target the schedule above to notify customers. Erratic or sudden onset of hazardous conditions that jeopardize public safety may impact SCE's ability to provide advanced notice to customers.							

In late 2019, SCE enhanced its notifications in EONS by implementing Zip Code-level alerting for PSPS events. Zip Code alerting enables non-SCE accountholder populations residing within SCE's service territory the ability to enroll to receive PSPS notifications based on their preferred zip code(s). In 2020, SCE will further enhance Zip Code-level alerting to include in-language notifications in alignment with its existing notification abilities for SCE customers. Furthermore, in 2020, SCE is deploying a new public alert messaging channel to notify anyone in an area affected by an active PSPS without signing up on SCE.com. This capability is similar to "Amber Alerts" and leverages industry-leading web-based public alerting technologies.

[13] SCE will make every attempt to notify customers at the 1-4 hour warning stage. Given the unpredictability of shifting weather during PSPS events, implementation of this timeframe may vary.

See Table 26 “Grid operations and protocols” for more detail on the initiatives above.

5.3.7 Data Governance

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description of the utility's initiatives, the utility's rationale behind each of the elements of the initiatives, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each initiative, how the utility plans to demonstrate over time whether each component of the initiatives is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds.

Include descriptions across each of the following initiatives. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell in the row.

1. *Centralized repository for data: Designing, maintaining, hosting, and upgrading a platform that supports storage, processing, and utilization of all utility proprietary data and data compiled by the utility from other sources.*
2. *Collaborative research on utility ignition and/or wildfire: Developing and executing research work on utility ignition and/or wildfire topics in collaboration with other non-utility partners, such as academic institutions and research groups, to include data-sharing and funding as applicable.*
3. *Documentation and disclosure of wildfire-related data and algorithms: Design and execution of processes to document and disclose wildfire-related data and algorithms to accord with rules and regulations, including use of scenarios for forecasting and stress testing.*
4. *Tracking and analysis of near miss data: Tools and procedures to monitor, record, and conduct analysis of data on near miss events.*
5. *Other / not listed [only if an initiative cannot feasibly be classified within those listed above]*

The list provided is non-exhaustive and utilities shall add additional initiatives to this table as their individual programs are designed and structured. Do not create a new initiative if the utility's initiatives can be classified under a provided initiative.

Data capture, data analysis, technology, and automation are increasingly a part of SCE's wildfire mitigation planning and implementation, as well as for its broader operations. Data quality and governance has been an instrumental part of SCE's values for many years. To date, organizations across SCE have addressed data governance at the system and initiative level largely focused on data quality, security, and compliance. While these programs and processes have been largely successful, moving forward, SCE is rethinking how it is using data for analysis, insights, and decision making. The volume of data SCE is collecting grows daily due to emerging new activities

such as aerial imagery and videos as well as the need to integrate more information. These increased data requirements are vast and need to be stored, analyzed, and managed. SCE plans to invest in automation, machine learning and artificial intelligence over this WMP period, focusing on data architecture, management, and stewardship. Existing data governance processes and structures were developed within the scope of each initiative with the intent of transitioning activities to operational groups after the processes are established. As an example, in the distribution and transmission area, SCE has initiated a series of initiatives to enhance and improve areas such as vegetation management, asset inspections, and PSPS. The accelerated nature of these initiatives resulted in the creation of some data silos (discussed below) that require manual activities to interconnect data to perform analysis.

To improve this, SCE is working to develop an integrated wildfire data management and governance process. One of the steps involves SCE investing in process (data governance, stewardship) and technology (integrated data platforms, data management, data pipelines) to enable comprehensive decision making across initiatives, activities and processes. SCE's Enterprise Information Governance (EIG) and Information Technology (IT) groups are collaborating with various organizational units to coordinate and formalize these data governance efforts. SCE will develop and implement consistent processes and tools across the wildfire related initiatives. This is SCE's primary focus and foundational structure for managing its wildfire related data and facilitating the items below.

The scope of the data management and governance process includes establishing new data roles and responsibilities (data stewards, data custodians, data subject matter experts, etc.), and capabilities in master data management, metadata management, data quality and integrity, data lifecycle management, and data security and privacy. SCE's approach is to implement these capabilities in smaller tangible pilots, prioritized based on impact of the data area and data elements. For example, creating a 360 view of an asset that integrates aerial and ground imagery with inspection and remediation data for both asset and vegetation programs. This will allow for greater insights from advanced analytics and for a single view of asset heath for better risk modeling and prediction. The initial focus will be on linking key data sets to support automated integration of data for risk modeling with a goal to have a fully integrated view of wildfire mitigation activities by 2023.

5.3.7.1 Centralized Repository for Data

SCE has several systems in place to support day-to-day operations. SCE is currently implementing an integrated data platform that allows for data to be shared and utilized across programs and activities. This will facilitate more advanced analytics, visualization of data, and management of discrepant issues across the territory. SCE expects that it will steadily progress this capability over the next three years based on evolving needs and requirements. See Table SCE 5-11 for the current set of databases directly or indirectly in use that support the applications supporting the wildfire mitigation activities.

Table SCE 5-11
Databases Supporting Wildfire Activities

Database Name	Database Description	Access	Governance	Existing/New
SAP – EAM	Master Datastore for all SCE Assets and work management transactions.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing
Outage Management System (OMS)	SCE's system to manage planned and unplanned outages to SCE's electrical grid.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing
Outage Database and Reliability Metrics System (ODRM)	Tracks distribution, substation, and transmission unplanned outages that affect a single line transformer or more on SCE's grid.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing
Operational Data Store (ODS) – Comprehensive Geographic information	The ODS is a data store model which contains spatial, non-spatial data from the various	Authentication and Authorization access is managed using SCE's enterprise	Any changes to this system are done by authorized users only and audited and tracked	Existing

Database Name	Database Description	Access	Governance	Existing/New
System (CGIS) Applications	source systems like map3d, GESW, SAP, CS	ticketing system and implemented based on roles-based access.	using in-built data base features and /or supporting processes.	
Distribution Circuit Mapping Application - GE Small World	The GE Smallworld application is currently used to maintain circuit schematic information of the distribution system and support SCE's OMS	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes.	Existing
Atmospheric Data Solutions Weather Database (ADS)	High Performance Computing Clusters (HPCCs) are used to help model the atmosphere and fuel conditions across SCE's HFRA for PSPS and other applications.	Authentication and Authorization access is managed using SCE's enterprise ticketing system.	This system is maintained by ADS and SCE business teams have access to reports generated by ADS.	New
Consolidated Mobile Solutions	CMS is an integrated mobile work management system with mobile GIS mapping, Global Positioning System guided navigation and automated vehicle location/ tracking.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing/ Enhancements

Database Name	Database Description	Access	Governance	Existing/New
AGOL – High Fire Risk Informed Inspections (HFRI)	Mobile apps and web apps and dashboard developed on AGOL to support HFRI for identified assets in SCE's HFRA.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	New
AGOL – Vegetation Management	Mobile Apps and Web apps and dashboard developed on AGOL to support Vegetation Management.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	New
AGOL – PSPS Applications	Mobile Apps and Web apps and dashboard developed on AGOL to support PSPS Activities.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	New
MS – Azure Aerial Inspections Database	Azure data store is being used to store all the images/videos captured as part of Aerial Inspections.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or	New

Database Name	Database Description	Access	Governance	Existing/New
		based on roles-based access.	supporting processes	
Local on-prem Image Storage	Local servers are being used to carry out inspections of all the images captured.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	New
SharePoint Repository	Repository for documentation, processes and procedures storage.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes.	Existing/ Enhancements
Weather Data Mart - Enterprise Data Warehouse (Hadoop)	Weather data mart is being used to store all weather datasets procured for forecasting purposes; weather forecasts are also stored in this data mart.	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on access-based roles.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing / Enhancements
Electronic Data Management / Record System (EDMRM)	Storage for records and documents associated with	Authentication and Authorization access is	Any changes to this system are done by authorized users	Existing

Database Name	Database Description	Access	Governance	Existing/New
	notifications / work orders and assets.	managed using SCE's enterprise ticketing system and implemented based on roles-based access.	only and audited and tracked using in-built data base features and /or supporting processes	

5.3.7.2 Collaborative Research on Utility Ignition and/or Wildfire

SCE seeks to leverage all resources and innovations available to support the WMP. This includes collaborating with academic institutions and benefitting from their knowledge and resources. The following are examples:

Distribution Fault Anticipation: In collaboration with Texas A&M, SCE installed distribution fault anticipation (DFA) devices in substations, which then transmit circuit data, specifically voltage and current, in the form of grid events through the LTE network (wireless communications network). The transmitted information is stored on a secure server which is accessible to both SCE and Texas A&M authorized personnel. Texas A&M assists SCE in performing an initial evaluation of grid events captured by DFA devices, as well as providing recommendations if the DFA devices do not provide a clear diagnostic of the grid event. SCE would then validate, perform field inspections and provide remediation recommendations. For more information on DFA, see Section 5.3.2.2.1.

High Definition Cameras: SCE partnered with the University of California, San Diego (UCSD) and the University of Nevada, Reno (UNR) to procure, install and maintain pan-tilt-zoom HD cameras at up to 80 locations. UCSD and UNR served as technical, research, and execution partners for the deployment of the HD cameras. SCE also worked with local and state fire agency personnel to support deployment and will continue to incorporate impacted fire agencies throughout SCE's HFRA to provide HD camera live feeds. This information is critical to fire agencies for effectively deploying air and ground resources to limit and contain fires in the early stages. SCE will continue to collaborate with UCSD on an ongoing basis. For more information on HD Cameras, see Section 5.1.2.

5.3.7.3 Documentation and Disclosure of Wildfire-Related Data and Algorithms

Ignition Probability Models:

SCE has developed predictive reliability models for selected major distribution system assets, including transformers, poles, overhead conductors, underground primary cables and overhead and underground switches. The process of proactively replacing equipment that is most likely to fail in-service is referred to as predictive maintenance. The objective of predictive reliability analysis is to improve system reliability performance by applying analytics to better identify and predict equipment failures at an individual asset-basis and partner with execution organizations

in creating processes to cost-effectively and strategically implement these benefits.

An extensive series of input variables was used to develop predictive models. Table SCE 5-12 shows the sources used for generation of the Ignition Probability Model. The output from the Ignition Probability model(s) is stored in the Critical Business Folder in a cloud-based repository. Authentication and authorization access to this store is managed using a standard defined approval process, and changes and updates to these are tracked using standard SharePoint tracking features.

Table SCE 5-12
Ignition Probability Model Data Sources

Database Name	Database Description
Repair Orders (RO)	Detail incident description. Material list, incident site picture, incident date, "from" and "to" structure, load off/on, crew type.
EMap/Eworld Database	This database has SCE circuit map information.
Facilities Inventory Mapping (FIM) Database	This database has map-based inventory of SCE assets.
Environmental Data. (California Department of Water Resources.)	Soil chemistry, soil composition, water table and groundwater data.
Enterprise Data Warehouse (Hadoop)	This database is used to store the usage data collected from all the meters.
SAP – EAM/HCM	Master datastore for all SCE assets and work management transactions.
OMS - Outage Management System	SCE's system to manage planned and unplanned outages on SCE's electrical grid.
ODRM - Outage Database and Reliability Metrics System	Tracks distribution, substation, and transmission unplanned outages that affect one or more line transformers on SCE's grid.
ODS - CGIS Applications	The ODS (Operational Data Store) is a data store model which contains spatial, non-spatial data from the various source systems like Map3D, GESW, SAP, CS
Distribution Circuit Mapping Application - GE Smallworld	The GE Smallworld application is currently used to maintain circuit schematic information of the distribution system and support SCE's Outage Management System

Consequence Model:

Table SCE 5-13 contains the different data sources used to generate the consequence models that are used in addition to the Ignition Probability to arrive at the overall asset risk score. The output from the consequence models are stored in SharePoint. Authentication and authorization access to this store is managed using a standard defined approval process, and changes and

updates to these are tracked using standard SharePoint tracking features.

Table SCE 5-13
Consequence Model Data Sources

Database Name	Database Description
CPAD_2018a_Units.shp - All parks (National, State, Local) in California, California Department of Conservation	This dataset provides polygon locations of all registered parks and recreation zones in Ca, listed by description of park name and agency supervising the parcel.
Formulas_PopData.xlsx -	This dataset provides latitude and longitude coordinates of manholes and vaults under SCE control, with corresponding census demographic information and description of the location.
Wells_All.shp - Oil/Natural Gas wells in Ca, California Department of Conservation	This dataset provides point location and other data (Operator, lease, well number, etc.) for nearly 200,000 oil and gas wells in California.
Home Prices - Zip code averages of Zillow, Realtor.com & Redfin median house price databases	This dataset provides the list of median home prices by zip code according to three different comprehensive real estate databases (highlight the challenge of the county assessor's offices).
CA schools - List of all public and private schools in Ca, California Dept. of Education's Public Schools	This dataset provides the locations of public and private schools in California. The data comes from the California Dept. of Education's Public Schools.
Census Data 2017 Med HH Income - US Census Bureau	This dataset contains the median household income for all counties in the state of California.
300m x 300m grid squares developed from Reax fire perimeter grid	This dataset has the fire perimeter grids for SCE territory.
California_BlockGroup_Pop_Households_2018 - US Census Bureau	This dataset contains the List of all California Census Block populations & corresponding number of households.
Fire stations - Lighthouse Database, US Department of Homeland Security, California	This data set contains the Fire Stations in the United States. Any location where fire fighters are stationed or based out of, or where equipment that such personnel use in carrying out their jobs is stored for ready use. Fire Departments not having a permanent location are included, in which case their

Database Name	Database Description
	location has been depicted at the city/town hall or at the center of their service area if a city/town hall does not exist. This dataset includes those locations primarily engaged in forest or grasslands firefighting, including fire lookout towers if the towers are in current use for fire protection purposes.
Active Business Dataset Listing of Active Businesses, City of Los Angeles.	This dataset Contains the listing of all active businesses currently registered with the Office of Finance. An "active" business is defined as a registered business whose owner has not notified the Office of Finance of a cease of business operations.
Hospitals Dataset California Health and Human Services ca-oshpd-gachospital-building-05022019 (Hospitals),	This dataset contains the list of all hospital GIS locations in the state of California.
Buildings Dataset List Buildings2_cleaned.csv Buildings_Cleaned_Parsed_3	This dataset contains the 125,192,184 building footprint polygon geometries in all 50 US States in GeoJSON format.
Social Vulnerability Index SoVI_2010_CA - Social Vulnerability Index,	This dataset contains the Social Vulnerability Index (SoVI®) 2010-14 measures the social vulnerability of U.S. counties to environmental hazards.
EGRESS (From workflow EGRESSV3_AVGfirearea --Reax & Tom-Tom GPS	This dataset has the Tom-Tom drive times measured from the center of grid blocks to create 30-minute drive time areas in square kilometers that showed, during peak hours, the max distance a population would be able to drive in every direction.

5.3.7.4 Tracking and Analysis of Near Miss Data

Table SCE 5-14 contains the different data sources used to track and analyze near miss data. SCE tracks all outages and causes based on information provided from the field and stores that data in its outage management database. SCE cross references these outages with operational data from system events such as relay operations to determine which conductor failures led to a wire down event. SCE used these data sources along with SAP, CPUC reportable ignition data to populate and track the "Number of incidents per year (faults)" and near misses.

Table SCE 5-14
Data Sources to Track and Analyze Near Miss Data

Database Name	Database Description	Access	Governance	Existing/New
Wire Down Database	Wire downs are based on wire down calls and repair orders across the entire SCE service territory where the following types of wire are reported down: -Primary -Secondary -Service drop -Transmission -Sub-transmission Any wire that is considered a risk to the public due to being on the ground or within eight feet of the ground is considered a wire down	Authentication and Authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access.	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing
CPUC Reportable Initiations	Excel file for reporting Fire events meeting the CPUC Reportable criteria	Access granted by SharePoint Site owners	Any changes to this SharePoint / Folders are done by authorized users only	Existing
ODRM	Tracks distribution, substation, and transmission unplanned outages that affect a single line transformer or more on SCE's grid	Authentication and authorization access is managed using SCE's enterprise ticketing system and implemented based on roles-based access	Any changes to this system are done by authorized users only and audited and tracked using in-built data base features and /or supporting processes	Existing

See Table 27 "Data governance" for more detail on the initiatives above.

5.3.8 Resource Allocation Methodology

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description of the utility's initiatives, the utility's rationale behind each of the elements of the initiatives, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each initiative, how the utility plans to demonstrate over time whether each component of the initiatives is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds.

Include descriptions across each of the following resource allocation methodology and sensitivities initiatives, including a description of the data flow into the calculations involved in each. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell in the row.

1. *Allocation methodology development and application*
2. *Risk reduction scenario development and analysis*
3. *Risk spend efficiency analysis*
4. *Other / not listed [only if an initiative cannot feasibly be classified within those listed above]*

The list provided is non-exhaustive and utilities shall add additional initiatives to this table as their individual programs are designed and structured. Do not create a new initiative if the utility's initiatives can be classified under a provided initiative

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5.3.8.1 Allocation methodology development and application

Resource allocation involves careful consideration and distribution of both human and financial resources across SCE's efforts towards minimizing the risk of its equipment or facilities causing wildfires. SCE has an internal allocation and planning process that governs and allocates capital across the various organizational units. This process is continuous and requires input and development at all levels of the company, including organizational unit management, SCE senior management, and the Board of Directors. In addition, key projects and programs are reviewed with senior leadership before funds are budgeted or spent. SCE undertakes these efforts to prudently distribute resources to address the safety, reliability and affordability of electric services and minimize the risks inherent in its business. Through the capital allocation process, SCE strives to make sure that customer dollars are spent effectively and efficiently and that its rates do not become unaffordable for customers, taking into consideration the value that SCE's work and investments provide to them. SCE typically develops forecasts for the prospective five-year period. The most granularity and confidence in this forecast exists in the next year's plan, while the outer years (years 2-5) provide directional guidance based on what is known at the time of the plan's development.

SCE continually monitors and, where necessary, adjusts short- and long-term plans for resource allocation and prioritization of work. SCE reviews whether resource plans are working effectively, and whether any adjustments to the plans are needed to improve the overall allocation methodologies used. As labor markets, environmental conditions, and other externalities change over time, and as SCE continues to refine its understanding of mitigation effectiveness, SCE will continue to adjust resourcing plans to help ensure effective allocation of human and financial resources.

There are constraints on how the amount of work that can be performed based on the availability of SCE workers (both SCE employees and contractors) to plan, design, engineer, and implement this work. In allocating resources, SCE must consider both the availability of and impacts to both financial and human resources. SCE also considers risk reduction, other execution constraints, and customer impacts while allocating financial resources. Execution capacity is constrained by mitigation cycle times, permit approvals, extreme weather, and other factors. SCE also considers customer fatigue, with respect to outages, and its impacts when allocating work.

Considering the work required to maintain and operate the electric system, and the need to immediately and substantially address wildfire risk, SCE undertook an effort to examine how SCE could modify the allocation of resources to rapidly and effectively deploy wildfire mitigation programs. SCE found that, in many cases, the same resources that are required to support wildfire mitigation activities are responsible for implementing SCE's traditional infrastructure replacement work. These resources are finite, and SCE faces real resource constraints. After assessing overall grid and societal needs, and in light of resource constraints, SCE made a conscious decision to pursue important system augmentation, infrastructure replacement, and load growth activities[14] at a slower pace for the near future during the next few years in order to divert necessary resources to implement higher safety risk reduction wildfire mitigation work. SCE is mindful of its responsibility as stewards of customer funding and has put forward a request in its 2021 GRC that provides significant immediate and longer-term value while maintaining affordability for customers.[15] SCE performed a risk analysis to evaluate the public safety impacts of shifting resources from traditional infrastructure replacement programs to wildfire mitigation work. This analysis shows that the safety benefit gained through the enhanced portfolio of wildfire mitigations exceeds the safety reduction in other risk initiatives, specifically contact with overhead conductor and underground equipment failure risks (which are further described in

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[14] Programs pursued at a slower pace (or deferred) to allow SCE to complete wildfire mitigation activities include, but are not limited to, Distribution Automation, 4 kV Cutovers, and Worst Circuit Rehabilitation.

[15] SCE discusses this resource re-allocation effort in its 2021 GRC Application and testimonies. *See* generally, *Test Year 2021 General Rate Case Amended Application of Southern California Edison Company* (U 338-E) (November 7, 2019), http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M319/K752/319752951.PDF.

SCE's 2018 RAMP Report). The methodology and summary of results can be found in SCE's 2021 GRC.[16]

5.3.8.2 Risk Reduction Scenario Development and Analysis

As discussed in Section 4.3, SCE's WRM quantifies wildfire risk at a granular level (i.e., down to specific circuits and circuit segments across the HFRA). It enables SCE to identify potential high-risk circuits and segments where mitigation considerations, such as covered conductor, targeted undergrounding, equipment replacement, or other strategies may be considered. At this point in time, while the wildfire risk model is effective for identifying granular risk scores across circuits and segments to assist in mitigation selection, it is not being used to generate mitigation effectiveness or financial scores. It is important to note that the relative risk ranking of circuits can and probably will change over time as SCE continues to evolve its risk modeling capabilities.

In general, SCE looks to first address those circuit segments and circuits which present the greatest risk. However, SCE will often bundle work related to multiple and/or contiguous circuit segments together to achieve operational efficiencies. For example, the risk associated with each circuit may not be uniform along its length: the risk can vary between a specific mile or segment within a circuit, especially if that circuit traverses various HFTD Tiers and is exposed to different probabilities of ignition by contact from objects, or varying topography and vegetation that can influence fire propagation and consequence. In some cases, it may be operationally efficient and prudent to remediate relatively lower risk segments of a circuit at the same time relatively higher risk segments of the same circuit are addressed, instead of sending multiple crews out at multiple different times, requiring the development of separate work scope packages.

5.3.8.3 Risk Spend Efficiency Analysis

SCE's Enterprise Risk Management group develops RSEs in conjunction with the SCE business units that will implement the mitigations. For a description of how RSEs are developed, please see Section 5.3.1.4. In the near and long term, SCE will look for ways to refine and improve its RSE development process.

Although included in SCE's 2020-2022 WMP, RSEs are not, and should not, be the only factor used to develop a risk mitigation plan. The RSE metric does not take into account certain operational realities, resource constraints, and other factors that SCE must consider in the development of its plan. For example, while PSPS has a relatively high RSE, there are regulatory and practical limits to how much PSPS can be deployed. Indeed, the Commission prescribes that PSPS should be used "as a last resort" despite its relatively high RSE. The same is true for other mitigations presented in this testimony. As another example, while undergrounding overhead power lines may present a relatively high risk-reduction opportunity, it requires considerably

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[16] *See Workpapers, SCE-01, Vol. 02, General Rate Case, Risk Informed Strategy & Business Plan*, Wildfire Tradeoff Risk Analysis, pp. 44-46 (August 2019), http://www3.sce.com/sscc/law/dis/dbattach5e.nsf/0/4BAB5842B1920B888825846600789252/$FILE/WPSCE01V02.pdf.

more planning and lead time to implement than reconductoring using covered conductor. If SCE focused only on undergrounding its overhead system in HFRA, its ability to immediately reduce risk would be significantly delayed. In addition, for various operational and financial reasons, it is not practical to underground the entire transmission and distribution system in HFRA. Accordingly, SCE developed a comprehensive and balanced mitigation plan with activities that will collectively reduce the greatest amount of risk in the shortest amount of time, considering RSE as well as various regulatory, operational, resource, and cost constraints. It would be inappropriate to implement a comprehensive wildfire risk mitigation plan based solely on RSEs, which would likely lead to significant parts of the system and potentially significant risk issues left unaddressed.

Indeed, the Commission's SED agrees that focusing solely on RSEs in selecting mitigations could be "suboptimal from an aggregate risk portfolio standpoint"[17] in its comments relating to PG&E's 2017 RAMP Report. SED acknowledged that "mitigations are usually selected based on the highest RSE score unless there may be some identified resource constraints, compliance constraints, or operational constraints that may favor another candidate measure with a lower RSE."[18]

5.3.8.4 Organizational Support - PMO and OCM

Program Management Office

The PMO provides oversight for all wildfire mitigation activities. It is responsible for: (1) executing near-term actions to further mitigate increased wildfire risk; (2) developing enhancements to its operational plans for long-term wildfire, public safety, and related resiliency strategies; and (3) integrating SCE's wildfire mitigation strategies with existing programs, such as long-term capital planning, RAMP, GRC, and WMP In order to support these objectives, SCE augments its current staff to provide additional overall PMO support. Additionally, SCE will focus on risk analysis to provide additional analysis and expertise regarding program selection, sizing and prioritization.

The recent increase in wildfire risk drives an even stronger need to find means to reduce the cause of wildfires and enhance methods to detect and suppress them more quickly. In order to operationalize the most effective suite of mitigations, SCE is contracting with vendors that have specific expertise. The PMO requires additional skills and resources that are responsible for oversight of the entire portfolio. These resources ensure the overall strategy gets integrated into the global company's long-term plans, drive completion of regulatory requirements, and report

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17 California Public Utilities Commission, *Risk and Safety Aspects of Risk Assessment and Mitigation Phase Report of Pacific Gas and Electric Company, Investigation 17-11-003,* p. 18 (March 30, 2018), https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/Safety/Risk_Assessment/RCR/SED_RAMP_Evaluation_PGE_033018a.pdf

18 *Ibid.*

on the overall status of the program.

Organizational Change Management

Organizational Change Management (OCM) is a program focused on helping to identify and manage the effect of necessary changes to business processes, systems and tools, job roles, policies and procedures, and other areas that may have a corresponding impact to resources. SCE's OCM efforts primarily support its wildfire mitigation programs and is embedded both at the program level to oversee and coordinate across work streams, and at the work stream level to address more targeted/localized OCM efforts. OCM efforts include employee and other stakeholder communications, engagement, training, coaching, development, feedback, monitoring, and advocacy.

For SCE's wildfire mitigation efforts, the OCM work is needed to facilitate internal and external awareness, understanding, and knowledge of the many and varied changes resulting from the increased hardening and resiliency of the Company's grid and the safety of its employees, customers, and communities. Given the scope, scale, and complexity of change inherent in the wildfire mitigation programs, it is critical to embed OCM efforts into these activities and solutions to increase the likelihood of success of the programs' intended outcomes.

See Table 28 "Resource allocation methodology" for more detail on the items above.

5.3.9 Emergency Preparedness and Planning

Include a general description of the overall emergency preparedness and response plan, and detail:

1. A description of how plan is consistent with disaster and emergency preparedness plan prepared pursuant to Public Utilities Code Section 768.6, including:
a. Plans to prepare for and restore service, including workforce mobilization (including mutual aid and contractors) and prepositioning equipment and employees
b. Emergency communications, including community outreach, public awareness, and communications efforts before, during, and after a wildfire in English, Spanish, and the top three primary languages used in California other than English or Spanish, as determined by United States Census data
c. Showing that the utility has an adequate and trained workforce to promptly restore service after a major event, taking into account mutual aid and contractors

2. Customer support in emergencies, including protocols for compliance with requirements adopted by the CPUC regarding activities to support customers during and after a wildfire, including:

- *a. Outage reporting*
- *b. Support for low income customers*
- *c. Billing adjustments*
- *d. Deposit waivers*
- *e. Extended payment plans*
- *f. Suspension of disconnection and nonpayment fees*
- *g. Repair processing and timing*
- *h. Access to utility representatives*

3. Coordination with Public Safety Partners, such as stationing utility personnel in county Emergency Operations Centers

Describe utility efforts to identify which additional languages are in use within the utility's service territory, including plan to identify and mitigate language access challenges.

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description of the utility's initiatives, the utility's rationale behind each of the elements of the initiatives, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each initiative, how the utility plans to demonstrate over time whether each component of the initiatives is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds.

Include descriptions across each of the following initiatives. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell

in the row.
1. Adequate and trained workforce for service restoration
2. Community outreach, public awareness, and communications efforts
3. Customer support in emergencies
4. Disaster and emergency preparedness plan
5. Preparedness and planning for service restoration
6. Protocols in place to learn from wildfire events
7. Other / not listed [only if an initiative cannot feasibly be classified within those listed above]
The list provided is non-exhaustive and utilities shall add additional initiatives to this table as their individual programs are designed and structured. Do not create a new initiative if the utility's initiatives can be classified under a provided initiative.

By undertaking comprehensive planning efforts, SCE aims to minimize the impacts of emergencies on customers and communities. SCE's emergency preparedness and response plans are developed to streamline SCE's response efforts, inform critical actions and decision-making, determine roles and responsibilities of SCE IMT members, and maximize SCE's ability to respond and recover following any type of disruptive incident. They are based on both the National Incident Management System (NIMS) and the California-specific Standardized Emergency Management System (SEMS); as well as the ICS principles and protocols developed by the Federal Emergency Management Agency (FEMA). Plans are regularly reviewed, evaluated, and updated to maintain public and employee health and safety and to minimize damage to public property, private property, and SCE infrastructure.

Emergency communications, including community outreach, public awareness, and communications efforts before, during, and after a wildfire in English, Spanish, and the top three primary languages used in California other than English or Spanish, as determined by United States Census data:
SCE has a comprehensive plan for communicating with its customers during emergencies, especially during outages, which includes a schedule of notifications for repair (unplanned) outages and maintenance (scheduled) outages. Automated outbound notifications are sent to customers via the customer's preferred method of contact (such as email and text message) when an outage occurs, as outage restoration times are determined or shifted, and upon conclusion of the outage. For maintenance outages, SCE provides advanced notice to customers at least three days prior to the outage, but usually up to two weeks prior. SCE provides an automated reminder call twenty-four hours ahead of the scheduled outage and SCE's Outage Map on SCE.com provides customers with outage information in their service location.

SCE enhanced its emergency communication plans following the 2017 wildfires to build awareness about the importance of wildfire mitigation and provide information about the critical work that SCE is undertaking in HFRA. SCE added proactive communications and education about wildfire and emergency preparedness as well as communications and awareness during and following wildfire events. For example, as part of its Grid Safety and Resiliency Program (GSRP), SCE implemented Phase One of its new Emergency Outage Notification System (EONS) in Fall

2018. This new system has the capability to execute high-volume notifications within very short timeframes, enabling SCE to reach a large number of customers in areas potentially subject to PSPS. SCE also added options for those who are not an SCE account holder or a customer of record to receive outage notifications by registering for alerts and notifications at a zip code level for PSPS events. Residents who are not the customer of record, such as those in a master-metered community, but who may know the name on the SCE account and the service address, can sign up for alerts and notifications (related to pre-planned maintenance and emergency outages) for that specific address on SCE's website. In 2020, SCE will launch a targeted campaign to its master-metered properties that will provide information about PSPS events and how to sign up for alerts and notifications and will direct customers to SCE's website to learn more about SCE's wildfire mitigation activities, PSPS and consumer protections from disasters.

On SCE's website (SCE.com), customers can find content about SCE's wildfire mitigation efforts, learn tips for how to become more resilient during major events and receive up-to-date information regarding PSPS in their area. Radio, digital banners/videos and social media ads also drive visitors to sce.com for more information. SCE also maintains a toll-free (1-800) phone line staffed with trained personnel in SCE's customer contact center who receive calls from impacted customers as a priority.

Showing that the utility has an adequate and trained workforce to promptly restore service after a major event, taking into account both mutual aid and contractors

SCE maintains an adequate and trained workforce to assist during emergencies. In addition to the Storm Plan, which guides SCE's response to emergencies of varying scopes and sizes, SCE delivers a robust ICS training FEMA-based program that follows the NIMS model for employees identified as IMT members. SCE has trained approximately 600 employees to-date. SCE maintains a large, highly skilled field workforce (both employees and contractors) to provide effective emergency response and restore service during and after a major event. SCE also uses contract resources that can be reassigned to assist with a major event. SCE's existing mutual assistance agreements are activated in situations where the response exceeds the capacity of SCE's crews and emergency contracting capabilities.

Trained employees are placed into Incident Management Teams (IMTs). While on-call, they are required to report to the Emergency Operations Center (EOC) to coordinate incident response within two hours, with limited exceptions. IMTs are rotated and are specifically designed to have multiple back-ups, so that response and recovery efforts can be conducted 24 hours a day for several days or even weeks. The IMT maintains visibility into any staffing shortages or workforce incidents during these events and may request appropriate support via additional internal staffing, emergency contracts, or mutual assistance. These requirements are captured in SCE's Storm Plan.

IMT and EOC capabilities are tested regularly through real-world incidents—such as windstorms, wildfires, and PSPS—and exercises and drills. During exercises and drills, team members are evaluated on their performance and given real-time feedback on areas for improvement and best practices.

Customer support in emergencies, including protocols for compliance with requirements adopted by the CPUC regarding activities to support customers during and after a wildfire:
SCE makes every effort to raise customer awareness about the protections SCE can offer them should they be impacted by wildfires and other disasters as detailed below:

- Access to outage reporting and emergency communications
    - SCE uses best practices to ensure all customer information is current so that customers can receive the most up-to-date information regarding outage and emergency communications and to ensure that resources are available for reporting outages.
- Support for low-income customers
    - Ensuring all impacted customers enrolled in CARE/FERA have their accounts flagged as impacted to automatically prevent annual verifications and high usage verifications from executing.
- Billing adjustments
    - Ensuring all identified impacted customer accounts do not receive estimations and daily minimum charges are halted/adjusted
- Deposit waivers
    - Ensuring all impacted customer accounts do not automatically, or manually, receive deposit requirements
- Extended payment plans
    - Working with impacted customers to provide extended payment plans through recovery from incident
- Suspension of disconnection and nonpayment fees
    - Ensuring all impacted customer accounts are not sent for disconnection due to non-payment, eliminating assessment of non-payment fees
- Repair processing and timing
    - Ensuring access to local planning resources to assist with expediting SCE support for rebuilding and providing up to date information about restoration timing both through contact center and web for impacted customers
- Access to utility representatives
    - Directing resources to local assistance centers and other events to provide in-person support following events to assist with information and consumer protections

5.3.9.1 Adequate and trained workforce for service restoration: SCE Emergency Responder Training (DEP-2)

SCE maintains a large, highly skilled field workforce (both employees and contractors) to restore service during and after a major event. All of SCE's Troublemen, Senior Patrolmen and Journeyman Lineman received training on SCE's 2019 Wildfire Mitigation Plan, changes to SOB 322 in 2019, roles and responsibilities of IMT team and PSPS activation criteria. In addition to the background information, the training covered T&D field personnel's involvement in the PSPS process which included specific patrolling scenarios and responsibilities. Field personnel with wildfire response and de-energization responsibilities were required to undertake additional

training on their roles and responsibilities as they relate specifically to PSPS.
Newly identified field personnel will be required to complete trainings in PSPS protocols. Existing QEWs will be required to participate in updated PSPS trainings to keep apprised of any changes to plans and protocols.

SCE continues to evaluate its emergency response staffing capabilities and may continue to identify and train more personnel to help support company efforts during and after an incident. SCE also utilizes a mutual assistance program to help effectively respond to and restore power following complex and/or large incidents. Assistance can be received or supplied in the form of personnel, equipment, materials, and other associated services. SCE is currently a party to the following mutual assistance agreements, which provide a mechanism to quickly obtain or supply emergency assistance prior to, during, or after an incident that affects SCE facilities:

- California Utilities Emergency Association (CUEA) among California utilities
- Western Region Mutual Assistance Agreement for Electric Utilities (WRMAG), a regional agreement
- Edison Electric Institute (EEI), a national mutual assistance program

These mutual assistance agreements are standardized across utilities and articulate specific requirements and authorizations to receive or deploy crews. SCE regularly participates in mutual assistance calls, planning efforts, and coordinating body meetings, and has provided mutual assistance to other utilities in large-scale emergencies.

In addition to a trained SCE workforce and mutual assistance agreements, SCE can utilize contractors to assist in restoring service following a major incident, including wildfires. Additional contractor resources can be quickly on-boarded if required. All contracts have provisions to facilitate requests for immediate emergent support to restore power following complex and/or large incidents throughout SCE's service territory. Many of SCE's contractor partners have a national and international presence and can bring in additional resources and support from their other operating areas upon request.

SCE also maintains a trained workforce to assist during emergencies. SCE delivers a training FEMA-based program that follows the NIMS model for employees identified as IMT members. Trained employees are placed into IMTs and while on-call, they are required to report to the Emergency Operations Center (EOC) to coordinate incident response within two hours, with limited exceptions. IMTs are rotated and are specifically designed to have multiple back-ups, so that response and recovery efforts can be conducted 24 hours a day for several days or even weeks. The IMT maintains visibility into any staffing shortages or workforce incidents during these events and may request appropriate support via additional internal staffing, emergency contracts, or mutual assistance. These requirements are captured in SCE's Storm Plan.
IMT and EOC capabilities are tested regularly through real-world incidents—such as windstorms, wildfires, and PSPS—and exercises and drills. During exercises and drills, team members are evaluated on their performance and given real-time feedback on areas for improvement and best practices. In 2020 through 2022, SCE will continue training existing and new IMT members and evaluate staffing levels and needs.

5.3.9.2 Community outreach, public awareness, and communications efforts (DEP-1.1, DEP-1.2, DEP-1.3, DEP-3, DEP-4)

SCE conducted extensive community outreach to increase public awareness of emergency planning and preparedness information in 2019. For example, SCE sent over one million letters to customer accounts targeting customers residing in HFRA. The focus of the letter included details on SCE's wildfire mitigation efforts, PSPS protocols, emergency preparedness tips, and guidance on where to go for more information. SCE also conducted a digital and radio campaign to inform all customers about PSPS, SCE's wildfire mitigation work and how customers can enhance their emergency preparedness. In 2020, SCE plans to send approximately 915,000 letters with information about PSPS, emergency preparedness, and SCE's wildfire mitigation plan to customer accounts in HFRA and approximately 3,200,000 letters to customer accounts in non-HFRA.

In 2019, SCE met with cities, counties, and tribes to review SCE's 2019 WMP and PSPS protocols. SCE also made presentations to city councils, boards of supervisors, community-based organizations, and other forums. SCE hosted community meetings throughout the its service territory from June through November 2019 to raise awareness of SCE's 2019 WMP and PSPS protocols. SCE mailed invitations to nearly 260,000 customers in SCE's HFRA and sent emails or utilized social media to invite customers to attend the community meetings.

In 2020, SCE plans to hold 8-12 community meetings primarily in areas that were impacted by multiple PSPS de-energization events in 2019 to share information about PSPS, emergency preparedness, and SCE's wildfire mitigation plan. SCE will also participate in community-based organization and other third-party meetings. To help evaluate the success of these meetings, SCE employees will provide a post-meeting questionnaire for attendees requesting feedback. In addition, SCE staff immediately debriefs for lessons learned and corrective actions after the meetings. The input from the surveys and debrief meetings are used to improve community engagement and outreach efforts going forward.

SCE will also host resiliency workshops to assist non-residential customers in making their facilities more resilient. Initial workshops will be held with small water agencies and then other customer segments to follow. The workshops highlight lessons learned from other customers and highlight resources that would be available to assist customers in their resiliency efforts.

SCE's customer research and education strategy, which aligns with the statewide campaign mentioned in the IOU Customer Engagement discussion under customer outreach, includes focus groups and customer surveys that inform SCE's approach to educating and supporting customers around wildfire mitigation activities and PSPS events.

During 2020-2022, SCE will continue to promote wildfire and resiliency awareness through several channels including direct mail, web-based messaging, and digital media. In 2020, SCE's marketing campaign expects to reach approximately 5,000,000 customer accounts to inform about the purpose of PSPS, emergency preparedness, and SCE's wildfire mitigation plan. The company will regularly engage local governments, tribal staff and first responders about SCE's

WMP, the PSPS de-energization process, and how SCE will communicate and work with government agencies, public safety partners and emergency responders during outages. Members of SCE's HFRA communities will hear firsthand at these meetings from SCE staff and other community leaders or agencies about fire risk in California and the implications for them, how to be prepared and remain resilient, and information about SCE's wildfire mitigation efforts. Community members will also have an opportunity to share their questions and concerns. SCE is exploring virtual community meetings to increase the reach of these discussions. SCE will continue to participate in meetings hosted by third parties, such as local governments, to discuss its WMP and PSPS protocol. SCE will also engage with county emergency managers to prepare for the fire season, and review PSPS activations for opportunities to improve its PSPS protocols.

To ensure that messages do not conflict and attention is focused appropriately on safety imperatives, information and resources, SCE will align its local outreach campaign with PSPS education campaigns airing statewide in conjunction with the other two large electric Investor-Owned Utilities (IOUs) and California Governor's Office of Emergency Services (Cal OES). The IOU Customer Engagement effort is a multi-channel, multi-lingual campaign using digital ads, social media ads and radio ads to provide customers with important and consistent messaging about wildfire mitigation activities happening across the state.

In addition to community outreach efforts to inform its customers, SCE increased efforts to obtain direct feedback from customers about their outage experiences and their recommendations to better prepare customers for such events. The information gathered from these activities have led to focused efforts to address customer needs based on unique usage profiles. The information is also used in the implementation of long-term solutions that promote self-sufficiency and resiliency. In 2020-2022, SCE will continue to develop and implement various research activities that gauge customer awareness, preparedness for, and satisfaction with outage experiences. These activities include, but are not limited to:

1. Town hall meetings in areas that have been highly impacted by WMP/PSPS outages
2. On-line and telephone surveys of both residential and business customers who have had WMP/PSPS outages
3. Focus groups with key populations to identify how outages impact their day-to-day functionality and how they manage during outages
4. Assessments of programs and services that have been designed to better prepare customers before outages, and provide support during these outage events

During this period, SCE will use year-over-year performance data to establish a benchmark of current activities and long-term goals for facilitating customer preparedness. SCE will use the data to explore additional programs and services that support customer resiliency. SCE will monitor the performance of the programs and services that result from its research and education activities by using performance metrics for outage satisfaction and tracking the changes in outage awareness and customer satisfaction with implemented support services.

Longer term, SCE will employ a similar strategy to the one described above, reaching out to all

local governments and tribes in SCE's HFRA to provide updates on the WMP and updates to its PSPS protocols. The meetings provide an opportunity for SCE to learn about ways to improve how the company interacts with local governments and tribes during PSPS and other emergency incidents. SCE will continue its engagement with County Emergency Operational Areas so that local government emergency response officials are aware of the PSPS protocol and can continue to work together with SCE to improving collaboration during PSPS events and other emergencies.

5.3.9.3 Customer support in emergencies

As described earlier in this section and in Section 5.3.6.7, SCE implemented EONS in 2019 to execute high-volume targeted notifications within very short timeframes, enabling SCE to reach a large number of customers in areas potentially subject to PSPS. SCE also developed a process to utilize this technology for customers impacted by disasters and inform of SCE's offerings and provide recovery support. In the fourth quarter of 2019, SCE enhanced EONS' capabilities to expand in-language notifications based on customer preference including, but not limited to, Spanish, Tagalog and Chinese.

SCE also enhanced notification plans to include options for those who are not an SCE account holder or customer of record to receive outage notifications, by implementing a registration for alerts and notifications at a zip code level. Also, residents who are not the customer of record (such as those in a master-metered community) but know the name on the SCE account and the service address for their specific address can sign up for emergency SCE alerts and notifications. SCE updated its annual master-metered letter to inform property owners (i.e., SCE account holders) of the options available to their tenants, which can be posted in community areas for awareness to these populations of customers.

SCE's long-term strategy will focus on continual improvement in areas that aim to increase customers' awareness before, during and following emergencies. SCE will work to improve customers' knowledge of the program offerings available and ensure customers receive critical notifications when emergencies arise. SCE will also emphasize reaching customers throughout the service territory. SCE is launching a targeted campaign to its master-metered properties that will provide information regarding PSPS events, instruct on how to sign up for alerts and notifications and direct customers to SCE's website to learn more about SCE's activities, PSPS and consumer protections from disasters.

5.3.9.4 Disaster and emergency preparedness plan

SCE regularly maintains disaster and emergency preparedness plans, which serve as the foundation for IMT training, exercise and response activities designed to facilitate a rapid return to continuity of operations. Among these plans are the Wildfire Response Plan that contains PSPS protocols and the tasks associated with execution in the IMT structure. Plans are regularly tested via simulation exercises and real-world events to ensure IMT members' proficiency in roles and responsibilities. These events also allow SCE to better understand resource needs during response operations, such as the number of personnel needed to execute emergency functions and restoration during PSPS events.

The Storm Plan articulates the operations and policies that guide how the company plans for, addresses and responds to emergency electrical incidents using the utility-specific ICS structure. It is designed to facilitate safe and efficient restoration of outages caused by outside forces, through the development of accurate situational awareness and the sharing of critical information during an incident. The Storm Plan outlines the communications strategy and notification procedures by which SCE will communicate with its customers, the public, appropriate government agencies, essential service providers, critical care customers, and other important stakeholders in the restoration process. It also outlines how SCE will collaborate with the communities it serves in preparing for and responding to emergency events, which may include activities such as pre-positioning of field resources or equipment in advance of forecasted weather events.

The Wildfire Response Plan outlines a threat specific strategy aimed at mitigating, planning for, responding to and recovering from an actual wildfire event, as well as a potential fire event with the possible need for pro-active de-energization through use of the PSPS protocol. It outlines the roles and responsibilities for the company leadership and incident response personnel across the enterprise during response operations.

To ensure effectiveness, components of SCE's disaster and emergency plans are regularly quality checked and periodically audited. For example, each real-world and simulation exercise is required to have an After Action/Corrective Action plan for all issues identified over the course of the incident. SCE tracks these for completion and incorporates all lessons learned into existing plans and protocols through regular updates to its disaster and emergency plans. SCE maintains both an annual plans maintenance schedule and a training/exercise calendar to facilitate syncing plan updates with lessons learned from existing trainings and exercises. SCE's long-term disaster and emergency plans will continue to be regularly updated to incorporate additional regulations and identified corrective actions and maturity models.

SCE also actively engages key stakeholders in conjunction with maintaining its disaster and emergency preparedness plans. As previously described in Section 5.3.6 Grid Operations and Protocols, in the event of a PSPS activation, SCE will coordinate with local emergency management agencies and employ a variety of targeted communication channels to ensure customers are notified in a timely manner. Also, in Section 5.6.2, SCE describes engagement with public safety partners, including fire and law enforcement agencies, to collaborate on mitigation strategies and event protocols, as well as outreach efforts to water agencies, telecommunications companies, and healthcare providers to educate them on PSPS protocols and potential impacts.

5.3.9.5 Preparedness and planning for service restoration

SCE provides its employees with the tools, plans, guidelines, and strategies to help ensure smooth and rapid re-energization. SCE increases resiliency by training employees to handle PSPS events weeks and even months in advance. During and before an event, the IMT briefs local field personnel on circuits that have a potential of being de-energized for PSPS. Existing SAP repair notifications are given to the local field personnel ahead of the activation to help remediate on

those circuits before the wind event begins. If a circuit is nearing the de-energization criteria, SCE reviews switching plans to assess how the de-energizations can be the least impactful to the customers, while still isolating the area of concern. These switching plans are also used when the circuits are being re-energized. Once circuits have de-escalated from PSPS criteria, the circuits are prioritized by the restoration teams to be patrolled and re-energized in a strategic fashion. Restoration teams have the expertise to assess whether additional resources are needed to re-energize a circuit faster, especially in the hard-to-reach circuits, by proactively requesting air operations to aid in the patrolling of de-energized lines. As the lines are being patrolled and monitored for re-energization, SCE maintains clear communications with all the affected departments.

In 2019, SCE significantly improved the consistency, rapidity, and reliability of the re-energization process, by developing De-energization and Re-energization protocols specific to use of the PSPS. De-energization protocols ensure that all groups are notified of the pending de-energization, that steps are documented and verified and that the proper managerial approvals have been obtained. Similarly, re-energization protocols ensure that all those affected are notified that a circuit is in the process of being restored, as well as having the steps documented, verified and approved by management. These protocols include circuit-specific switching plans created prior to the event, which save the teams time in both de-energizing circuits and re-energizing them. For 2020 to 2022, and in the longer term, SCE will continue to focus on opportunities to improve restoration by exploring new tools and technologies that support the IMT and field staff with restoration efforts.

To ensure compliance, SCE will establish the following audit measures. SCE plans on performing a quarterly audit to confirm Consolidated Mobile Solution (CMS), Circuit Maps, and Geographical Information System (GIS) Circuit Geometries match. SCE also plans on reviewing the de-energization and re-energization forms after an event to ensure that they are being completed correctly and to identify any potential areas of improvement to the form or personnel training.

5.3.9.6 Protocols in place to learn from wildfire events

Following every wildfire or PSPS EOC activation, SCE conducts a debriefing of response participants to solicit feedback and lessons learned. This feedback is incorporated into an After-Action Report (AAR), which includes an Improvement Plan or a Corrective Action Plan. SCE maintains a robust after-action process for all IMT activations, regardless of hazard. These protocols have been successful in ensuring that strengths and successes during activations are replicated across future incidents. SCE will use AARs to assess areas for improvement, turn these areas into corrective actions, and assign actions to personnel to remediate.

In 2019, AARs were completed for all IMT activations, including those related to wildfires or PSPS. These AARs have been successfully utilized to describe and assign necessary corrective actions and ensure the continuous improvement of SCE preparedness and response efforts.

SCE plans to continue utilizing these protocols and processes in order to assign corrective actions and continuously improve. Currently, there are no plans to change the processes or procedures for developing AARs or corrective actions.

See Table 29 “Emergency planning and preparedness” for more detail on the initiatives above.

5.3.10 Stakeholder Cooperation and Community Engagement

Description of programs to reduce ignition probability and wildfire consequence
For each of the below initiatives, provide a detailed description and approximate timeline of each, whether already implemented or planned, to minimize the risk of its equipment or facilities causing wildfires. Include a description of the utility's initiatives, the utility's rationale behind each of the elements of the initiatives, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each initiative, how the utility plans to demonstrate over time whether each component of the initiatives is effective and, if not, how the utility plans to evolve each component to ensure effective spend of ratepayer funds. Include descriptions across each of the following initiatives. Input the following initiative names into a spreadsheet formatted according to the template below and input information for each cell in the row.

6. *Community engagement*
7. *Cooperation and best practice sharing with agencies outside CA*
8. *Cooperation with suppression agencies*
9. *Forest service and fuel reduction cooperation and joint roadmap*
10. *Other / not listed [only if an initiative cannot feasibly be classified within those listed above]*

The list provided is non-exhaustive and utilities shall add additional initiatives to this table as their individual programs are designed and structured. Do not create a new initiative if the utility's initiatives can be classified under a provided initiative.

SCE is committed to keeping its customer and key stakeholders informed on the company's WMP activities, PSPS protocols, and general emergency preparedness. In 2019, SCE conducted over 350 meetings and presentations with local government and tribal officials, community organizations, and the general public. In 2020, SCE will continue to inform its customers on wildfire mitigation strategies and concentrate its efforts on communities that were impacted by multiple PSPS de-energizations in the past.

5.3.10.1 Community engagement

In 2020, SCE will continue to regularly engage with local government officials, tribal staff and first responders to educate stakeholders on SCE's 2020-2022 WMP and its potential impact on their community. These meetings will focus on educating local and tribal governments about the PSPS de-energization process and how the company will communicate and work with government agencies and emergency operations during outages. In the past, SCE received input from these meetings and other discussions with local government officials and incorporated them in its PSPS notifications. For example, when SCE expects conditions to meet the criteria for potential PSPS, "Periods of Concern" notifications are sent to local government officials so they are better able to plan for potential PSPS events. SCE will continue these meetings to further enhance partnerships, increase awareness, and discuss lessons learned.

SCE will also continue to conduct meetings in HFRA communities to engage SCE customers,

community leaders, and other stakeholders to understand their questions and concerns, as well as to increase awareness about the fire risk in California and what that means to them; how to be prepared and remain resilient; and SCE's wildfire mitigation efforts. These forums allow SCE to obtain up-to-date customer information that is critical for outreach and notification during events. SCE will invite local first responders, emergency personnel and the Red Cross to educate the community members on emergency preparedness. SCE is also exploring virtual community meetings to increase the reach of the meetings. SCE's community outreach, public awareness, and communications efforts are further described in Section 5.3.9.2.

5.3.10.2 Cooperation and best practice sharing with agencies outside CA

SCE believes in the value of cooperating and sharing best practices with agencies outside of California to help educate and learn from other organizations that may be facing similar challenges. SCE will continue to engage and share best practices with industry trade associations, including but not limited to, Electric Power Research Institute, Western Energy Institute, and Edison Electric Institute. Additionally, SCE will continue to share expertise and insights with technical organizations including the Institute of Electrical and Electronic Engineers and the National Fire Protection Association.

SCE is currently working with the UMS Group to establish an International Joint Investor-Owned Utility wildfire committee with two of the major Australian electric utilities, AusNet Services and Powercor Australia. This planned committee would include the three large investor-owned utilities (IOUs) in California and the two Australian utilities with the intent of sharing best practices and lessons learned.

The comprehensive approach to sharing with trade associations, technical organizations and establishing an international wildfire committee gives SCE the ability to collaborate and share best practices with a vast of array of agencies both nationally and internationally.

5.3.10.3 Cooperation with suppression agencies

SCE develops and maintains excellent long-term working relationships with fire suppression agencies in order to become a trusted partner in all aspects of fire risk mitigation, training and emergency response. SCE's internal Fire Management team is responsible for maintaining situational awareness of fire threats and fire activity affecting or having the potential to affect the electric grid; reporting on fires; responding in person to fires threatening SCE infrastructure; and representing SCE and acting as a liaison with public agencies and affected SCE organizational units. They are required to serve as SCE's technical representative and subject matter experts to fire agency incident commanders, senior staff, and fire agency executives, and they must possess a good working knowledge of the ICS and SCE's transmission and distribution power delivery systems, including construction and protection. The Fire Management team also ensures that critical information is shared between SCE organizational units and public agencies and resolves conflicts. They also provide Electrical Safety for First Responders training to suppression agencies, organizations and conferences. SCE Fire Management is the point of contact and coordinator of fire agency access to SCE's HD cameras throughout its 50,000-mile service territory (see 5.3.2 Situational Awareness and Forecasting). SCE will continue to partner with all

wildland fire suppression agencies as part of SCE's overall fire mitigation efforts.

5.3.10.4 Forest service and fuel reduction cooperation and joint roadmap

Cooperation with the USFS on fuel reduction is conducted on an as needed basis. Currently there is no formal operating agreement or joint roadmap in place to coordinate with USFS on fuel reduction related initiatives.

See Table 30 "Stakeholder Cooperation and Community Engagement" for more information on the initiatives above.

5.4 Methodology for Enterprise-Wide Safety Risk and Wildfire-Related Risk Assessment

Describe methodology for identifying and evaluating enterprise wide safety risk and wildfire related risk, and how that methodology is consistent with the methodology used by other electric utilities or electrical corporations. If the risk identification and evaluation methodology is different, the utility shall explain why in this section.

Similar to the other California investor-owned utilities, SCE followed the CPUC's adopted risk-mitigation procedures in the S-MAP and RAMP[19] in developing its methodology for identifying and evaluating enterprise wide safety risk and wildfire risk. See Section 4.2 for more detail.

[19] For more details on SCE's RAMP methodology, please see Southern California Edison Company's *2018 Risk Assessment And Mitigation Phase Report*, http://www3.sce.com/sscc/law/dis/dbattach5e.nsf/0/B2ADFEF6506791E98825834600743 89A/$FILE/I.18-11-006%20SCE%202018%20RAMP%20Report.pdf

5.5 PLANNING FOR WORKFORCE AND OTHER LIMITED RESOURCES

Include a showing that the utility has an adequately sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with the utility.

SCE maintains an adequate and trained workforce ready to provide assistance during emergencies. SCE has a Storm Plan to respond to emergencies that can vary in scope and size and which may require the activation of mutual assistance to restore power in a safe and timely manner. SCE also has a robust ICS training program for employees identified as emergency responders. In 2019, SCE had 655 rostered members, all of whom received either initial qualification or re-qualification training.[20] All of these members were trained for activations, and these personnel are now all rostered to an IMT, IST (Incident Support Team), or PSPS Task Force. Many of these positions received multiple trainings from BR (such as ICS 300, position specific, and PSPS specific trainings).

IMTs are placed on rotations, and on-call teams are required to respond to the EOC within two hours, with limited exceptions. These teams are specifically structured to have multiple back-ups available, so that response and recovery efforts can be conducted 24 hours-a-day for several days or even weeks. Moreover, SCE has a large field workforce (both employees and contractors) that is highly skilled and able to restore service during and after a major event (see Table SCE 5-15 and Table SCE 5-16). SCE's field workforce has many years of experience, on average, which allows it to effectively respond to major events. SCE also employs contract resources that can be reassigned to assist with a major event.

Due to the frequency and duration of PSPS activity in 2019, SCE expanded the number of PSPS IMTs from four to six teams and expanded the number of positions on each team to improve overall operations and balance workload and fatigue. SCE also put in place a dedicated Advanced Circuit Evaluation (ACE) team to continually monitor, assess, track and report out on circuit integrity and environmental conditions to inform PSPS decision making. Over this WMP period, SCE will continue to refine and enhance its PSPS program based on lessons learned, community feedback, and WSD and Commission guidance. For example, as further described in Section 5.3.6.5.7, SCE is setting up a new, dedicated PSPS Operations Team.

IMT and EOC capabilities are tested regularly both by actual incidents such as windstorms, wildfires, and PSPS, and through exercises and drills that all team members are required to participate in annually. These exercises, drills, and actual activations provide an opportunity for team members to utilize their training, refresh their skills, and learn on the job. During exercises

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[20] This number excludes 'non-rostered' positions (e.g., assistants, analysts, and customer service representatives) that assist in activations in an ad-hoc manner but are not considered ICS trained.

and drills, team members are also evaluated on their performance and given feedback on areas for improvement and best practices.

In addition to SCE's internal response and recovery capabilities, SCE maintains existing mutual assistance agreements with outside providers to meet restoration objectives. These mutual assistance agreements are activated in incidents which exceed the capacity of SCE's crews and emergency contracting capabilities. The IMT and EOC maintain visibility on the workforce and incidents, maintaining situational awareness of any staffing shortages or other potential shortages, looking ahead at potential needs and requesting appropriate support via additional internal staffing, emergency contracts, or mutual assistance. These requirements are captured in SCE's Storm Plan detailed in Section 5.3.9, Emergency Preparedness and Planning.

Recognizing the impacts of climate change, the increasing wildfire risk within SCE's HFRA service territory, and the potential for numerous PSPS related activations, SCE added approximately 75 additional contract crews and approximately 180 additional contract planners in 2019 to help design and execute all its work including the critical wildfire mitigation efforts described in its 2019 WMP. SCE continues to evaluate the need for additional field resources and trained staff members. In 2020, SCE plans to continue to add contract crews and professional staff including planners, engineers, and other resources to continue to build out its workforce to execute critical wildfire initiatives amongst other work. SCE will also continue to implement training and exercise opportunities in 2020 to increase team capacity and will continue to do so through this WMP period. In Table SCE 5-15, SCE provides a detailed breakdown of its Distribution Field Workforce and supporting personnel through 2019. In Table SCE 5-16 below, SCE provides a similar detailed breakdown of its Transmission, Substations & Operations Field Workforce and supporting personnel through 2019. These tables show that SCE grew its field workforce by approximately 700 resources (SCE and contract) compared to January 2019 counts provided in the 2019 WMP. [21]

[21] In the 2019 WMP, SCE mistakenly did not include distribution contract planners of approximately 520.

Table SCE 5-15
Distribution Field Workforce

As of Year End 2019
(FTE only)

Distribution - Resources	5,159	Supporting
Foreman Electl Crew	166	Trained resources to work on SCE's high voltage, overhead and underground distribution system. They perform inspections and maintenance, assess system damages, make repairs to restore service, and serve as SCE's first responders.
Journeyman Lineman	572	
Troubleman	205	
Splcr Sr Cble	23	
Streetlight Repairman	27	
Lineman, Apprentice	201	Serve as compliments to field crews, training under the direct supervision of Journeyman Lineman and Foreman.
Groundman	333	Compliments the field crews as part of their training, working in direct supervision of the Journeyman Lineman and Foreman.
Sup, Field	82	Provides management, field safety, and operational oversight and technical support for field crews in each of the SCE's district locations.
Sup, General Foreman	73	
Form Troubleman Training	4	
PSPECs	107	Coordinates outages, laying out jobs and customer contacts
Sup, Project General Sup	41	Oversees contract crews site training, safety
Field Service Rep	144	1st responders - identify problems and stand by to ensure site is secure
Meter Technicians	97	
MGR - Metering Field Ops	3	
Sr Sup, Ops	28	
Sr Sup, Engy Del / Distrib	17	
Planners/Designers	769	Damage assessments - support the field crews by conducting assessments, order material, and other admin support
Materials Mgmt, Sr Specialist	17	
Construction/Maintenance Clerk/Special	215	
Supervise Construct/Maint Acct	50	
Meter Support Specialist	7	
Spclst Fld Svcs Support	4	
Inspectors	175	
Contractors - 4-Man Crew	1,100	Avg 275 crew (4-Man Crew)
Contractor - Planner/Designer	699	

Table SCE 5-16
Transmission, Substations & Operations Field Workforce

	2019 Year-End	
Transmission, Substations & Operations - Field Crews	**1,318**	**Supporting**
Transmission		Trained resources to work on SCE's high voltage, overhead and underground distribution system. They perform inspections and maintenance, assess system damages, make repairs to restore service, and serve as SCE's first responders.
Journeyman Lineman	133	
Splcr Sr Cble	20	
Patrolman Sr	38	
Right of Way Equipment Operator	5	
Transmission		Compliments to field crews, training under the direct supervision of Journeyman Lineman (i.e. JM Battery Electricians, Construction Electricians, Substation Cable Splicers) and Foreman.
Groundman	30	
Lineman, Apprentice	62	
SC&M		
Apprentice Substn Elctrcn	35	
Electn Appr Battry	4	
Electn Appr Cnstrn	14	
Hlpr Electl Constr	5	
Splcr Appr Subs Cable	3	
Transmission		Provides management, field safety, and operational oversight and technical support for maintenance & test crews.
Sup, General Foreman	14	
Supr Road R/W	4	
SC&M		
Substation Electrician	129	
Sup, Apparatus	5	
Sup, Cnstrn	4	
Sup, Tech Spec	1	
Sr Sup, Maint / Test	44	
Grid Ops		
Sup, Substn Ops	5	
Transmission		Coordinates outages, laying out jobs and customer contacts
PSPECs	10	
SC&M		1st responders - identify problems, stand by to ensure site is secure, analyze grid flow, and support construction (i.e. civil)
Electn Battry	8	
Electn Constrn	45	
Form Dstrbn Aprts	16	
Mech Structural	17	
Splcr Subs Cable	7	
Techn Dstrbn Aprts	42	
Techn Electl Aprats Test/Test A	4	
Technician, Test	79	
Technician, Test Supervising	54	
Transformer Helper	4	
Transformer Specialist	15	
Transformer Specialist Foreman	4	
Utilityman Terrtrl	16	
Welder Cnstrn	4	
Working Foreman - CFF	6	
Working Form CFF Elect Const	3	
Grid Ops		
Operator, System	136	
Opr Substation	111	
Opr Trainee	6	
Power Sys Ops Specialist	46	
Power Systems Planner 3	4	
SC&M		Damage assessments - support the field crews by conducting assessments, order material, and other admin support
Materials Mgmt, Advisor	11	
Transmission		
Planners	51	
Contractors	64	Avg 16 crews (4-Man Crew)
Telecom	13	
Form Cable	9	1st responders - identify problems, stand by to ensure site is secure, analyze grid flow, and construction
Planner	1	
Trans Telecom PSPEC	3	
Total	**1,331**	

5.6 Expected Outcomes of 3-Year Plan

5.6.1 Planned Utility Infrastructure Construction and Upgrades

Explain how the utility expects the geographic location of transmission and distribution lines to shift over the three-year plan period and discuss its impact on 1) the utility's risk exposure and 2) the utility's wildfire mitigation strategy. Outline portions of grid within HFTD that are highest cost to serve, by highlighting circuits or portions of circuits that exceed $0.5M per customer in capital cost required to harden. Provide justification for the level of hardening required and why the lowest cost path to harden this equipment exceeds $0.5M per customer, including by describing the various alternatives that were considered to reduce ignition probability and estimated wildfire consequence. For each of these sections of the grid, outline any analysis that was conducted around islanding, serving with microgrids, or providing backup generation, all to reduce the impact of PSPS events and reduce ignition probability and estimated wildfire consequence at the lowest possible cost.

Discuss how the utility wildfire mitigation strategy influenced its plan for infrastructure construction (in terms of additions or removal of overhead lines, including undergrounding of overhead lines) as detailed in Section 3.4.2. Discuss how the utility wildfire mitigation strategy influenced its plan for upgrades to overhead lines and substations as detailed in the Section 3.4.2.

How Transmission and Distributions Lines are Expected to Shift and Their Impact on Risk and WMP Strategy Over the 3-year Period

Distribution and transmission lines in SCE's service territory are expected to incrementally grow and shift over the three-year WMP period due to additions and removals of lines. Additions and removals of lines occur for various reasons including, but not limited to, new circuitry to accommodate customer load growth and Distributed Energy Resources (DER), line extensions, removal of facilities, generator interconnections, new substations, and undergrounding of existing overhead lines. While there are various drivers that result in changes and additions to SCE's lines, SCE designs and constructs lines in accordance with standards to minimize risk exposure in support of its wildfire mitigation strategy. Therefore, new infrastructure will be designed and constructed utilizing the latest wildfire mitigation strategies, current risk analyses, and determination of a solution to reduce the risk at that location. For example, all new distribution circuits and poles in HFRA will be constructed with at least insulated conductors and fire-resistant poles. Further details on changes to SCE's design and construction standards are described below. These standards and continual risk analyses coupled with SCE's wildfire initiatives (including PSPS) in HFRA through this WMP period are anticipated to help decrease ignitions in HFRA thus reducing wildfire risk and increasing public safety.

Current plans[22] over the three-year WMP period demonstrate the following net changes[23] in terms of geographic location of transmission overhead lines in SCE's service territory:

- In non-HFTD, a net change of approximately 18.9 circuit miles of transmission lines
- In HFTD Zone 1, a net change of 0.0 circuit miles of transmission lines
- In HFTD Tier 2, a net change of approximately 14.9 circuit miles of transmission lines
- In HFTD Tier 3, a net change of approximately 25.5 circuit miles of transmission lines

The land use breakdown of these net changes in HFRA are 14.0% in urban areas, 21.8% in rural areas, and 64.2% in highly rural areas. The percentages provided represent known quantifiable changes for overhead transmission circuit miles. Additional circuit mile changes may be planned and implemented between 2020 and 2022.

The information listed above and within Table 16 does not include distribution primary overhead line removals due to targeted undergrounding. As a result, the total primary overhead line removals that are anticipated through 2022 are not fully reflected within the net changes provided above. While a list of potential targeted undergrounding projects has been identified, SCE will continue to refine its evaluation methodology and determine the areas to execute targeted undergrounding work in support of its wildfire mitigation strategy. In addition, as noted in Section 2.7, SCE does not routinely track planned additions, removals, or upgrades by circuit mile, population density, or WUI. While SCE has a number of planned distribution projects over the next few years, they are not far along enough in the project lifecycle to have a complete list of affected structures (new or existing), circuit path/route geometries, and/or geospatial coordinates. Therefore, SCE is unable to map the distribution projects in GIS and subdivide as requested to summarize net changes to distribution overhead lines.

See Table 16 "Location of Planned Utility Equipment Additions or Removal by End of 3-year Plan Term" for more detailed information highlighting changes in transmission overhead lines over the three-year WMP period.

Highest Cost to Serve Portions of the Grid within HFTD

A circuit level review was completed to determine the cost per metered customer for capital expenditures (non-maintenance or compliance-related activities) currently planned related to grid hardening projects. The list of grid hardening activities considered for this analysis are listed below.

- Wildfire Covered Conductor Program (WCCP)
- High Fire Risk Area (HFRA) Sectionalizing Devices and PSPS mitigation
- Fusing Mitigation
- Targeted Undergrounding Program

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[22] Current plans account for known transmission, substation and distribution projects that are far along the planning and engineering phase and SCE has geospatial data for.

[23] Positive change is a net addition, and a negative change is a net removal.

Where scope identified was currently available, a cost required to harden per metered customer was found by aggregating all hardening activity costs for a targeted circuit, and then evaluating whether the ratio of cost per metered customers exceeded a threshold of $0.5 million. The outcome of the above described review demonstrated that zero circuits currently exceeded the threshold of $0.5 million per metered customer.

Wildfire Mitigation Strategy Influence on Construction and Upgrades

SCE's 2019 wildfire mitigation strategy included updating distribution design and construction standard manuals to expand the use of wildfire mitigating measures in HFRA. For example, standards were refined for connector selection in HFRA application to prioritize the use of CAL FIRE-exempt connectors, such as bolted wedges. SCE also completed the publication of the CAL FIRE-exempt spark prevention surge arrestor after a successful pilot evaluation (as a result of 2019 WMP AT-1 and AT-4 activities). These surge arresters are now required with all HFRA applications. Additionally, SCE issued standards on increased usage of vibration dampers on bare conductor for mitigating the Aeolian vibration effect (as a result of 2019 WMP AT-4 activity). Furthermore, SCE published standards for ridge-pin construction which is an alternative construction method increasing the vertical separation between the center phase conductor and the two other phases and reducing the potential for conductor slapping (as a result of 2019 WMP AT-4 activity). Finally, SCE updated its design and construction standards to include fire-resistant wrap on new treated wood poles for use in HFRA, an alternative to fire-resistant composite poles (as a result of 2019 WMP RAMP Mitigation M9 activity). SCE frequently reviews and updates these standards to reflect regulatory requirement changes, new or revised construction methods, and new technologies to help mitigate wildfire risk. Over this WMP period, SCE plans to continue improving its wildfire mitigation transmission design and construction strategies as well as expanding its efforts to the transmission system, please see Section 5.3.3.18, TOH Review for more details.

Change In Drivers Of Ignition Probability Taking Into Account Planned Initiatives For Each Year Of The Plan

Tables 31a and 31b include estimates of changes in drivers of ignition probability considering planned wildfire mitigation initiatives for each year of the plan for distribution and transmission equipment, respectively. Estimates were provided for drivers where SCE tracks near misses. As such, there are a few drivers SCE does not track and these are coded NA in the tables. SCE assumed constant weather patterns consistent with its historical weather data.

The calculations for projected ignitions in Tables 31a and 31b are primarily driven by the cumulative propagation of mitigation effectiveness for each of the mitigation initiatives. Although the numbers provided in the table reflect an expected value, the uncertainty inherent in each mitigation effectiveness estimate, especially when compounded with the other mitigations, leads to a significant range of uncertainty around the expected value calculation.

See Tables 31a and 31b "Change in Drivers of Ignition Probability Taking into Account Planned

Initiatives, for Each Year of Plan" for more detail.

5.6.2 Protocols on Public Safety Power Shut-off

Describe protocols on Public Safety Power Shut-off (PSPS or de-energization), to include (See 1 through 5 in italics below):
1. Strategy to minimize public safety risk during high wildfire risk conditions and details of the considerations, including but not limited to list and description of community assistance locations and services provided during a de-energization event.
2. Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization (e.g., decision tree).
3. Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol.
4. Company standards relative to customer communications, including consideration for the need to notify priority essential services – critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies. This section, or an appendix to this section, shall include a complete listing of which entities the electrical corporation considers to be priority essential services. This section shall also include description of strategy and protocols to ensure timely notifications to customers, including access and functional needs populations, in the languages prevalent within the utility's service territory.
5. Protocols for mitigating the public safety impacts of these protocols, including impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies.

5.6.2.1 Strategy to Minimize Public Safety Risk During High Wildfire Risk Conditions

SCE's wildfire mitigation plan strategy is designed to prevent, combat and respond to the threat of wildfires and consists of three main pillars: enhancing operational practices, bolstering situational awareness, and hardening the grid. Each of these wildfire mitigation focus areas include initiatives designed to minimize public safety risks during high wildfire risk conditions. Operational practices, for example, include vegetation management, implementation of system operating restrictions and PSPS response protocols. During elevated fire weather conditions, SCE proactively employs a number of operational practices to mitigate against the threat of wildfires, reserving PSPS for extreme weather conditions. These other operational practices include, but are not limited to, blocking reclosers to prevent automated reclosing devices from re-energizing circuits when conditions may be hazardous and implementing Fast Curve settings to reduce the fault energy to more quickly de-energize when a short circuit has been detected, as described in Section 5.3.3.

In the area of situational awareness, SCE has invested in tools, technologies, and practices to better forecast potential wildfire conditions and be more effective in responding to fire events when they occur. These include: a Situational Awareness Center that during emergencies and incidents is staffed around the clock with meteorologists and Geographic Information System (GIS) professionals, additional weather stations that provide real-time information about wind,

temperature, and humidity to help SCE make decisions during potential fire conditions, and live fire-monitoring cameras to help IMTs and first responders more quickly assess and respond to reported fires. Additionally, in 2020, SCE will have installed two super computers (one at the primary location and one at the backup location) that help produce high-resolution weather and fuel modeling forecasts to provide IMTs with precision and granularity.

In the area of grid hardening, mitigations to reduce the risk of ignition include: Installation of insulated wires that lower the chance of faults or short circuits that can create ignitions, fire resistant poles wraps that are more resilient than wood poles, and fast-acting fuses that can react more quickly to minimize fire risks. All of these efforts help reduce the public safety risk during high wildfire risk conditions.

5.6.2.2 Tactical and Strategic Decision-Making Protocol for Initiating a PSPS

The decision to preemptively de-energize a circuit requires consideration of many complex factors. Execution of de-energization protocols is managed by the Incident Management Team (IMT) in alignment with nationally recognized Incident Command System principals. The following considerations are intended to provide a framework to assist the IMT in exercising this discretion:

- National Weather Service alerts or warnings for counties that contain SCE circuits in high fire risk areas;
- Ongoing assessments from SCE's in-house meteorologists informed by high resolution weather models, data from strategically deployed SCE weather stations (e.g., wind speeds, humidity levels, and temperature), and publicly available weather stations;
- The SCE Fire Potential Index (FPI), an internal tool that utilizes both modeled weather and fuel conditions;
- Real-time situational awareness information obtained from weather station data and in some instances, field observers positioned locally in high fire risk areas identified as at risk for extreme fire weather conditions
- Specific concerns from state and local fire authorities, emergency management personnel, and law enforcement regarding public safety issues;
- Expected impact of de-energizing circuits on essential services such as public safety agencies, water pumps, traffic controls, etc.; and
- Other operational considerations to minimize potential wildfire ignitions including current known state of circuit conditions.

SCE will continue to improve its ability to gather improved and real-time information that better informs PSPS decisions. For a more detailed narrative on SCE's process for de-energization and lessons learned, refer to Section 4.4.

5.6.2.3 Protocols for mitigating the public safety impacts of these protocols

SCE continues to host meetings and provide information to county Offices of Emergency Management (OEM), local and tribal governments, public safety agencies and community members (including selected groups through specialized workshops) that may be impacted by circuits that traverse HFRA. These meetings enable SCE to provide information regarding its PSPS

protocol, explain its wildfire mitigation efforts, and encourage emergency preparedness. SCE uses these opportunities to convey the importance of community resiliency in the event of any outage, irrespective of cause, and to receive important feedback from its customers so SCE may incorporate this feedback into its planning process and PSPS protocol. These meetings, and SCE's wildfire planning efforts (including PSPS), are conducted in compliance with PU Code Section 768.6.

SCE continues to hold regular meetings with public safety partners including fire agencies, law enforcement agencies and emergency management agencies to continue dialogue regarding PSPS and to collaborate on mitigation strategies and event protocols. Meeting topics include, but are not limited to, how circuits are identified as being subject to PSPS, overview of SCE's de-energization criteria, notification process throughout an event, information on SCE's ICS structure, how SCE handles emergent requests from public safety partners during events, and information sharing (e.g., GIS boundaries, critical care and medical baseline customer information, period of concern data, etc.).

SCE's engagement with local governments includes the following: information (via email) on its PSPS protocol and its wildfire mitigation efforts to representatives of cities, counties, tribes, and unincorporated communities (unincorporated communities are included in outreach to counties) with HFRA circuits; proposals to meet and meetings with key city and county personnel to further review and discuss any of the topics presented; proposals to provide maps of HFRA circuits (both PDF and GIS layers); requests for local governments and other agencies to provide SCE information on critical facilities/essential service providers and other concerns resulting from de-energizing particular circuits. Additionally, and upon request, SCE has presented at city council and local public safety commission meetings and solicit feedback on the company's WMP from fire officials in its service territory.

SCE also conducts outage education meetings (Outage Schools) throughout the year for business and residential customers. These meetings are designed to help customers understand what to expect during an outage, including an outage related to PSPS. Outage Schools will continue annually throughout SCE's service territory. Topics include the process for determining the extent of an outage (damage assessment), information on notification process during an outage, details on SCE's PSPS, and, outage restoration information.

SCE hosts targeted workshops and presentations with public safety partners including water agencies, telecommunications companies, and healthcare providers to educate them on PSPS protocols and potential impacts. These workshops allow for two-way communication to better understanding customer concerns, including resiliency, and for customers to share best practices with one another. By partnering with industry associations, SCE is better able to discuss resiliency efforts with their members and gain assistance in expanding the reach of PSPS education.

Building off feedback received from impacted stakeholders, SCE formed an internal task force to

address customer care solutions. The objective of this task force is to identify near-term and long-term customer care solutions to support customers potentially impacted by PSPS events. The task force develops solutions, educates customers on existing resources, and resolves issues for identified and emerging customer care initiatives. Such work includes:

- Response IMT: Response activities including deploying customer care assets to the field such as community resource centers, ice trucks, blankets, potable water, etc.
- Business, government and agency coordination, education and outreach: Outreach and support for affected business customers including telecommunication companies, water entities, healthcare, and education. Initiatives for government agencies include rural and tribe-specific needs.
- Access and functional needs (AFN) and community-based organization (CBO) coordination: Outreach initiatives for AFN customers and CBO coordination to assist customers such as seniors, people with limited English proficiency, and customers with disabilities, and/or those who are transportation disadvantaged.
- Customer contact effectiveness: Continue to explore more effective information and resources to customers who call into the SCE call center. Partner with public agencies or non-profit organizations that can serve non-electrical needs.
- Products and programs: Explore and define new programs to support electric resiliency of customers including rebates for equipment such as back-up power and distributed energy resources and other programs for all classes of customers.
- Customer care feedback: Implement formal pipelines for PSPS-specific customer feedback. Execute PSPS research to determine customer needs and impact and/or test new materials.
- SCE.com/Digital/Notifications: Improvements to SCE.com information including maps and public alerts, including new methods of notifying customers.

5.6.2.4 Critical and Essential services

SCE considers the following customer categories as critical infrastructure providers:

- Emergency Services Sector, including:
    - Fire Stations (Federal/State/Local)
    - Police Stations (Federal/State/Local)
    - Emergency Operations Centers (EOCs)
    - Emergency Dispatch Centers*
    - Communications Sites Supporting Emergency Operations*
- Government Facilities, including:
    - Schools
    - Jails and Prisons
    - Gov't agencies essential to national defense
- Healthcare and Public Health Sector, including:
    - Public Health Departments
- Hospitals
    - Skilled Nursing Facilities

    - Nursing Homes
    - Blood Banks
    - Dialysis Centers
    - Hospice Facilities
- Energy Sector, including:
    - Public and Private Utility Facilities
- Inter-connected Publicly Owned Utilities
    - Electric Cooperatives
    - Community Choice Aggregators (CCA)
- Water and Wastewater Systems Sector, including:
    - Pumping Stations
    - Well Sites
    - Lift Stations
    - Wastewater Treatment Plants
    - Flood Control Gates*
- Communications Sector, including:
    - Radio and Television broadcasting stations
    - Communication Carrier Infrastructure:
    - Routers
    - Central Offices
    - Head Ends
    - Cellular Switches
    - Cellular Sites
    - Remote Switches
    - Radio Repeaters Utilized by Emergency Responders*
- Chemical Sector, including:
    - Chemical Plants
    - Chemical Storage Facilities
    - Chemical Distribution Centers
- Transportation Sector, including:
    - CalTrans Operations Centers*
    - Transportation Management Centers*
    - Airports*
    - Mass Transit Stations*

* Represents County request as Critical Infrastructure/Facilities

Chapter 6

Utility GIS Attachments

6 UTILITY GIS ATTACHMENTS

As explained in Section 2.7, SCE is providing the WSD with both confidential and non-confidential GIS files. The non-confidential GIS files are available on SCE's website. SCE has used the following method to name its GIS files, consistent with the naming conventions in Chapter 6 of the Guidelines (i.e., 6.1 – Recent weather patterns; 6.2 – Recent drivers of ignition probability; 6.3 – Recent use of PSPS; 6.4 – Current baseline state of service territory and utility equipment; 6.5 – Location of planned equipment additions or removal; and 6.6 – Planned 2020 WMP initiative activity by end-2022):

- All GIS files are related to the layers listed in Tables 8 and 9 and follow the attachment locations described on those tables.
- The GIS files' names will include the Table (8 or 9), the specific attachment (i.e., 6.1 to 6.6) and the specific row in the table (i.e., A-Z, with A being the first row).
- As an example, for the "6.4 – Current baseline state of service territory and utility equipment" in Table 9, the GIS file showing the location of substations will be named, "Table9_Attachment6_4_I."

As part of its GIS submission, SCE is also providing a table that will list the GIS layer name with the table and attachment references included in the Guidelines.

Appendix A
List of Acronyms

Acronym / Abbreviation	Definition
A.	Application
AAR	After Action Report
AB	Assembly Bill
ACE	Advanced Circuit Evaluation
ACS	Arc Suppression Coils
ADS	Atmospheric Data Solutions
AFN	Access and Functional Needs
AGOL	ArcGIS Online
AGP	Annual Grid Patrol
AHJ	Authority Having Jurisdiction
AI	Artificial Intelligence
ALJ	Administrative Law Judge
ANSI	American National Standards Institute
AR	Automatic Reclosers
ASC	Arc Suppression Coil
ASD	Audit Services Department
AT	Alternative Technology
BES	Bulk Electric System
BLF	Branch Line Fuses
BR	Business Resiliency
BTM	Behind-the-Meter
BVLOS	Beyond Visual Line of Sight
C3	Customer Crew Communications
CAISO	California Independent System Operator
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Governor's Office of Emergency Services
CARE	California Alternate Rates for Energy
CB	Circuit Breaker
CBO	Community Based Organization
CCA	Community Choice Aggregators
CCC	Customer Contact Center
CEII	Critical Energy Infrastructure Information
CEMA	Catastrophic Event Memorandum Account
CFO	Contact with a Foreign Object
cGIS	Comprehensive Geographic Information System
CLF	Current-Limiting Fuses
CMS	Consolidated Mobile Solutions
CPCN	Certificate of Public Convenience and Necessity

Acronym / Abbreviation	Definition
CPUC	California Public Utilities Commission or Commission
CRC	Community Resource Centers
CRM	Customer Relationship Systems
CS	Customer Service
CSS	Customer Service System
CSWC	California State Warning Center
CUEA	California Utilities Emergency Association
D.	Decision
DDS	Distribution Design Standards
DEP	Emergency Preparedness
DER	Distributed Energy Resource
DFA	Distribution Fault Anticipation
DIMP	Distribution Inspection and Maintenance Program
DOH	Distribution Overhead
DRI	Drought Relief Initiative
DVMP	Distribution Vegetation Management Plan
EAM	Enterprise Asset Management
EDMRM	Electronic Documents Management/Records System
EEI	Edison Electric Institute
EFD	Early Fault Detection
EFWT	Elevator Fire Weather Threat
EIG	Enterprise Information Governance
EOC	SCE's Emergency Operations Center
EOI	Enhanced Overhead Inspections
EONS	Emergency Outage Notification System
EPRI	Electric Power Research Institute
EPUC/IS	Energy Producers and Users Collation and Indicated Shippers
ERO	Emergency Response Organization
ESA	Energy Savings Assistance
ESRB	Electric Safety and Reliability Scan
EVLOS	Extended Visual Line of Sight
FAA	Federal Aviation Administration
FAC	Facilities Design, Connections, and Maintenance
FEMA	Federal Emergency Management Agency
FERA	Family Electric Rate Assistance
FERC	Federal Energy Regulatory Commission
FHPMA	Fire Hazard Prevention Memorandum Account

Acronym / Abbreviation	Definition
FHSZ	Fire Hazard Severity Zone
FIM	Facilities Inventory Mapping
FMEA	Failure Modes and Effects Analysis
FPI	Fire Potential Index
FPP	Fire Prevention Plan
FR	Fire-Resistant
FRP	Fiber Reinforced Polymer
FTM	Front-of-the-Meter
FWT	Fire Weather Threat
FWZ	Fire Weather Zone
GCC	Grid Control Center
GESW	General Electric Smallworld
GFN	Ground Fault Neutralizer
GIS	Geographic and Information System
GO	General Order
GPS	Global Positioning System
GRC	General Rate Case
GSRP	Grid Safety and Resiliency Program
HCM	Human Capital Management
HD	High Definition
HFRA	High Fire Risk Areas
HFRI	High Fire Risk Informed Inspection
HFTD	High Fire Threat District
HHZ	High Hazard Zones
HPCC	High Performance Computing Cluster
HTMP	Hazard Tree Management Program
I.	Investigation
ICS	Incident Command System
ILC	Independent Living Centers
IMT	Incident Management Team
IN	Inspections
IOU	Investor-Owned Utility
IPI	Intrusive Pole Inspection Program
IQCC	Income Qualified Critical Care
IR	Infrastructure Replacement
ISA	International Society of Arboriculture
IST	Incident Support Team
IT	Information Technology
IVM	Integrated Vegetation Management
LAC	Local Assistance Center
LACFD	Los Angeles County Fire Department

Acronym / Abbreviation	Definition
LFO	Live Field Observation
LiDAR	Light Detection and Ranging Technology
LLC	Limited Liability Company
LTE	Long-Term Evolution
MA	Memorandum Account
MADEC	Meter Alarming for Downed Energy Conductor
MARS	Multi Attribute Risk Score
MAVF	Multi-Attribute Value Function
MICOP	Mixteco Indigena Community Organizing Project/ El Proyecto Mixteco / Indígena Organización Comunitaria
ML	Machine Learning
MVCD	Minimum Violation Clearance Distance
NA	Not Applicable
NERC	North American Reliability Corporation
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NIMS	National Incident Management System
NWS	National Weather Service
OCM	Organizational Change Management
OCP	Overhead Conductor Program
ODI	Overhead Detail Inspection Program
ODRM	Outage Database and Reliability Metrics
ODS	Operational Data Store
OEM	Offices of Emergency Management
OIR	Order Instituting Rulemaking
OMS	Outage Management System
OP	Operational Practices
OPD	Open Phase Detection
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PFM	Petition for Modification
PG&E	Pacific Gas and Electric Company
PLP	Pole Loading Program
PMO	Program Management Office
PRC	Public Resources Code
PSPS	Public Safety Power Shut-Off
PTC	Permit to Construct

Acronym / Abbreviation	Definition
PTZ	Pan-Tilt-Zoom
PU	Public Utilities
PUC	Public Utilities Code
QA	Quality Assurance
QC	Quality Control
QEW	Qualified Electrical Worker
R.	Rulemaking
RA	Risk Analysis
RAMP	Risk Assessment Mitigation Phase
RAR	Remote-Controlled Automatic Reclosers
RAWS	Remote Automated Weather Stations
RCS	Remote Controlled Switches
REFCL	Rapid Earth Fault Current Limiter
RF	Radio Frequency
RFP	Request for Proposal
RFW	Red Flag Warnings
RO	Repair Orders
ROW	Rights-of-Way
RSE	Risk Spend Efficiency
RSM	Remaining Section Modulus
RSR	Remote Sectionalizing Recloser
SA	Situational Awareness
SAP	Systems, Applications & Products
SAWTi	Santa Ana Wildfire Threat Index
SB	Senate Bill
SCADA	Supervisory Control and Acquisition Data
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SDR	Supplemental Data Request
SED	Safety and Enforcement Division
SEMS	Standardized Emergency Management System
S-GIP	Self-Generation Incentive Program
SH	System Hardening
SIMP	Substation Inspection and Maintenance Program
S-MAP	Safety Model Assessment Proceedings
SME	Subject Matter Expert
SOB	Standard Operating Bulletin
SoCalGas	Southern California Gas Company

Acronym / Abbreviation	Definition
T&D	SCE's Transmission and Distribution Business Unit
TA	Tree Attachment
THC	Transform Holdco
TIMP	Transmission Inspection and Maintenance Program
TOH	Transmission Overhead
TT	Thunderstorm Threat
TTY	TeleTYpe
TURN	The Utility Reform Network
TVMP	Transmission Vegetation Management Plan
UAS	Advanced Unmanned Aerial Systems
UAV	Unmanned Aerial Vehicle
UCSD	University of California San Diego
UDI	Underground Detail Inspection
UNR	University of Nevada, Reno
USFS	United States Forest Service
USGS	United States Geological Survey
USZ	Utility Strike Zone
VM	Vegetation Management
WCCP	Wildfire Covered Conductor Program
WECC	Western Electricity Coordination Council
WMP	Wildfire Mitigation Plan
WMS	Work Management Systems
WRF	Weather Research and Forecasting
WRM	Wildfire Risk Model
WRMAG	Western Region Mutual Assistance Agreement for Electric Utilities
WRRM	Wildfire Risk Reduction Model
WSD	Wildfire Safety Division
WUI	Wildland Urban Interface

Appendix B
WMP GIS Dashboard Descriptions

Dashboard Name	Purpose
PSPS HUB	Monitor the status of weather stations, field observations and update circuit status during PSPS Event.
DOCI GIS HUB	Assign, Monitor, and Review Distribution Off-Cycle Inspections (Structures, Inspections, Notifications, Photos)
TOCI GIS HUB	Assign, Monitor, and Review Transmission Off-Cycle Inspections (Structures, Inspections, Notifications, Photos)
Distribution Remediation	Assign, Monitor, and Review Distribution Remediation Contractor Work Notifications and Orders (Structures, Notifications, Orders, Photos)
Transmission Remediation	Assign, Monitor, and Review Transmission Remediation Work Notifications and Orders (Structures, Notifications, Orders, Photos)
Long Span Inspections	Assign, Monitor, and Review Distribution Long Span Off-Cycle Inspections (Structures, Inspections, Notifications, Photos)
Generation GIS Hub	Assign, Monitor, and Review Generation Off-Cycle Inspections (Structures/Facilities, Inspections, Notifications, Photos)
Aerial Distribution Inspections	Assign, Monitor, and Review Aerial Distribution Inspections (Structures, Inspections, Notifications, Photos)
Aerial Transmission Inspections	Assign, Monitor, and Review Aerial Trasnmission Inspections (Structures, Inspections, Notifications, Photos)

Appendix C
WMP GIS Dataset Descriptions

Data Name	Description	Purpose
DOCI_V2_0	Distribution Off-Cycle Inspections	The purpose of this dataset was to capture the inspection data for Distribution Enhanced Overhead Inspection assets
DOCI_V2_0 Notifications	Distribution Off-Cycle Inspection Notifications	The purpose of this dataset was to capture the work notification data from the ground-based inspection for Distribution Enhanced Overhead Inspection assets
TOCI_V1_0	Transmission Off-Cycle Inspections	The purpose of this dataset was to capture the ground-based inspection for Transmission Enhanced Overhead Inspection assets
TOCI_V1_0 Notifications	Transmission Off-Cycle Inspection Notifications	The purpose of this dataset was to capture the work notification data from the ground-based inspection for Transmission Enhanced Overhead Inspection assets
QC DOCI	Quality Control Distribution Off-Cycle Inspections	The purpose of this data was to capture the quality control results for Distribution Enhanced Overhead Inspection assets
QC TOCI	Quality Control Transmission Off-Cycle Inspections	The purpose of this data was to capture the quality control results for Transmission Enhanced Overhead Inspection assets
QC Long Span Inspections	Quality Control Long Span Inspections	The purpose of this data was to capture the quality control results for Distribution Long Span Enhanced Overhead Inspection assets
LongSpanInspection	Long Span Inspections	The purpose of this dataset was to perform inspections and identify work notifications for long spans on Distribution Enhanced Overhead Inspection assets
Notification_Validate_V1_0	SAP Notification Validation	The purpose of this dataset was to field validate existing work notifications for potential fire ignition risk
Third_Party_Notification_Validation_V1_0	SAP Third Party Notification Validations	The purpose of this dataset was to field validate existing third party work notifications for potential fire ignition risk
TOCI_REMEDIATION_V2_1	Transmission Remediation	The purpose of this dataset is to field complete work notifications on Transmission assets
Distribution_Remediation_V1_0	Distribution Remediation	The purpose of this dataset is for contractors to field complete work notifications on Distribution assets
Form_1 (Aerial Distribution Inspections)	Aerial Distribution Inspections (ADI)	The purpose of this dataset was to capture the aerial-based inspection for Distribution Enhanced Overhead Inspection assets
Form_1 Notifications (Aerial Distribution Inspections)	Aerial Distribution Inspections (ADI) Notifications	The purpose of this dataset was to capture the work notification data identified by the aerial-based inspection for Distribution Enhanced Overhead Inspection assets
TOCI_Aerial_Inspection_V1_2	Aerial Transmission Inspections (ATI)	The purpose of this dataset was to capture the aerial-based inspection for Transmission Enhanced Overhead Inspection assets
TOCI_Aerial_Inspection_V1_2 Notifications	Aerial Transmission Inspections (ATI) Notifications	The purpose of this dataset was to capture the work notification data identified by the aerial-based inspection for Transmission Enhanced Overhead Inspection assets
Aerial Inspection Scope Areas	Aerial Inspection Scope Areas	The purpose of this dataset was to group distribution structures for aerial vendor scope packages
Aerial Inspection Flight Blocks	Aerial Inspection Flight Blocks	The purpose of this dataset is for aerial vendors to supply when and where they would be scheduling aerial capture of Transmission and Distribution assets and affected ZIP Codes, Cities, SCE Districts, and Supervisorial Districts
Fire_Perimeter	Fire_Perimeter	The purpose of this dataset is to visualize the perimeter of wildfire activity in an area to determine impacts. Data is collected remotely and updated in the field by SCE's fire management team.
Evacuation_Areas	Evacuation_Areas	The purpose of this dataset is to identify evacuation areas as a result of wildfire activity
PSPS_Outage_Areas	PSPS_Outage_Areas	The purpose of this dataset is to Identify the approximate outage area of circuits that may be impacted by a Public Safety Power Shutoff and to inform CalOES information on customers impacted.
PSPS_LFO	PSPS_LFO	The purpose of this dataset is Live Field Observations of weather and structure observations during PSPS event
PSPS_Patrol	PSPS_Patrol	The purpose of this dataset is PrePatrol of structures and circuits conditions on the Period of Concern list prior to PSPS Event.
Weather_Stations	Weather_Stations	The purpose of this dataset is to track and monitor changing weather conditions throughout SCE territory. To identify areas where weather conditions reach thresholds that could cause wildfires or structure damage.
SCE_Districts_NSEW	SCE Districts	The purpose of this dataset is to visualize SCE district boundaries
SCE_GridTerritory	SCE Transmission Grids	The purpose of this dataset is to visualize SCE Transmission Grid boundaries
SCE_HighFireRiskArea	SCE_HighFireRiskArea	SCE's Current High Fire Risk Layer updated as of 20190723 with reduced Legacy Bulletin 322 areas
SCE_Territory_Boundary	SCE Territory Boundary	The purpose of this dataset is to visualize SCE's Territory boundary

Data Name	Description	Purpose
MB Municpalities	Michael Baker Municipalities	The purpose of this dataset is to visualize municipal boundaries
MB County	Michael Baker Counties	The purpose of this dataset is to visualize county boundaries
MB_Zip_Codes	Michael Baker Zip Code	The purpose of this dataset is to visualize Zip Code boundaries
cGIS Distribution Circuits GG CONCAT	cGIS Distribution Circuits GG CONCAT	The purpose of this dataset is to visualize a simplified view of cGIS Distribution Circuits.
cGIS Transmission Lines GG CONCAT	cGIS Transmission Lines GG CONCAT	The purpose of this dataset is to visualize a simplified view of cGIS Transmission Circuits.
OMS Circuits	Outage Management System Circuits	The purpose of this dataset is to visualize a view in AGOL of SCE's outage management system's Distribution Circuits.
GOCI	Generation Off-Cycle Inspections	The purpose of this dataset was to capture the inspection data for Generation Overhead Inspection assets
Covered Conductor	CoveredCOnductor_OMS	The purpose of this dataset is to view the location of covered conductor from the outage management system
GESW_STRDEV_Dissolve_WGS1984	GESW DEVICES STROKED ANNOTATION	The purpose of this dataset is to visualize GESW Device locations and annotation
Reax+ Grid Score	ReaxPlusGridscore	"REAX" refers to a measure of wildfire consequence for each circuit, structure and segment within SCE's High Fire Risk Area (HFRA)1. For every structure, segment and circuit, REAX simulates how a fire that starts within 100 meters of those assets would spread (area), how large it would be (volume), how many structures would be impacted (e.g., buildings), and the fire risk to those structures (fire volume x impacted structures). These are different measures of the consequence of a wildfire if one were to occur within HFRA near SCE's overhead facilities. The output is in a GIS data format (GeoTiff rasters, .tif).
HD Camera Locations	HD Camera Locations	The purpose of this dataset is to visualize the location of SCE's HD cameras throughout the service territory used to monitor conditions.
SCE Work Locations	SCE Work Locations	The purpose of this dataset is to visualize SCE Work Locations
SCE FIM Grid	SCE Facility Inventory Mapping (FIM) Grids	The purpose of this dataset is to visualize SCE Facility Inventory Mapping (FIM) Grids for referencing FIM Maps
Local Coastal Plan	Local Coastal Plan	The purpose of this dataset is to visualize Local Coastal Plan boundaries
Government Lands	Government Lands	The purpose of this dataset is to visualize Government/Public Land boundaries
Fire_Weather_Zone	CA,AZ,NV Fire Weather Zone	The purpose of this dataset is to visualize State Identified Fire Zones.
SCE_Fire_Zones	SCE Identified Fire Zones	The purpose of this dataset is to visualize the SCE Identified Fire Zones Based on SCE's Territory
NWS_Watches_Watches_and_Warnings	National Weather Service Watches, Warnings, and Advisories	Watches, warnings and advisories for the U.S. A watch indicates that conditions are favorable for the particular weather event in and near the Watch area, and which may pose a risk to life and property. Watches are issued up to 48 hours in advance with forecaster confidence around 50%. Warning/Advisory Indicates that a particular weather event is imminent or occurring. Advisories are issued if the weather event will lead to nuisance conditions, while Warnings are issued for significant weather events which will pose a risk to life and property. Warnings and Advisories are issued up to 48 hours in advance with forecaster confidence of at least 80%.
SCE_Substations	SCE Substation locations	The purpose of this dataset is to visualize SCE Substation Locations
Fire_Threat_Area_CalFire	CalFire_Fire_Threat_Areas	The purpose of this dataset is to visualize the CalFire threat areas with a focus on threat to people
ClimateZones_CA_CEC	California Energy Commission Climate Zones	The purpose of this dataset is to visualize the Statewide layer of California's sixteen separate climate regions that affect building energy use for heating and cooling.

Table 13: Current baseline state of service territory and utility equipment					
Land use	**Characteristic tracked**	**In non-HFTD**	**In HFTD Zone 1**	**In HFTD Tier 2**	**In HFTD Tier 3**
In urban areas	Circuit miles	17,159.88	0.85	1,126.19	1,452.86
	Circuit miles in WUI	3,446.19	0.48	749.70	1,363.52
	Number of critical facilities	36,757	6	2,550	3,923
	Number of critical facilities in WUI	7,305	5	1,676	3,489
	Number of customers	3,790,432	545	209,126	323,745
	Number of customers in WUI	778,819	525	149,646	294,005
	Number of customers belonging to access and functional needs populations	1,032,899	32	30,783	44,840
	Number of customers belonging to access and functional needs populations in WUI	206,260	21	23,970	41,362
	Circuit miles of overhead transmission lines	1,953.85	0.08	217.92	223.98
	Circuit miles of overhead transmission lines in WUI	293.15	0.00	130.59	182.31
	Circuit miles of overhead distribution lines	15,206.04	0.77	908.27	1,228.89
	Circuit miles of overhead distribution lines in WUI	3,153.05	0.48	619.12	1,181.22
	Number of substations	231	0	23	17
	Number of substations in WUI	47	0	16	16
In rural areas	Circuit miles	8,536.18	0.46	2,127.05	3,723.50
	Circuit miles in WUI	3,262.55	0.04	1,491.89	2,729.02
	Number of critical facilities	7,692	0	1,456	2,894
	Number of critical facilities in WUI	2,397	0	1,036	2,348
	Number of customers	225,587	20	53,624	92,195
	Number of customers in WUI	94,950	16	44,971	83,235
	Number of customers belonging to access and functional needs populations	37,100	4	7,741	9,410
	Number of customers belonging to access and functional needs populations in WUI	19,384	1	6,718	8,676
	Circuit miles of overhead transmission lines	1,353.32	0.09	453.91	771.52
	Circuit miles of overhead transmission lines in WUI	333.80	0.00	283.81	419.23
	Circuit miles of overhead distribution lines	7,182.86	0.37	1,673.14	2,951.98
	Circuit miles of overhead distribution lines in WUI	2,928.75	0.04	1,208.08	2,309.79
	Number of substations	125	0	18	32

Land use	Characteristic tracked	In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
	Number of substations in WUI	25	0	10	26
In highly rural areas	Circuit miles	12,178.84	0.84	2,757.67	2,992.26
	Circuit miles in WUI	93.66	0.00	34.64	43.60
	Number of critical facilities	21,784	0	1,767	2,598
	Number of critical facilities in WUI	98	0	22	32
	Number of customers	379,812	8	24,861	37,774
	Number of customers in WUI	2,566	0	968	1,578
	Number of customers belonging to access and functional needs populations	44,535	0	2,492	2,674
	Number of customers belonging to access and functional needs populations in WUI	342	0	54	100
	Circuit miles of overhead transmission lines	5,161.27	0.02	1,285.50	1,399.53
	Circuit miles of overhead transmission lines in WUI	7.75	0.00	3.18	2.97
	Circuit miles of overhead distribution lines	7,017.57	0.81	1,472.17	1,592.74
	Circuit miles of overhead distribution lines in WUI	85.92	0.00	31.46	40.63
	Number of substations	420	0	62	49
	Number of substations in WUI	1	0	0	0

Table 14: Summary data on weather station count		
Weather station count type	**Current count**	**Unit (s)**
Number of weather stations (total)	482	Total number located in service territory and operated by utility
Number of weather stations (normalized)	0.009259	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory
Number of weather stations in non-HFTD (total)	34	Total number located in non-HFTD service territory and operated by utility
Number of weather stations in non-HFTD (normalized)	0.000898	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory
Number of weather stations in HFTD Zone 1 (total)	0	Total number located in HFTD Zone 1 service territory and operated by utility
Number of weather stations in HFTD Zone 1 (normalized)	0	Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory
Number of weather stations in HFTD Tier 2 (total)	145	Total number located in HFTD Tier 2 service territory and operated by utility
Number of weather stations in HFTD Tier 2 (normalized)	0.024123	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory
Number of weather stations in HFTD Tier 3 (total)	303	Total number located in HFTD Tier 3 service territory and operated by utility
Number of weather stations in HFTD Tier 3 (normalized)	0.037093	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory

ATTACHMENT 5

Liberty response to data request CalAdvocates-LIB-A2506017-029, October 29, 2025 and excerpt of internal attachment

Liberty Utilities (CalPeco Electric) LLC
933 Eloise Avenue
South Lake Tahoe, CA 96150
Tel: 800-782-2506
Fax: 530-544-4811

October 29, 2025

Liberty Utilities (CalPeco Electric) LLC

A.25-06-017
WEMA

The Public Advocates Office

Data Request No.:	CalAdvocates-LIB-A2506017-029
Requesting Party:	Public Advocates Office
Originator:	Amanda Asadi, Amanda.Asadi@cpuc.ca.gov
	Aaron Louie, Aaron.Louie@cpuc.ca.gov
	Patrick Huber, Patrick.Huber@cpuc.ca.gov
cc:	Matthew Karle, Matthew.Karle@cpuc.ca.gov
	Cal Advocates Wildfire Discovery CalAdvocates.WildfireDiscovery@cpuc.ca.gov
Date Received:	October 15, 2025
Due Date:	October 29, 2025

Attachments to these responses contain information marked confidential in accordance with applicable law and regulation. The basis for confidentiality is set forth in accompanying confidentiality declaration. Public disclosure is restricted.

Situational Awareness

REQUEST NO. 1:

In Liberty's response to Data Request CalAdvocates-LIB-A2506017-017, Question 2, Liberty states:

> "FPI forecasts were used to guide operation and maintenance crew activities, and were not used for PSPS decision-making or system operations. Please refer to attachment LU Fire Prevention Plan 10-9-2020.pdf, which described operating procedures for the five categories of FPI risk conditions."

a) Elaborate on why FPI forecasts were used to guide operation activities but not used for system operations.
b) Other than the activities listed in the Fire Prevention Plan,[1] what else did Liberty use its FPI forecasts for?
c) When did Liberty start generating FPI forecasts?
d) When did Liberty start using its FPI forecasts?
e) Provide a copy of all of Liberty's FPI forecasts for the Topaz 1261 circuit from the time Liberty began generating FPI forecasts through November 10, 2020.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Subject to and without waiving its objections, Liberty responds as follows:

a) Because the Fire Potential Index forecasts generated on a daily basis were intended to assess fire risk based on correlation with fire occurrence and final fire size of all causes, it was a useful guide for Liberty's operation and maintenance crew activities to mitigate the risk of fire from field work during higher fire risk periods (e.g., use of equipment, off-road driving, assigning fire safety personnel, etc.). The FPI scale differentiated fire risk as low, moderate, high, very high, and extreme, which was not at the level of granularity needed to make PSPS decisions. As explained in *Liberty-03: Prudence of Operations* (at pp. 37-39), Liberty's PSPS decision-making was based on quantitative thresholds for three criteria also intended to capture the risk of wildfire ignition and spread: Energy Release Component; wind gusts; and Fosberg Fire Weather Index. For reclose blocking restrictions, Liberty enabled "fire mode" or non-reclose mode on a seasonal basis based on a variety of factors and with input from its fire science and risk modeling consultant, and did not implement those restrictions based on the daily FPI.
b) The Fire Prevention Plan set forth the comprehensive list of activities and operating restrictions based on FPI levels.
c) Liberty does not generate FPI forecasts internally. In 2019 Liberty hired a fire science and risk modeling consultant to develop an FPI methodology and in 2020, Liberty began populating its fire weather dashboard with FPI forecasts calculated by the U.S. Forest Service Wildland Fire Assessment System ("WFAS") based on two National Fire Danger Rating System ("NFDRS") indices—Energy Release Component ("ERC") and Burning Index ("BI").
d) See Liberty's response to subpart (c).
e) Liberty does not have access to fire weather dashboard data from the specified time frame given the passage of time.

REQUEST NO. 2:

In Liberty's response to Data Request CalAdvocates-LIB-A2506017-008, Question 8a, Liberty states "Liberty's fire science and risk modeling consultant validated its FPI tool by comparing forecasted conditions with real-time weather station observations and archived forecast data."

a) Who was Liberty's fire science and risk modeling consultant?

[1] See FPP at p. 5-6.

b) Did Liberty's fire science and risk modeling consultant provide Liberty with documentation showing that it had validated its FPI tool by comparing forecasted conditions with real-time weather station observations and archived forecast data? If so, provide a copy of that documentation.
c) If the answer to subpart (b) is no, explain why not.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed and as to the term "validate." Liberty understands the term "validate" to refer to the comparison of predicted outcomes with actual outcomes to assess the accuracy of a model. Subject to and without waiving its objections, Liberty responds as follows:

a) Liberty's fire science and risk modeling consultant as of November 17, 2020 was Reax Engineering, and specifically Dr. Chris Lautenberger (now at CloudFire).
b) Liberty understands that its fire science and risk modeling consultant monitored FPI forecasts, but did not specifically perform "validations" of the FPI tool on an ongoing basis. Rather, the consultant performed validations of the PSPS predictive tool through monitoring and comparison of weather forecast models with observed conditions. Liberty will amend its responses to CalAdvocates-LIB-A2506017-008.

   Because Liberty's FPI forecast differentiated fire risk as low, moderate, high, very high, and extreme, it could not be "validated" by comparison to specific weather observations. For details regarding Reax's ongoing monitoring of FPI forecasts, please refer to subtask number eight of Reax's proposed scope of work for the development of a Fire Potential Index for Liberty, on page 3 of confidential attachment *CONFIDENTIAL-2019-10-08 - Reax Liberty Utilities FPI proposal_Redacted.pdf.*
c) N/A

REQUEST NO. 3:

In Liberty's response to Data Request CalAdvocates-LIB-A2506017-008, Question 8b, Liberty states "Validation [of Liberty's FPI tool] performed on an ongoing basis through monitoring and comparison of forecasted versus observed conditions."

a) Provide documentation showing that this validation was performed on an ongoing basis.
b) Did Liberty perform any review of these validations? If so, provide documentation showing Liberty's review.
c) If the answer to subpart (b) is no, explain why not.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed and as to the term "validation." Liberty understands the term "validation" to refer to the comparison of predicted outcomes with actual outcomes to assess the accuracy of a model. Subject to and without waiving its objections, Liberty responds as follows:

a) Please refer to Liberty's response to Question 2(b) of this set of data requests.
b) See Liberty's response to subpart (a).
c) See Liberty's response to subpart (a).

REQUEST NO. 4:

Regarding Liberty's response to Data Request CalAdvocates-LIB-A2506017-017, Question 2, Liberty's attachment *Fire Prevention Plan for Overhead Electric Facilities* dated October 9, 2020:

a) Was this the version of Liberty's Fire Prevention Plan in effect on November 17, 2020?
b) If the answer to subpart (a) is no, provide the copy of the Fire Prevention Plan that was in effect on November 17, 2020.

RESPONSE:

a) Yes.
b) N/A

REQUEST NO. 5:

In the Application, Exhibit Liberty-03, page 35, Liberty states: "Liberty installed ten weather stations in 2019 and an additional 19 weather stations in 2020."

a) Prior to the Mountain View Fire ignition, what did Liberty use its weather station data for?
b) Prior to the Mountain View Fire ignition, when did Liberty observe its real-time weather station data?
c) Did Liberty have a dashboard or other user interface that it used to pull and observe real-time weather station data? If yes, provide documentation showing how employees used this dashboard or other user interface.
d) If the answer to subpart (c) is no, explain how Liberty would be able to observe its real-time weather station data.
e) Prior to the Mountain View Fire ignition, did Liberty ever use data from its weather stations for any non-forecasting activities? If yes, explain what these were and provide documentation showing how Liberty used this data.
f) If the answer to subpart (e) is no, explain why.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Subject to and without waiving its objections, Liberty responds as follows:

a) Prior to November 17, 2020, Liberty used its weather station data to monitor weather conditions across its service territory, to validate and improve the accuracy of forecast models, and, in the event of a PSPS activation, to guide the ultimate decision to de-energize along with other inputs such as field observations.
b) In addition to general monitoring of weather conditions across its service territory, Liberty increased its monitoring of real-time weather data during PSPS events and in anticipation of and during severe weather conditions such as winter storms.
c) Liberty objects as vague and ambiguous to the term "documentation." Real-time weather station data reported by Liberty's weather stations are available on Western Weather Group's publicly available website: https://liberty.westernweathergroup.com/. This dashboard was generally available to Liberty employees. See Liberty's responses to subparts (a) and (b) of this Question for how Liberty used real-time weather data.

d) N/A
e) Liberty's fire science and risk modeling consultant would meet with Liberty to review weather data after the occurrence of weather events such as wind, storm, and precipitation events on its system.
f) N/A

REQUEST NO. 6:

In Liberty's response to Data Request CalAdvocates-LIB-A2506017-017, Question 3, Liberty states:

"In addition, because the [Energy Release Component or ERC] percentile forecasts displayed on Liberty's fire weather dashboard were obtained from the U.S. Forest Service Wildland Fire Assessment System ("WFAS"), it is possible that some data in the ERC tables did not display correctly on occasion due to delays or other issues with WFAS reporting, such as when there was an outage in the WFAS."

a) Did Liberty have a protocol in place to address delays or other issues with WFAS reporting? If so, provide a copy of the protocol.
b) If the answer to subpart (a) is no, explain why not.
c) Did Liberty document when these delays or other issues with WFAS reporting occurred? If so, provide a copy of a record prior to the Mountain View Fire ignition showing the most recently documented issue related to delayed or other issues with WFAS reporting.
d) If the answer to subpart (c) is no, explain why not.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Subject to and without waiving its objections, Liberty responds as follows:

a) Liberty did not have a formal protocol to address delays or other WFAS reporting issues. Liberty's fire science and risk modeling consultant helped monitor system reliability and Liberty communicated with him regarding issues on an as-needed basis.
b) See Liberty's response to subpart (a).
c) Liberty is not aware of records formally tracking delays or other issues with WFAS reporting.
d) See Liberty's response to subpart (a).

REQUEST NO. 7:

In Liberty's 2020 Wildfire Mitigation Plan Annual Report on Compliance, March 31, 2021, at 3 states:

"In 2020, Liberty installed 19 out of 20 targeted weather stations, bringing the total number of weather stations to 29. Fuel moisture sensors were also added to weather stations installed in 2020 and retrofitted to several of the locations installed in 2019. Fuel moisture sensors can help to validate fuel moisture conditions, which is crucial to accurately predict wildfire risk in local areas."

a) Explain why Liberty was unable to install the 20th weather station in 2020.
b) Where was this weather station located, and did Liberty eventually install it?

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed and assuming facts. Subject to and without waiving its objections, Liberty responds as follows:

a) Liberty targeted the installation of 30 weather stations between 2019 and 2020. Liberty ultimately installed 29 weather stations during that timeframe. After diligent inquiry and reasonable search, Liberty has not located records as to why a 30th weather station was not installed by the end of 2020. After 2020, the next weather station Liberty installed on its system was LIB-3133 (Tahoe-7300 Sugar Pine Point).
b) See Liberty's response to subpart (a).

REQUEST NO. 8:

In Liberty's 2020 Wildfire Mitigation Plan Annual Report on Compliance, March 31, 2021, at 3 states:

In 2020, Liberty installed 19 out of 20 targeted weather stations, bringing the total number of weather stations to 29. Fuel moisture sensors were also added to weather stations installed in 2020 and retrofitted to several of the locations installed in 2019. Fuel moisture sensors can help to validate fuel moisture conditions, which is crucial to accurately predict wildfire risk in local areas.

Provide an Excel file which identifies each Liberty's weather station that Liberty retrofitted with fuel moisture sensors with the following information:

a) Unique ID number or identifier;
b) Name
c) Geographic location
d) Date that weather station was installed
e) Date that Liberty installed the fuel moisture sensor
f) Whether or not the station or fuel moisture sensor was not working
g) If the station or fuel moisture sensor had issues, explain what did Liberty do to address the issue, when did Liberty realize the issue had occurred, and when did Liberty resolve the issue.

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome. Subject to and without waiving its objections, Liberty responds as follows: See attachment *CalAdvocates-LIB-A2506017-029-Q8.xlsx* for the information requested in subparts (a)-(d) for the ten Liberty weather stations installed between May 2019 and April 2020. The information requested in subparts (e)-(g) is not maintained in the ordinary course of business and is not readily accessible. Liberty has included a column with information regarding the earliest fuel moisture readings available in archival data for these stations to provide insight regarding the timing of installation of fuel moisture sensors for the Liberty weather stations installed between May 2019 and April 2020. Liberty constructed this spreadsheet using publicly available archival data of Liberty's weather stations at https://liberty.westernweathergroup.com/.

Control Center

REQUEST NO. 9:

In Liberty's response to Data Request CalAdvocates-LIB-A2506017-017, Question 4e and 4f, Liberty states:

"Liberty's operations team in California was responsible for monitoring Liberty's fire weather dashboard and communicating PSPS and other operational decisions to Liberty Utilities' System Control Center in New Hampshire as needed. Please refer to Liberty's responses to Questions 1-2 of this set of data requests and Liberty's response to CalAdvocates-LIB-A250617-006, Question 3."

a) Clarify the name of Liberty's operations team in California who was responsible for monitoring Liberty's fire weather dashboard and communicating PSPS and other operational decisions to Liberty's Control Center.
b) On each of the days leading up to the Mountain View Fire ignition, starting from November 11, 2020, up through November 17, 2020, how many staff in Liberty's operations team in California did Liberty have actively monitoring Liberty's fire weather dashboard and communicating PSPS and other operational decisions to Liberty's Control Center?
c) Identify any times, from November 11, 2020 through November 17, 2020, when there were no staff on duty in Liberty's operations team in California
d) From November 11, 2020 up through November 17, 2020, did Liberty's operations team in California actively monitor Liberty's weather station data in real-time. If yes, elaborate. If not, explain why not.
e) From November 11, 2020 up through November 17, 2020, where was Liberty's operations team in California located?
f) How did Liberty's operations team in California use Liberty's FPI Forecasts to inform its decision-making?
g) How did Liberty's operations team in California use Liberty's real-time weather data (including, but not limited to, weather station data) to inform its decision-making?

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Subject to and without waiving its objections, Liberty responds as follows: Liberty did not have a PSPS activation within the specified time frame and did not activate its Incident Management Team (IMT) prior to the Mountain View Fire. Liberty understands the term "operations team" to refer generally to its operations personnel in California, not the IMT that would have been activated during a PSPS event.

a) Liberty's California operations team included the Senior Manager of Wildfire Prevention, the Vice President of Operations, the Director of Operations, and the Emergency Management Manager. This team was responsible for monitoring Liberty's fire weather dashboard and communicating with Liberty's System Control Center and other personnel regarding potential PSPS events.
b) Liberty's fire weather dashboard and real-time weather data were accessible on publicly available websites and available to all employees at all times. Liberty does not have

specific records tracking when and how many operations personnel accessed the data at any given time. See Liberty's response to subpart (a).

c) There would be no time during the specified time frame when Liberty had no California operations personnel available.
d) See Liberty's response to subpart (b).
e) Due to the Covid-19 pandemic, much of Liberty's California operations personnel worked virtually within the specified timeframe. A limited number of operations personnel worked in Liberty's two offices Tahoe Vista and South Lake Tahoe within the specified timeframe.
f) Please refer to Liberty's response to CalAdvocates-LIB-A2506017-017, Question 2 and attachment *LU Fire Prevention Plan 10-9-2020.pdf* contained therein.
g) See Liberty's response to Question 5 of this set of data requests.

REQUEST NO. 10:

In the Application, Exhibit Liberty-03, page 43, Liberty states:

"In accordance with GO 166, Liberty had an Emergency Management Plan ("EMP") in 2020 that contained policies and procedures to enhance Liberty's ability to respond to and recover from emergencies of all levels, including natural disasters."

a) Provide a copy of Liberty's Emergency Management Plan that was in effect on November 17, 2020 if different from the copy provided in Liberty's response to Data Request CalAdvocates-LIB-A2506017-002, Question 2.
b) Identify the date on which the EMP in effect on November 17, 2020 was adopted.
c) Was Liberty's operations team in California required to be trained on Liberty's EMP?
d) Were Liberty's Control Center System Operators and Managers required to be trained on Liberty's EMP?

RESPONSE:

a) Liberty is working to confirm that attachment *Corporate Emergency Management Plan_2020.docx* provided in response to CalAdvocates-LIB-A2506017-002, Question 2 was the version in effect on November 17, 2020 and will update this response accordingly.
b) See Liberty's response to subpart (a).
c) Yes, Liberty requires employees who are part of Liberty's Incident Management Team to be trained on its EMP, consistent with GO 166.
d) System Control Center personnel are included in Liberty's emergency management training and exercises.

Public Safety Power Shutoffs (PSPS)

REQUEST NO. 11:

Regarding Liberty's *2019 PSPS Post-Event Report for September 10 to September 14, 2019,* December 31, 2019:

a) Provide a copy of all the forecasts that Liberty's Tahoe Fire Weather Monitoring tool provided for each day from September 7, 2019 through September 14, 2019.
b) For this event, did Liberty use real-time weather station data in its PSPS decision-making? If so, explain.
c) If the answer to subpart (b) is no, explain why not.
d) Did Liberty's operations team in California alert Liberty's Control Center of the potential PSPS event?
e) What was Liberty's Control Center's role in this event?

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as unduly burdensome to the extent it seeks information not maintained by Liberty in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) Liberty does not have access to fire weather dashboard data from the specified time frame given the passage of time.
b) As set forth in its Post Event Report, see attachment *PSPS Post Event Report for September 10 to September 14, 2019.pdf*, Liberty made the decision to activate and, in turn, de-mobilize its event team based on forecast data.
c) Please refer to attachment *PSPS Post Event Report for September 10 to September 14, 2019.pdf*.
d) Liberty did not locate specific records documenting its communications with the System Control Center during this potential PSPS event, but its PSPS event team would have been in contact with the System Control Center regarding this potential PSPS event.
e) In accordance with its usual role of monitoring Liberty's electric system and coordinating with personnel in California to respond to issues that arise, Liberty's System Control Center would have been responsible for executing operational changes communicated to it by the PSPS event team in California.

REQUEST NO. 12:

Regarding Liberty's *PSPS Report on the November 21, 2018 De-Energization Event*:

a) Provide a copy of all the forecasts that Liberty used from November 15, 2018 through November 21, 2018.
b) For this event, did Liberty use real-time weather station data in its PSPS decision-making? If so, explain.
c) If the answer to subpart (b) is no, explain why not.
d) Where was Liberty's Control Center located?
e) Did Liberty's operations team in California alert Liberty's Control Center of the potential PSPS event?
f) What was Liberty's Control Center's role in this event?

RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as unduly burdensome to the extent it seeks information not maintained by Liberty

in the ordinary course of business. Subject to and without waiving its objections, Liberty responds as follows:

a) Please refer to attachment *November 21, 2018 De-Energization Event.pdf* and Attachment 1 contained therein for forecast information Liberty used in the lead up to the November 21, 2018 de-energization event.
b) Liberty objects to the term "PSPS decision-making" as this event predated Liberty's formal PSPS protocol. Please refer to attachment *November 21, 2018 De-Energization Event.pdf* for discussion of Liberty's decision-making based on forecast and actual conditions. At the time of this de-energization event on November 21, 2018, Liberty had not yet installed its own weather stations.
c) See Liberty's response to subpart (b).
d) As described in *Liberty-03: Prudence of Operations* (at p. 32), during the specified time frame, Liberty was in the process of transitioning its system control functions from NV Energy in Nevada to Liberty Utilities in New Hampshire. As of November 21, 2018, NV Energy's system control center operated two of the three de-energized lines (the 625 and 111 Lines) and Liberty's System Control Center in New Hampshire operated the 3400 laterals.
e) Liberty did not locate specific records documenting its communications with the System Control Center during this proactive de-energization event, though the System Control Center would have executed circuit de-energization and re-energization for this event.
f) See Liberty's response to subpart (e).

Station_ID	Station_Name	Latitude	Longitude	Install_Date	Earliest Date When Fuel Moisture Data Was Reported
LIB-3101	GLS7600-Walden	39.331395	-120.073860	5/1/2019	8/26/2020
LIB-3102	TAH7300-DL Bliss	38.975612	-120.100274	5/2/2019	8/7/2020
LIB-3103	MUL1296-Woodfords	38.782650	-119.817862	5/17/2019	1/17/2021
LIB-3104	BKY4201-Summit	39.261196	-120.072017	6/10/2019	7/23/2020
LIB-3105	TPZ1261–Park Ranch	38.641203	-119.520232	5/20/2019	2/17/2021
LIB-3106	TPZ1261-Walker	38.533924	-119.504162	5/31/2019	3/10/2021
LIB-3107	Meyers3400-Uplands	38.895632	-120.037443	4/10/2020	2/17/2021
LIB-3108	111Line-Columbine Trail	38.890617	-119.959654	6/10/2019	6/8/2021
LIB-3109	POR31-Iron Horse	39.778975	-120.502840	6/17/2019	1/14/2021
LIB-3110	619Line-Sierra Valley West	39.759370	-120.374084	6/24/2019	4/9/2021

ATTACHMENT 6

Liberty response to data request
CalAdvocates-LIB-A2506017-008, September 5, 2025

Liberty Utilities (CalPeco Electric) LLC

A.25-06-017
WEMA

The Public Advocates Office

Data Request No.:	CalAdvocates-LIB-A2506017-008
Requesting Party:	Public Advocates Office
Originator:	Herman Eng, Herman.Eng@cpuc.ca.gov
cc:	Aaron Louie, Aaron.Louie@cpuc.ca.gov
	Patrick Huber, Patrick.Huber@cpuc.ca.gov
Date Received:	August 21, 2025
Due Date:	September 5, 2025

Question 1

Please list all external or third-party sources of wind and weather information that Liberty used for situational awareness and to inform its operations (e.g., Public Safety Power Shutoff (PSPS)) as of November 17, 2020.

Response to Question 1:
As of November 17, 2020, Liberty had a range of open-source and publicly available weather forecasting tools and models to support situational awareness and inform operational decisions, through its third-party fire science and risk modeling consultant. These sources included:

- National Weather Service (NWS)
- PyreCast
- Wildland Fire Assessment System (WFAS)
- Weather forecast models:
    - ECMWF (European Centre for Medium-Range Weather Forecasts)
    - HRRR (High-Resolution Rapid Refresh)
    - NAM 3km and NAM 12km (North American Mesoscale Model)
    - GFS 0.125° and GFS 0.250° (Global Forecast System)
    - NBM (National Blend of Models)

Question 2
Please list all internal tools or methodologies that Liberty used to measure and estimate wind speeds and weather at the time of the Mountain View Fire ignition.

Response to Question 2:
As of November 17, 2020, the tools Liberty used included its PSPS predictive tool, which provided forecasts for weather conditions relative to Liberty's PSPS thresholds. Liberty's

weather stations and field fuel moisture sampling also provided information on wind speeds and weather conditions, which were used as inputs into Liberty's FPI tool and forecast models behind Liberty's PSPS predictive tool and to guide de-energization decisions in the event of a PSPS activation. Liberty utilized a fire weather dashboard (https://tahoefireweather.com/) to monitor forecasted weather conditions across its service territory.

Question 3

For the period from 2010 through 2020:

a) Please list the dates that Liberty estimates had sustained wind speeds of more than 20 miles per hour (mph) within a five-mile radius of the Mountain View Fire ignition site.
b) Please list the dates that Liberty estimates had sustained wind speeds of more than 60 mph within a five-mile radius of the Mountain View Fire ignition site.

Response to Question 3:

Liberty objects to this Question as burdensome to the extent it seeks information not maintained in the ordinary course of business. Liberty further objects to this Question as overbroad to the extent it seeks information prior to the start of Liberty's operation in approximately 2011, when it purchased the utility system from NV Energy. Liberty further objects to this Question as vague and ambiguous as to the phrase "the Mountain View Fire ignition site." Subject to and without waiving its objections, Liberty responds as follows:

Liberty understands the phrase "the Mountain View Fire ignition site" to refer to the area of the Subject Span (the span between Pole 266731 ("West Pole") and Pole 40288 ("East Pole")) as described in *Liberty-03: Prudence of Operations*. As of November 17, 2020, there were three weather stations within an approximate five-mile radius of the Mountain View Fire ignition site: LIB-3106/LIB06; LIB-3130/LIB26; and Walker RAWS. Data from all three weather stations are publicly available via MesoWest: https://mesowest.utah.edu/. Data from the two Liberty weather stations are also publicly available from Western Weather Group: https://liberty.westernweathergroup.com/search.

Question 4

When (i.e., approximately what date and time) did Liberty become aware of the likelihood of hazardous weather conditions (i.e., warm temperatures, high winds, and low humidity combined with dry fuels) occurring on November 17, 2020?

Response to Question 4:

Liberty objects to this Question as vague and ambiguous as framed. Subject to and without waiving its objections, Liberty responds as follows: Based on weather forecasts, Liberty was not aware of any heightened risk of wildfires on November 17, 2020. As explained in *Liberty-03: Prudence of Operations*, Part VI.B.2, the National Weather Service (NWS) issued a High Wind Warning for November 17, 2020 but did not issue a Red Flag Warning and its briefings in the days leading up to November 17, 2020 did not indicate any heightened wildfire threat. *See* Liberty-03 at 40. Likewise, the forecast Fire Potential Index for the Topaz zone ranged from "Low" to "Moderate," meaning there was no anticipated elevated fire threat conditions. *See* Liberty-03 at 34-35 and the attachment *FPI Forecasts.pdf*.

Question 5

Please provide the information in the table below regarding how many Liberty-owned weather stations Liberty has in its service territory, both on November 17, 2020 and at the current time, separated by High Fire-Threat District (HFTD) tier.
Number of weather stations in Liberty's service territory

Date	Non HFTD	HFTD Tier 2	HFTD Tier 3
November 17, 2020			
July 31, 2025			

Response to Question 5:
Number of weather stations in Liberty's service territory

Date	Non HFTD	HFTD Tier 2	HFTD Tier 3
November 17, 2020	3	25	1
July 31, 2025	5	33	1

Question 6
Regarding Liberty's weather station network:

a) As of November 17, 2020, how did Liberty determine how many weather stations it should install and where to place them?
b) Provide documentation from 2020 showing Liberty's weather station siting criteria.
c) Have Liberty's standards for determining how many weather stations to install and where to place them changed between November 17, 2020 and the present? If so, describe the changes, including when those changes took place.

Response to Question 6:

a) As of November 17, 2020, Liberty had engaged a third-party expert consultant (Western Weather Group) to support installation of Liberty-owned weather stations, including determining the number of weather stations to install and their locations. As Liberty has explained in its Wildfire Mitigation Plan, the priority locations were chosen based on several factors, including existing weather stations providing publicly available data, gaps within Liberty's service area where a weather station would be beneficial, and the potential wildfire impact and prevailing weather trends in an area.
b) Please refer to Liberty's response to subpart (a).
c) No.

Question 7
In the Application, Exhibit Liberty-03, page 35, Liberty states:
Liberty installed ten weather stations in 2019 and an additional 19 weather stations in 2020. Enhanced collection of weather data provided valuable inputs and improved accuracy for Liberty's PSPS and FPI tools and helped Liberty plan for operations during extreme weather events.

a) Describe how Liberty used its weather station data as inputs for its PSPS operations as of November 17, 2020?
b) Describe how Liberty used its weather station data as inputs for its FPI tool as of November 17, 2020?

Response to Question 7:

a) As explained in *Liberty-03: Prudence of Operations*, Part VI.B.1, data from Liberty's weather stations provided inputs to the forecast models behind the PSPS predictive tool, developed with the assistance of a third-party fire science and risk modeling consultant. This weather station data also helped to validate and improve the accuracy of forecast models behind the PSPS predictive tool. In the event of a PSPS activation, live weather station observations, along with data from field observers, would guide the ultimate decision to de-energize.
b) Liberty used weather station data including temperature, humidity, wind speed, and fuel moisture readings as inputs to its FPI tool, which classified fire threat levels and supported situational awareness.

Question 8

In the Application, Exhibit Liberty-03, page 34, Liberty states:
Liberty's FPI tool provided a seven-day forecast for 11 different geographic zones across Liberty's service area, ranking fire risk conditions on a five-category scale: Low, Moderate, High, Very High, and Extreme.

a) Explain how Liberty ensured the accuracy and validity of its Fire Potential Index (FPI) tool.
b) How often did Liberty perform validation of its FPI tool?
c) Provide a copy of Liberty's seven-day forecast from each of the following days: November 11, 2020; November 12, 2020; November 13, 2020; November 14, 2020; November 15, 2020; November 16, 2020; and November 17, 2020.
d) As of November 2020, did Liberty have a method or protocol to calculate FPI in real-time?
e) If the answer to part (d) is yes, explain what real-time inputs were used and how Liberty measured those inputs.
f) If the answer to part (d) is no, explain why not.

Response to Question 8:

a) As explained in *Liberty-03: Prudence of Operations*, Liberty developed and implemented an FPI tool, with the help of a third-party fire science and risk modeling consultant. The FPI tool used multiple inputs such as fuel moisture, ambient temperature, relative humidity, and other data points, which were then translated into a scale of fire threat levels. Liberty's fire science and risk modeling consultant validated its FPI tool by comparing forecasted conditions with real-time weather station observations and archived forecast data.
b) Validation was performed on an ongoing basis through monitoring and comparison of forecasted versus observed conditions.
c) Liberty understands this subpart to be referring to seven-day FPI forecasts described in *Liberty-03: Prudence of Operations*. Please refer to attachment *FPI Forecasts.pdf* for

forecasts beginning at 0000 hours on November 11, 2020 to 1800 hours on November 17, 2020, in six-hour intervals for each of the 11 geographic zones in Liberty's service area.

d) Liberty had a fire weather dashboard (https://tahoefireweather.com/) that displayed FPI values by zone that was updated daily.
e) Liberty used inputs measured by weather stations for temperature, relative humidity, wind speed, and fuel moisture as well as field fuel moisture sampling to calculate FPI.
f) N/A

Liberty Utilities Fire Potential Index Forecast for 11/11/20 - 11/17/20

Zone	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

Liberty Utilities Energy Release Component Forecast for 11/11/20 - 11/17/20

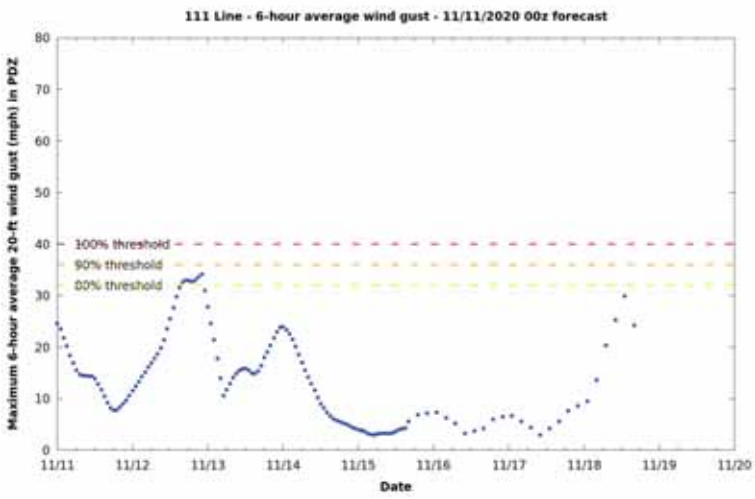
Zone	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	59.0	46.0	38.0	34.0	32.0	30.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

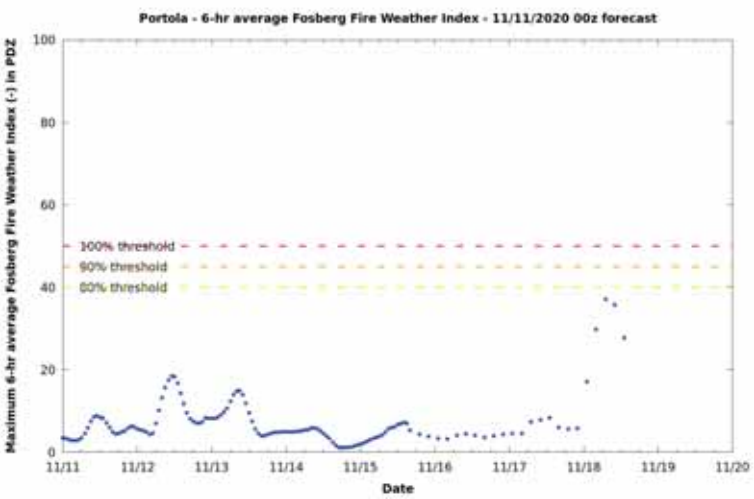
Liberty Utilities Fire Weather Summary Plots - 11/11/2020 00z forecast

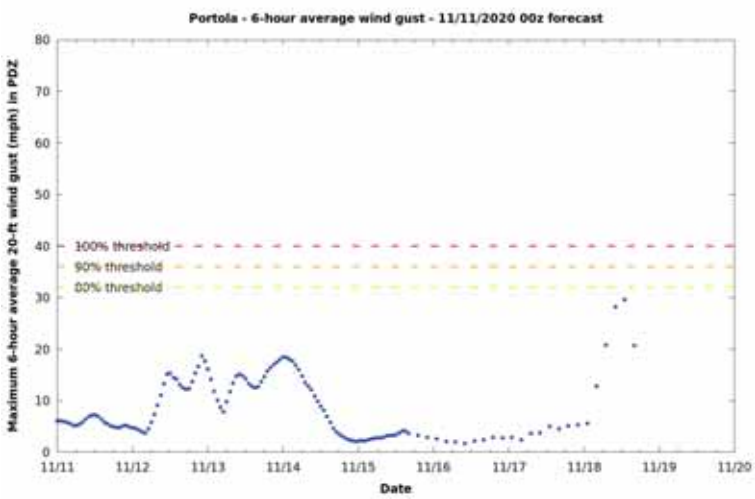
111 Line



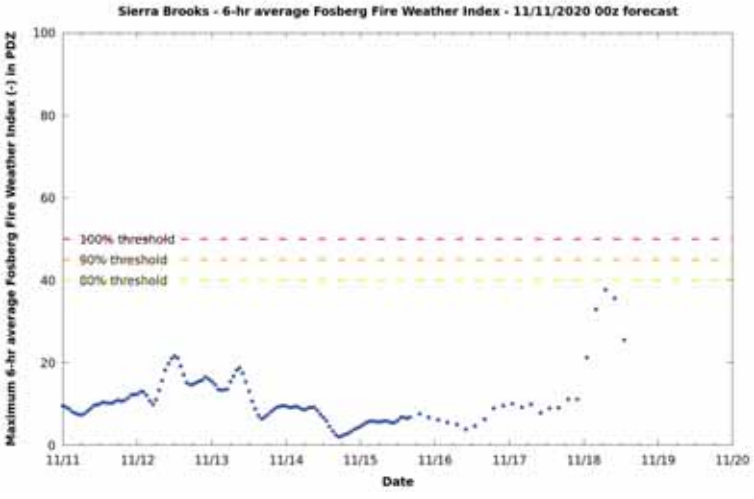


Portola



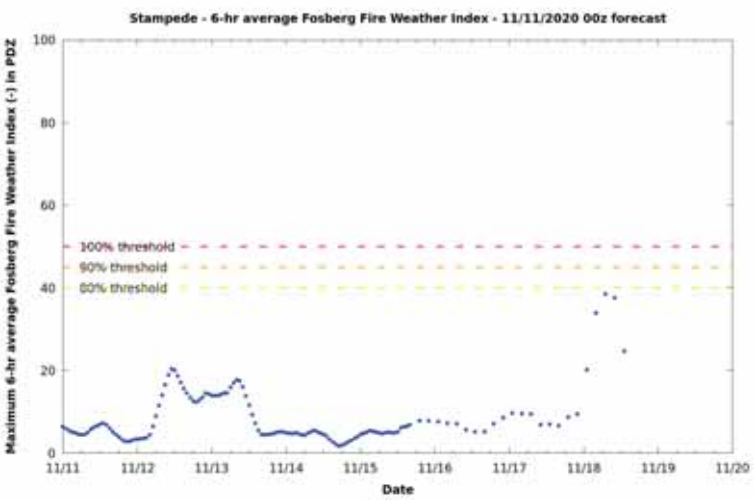


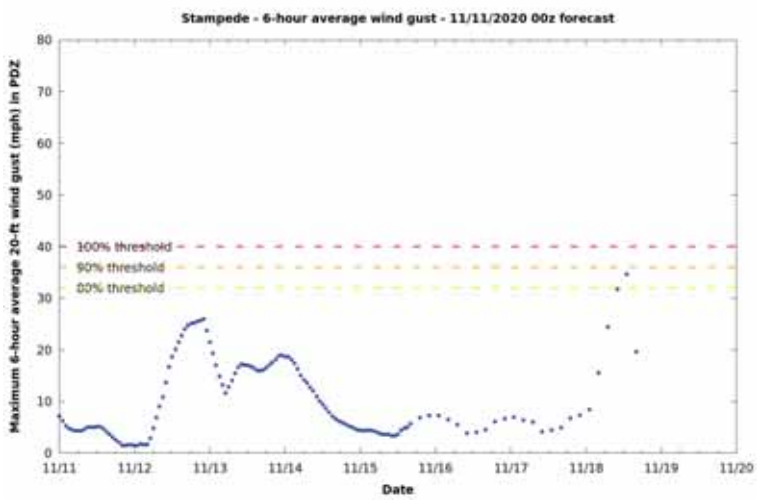
Sierra Brooks



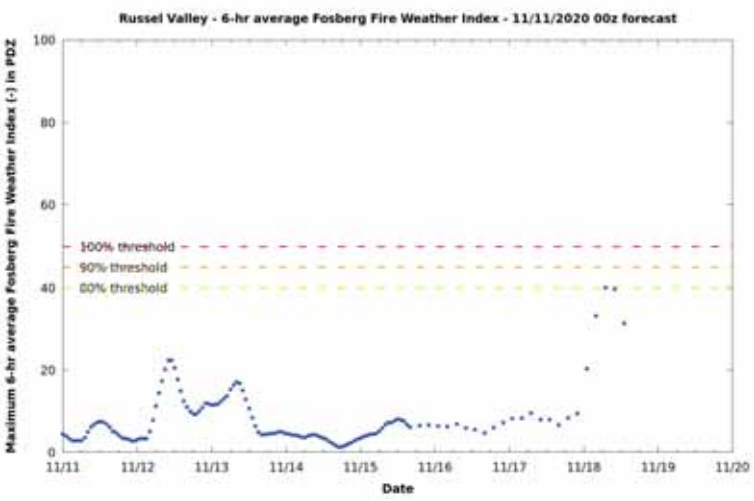


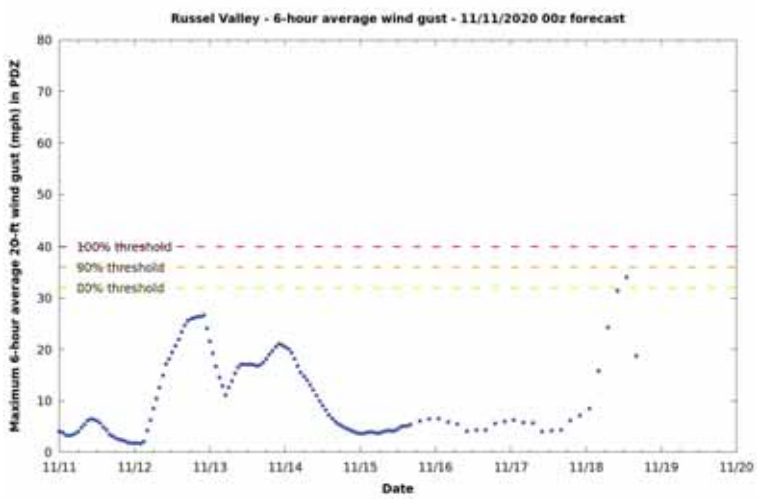
Stampede





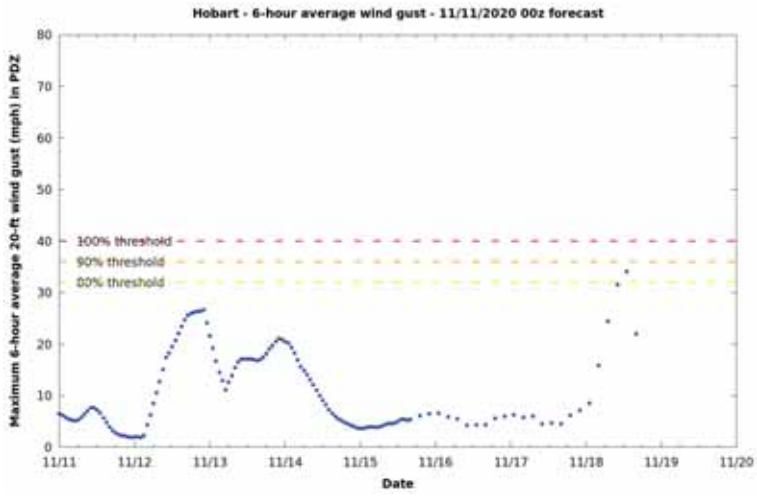
Russell Valley



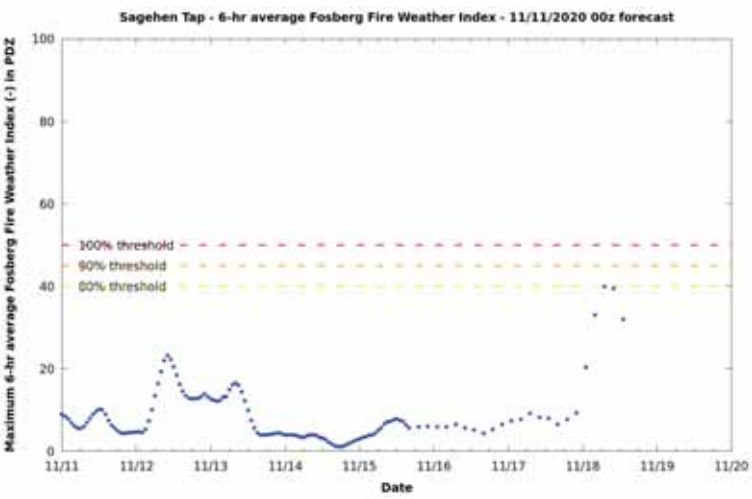


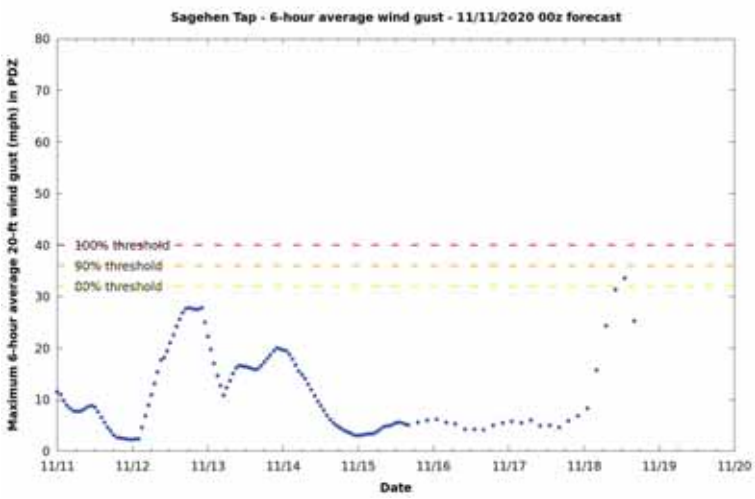
Hobart



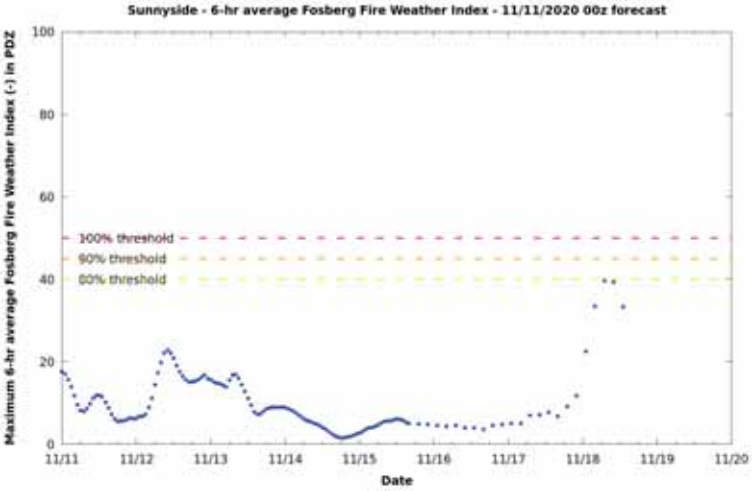


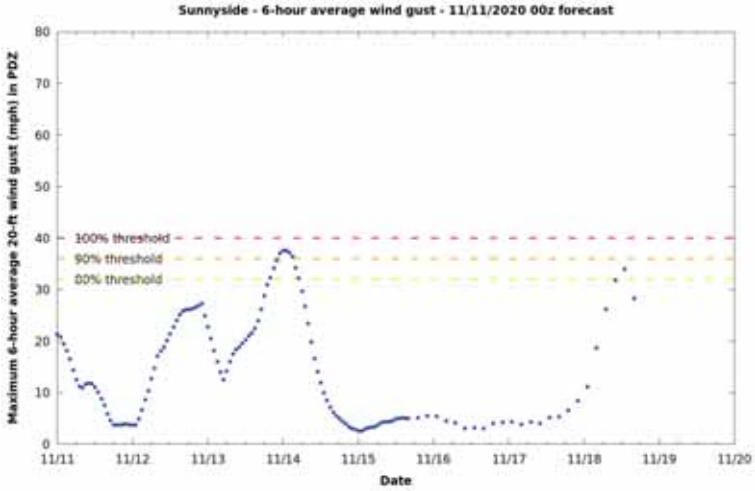
Sagehen tap



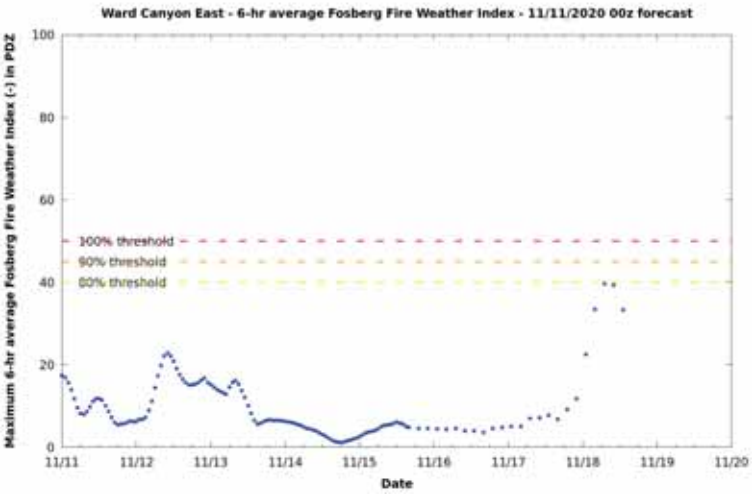


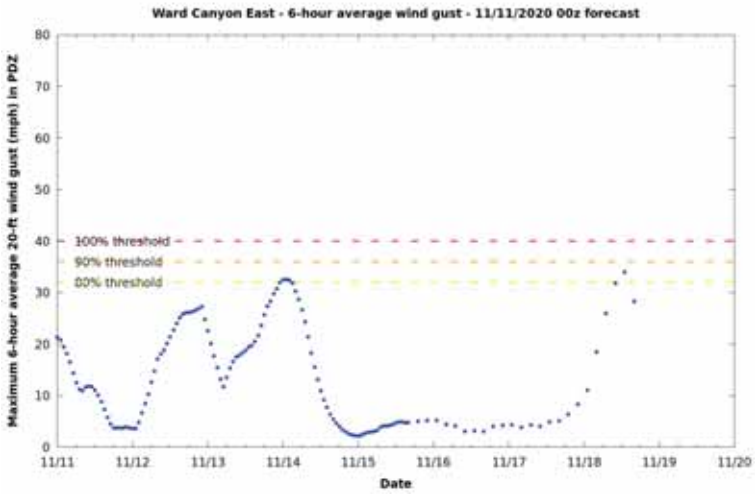
Sunnyside



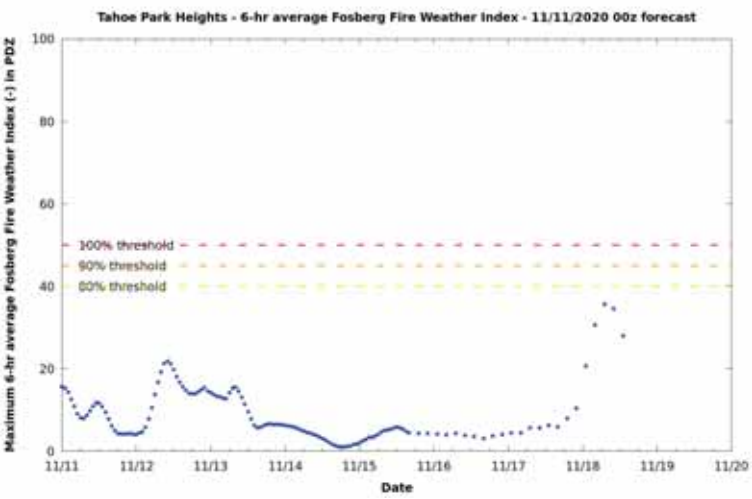


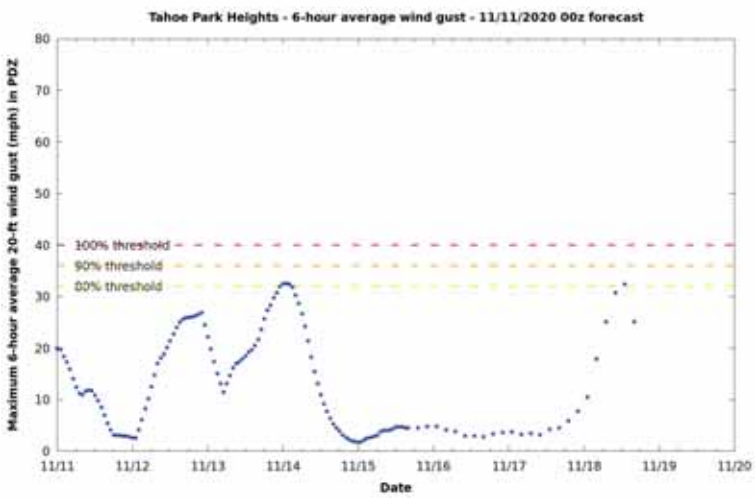
Ward Canyon East



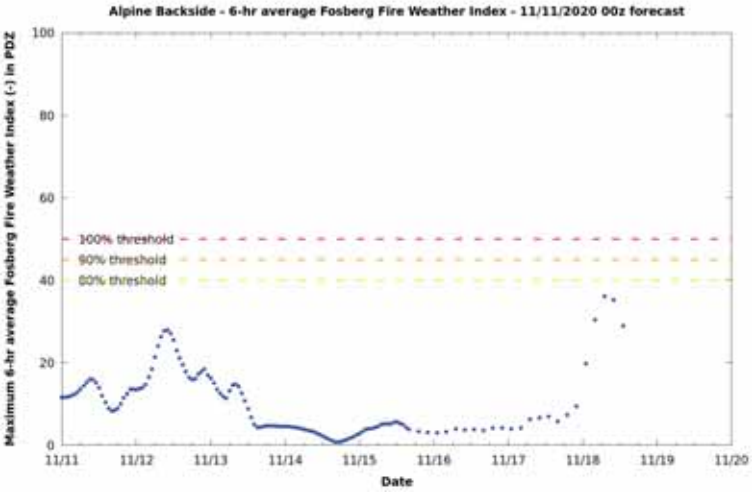


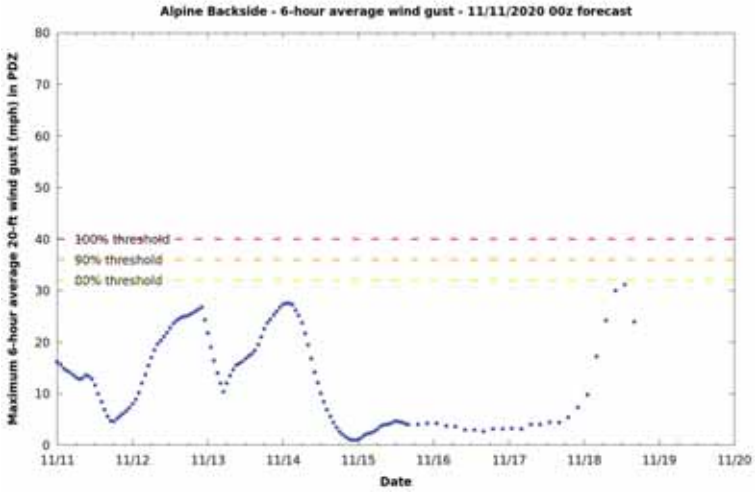
Tahoe Park Heights



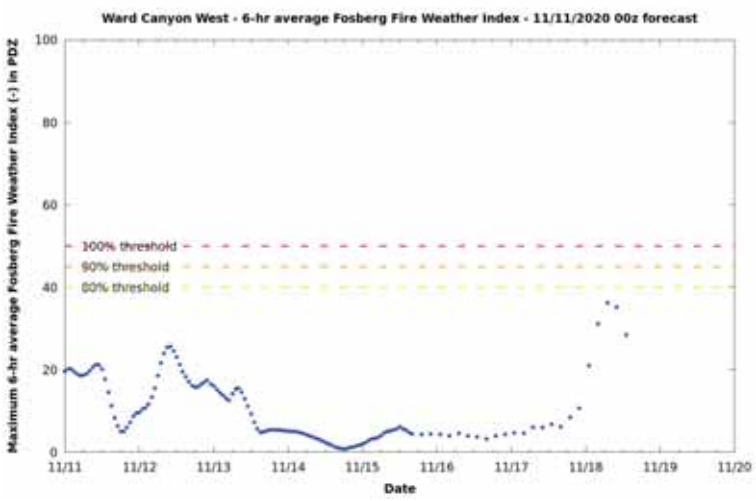


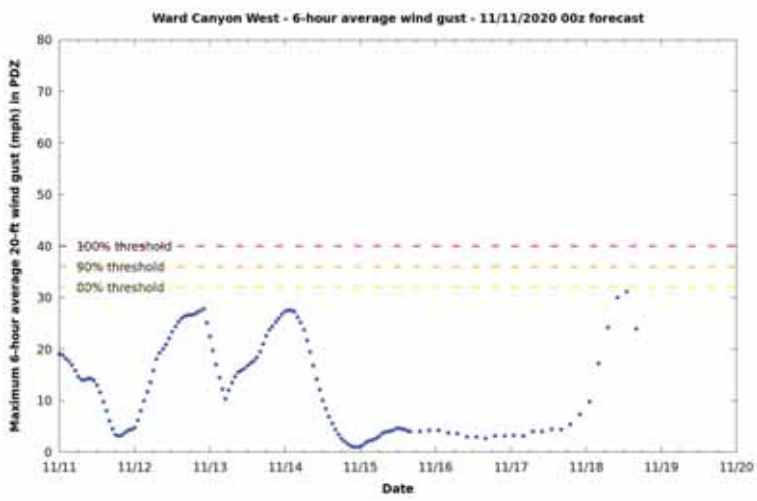
Alpine Backside



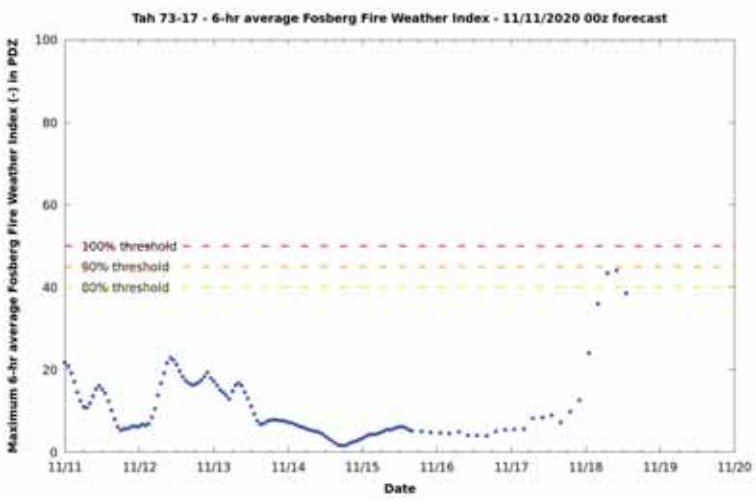


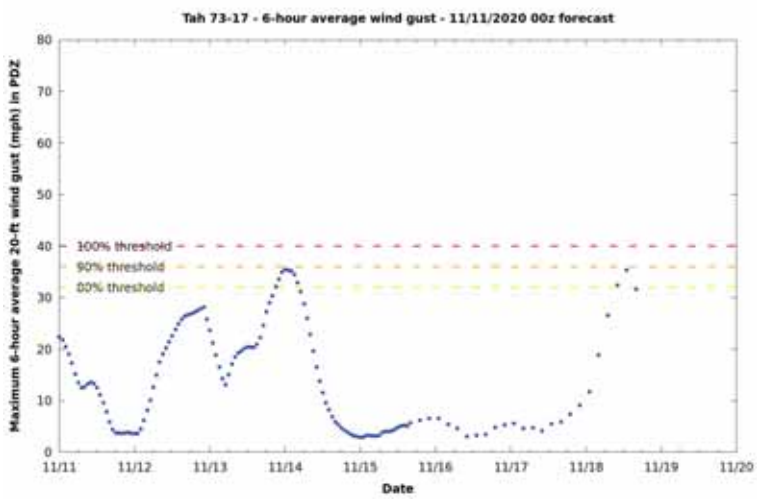
Ward Canyon West



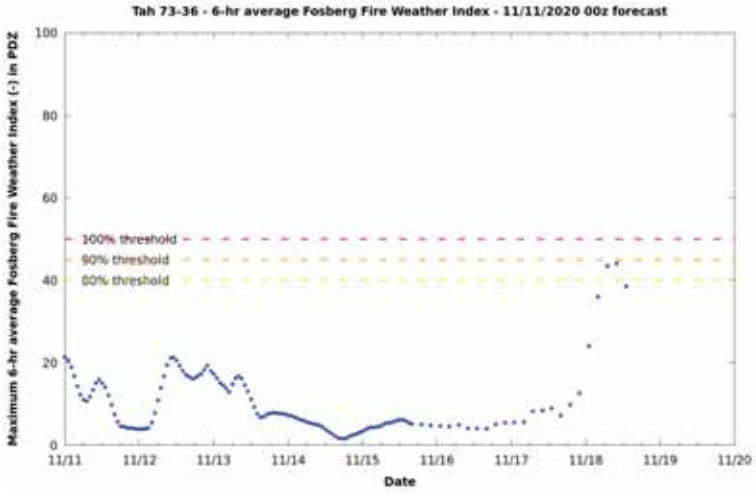


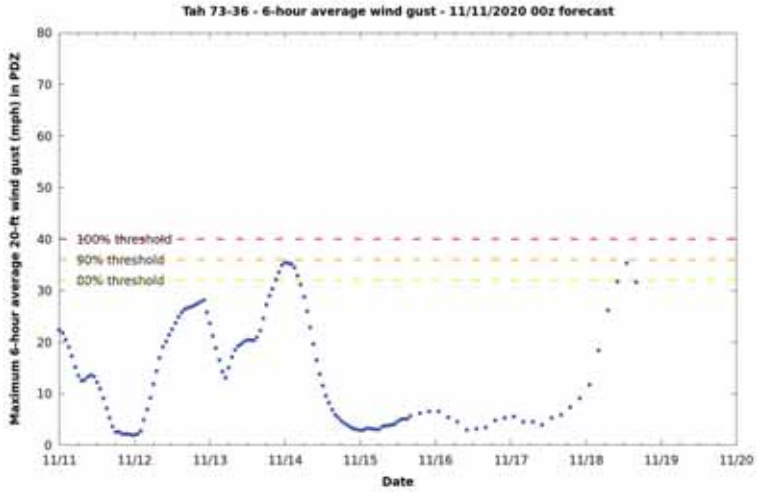
Tah 73-17



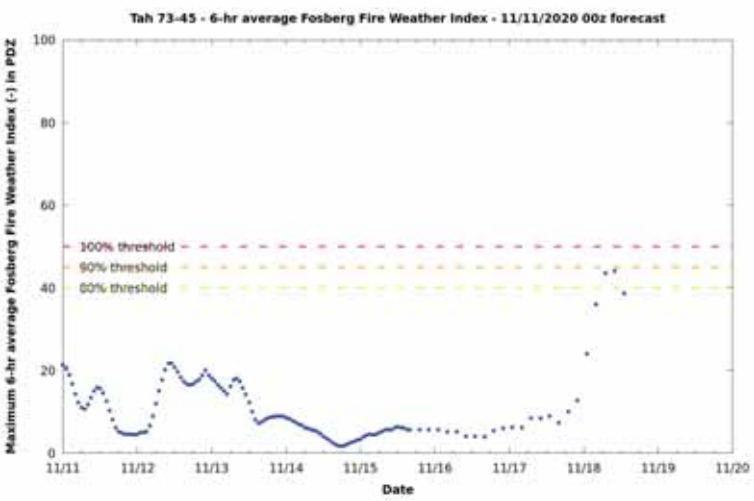


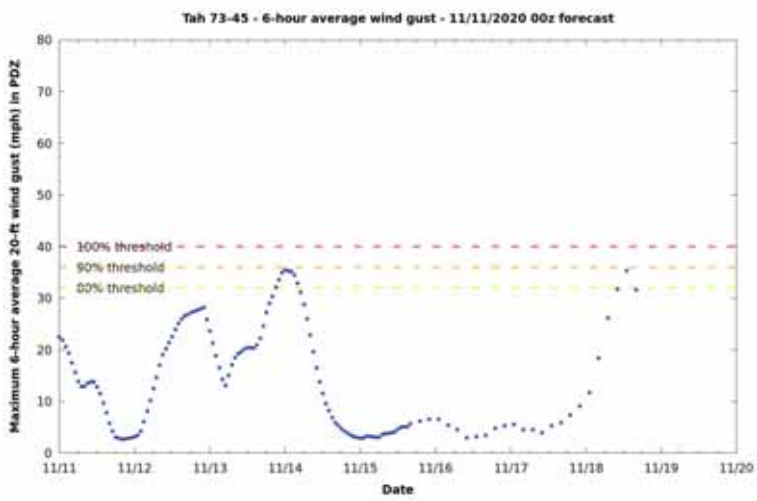
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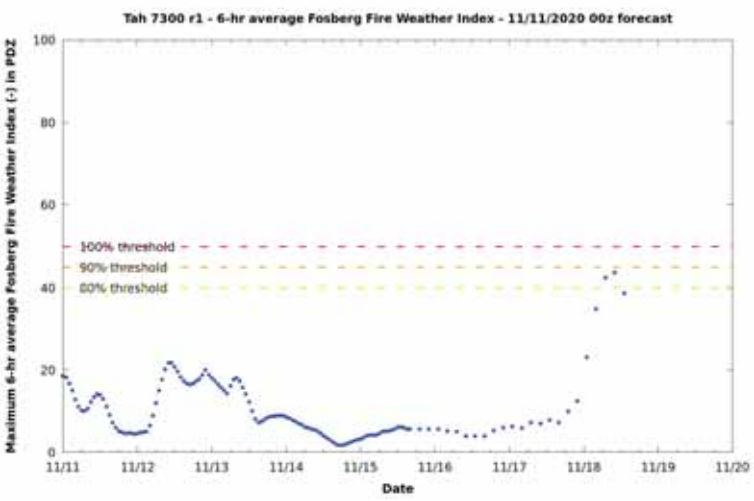


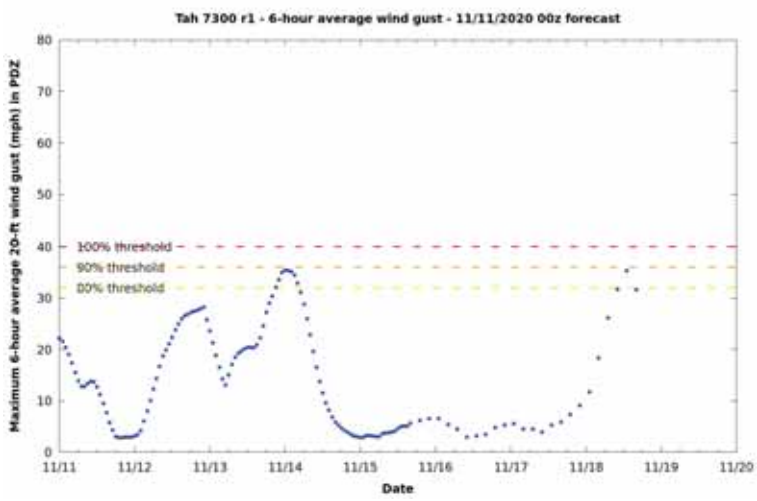
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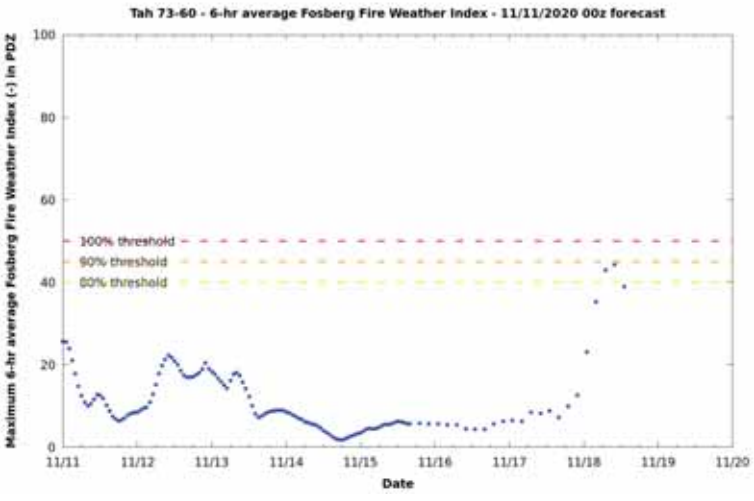


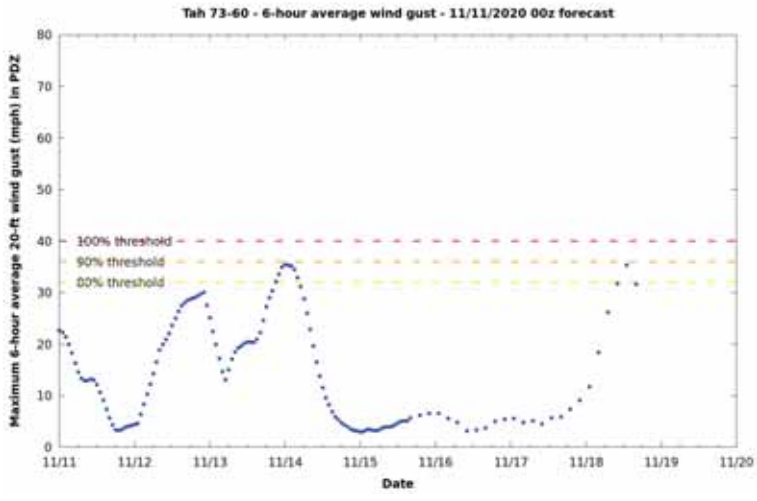
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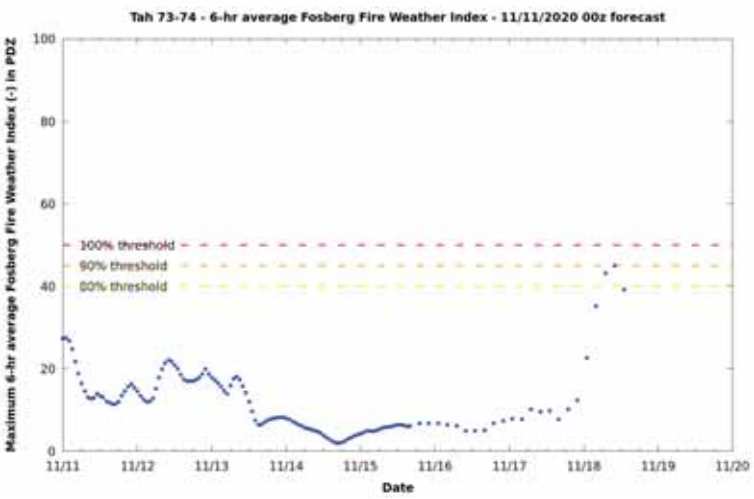


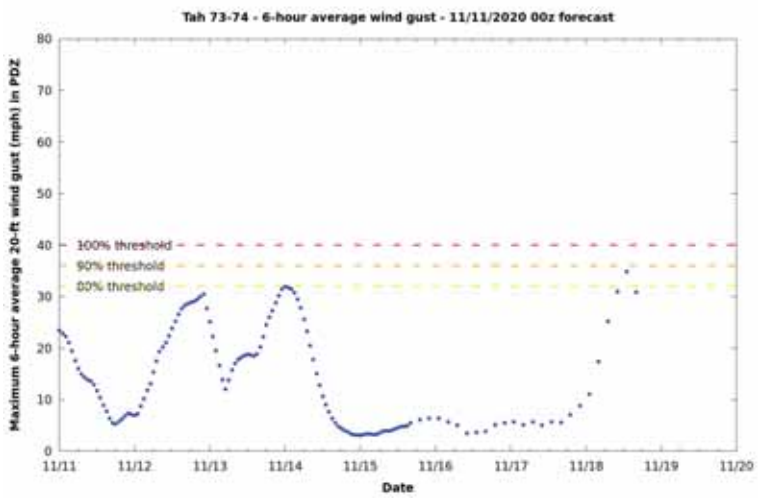
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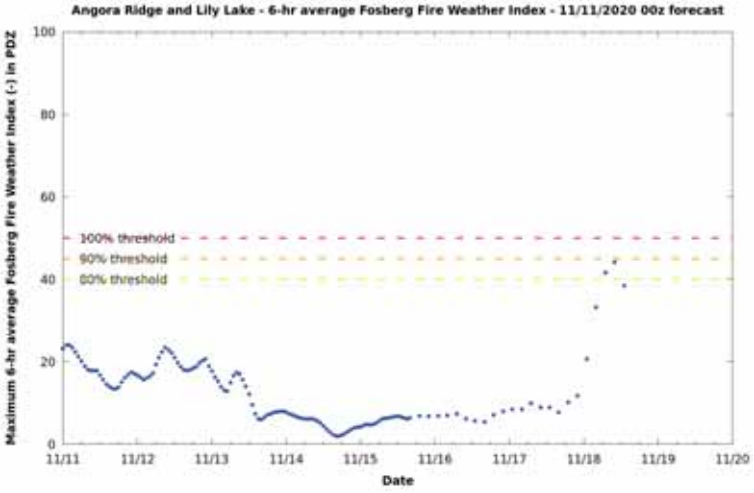


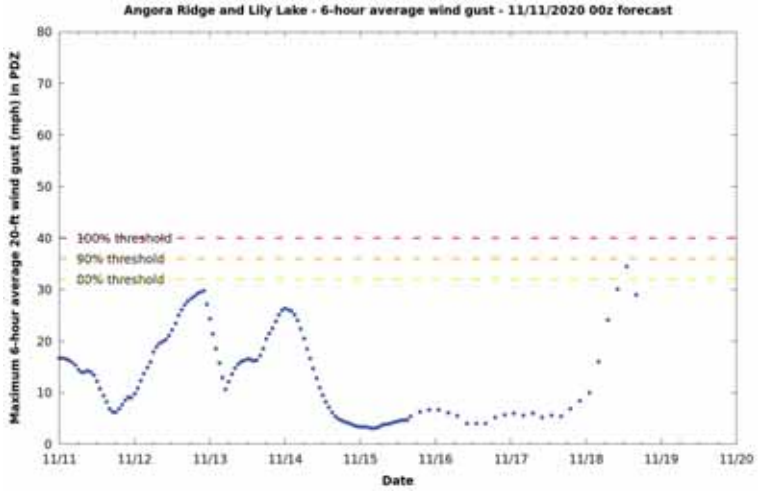
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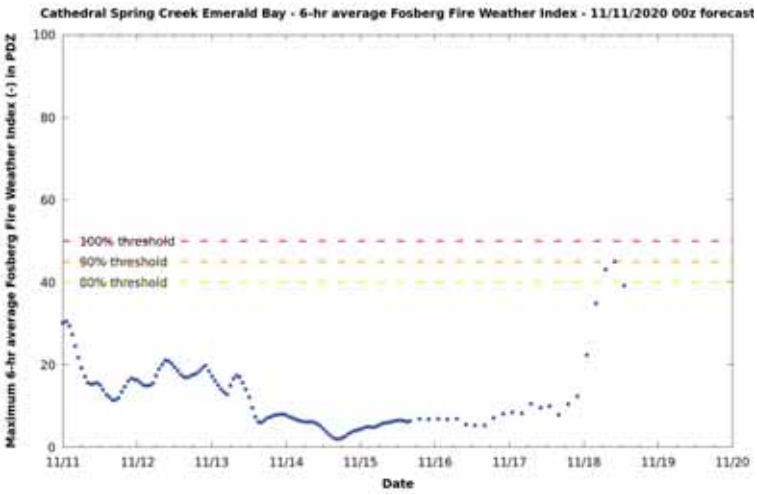


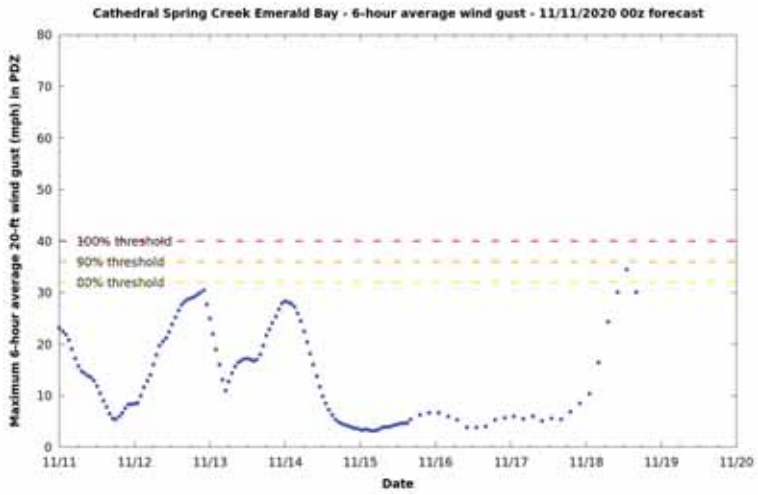
Angora Ridge and Lily Lake



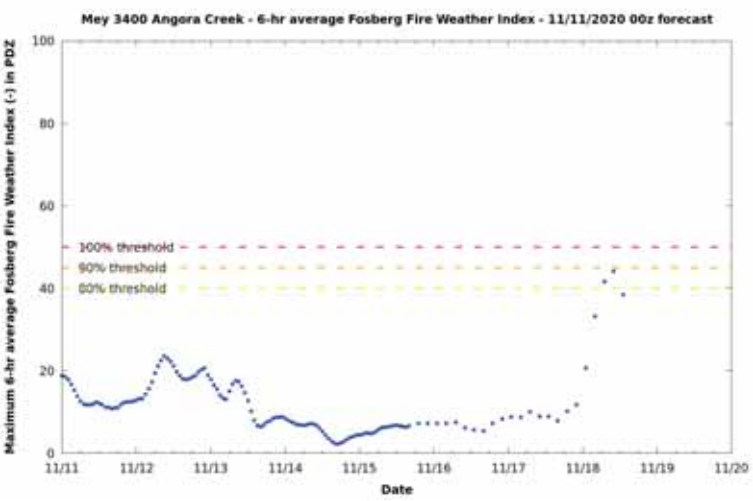


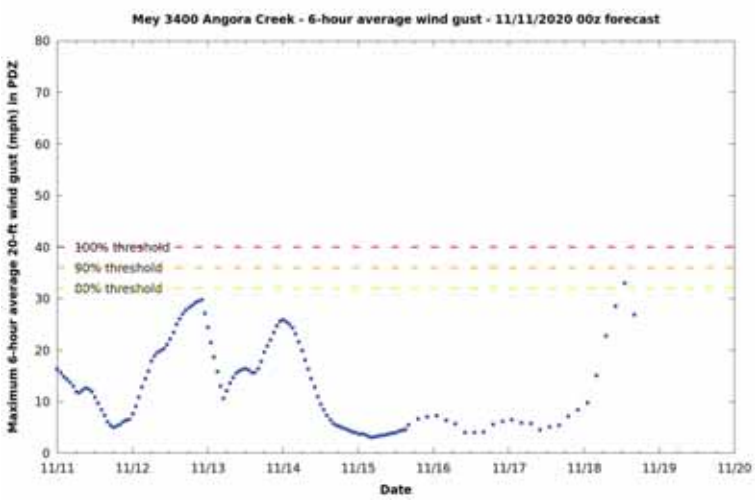
Cathedral Spring Creek Emerald Bay



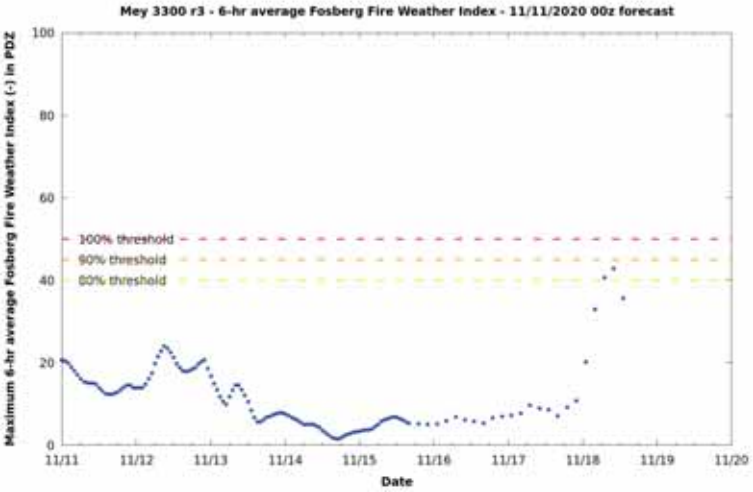


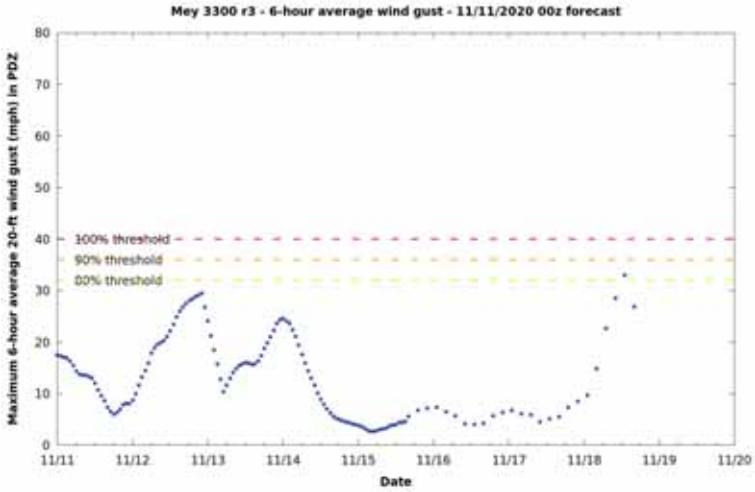
Mey 3400 Angora Creek



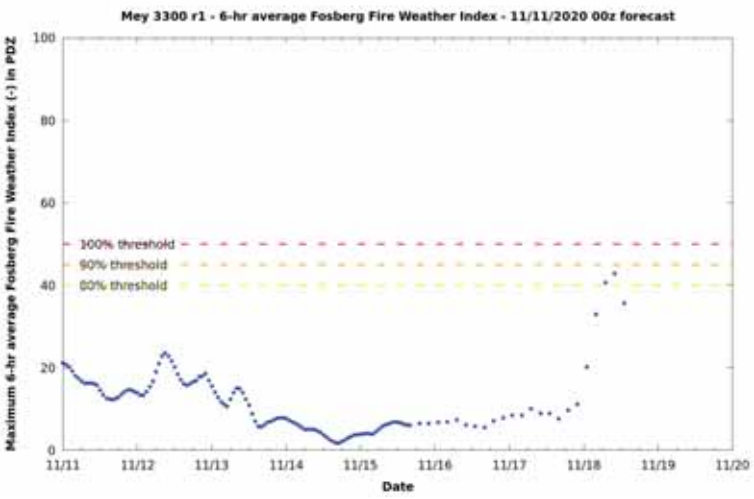


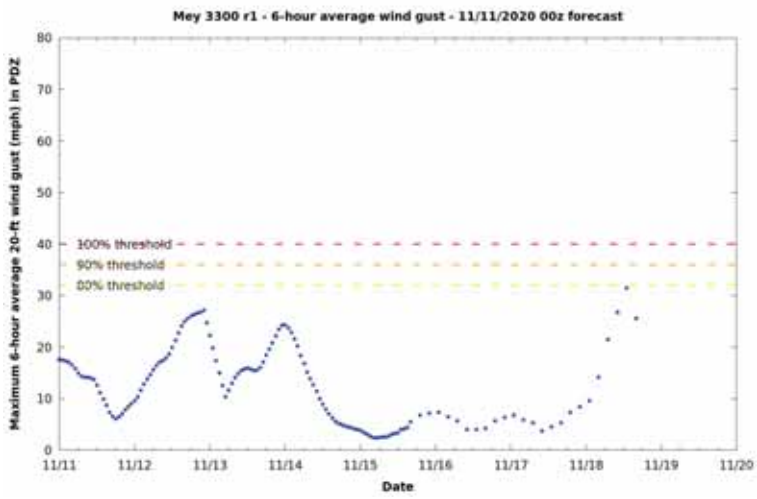
Mey 3300 r3



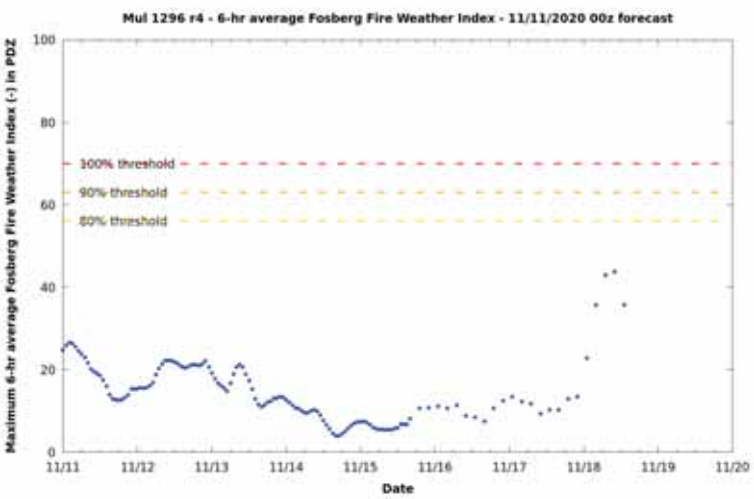


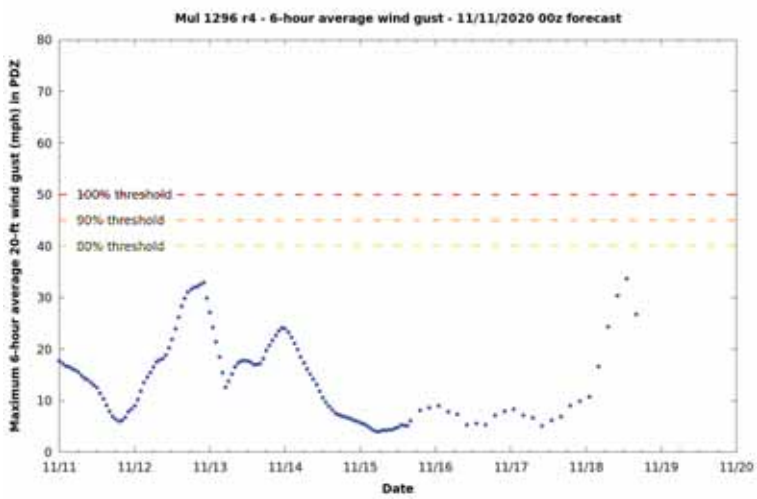
Mey 3300 r1



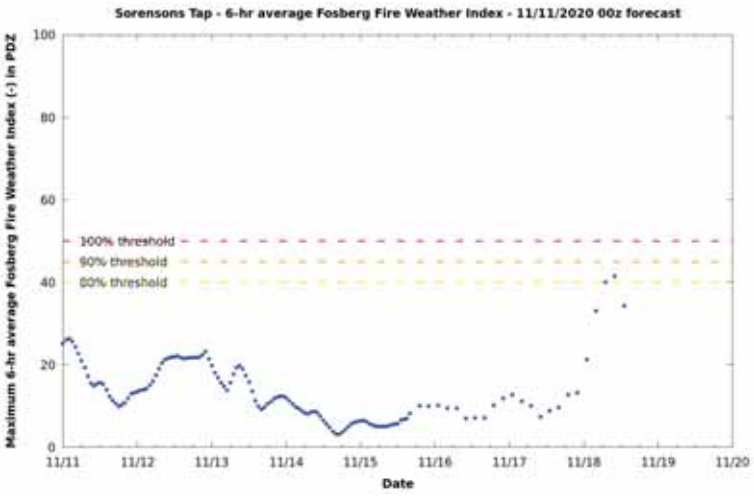


Mul 1296 r4



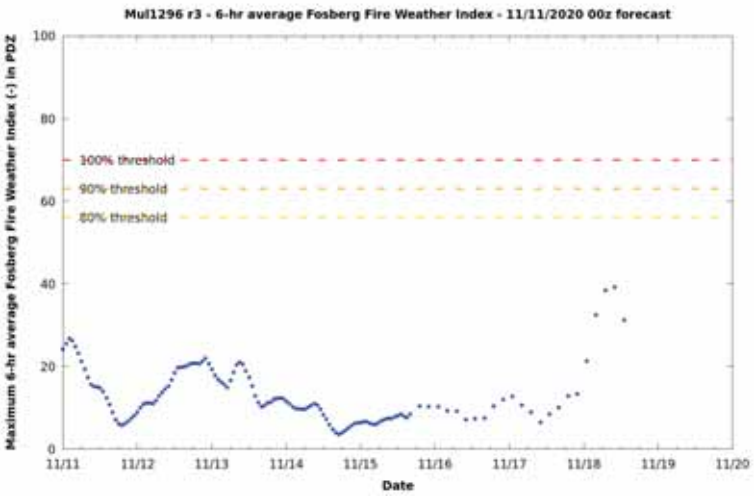


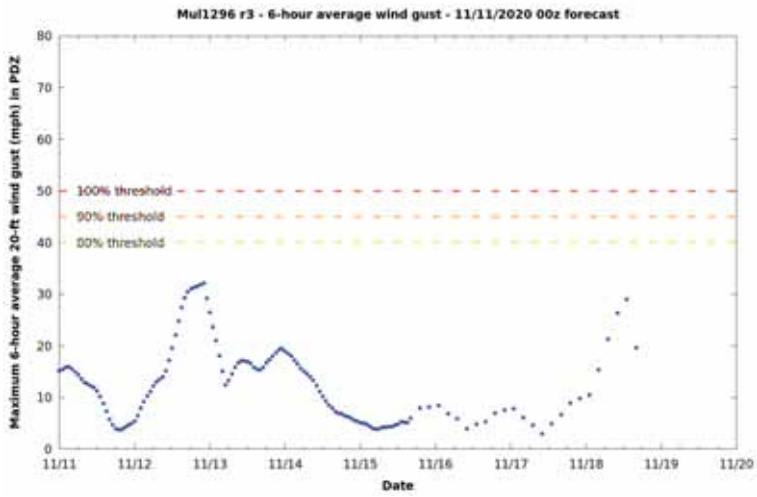
Sorensons Tap



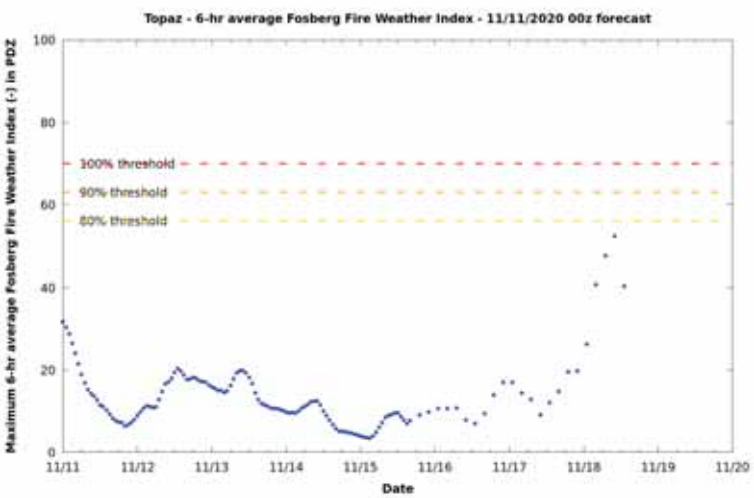


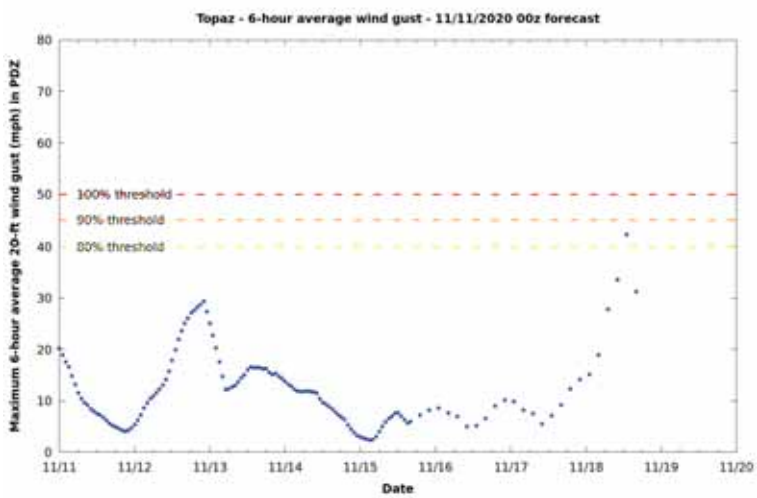
Mul 1296 r3



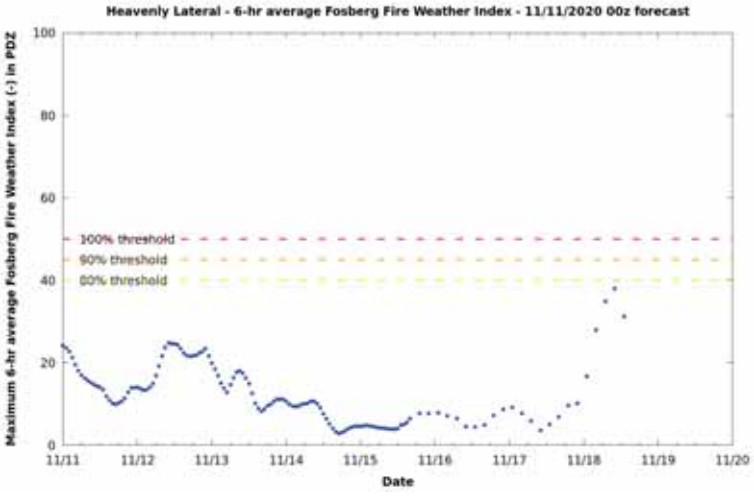


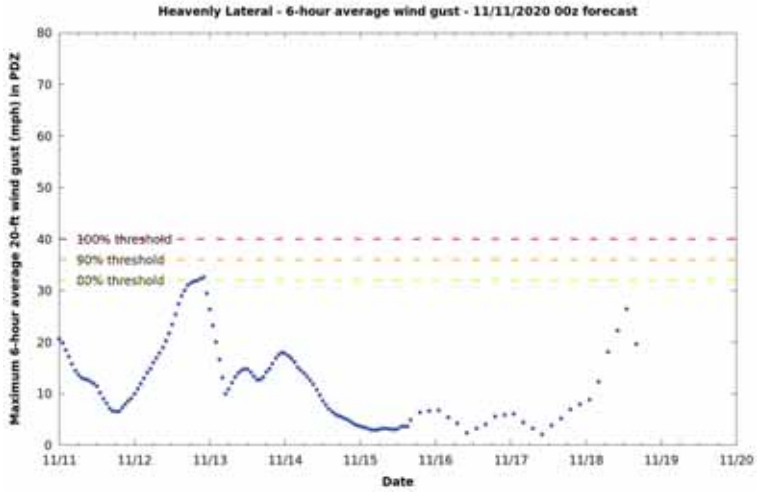
Topaz



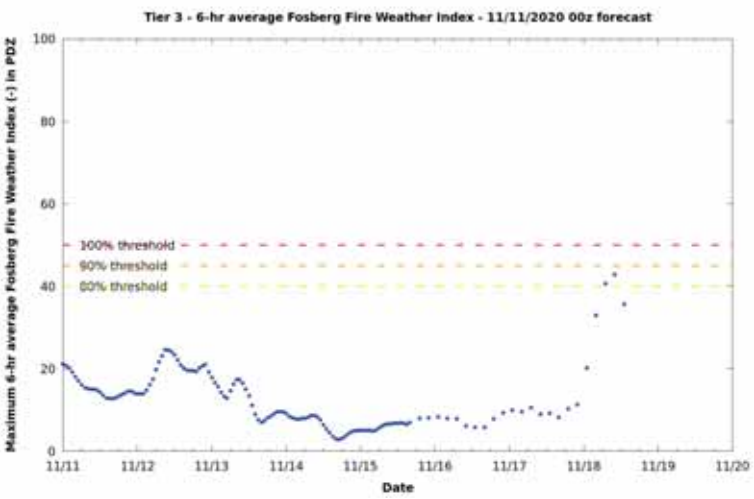


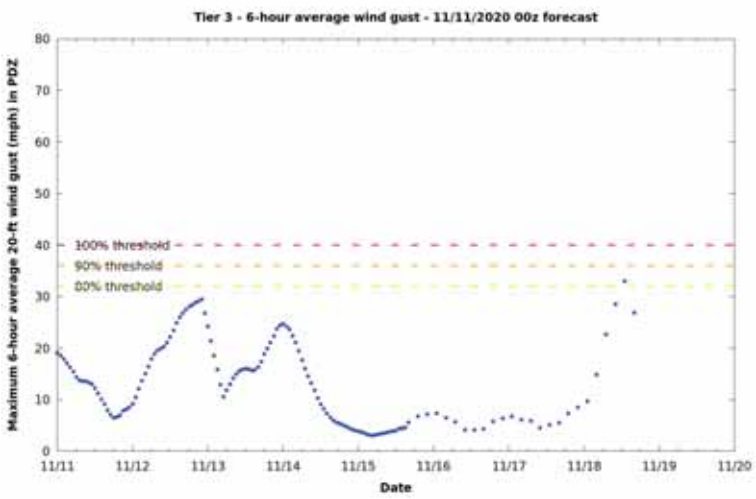
Heavenly Lateral



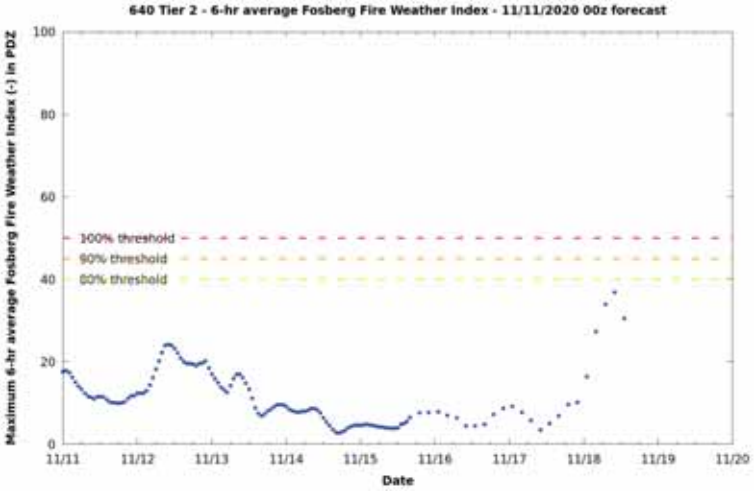


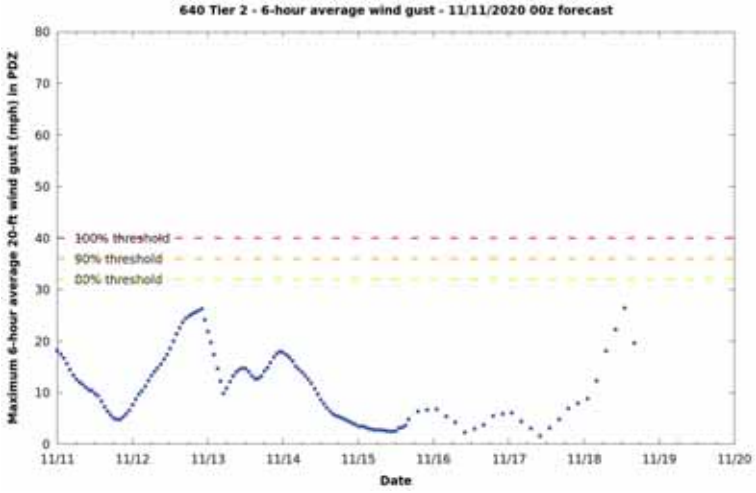
Tier 3



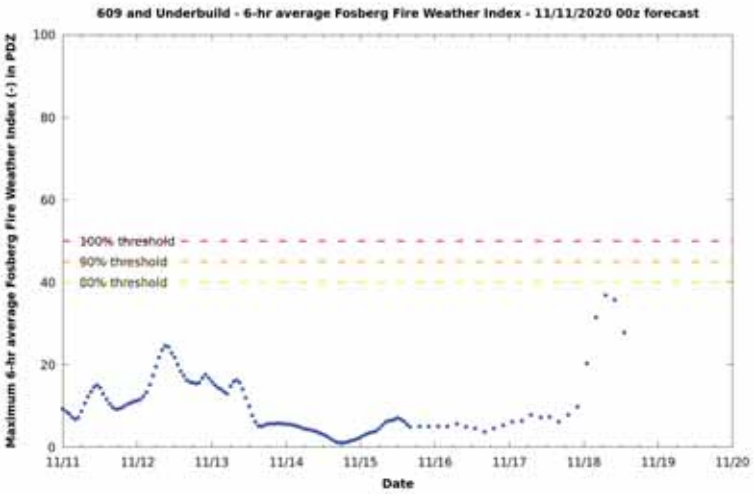


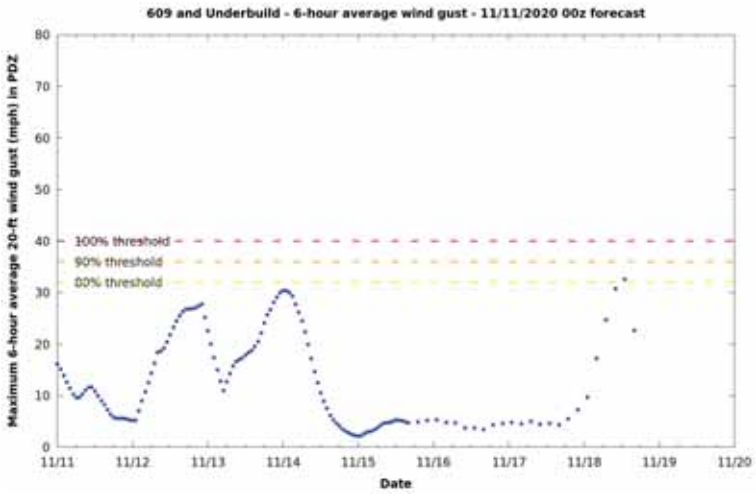
640 Tier 2



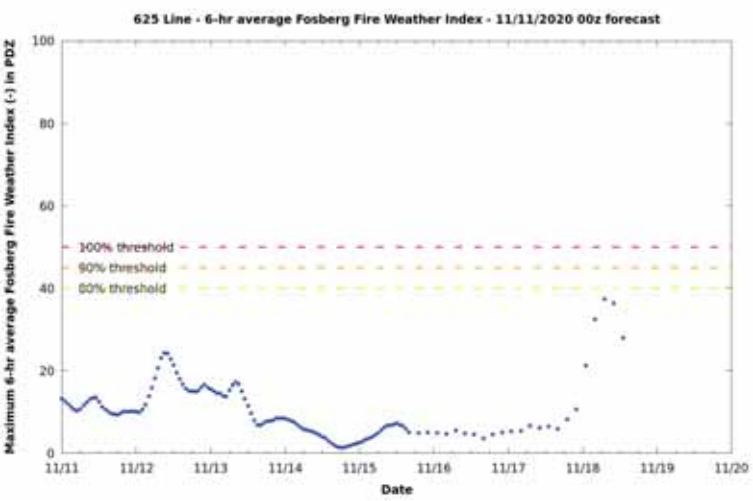


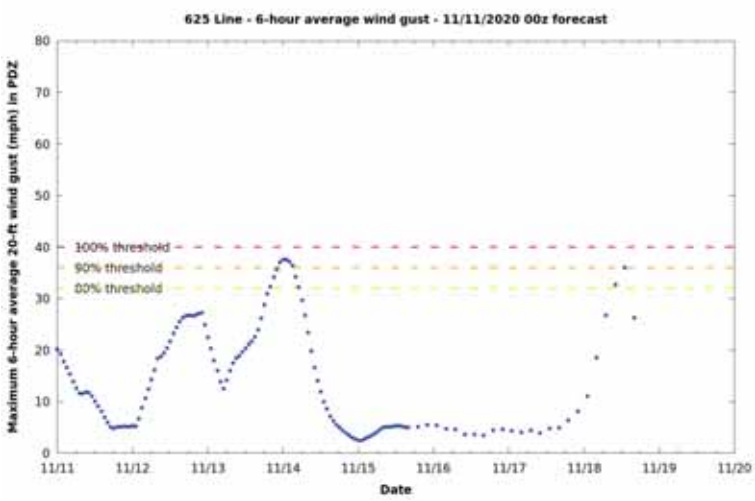
609 and Underbuild



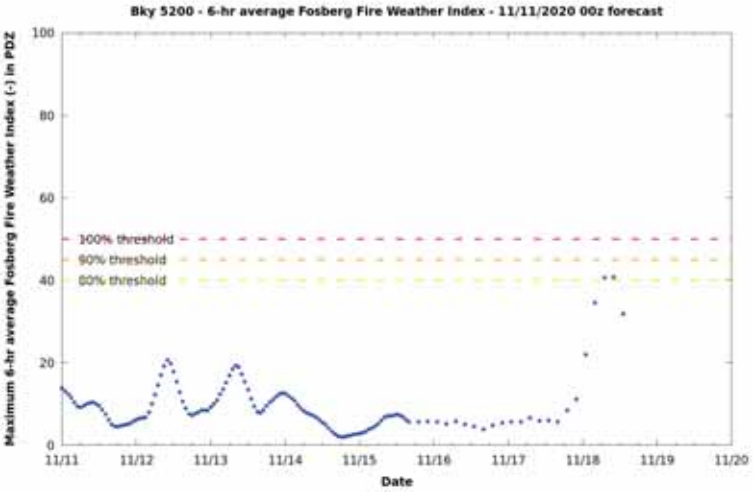


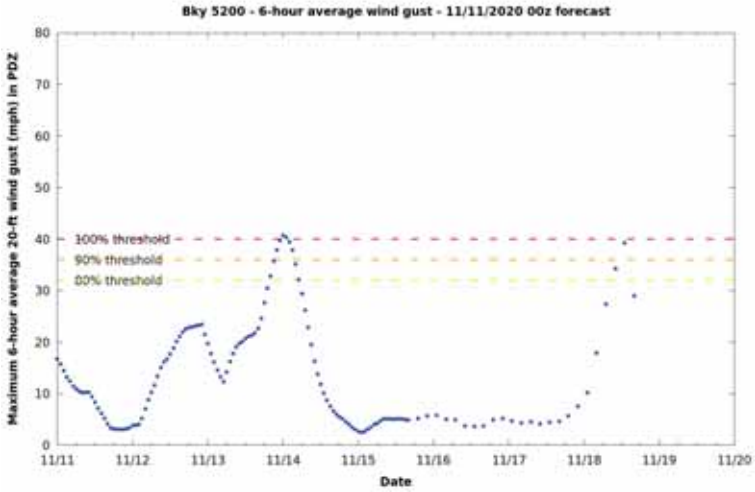
625 Line



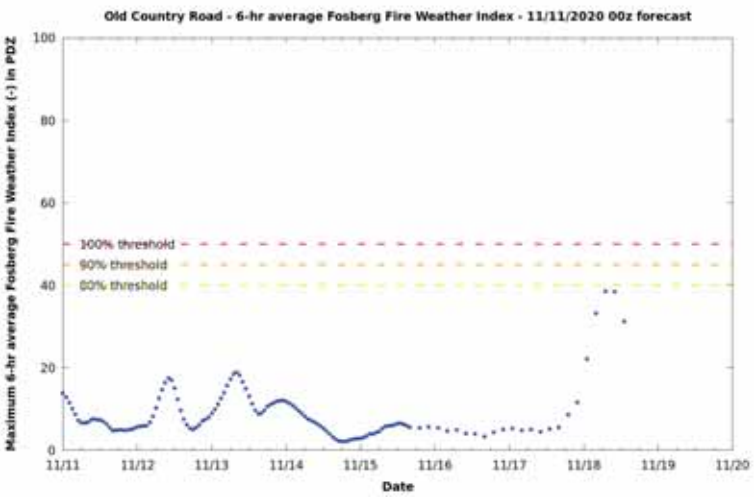


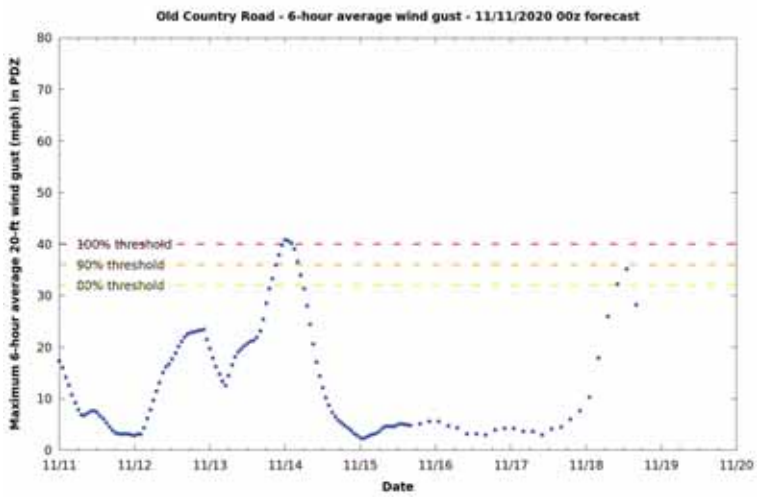
Bky 5200



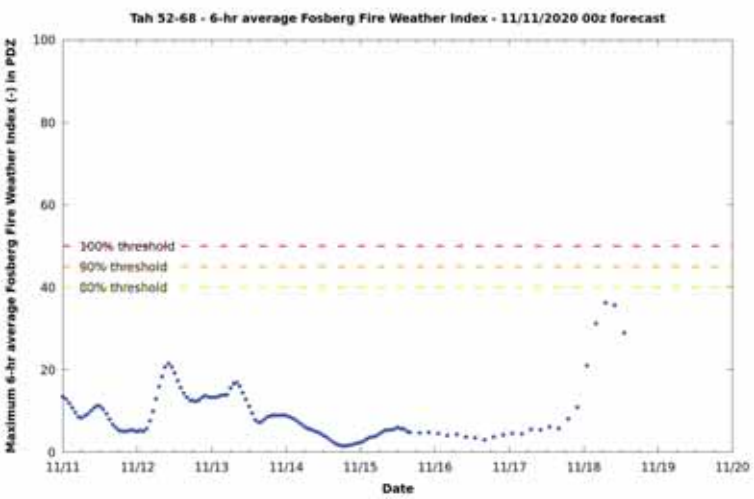


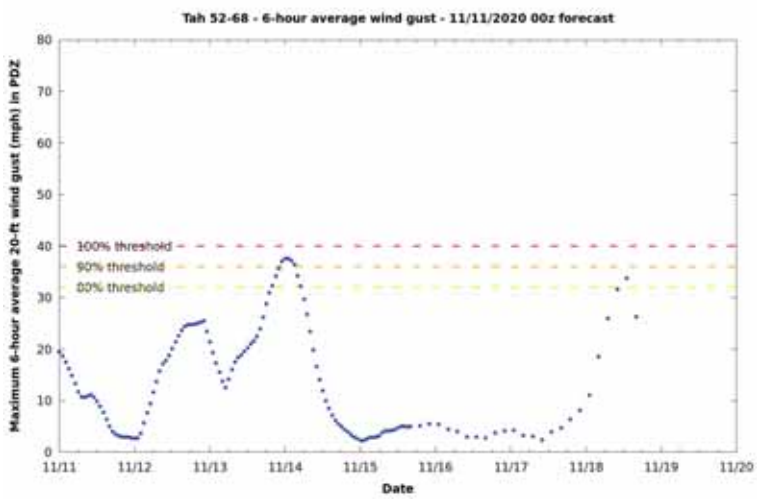
Old Country Road



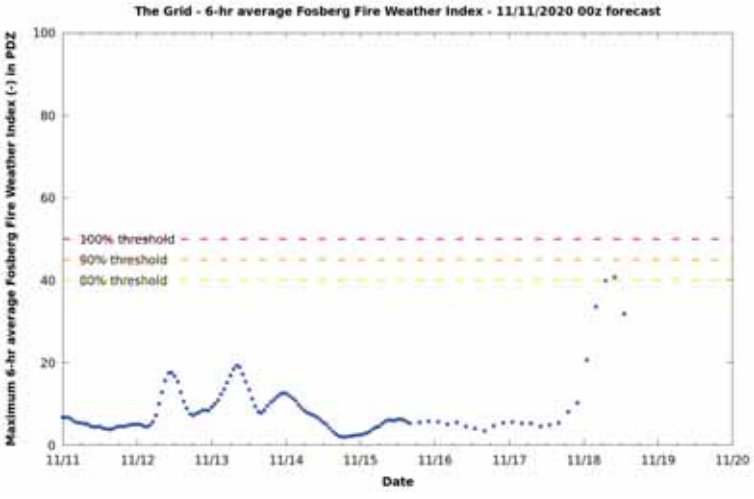


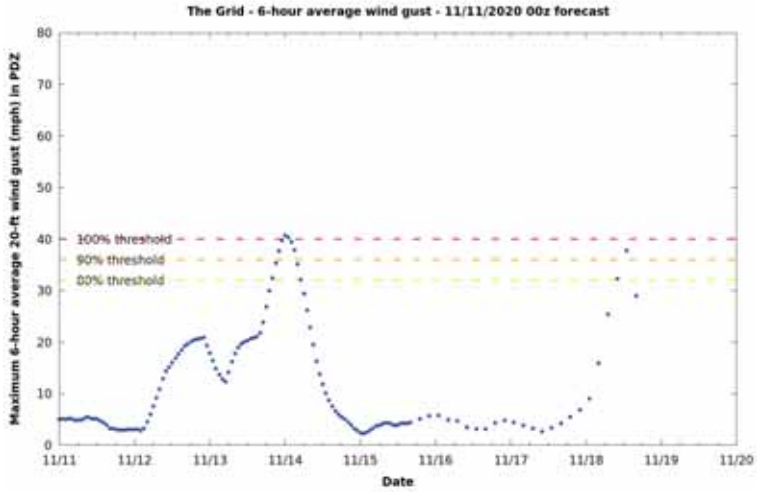
Tah 52-68



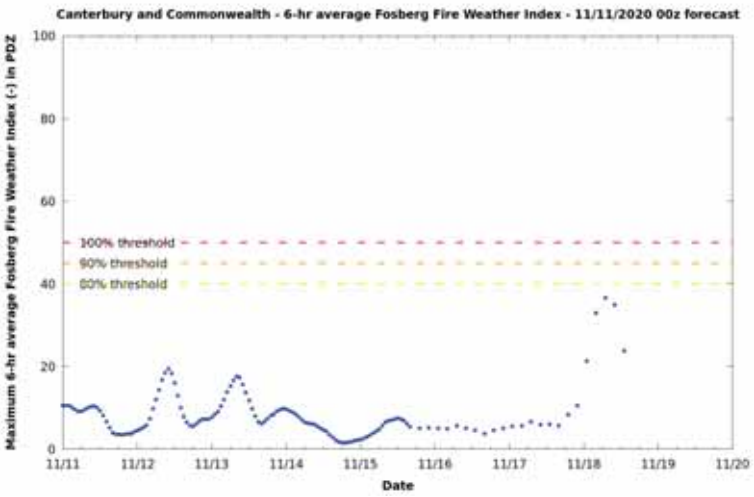


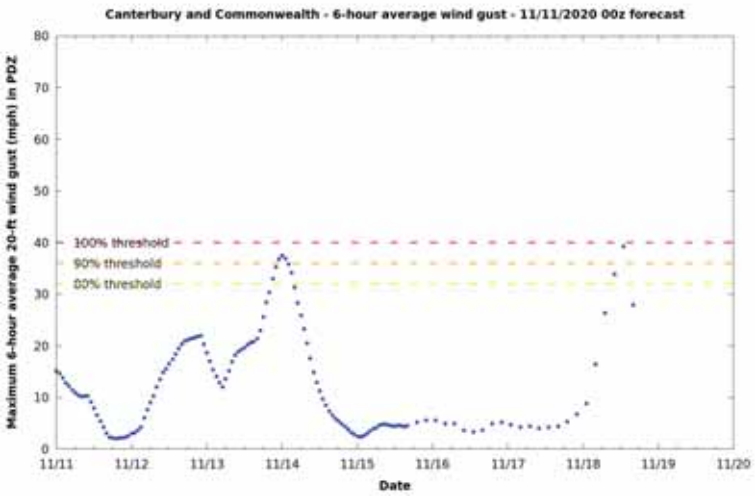
The Grid



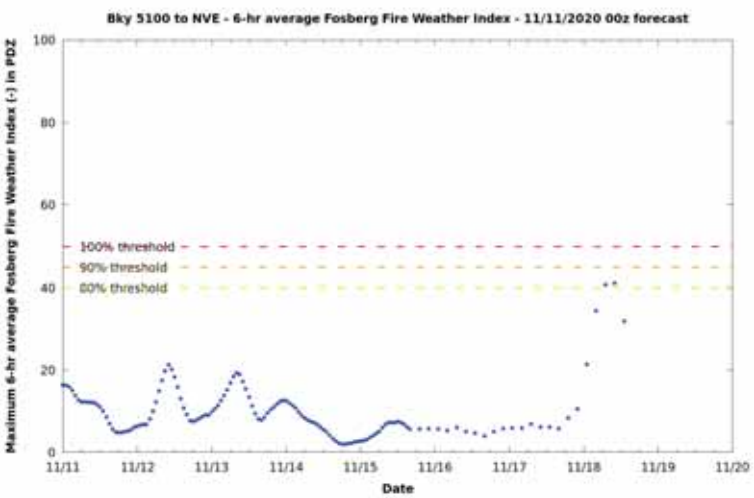


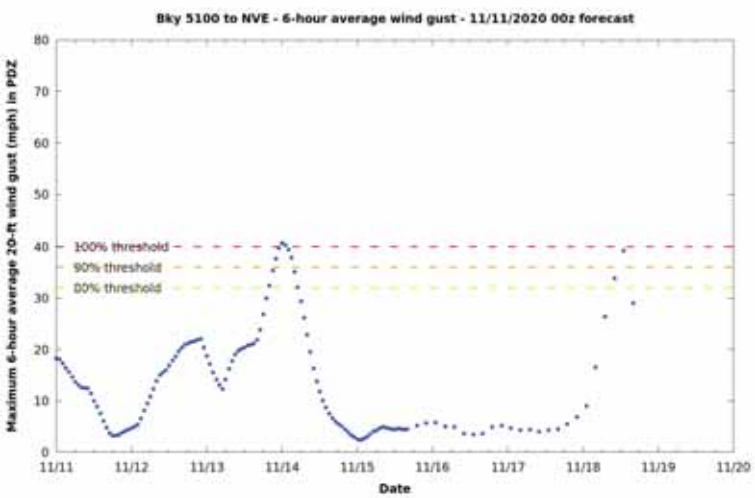
Canterbuy and Commonwealth



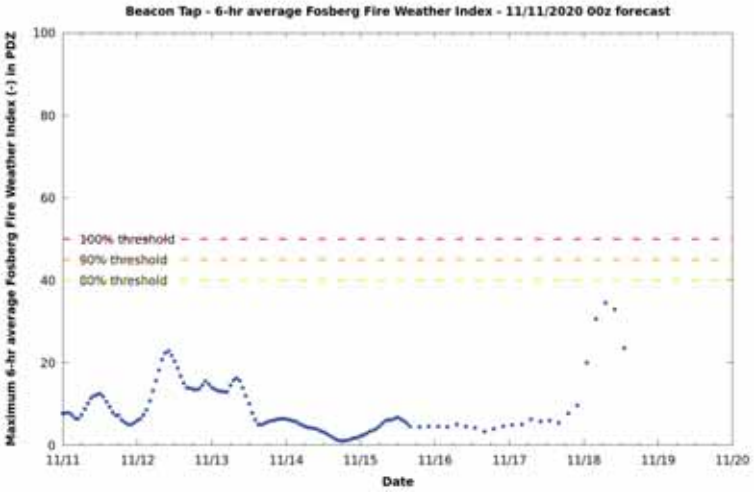


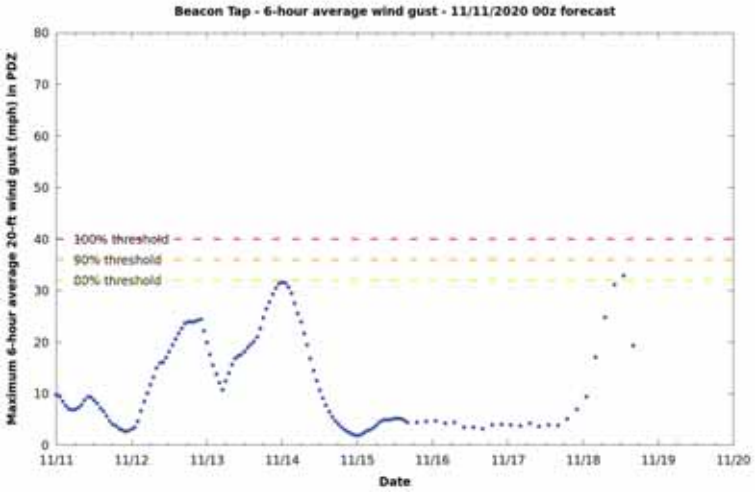
Bky 5100 to NVE



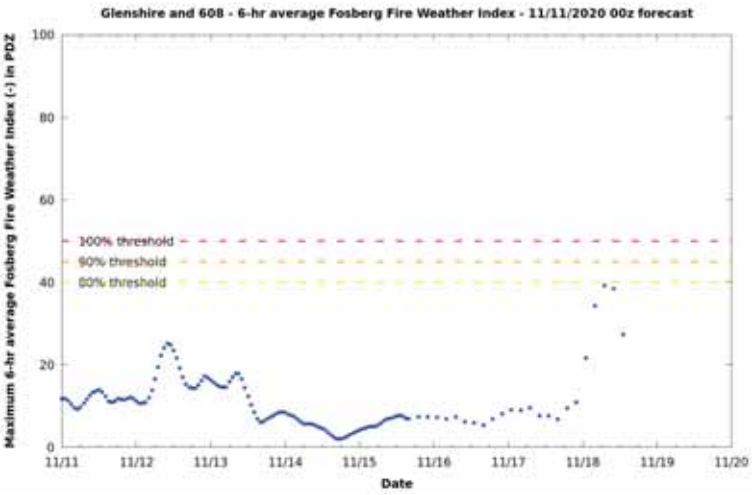


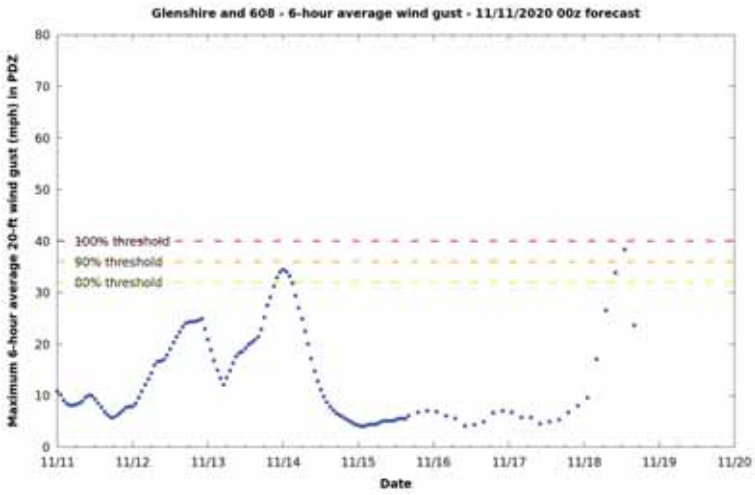
Beacon Tap



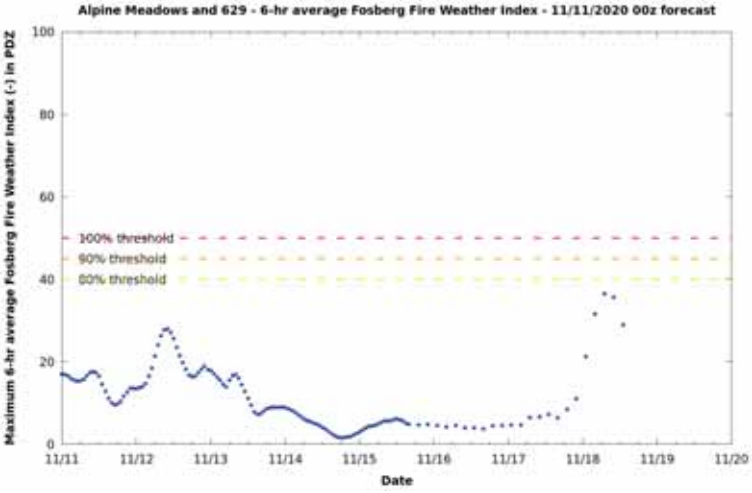


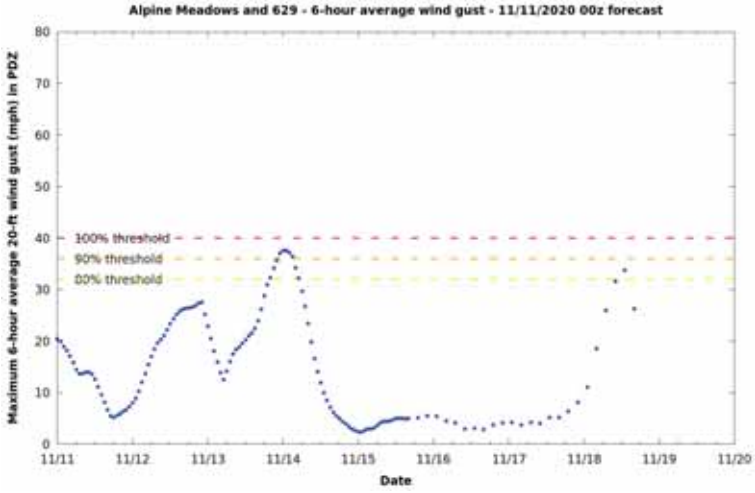
Glenshire and 608



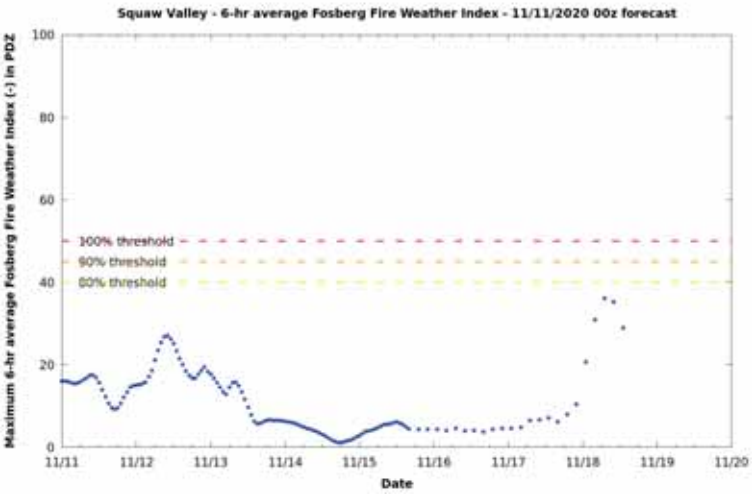


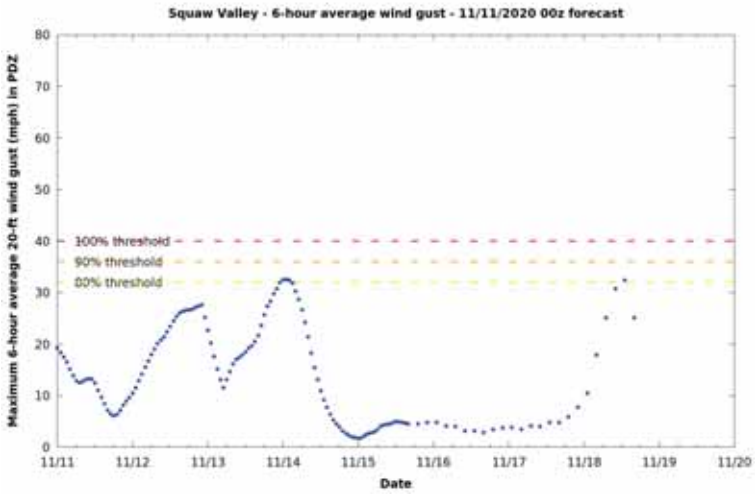
Alpine Meadows and 629



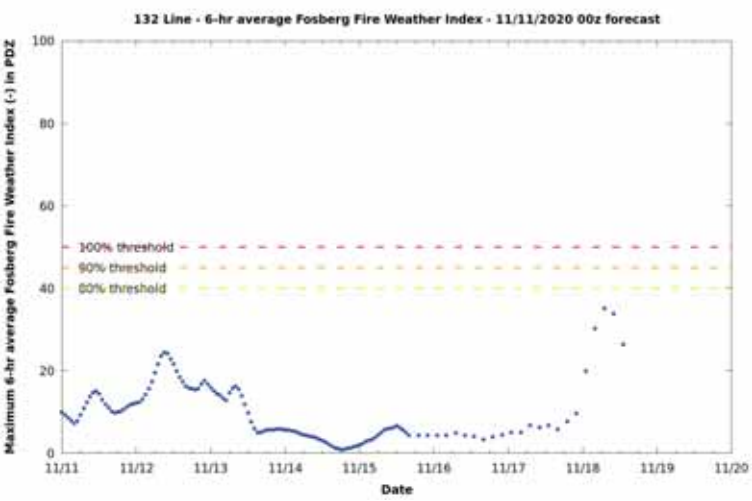


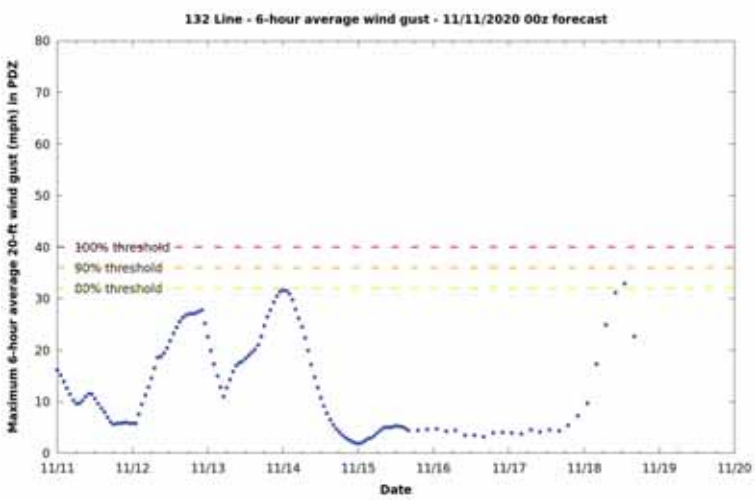
Squaw Valley



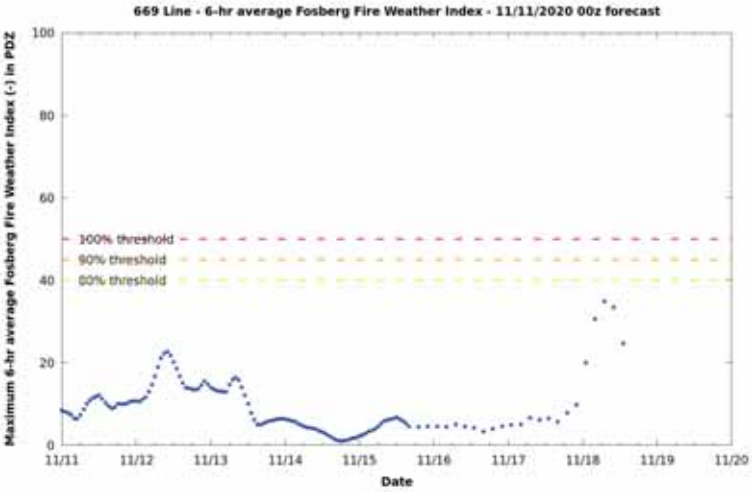


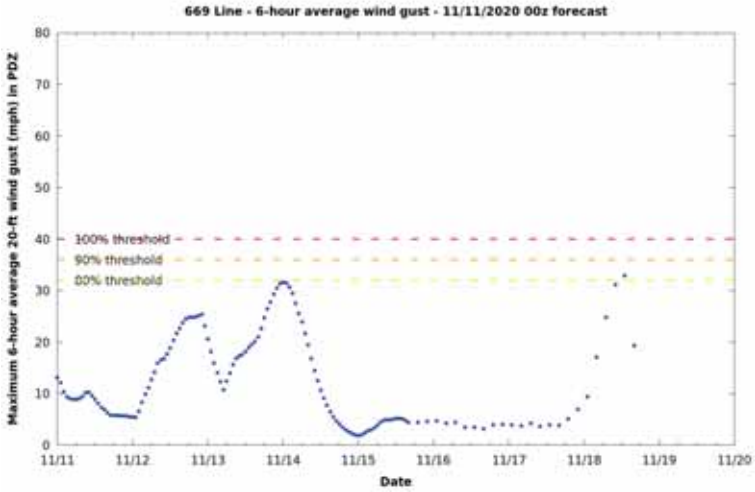
132 Line



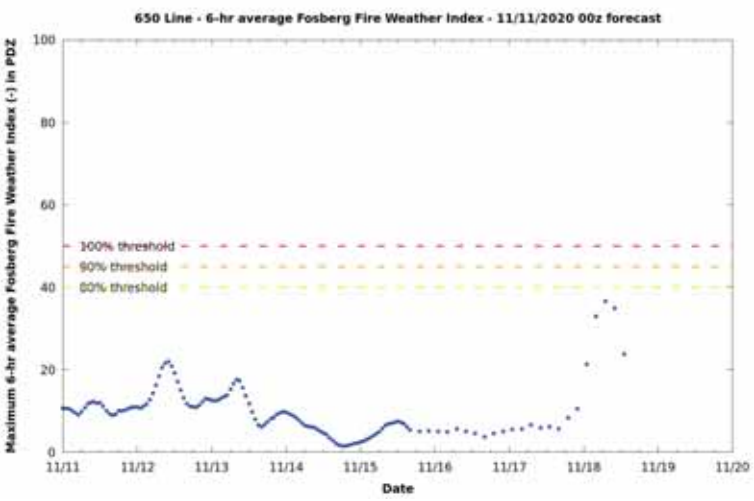


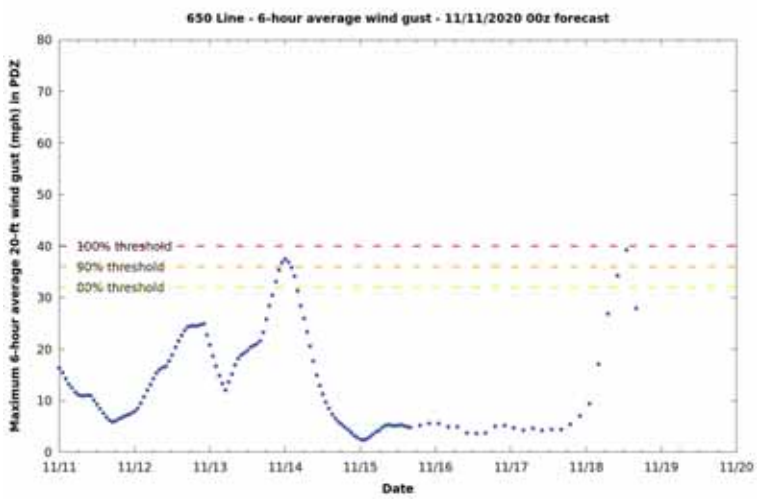
669 Line



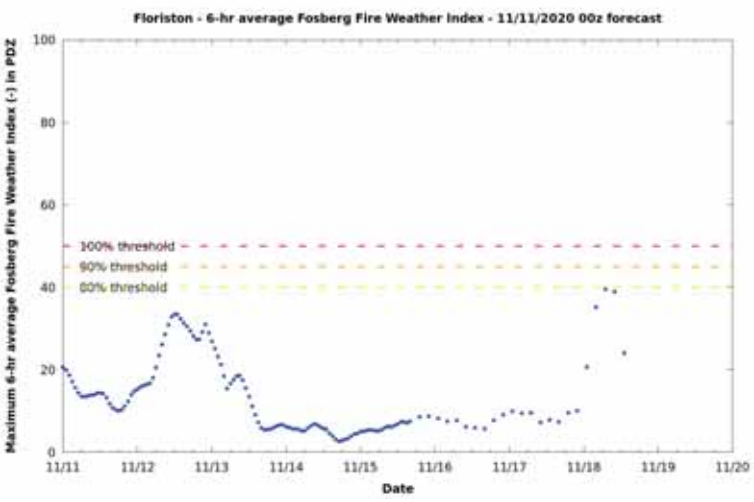


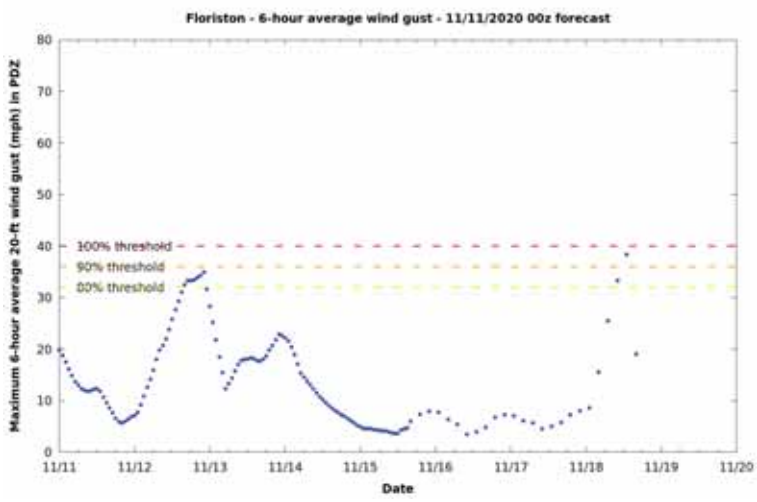
650 Line



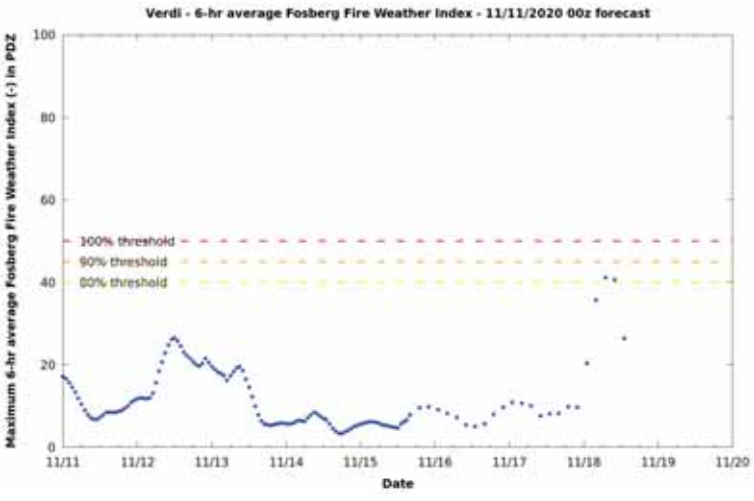


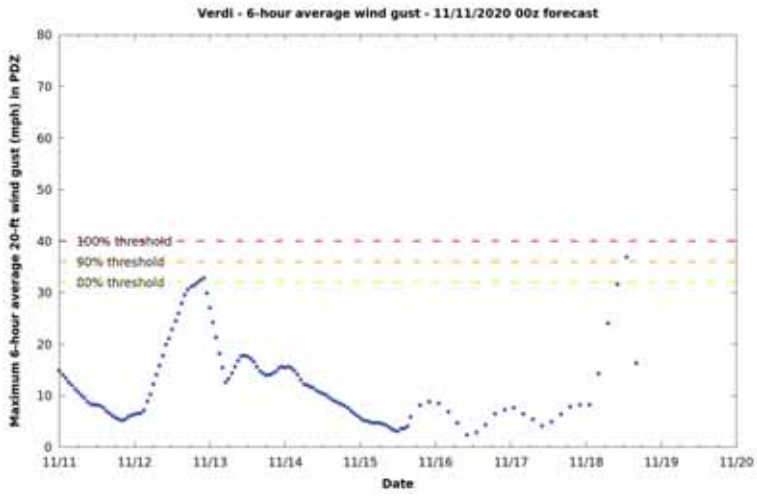
Floriston



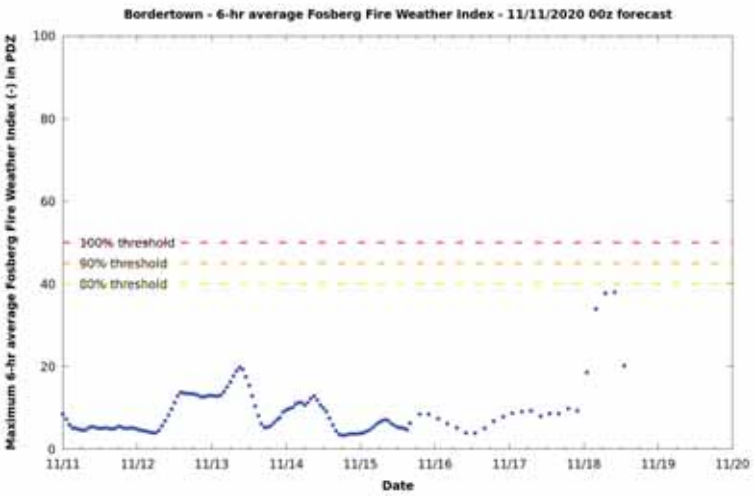


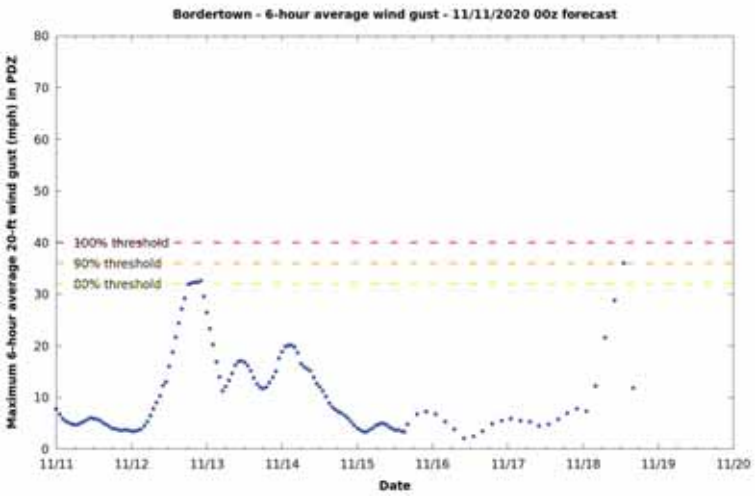
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/11/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
00% threshold
Date


Bordertown - 6-hour average wind gust - 11/11/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
00% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/11/20 - 11/17/20

Zone	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

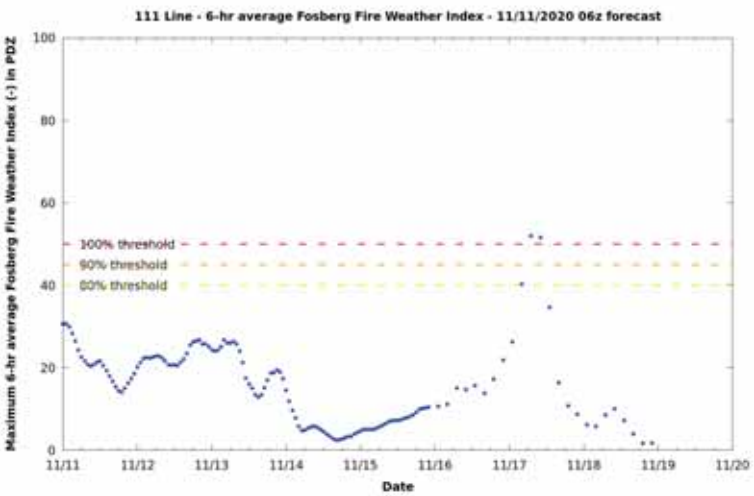
Liberty Utilities Energy Release Component Forecast for 11/11/20 - 11/17/20

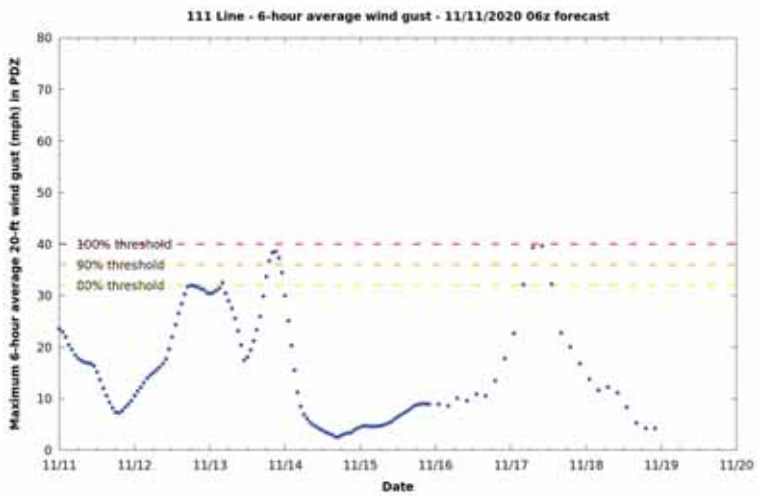
Zone	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	59.0	46.0	38.0	34.0	32.0	30.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

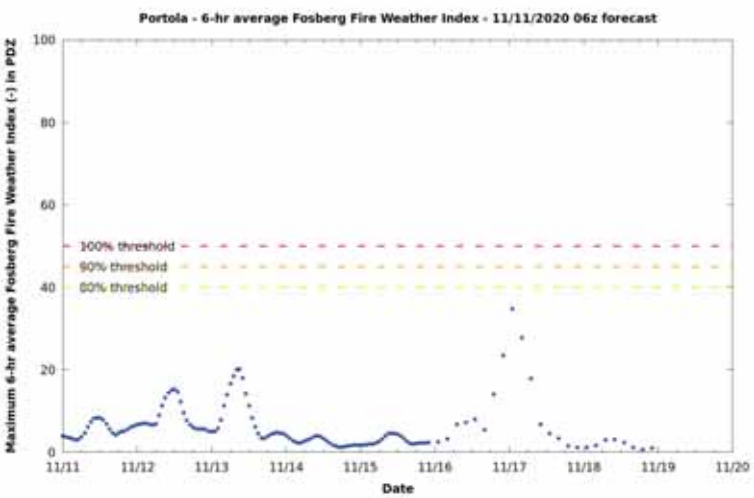
Liberty Utilities Fire Weather Summary Plots - 11/11/2020 06z forecast

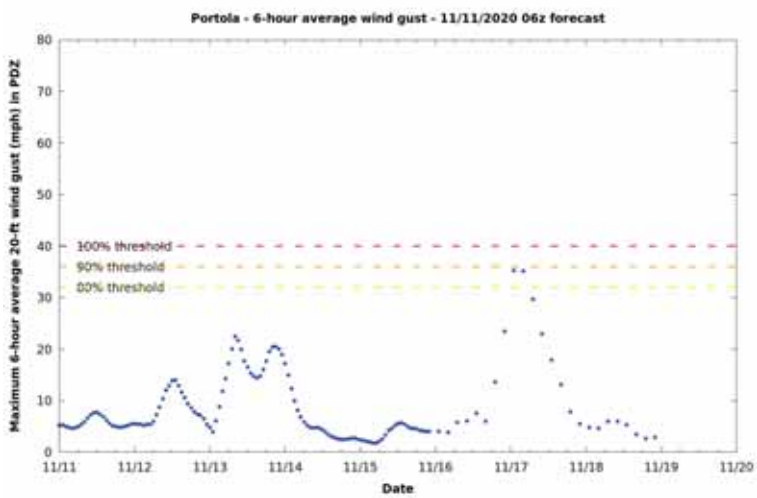
111 Line



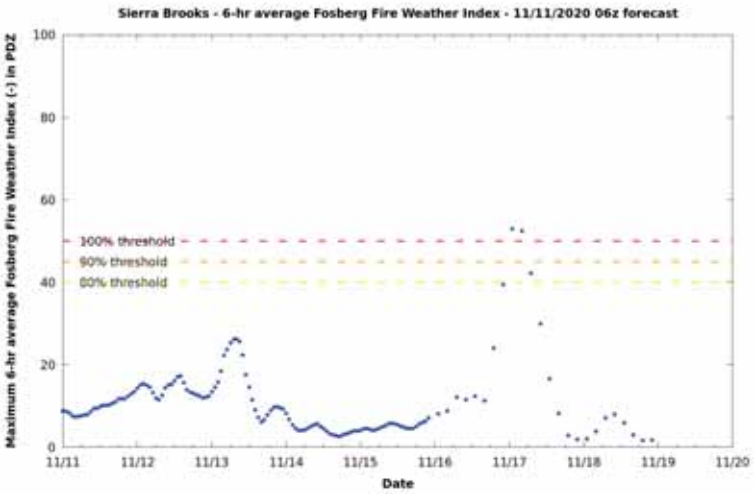


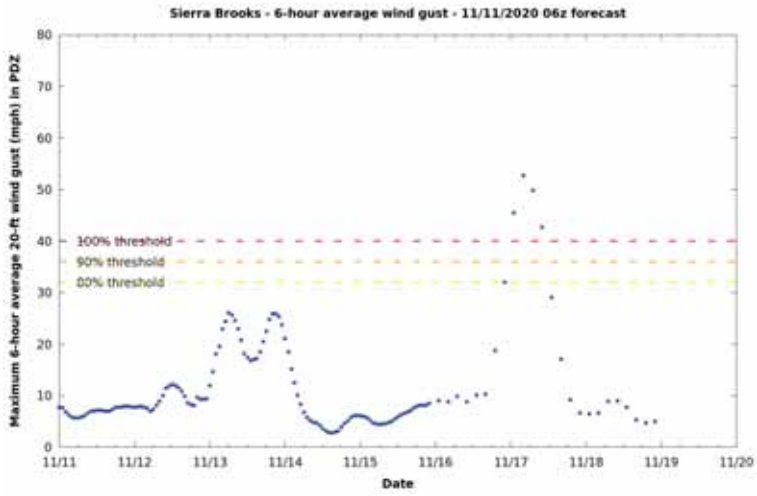
Portola



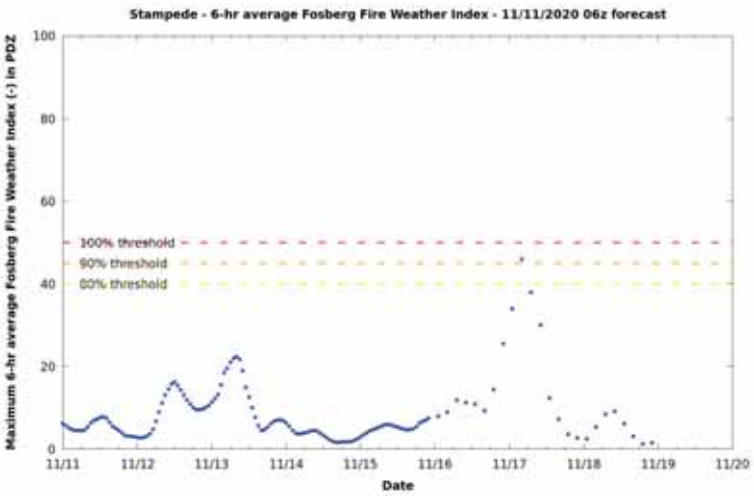


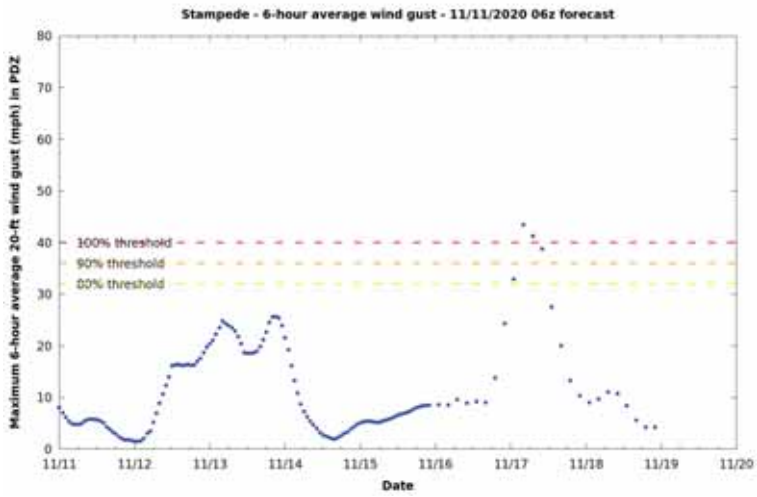
Sierra Brooks



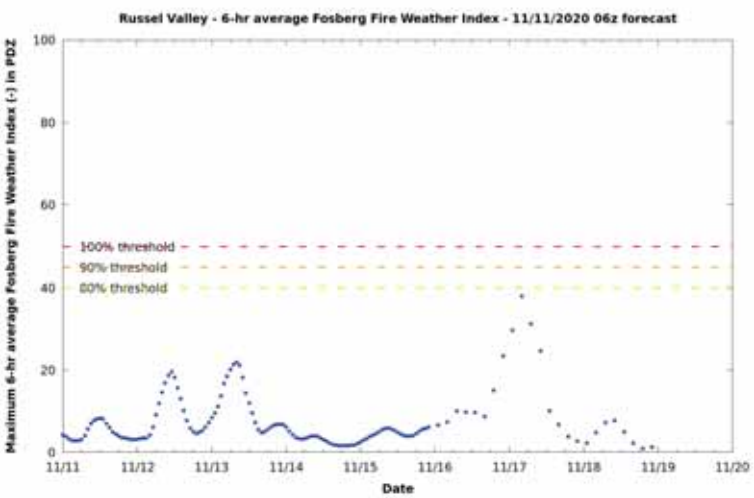


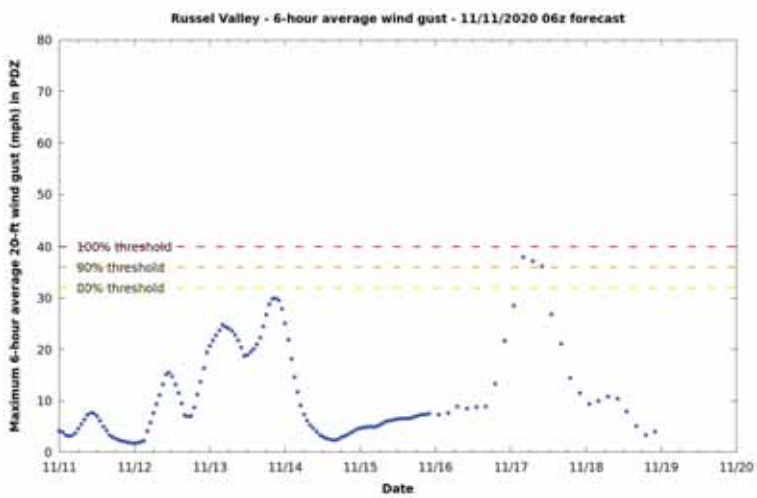
Stampede



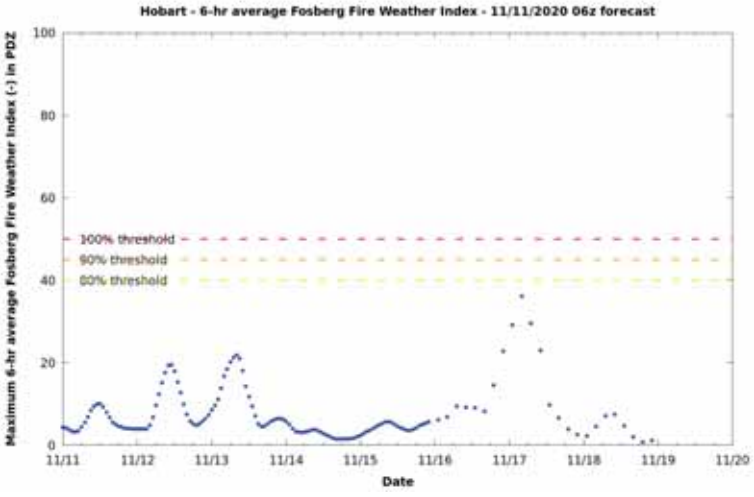


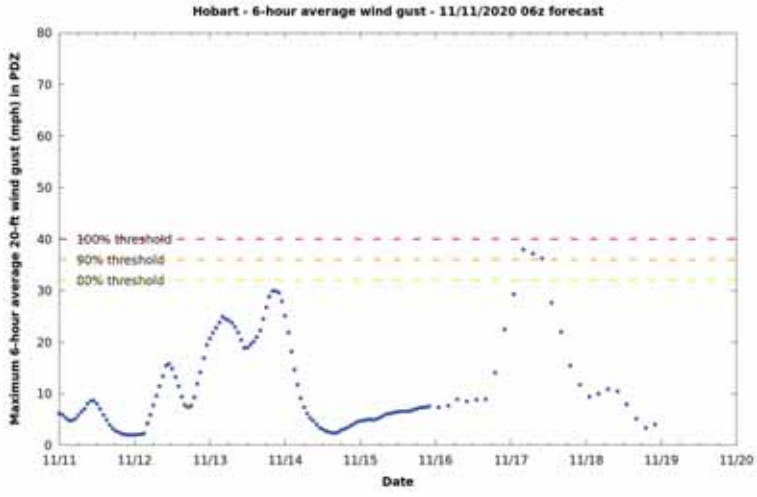
Russell Valley



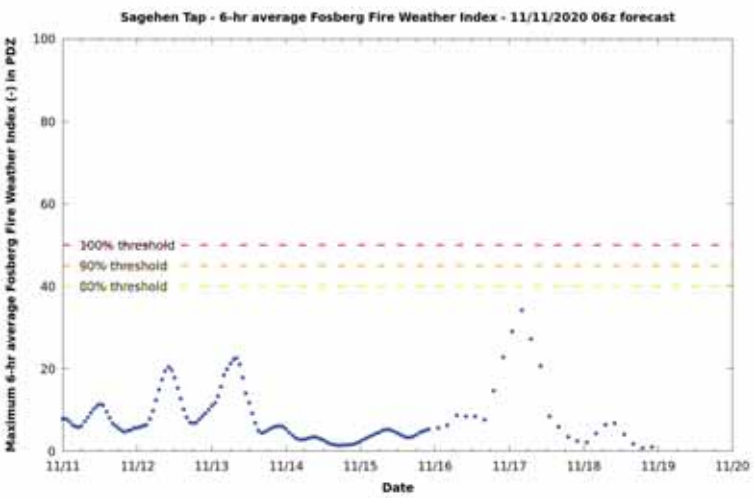


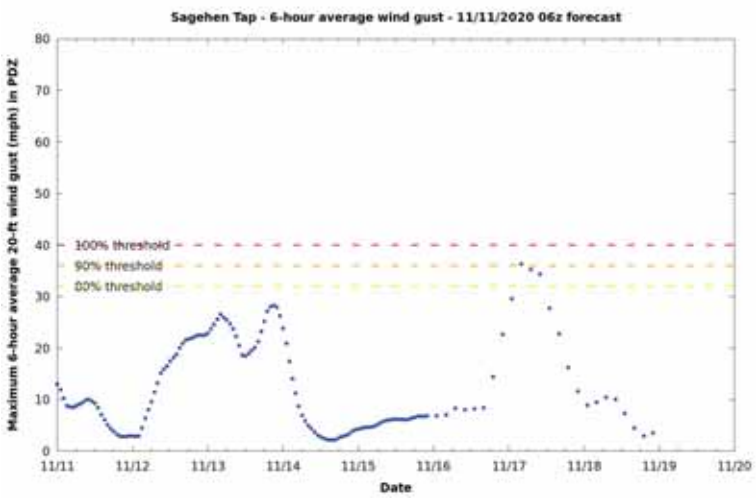
Hobart



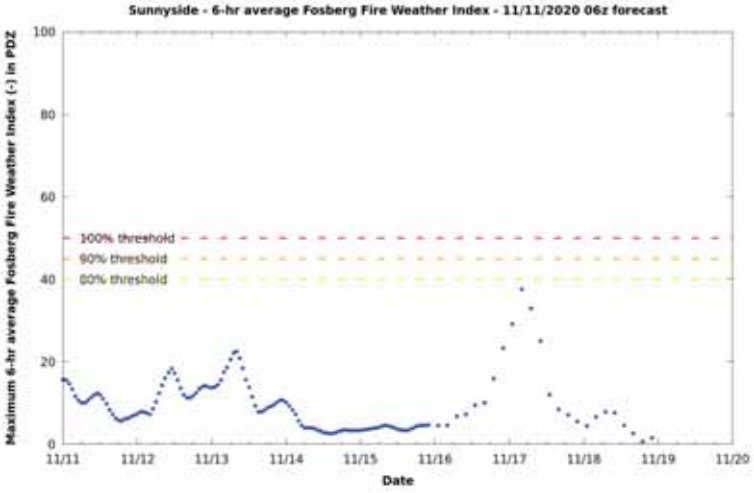


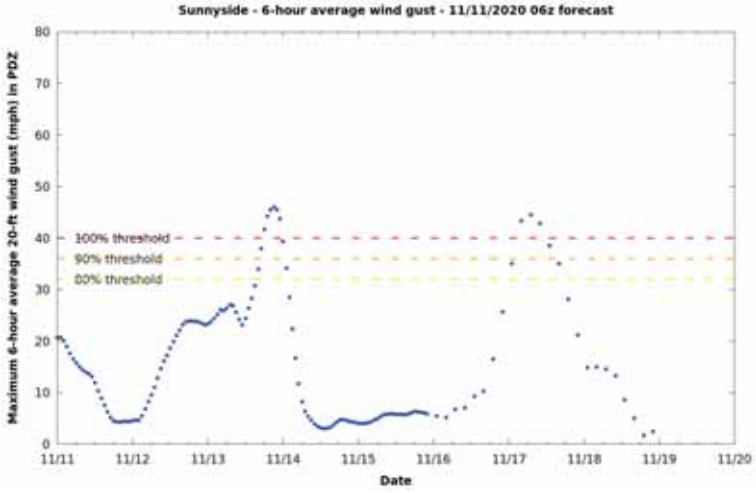
Sagehen tap



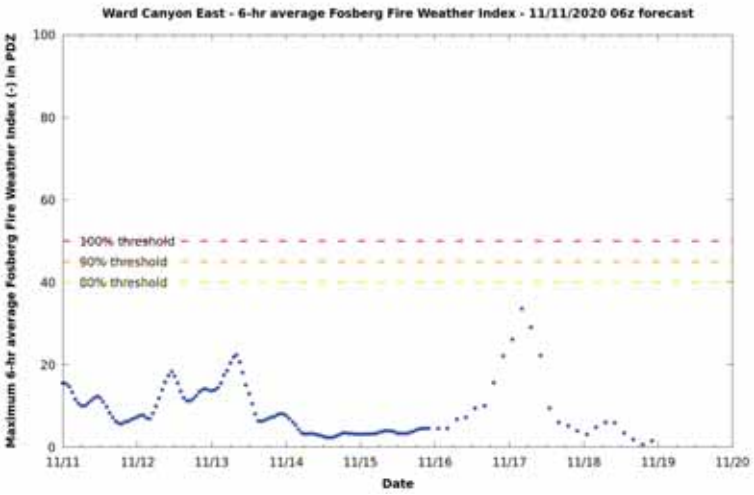


Sunnyside



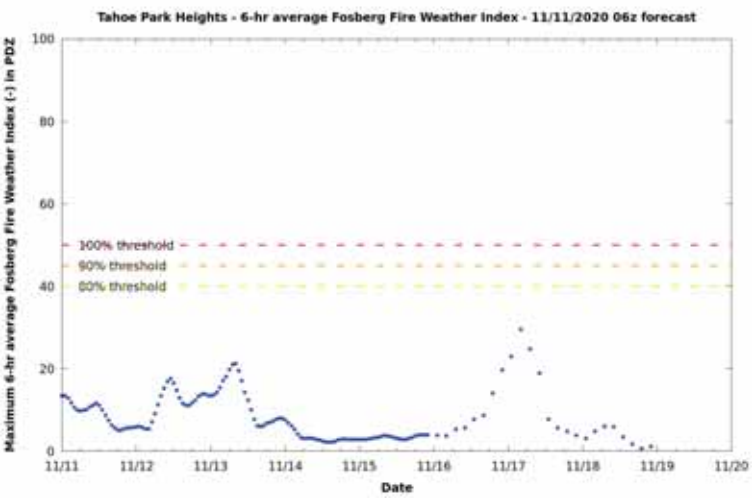


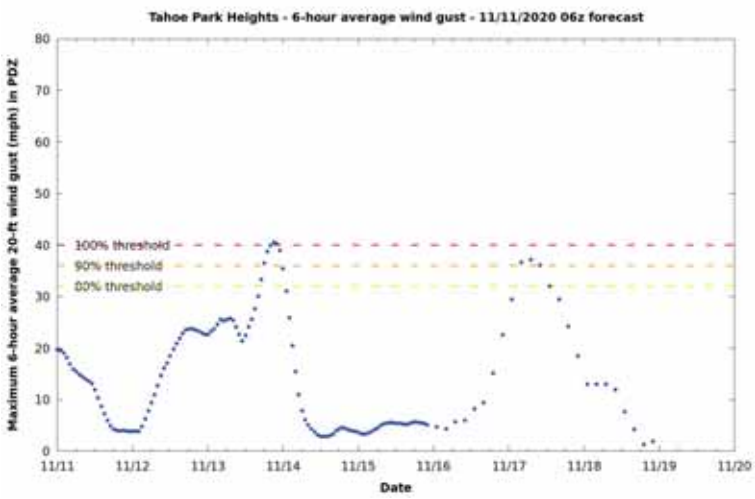
Ward Canyon East



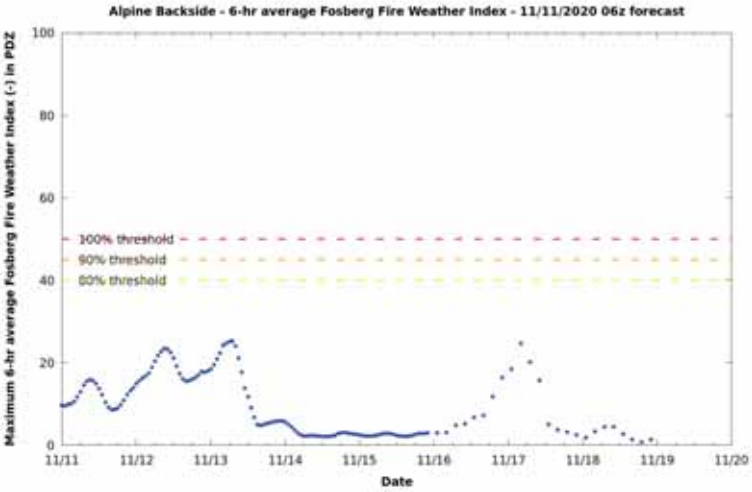


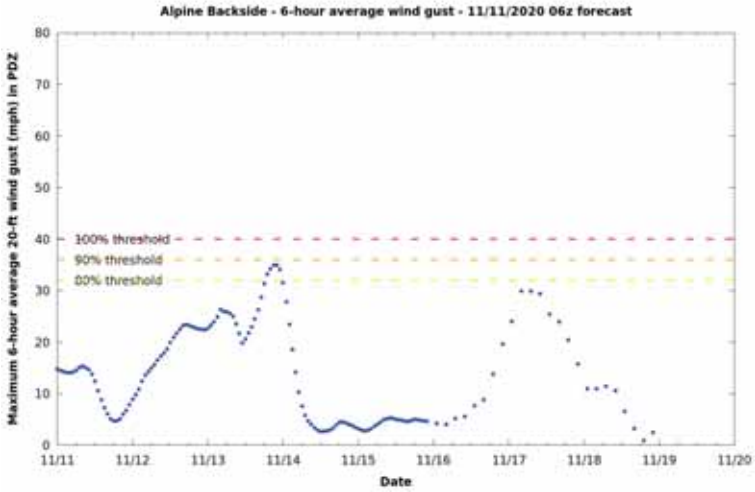
Tahoe Park Heights



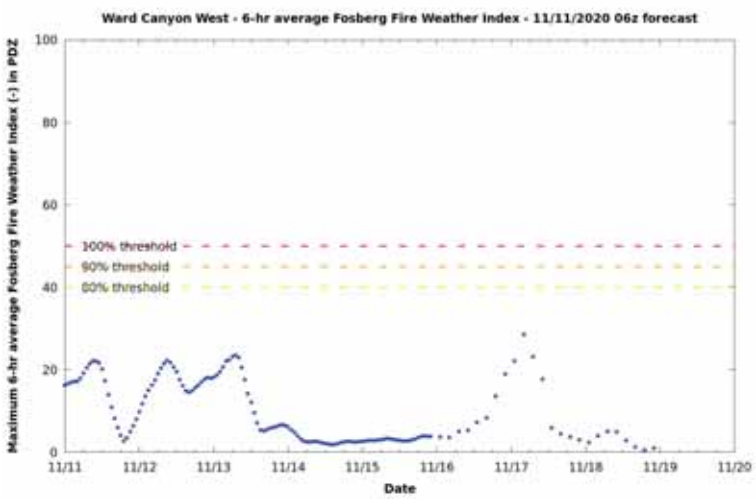


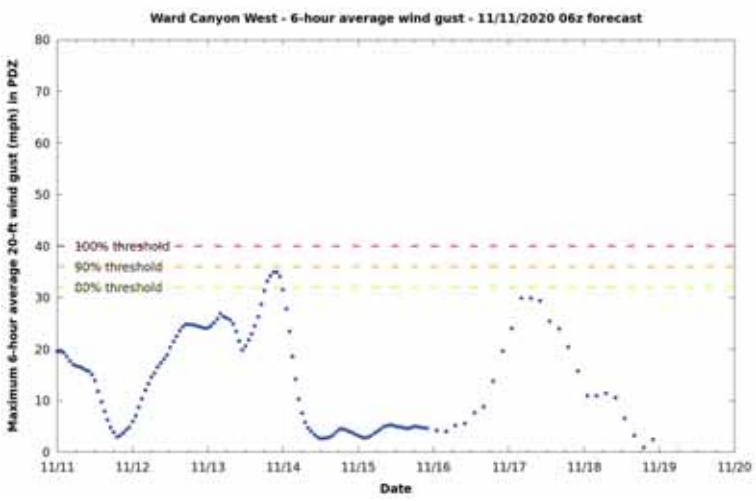
Alpine Backside



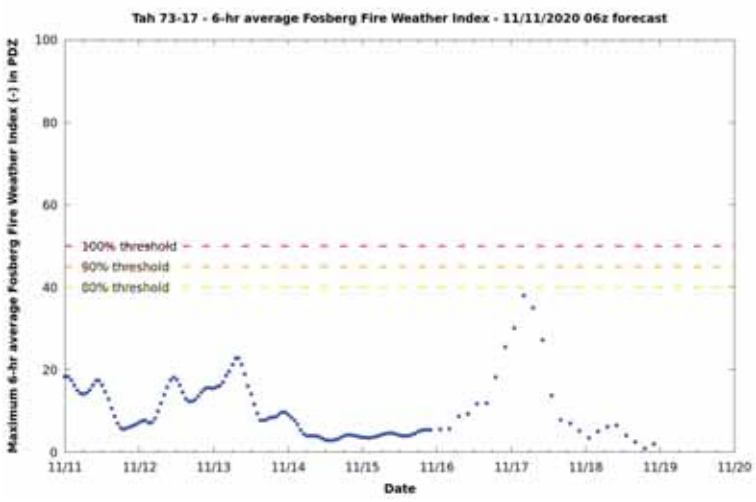


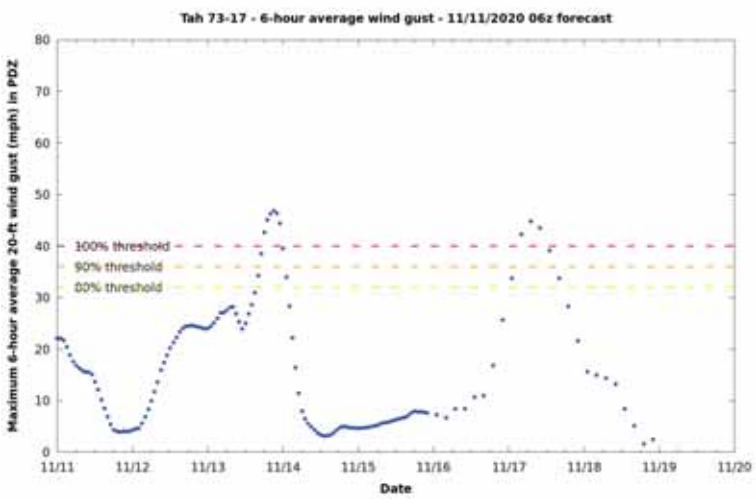
Ward Canyon West



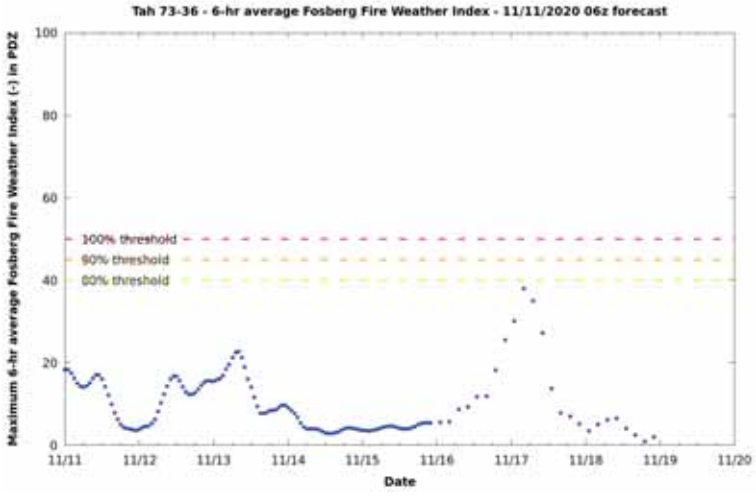


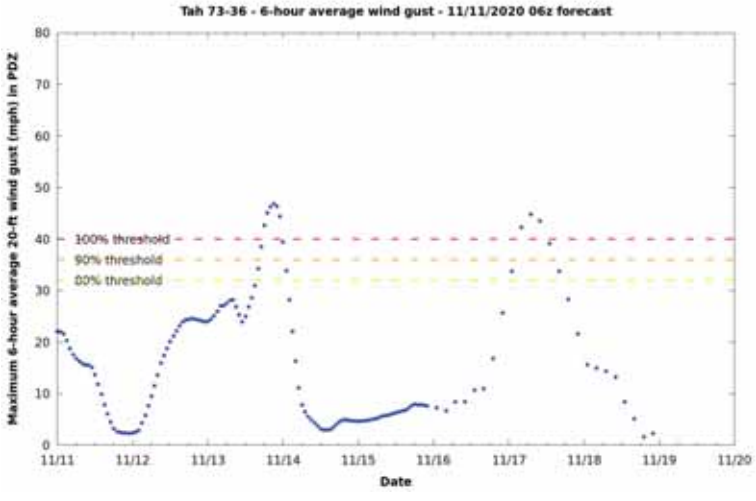
Tah 73-17



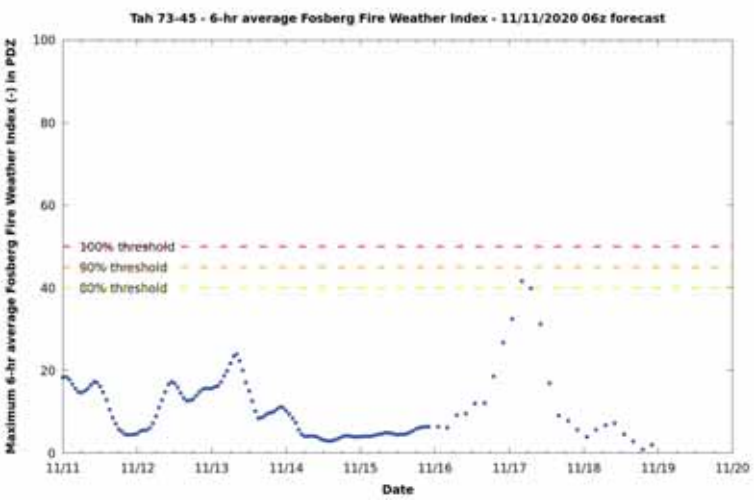


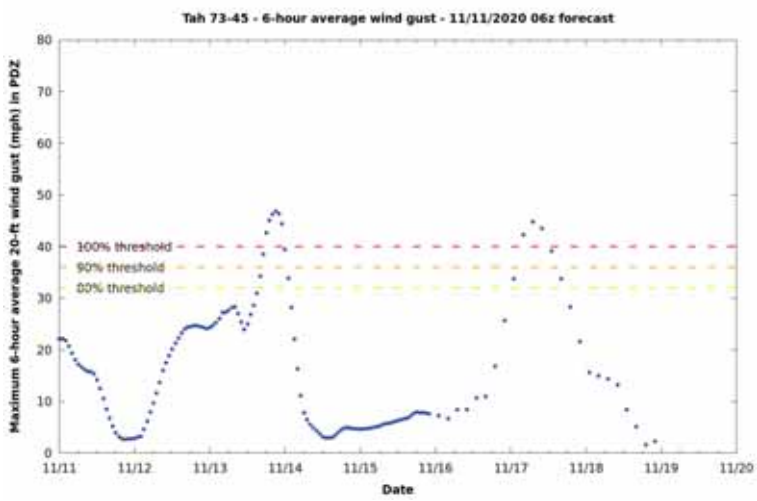
Tah 73-36



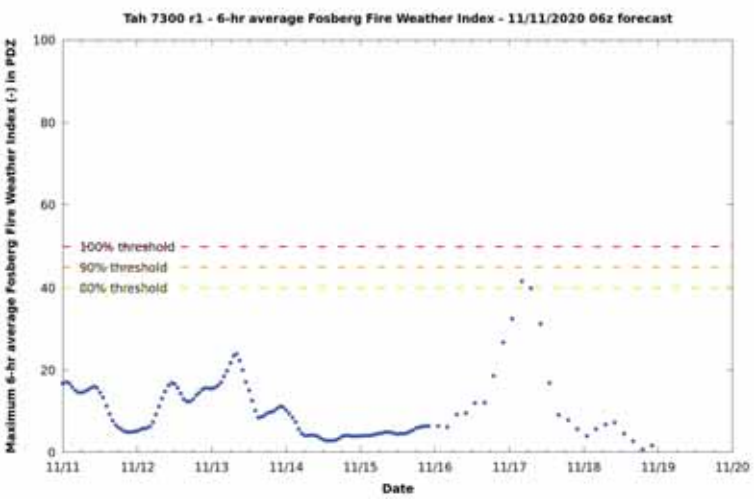


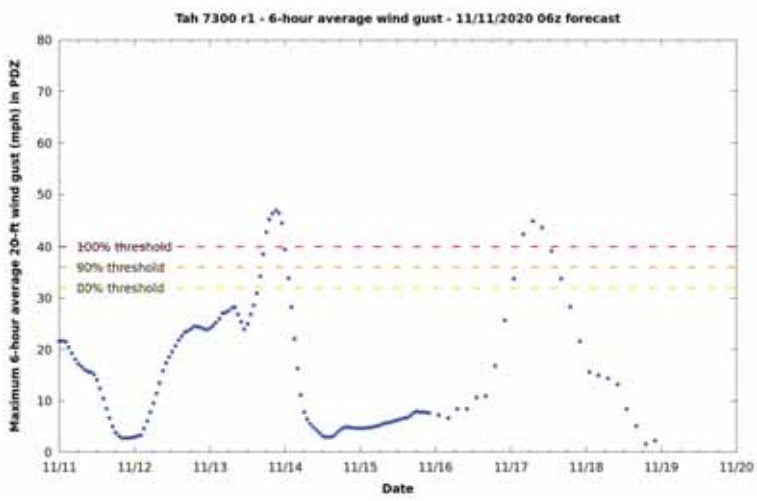
Tah 73-45



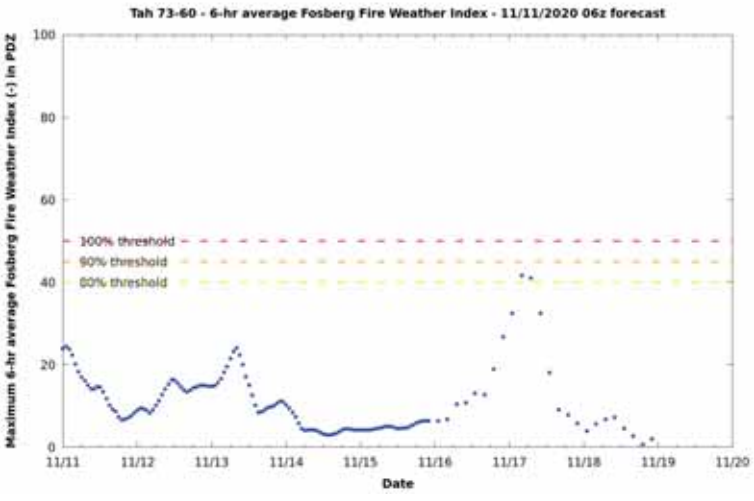


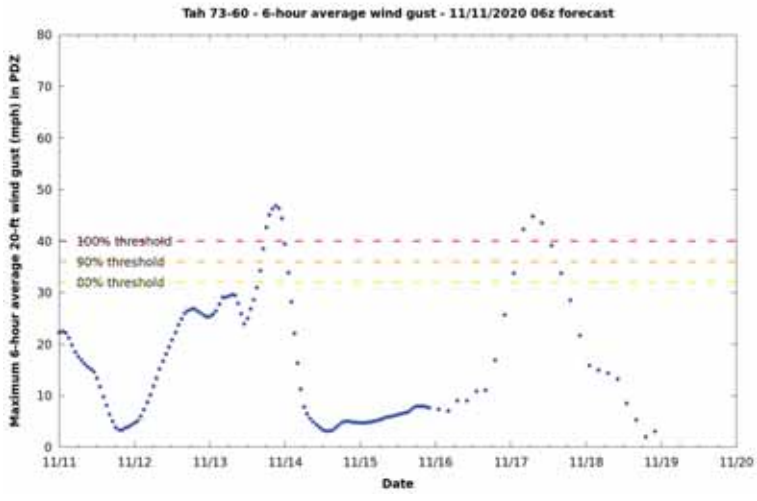
Tah 7300 r1



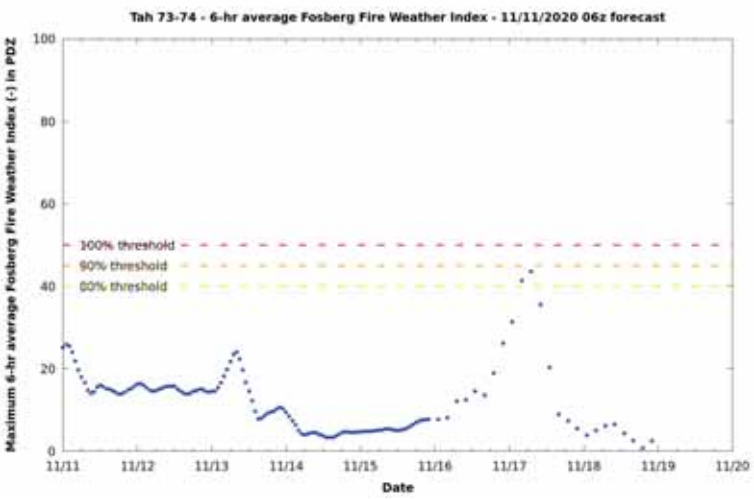


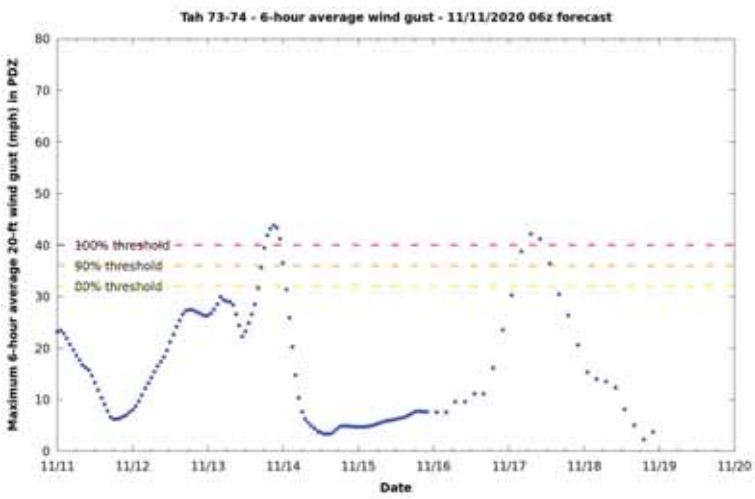
Tah 73-60



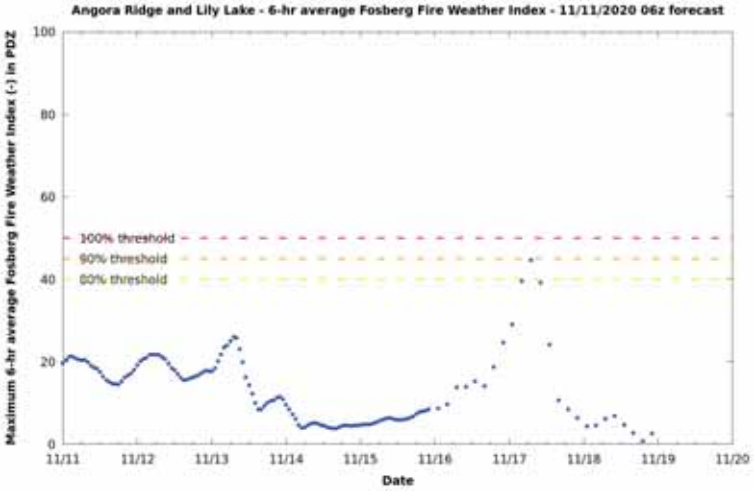


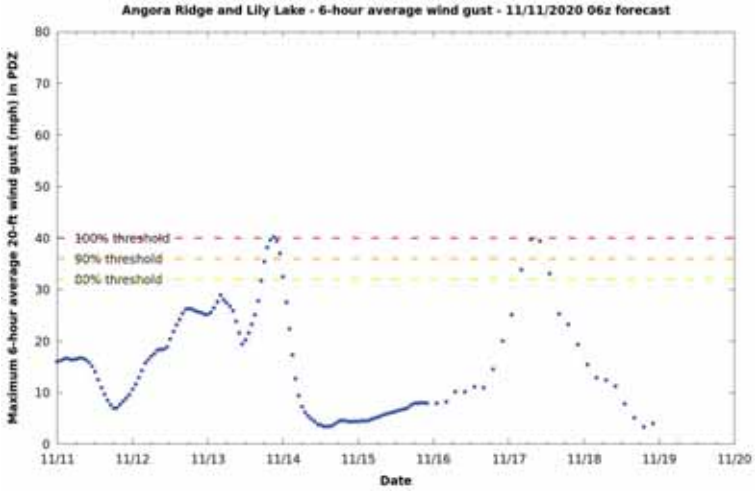
Tah 73-74



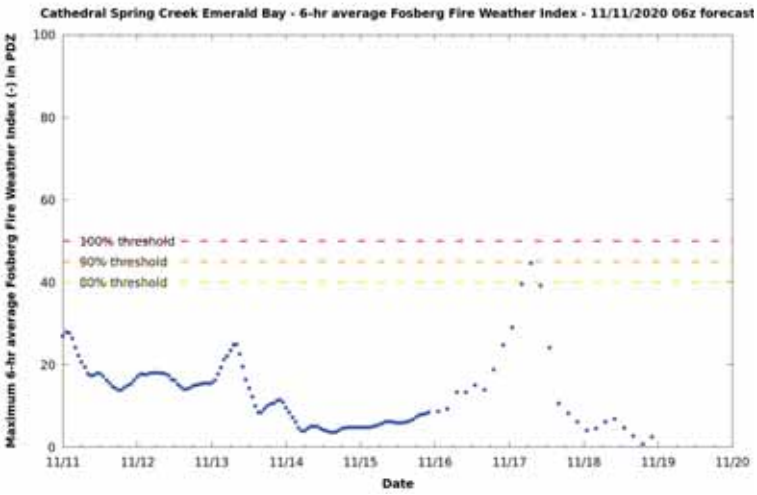


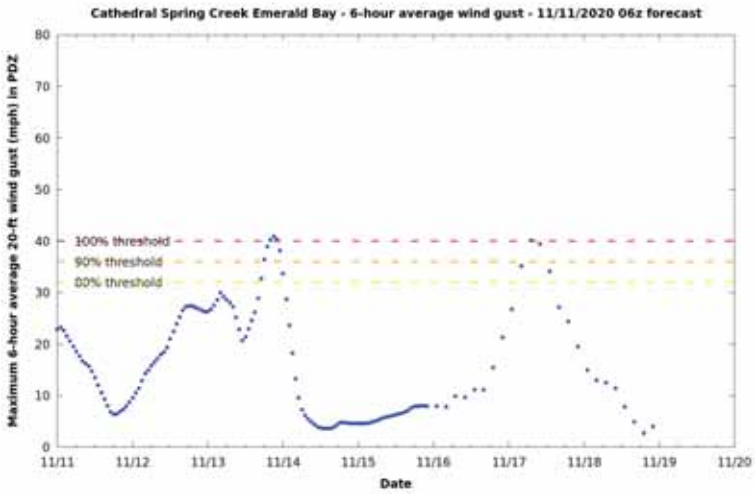
Angora Ridge and Lily Lake



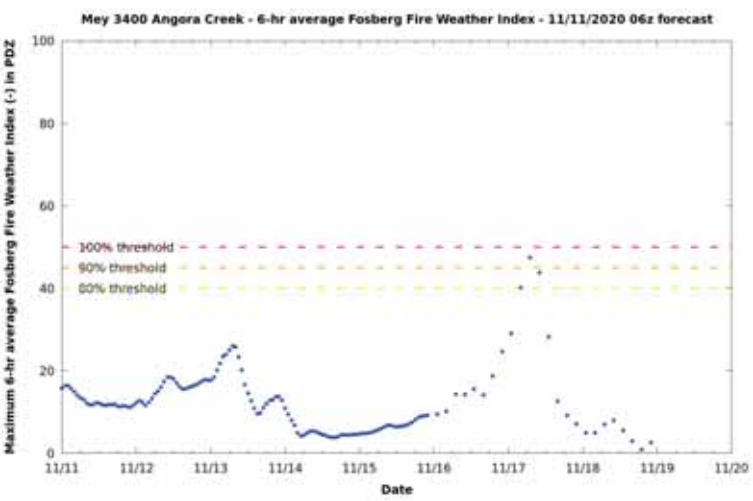


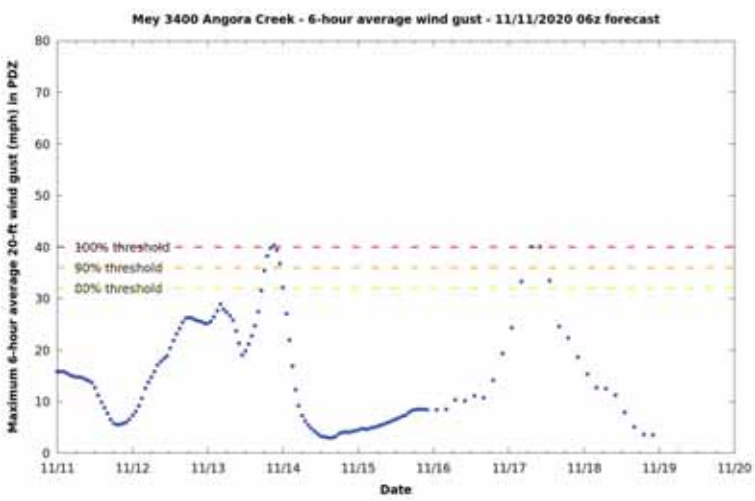
Cathedral Spring Creek Emerald Bay



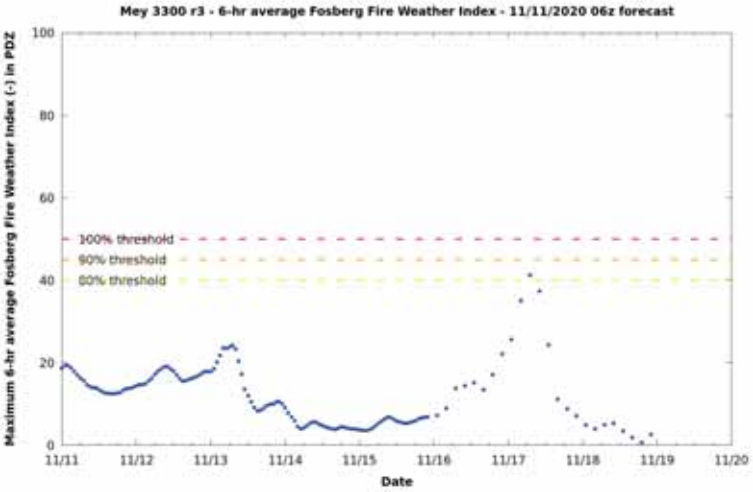


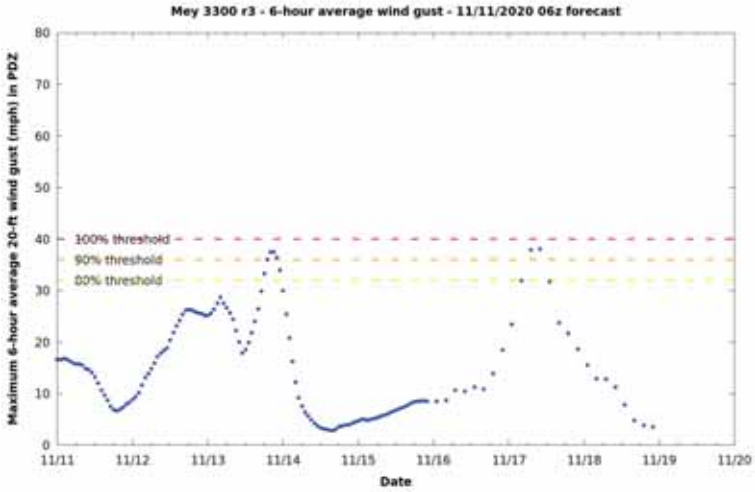
Mey 3400 Angora Creek



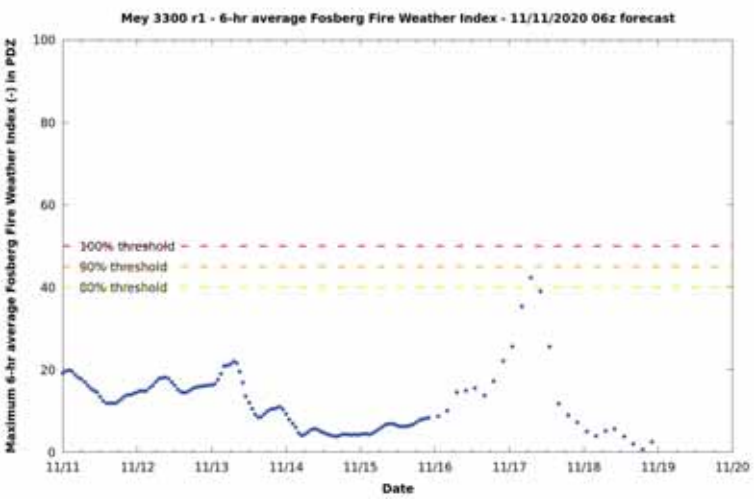


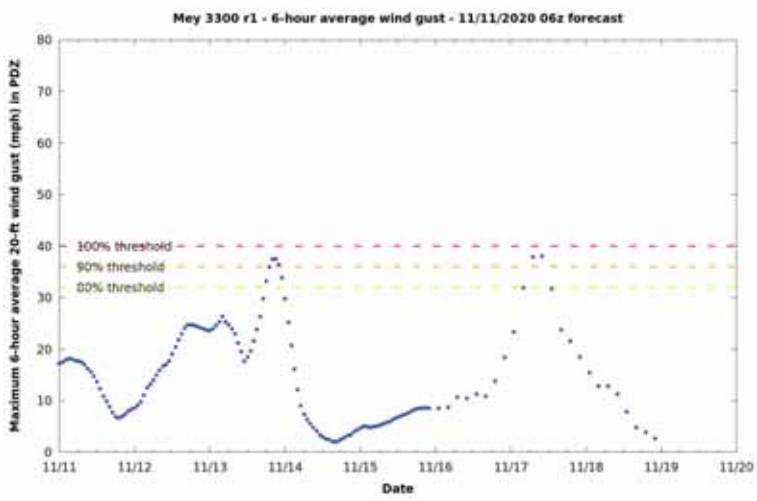
Mey 3300 r3



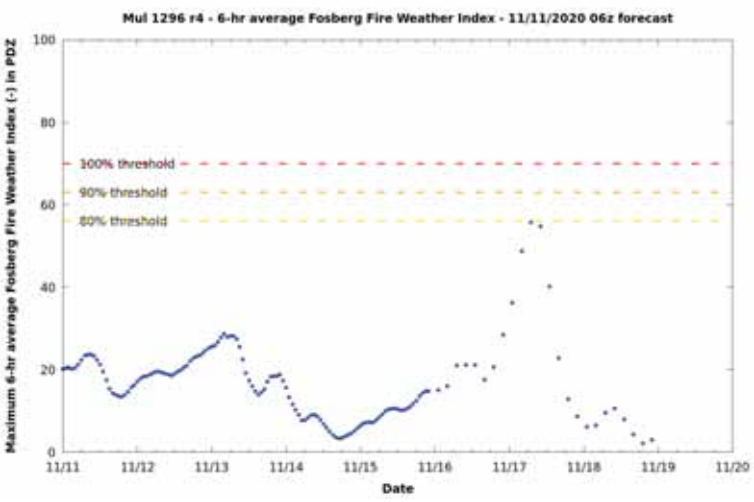


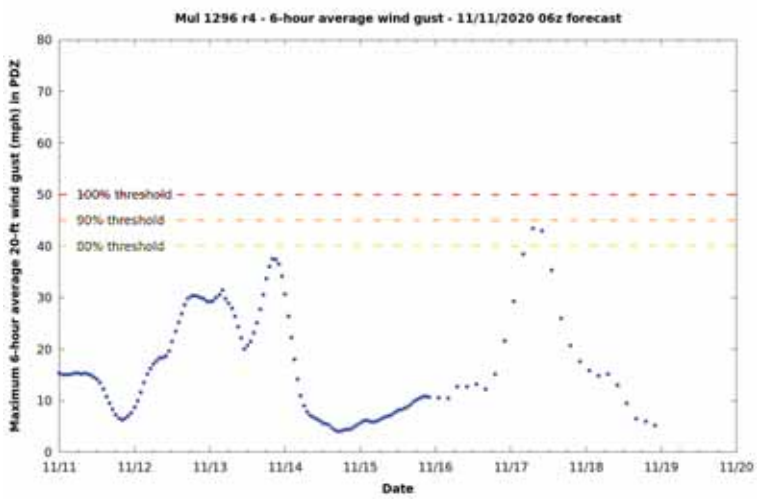
Mey 3300 r1



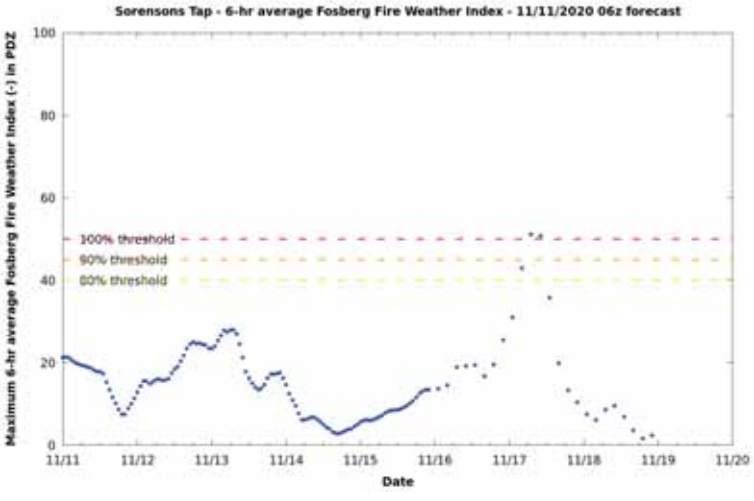


Mul 1296 r4



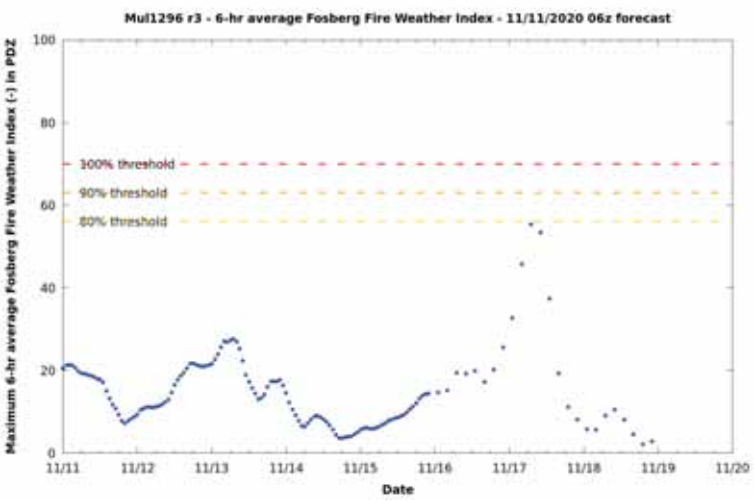


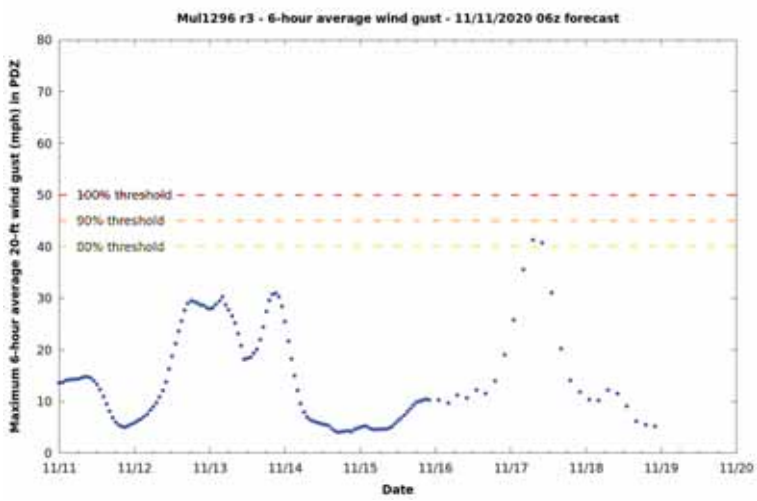
Sorensons Tap



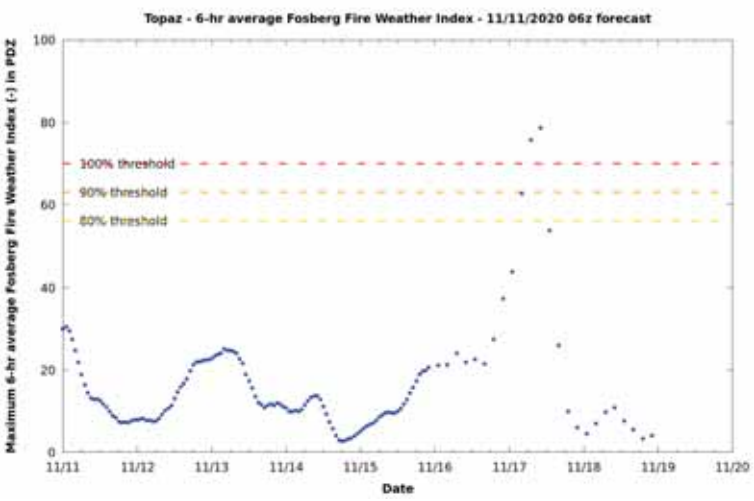


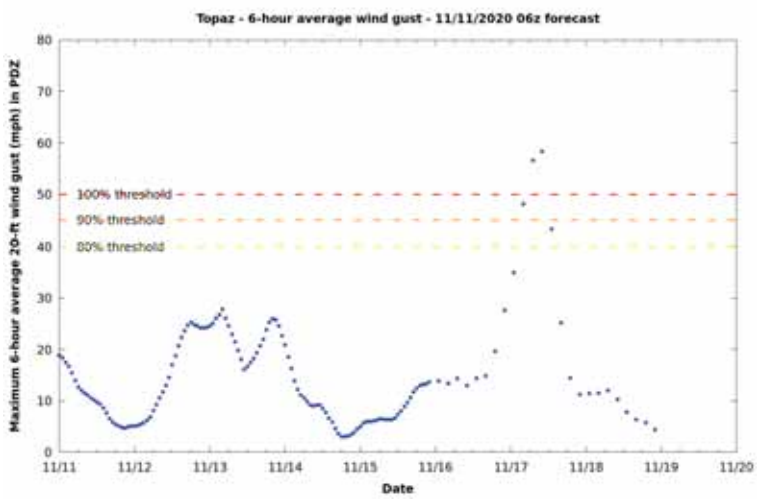
Mul 1296 r3



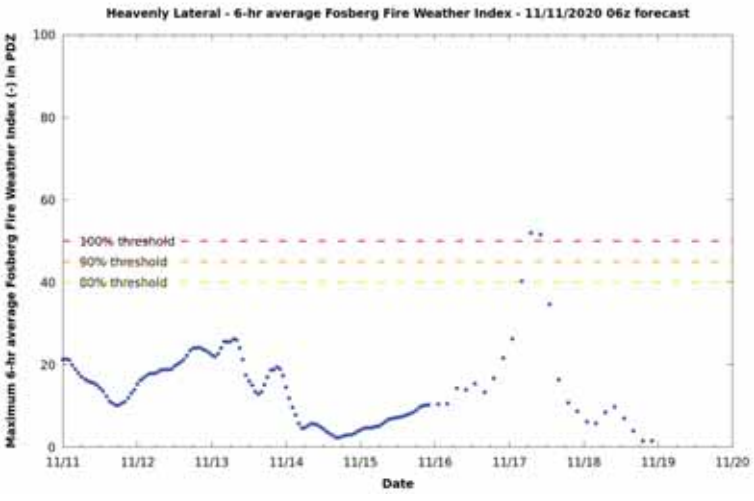


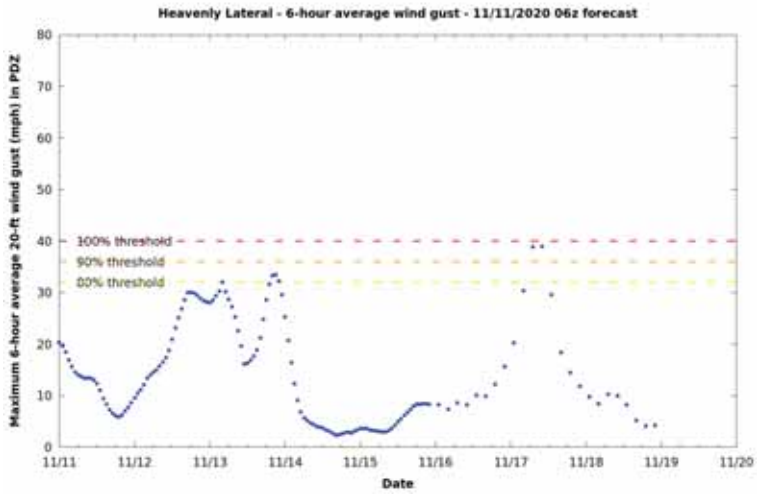
Topaz



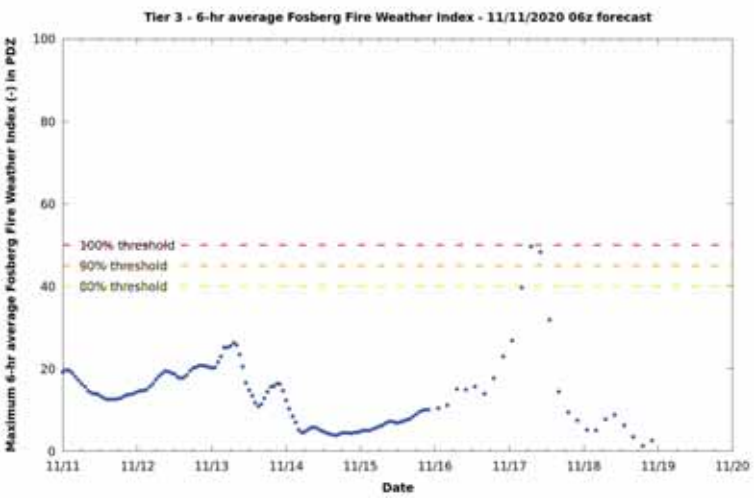


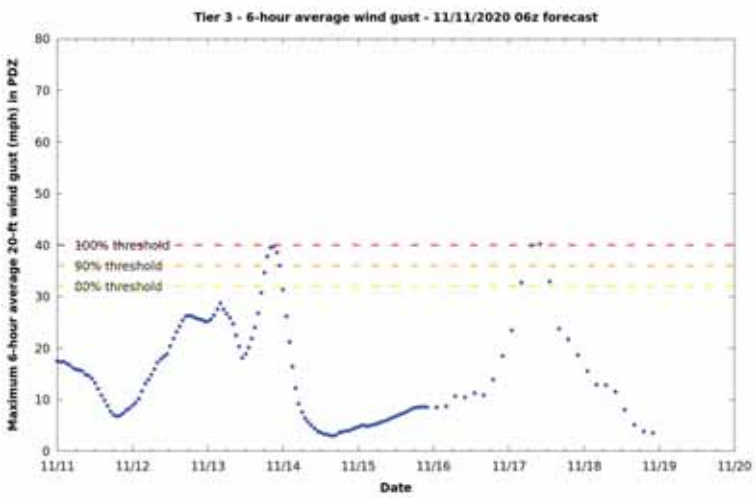
Heavenly Lateral



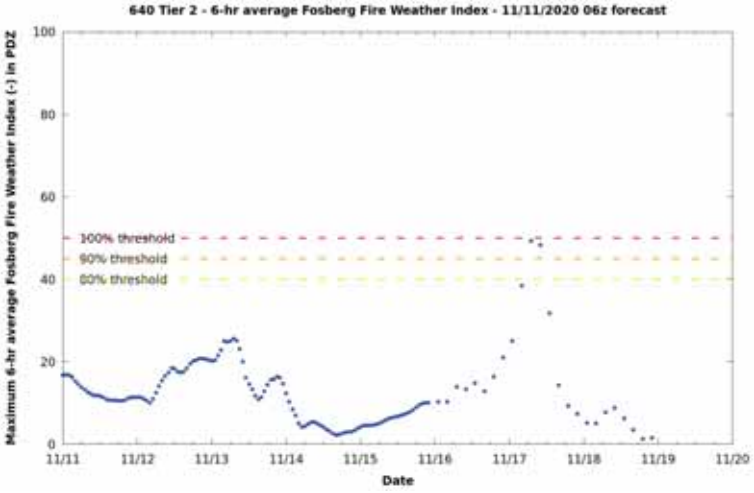


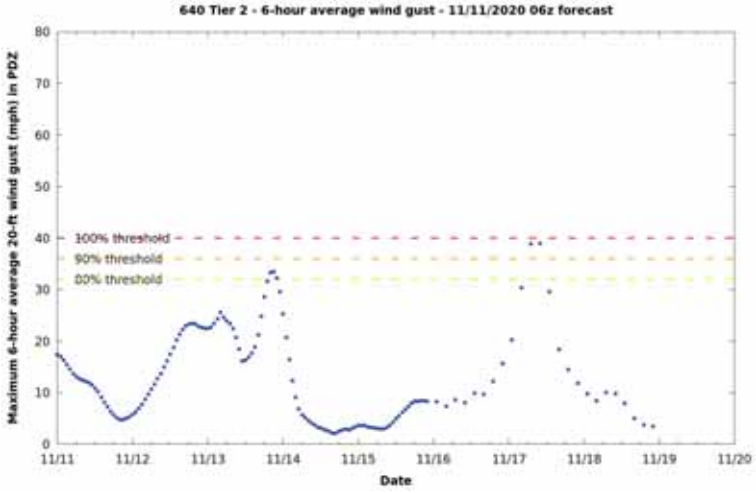
Tier 3



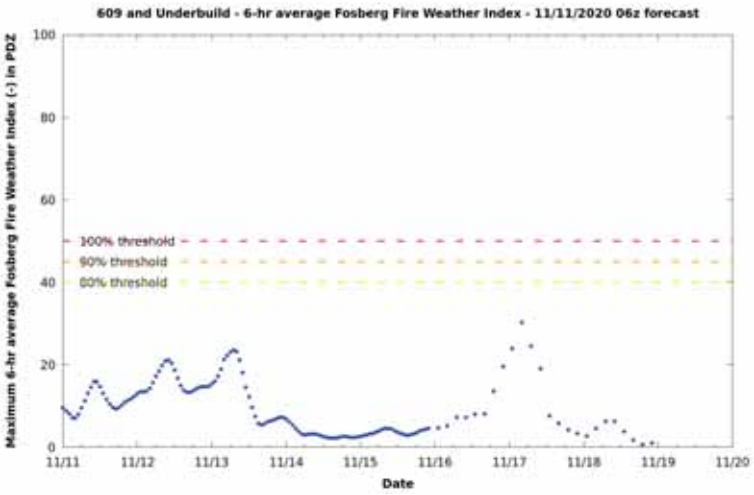


640 Tier 2



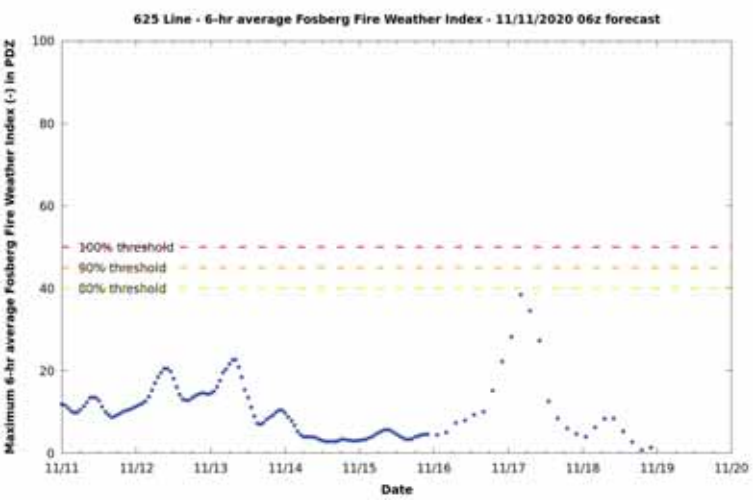


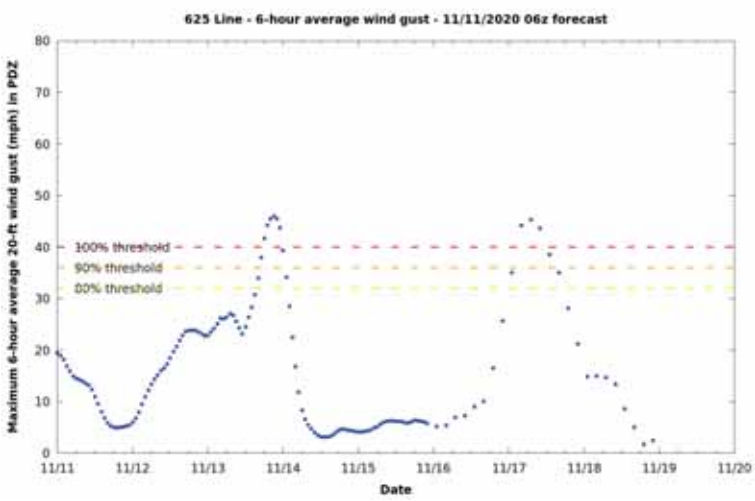
609 and Underbuild



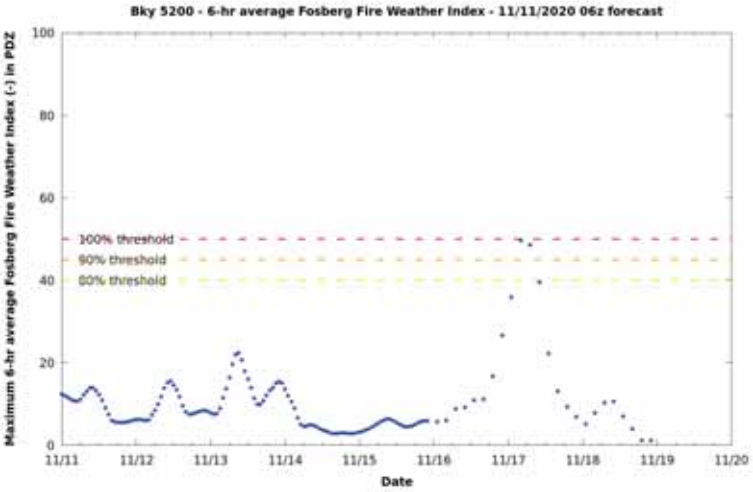


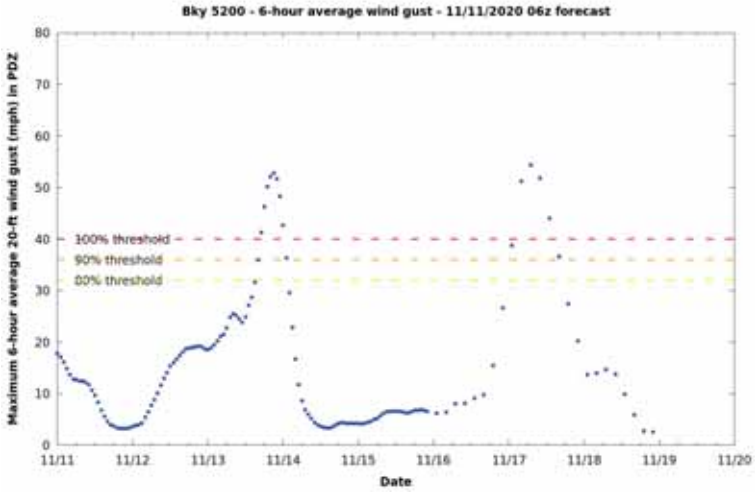
625 Line



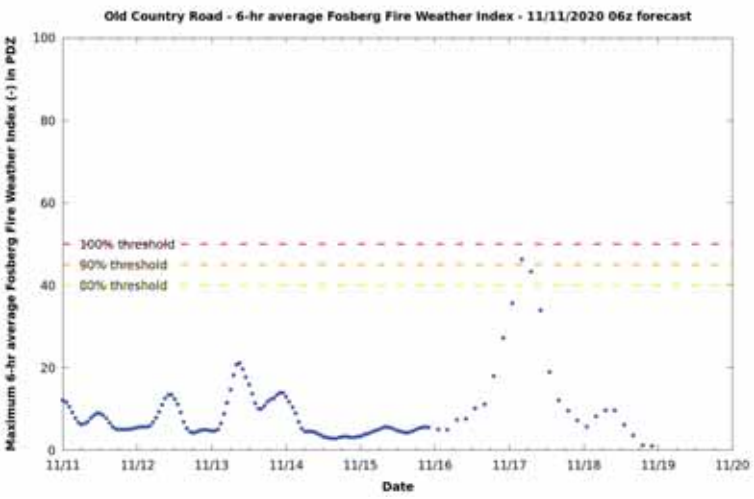


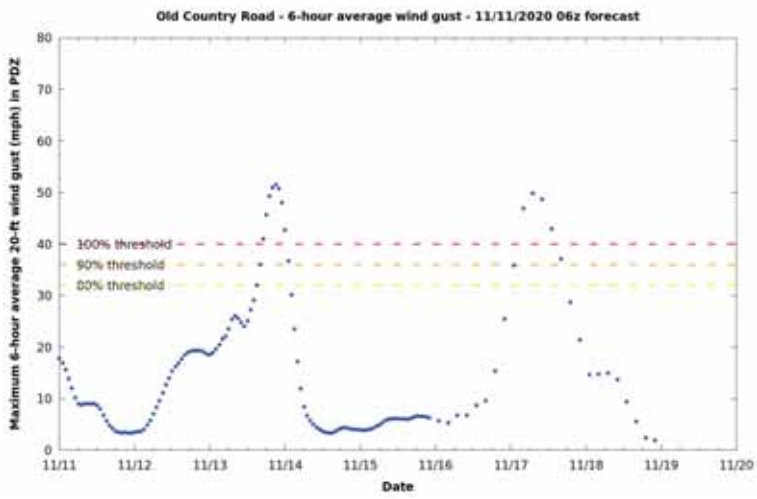
Bky 5200



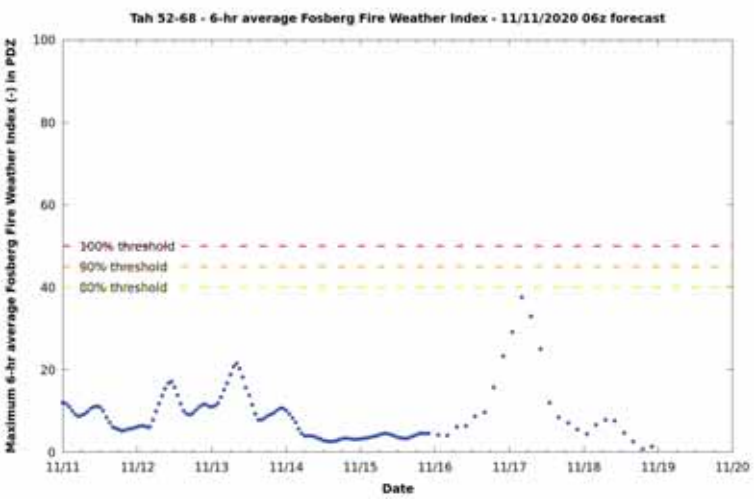


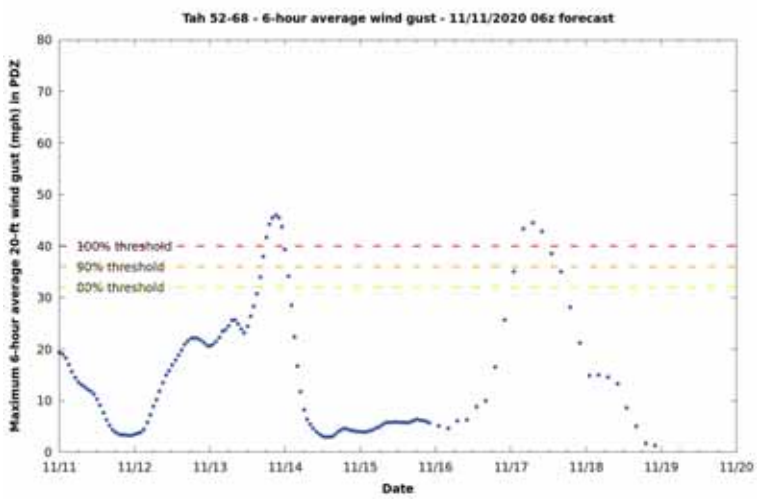
Old Country Road



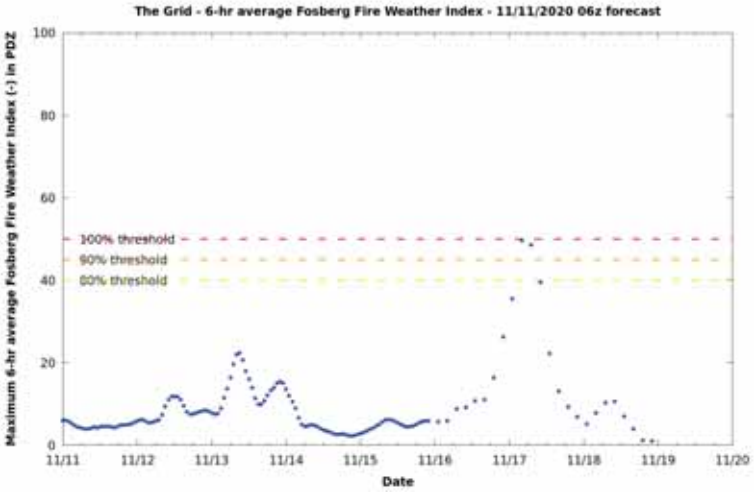


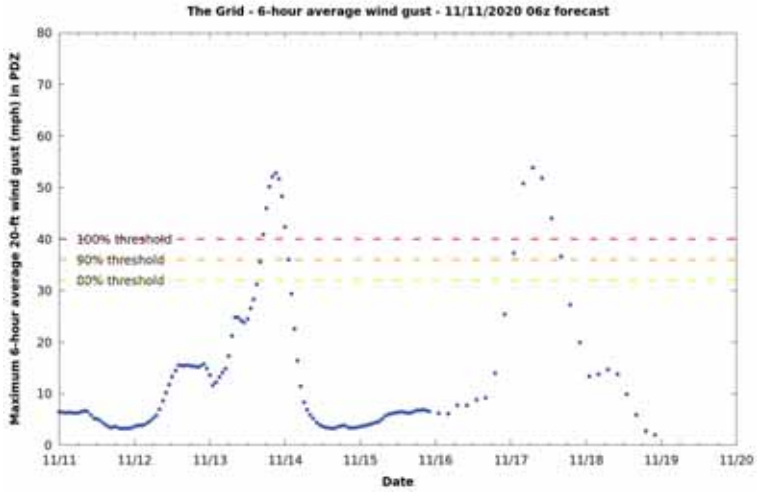
Tah 52-68



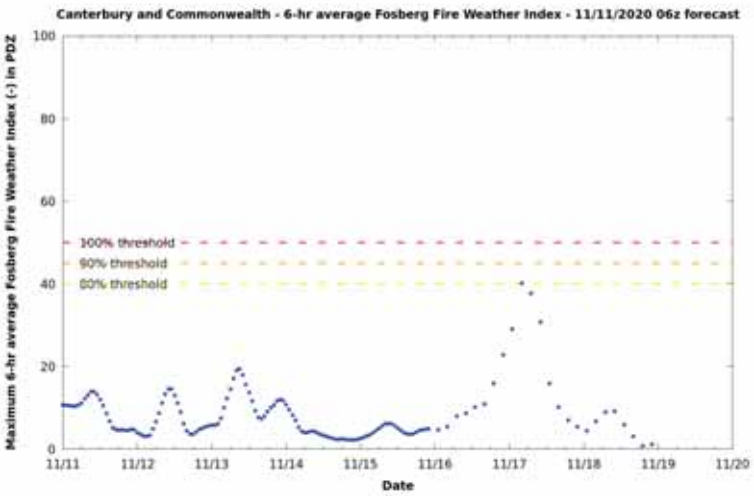


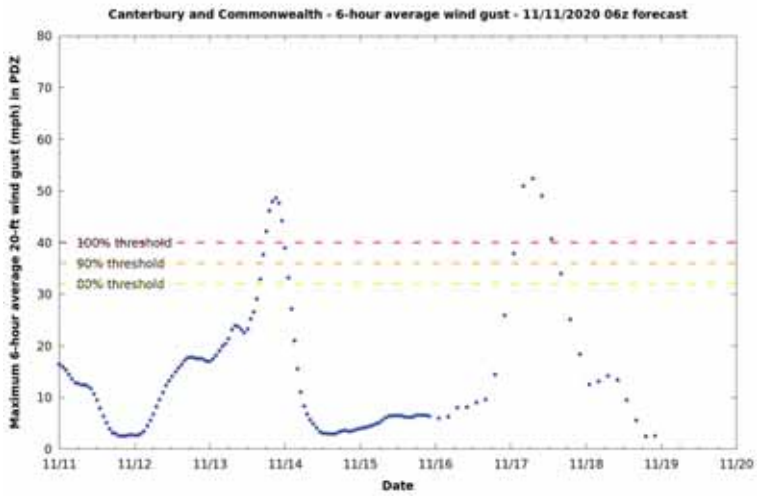
The Grid



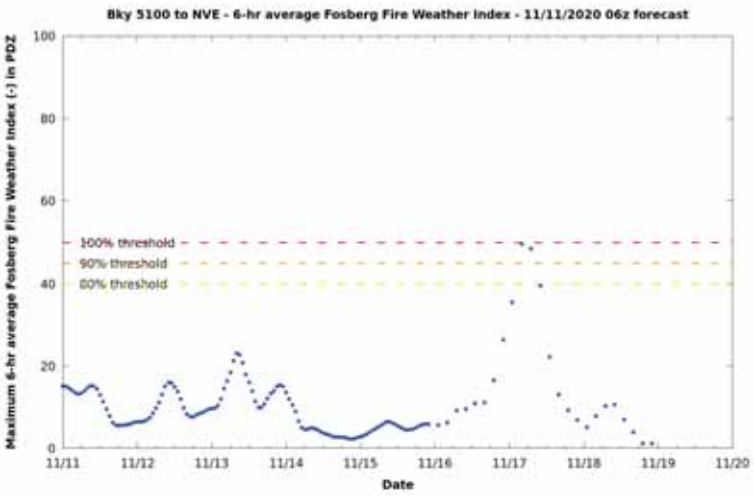


Canterbuy and Commonwealth



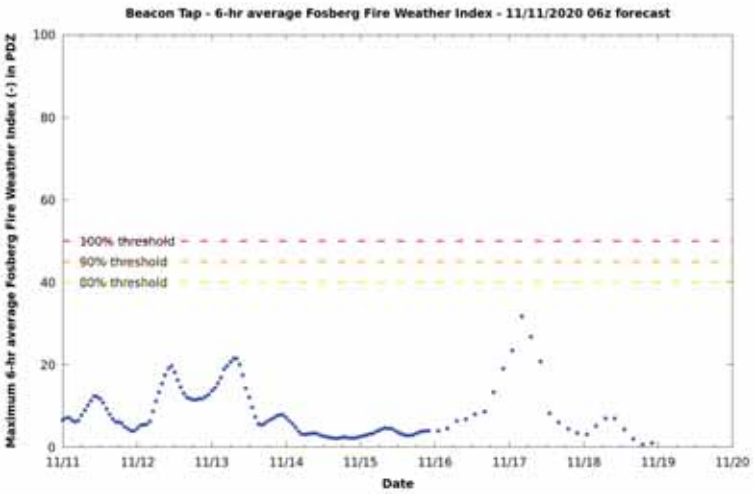


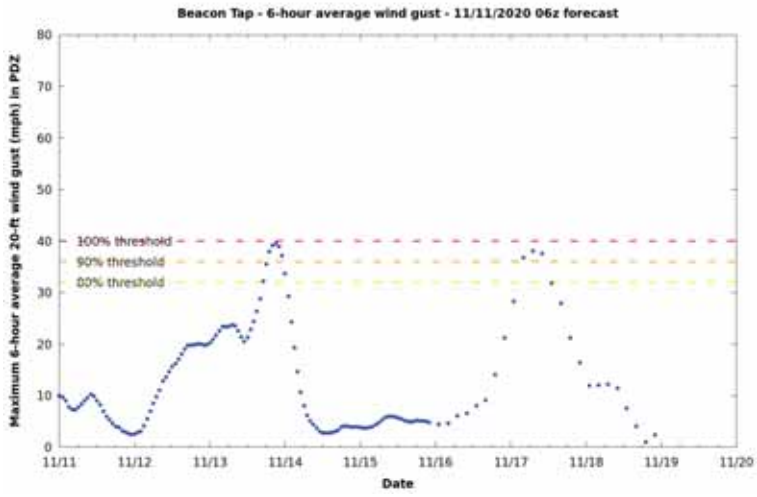
Bky 5100 to NVE



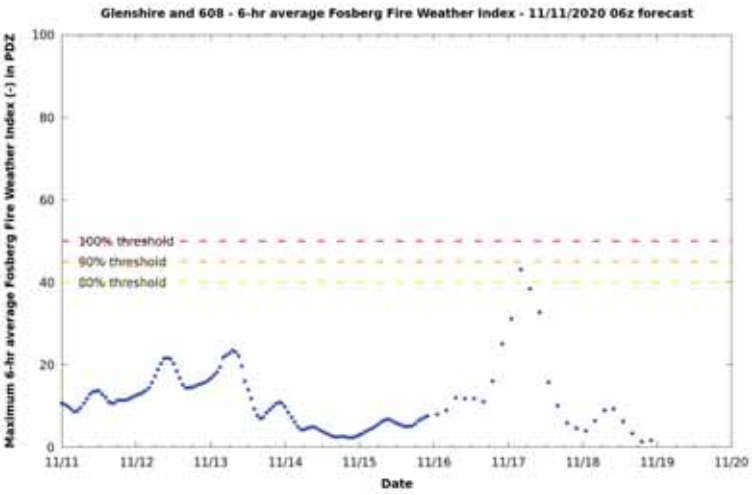


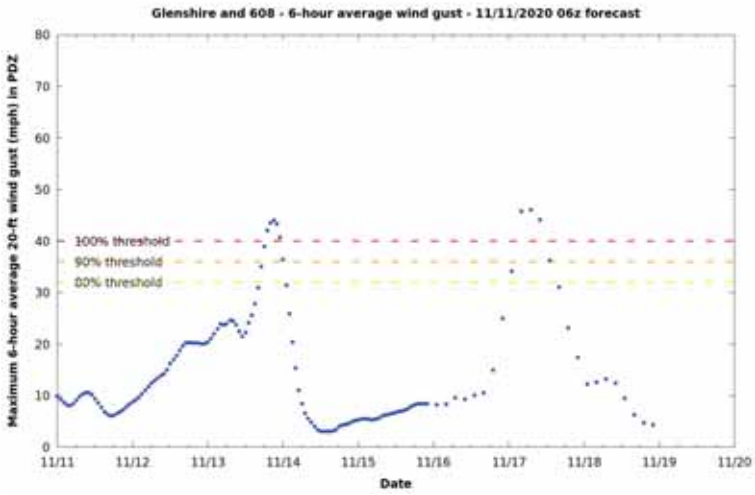
Beacon Tap



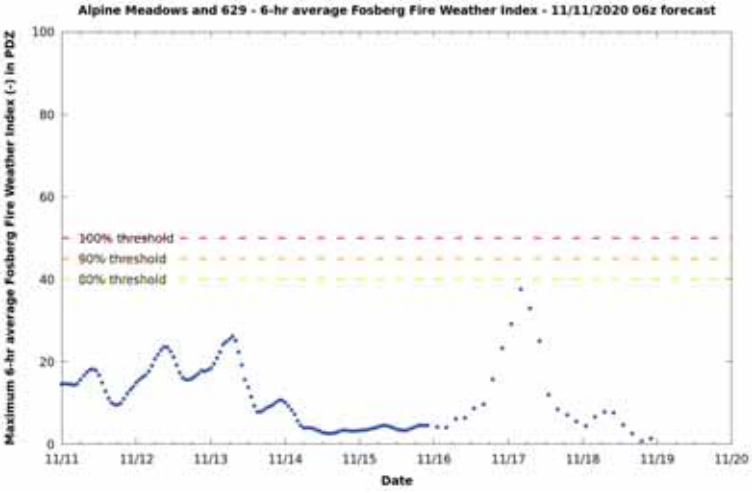


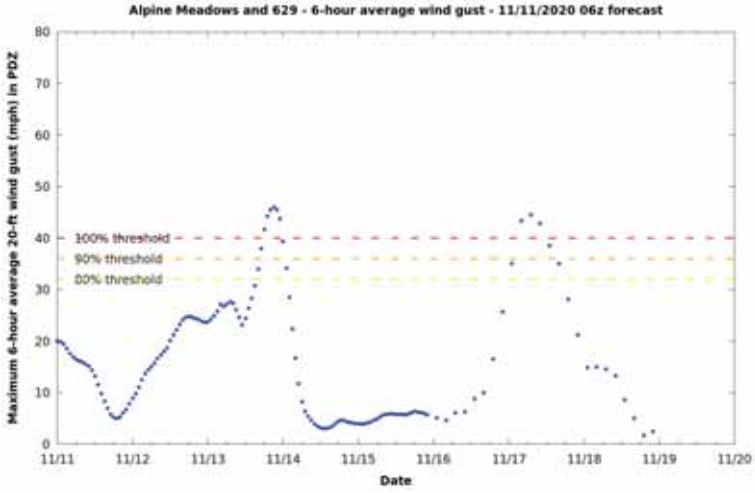
Glenshire and 608



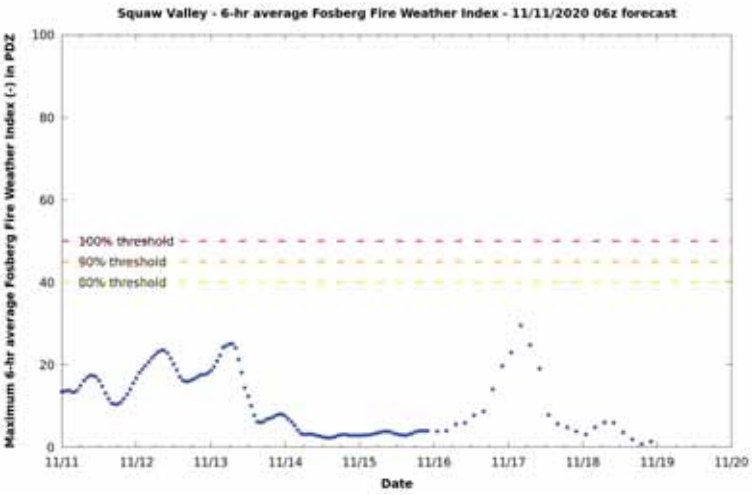


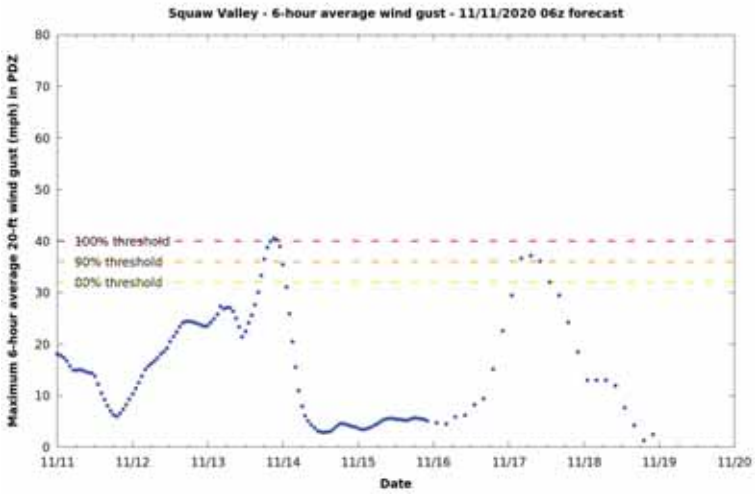
Alpine Meadows and 629



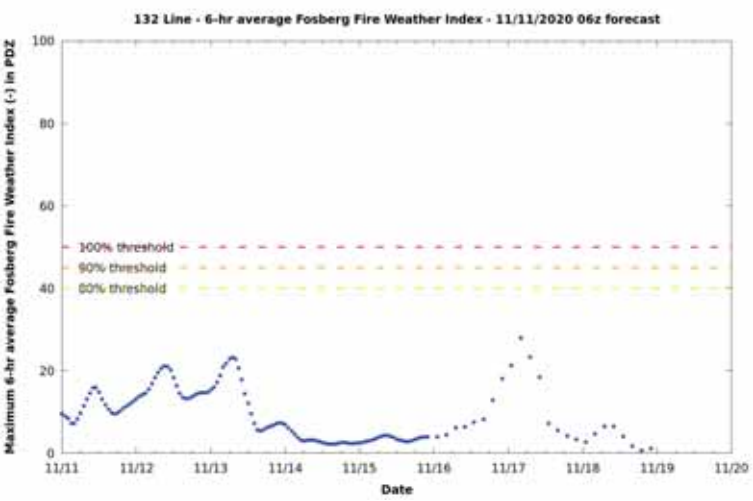


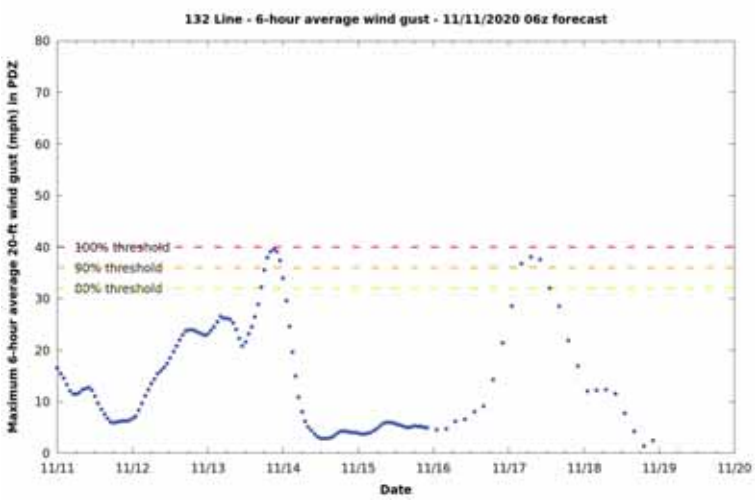
Squaw Valley



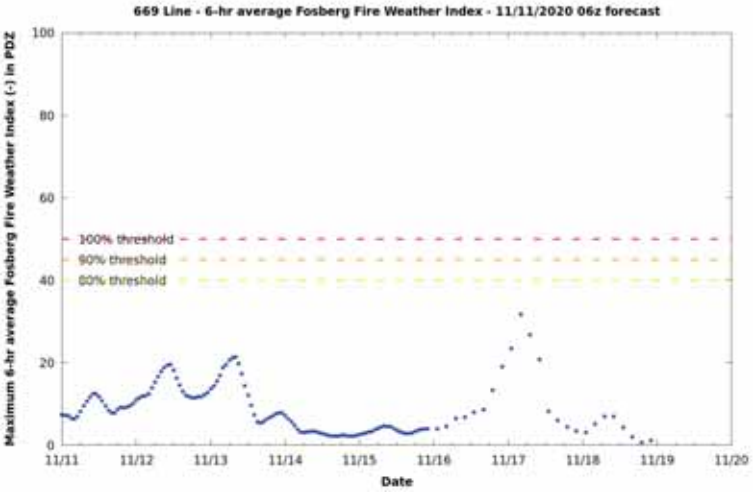


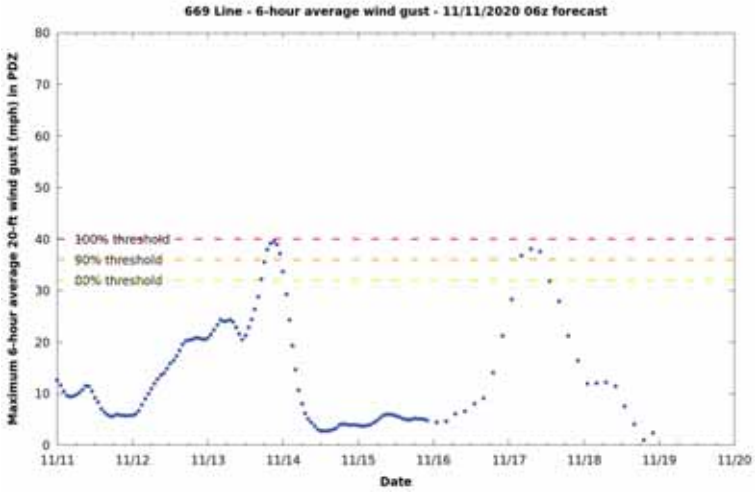
132 Line



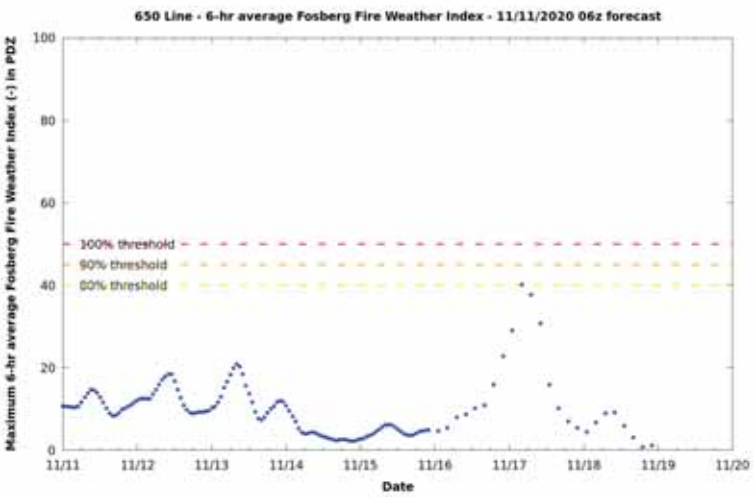


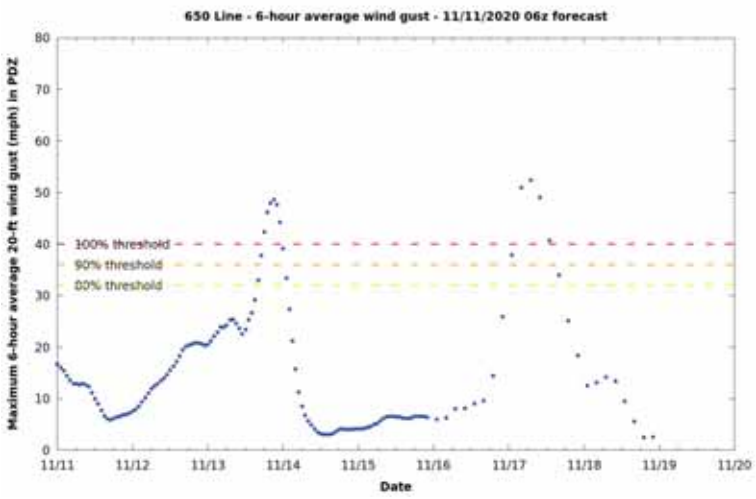
669 Line



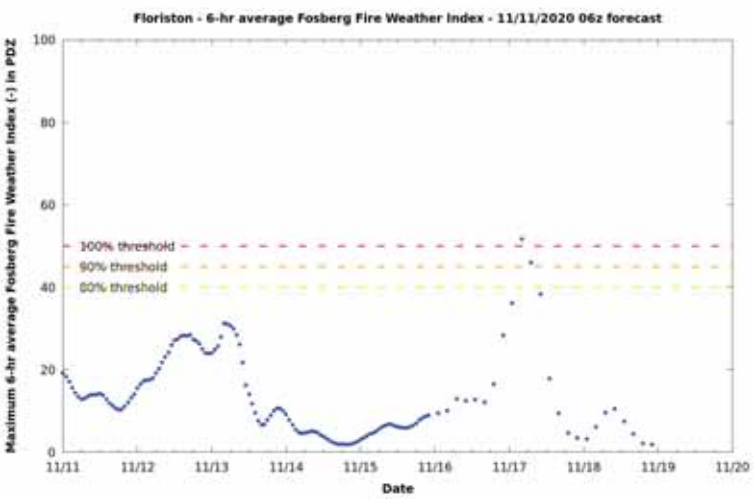


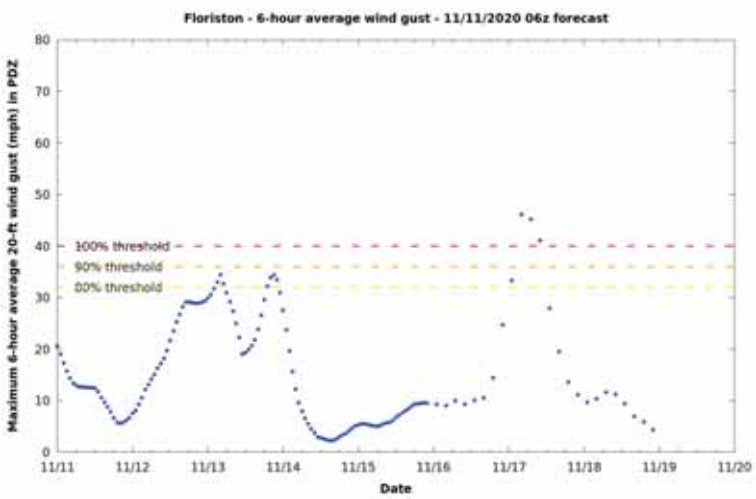
650 Line



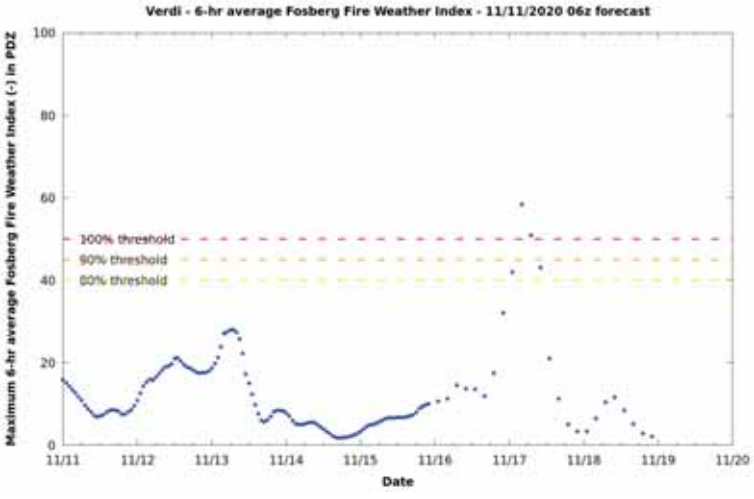


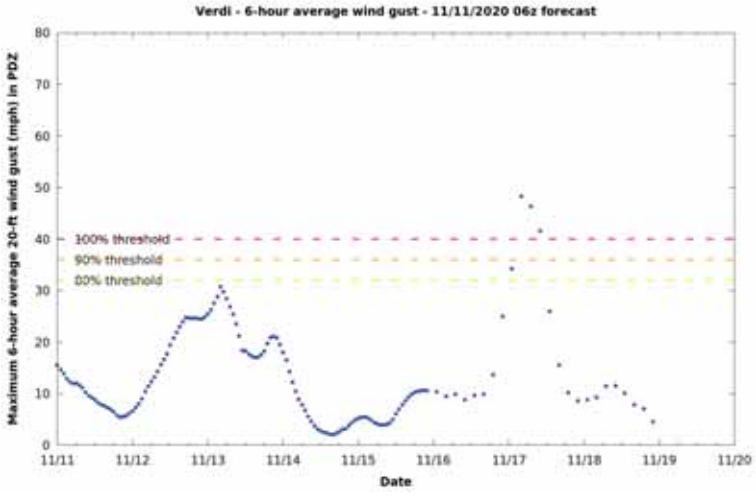
Floriston



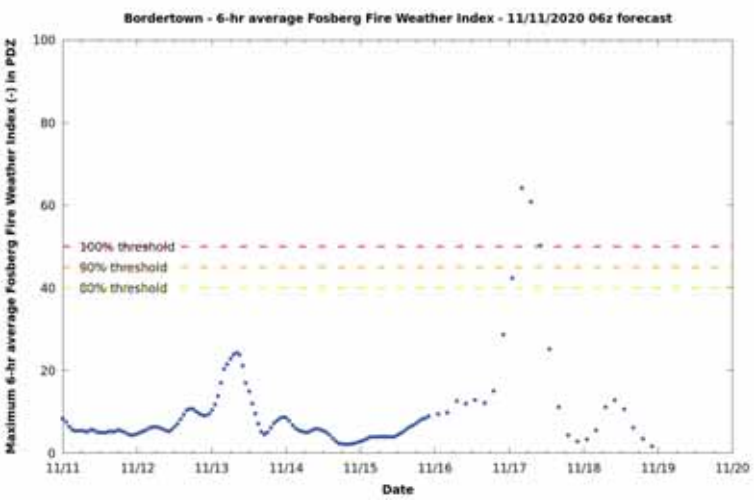


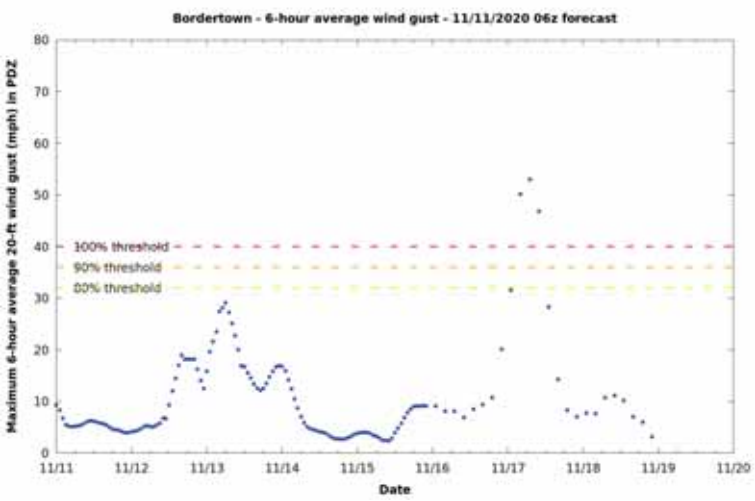
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/11/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/11
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20


Bordertown - 6-hour average wind gust - 11/11/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/11
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20

Liberty Utilities Fire Potential Index Forecast for 11/11/20 - 11/17/20

Zone	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

Liberty Utilities Energy Release Component Forecast for 11/11/20 - 11/17/20

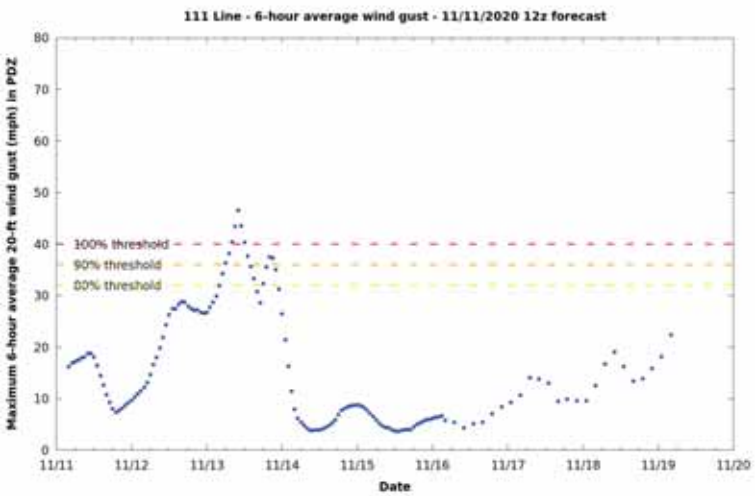
Zone	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	42.0	39.0	33.0	34.0	31.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

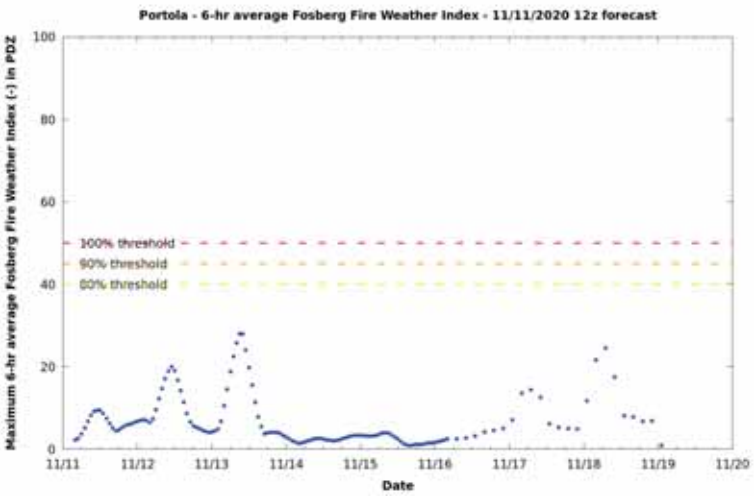
Liberty Utilities Fire Weather Summary Plots - 11/11/2020 12z forecast

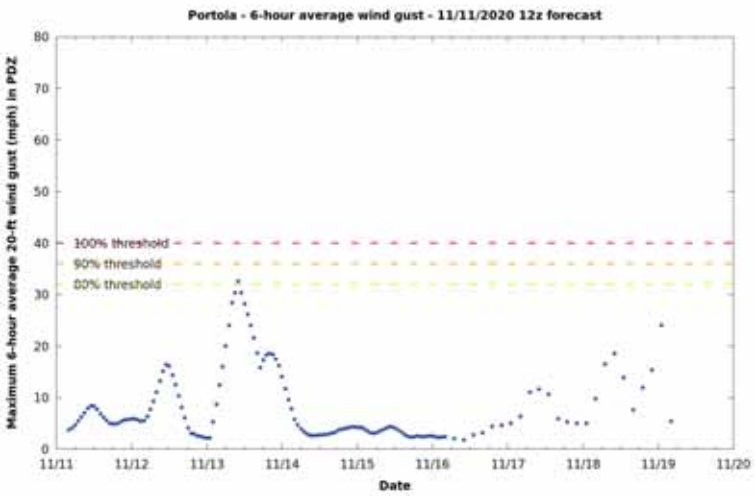
111 Line



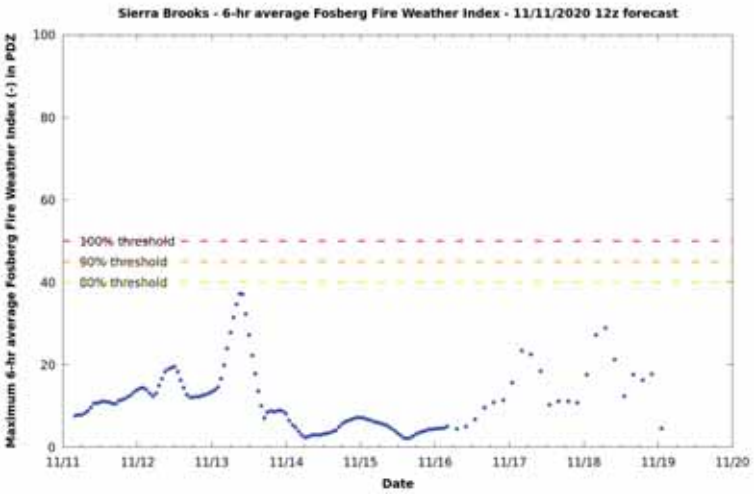


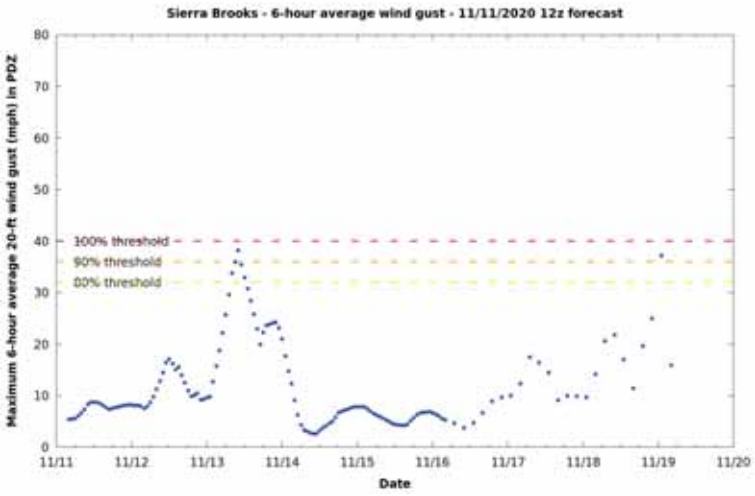
Portola



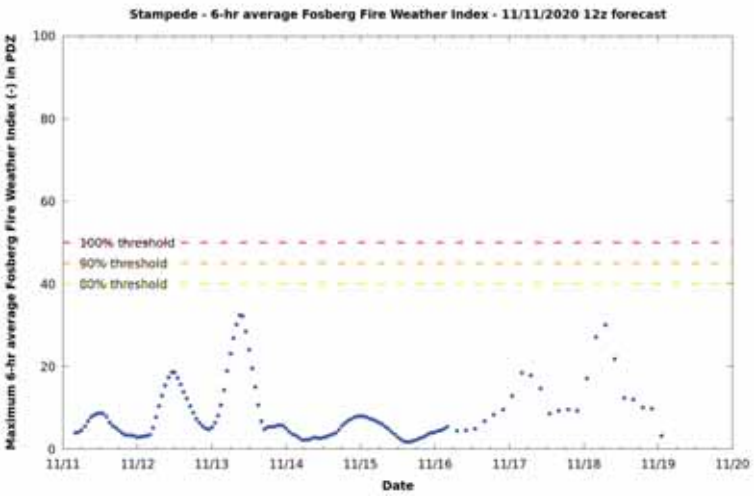


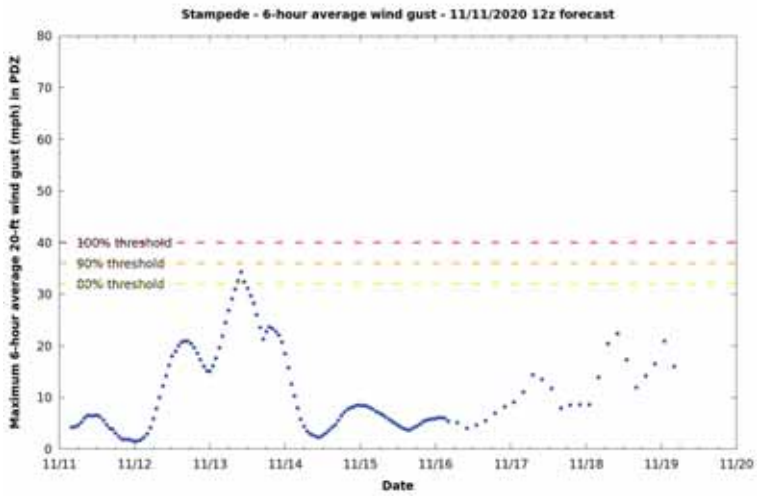
Sierra Brooks



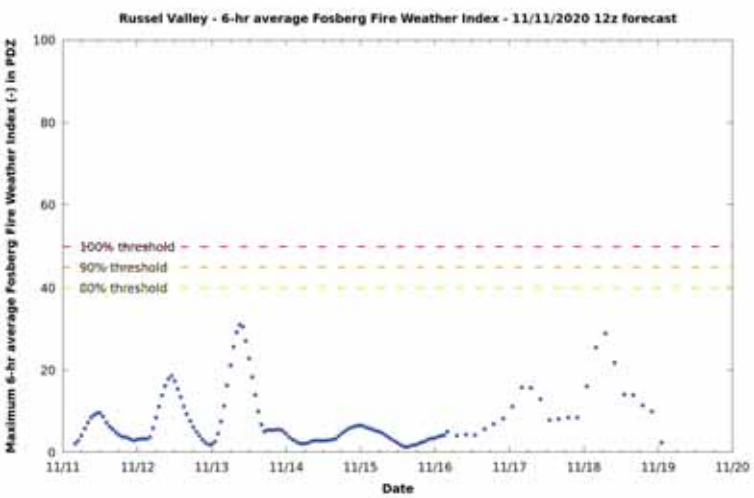


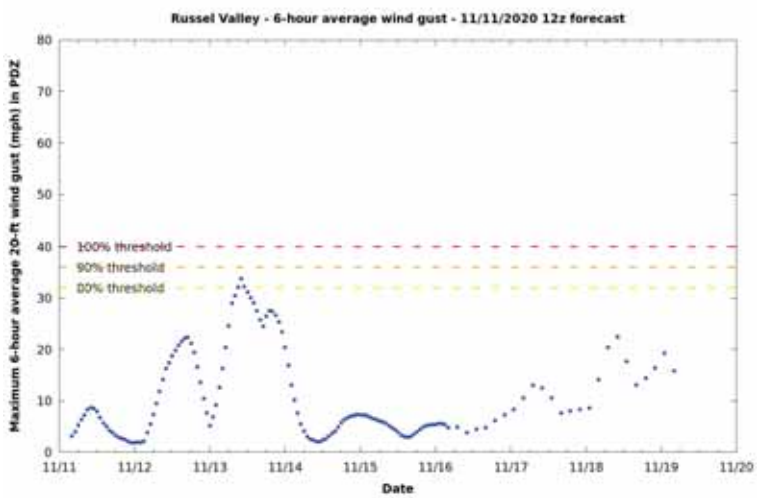
Stampede



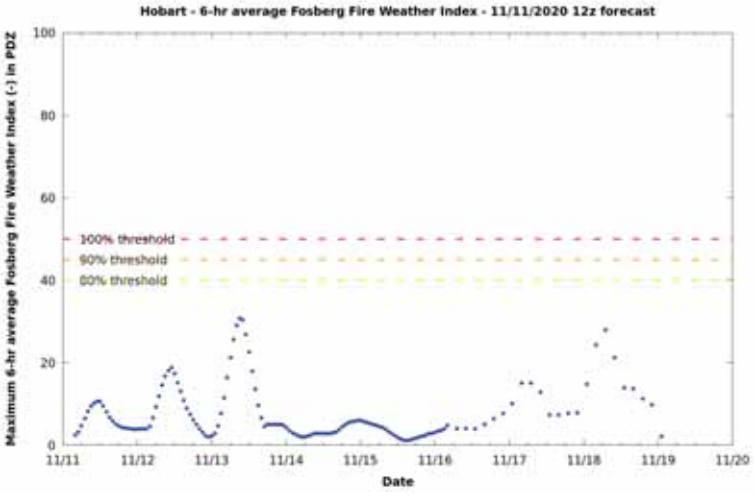


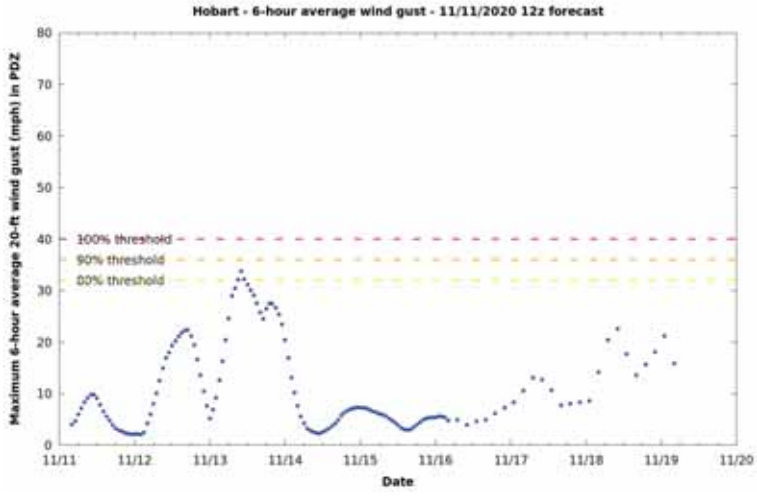
Russell Valley



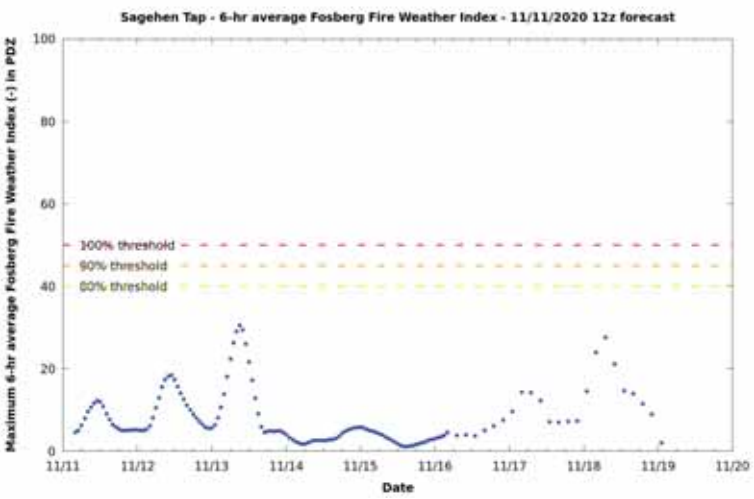


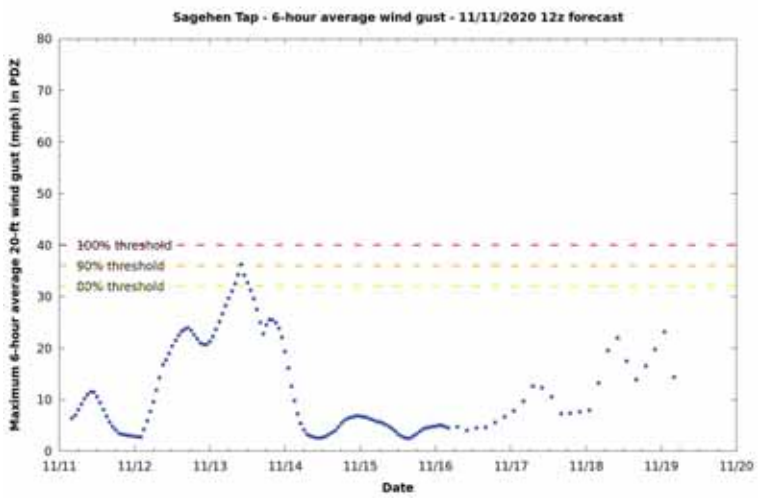
Hobart



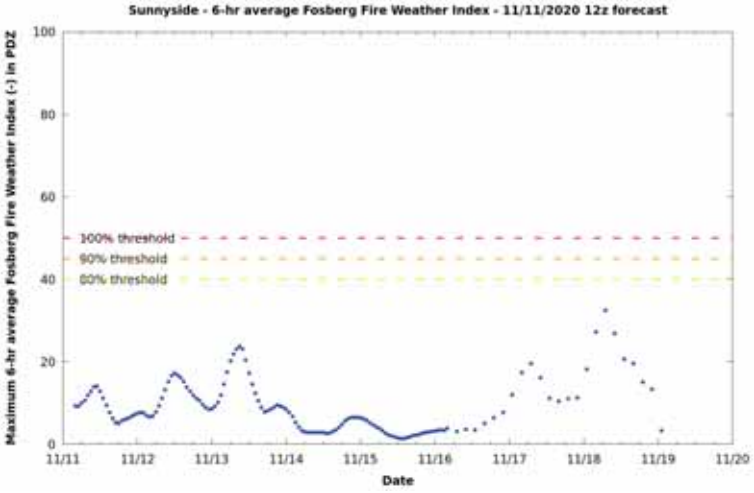


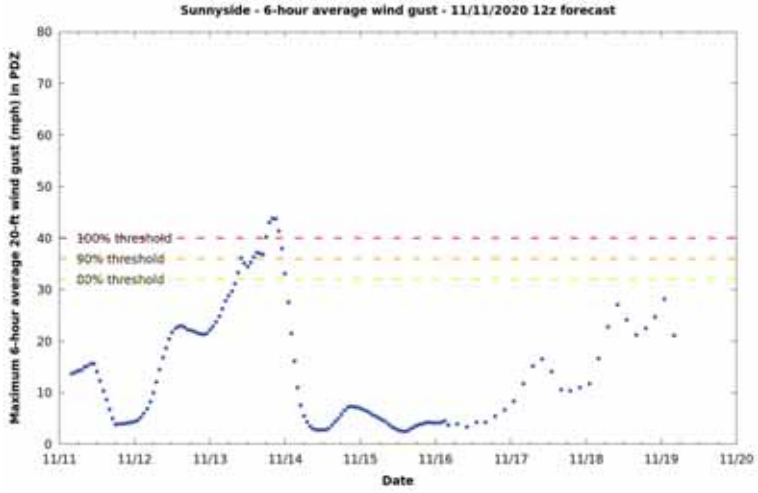
Sagehen tap



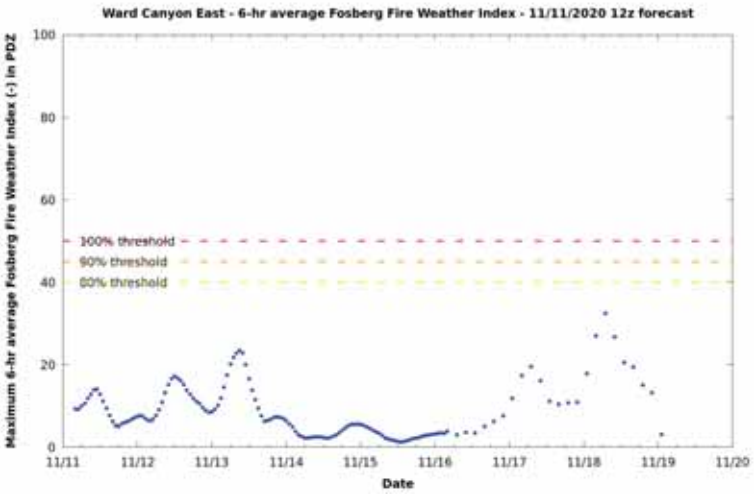


Sunnyside



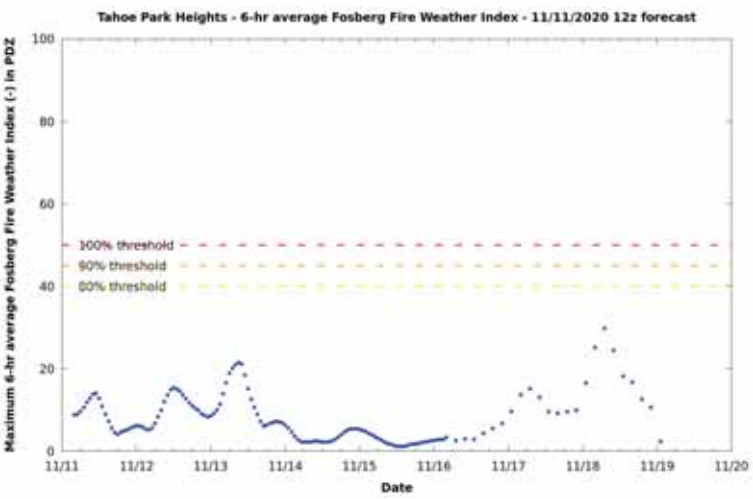


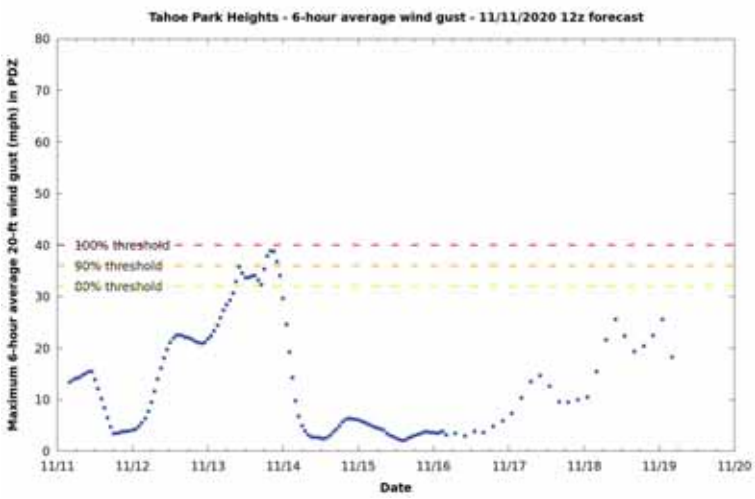
Ward Canyon East



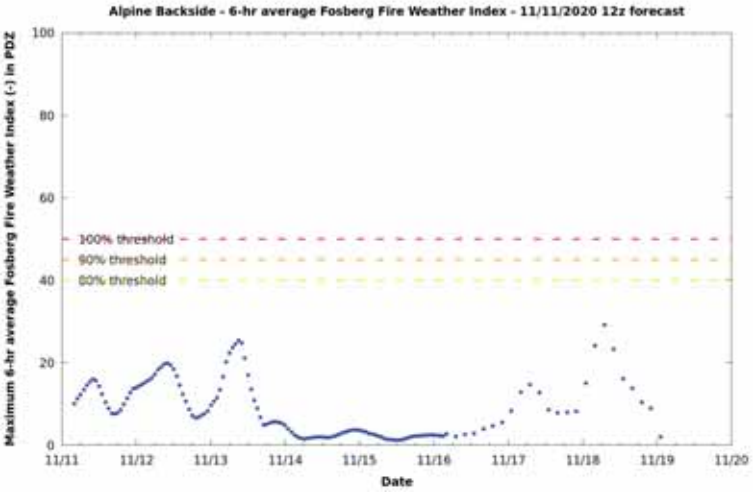


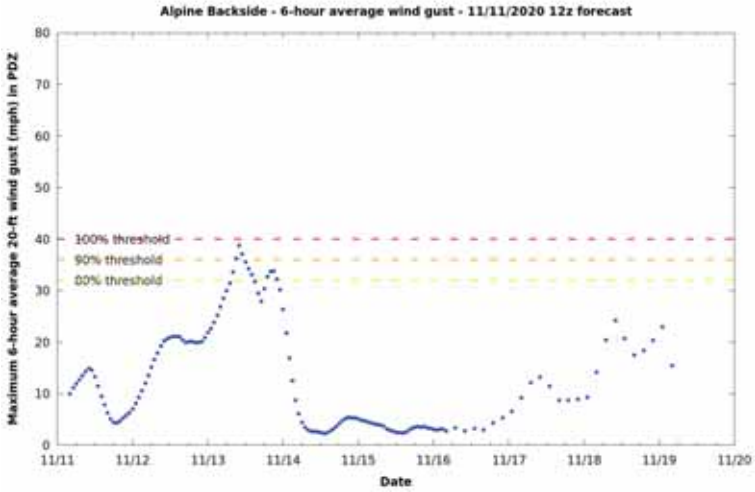
Tahoe Park Heights



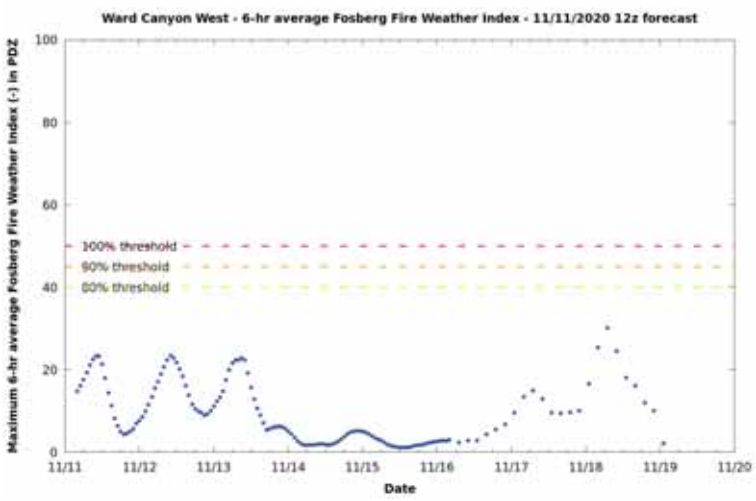


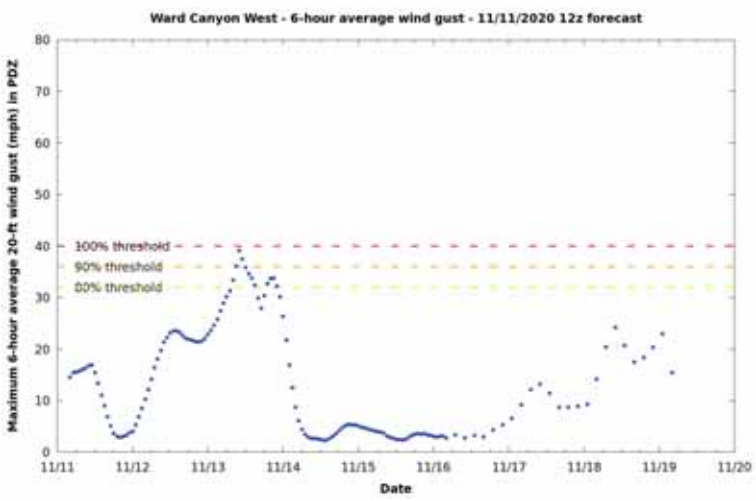
Alpine Backside



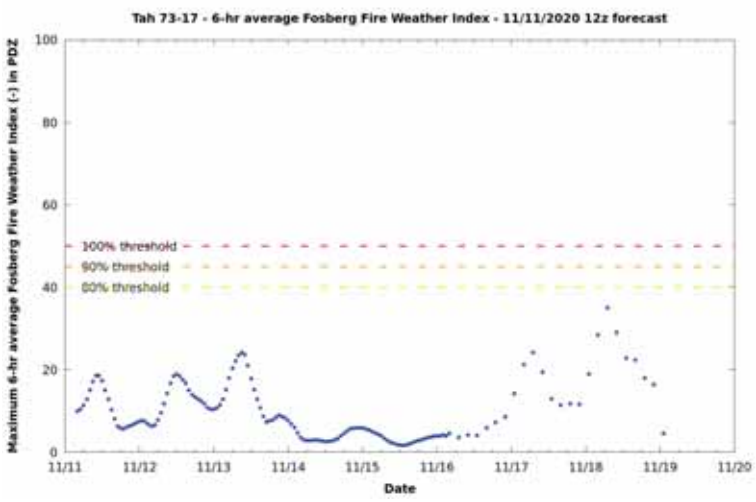


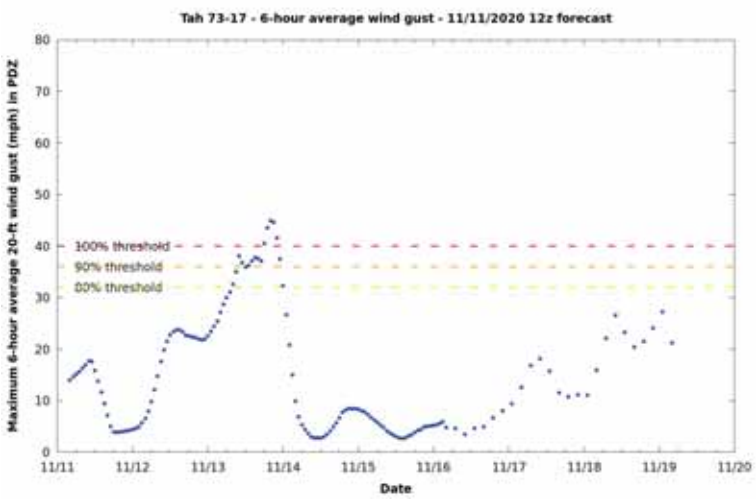
Ward Canyon West



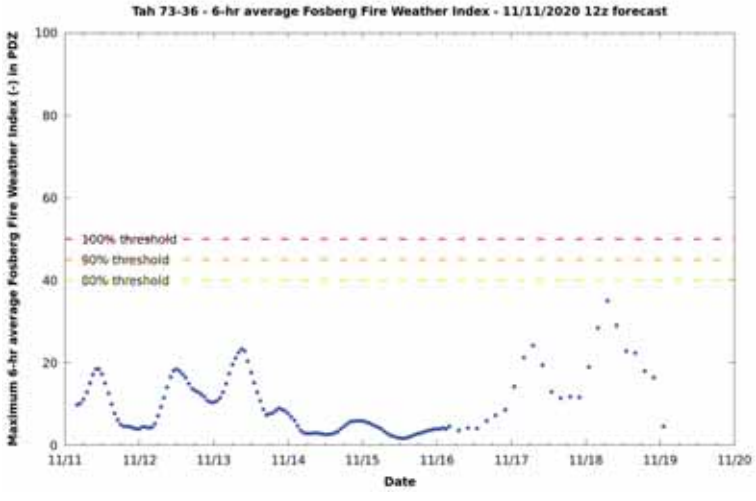


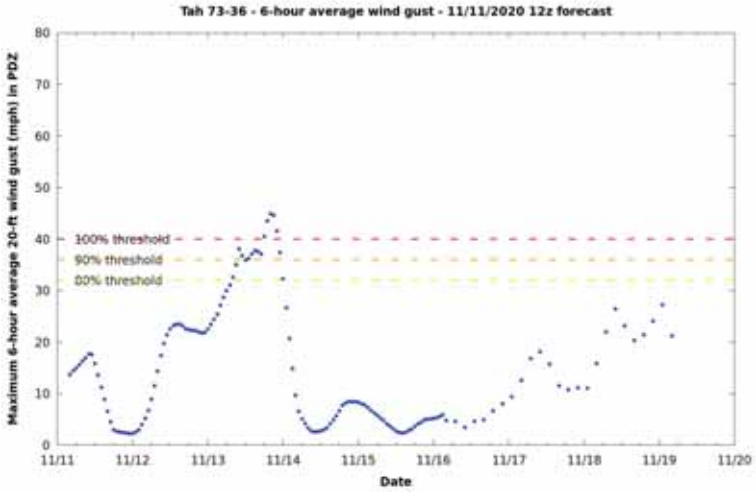
Tah 73-17



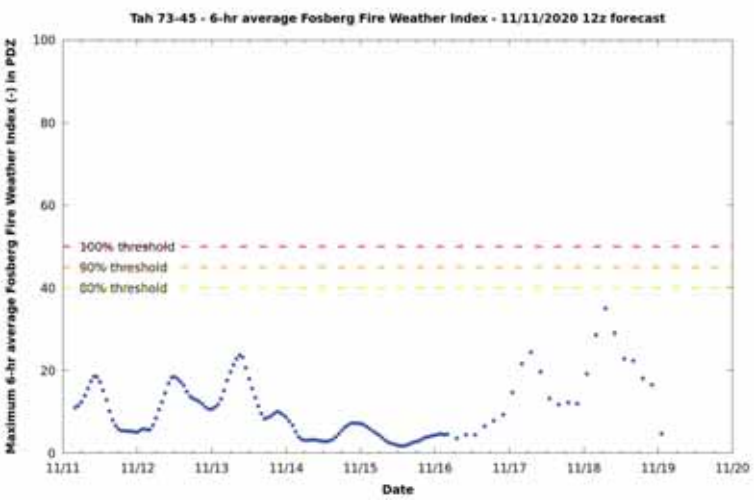


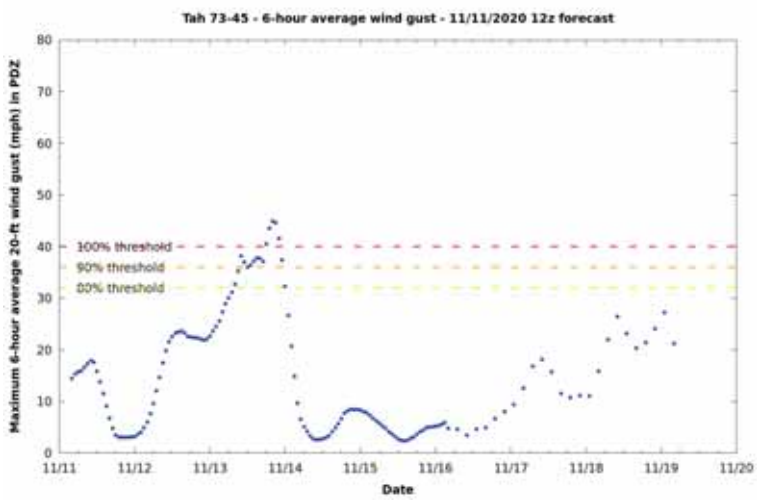
Tah 73-36



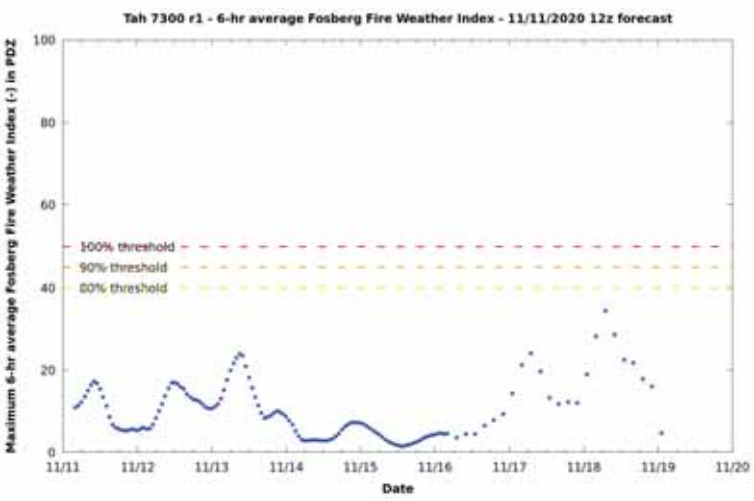


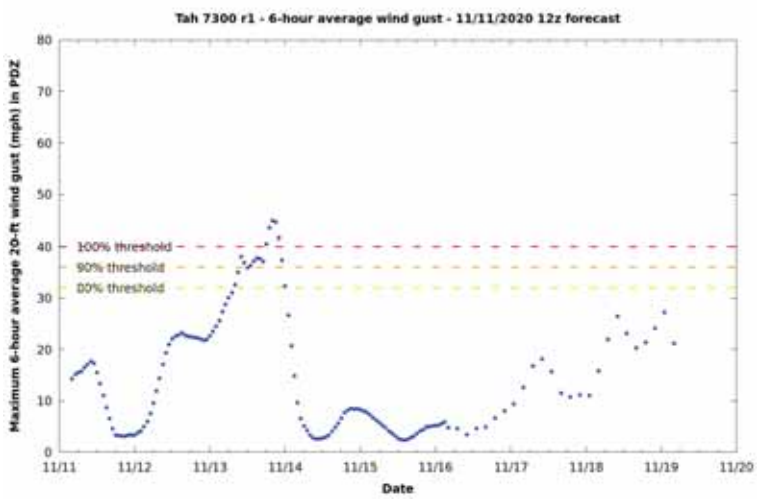
Tah 73-45



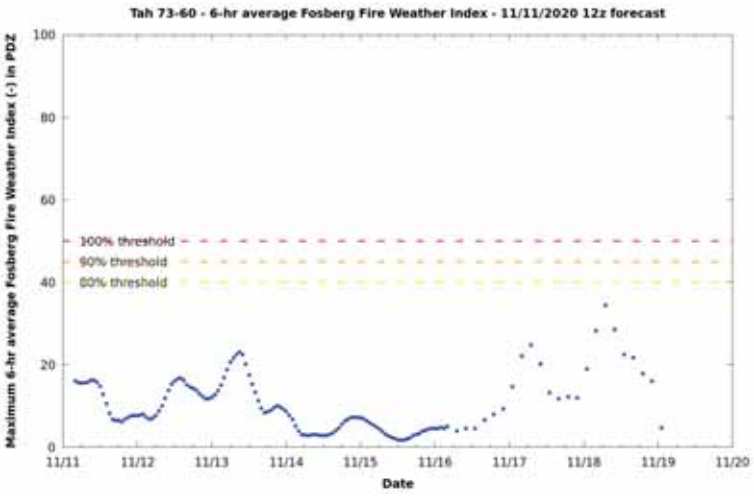


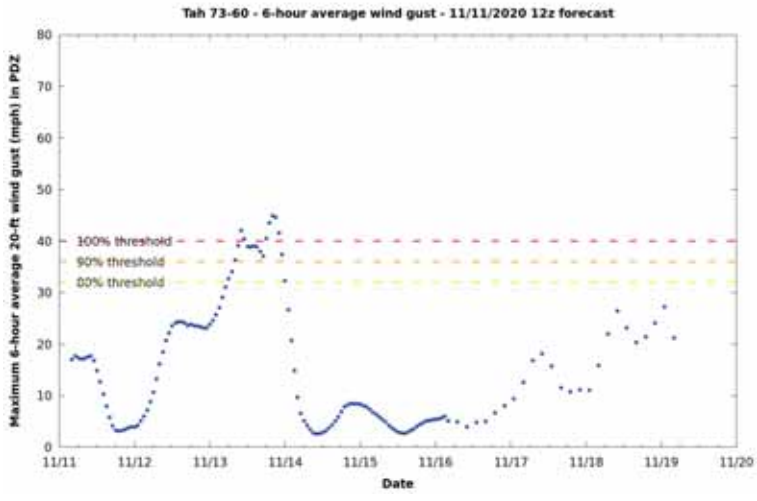
Tah 7300 r1



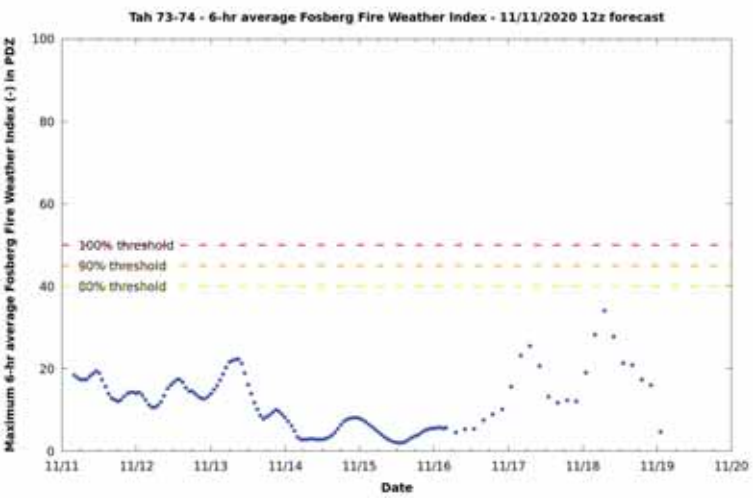


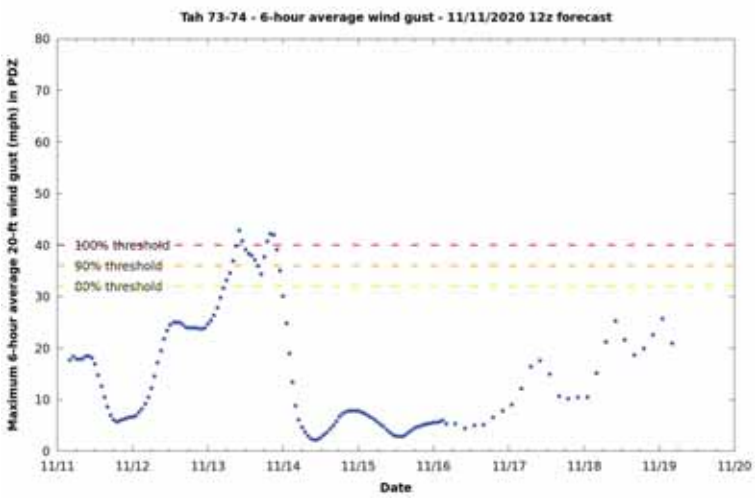
Tah 73-60



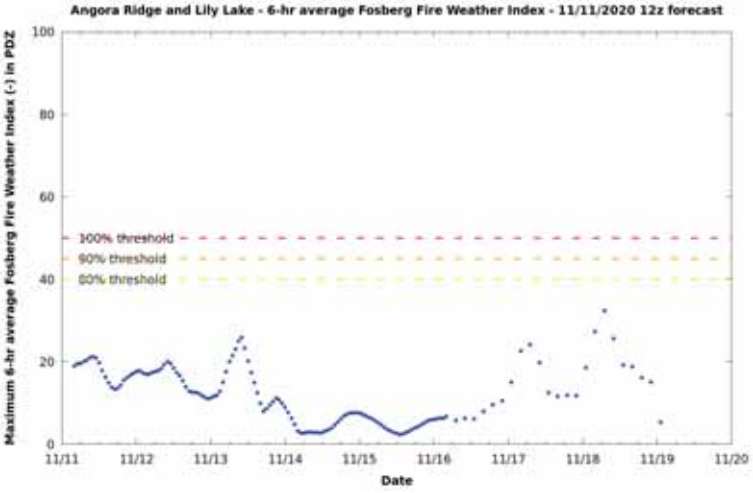


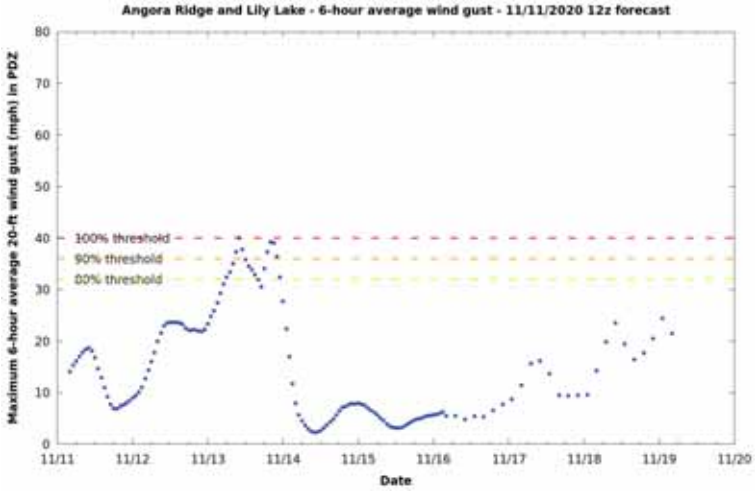
Tah 73-74



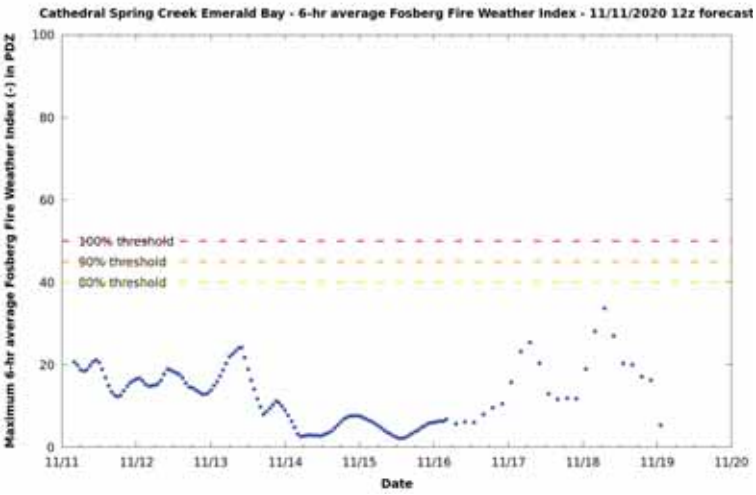


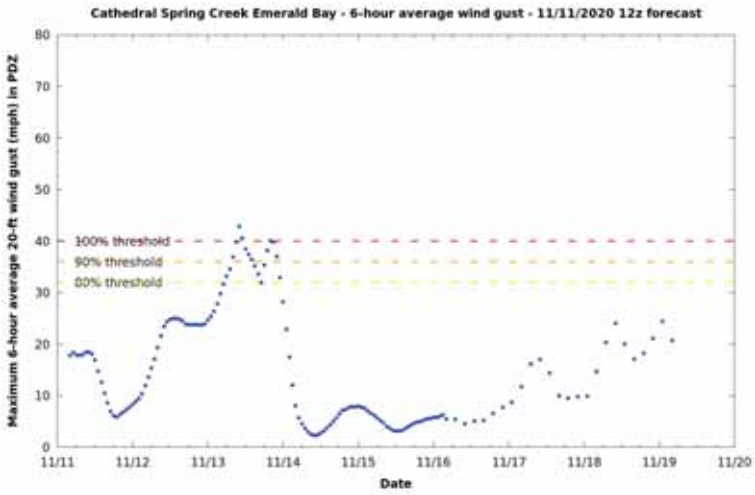
Angora Ridge and Lily Lake



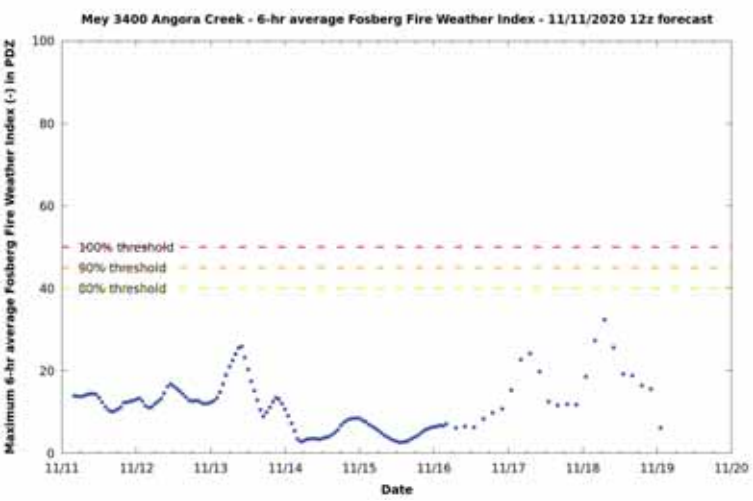


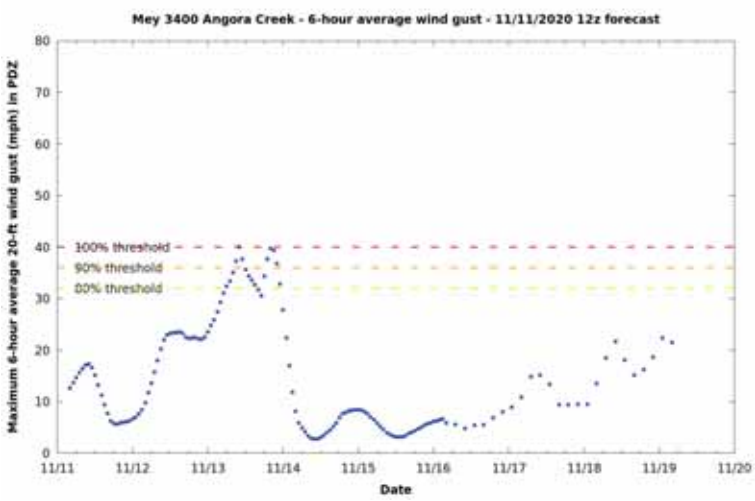
Cathedral Spring Creek Emerald Bay



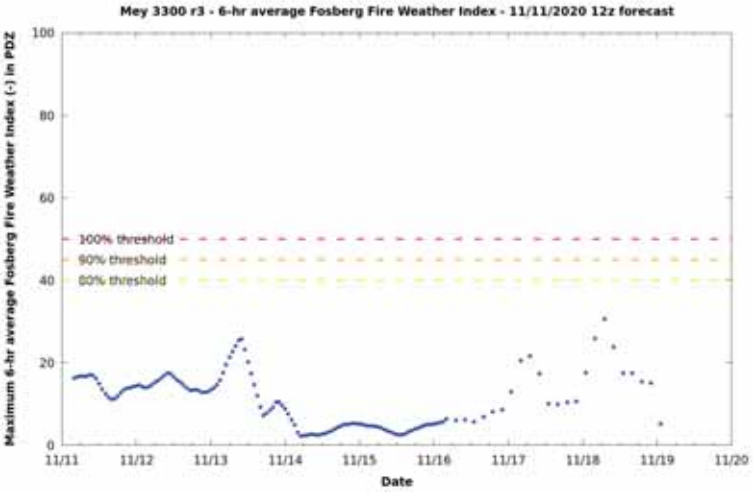


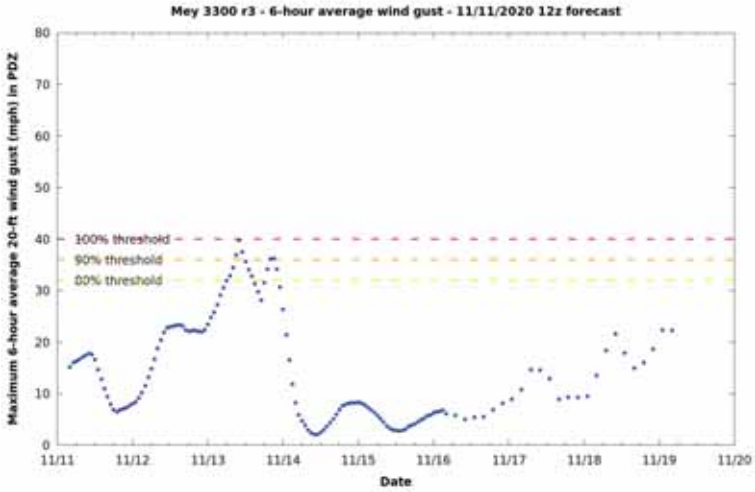
Mey 3400 Angora Creek



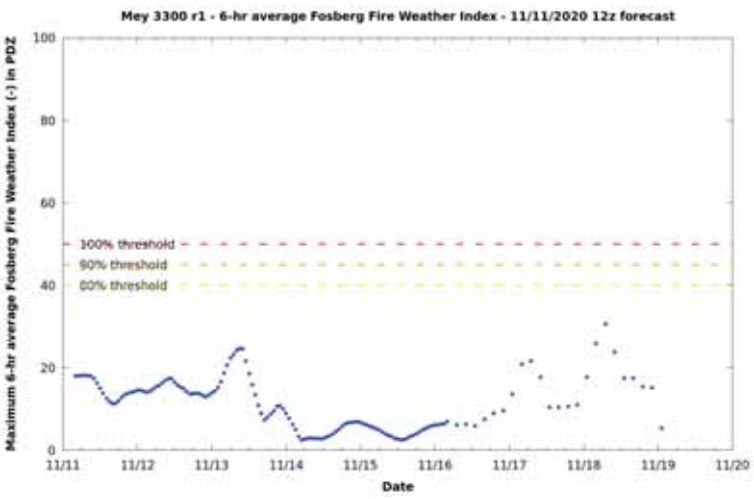


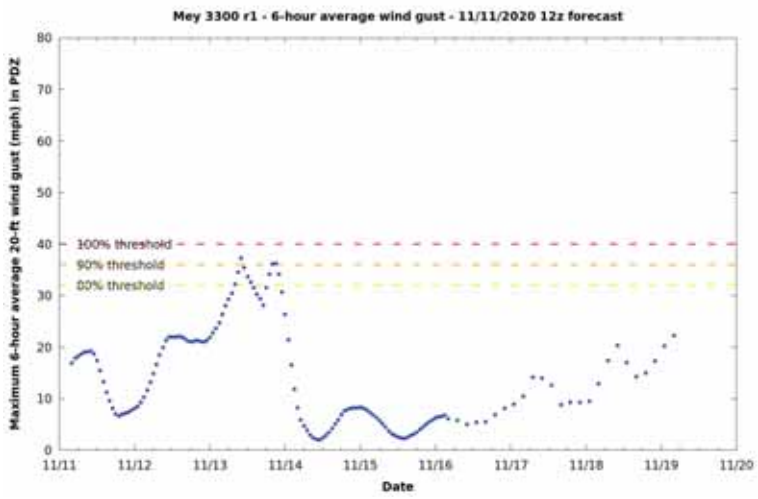
Mey 3300 r3



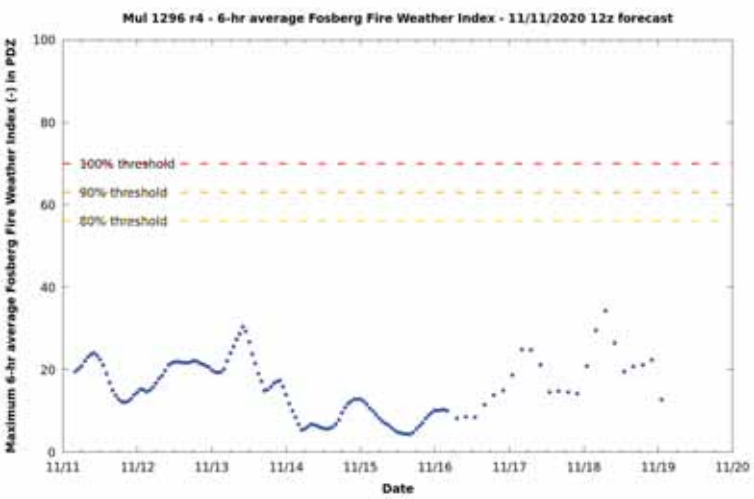


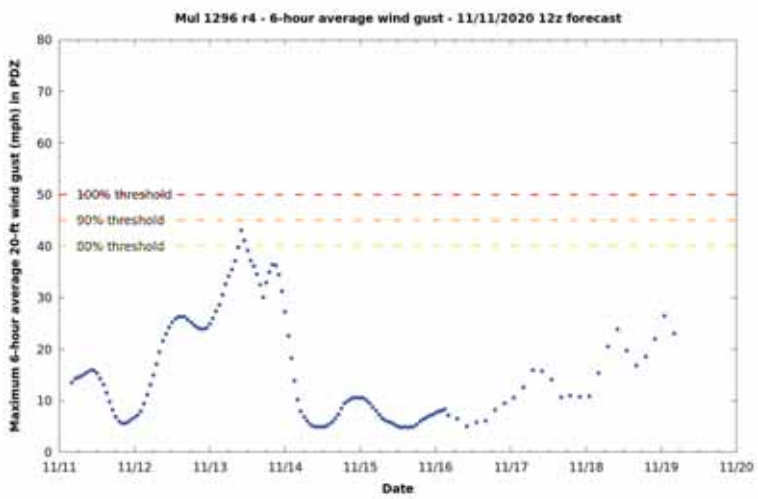
Mey 3300 r1



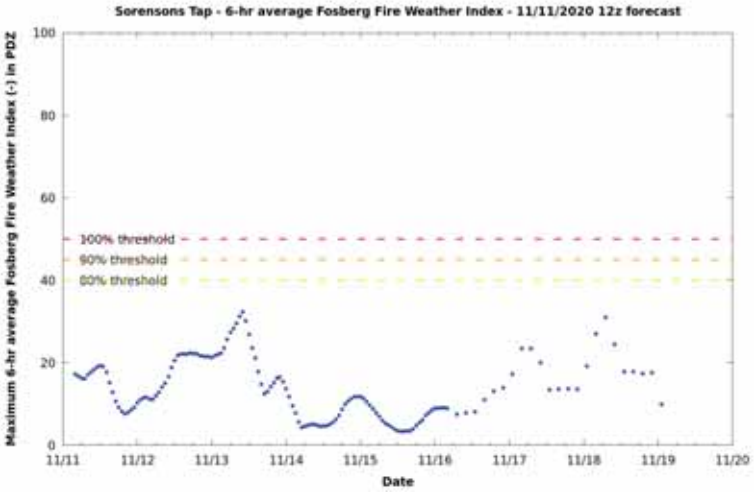


Mul 1296 r4



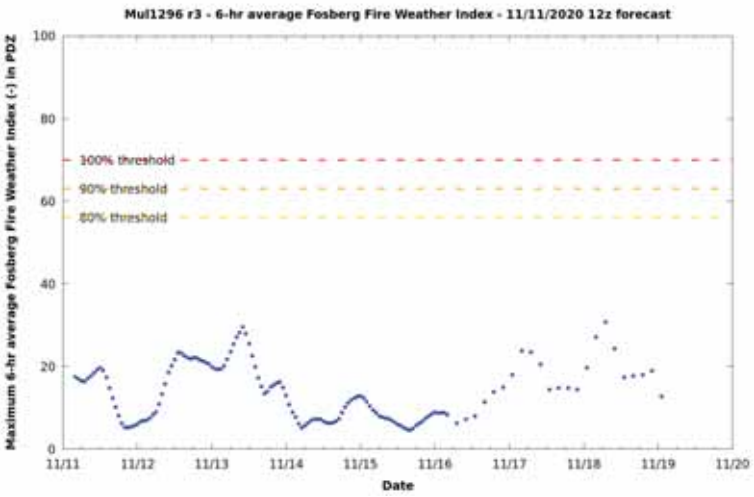


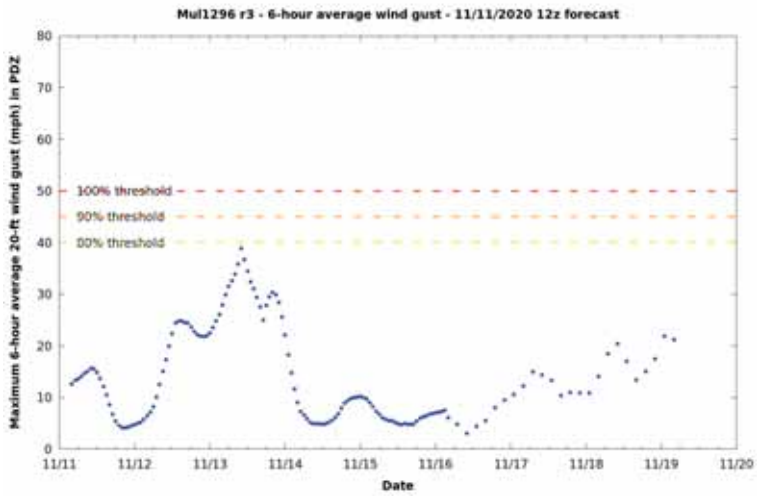
Sorensons Tap



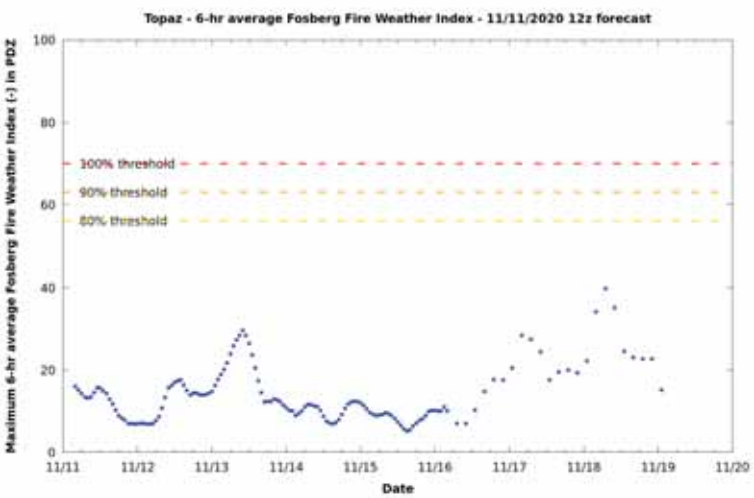


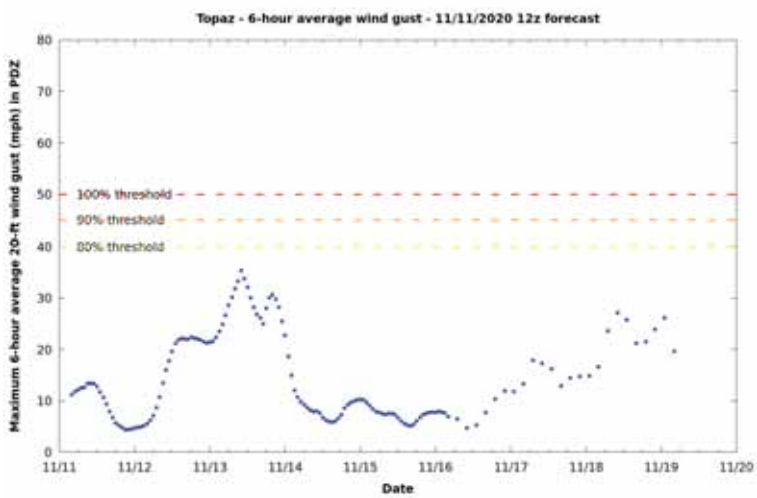
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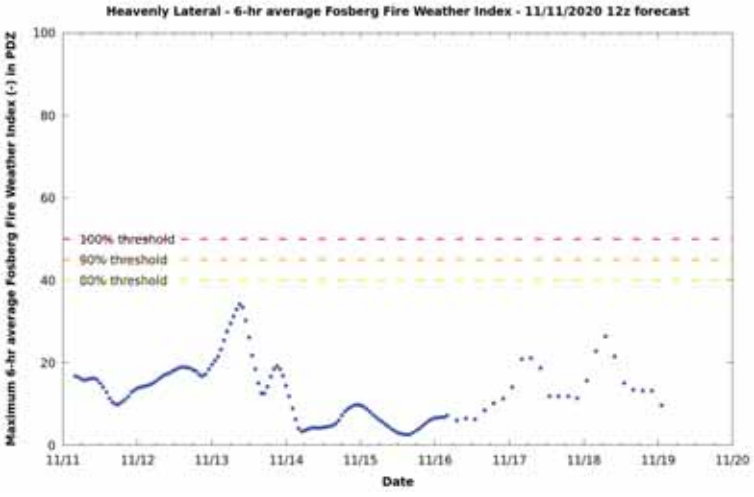


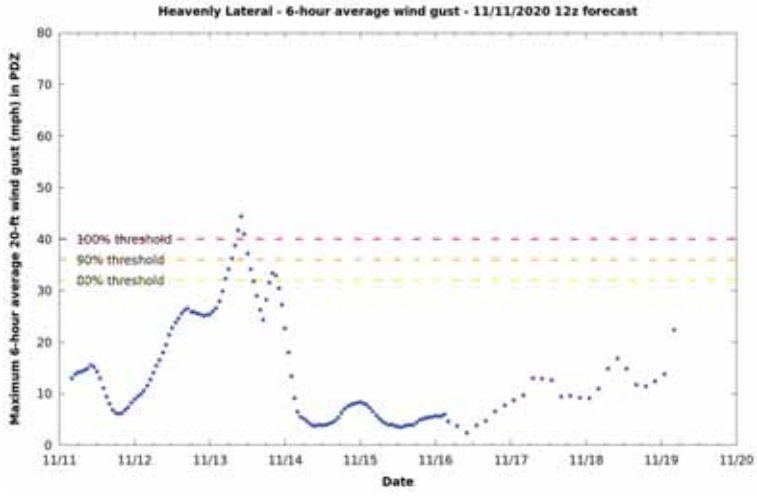
Topaz



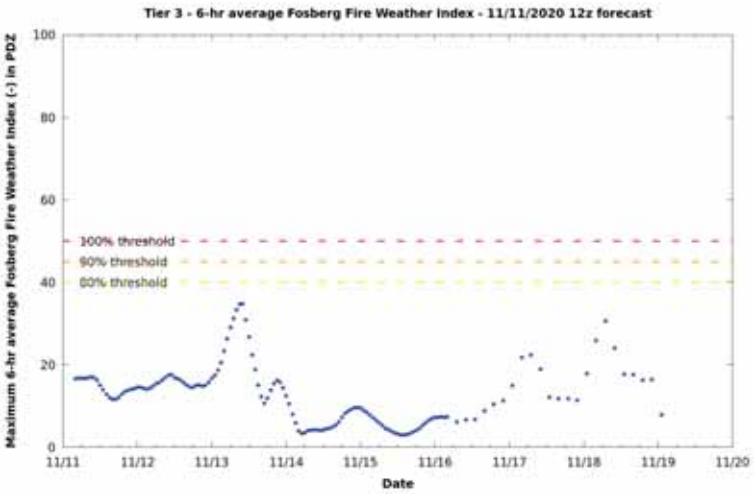


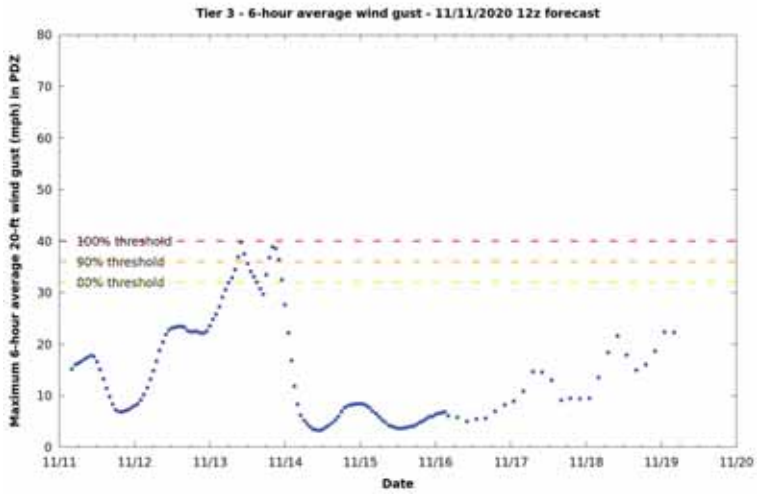
Heavenly Lateral



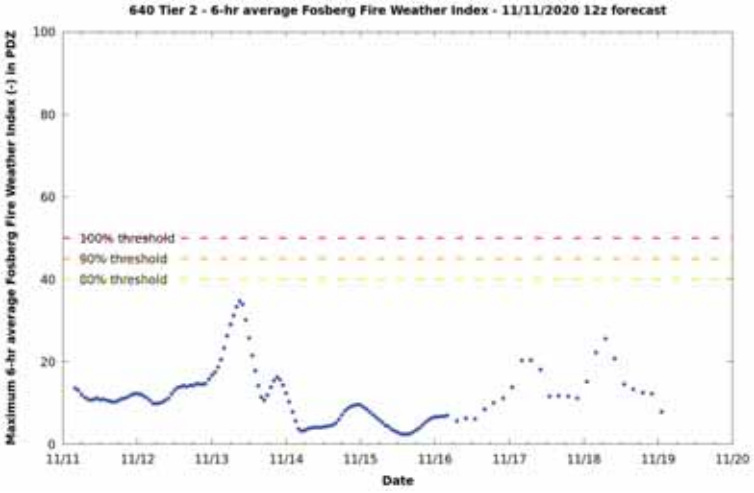


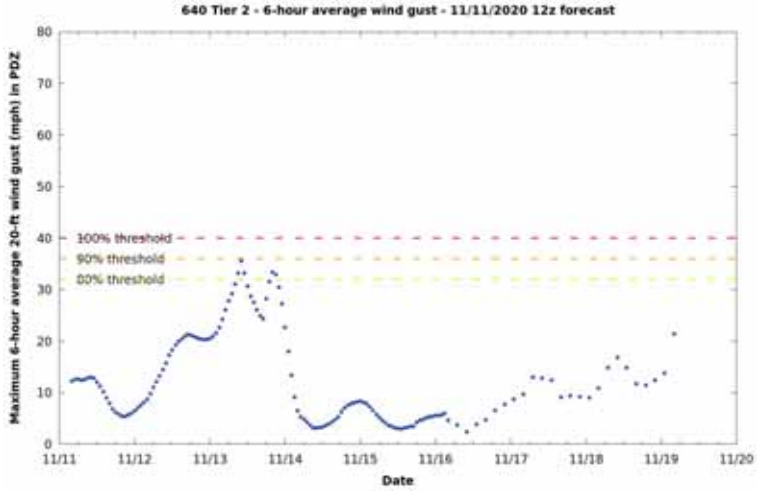
Tier 3



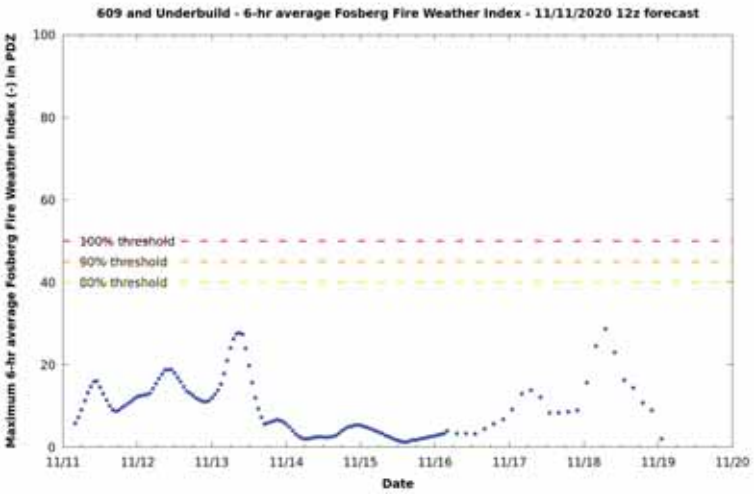


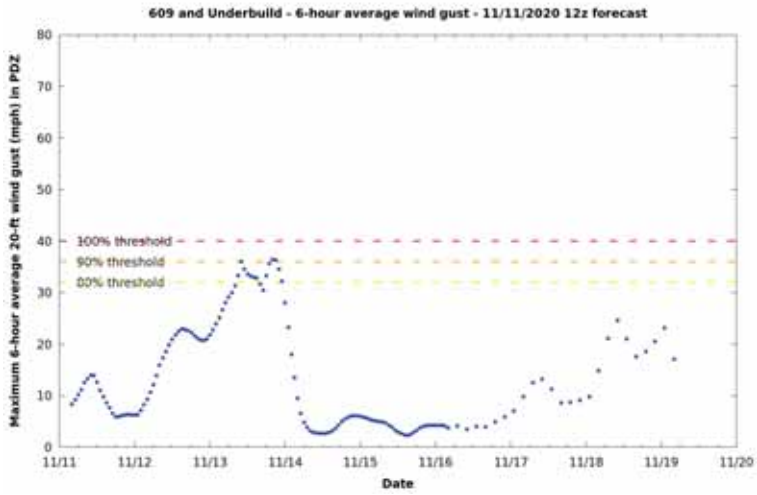
640 Tier 2



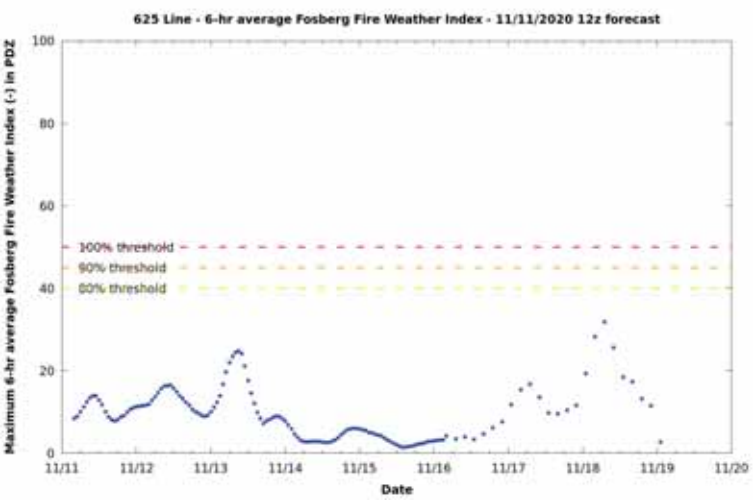


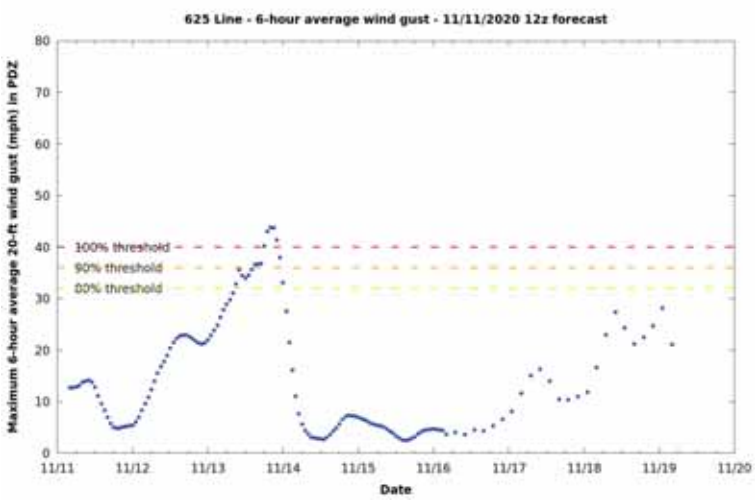
609 and Underbuild



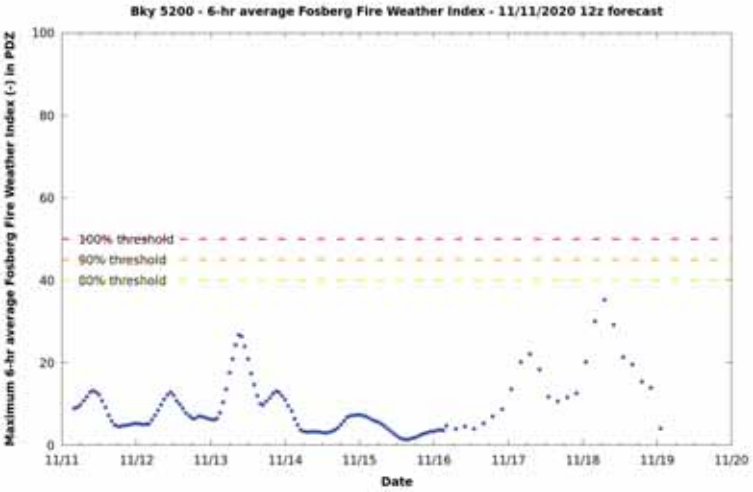


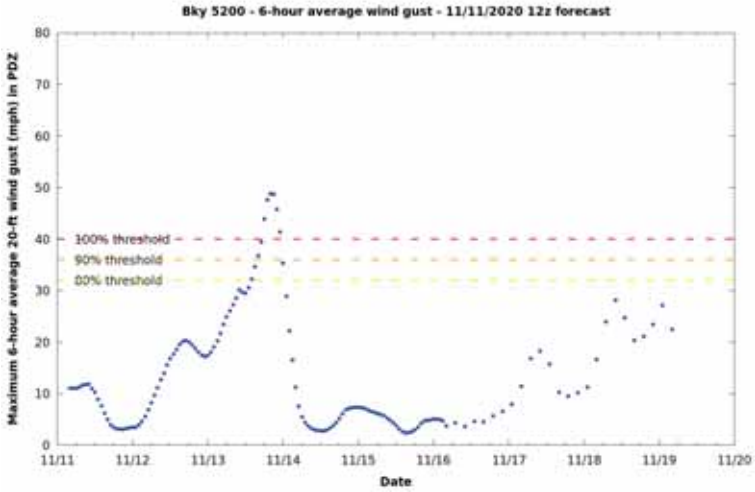
625 Line



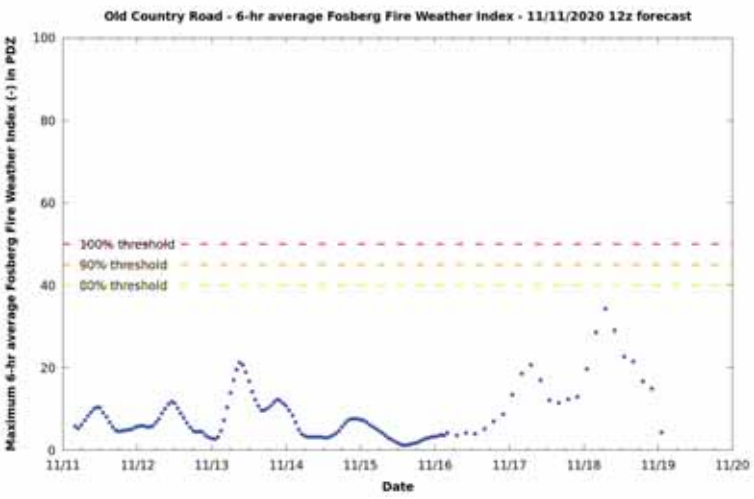


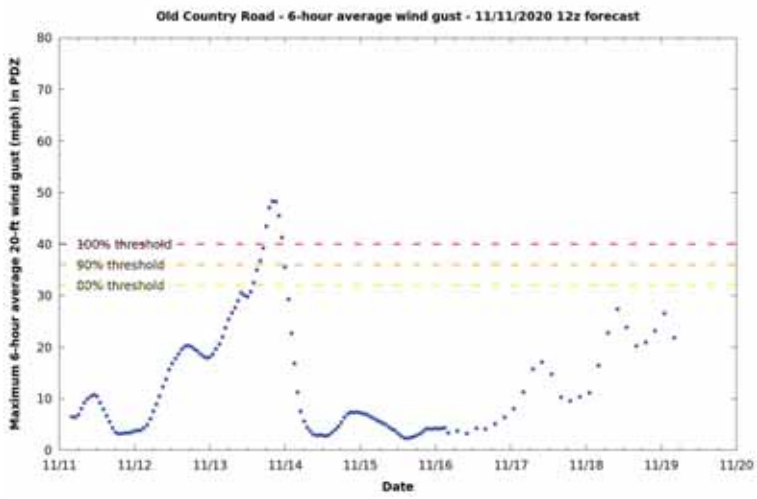
Bky 5200



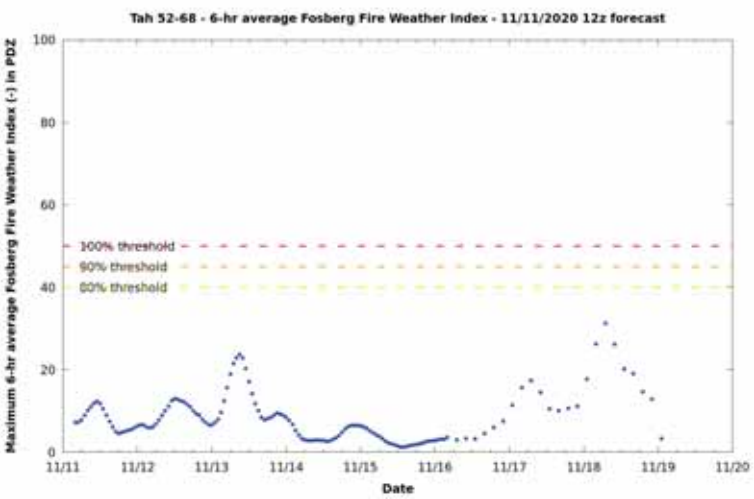


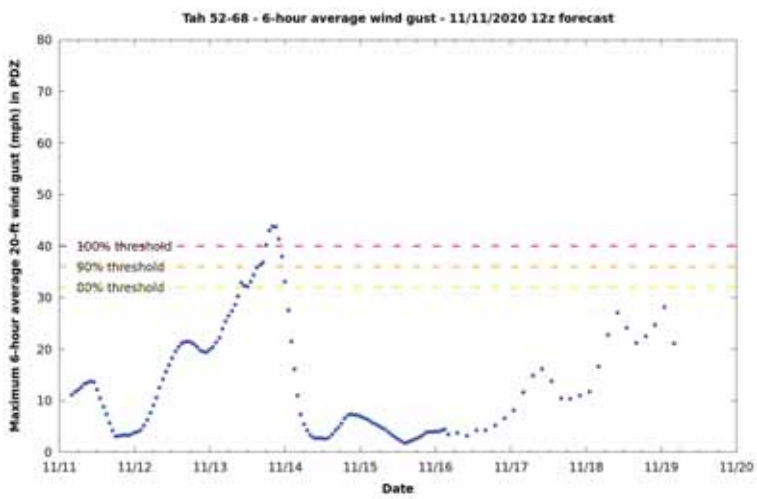
Old Country Road



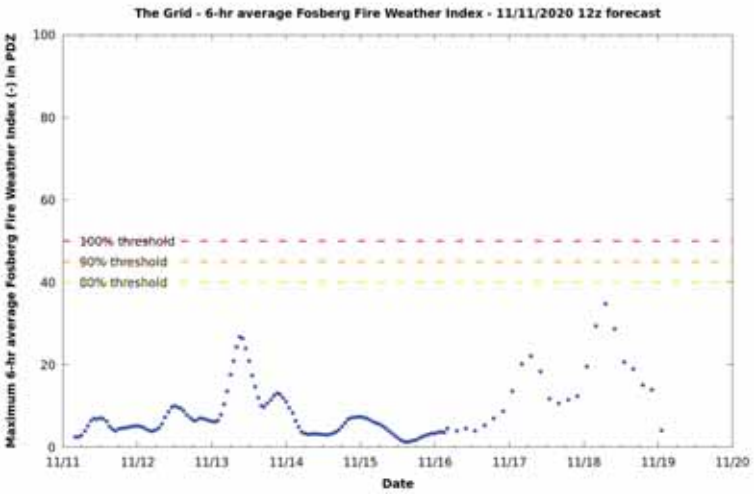


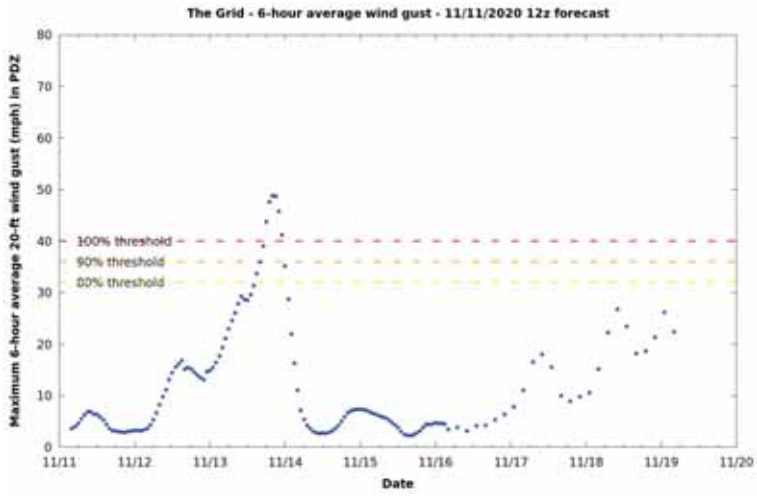
Tah 52-68



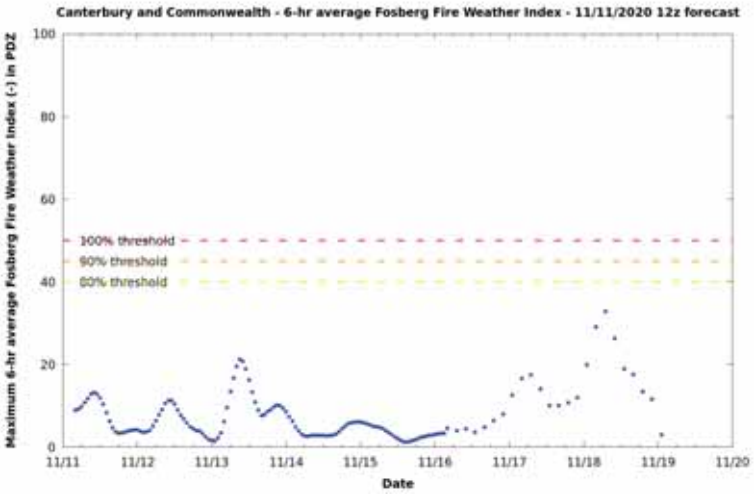


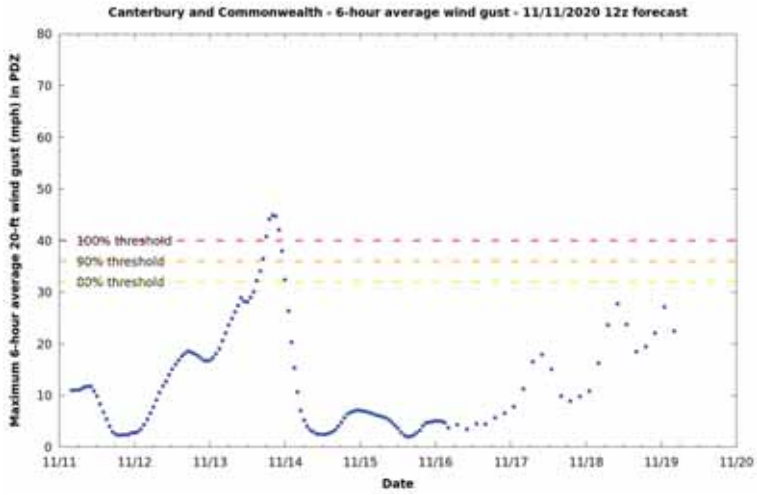
The Grid



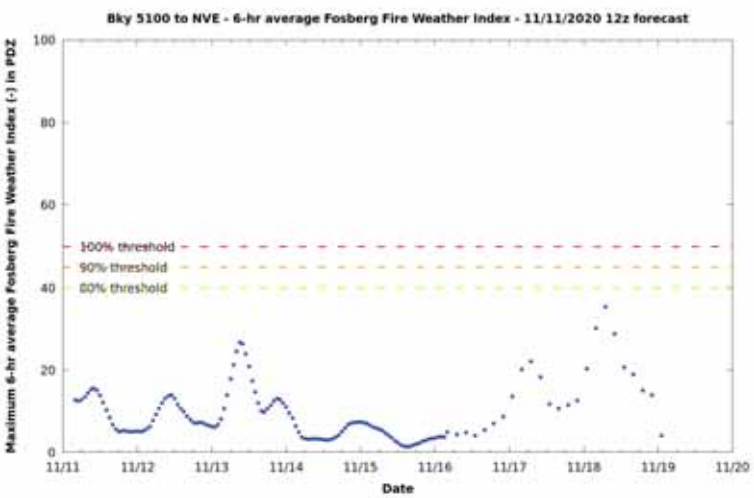


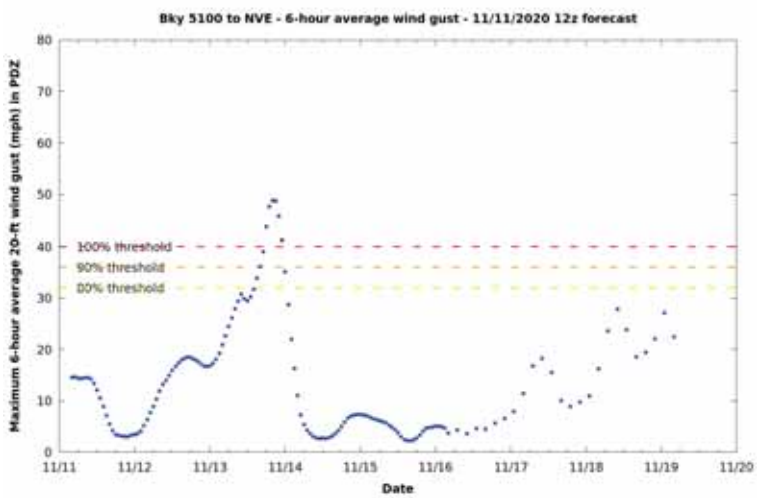
Canterbuy and Commonwealth



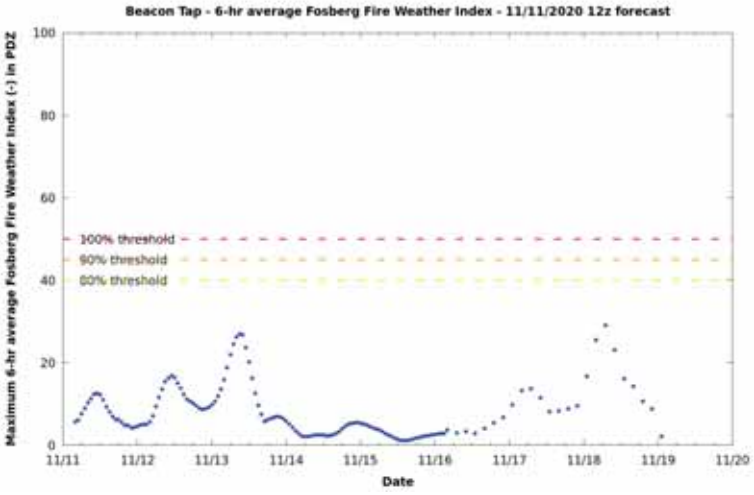


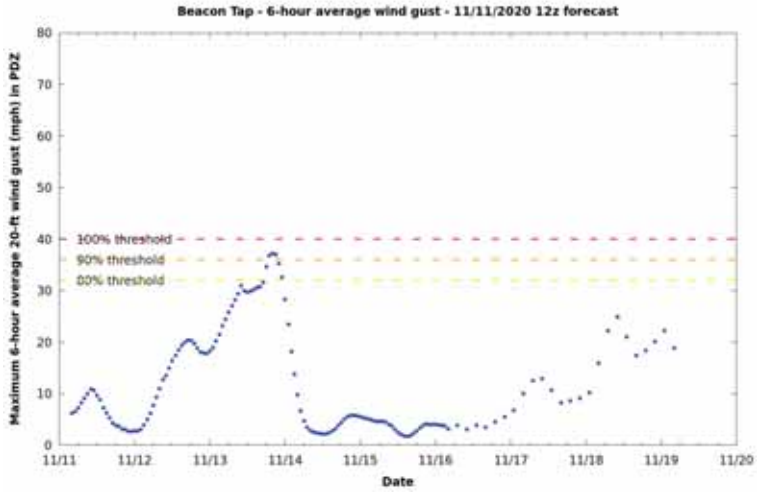
Bky 5100 to NVE



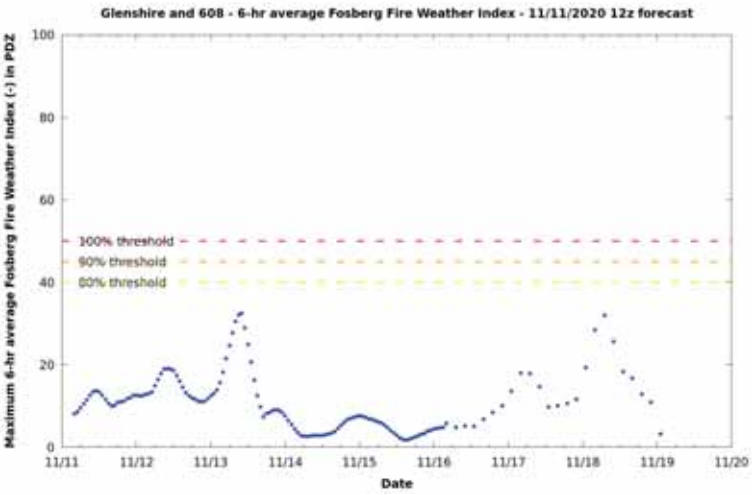


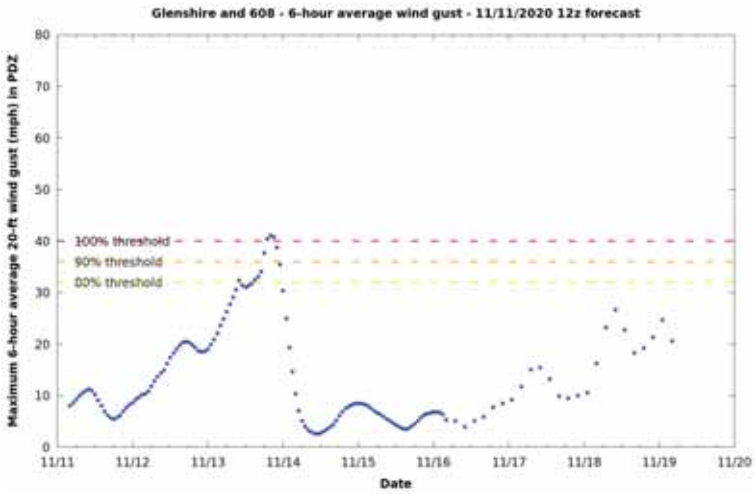
Beacon Tap



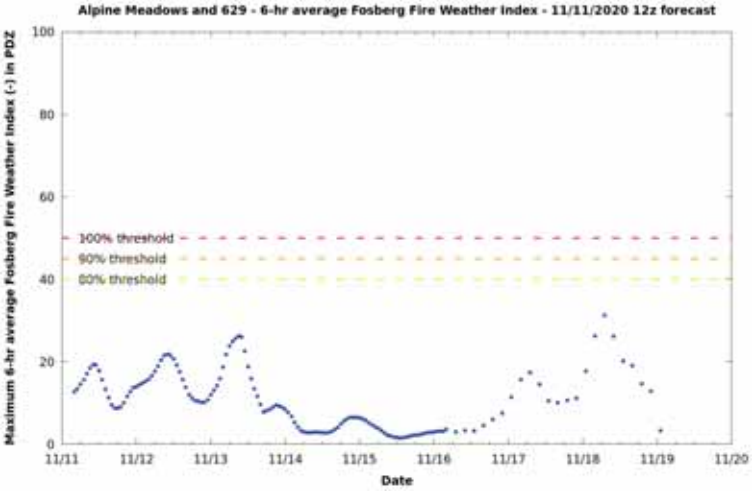


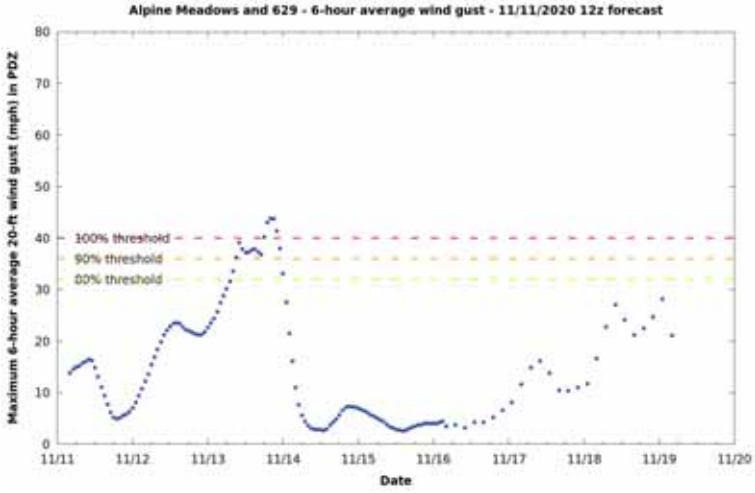
Glenshire and 608



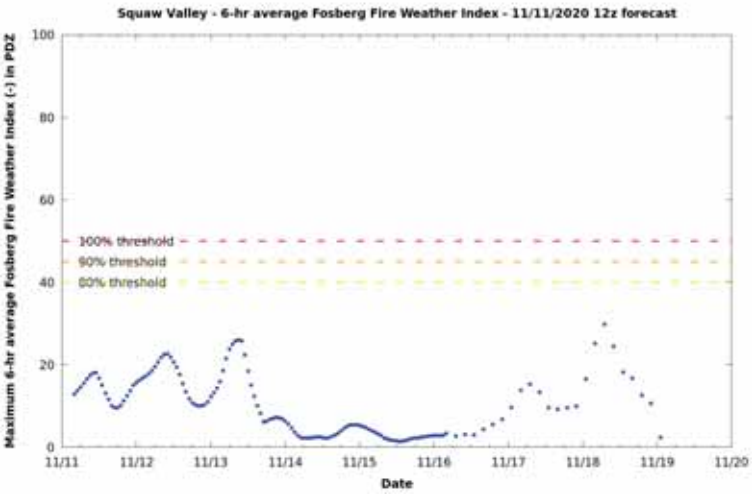


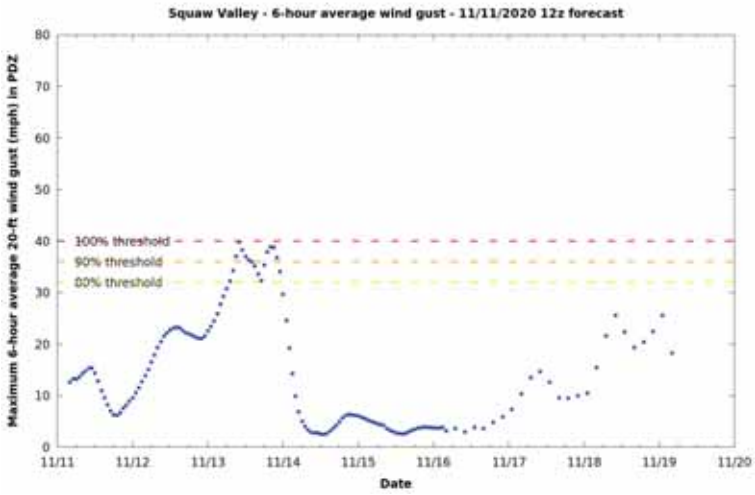
Alpine Meadows and 629



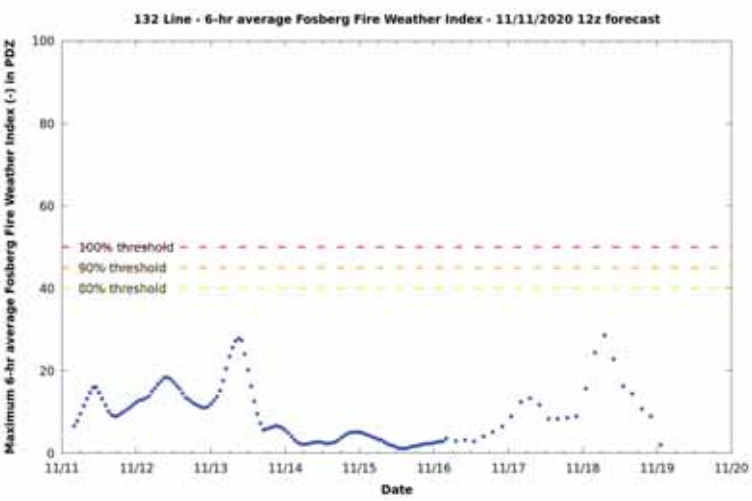


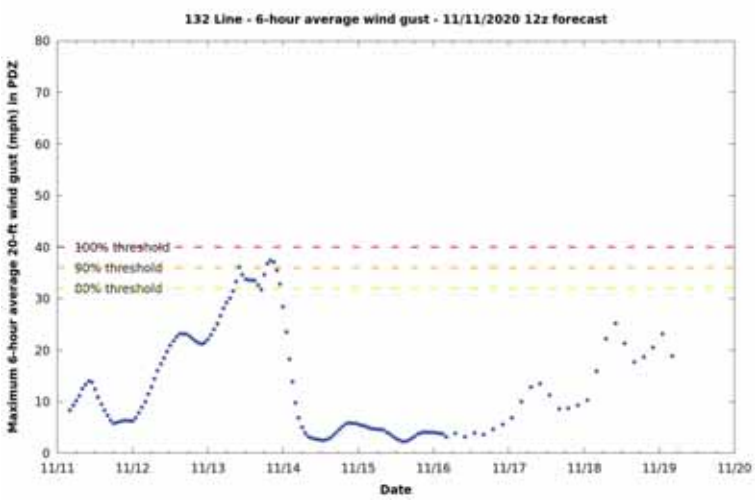
Squaw Valley



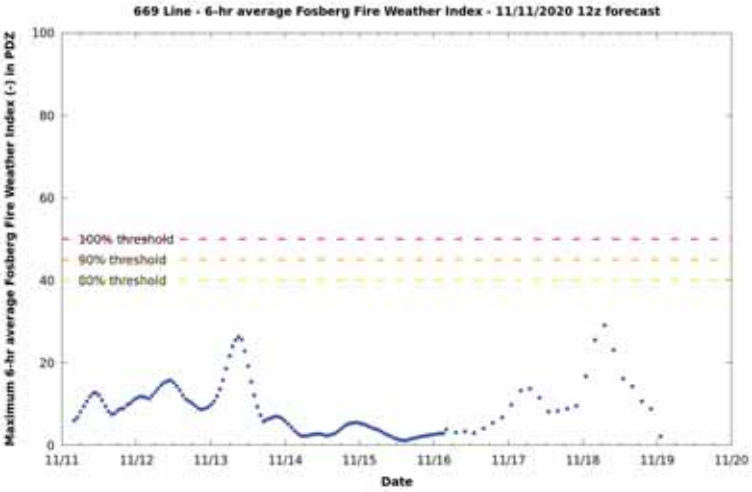


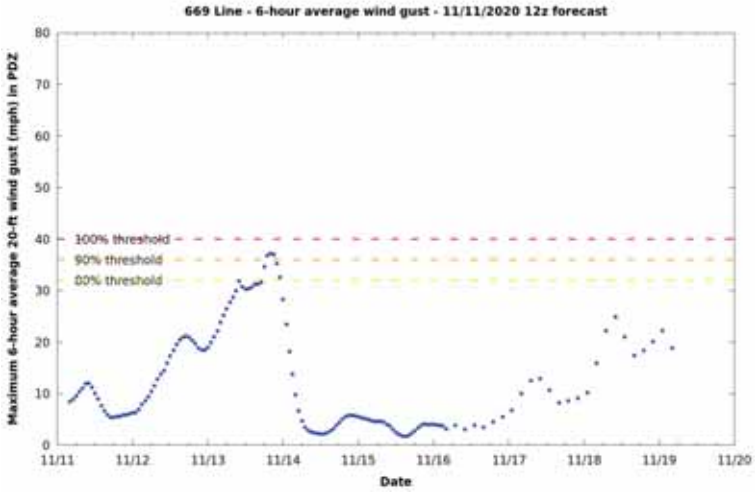
132 Line



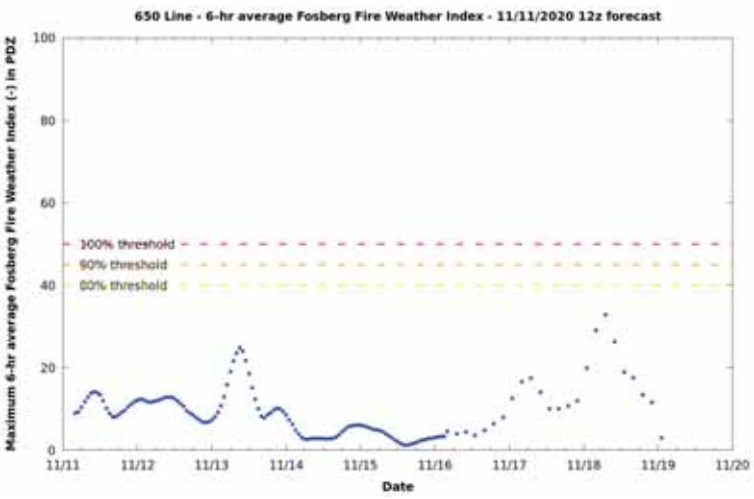


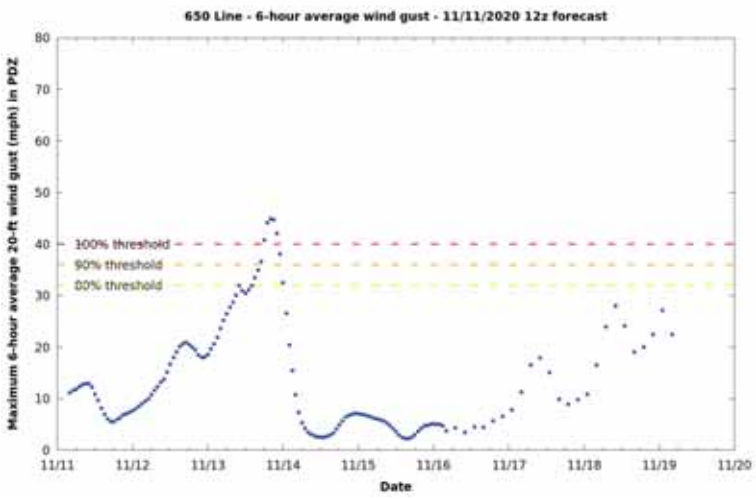
669 Line



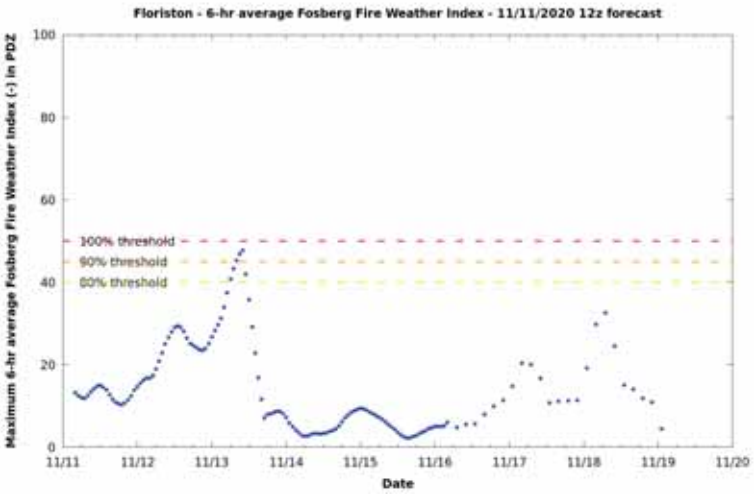


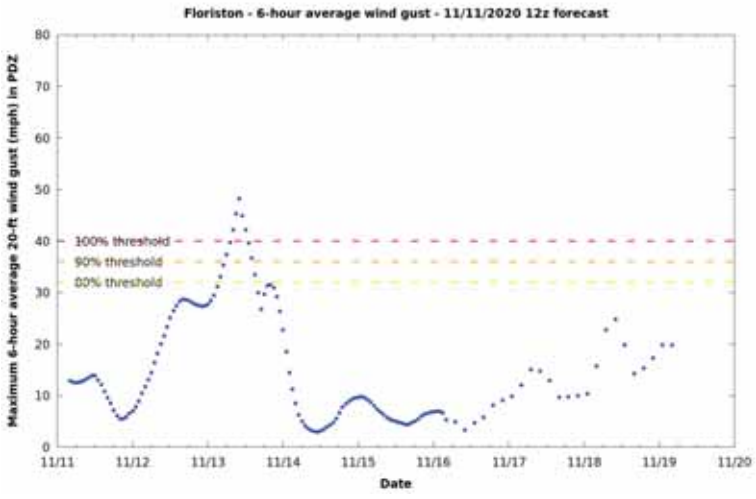
650 Line



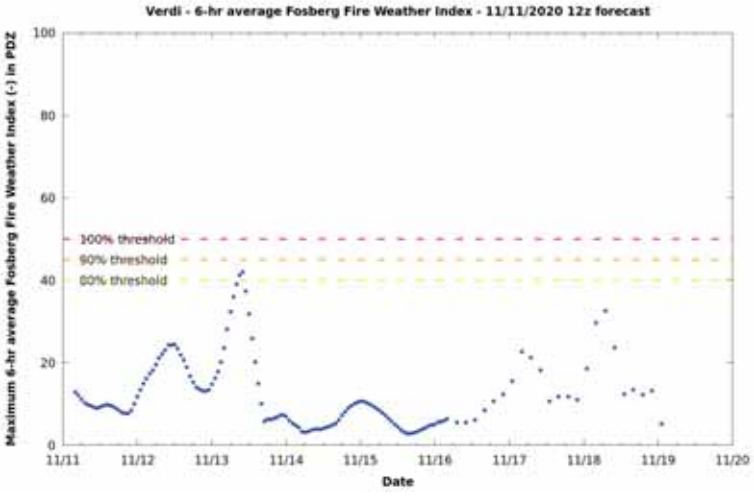


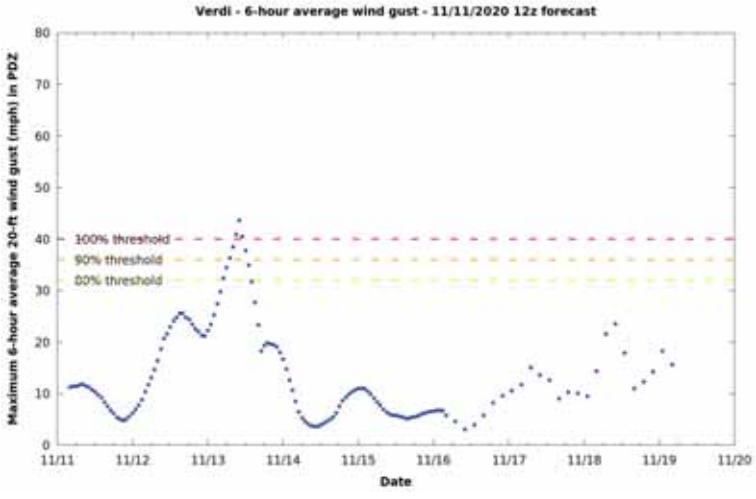
Floriston



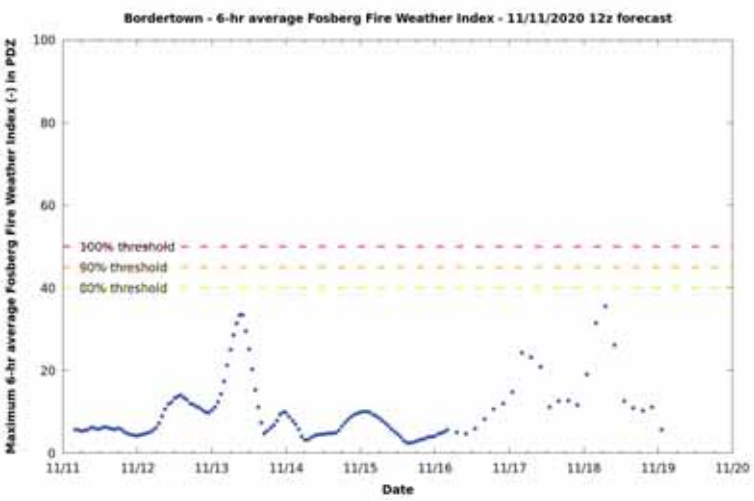


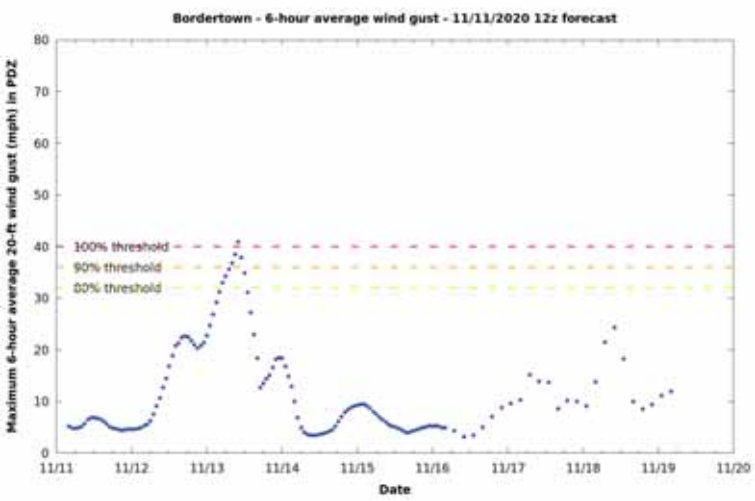
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/11/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/11
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20


Bordertown - 6-hour average wind gust - 11/11/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/11
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20

Liberty Utilities Fire Potential Index Forecast for 11/12/20 - 11/18/20

Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

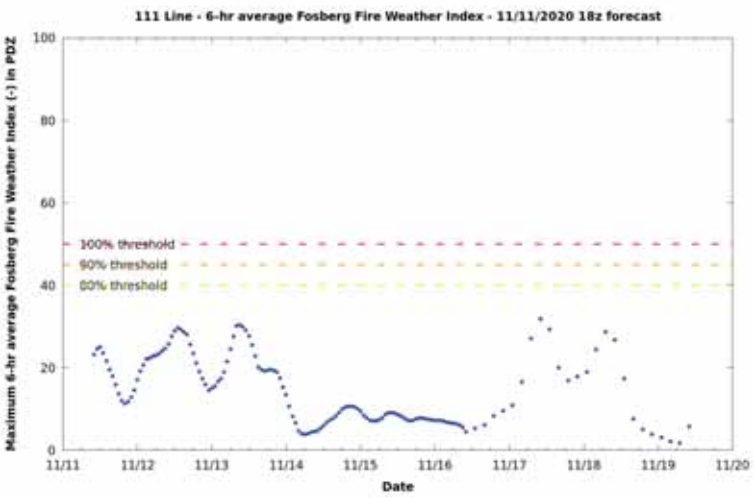
Liberty Utilities Energy Release Component Forecast for 11/12/20 - 11/18/20

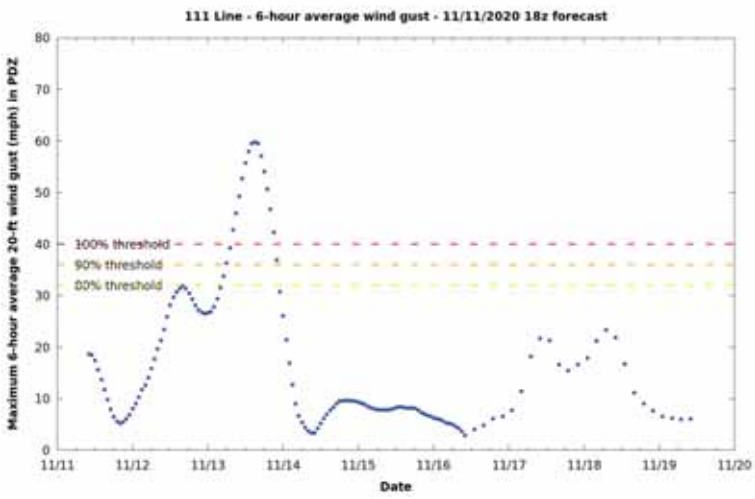
Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	42.0	39.0	33.0	34.0	31.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

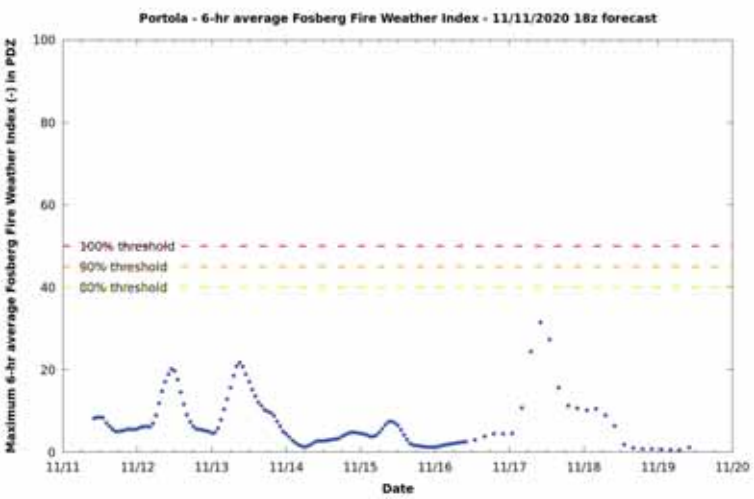
Liberty Utilities Fire Weather Summary Plots - 11/11/2020 18z forecast

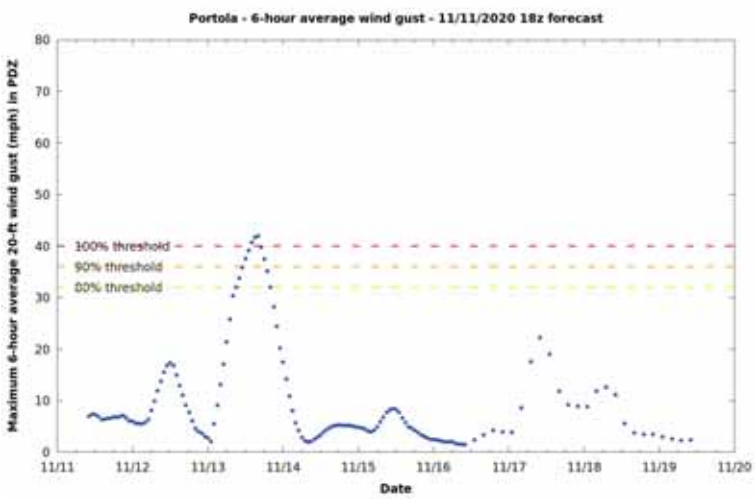
111 Line



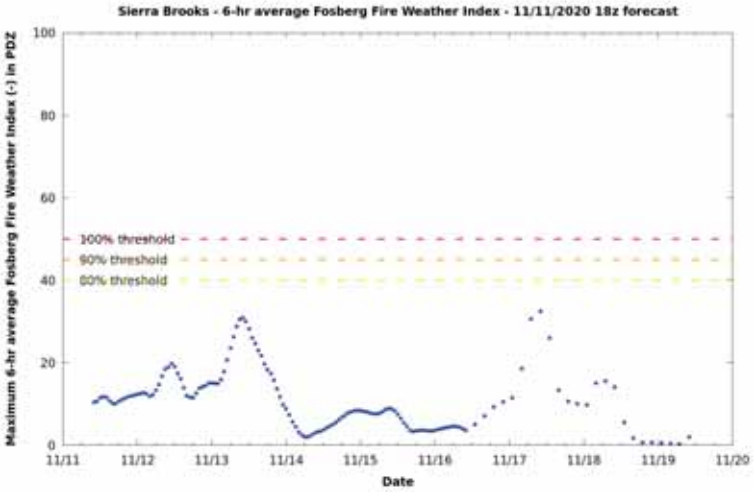


Portola



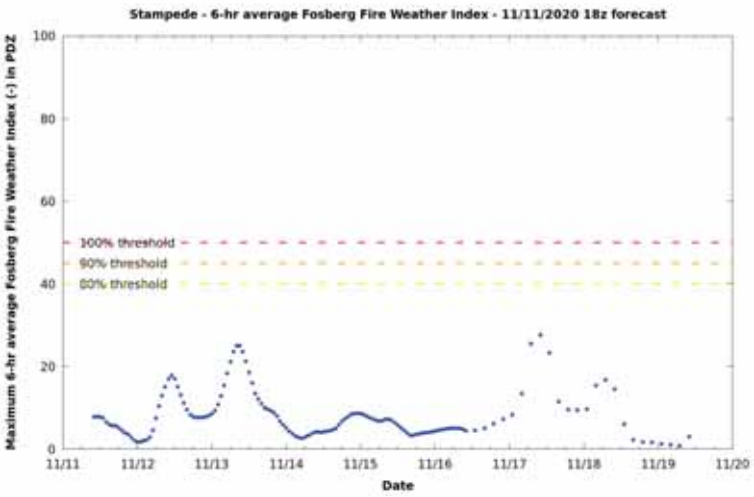


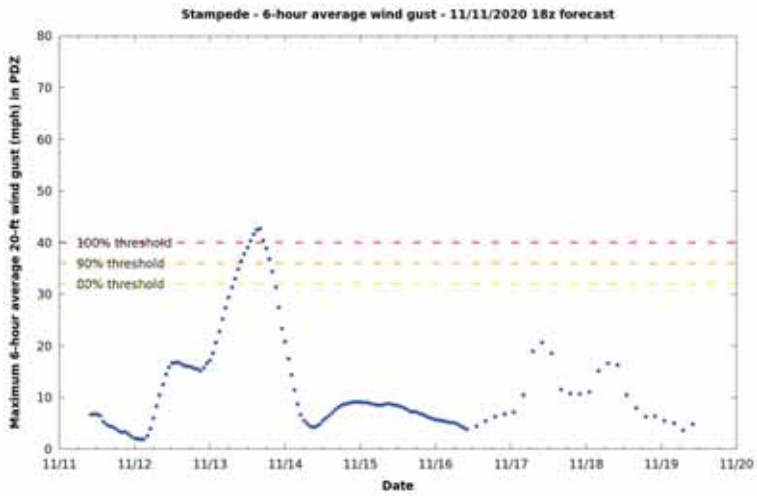
Sierra Brooks



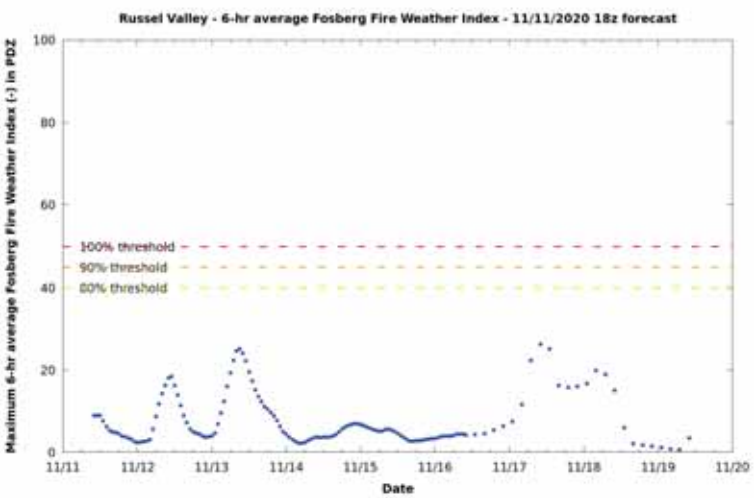


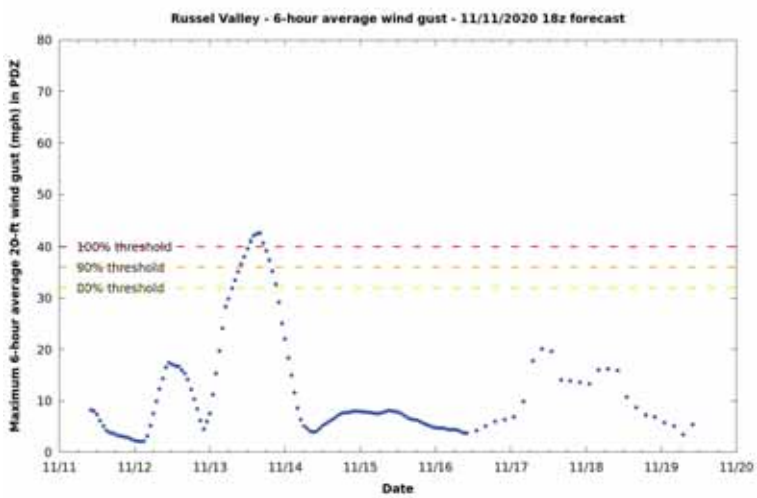
Stampede



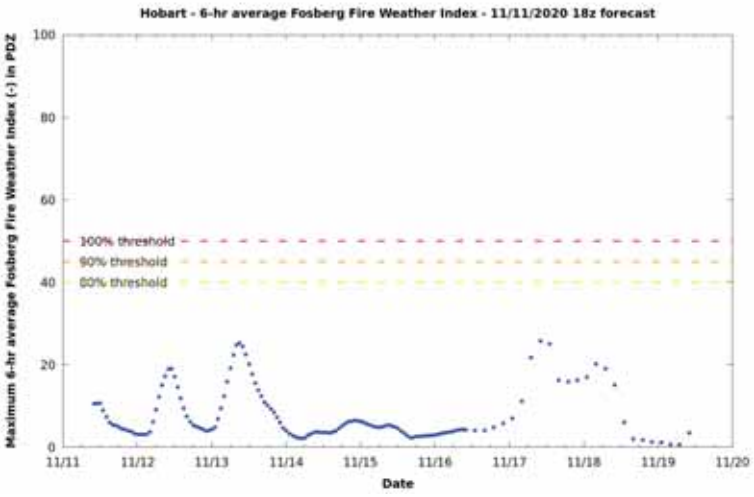


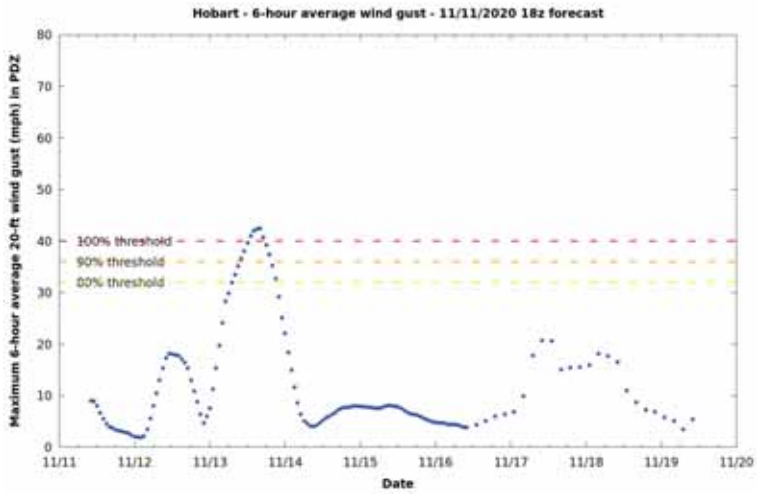
Russell Valley



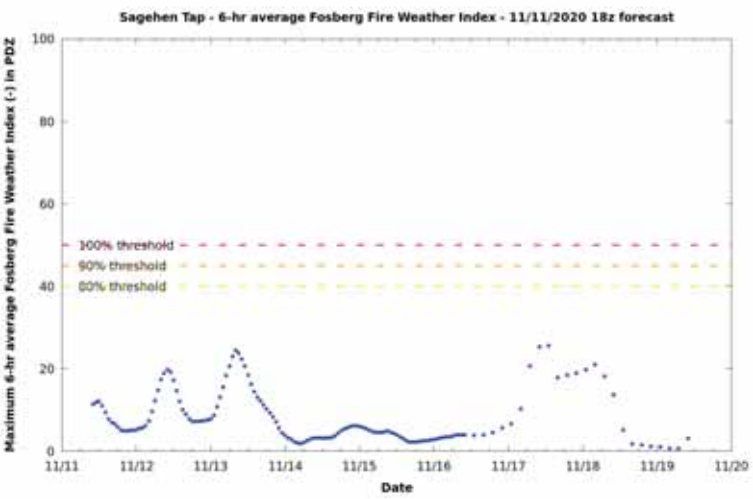


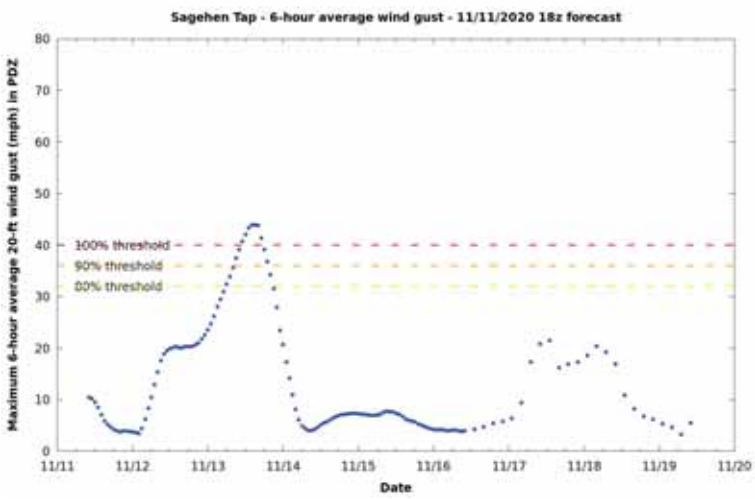
Hobart



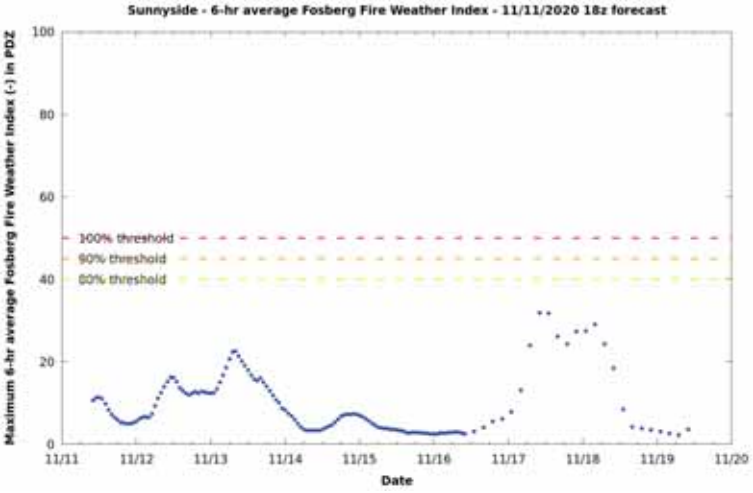


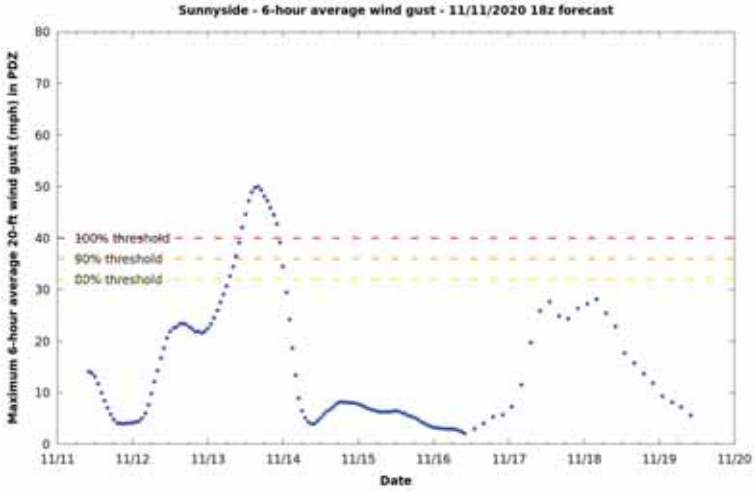
Sagehen tap



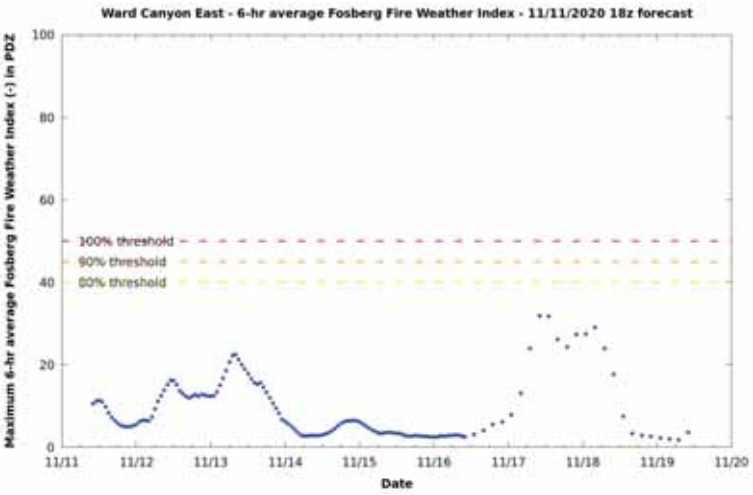


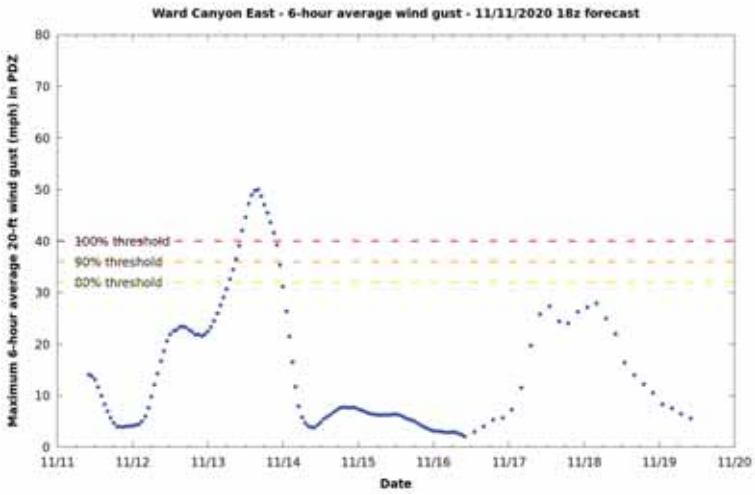
Sunnyside



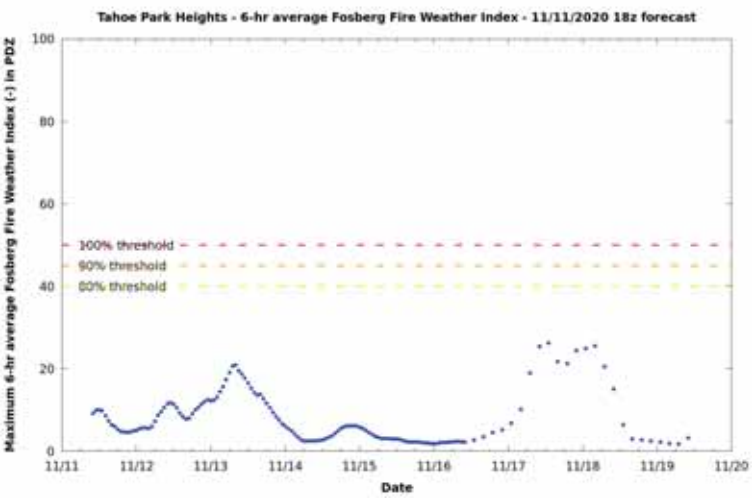


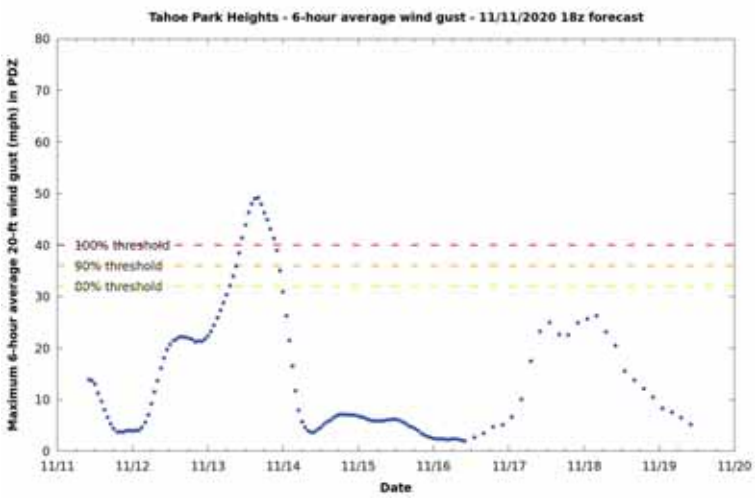
Ward Canyon East



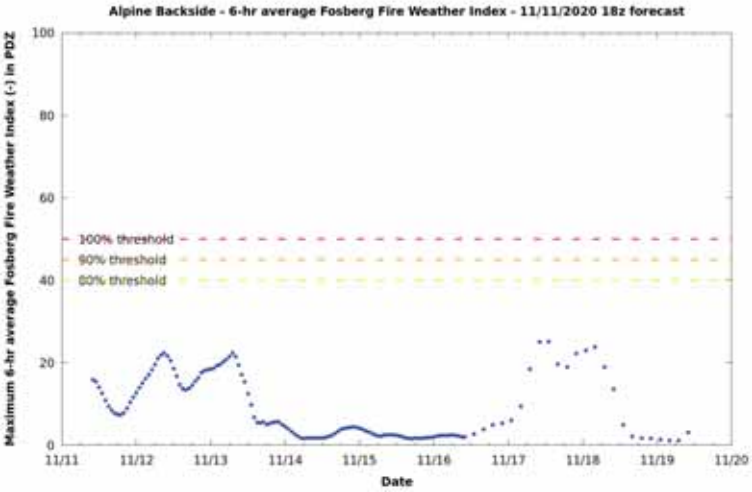


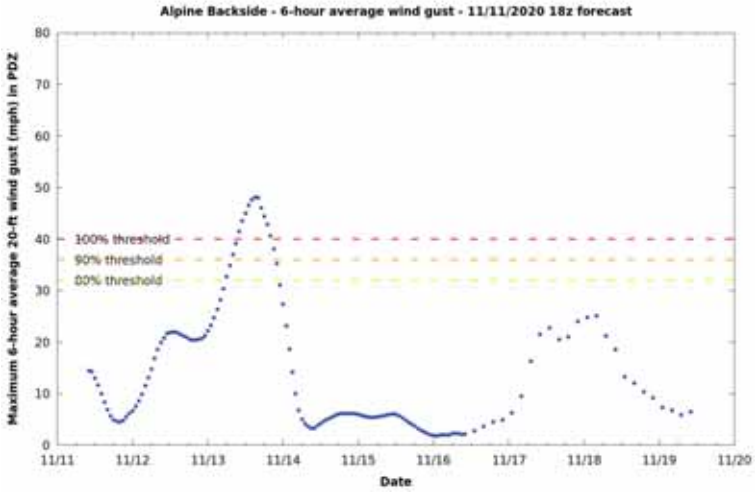
Tahoe Park Heights



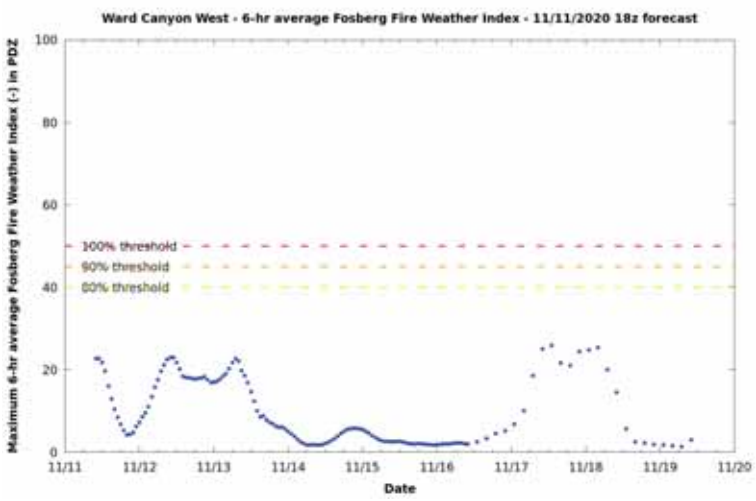


Alpine Backside



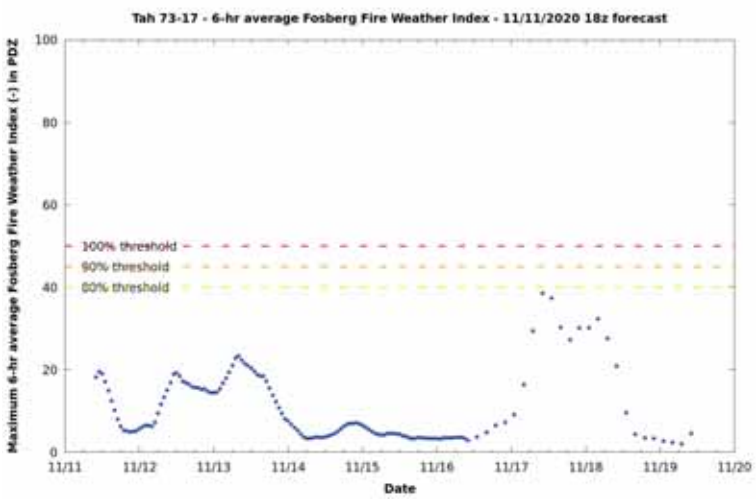


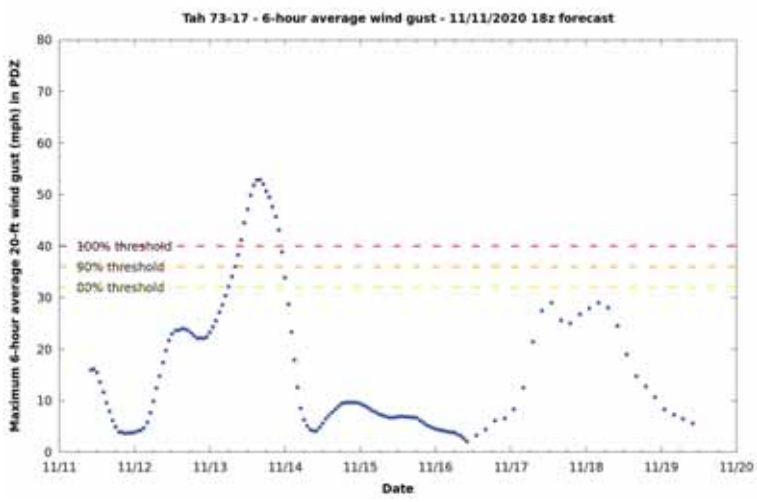
Ward Canyon West



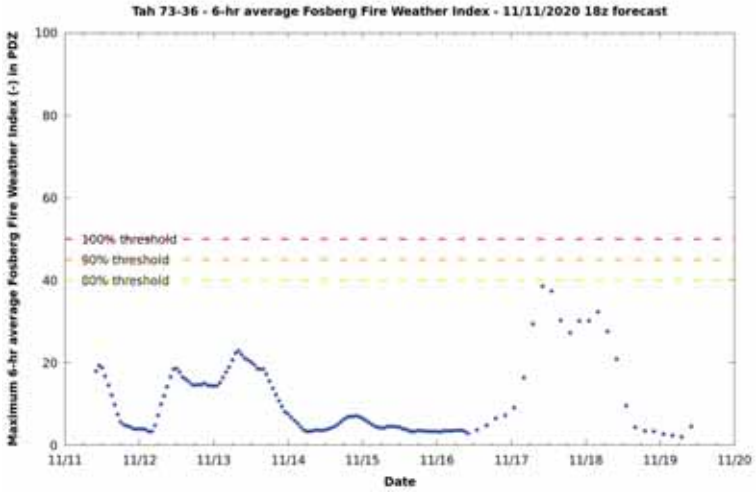


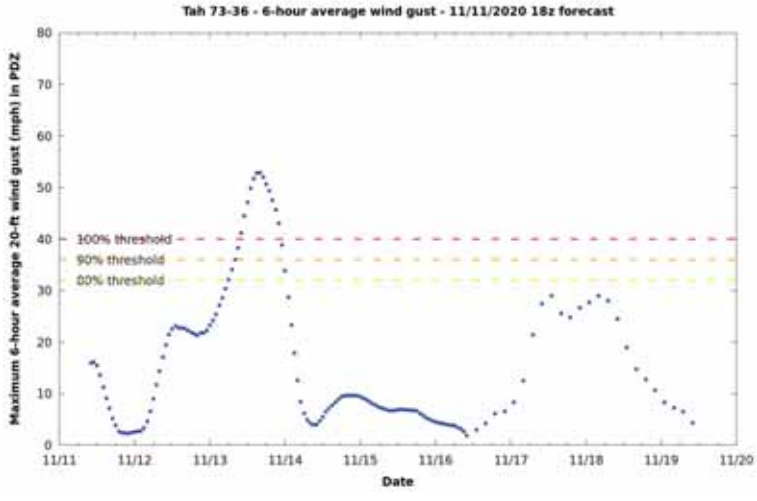
Tah 73-17



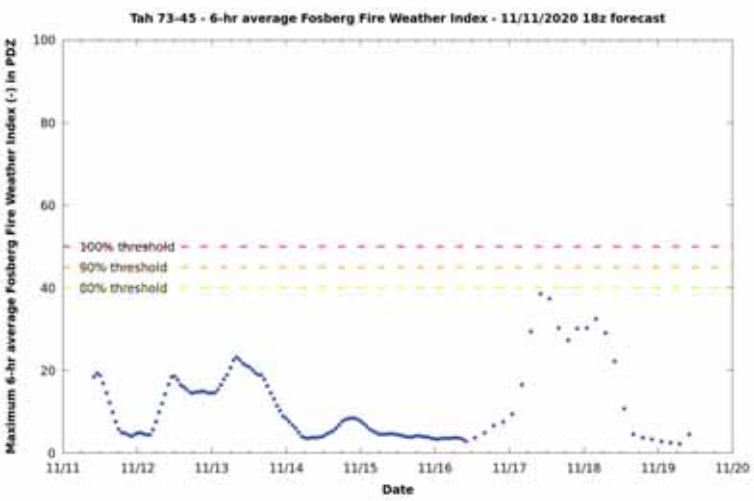


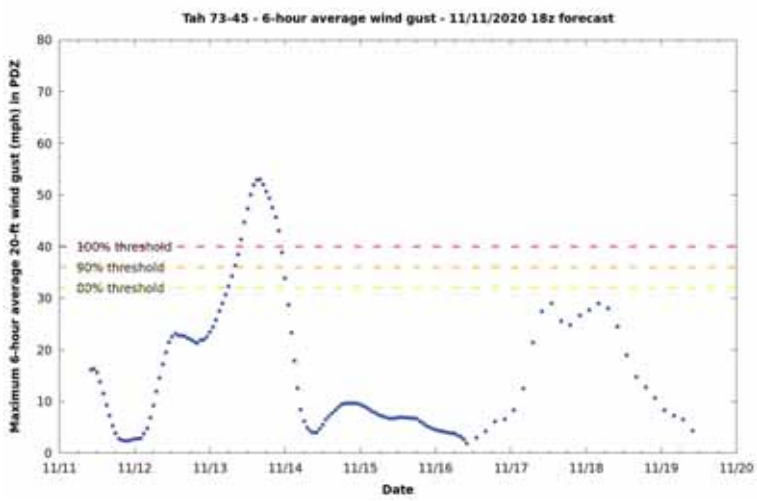
Tah 73-36



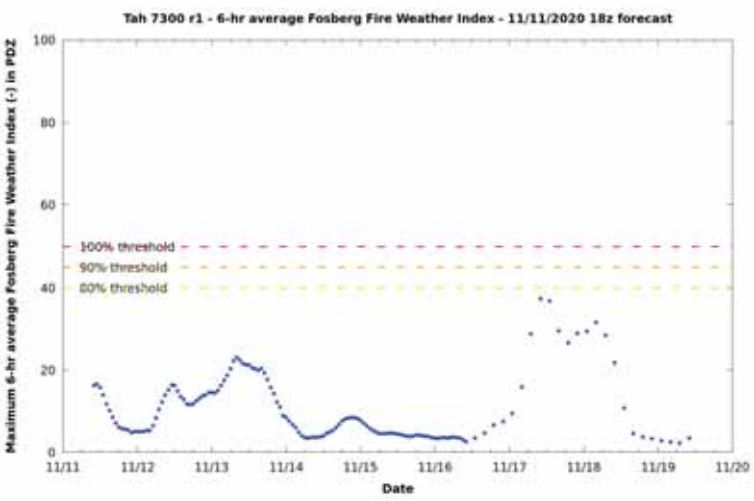


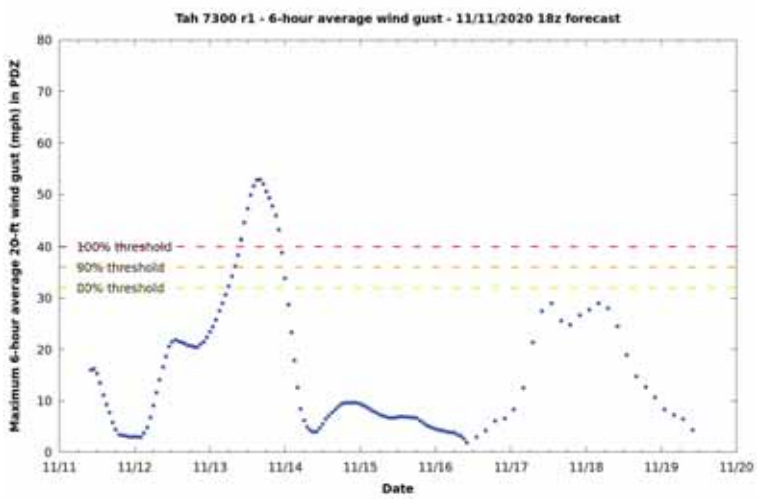
Tah 73-45



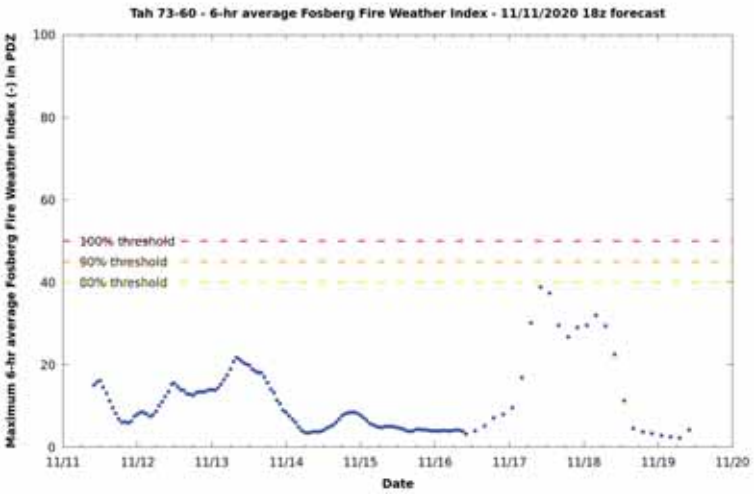


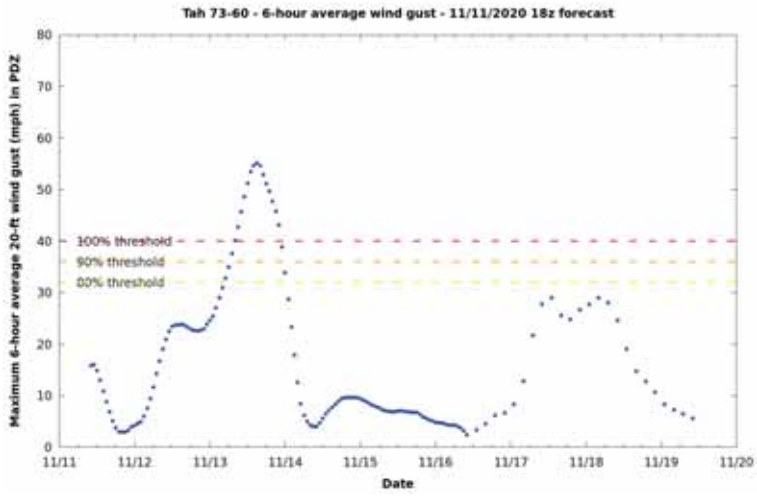
Tah 7300 r1



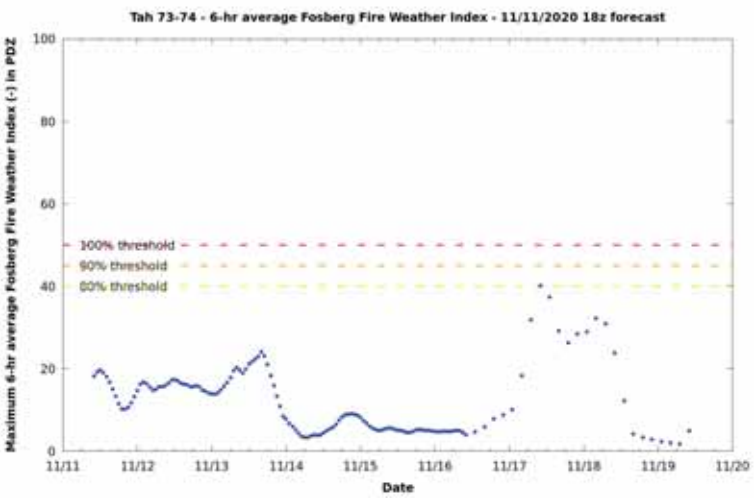


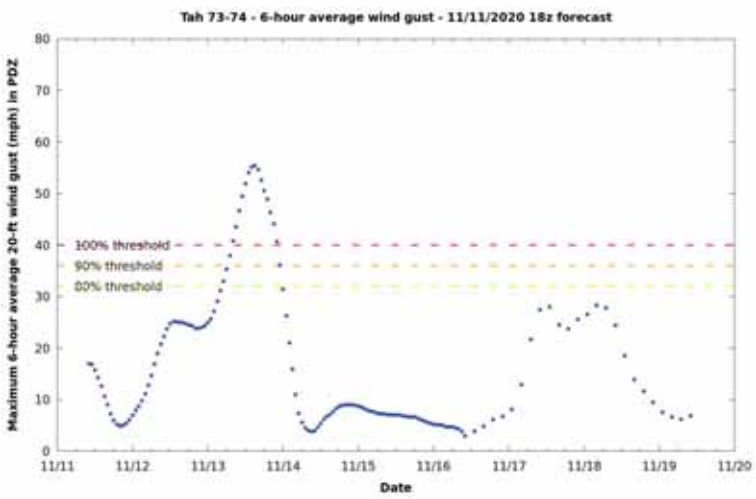
Tah 73-60



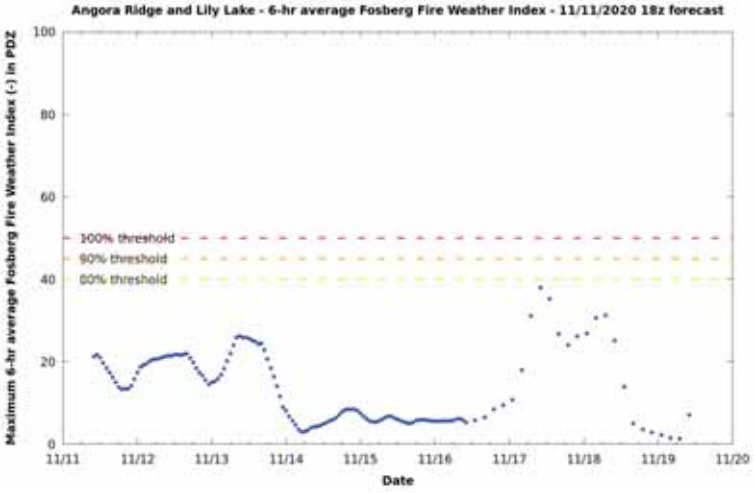


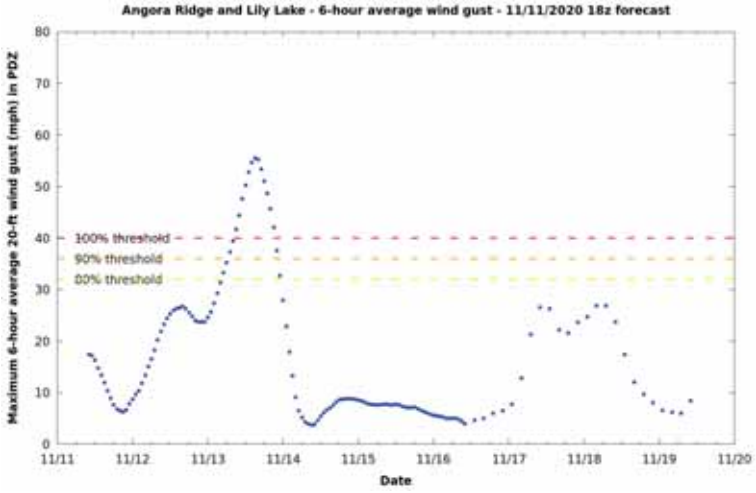
Tah 73-74



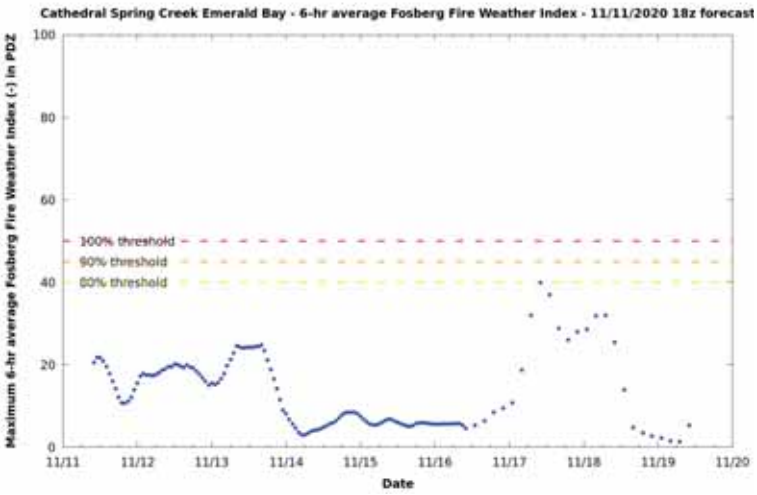


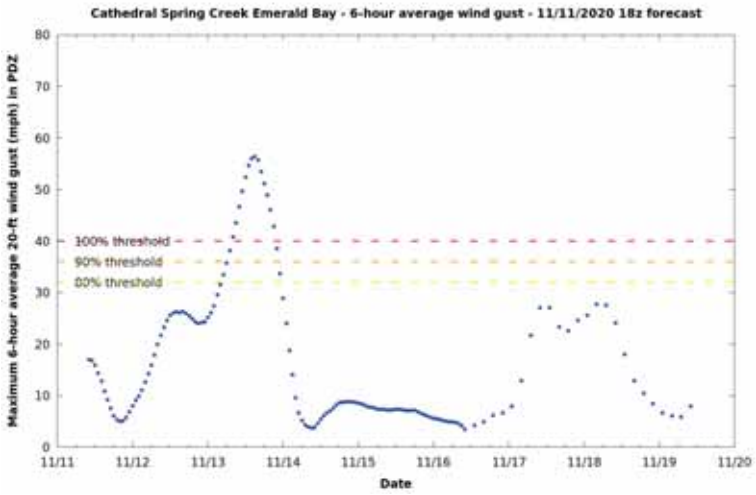
Angora Ridge and Lily Lake



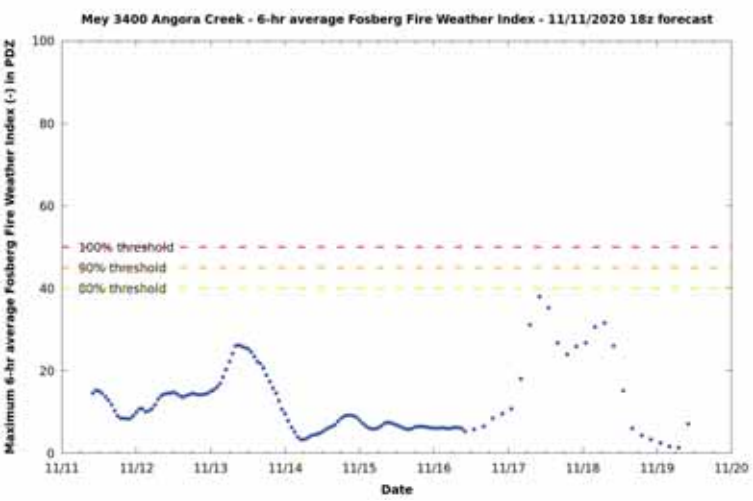


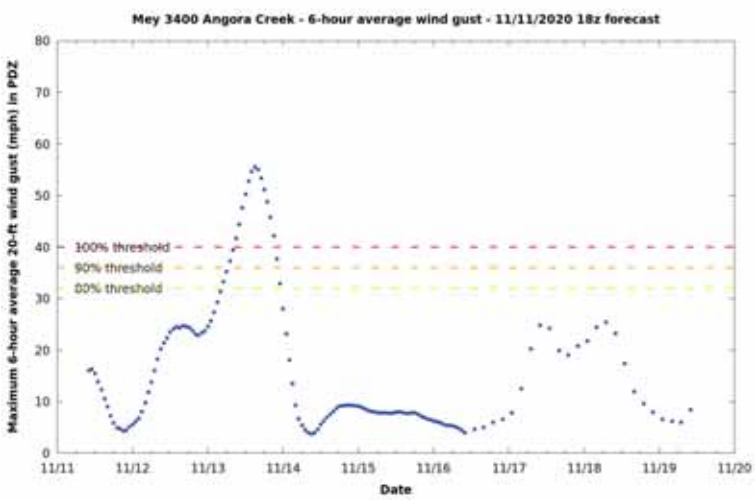
Cathedral Spring Creek Emerald Bay



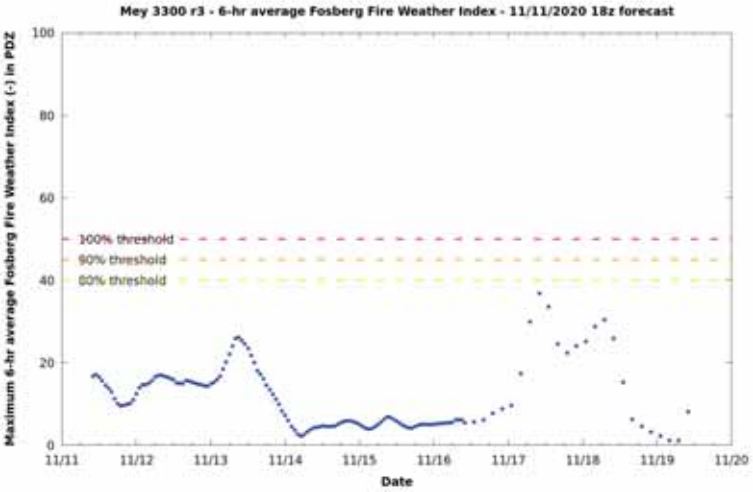


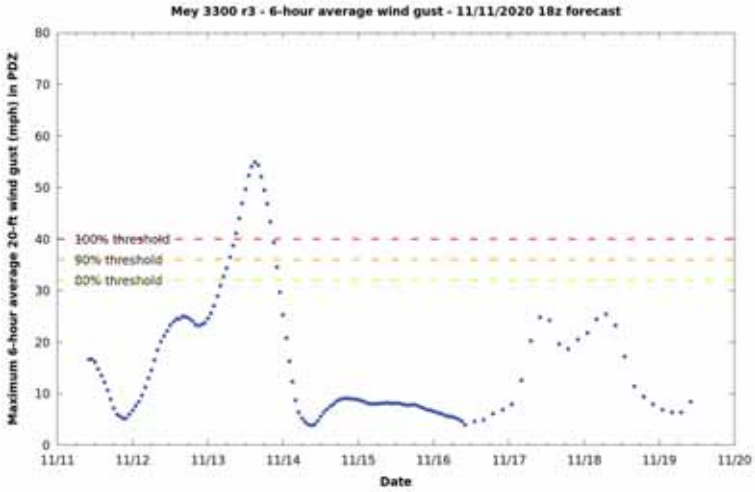
Mey 3400 Angora Creek



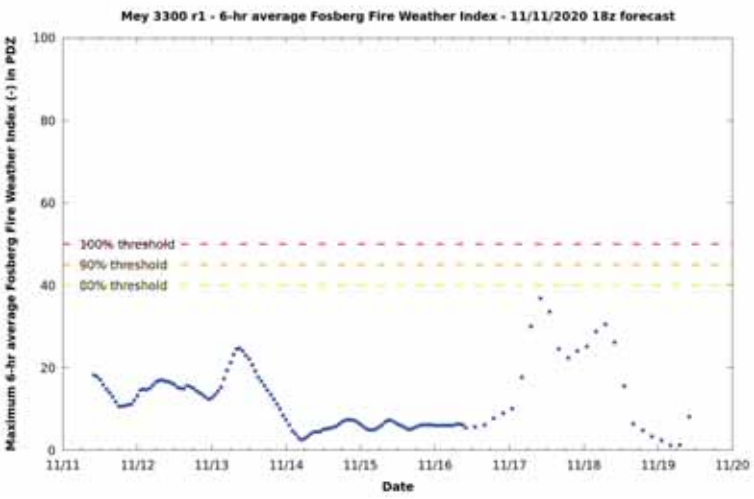


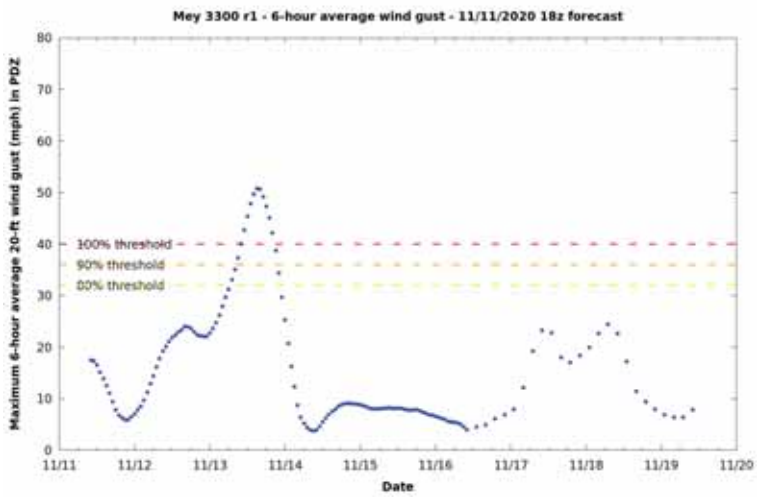
Mey 3300 r3



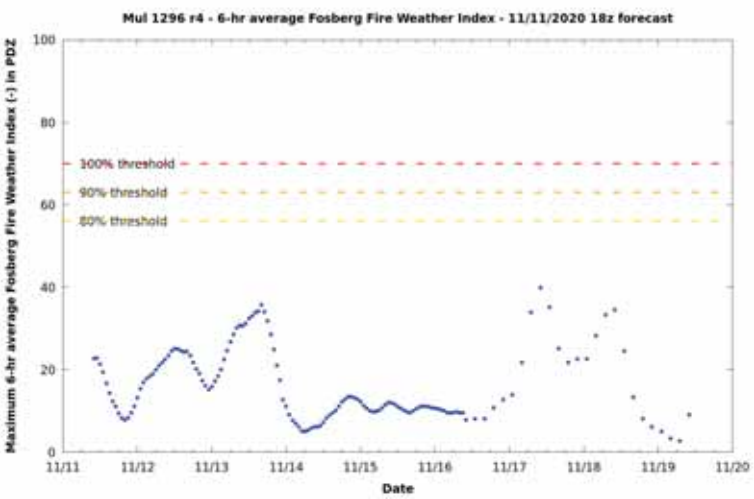


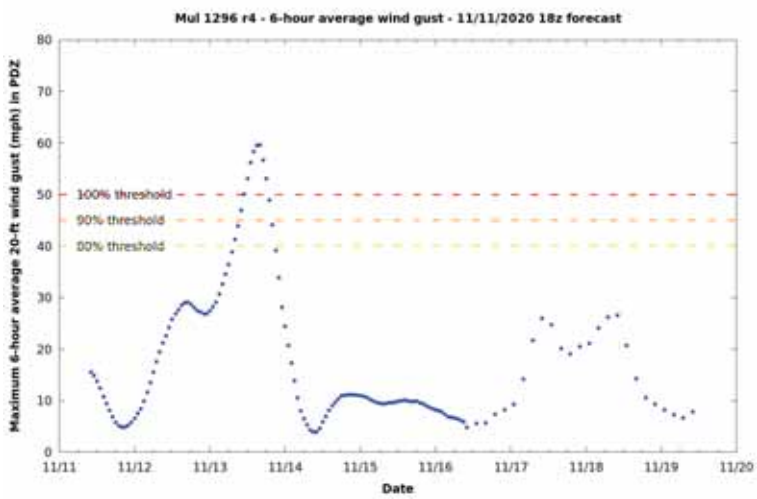
Mey 3300 r1



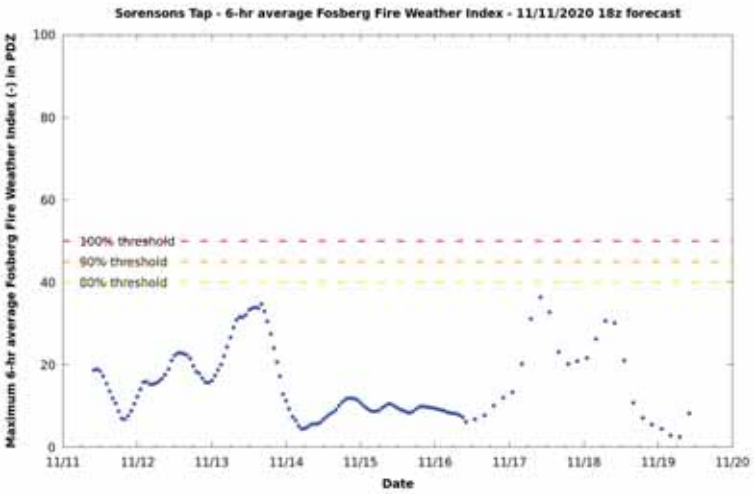


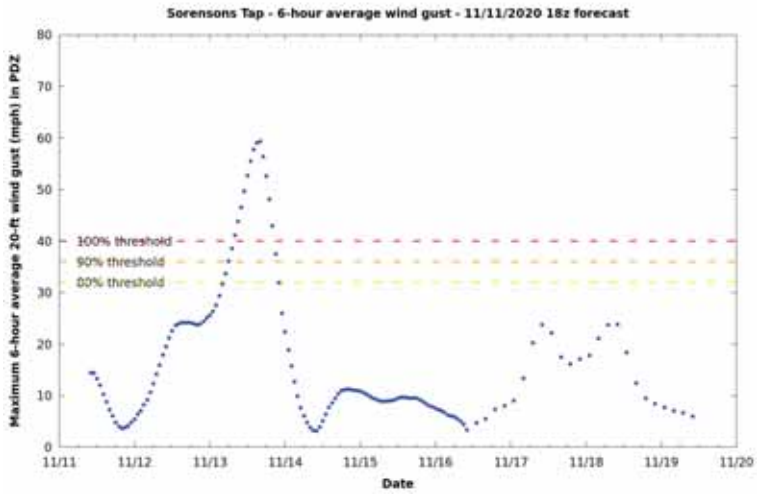
Mul 1296 r4



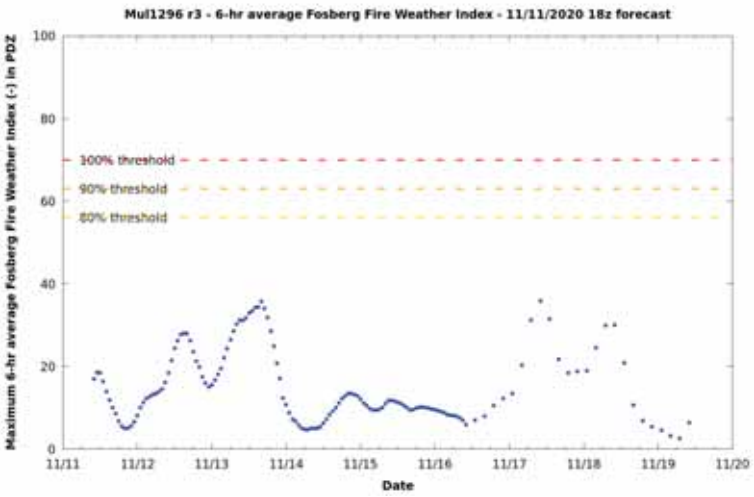


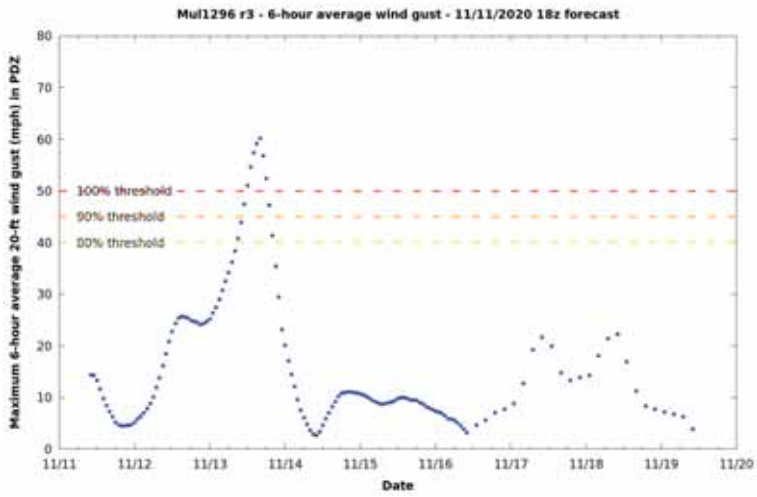
Sorensons Tap



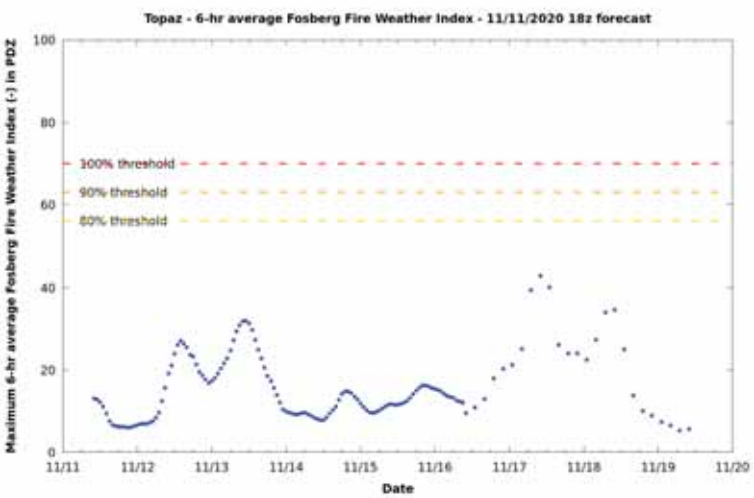


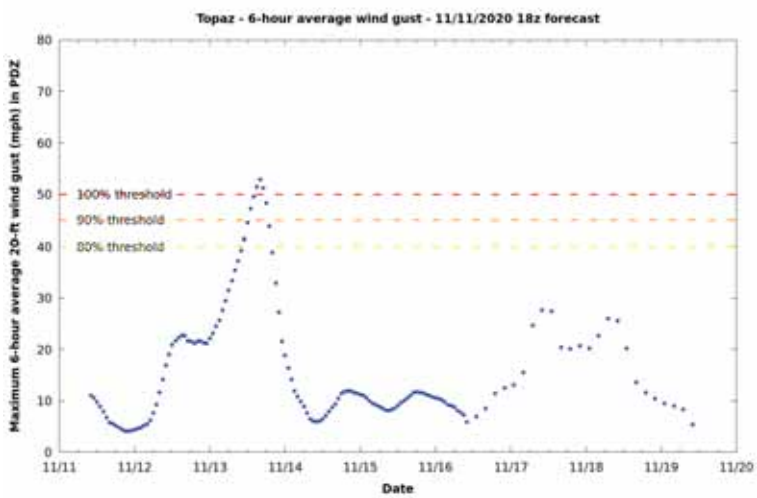
Mul 1296 r3



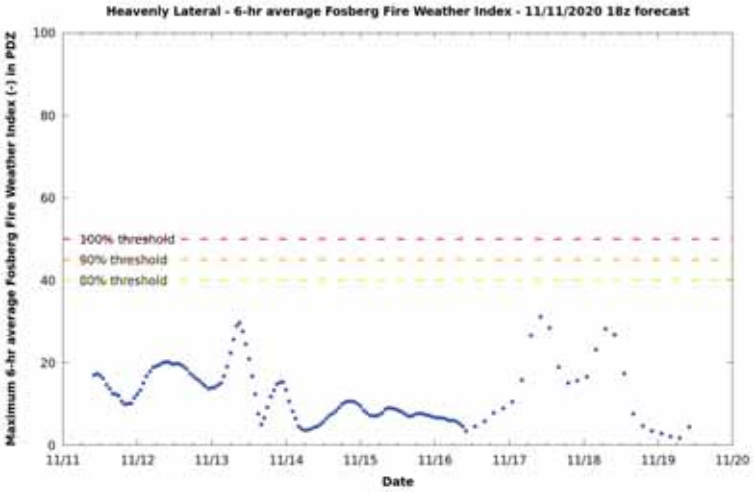


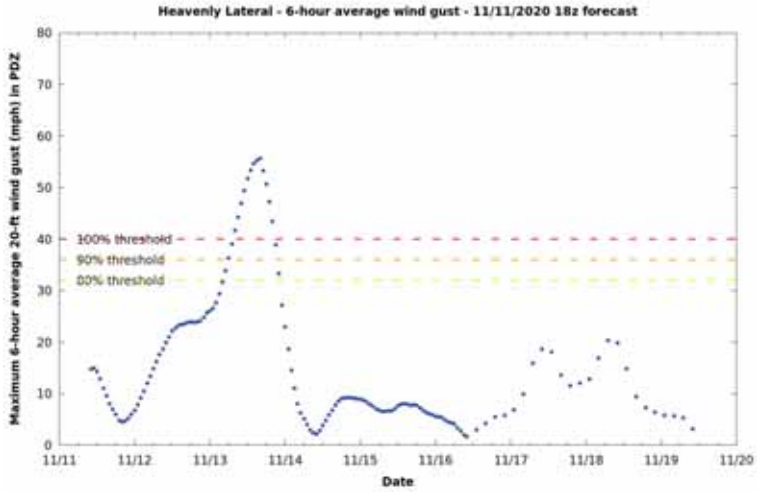
Topaz



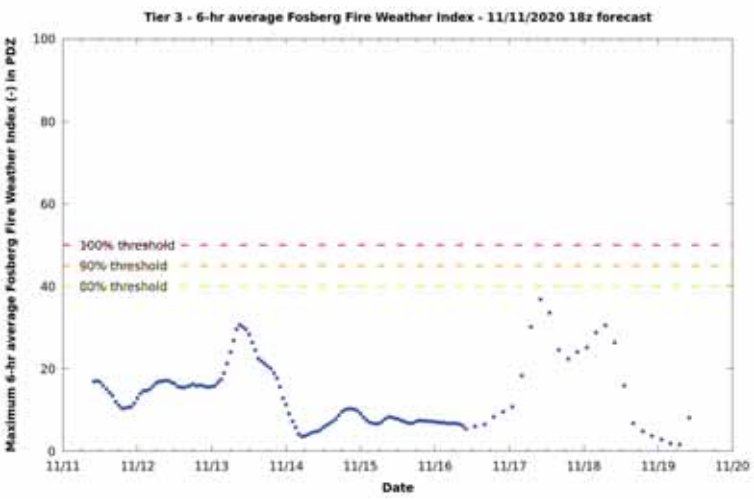


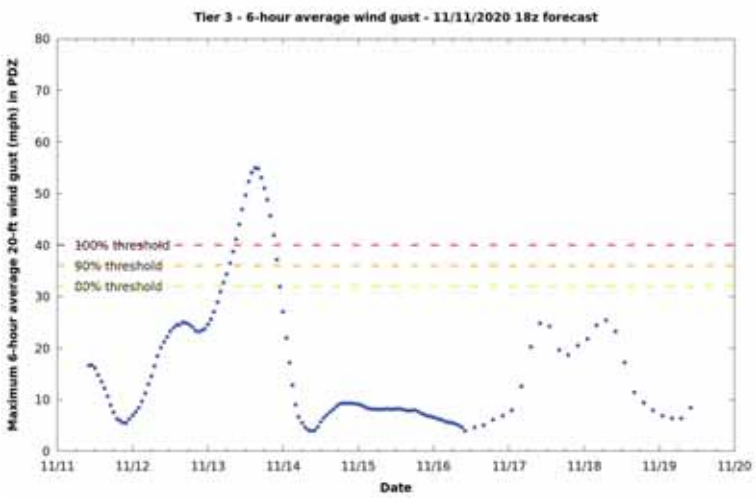
Heavenly Lateral



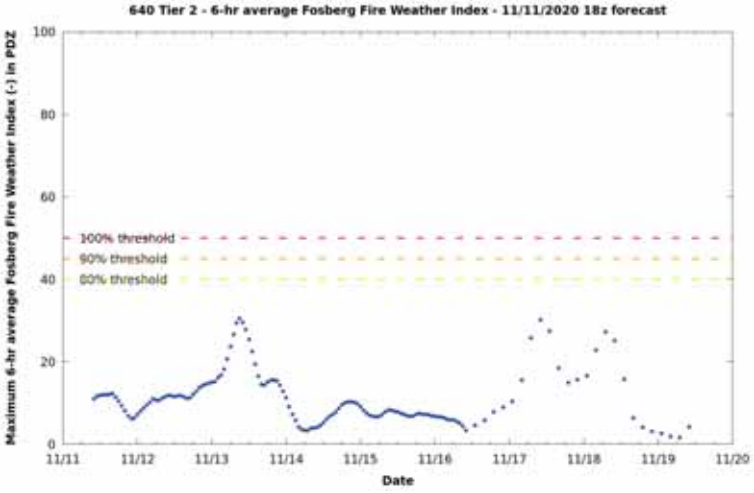


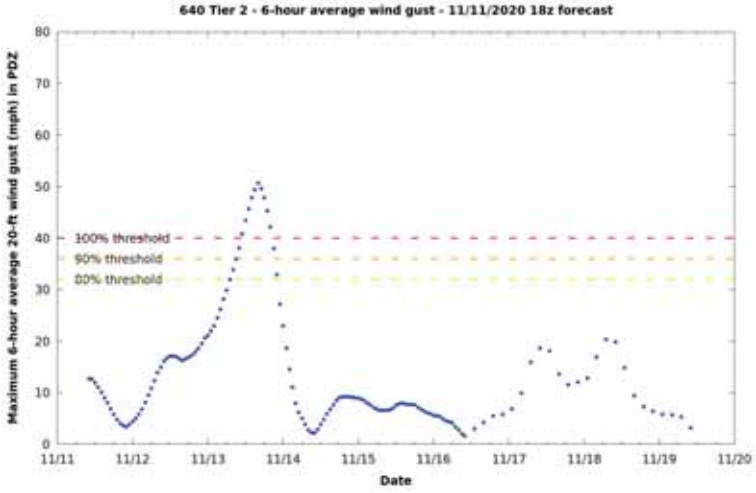
Tier 3



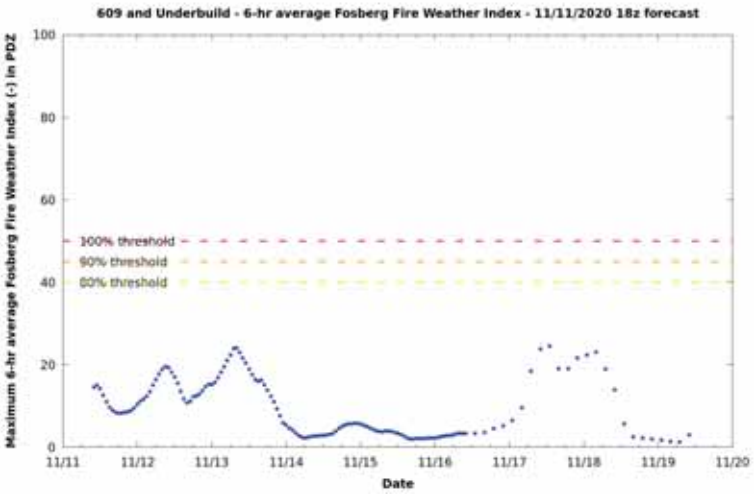


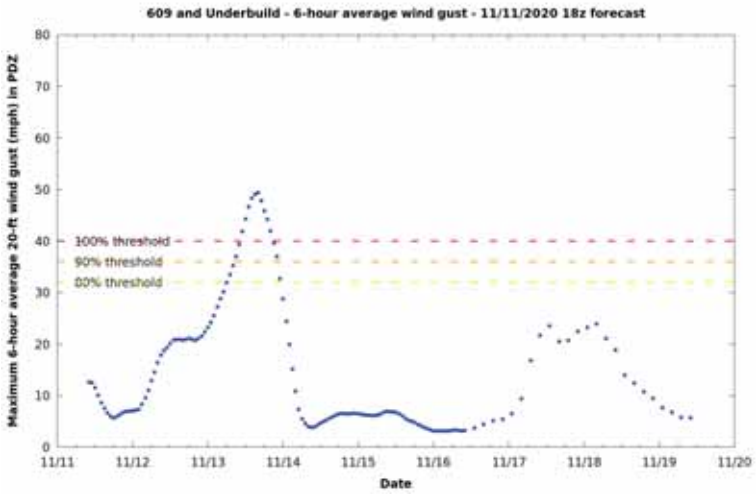
640 Tier 2



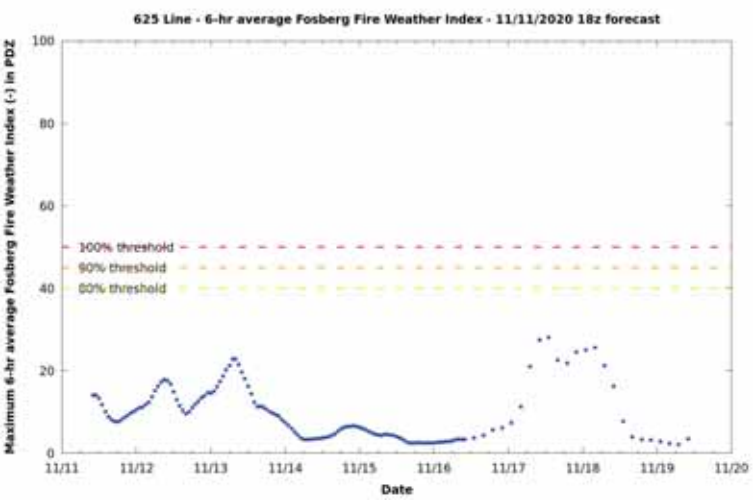


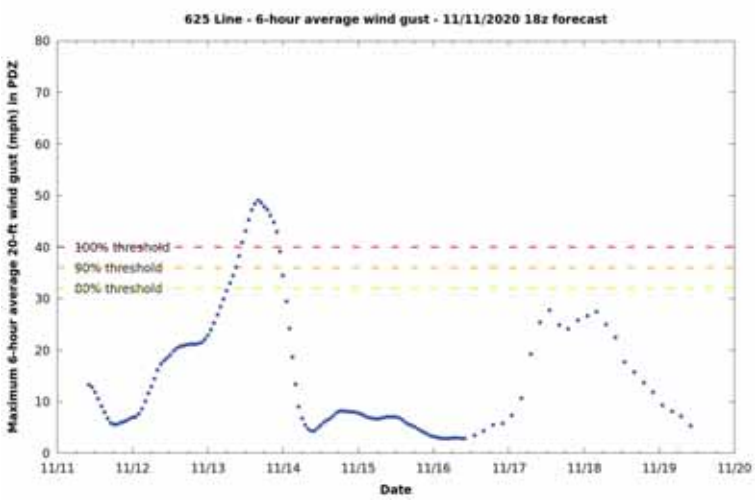
609 and Underbuild



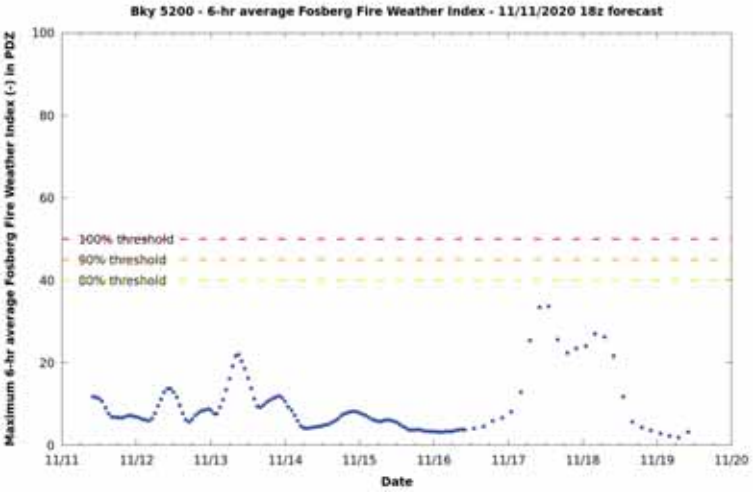


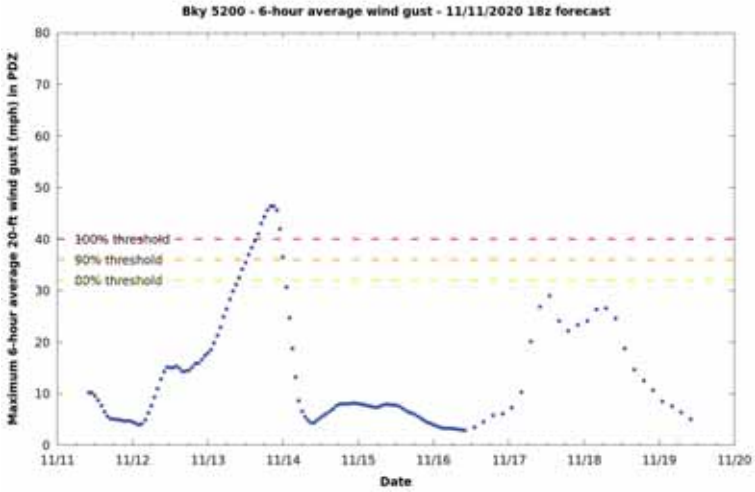
625 Line



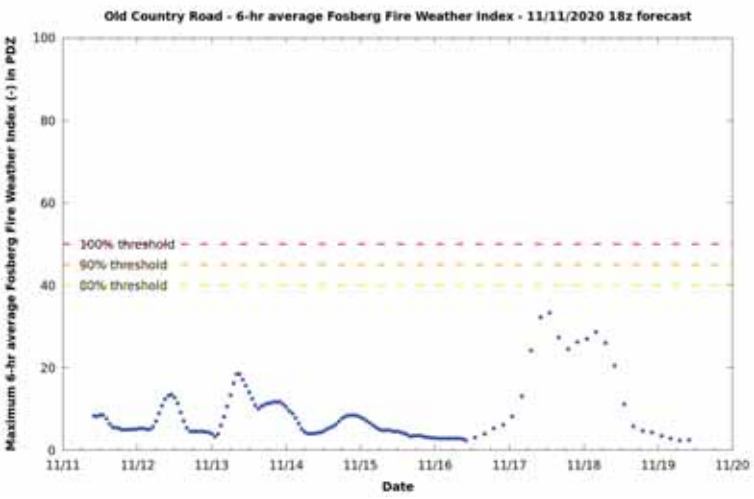


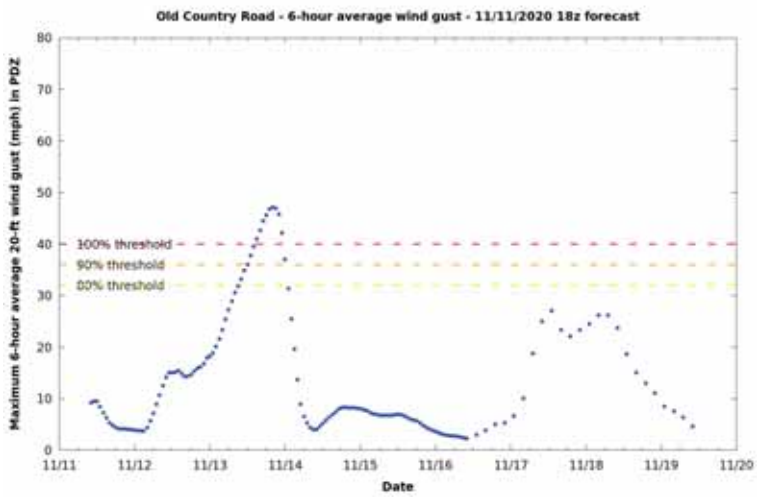
Bky 5200



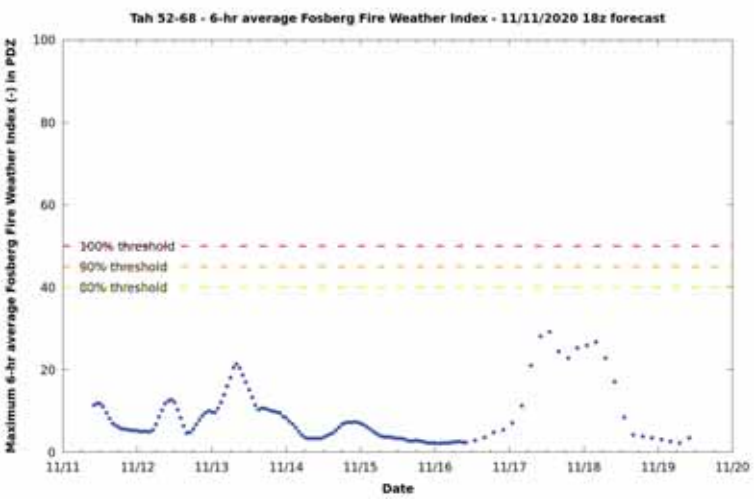


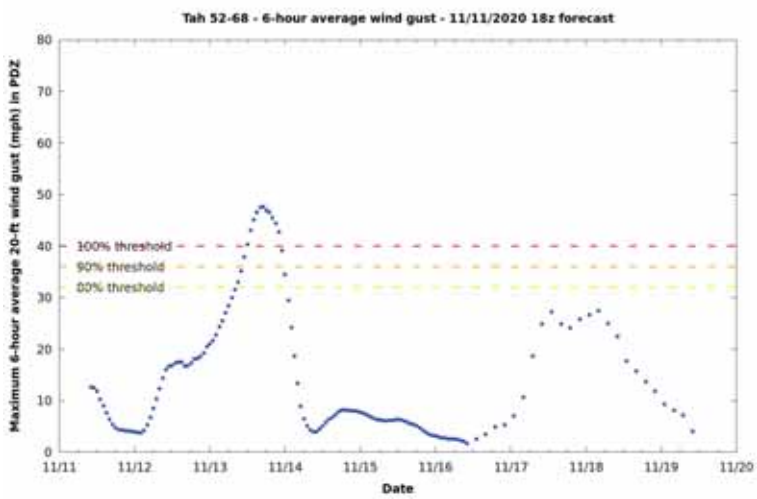
Old Country Road



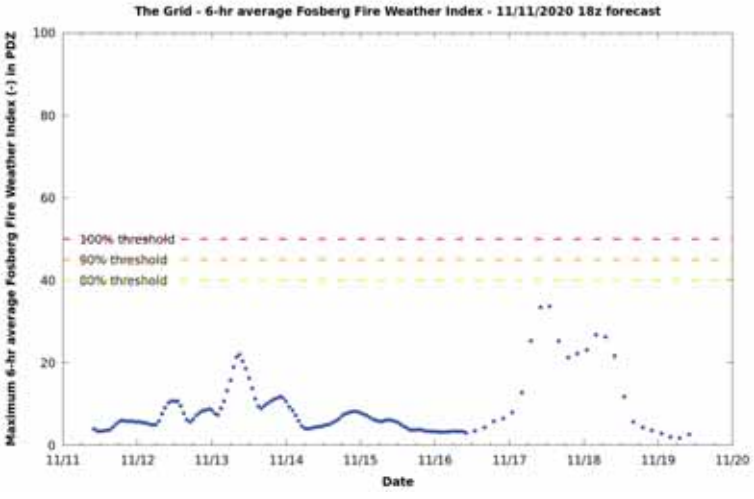


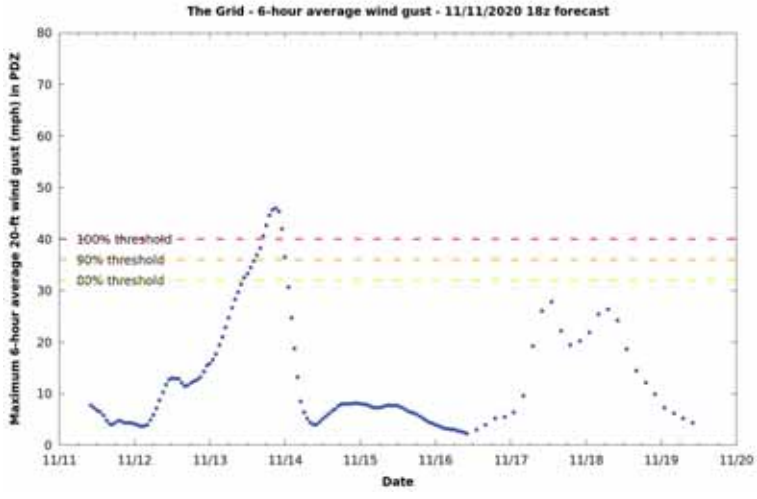
Tah 52-68



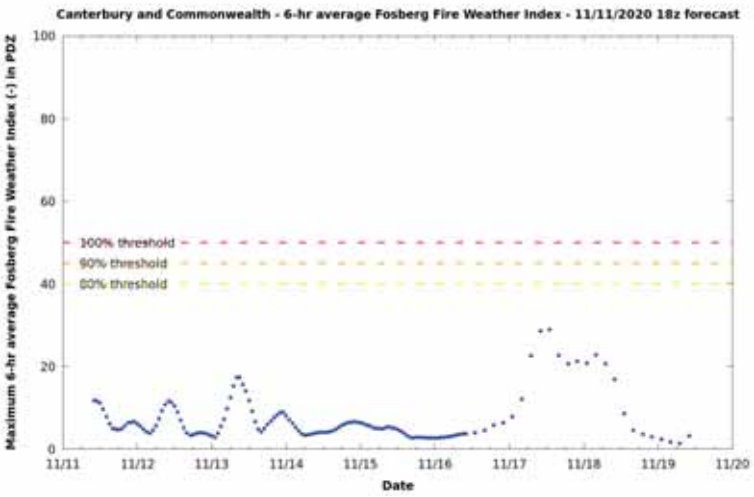


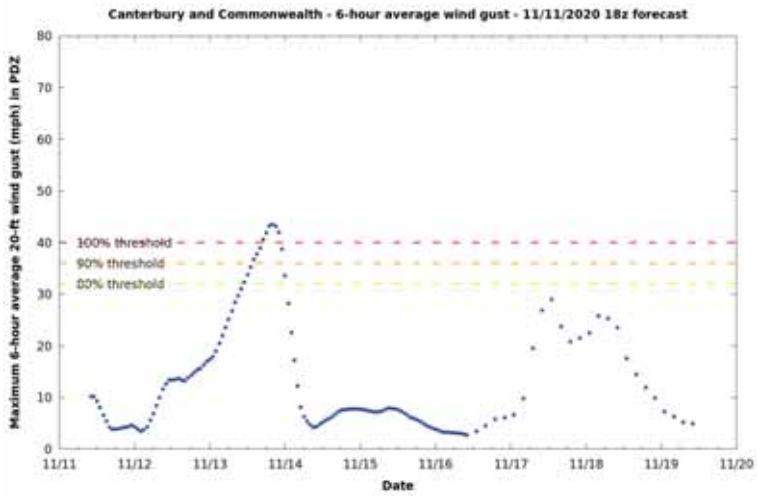
The Grid



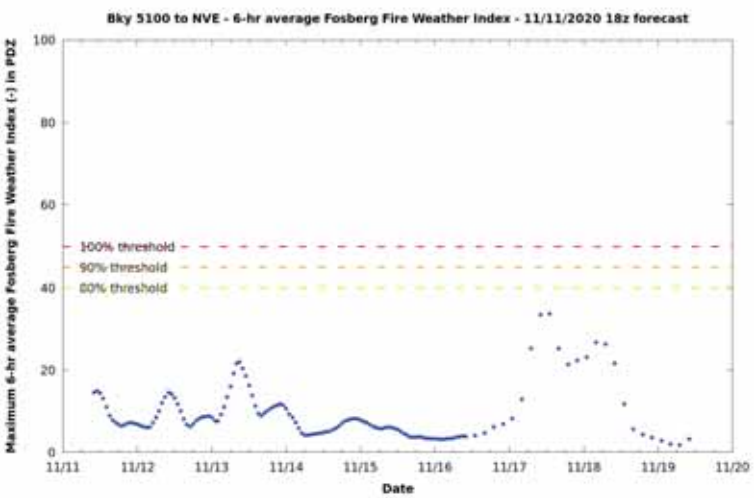


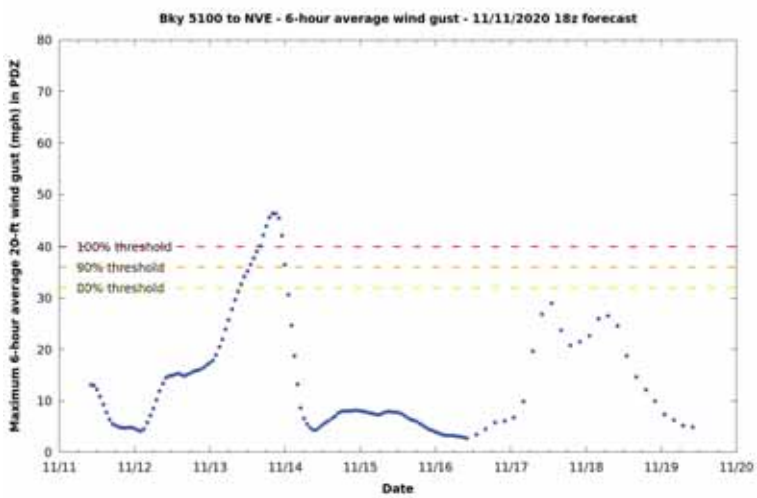
Canterbuy and Commonwealth



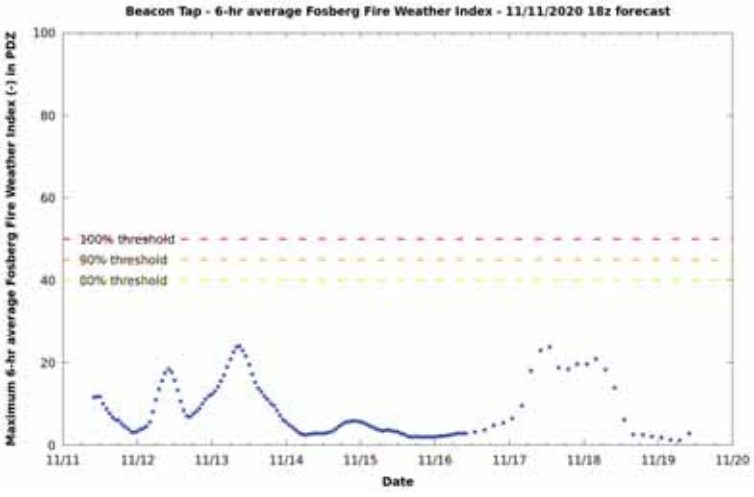


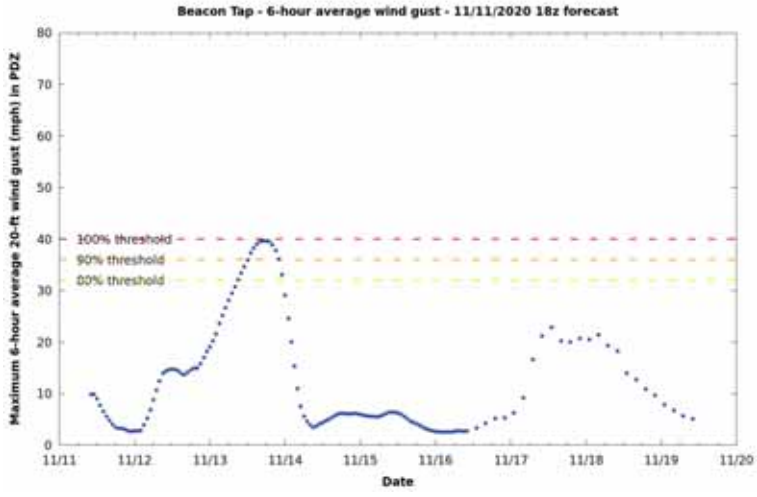
Bky 5100 to NVE



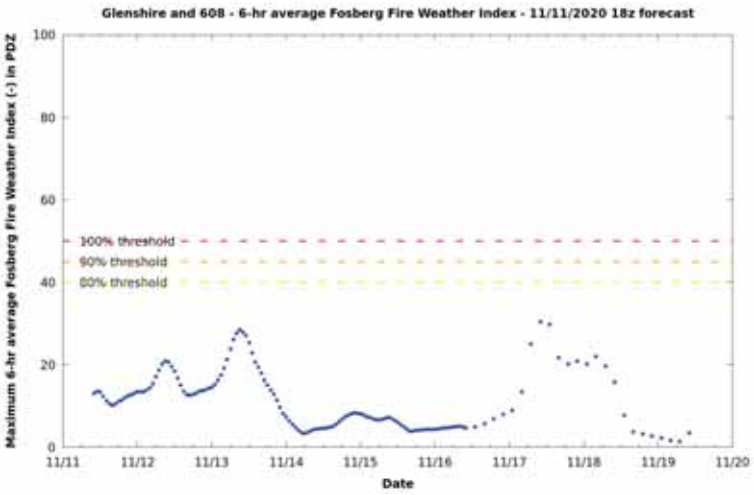


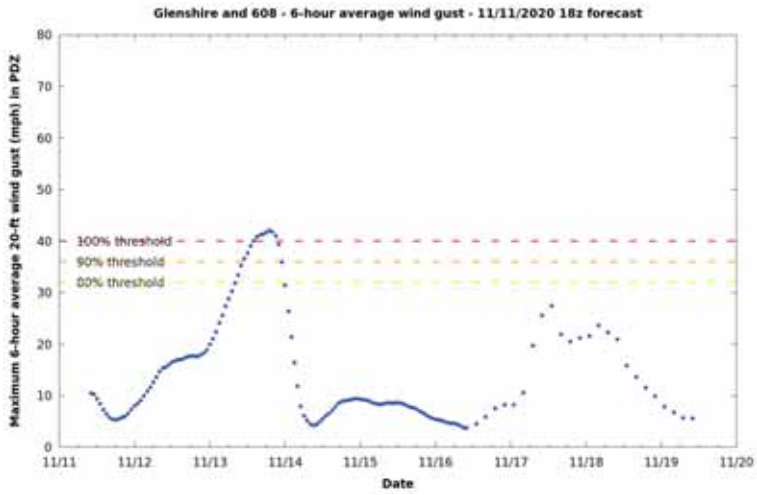
Beacon Tap



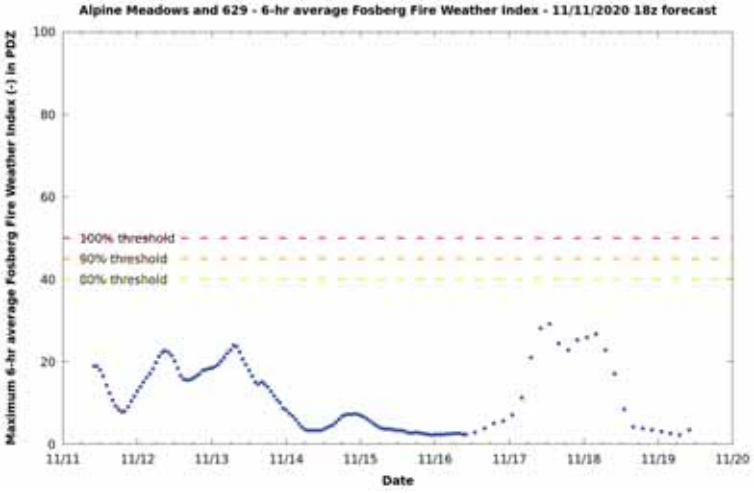


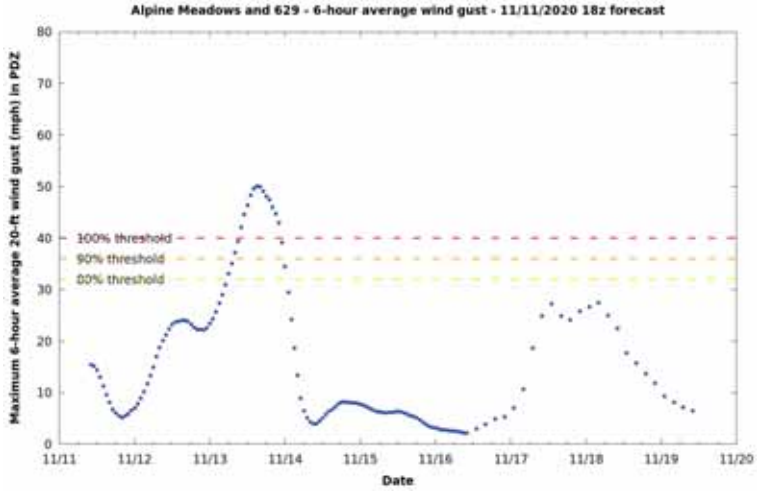
Glenshire and 608



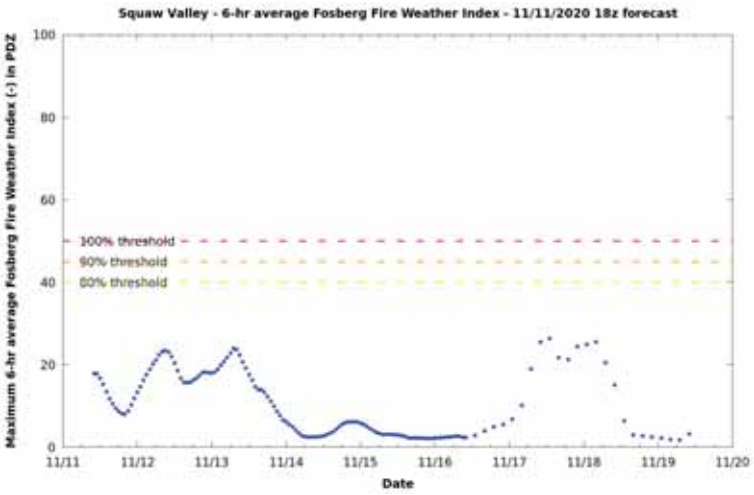


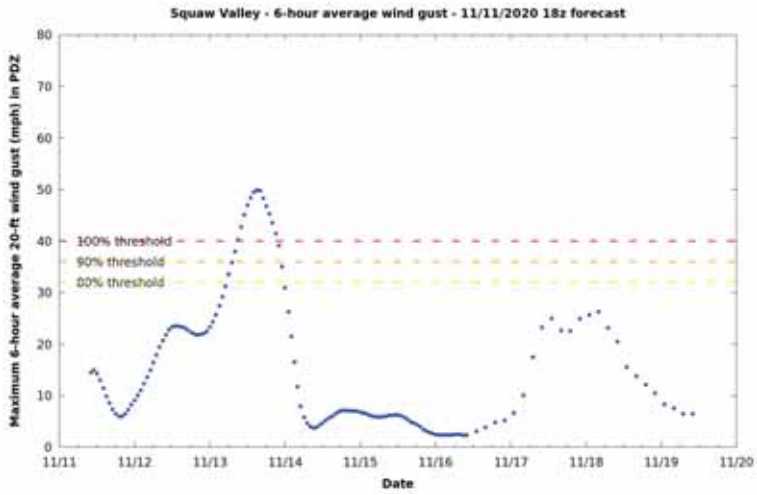
Alpine Meadows and 629



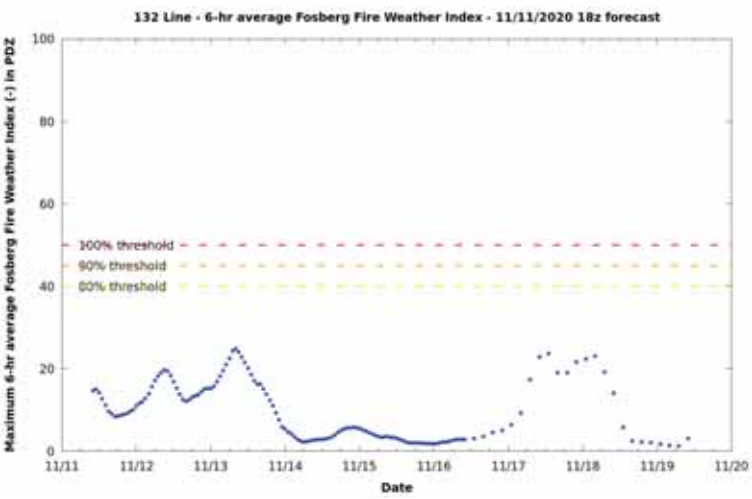


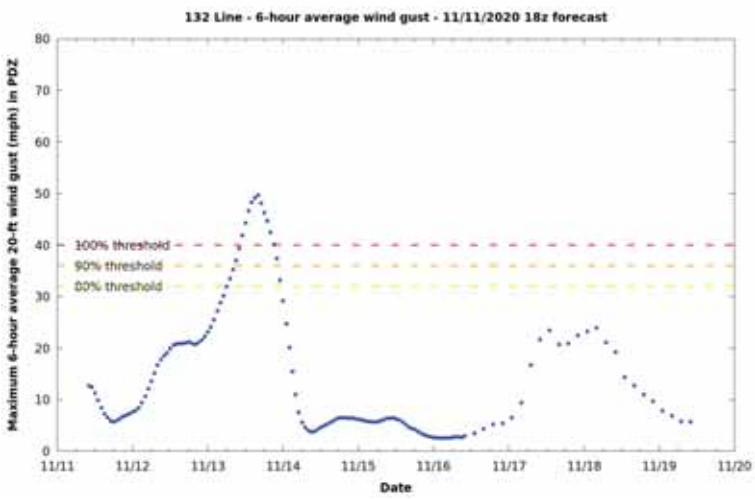
Squaw Valley



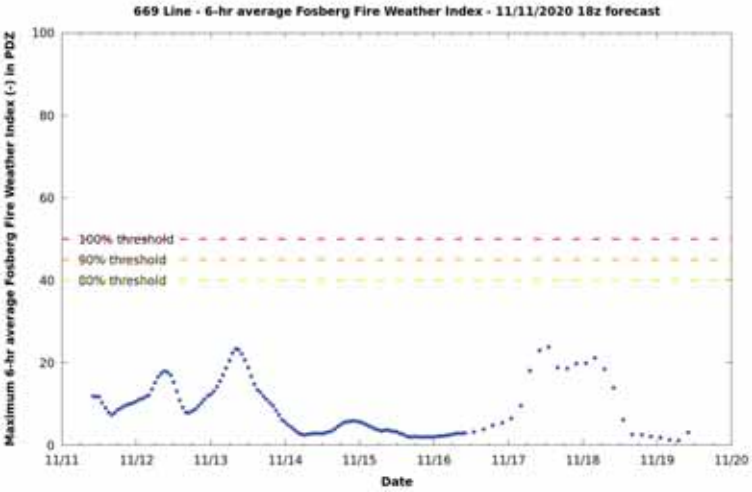


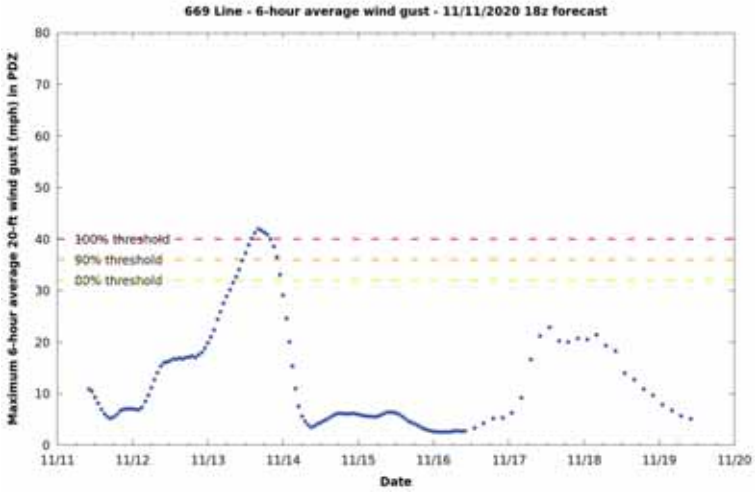
132 Line



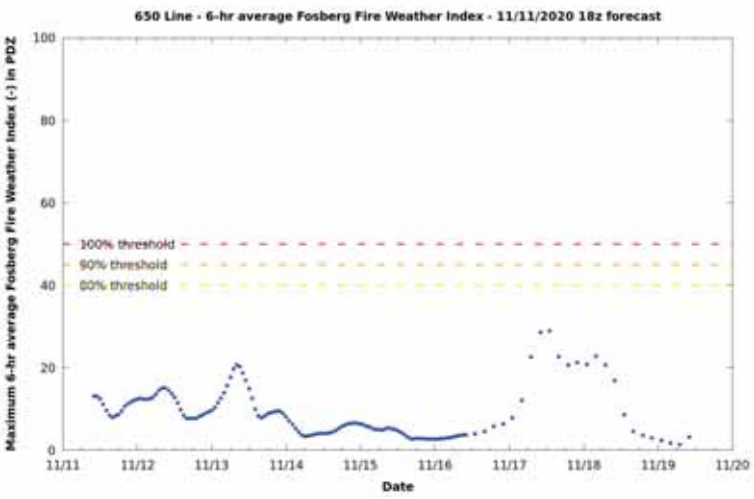


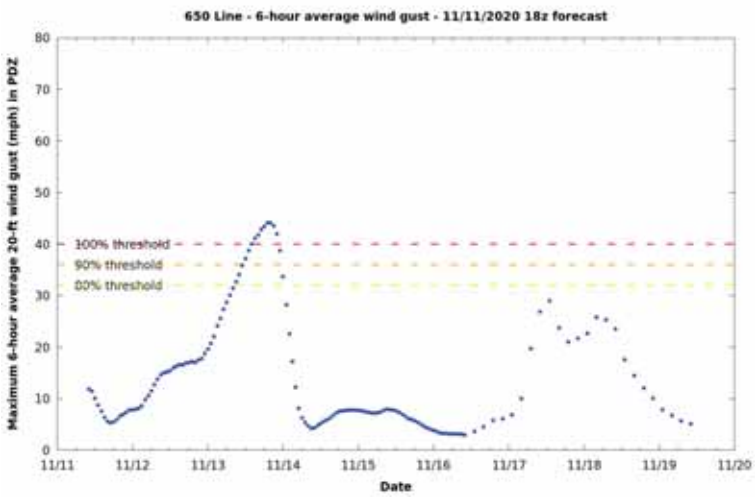
669 Line



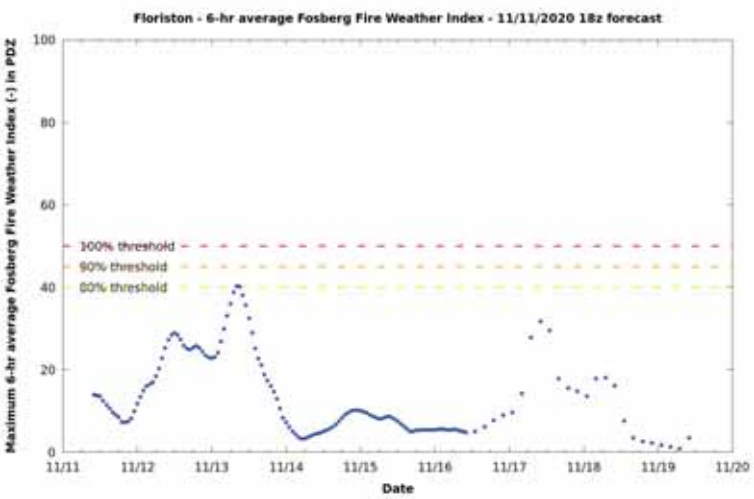


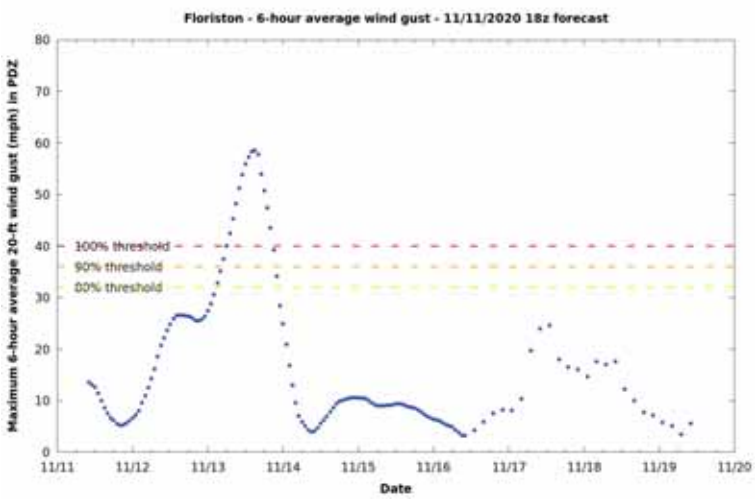
650 Line



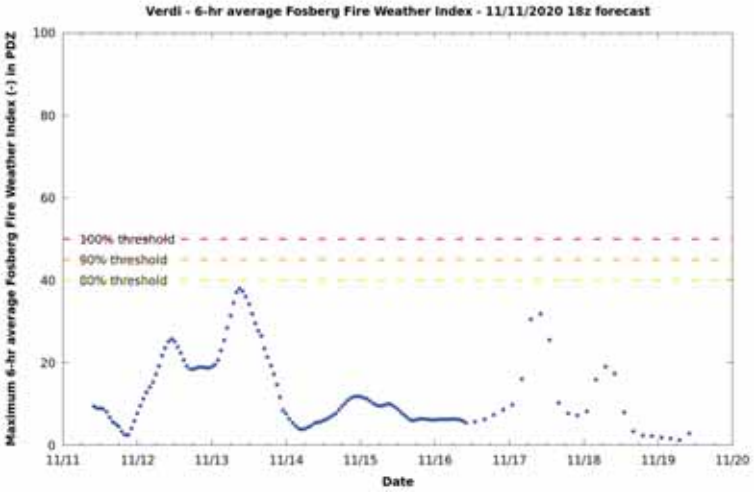


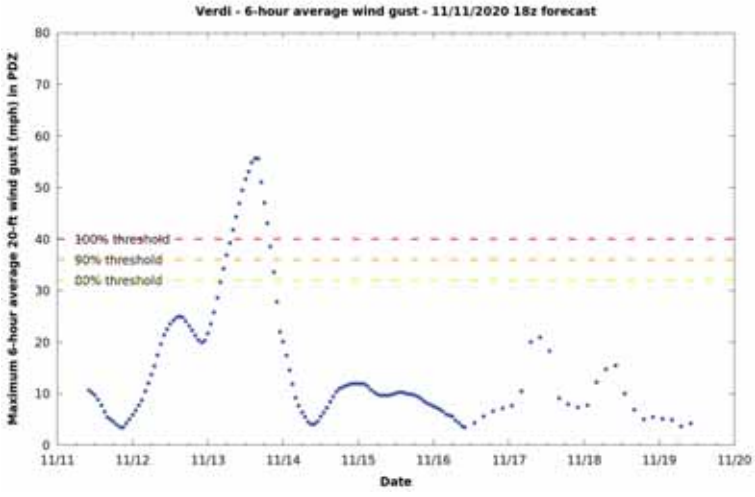
Floriston



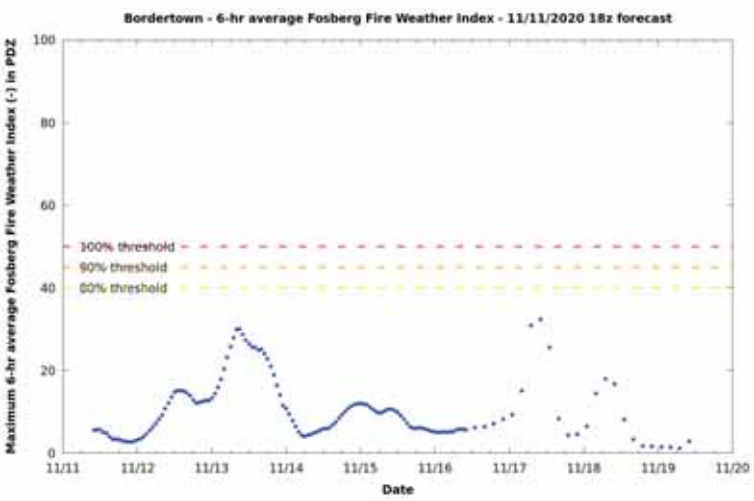


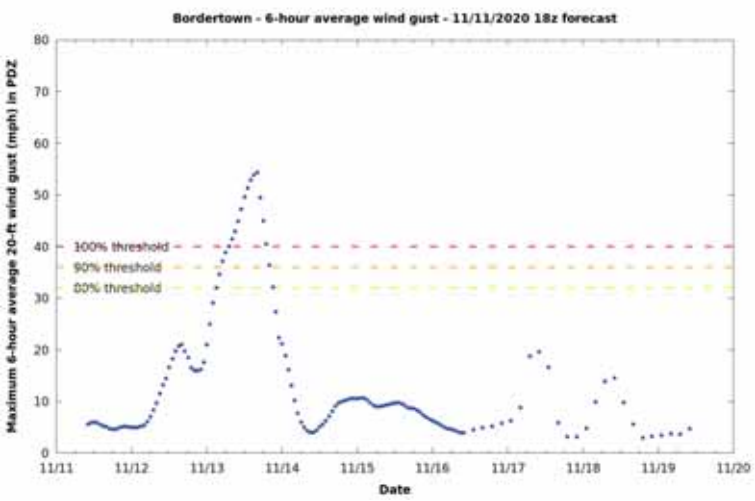
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/11/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/11
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20


Bordertown - 6-hour average wind gust - 11/11/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/11
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20

Liberty Utilities Fire Potential Index Forecast for 11/12/20 - 11/18/20

Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

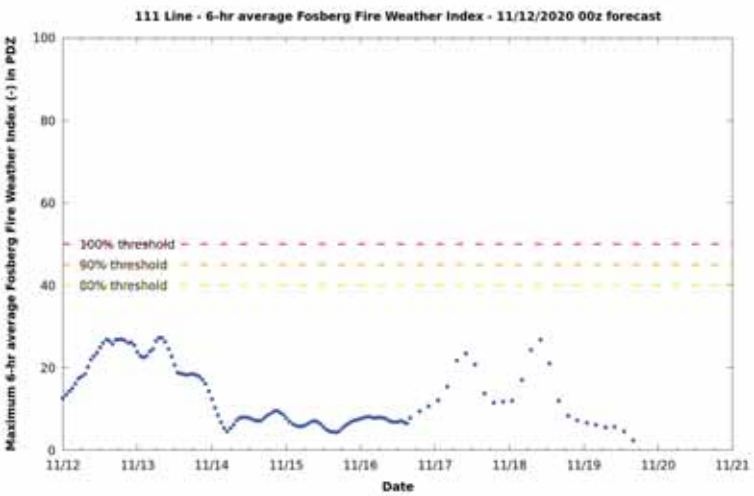
Liberty Utilities Energy Release Component Forecast for 11/12/20 - 11/18/20

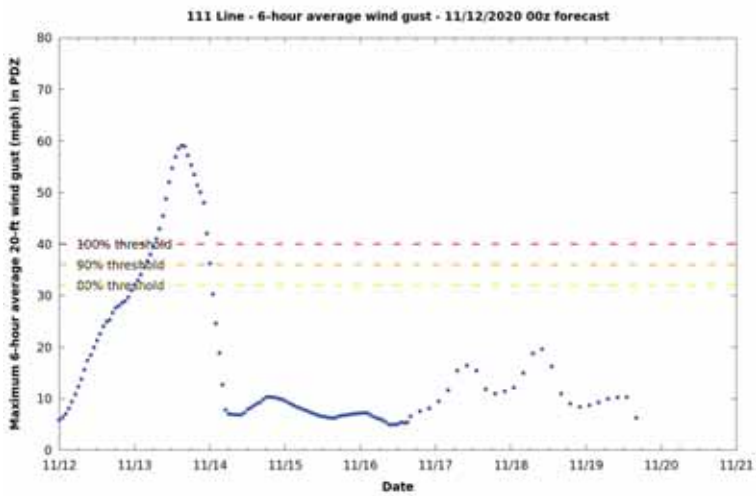
Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	42.0	39.0	33.0	34.0	31.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

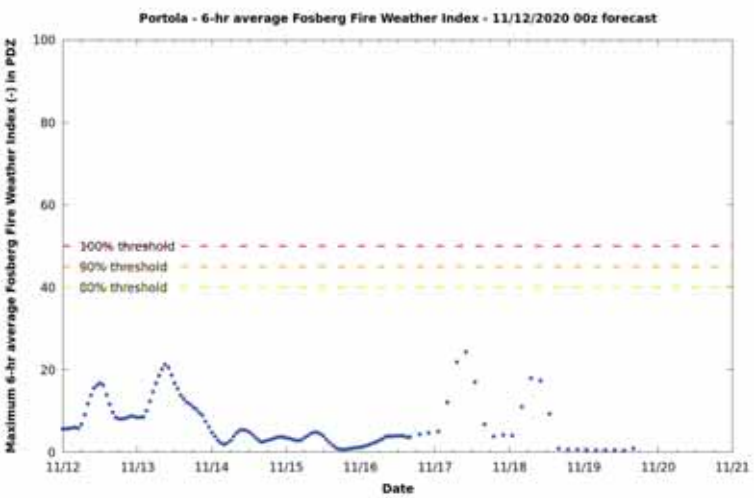
Liberty Utilities Fire Weather Summary Plots - 11/12/2020 00z forecast

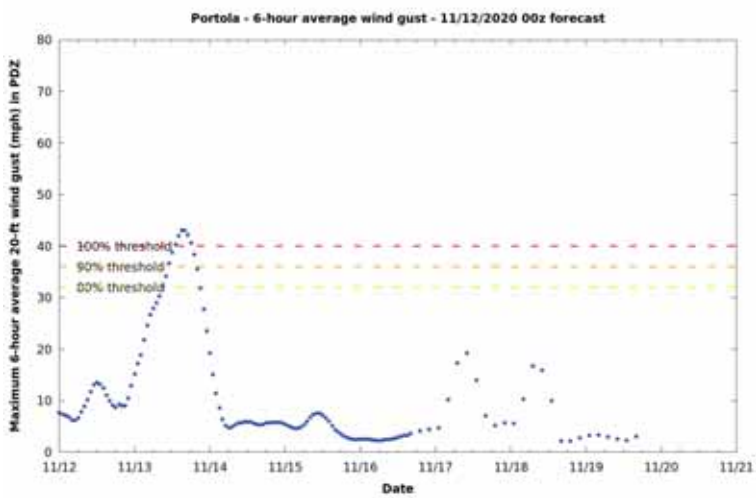
111 Line



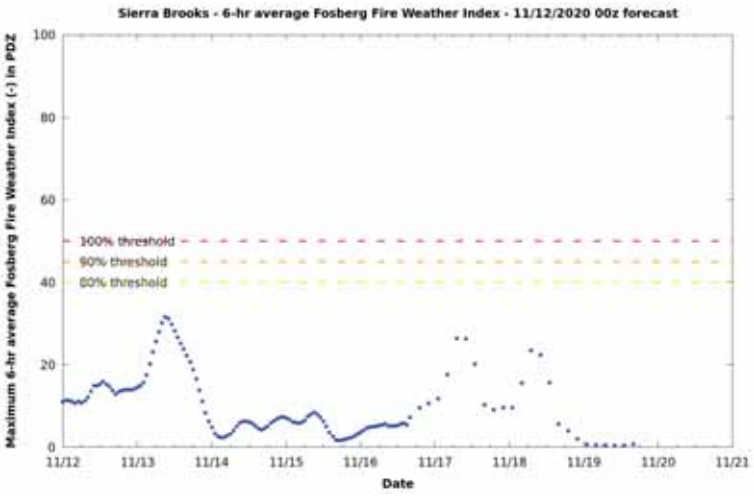


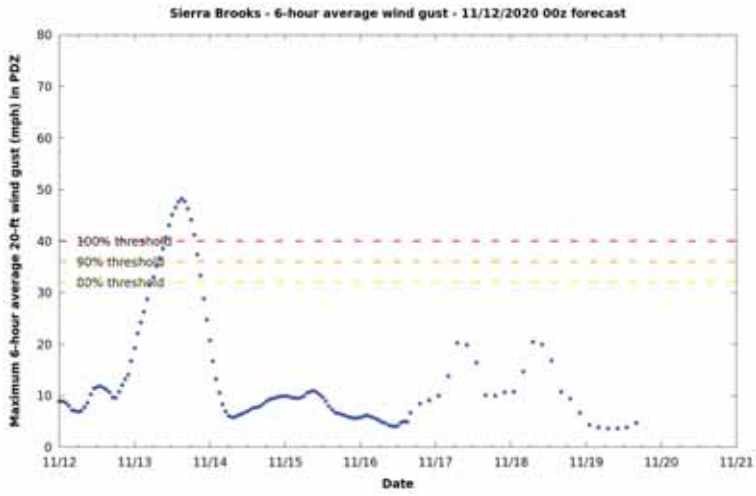
Portola



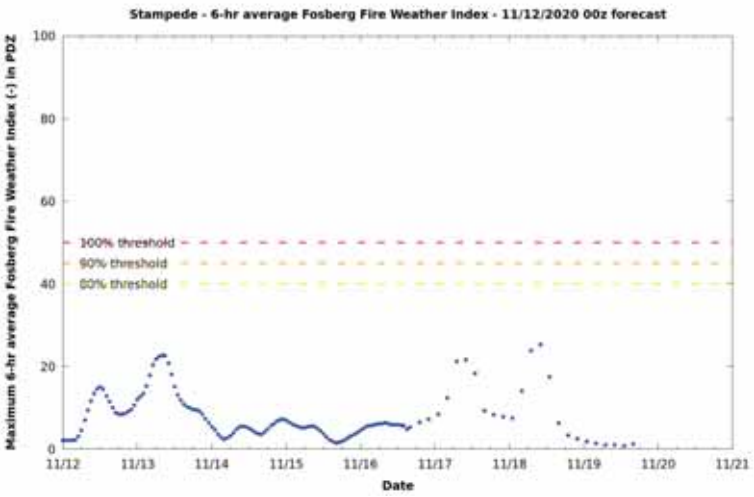


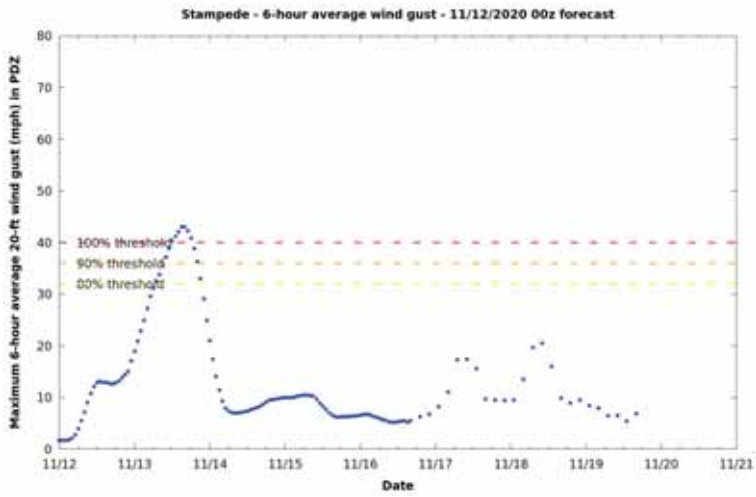
Sierra Brooks



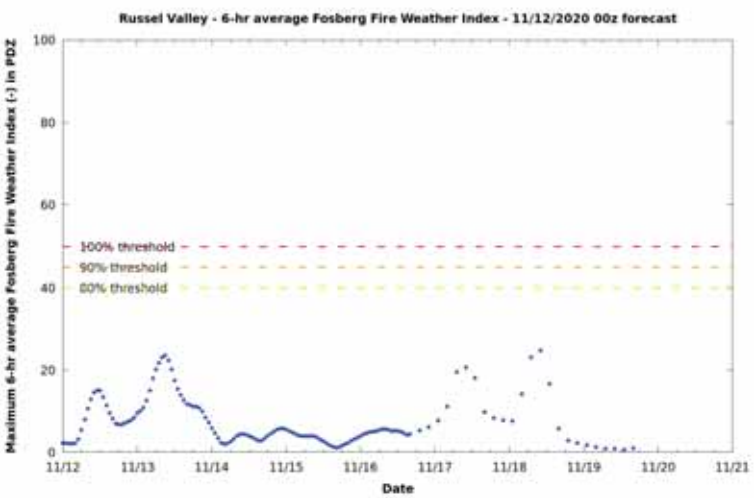


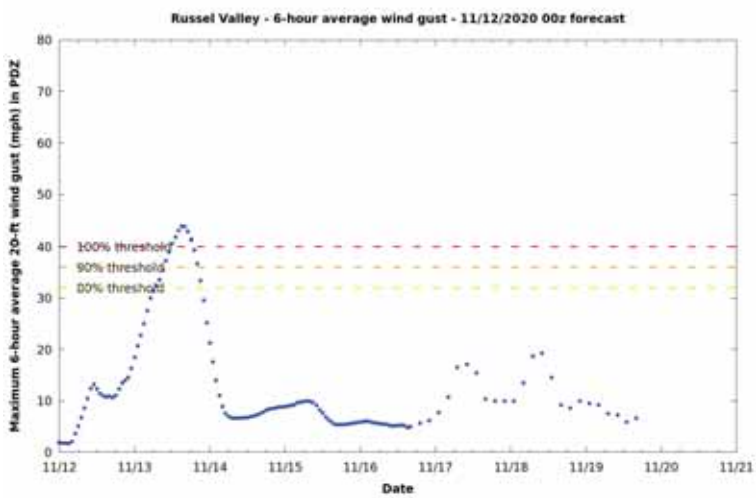
Stampede



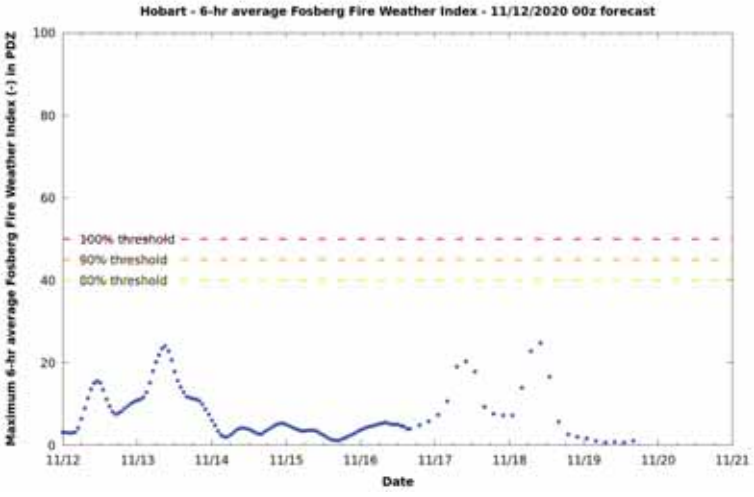


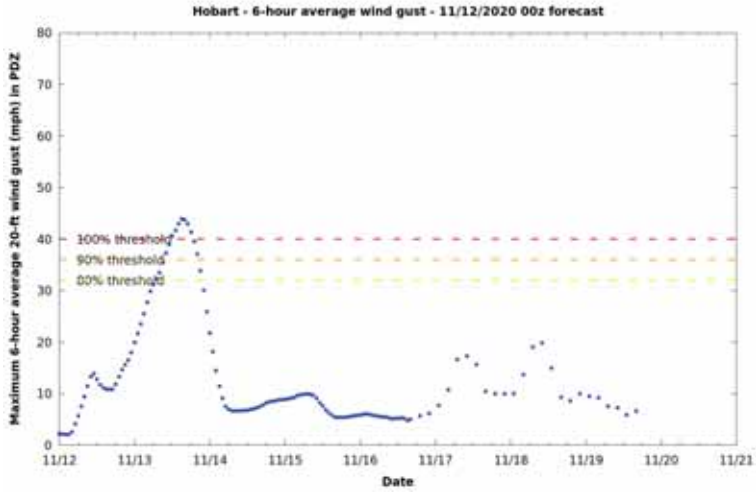
Russell Valley



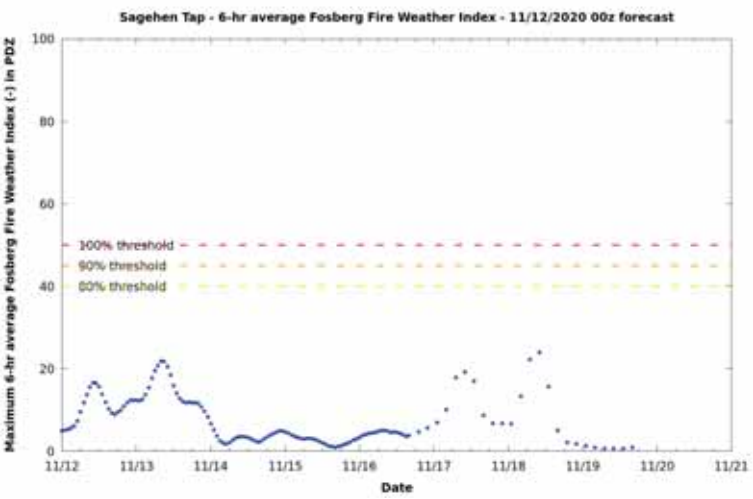


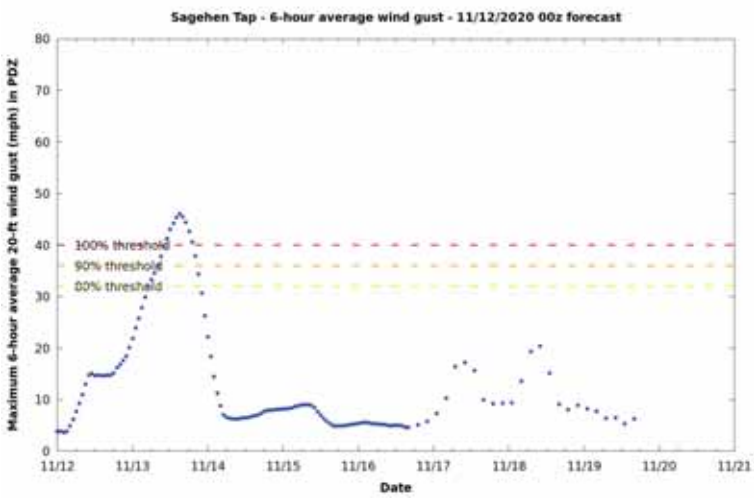
Hobart



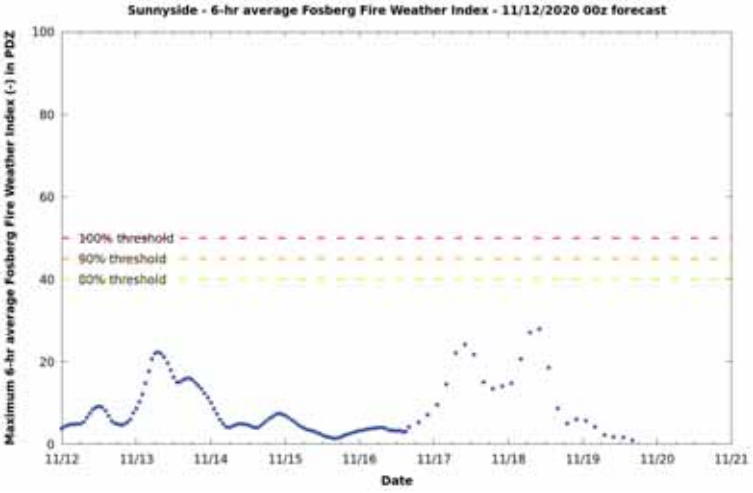


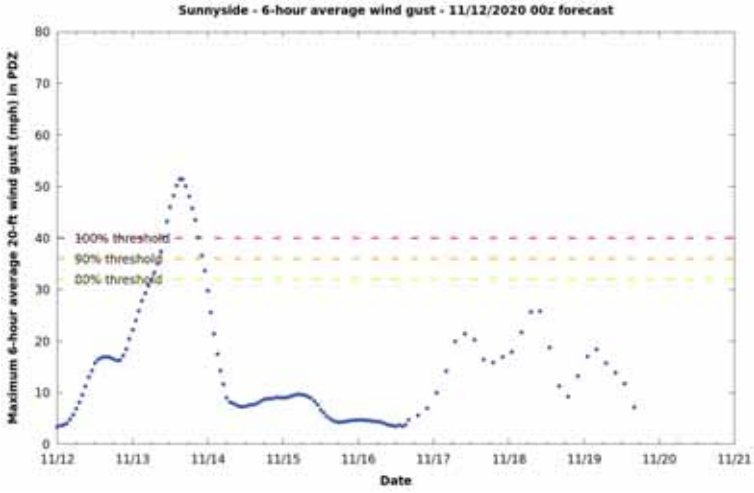
Sagehen tap



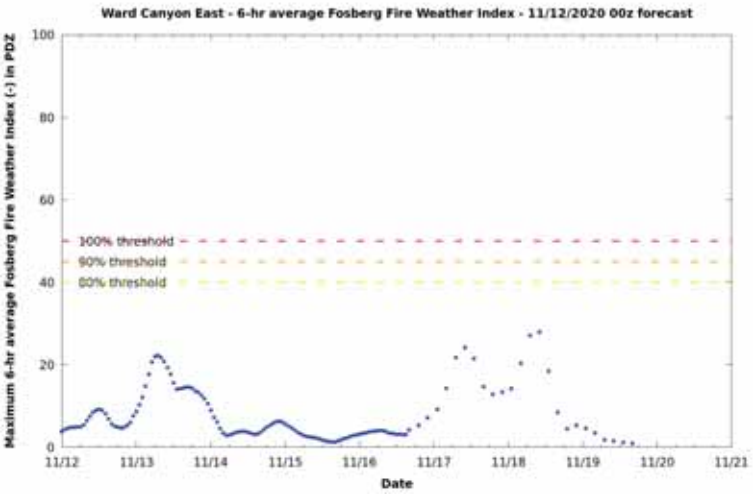


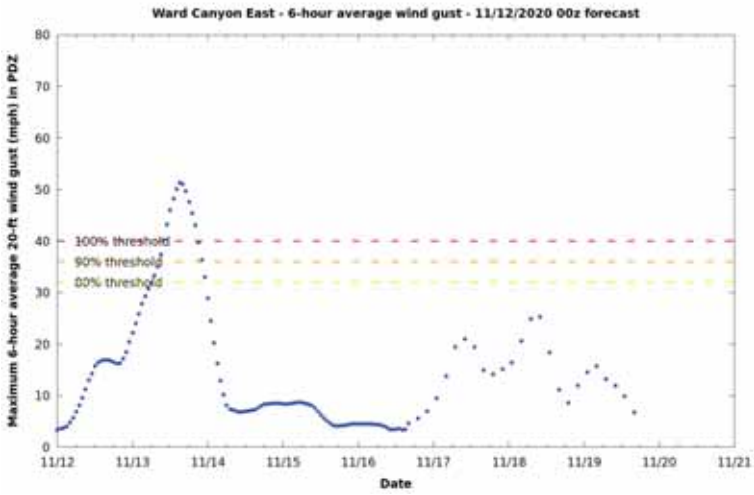
Sunnyside



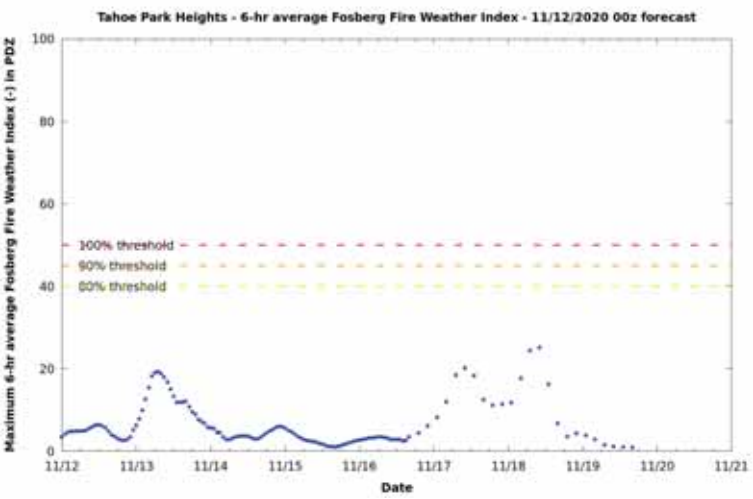


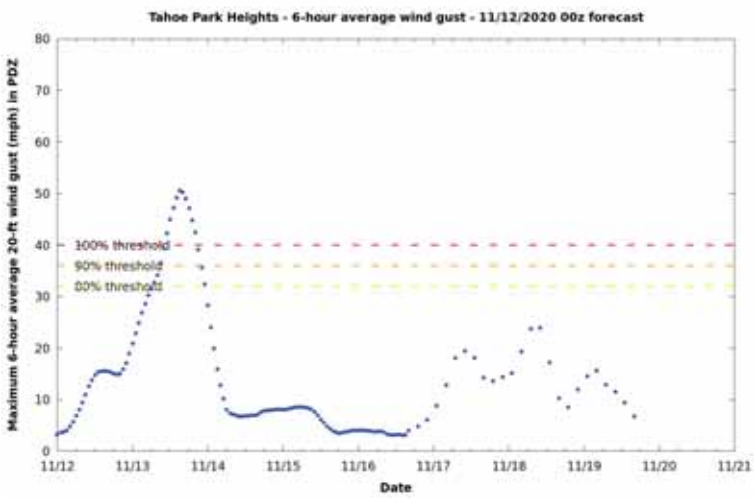
Ward Canyon East



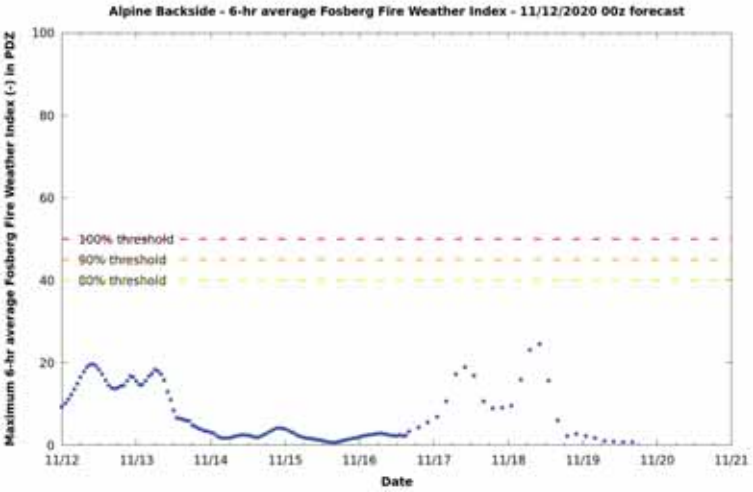


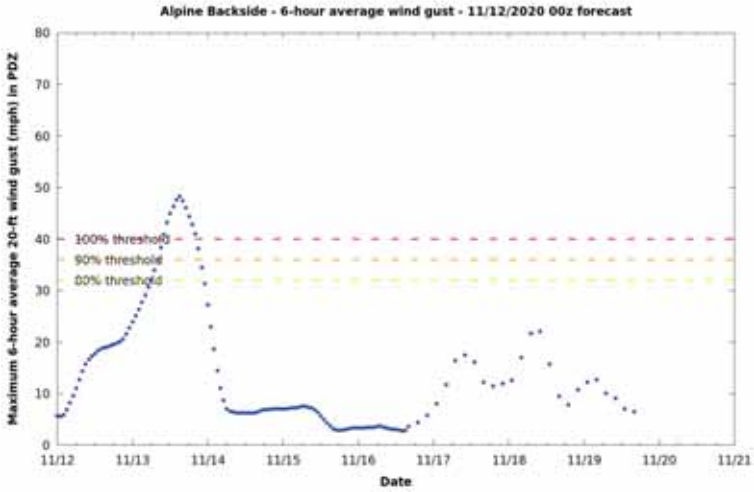
Tahoe Park Heights



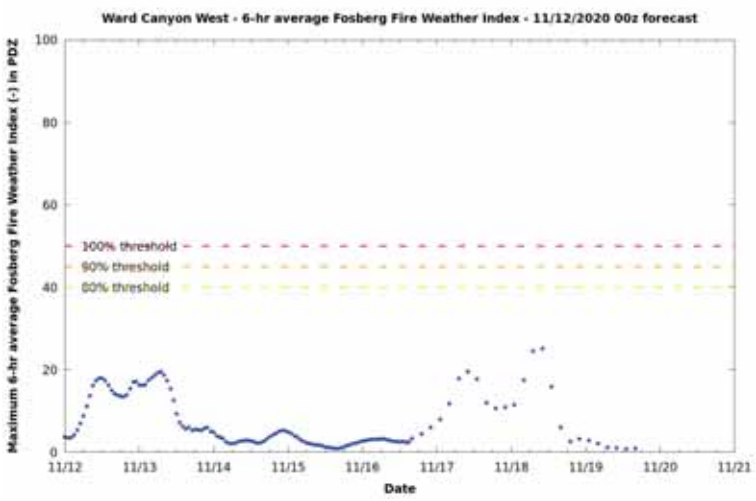


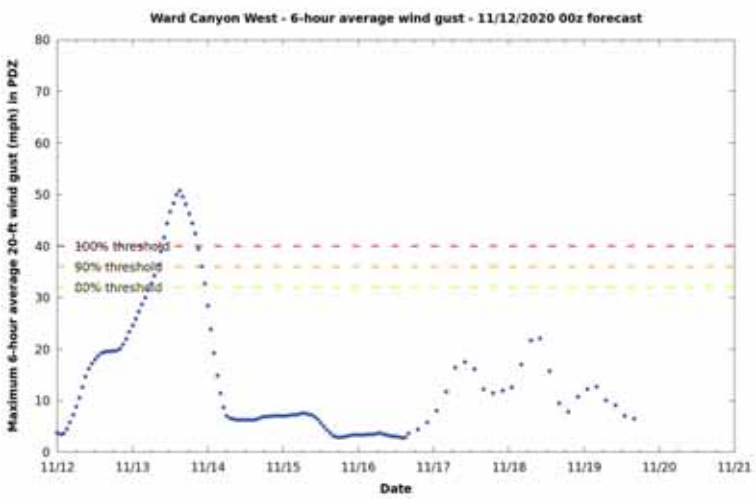
Alpine Backside



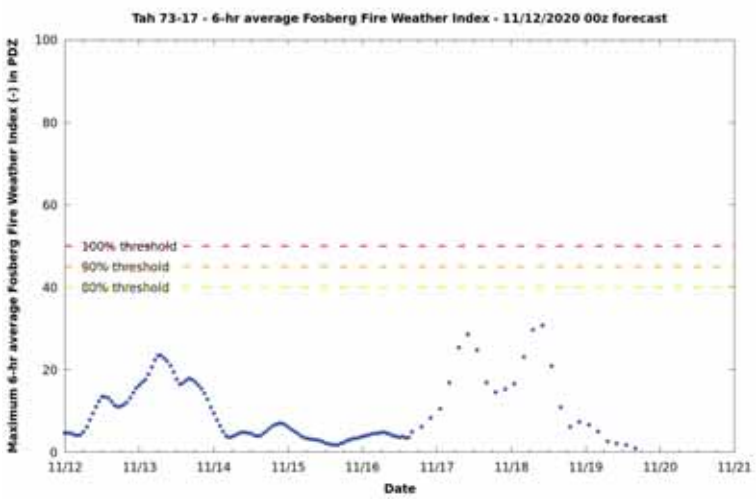


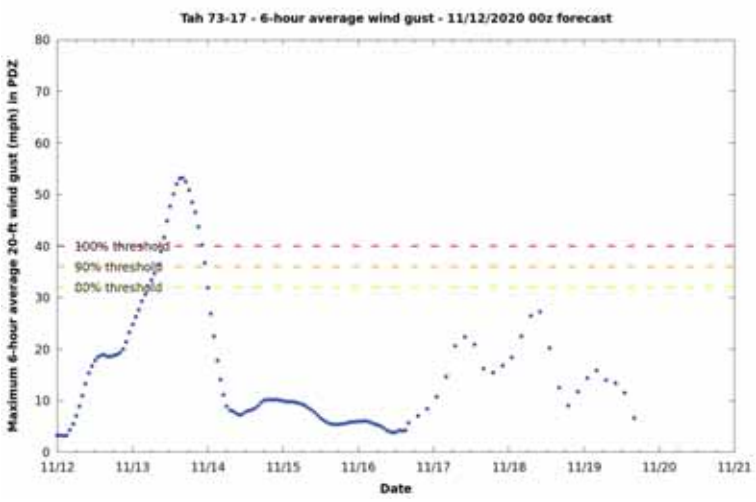
Ward Canyon West



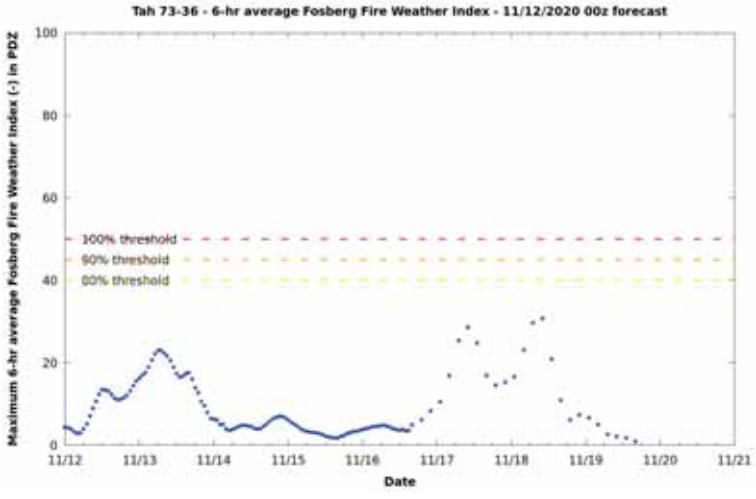


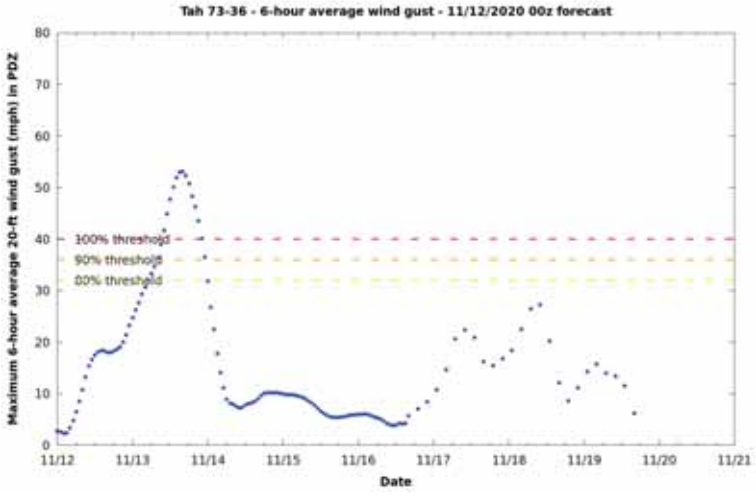
Tah 73-17



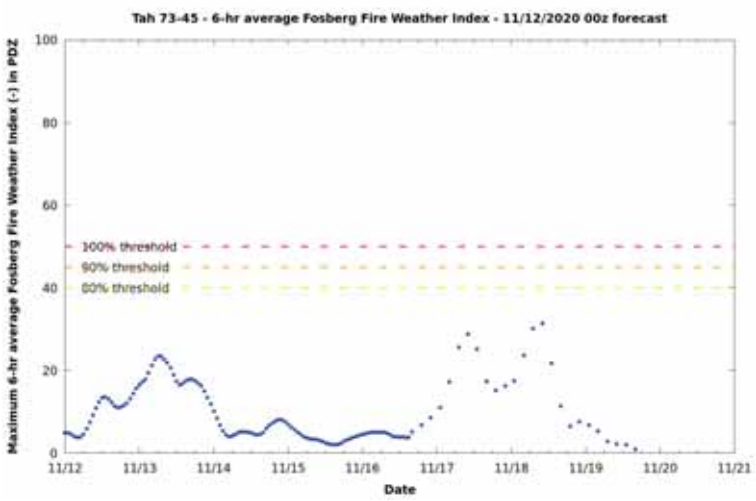


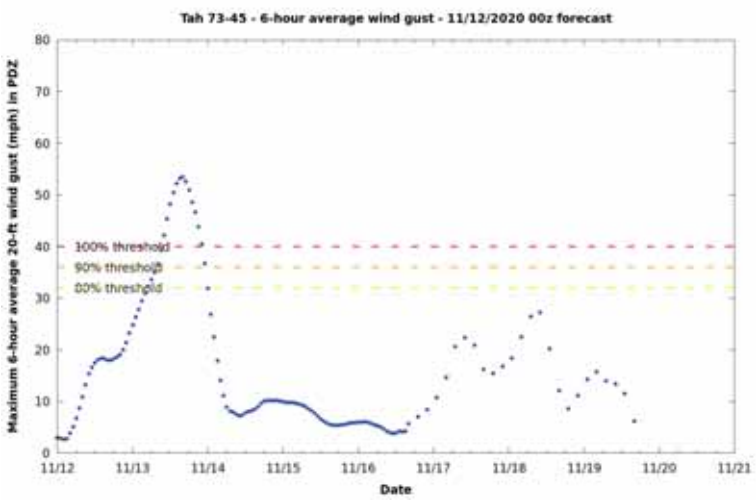
Tah 73-36



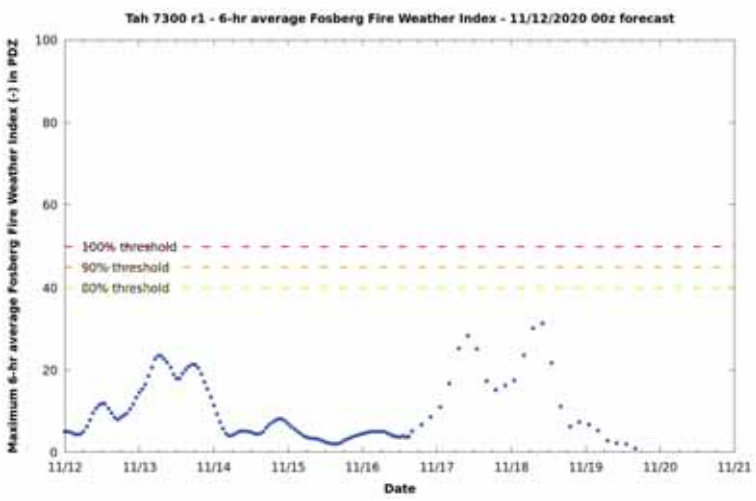


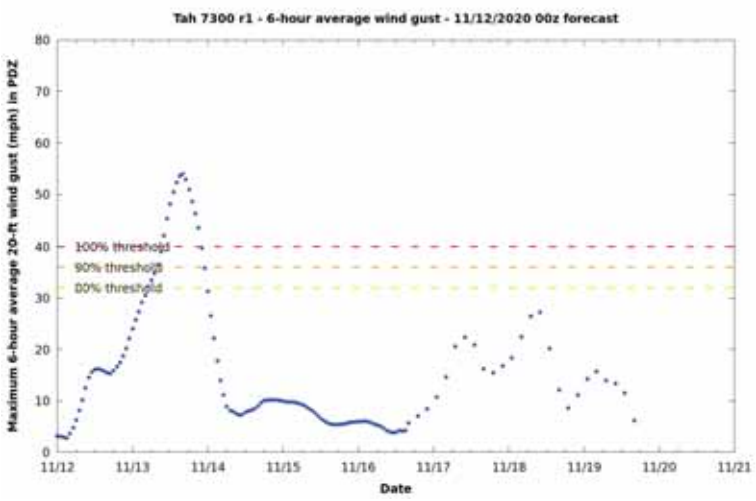
Tah 73-45



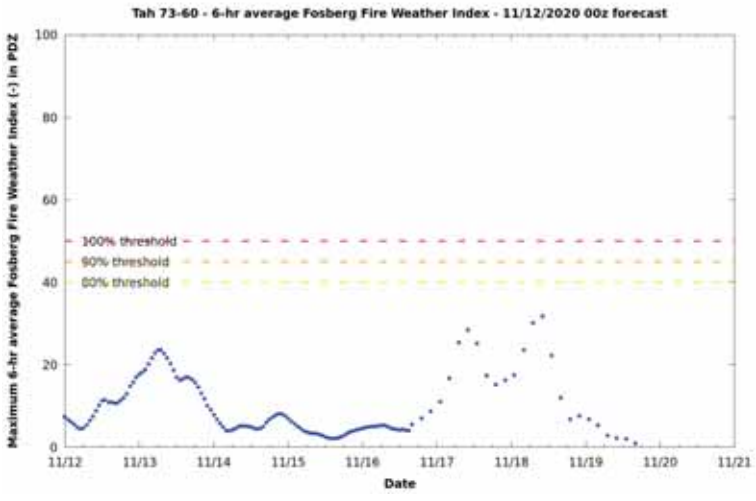


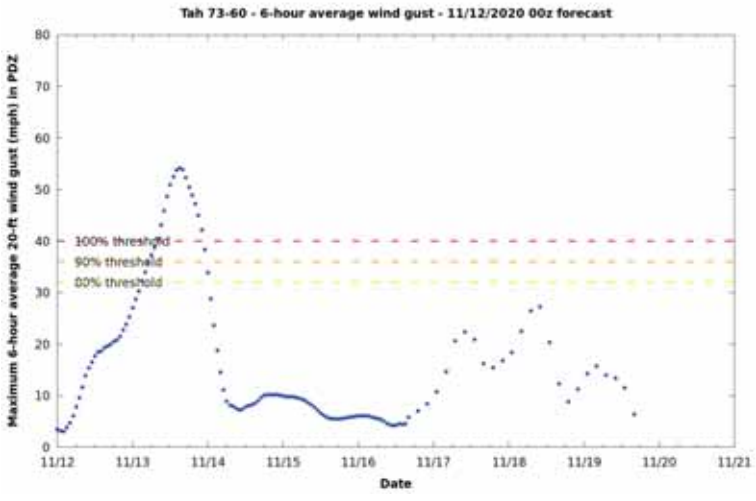
Tah 7300 r1



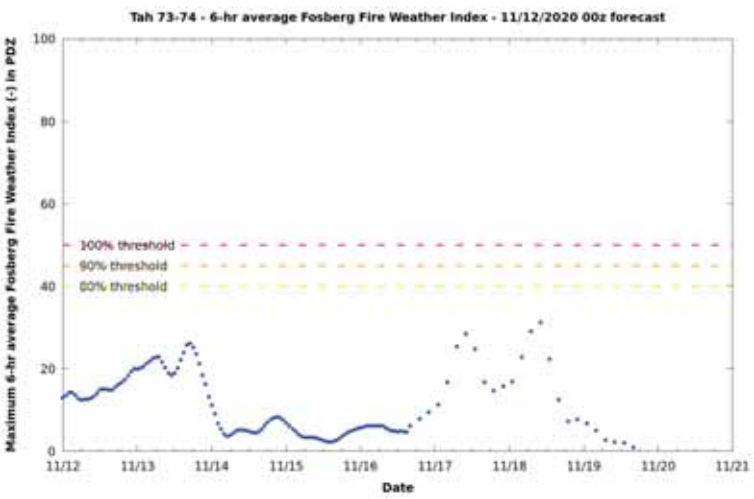


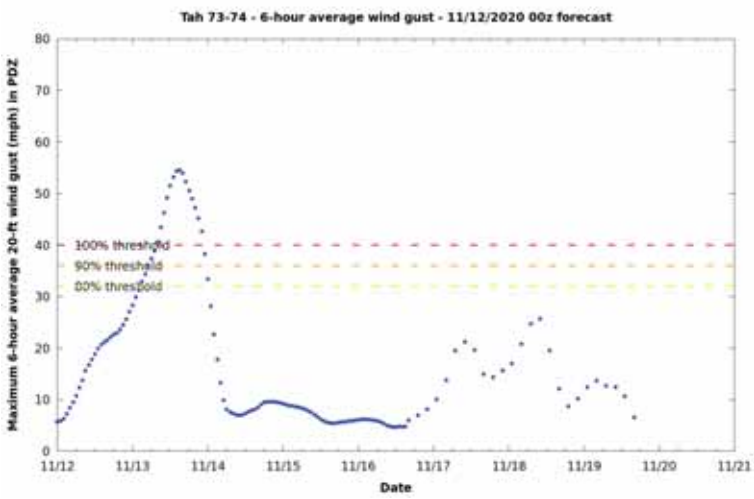
Tah 73-60



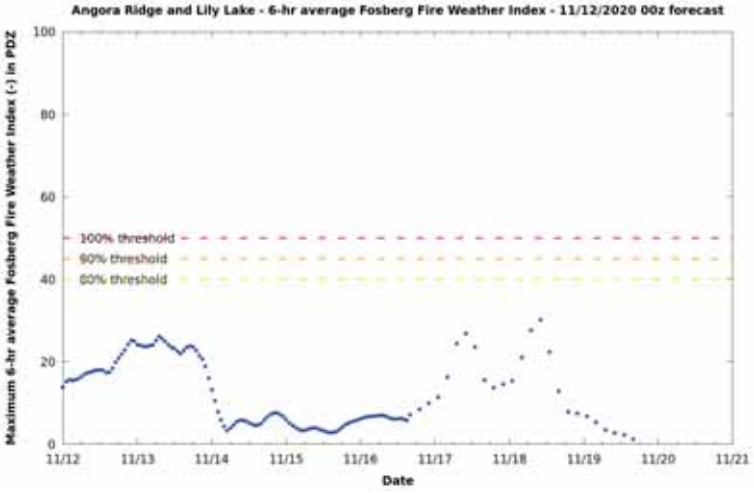


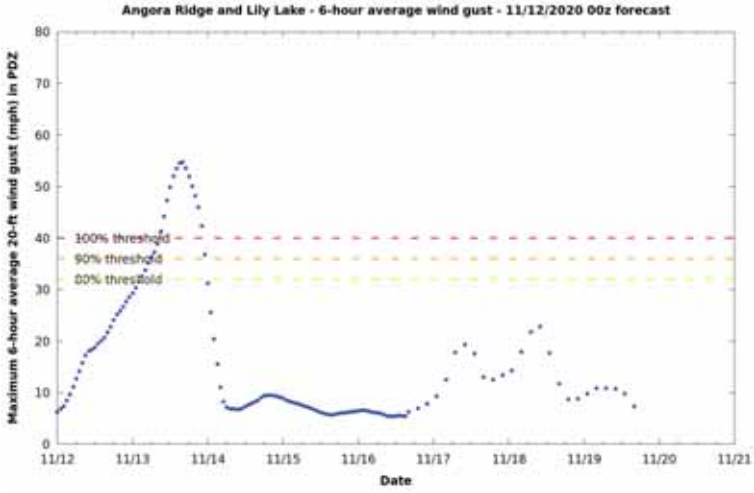
Tah 73-74



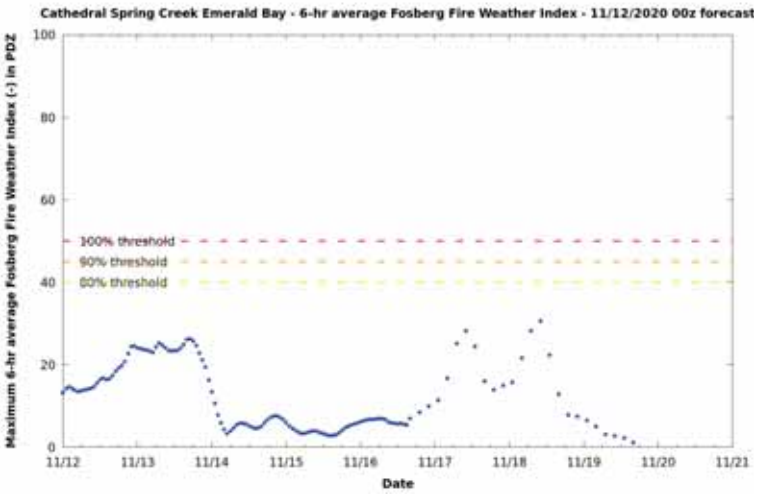


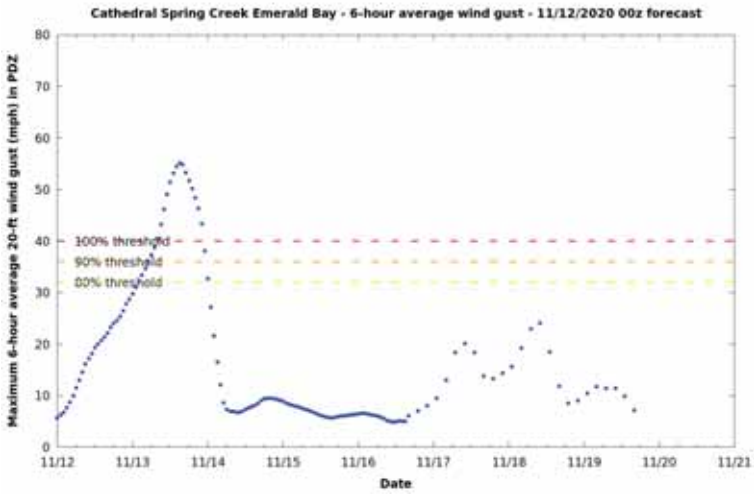
Angora Ridge and Lily Lake



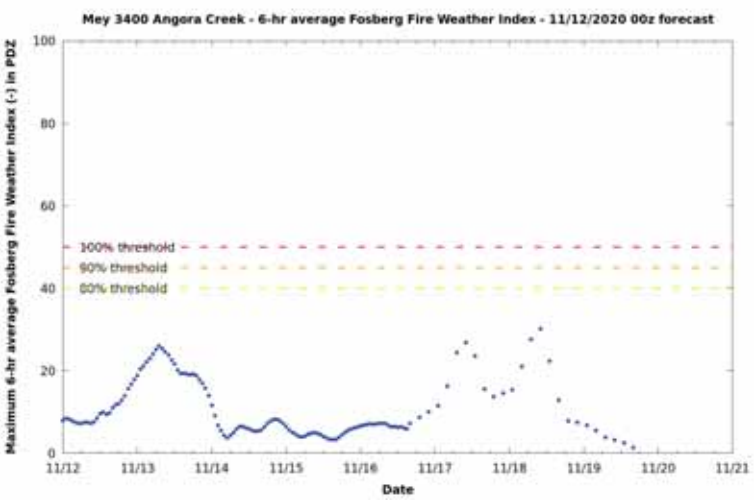


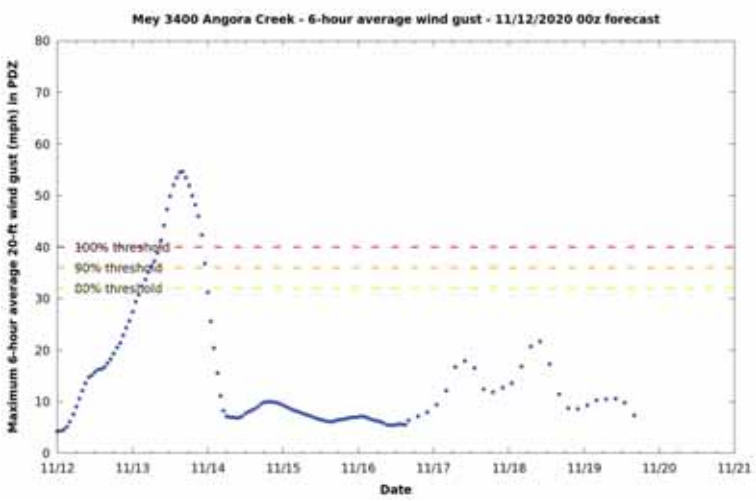
Cathedral Spring Creek Emerald Bay



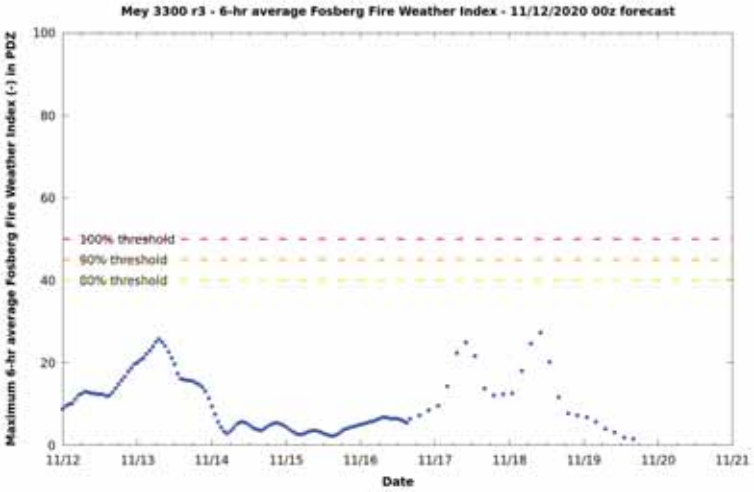


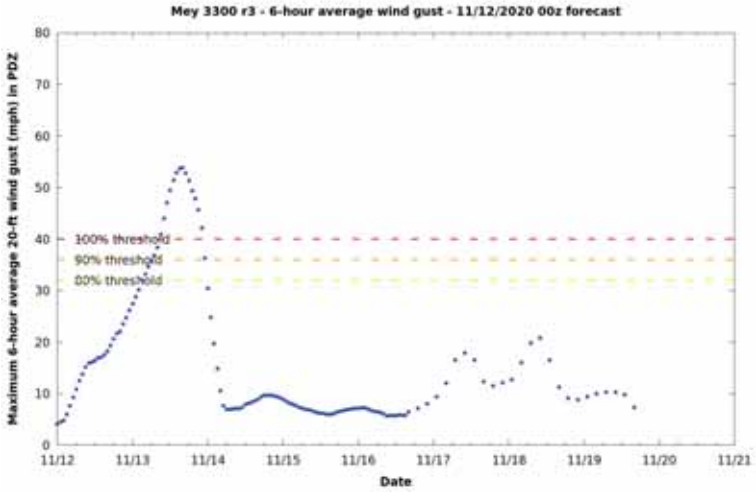
Mey 3400 Angora Creek



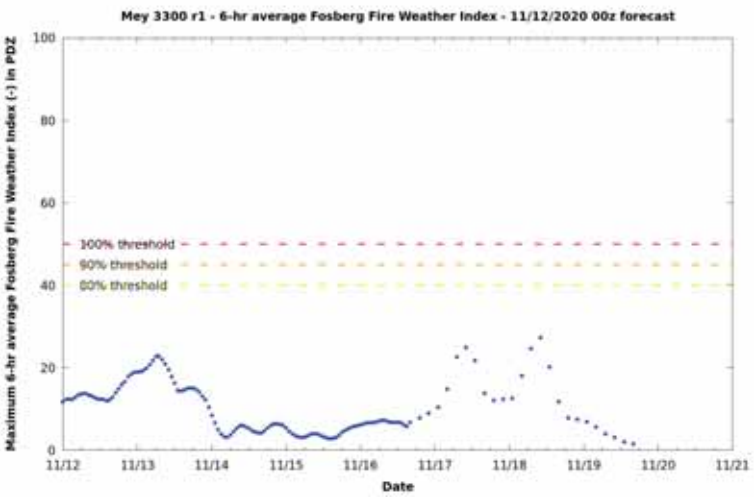


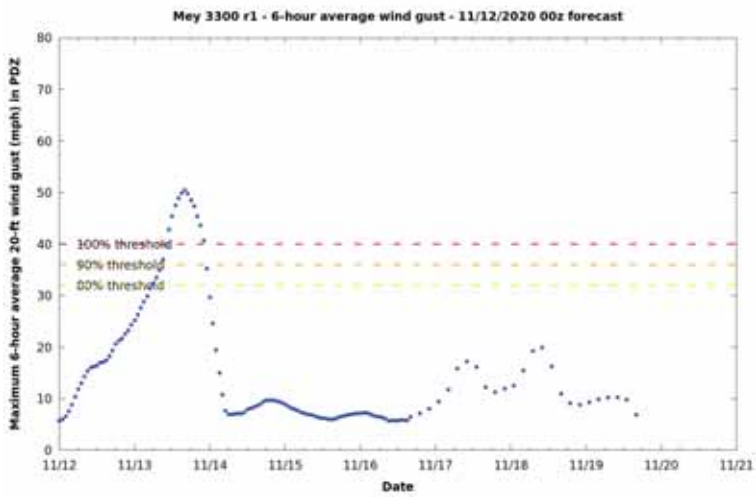
Mey 3300 r3



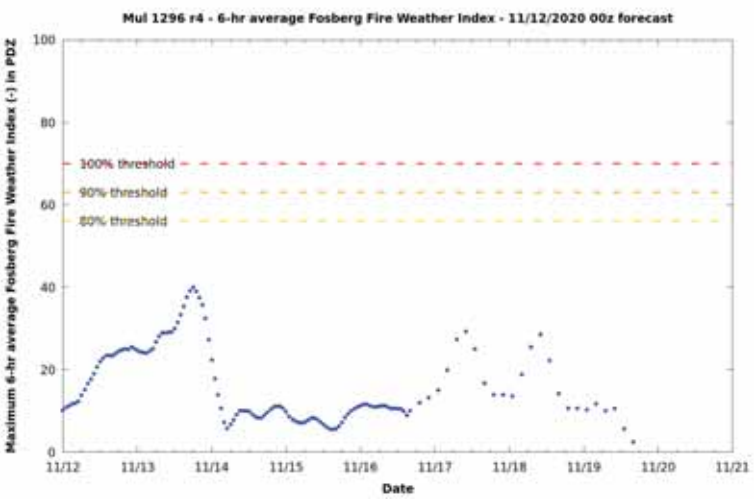


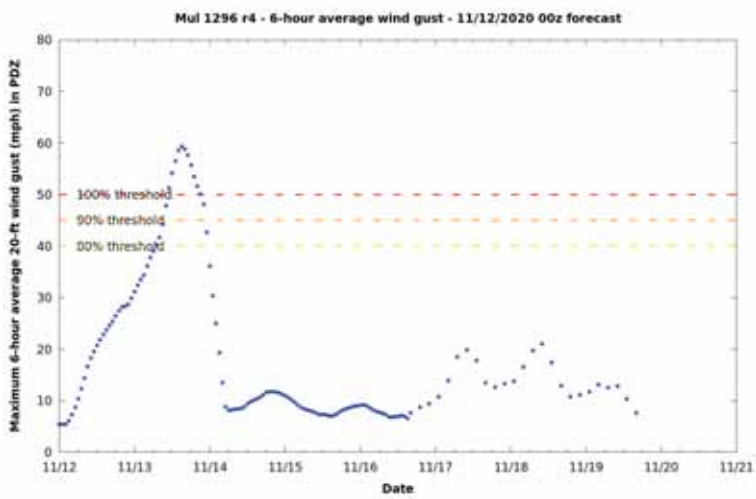
Mey 3300 r1





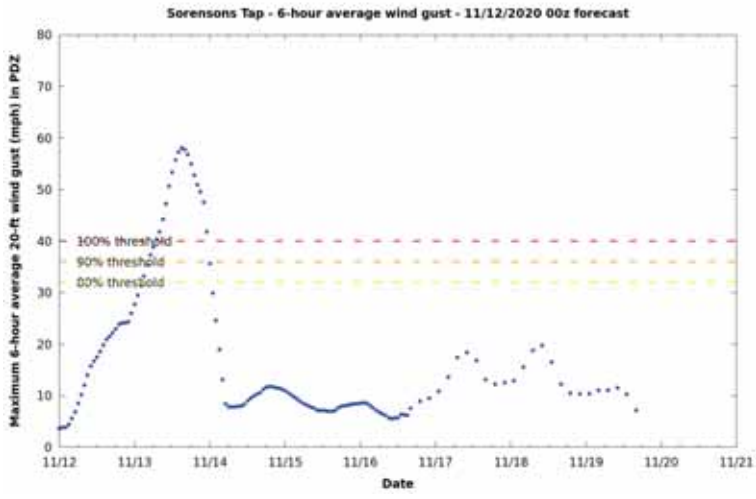
Mul 1296 r4



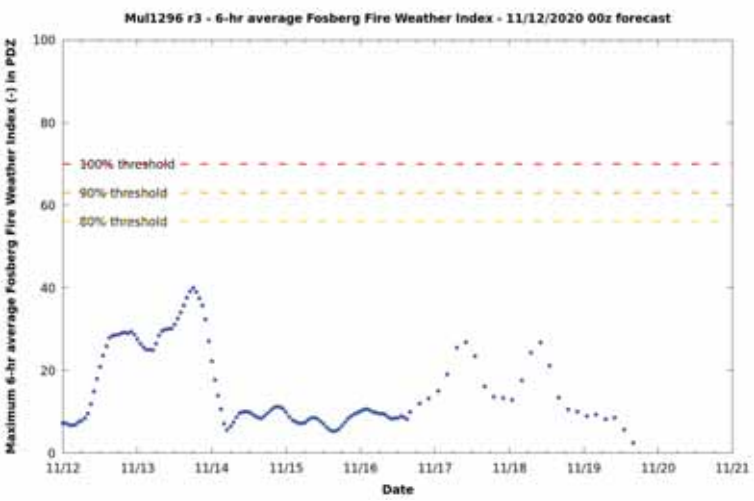


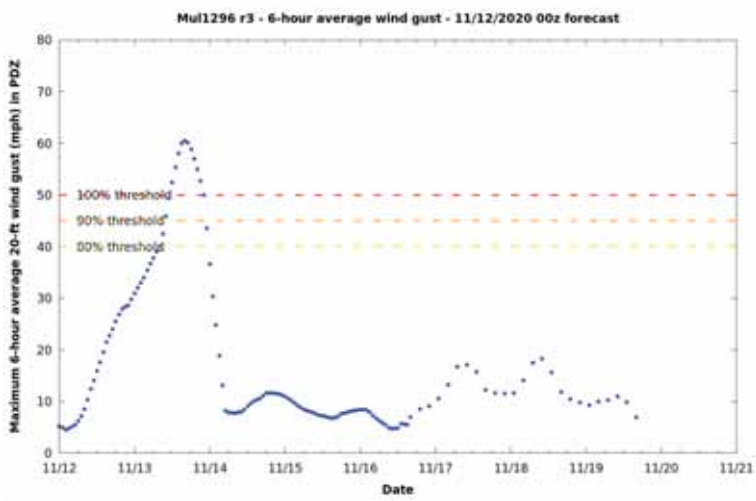
Sorensons Tap



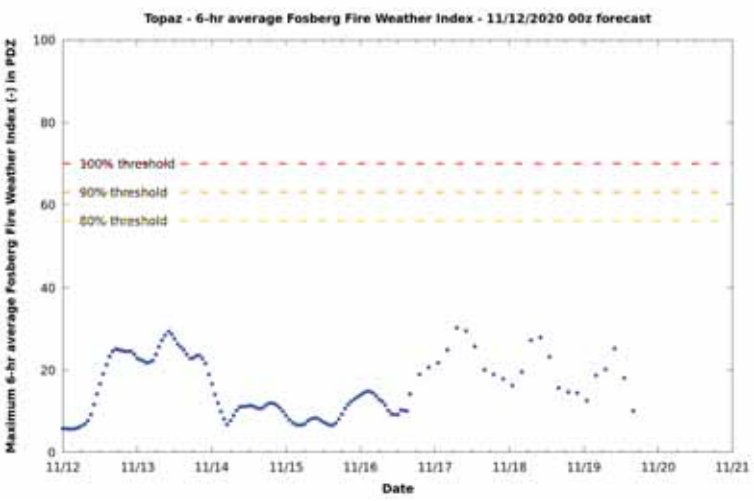


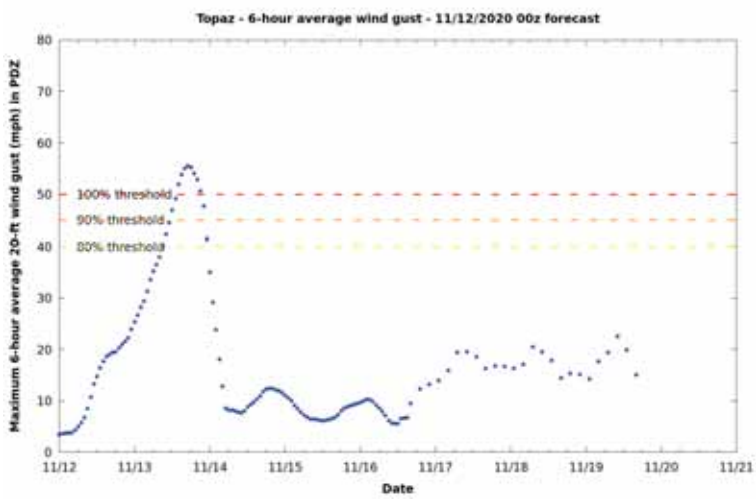
Mul 1296 r3



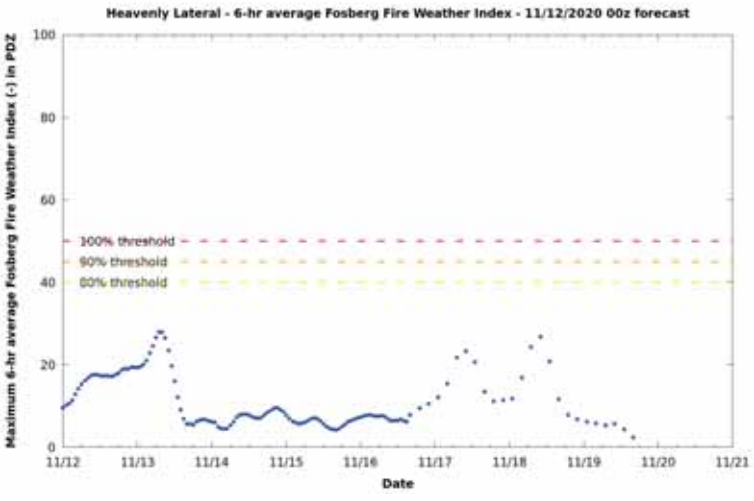


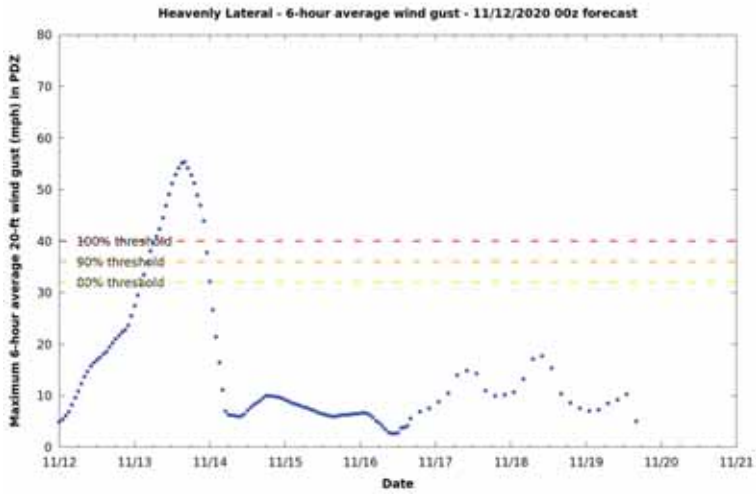
Topaz



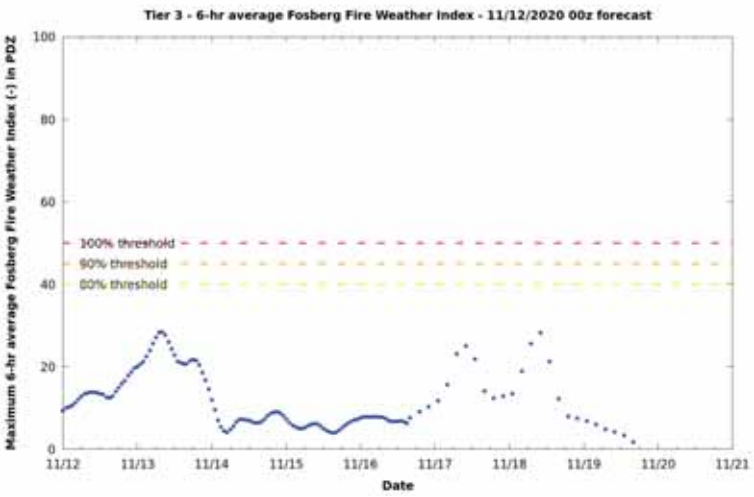


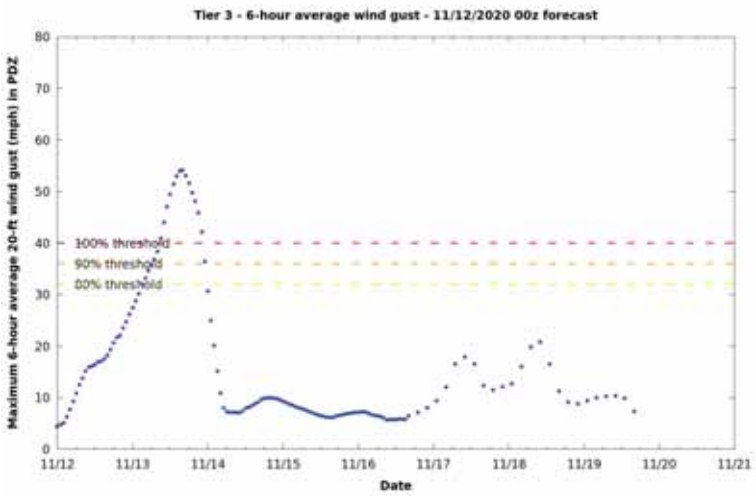
Heavenly Lateral



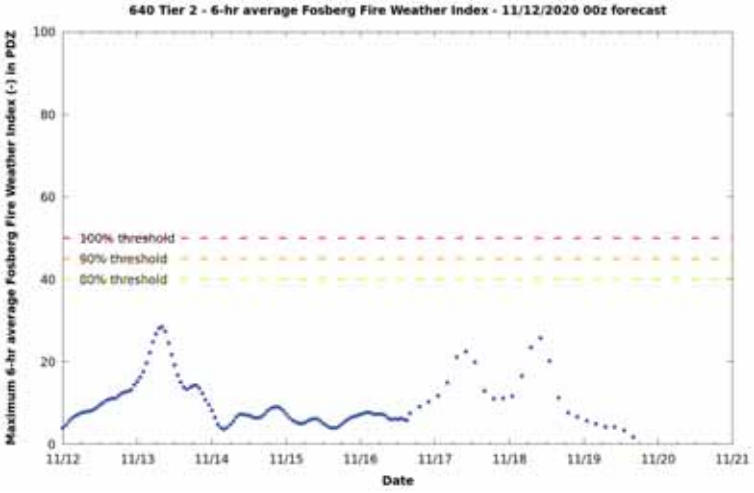


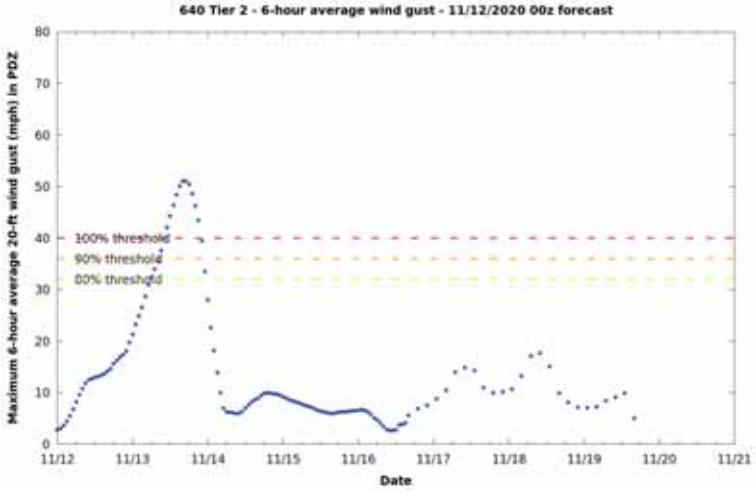
Tier 3



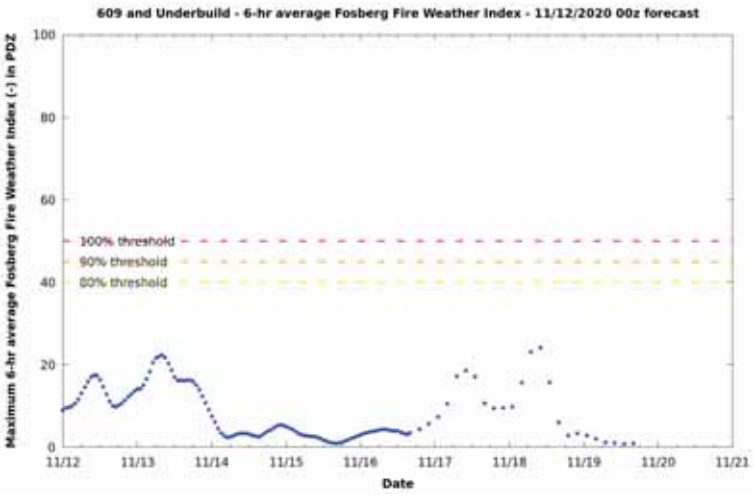


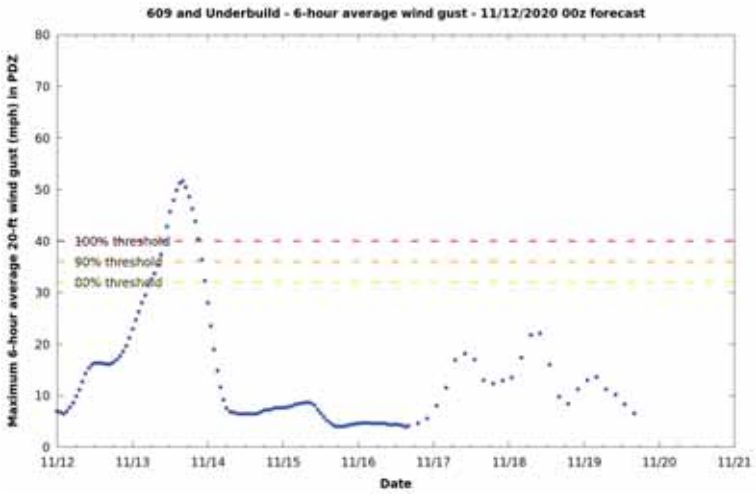
640 Tier 2



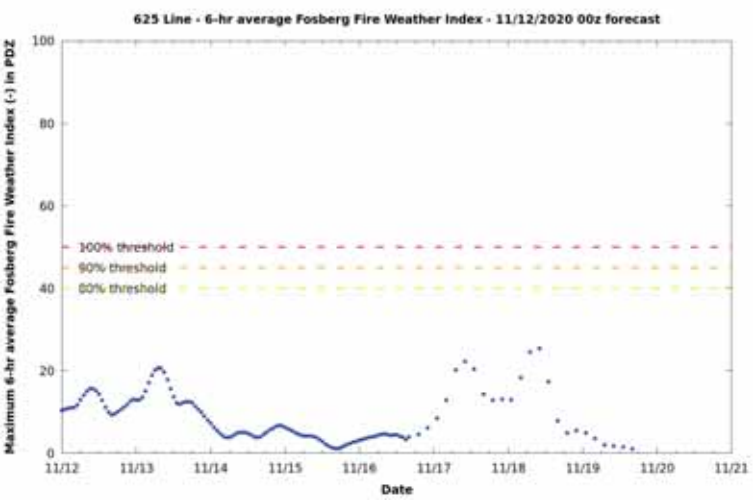


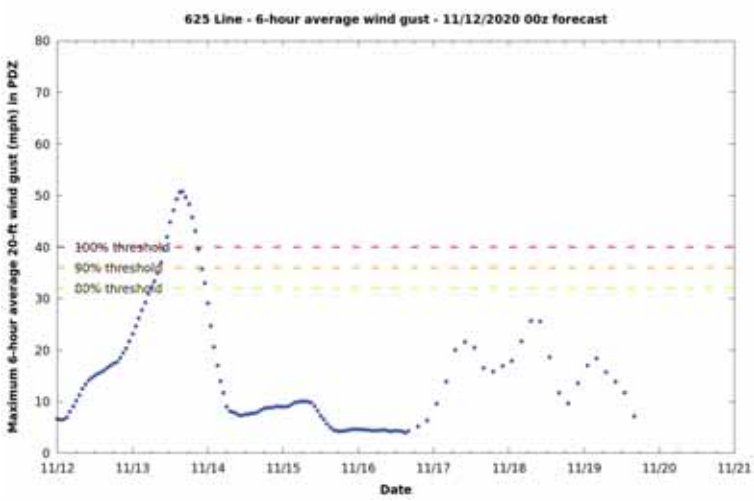
609 and Underbuild



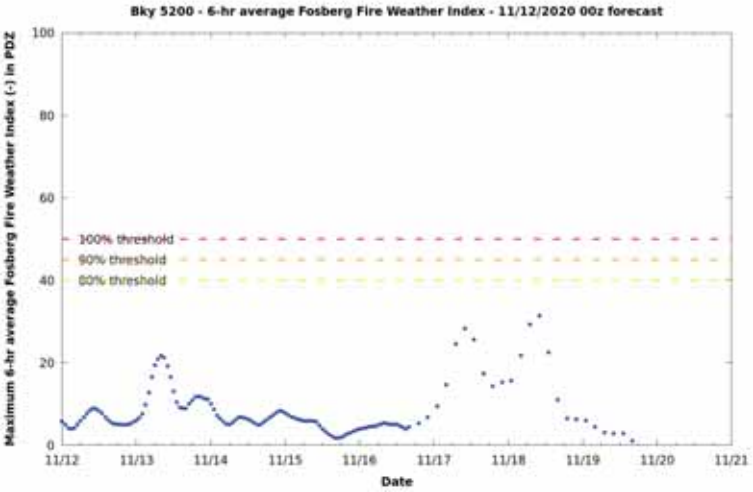


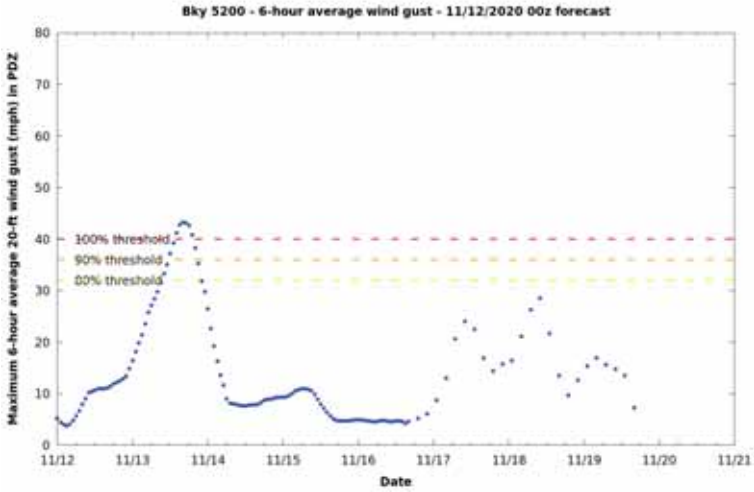
625 Line



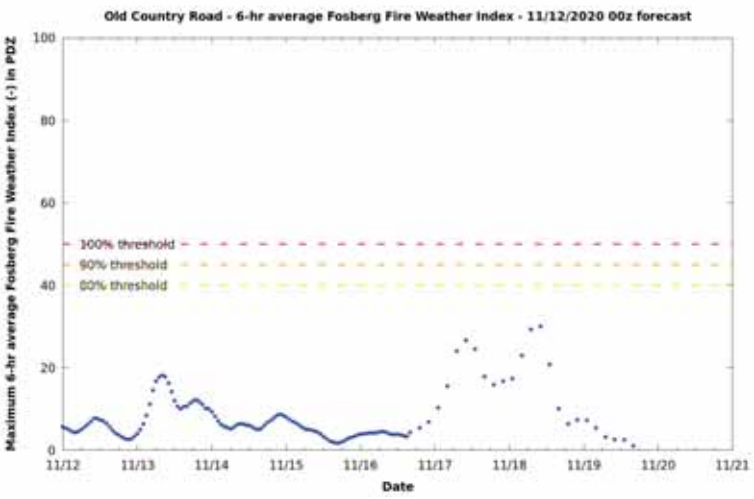


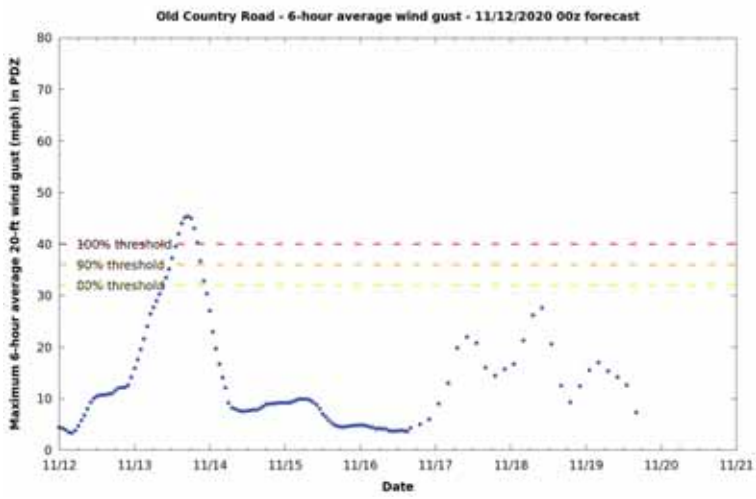
Bky 5200



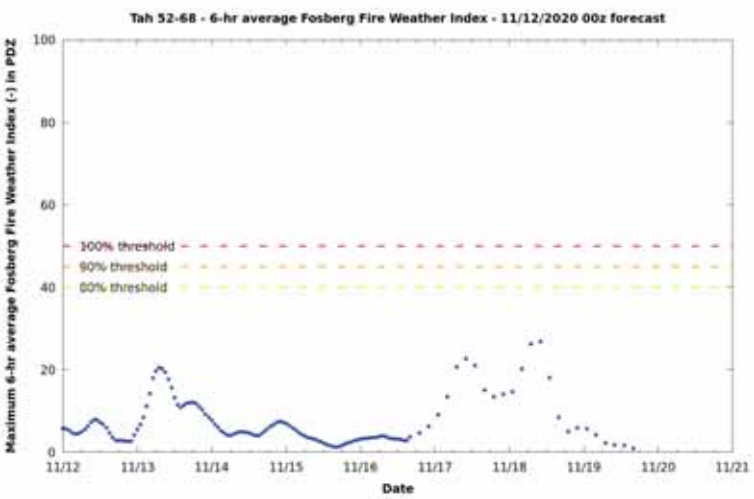


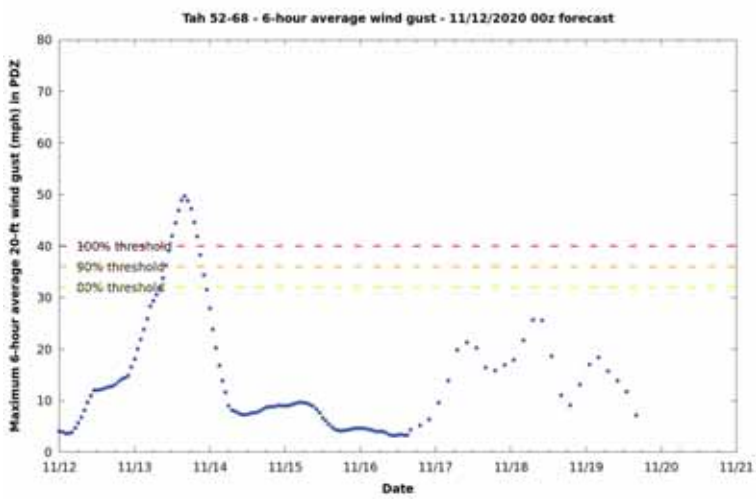
Old Country Road



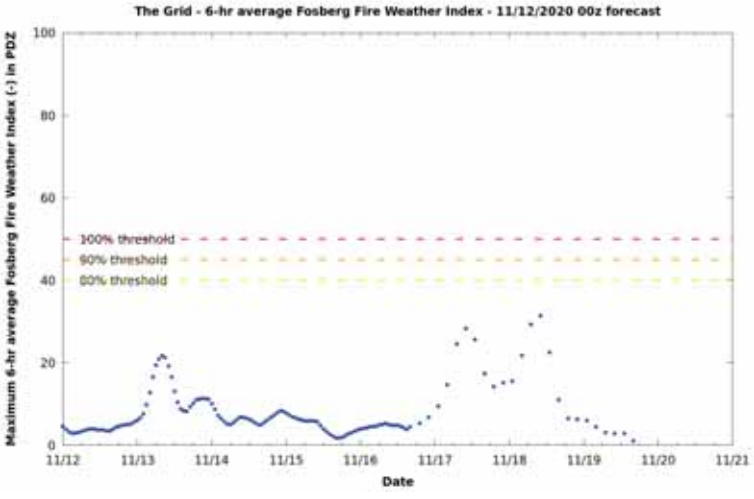


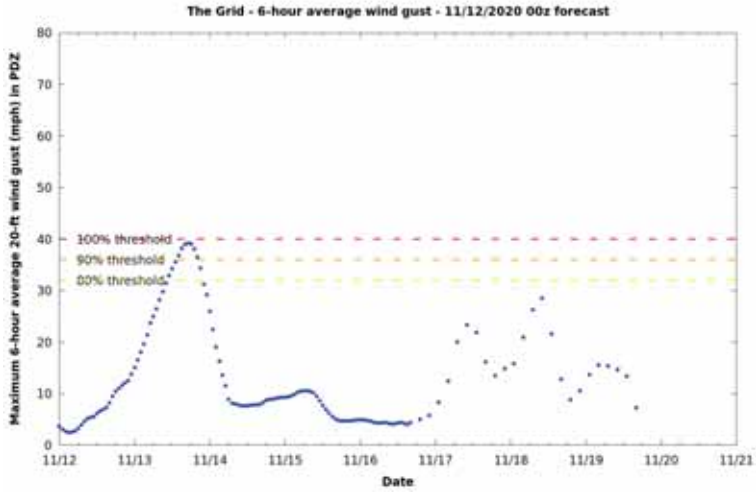
Tah 52-68



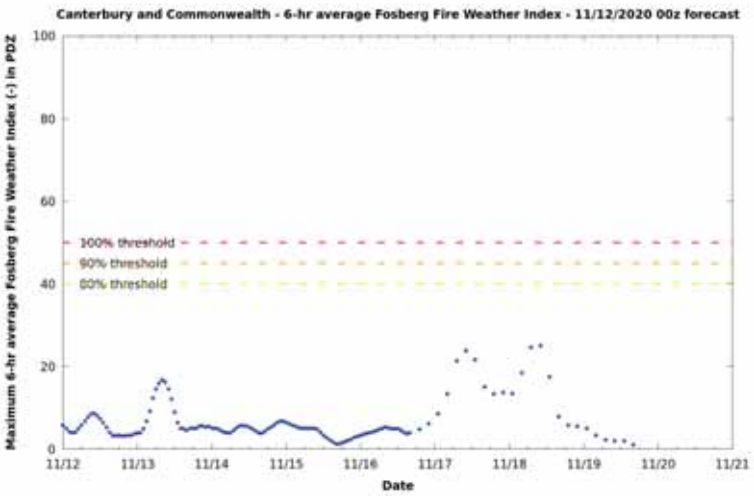


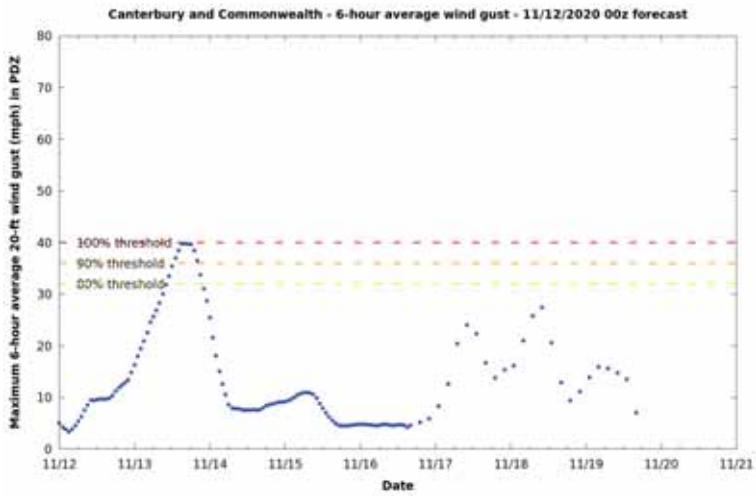
The Grid



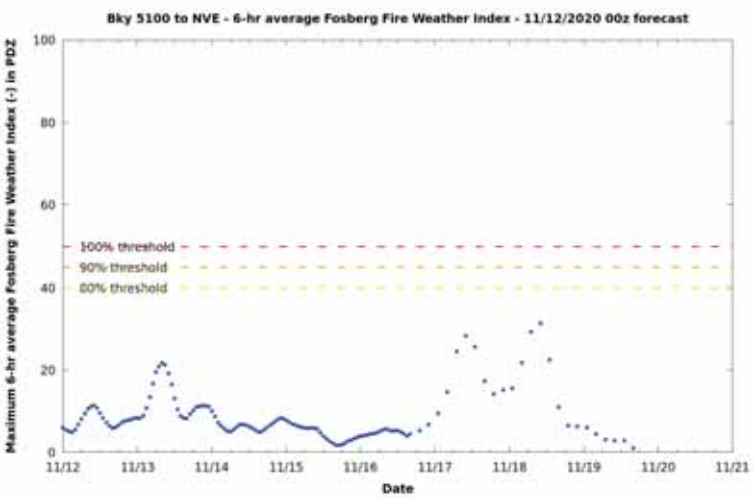


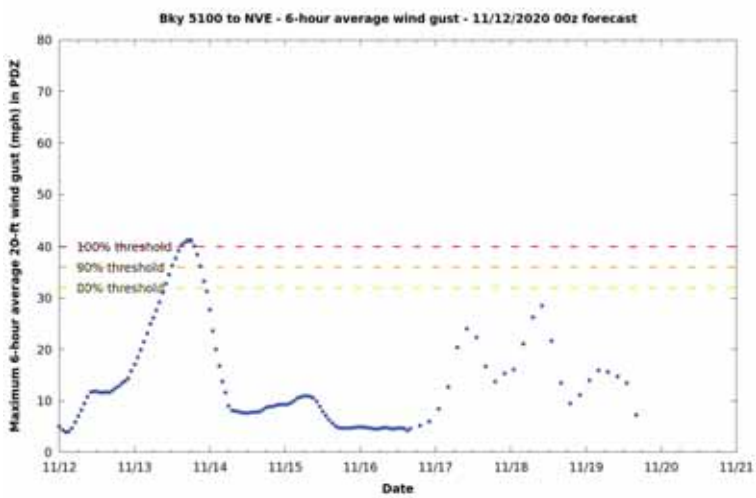
Canterbuy and Commonwealth



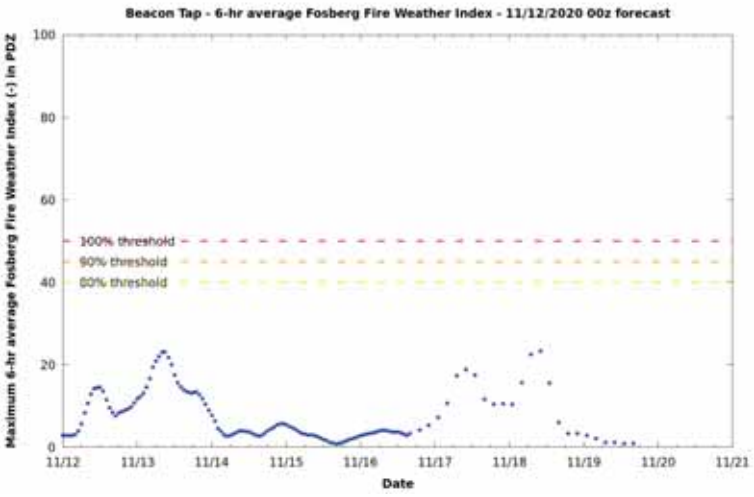


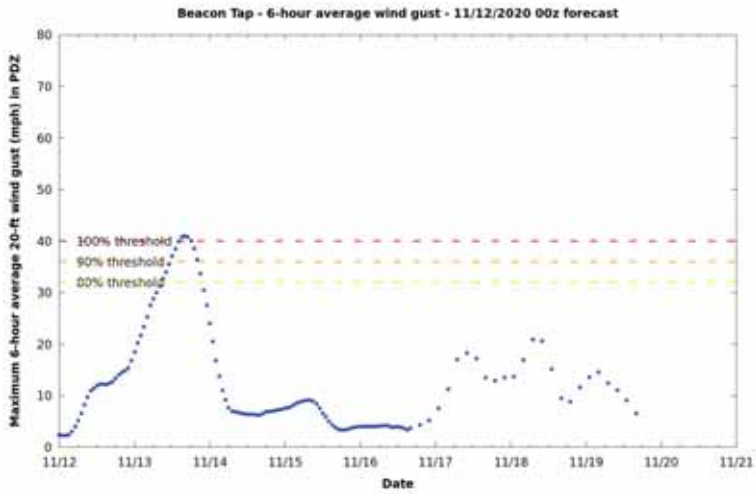
Bky 5100 to NVE



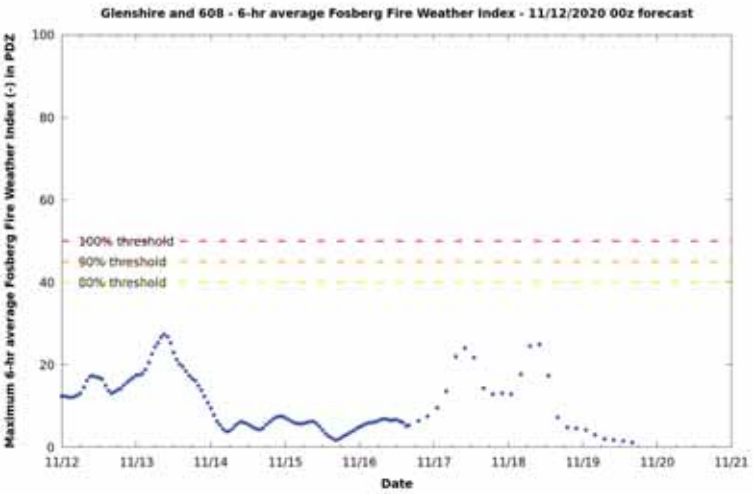


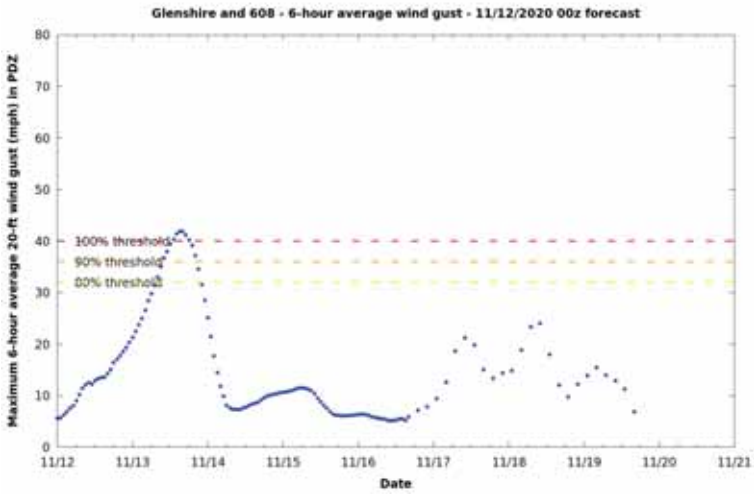
Beacon Tap



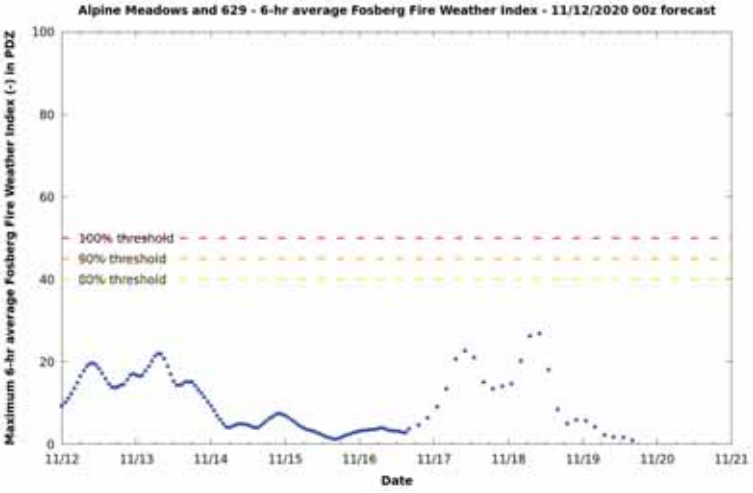


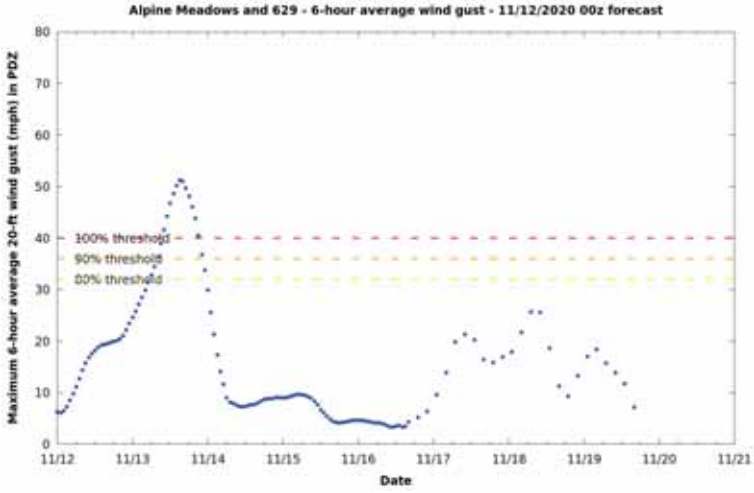
Glenshire and 608



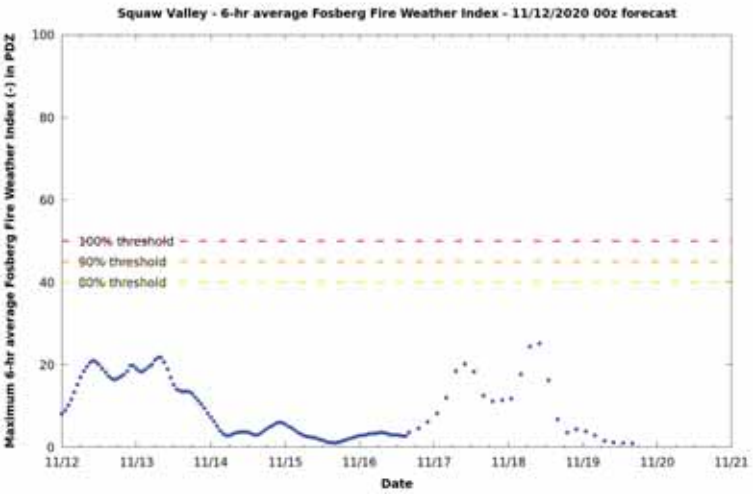


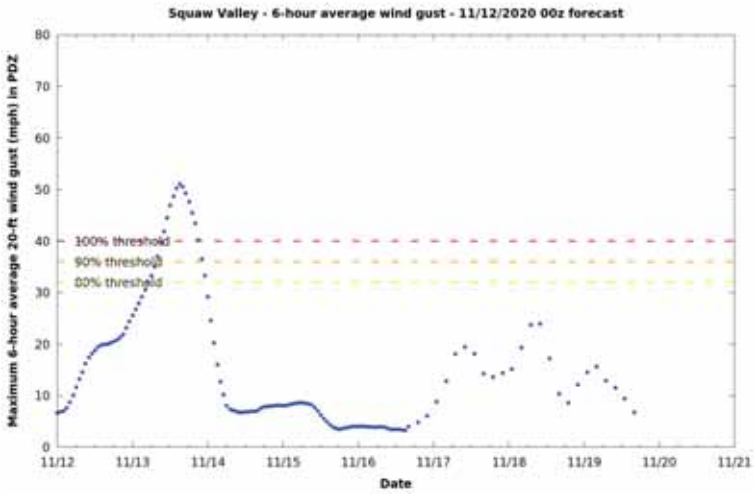
Alpine Meadows and 629



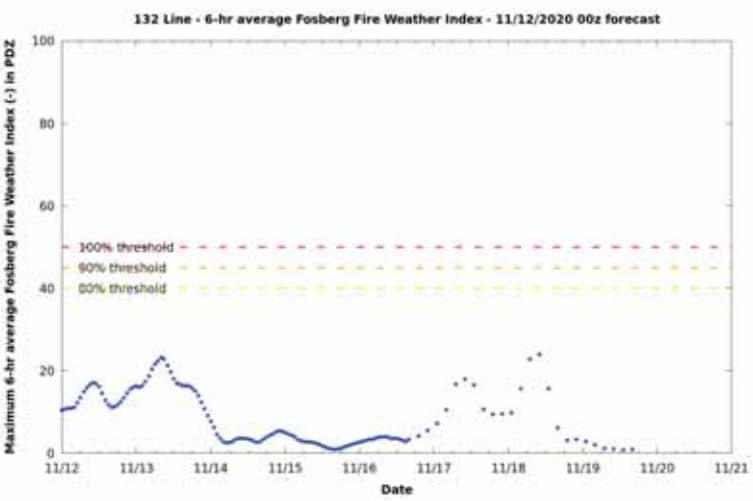


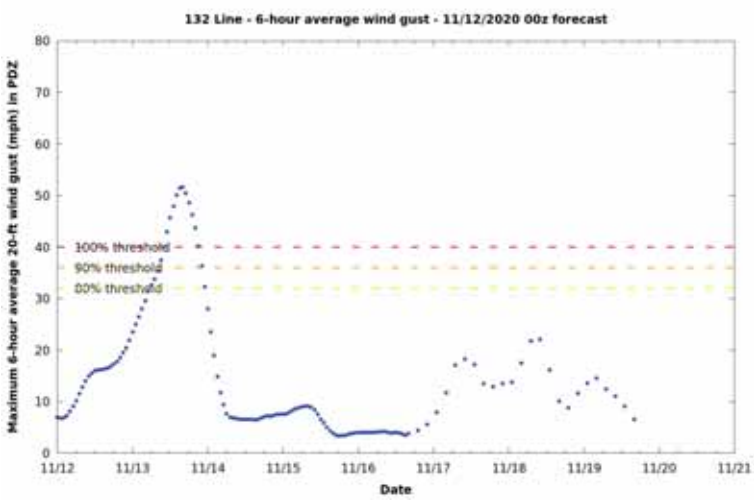
Squaw Valley



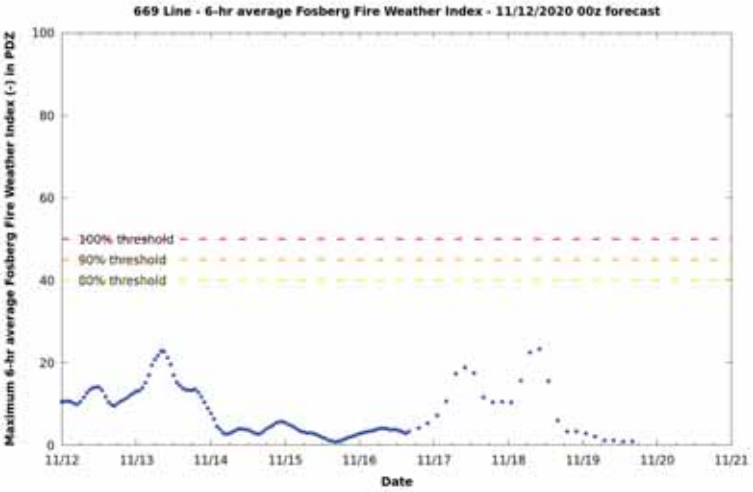


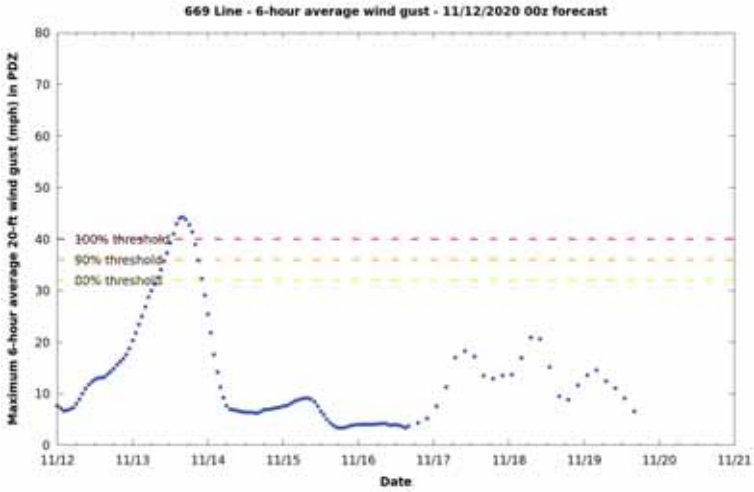
132 Line



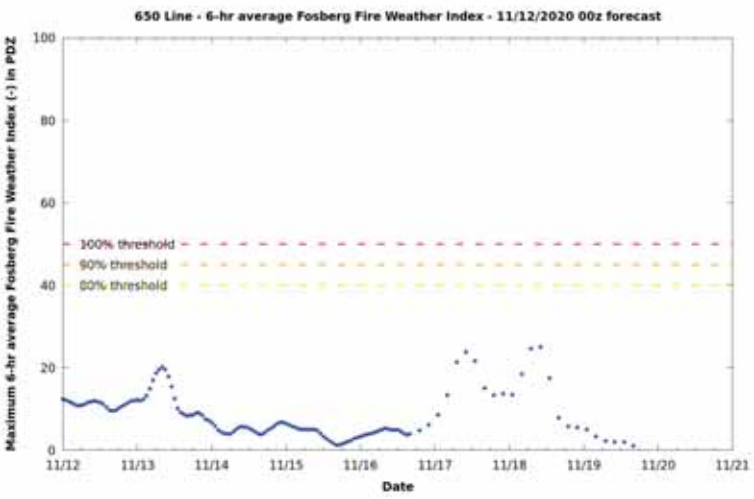


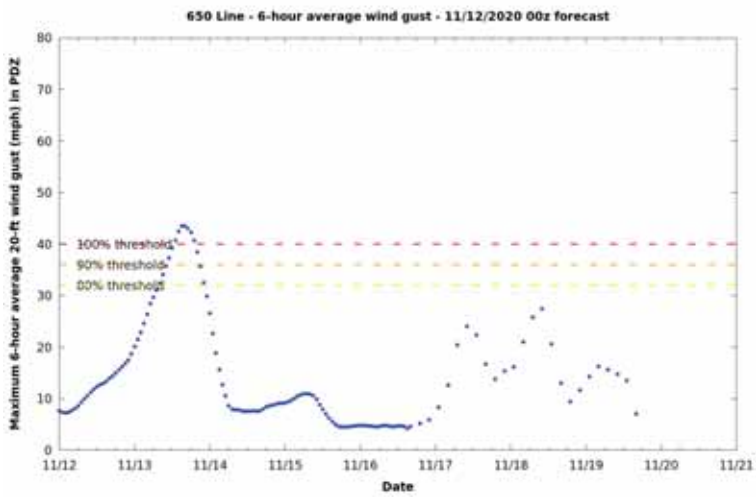
669 Line



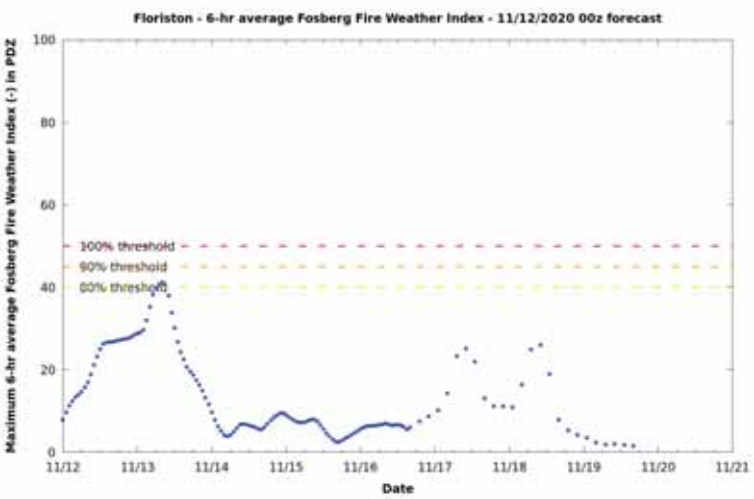


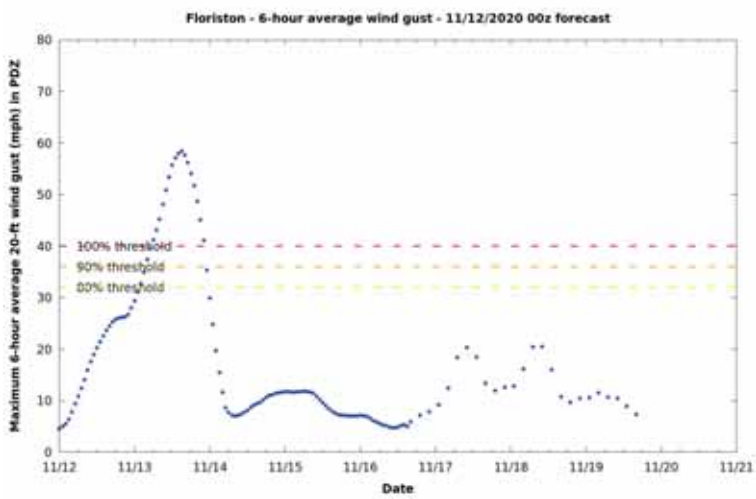
650 Line



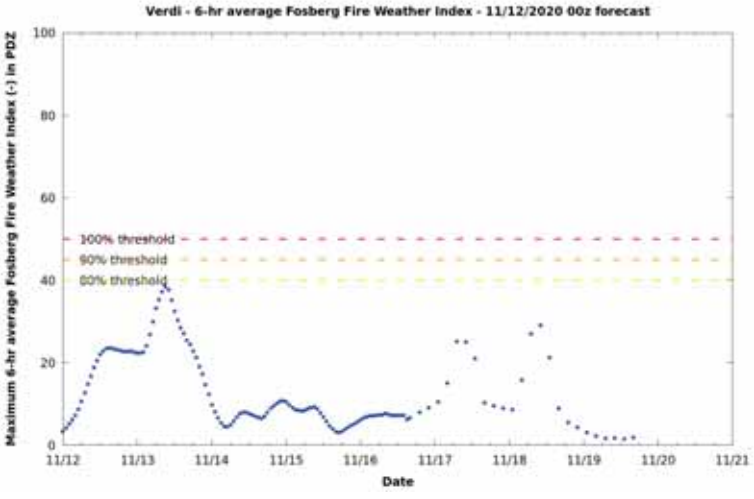


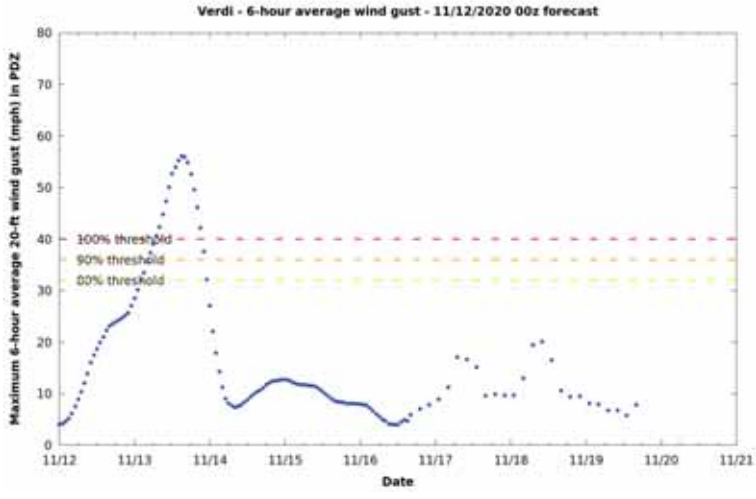
Floriston



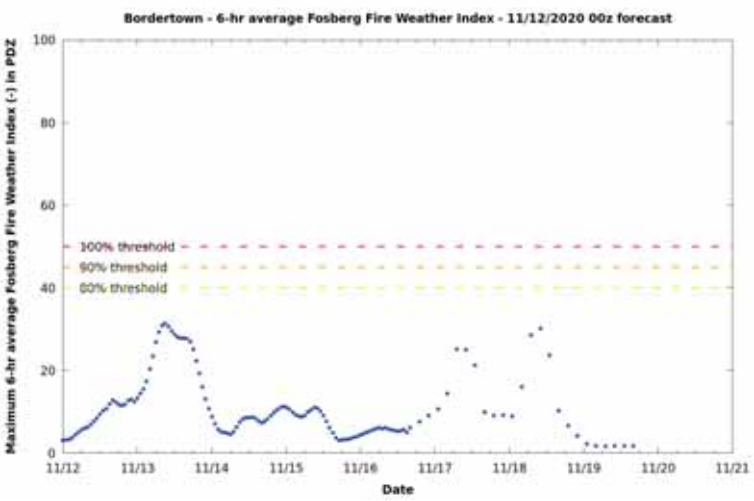


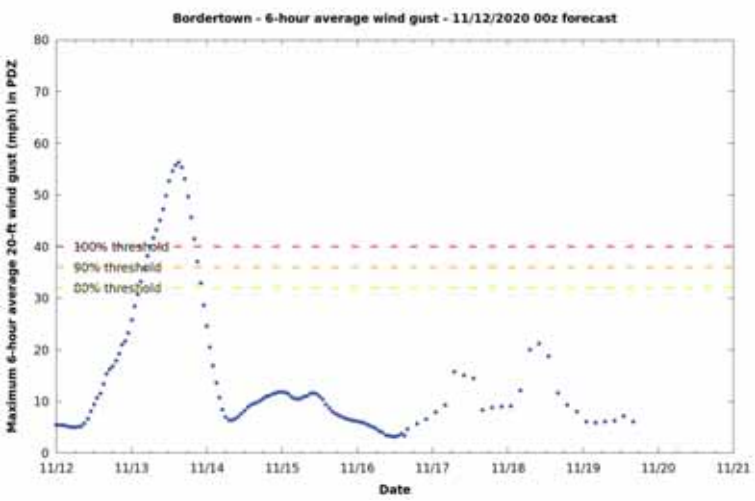
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/12/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
00% threshold
Date


Bordertown - 6-hour average wind gust - 11/12/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
00% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/12/20 - 11/18/20

Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

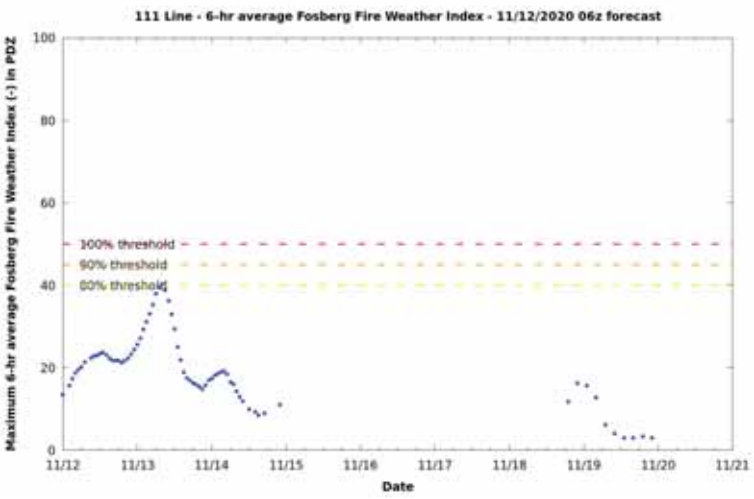
Liberty Utilities Energy Release Component Forecast for 11/12/20 - 11/18/20

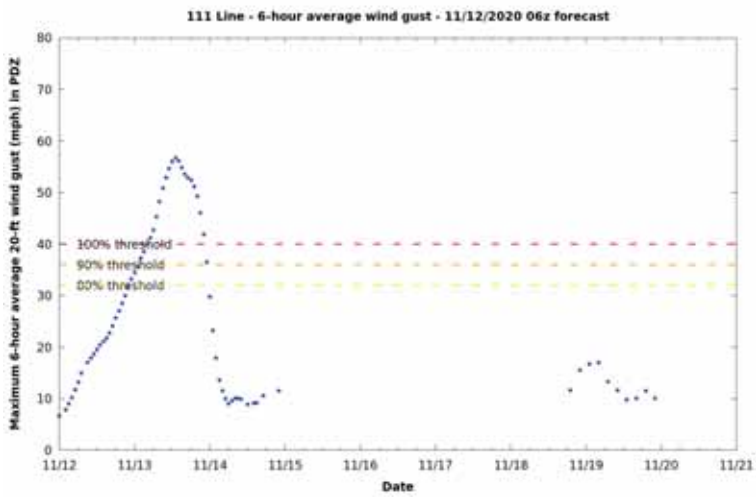
Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	42.0	39.0	33.0	34.0	31.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

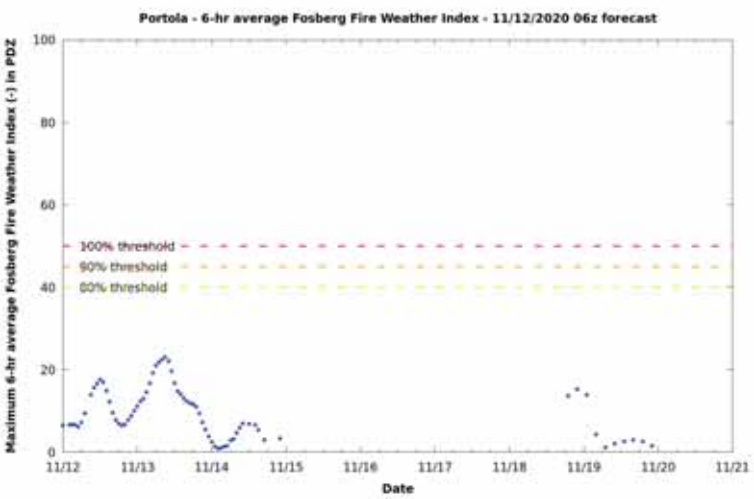
Liberty Utilities Fire Weather Summary Plots - 11/12/2020 06z forecast

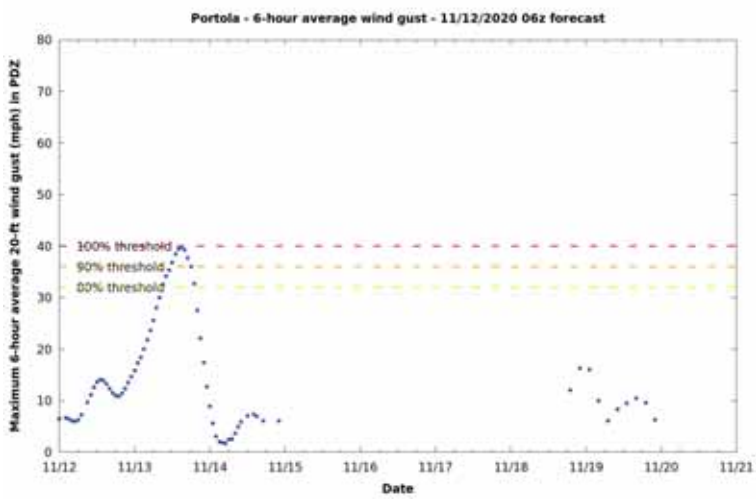
111 Line



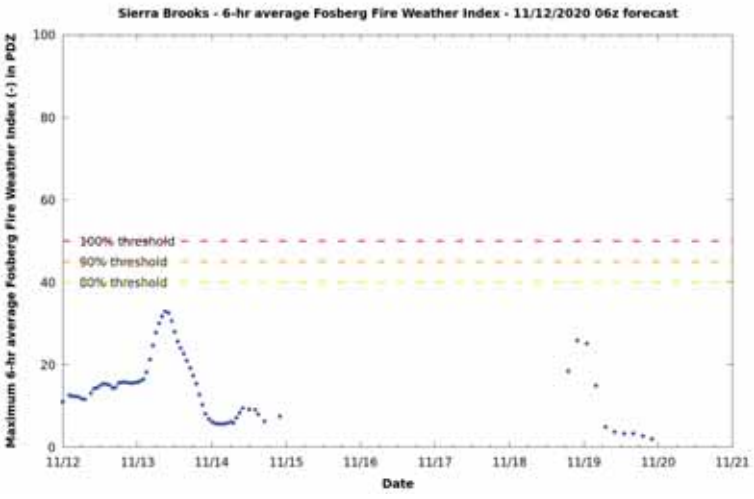


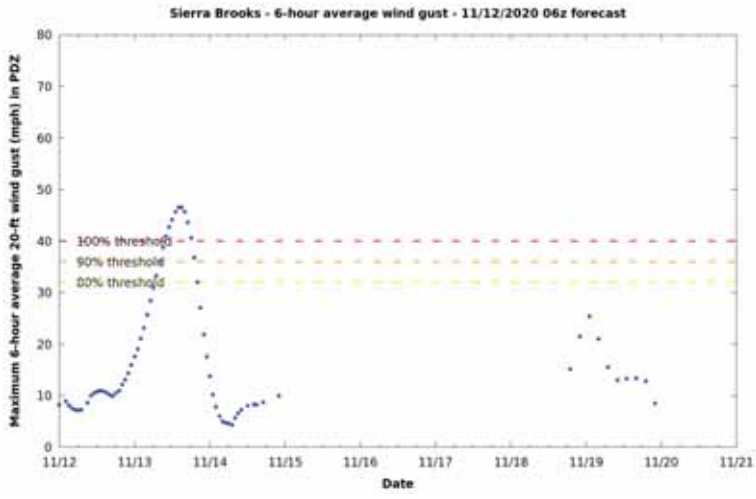
Portola



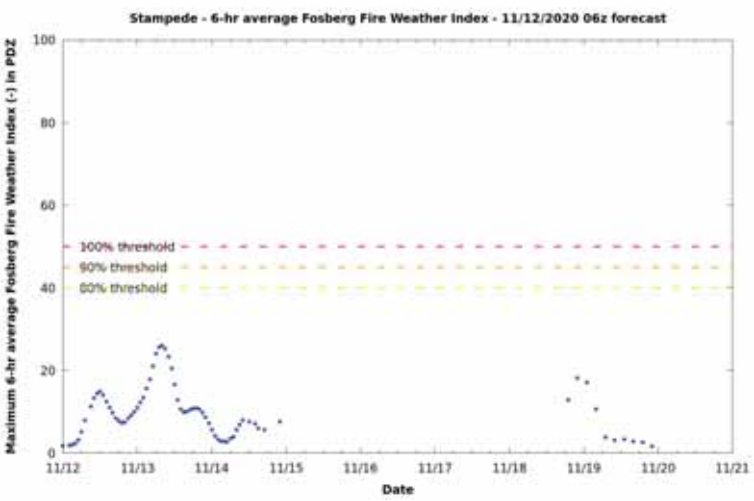


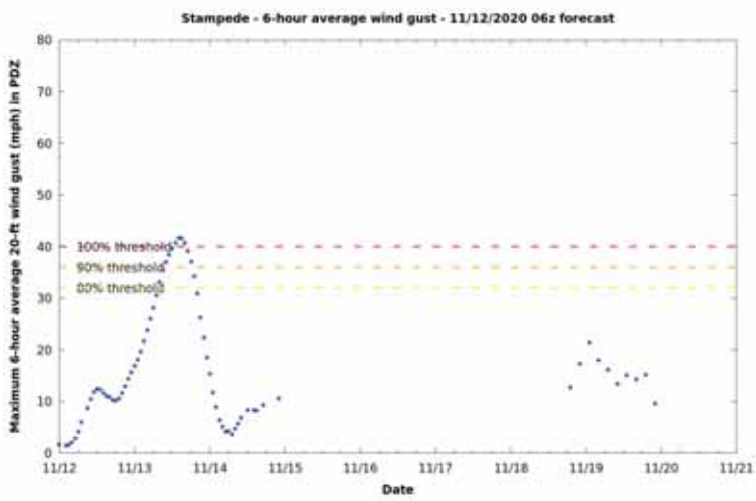
Sierra Brooks



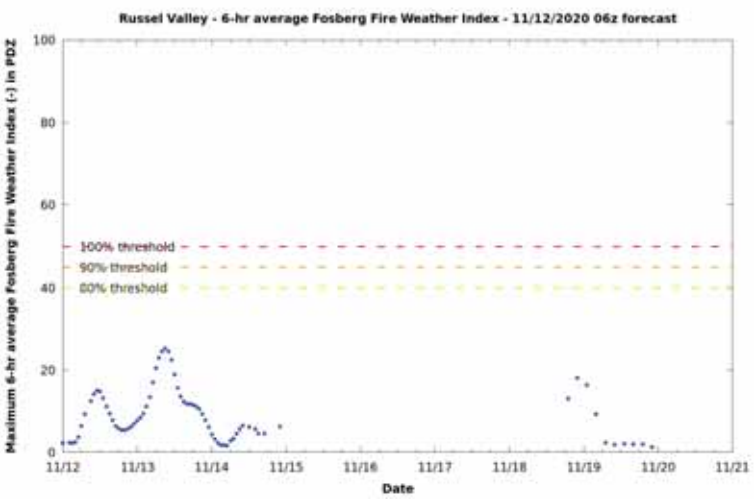


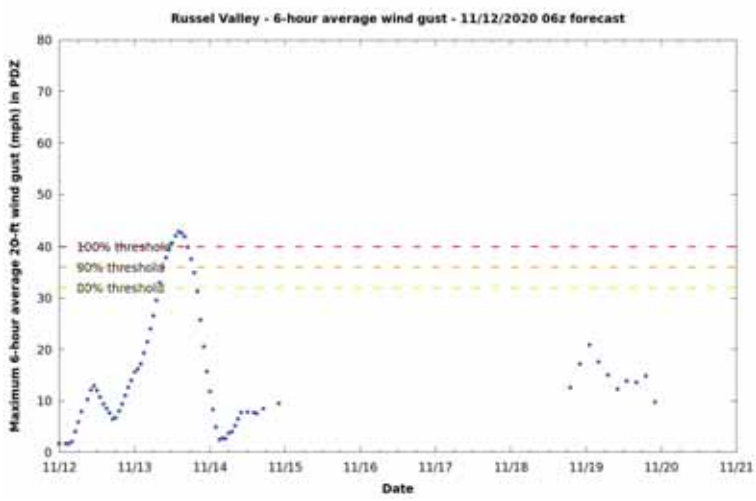
Stampede



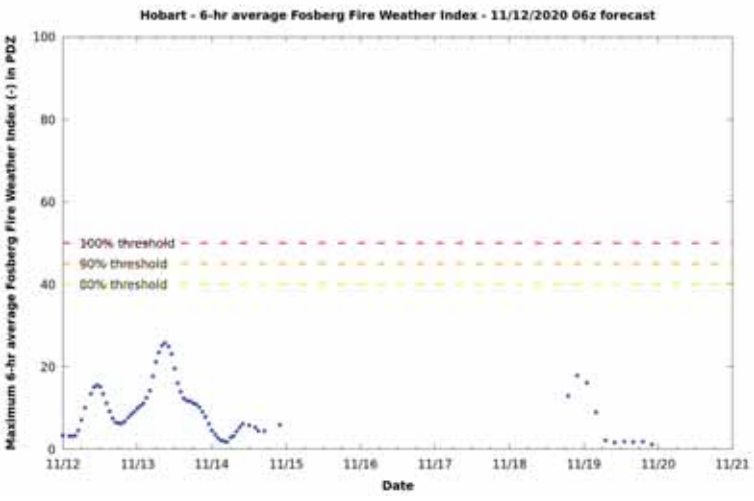


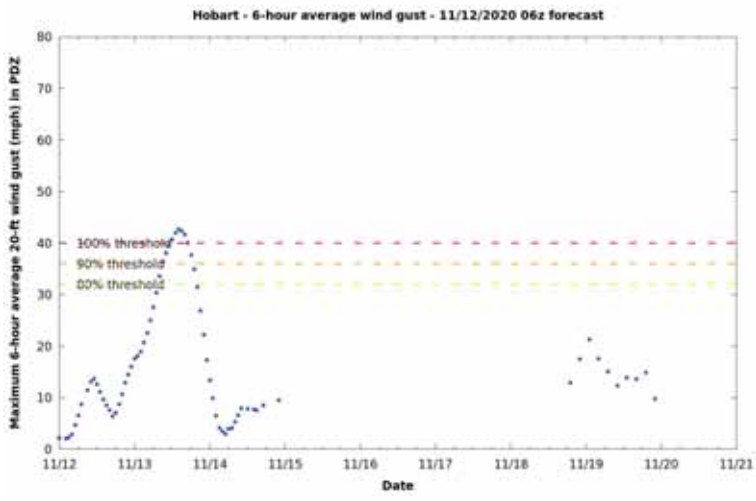
Russell Valley



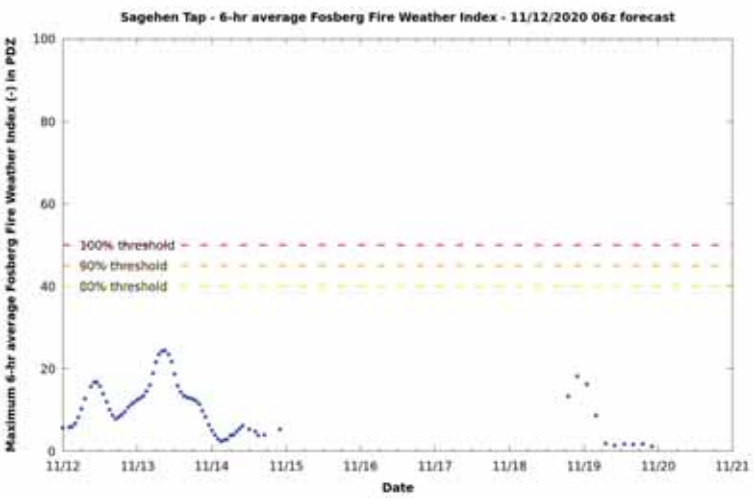


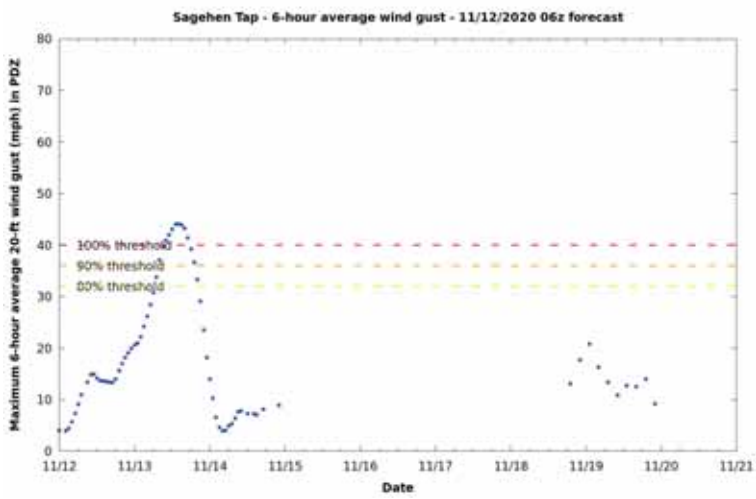
Hobart



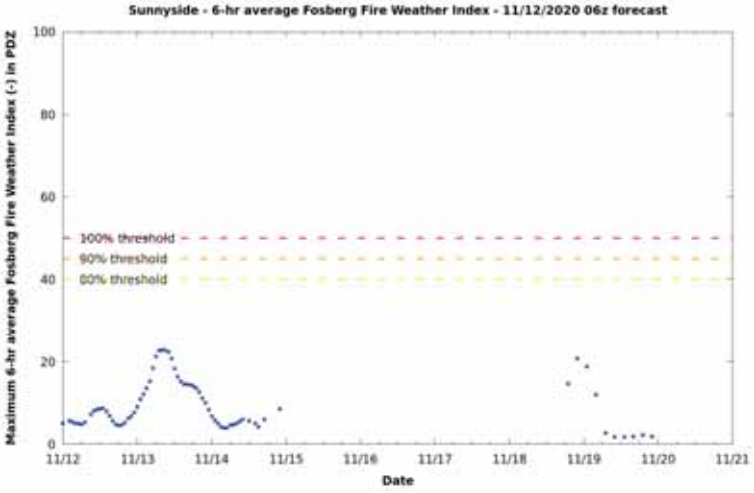


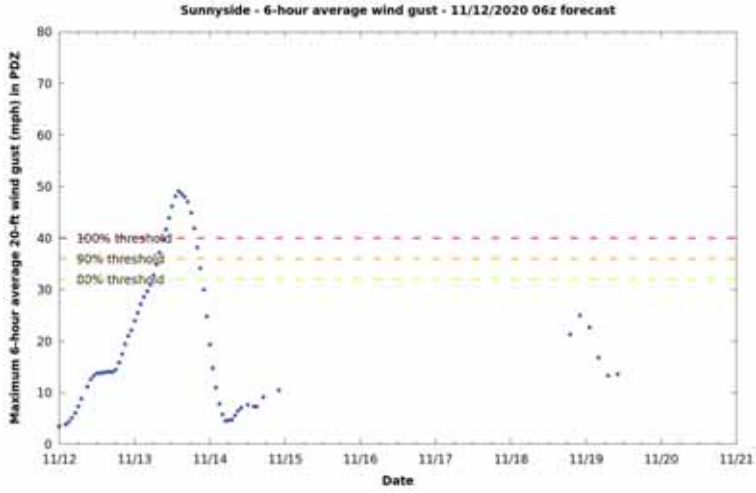
Sagehen tap



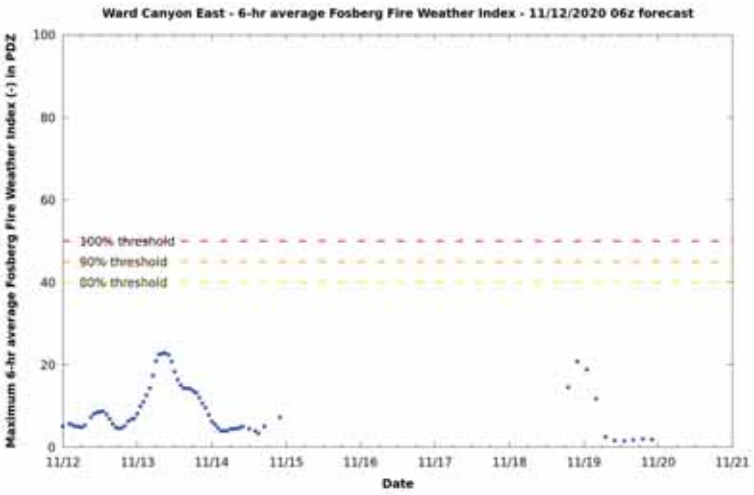


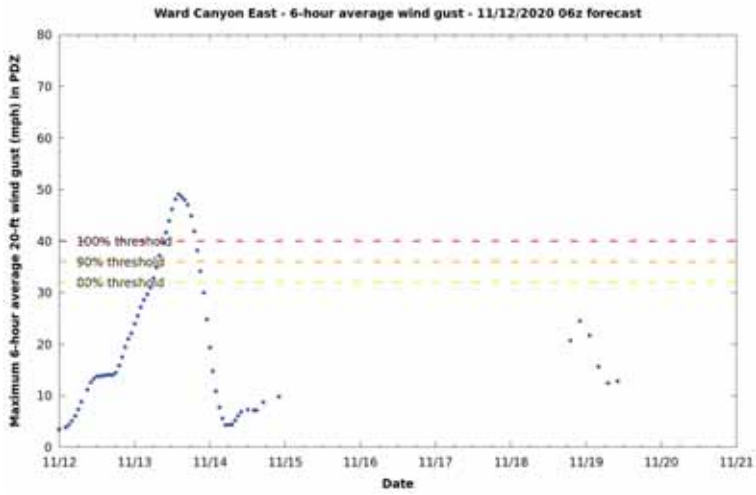
Sunnyside



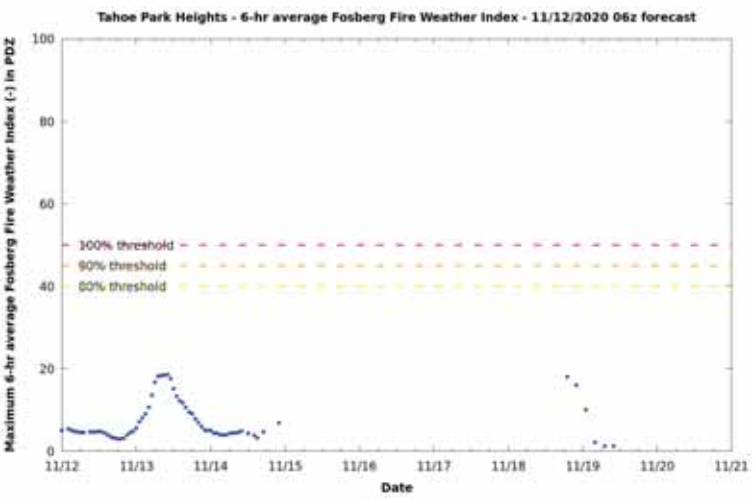


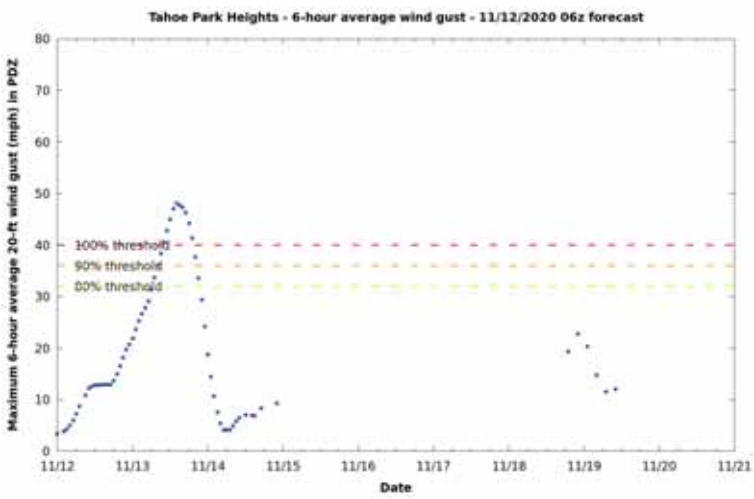
Ward Canyon East



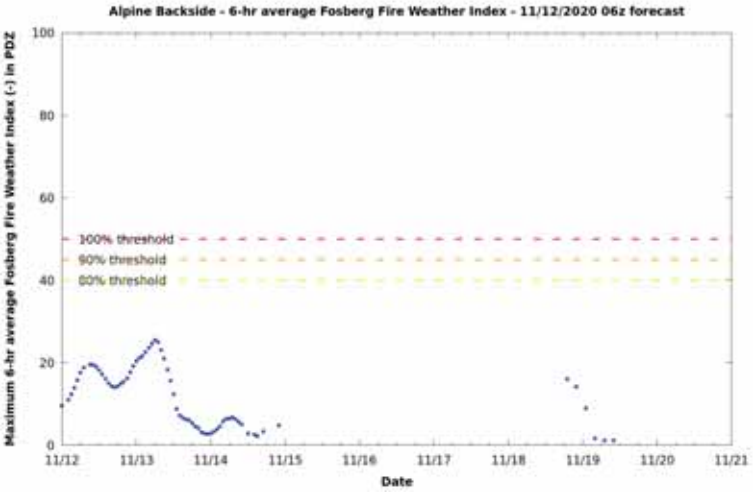


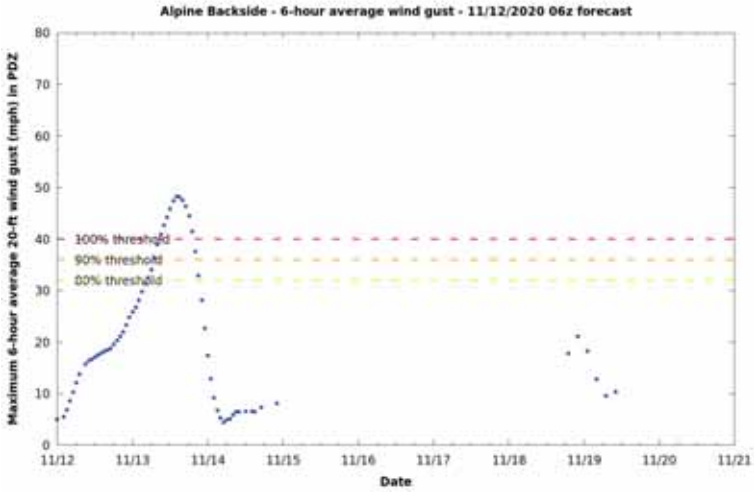
Tahoe Park Heights



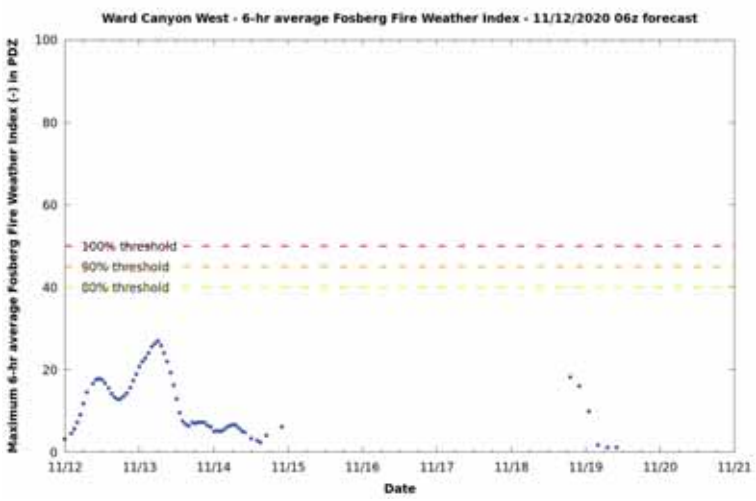


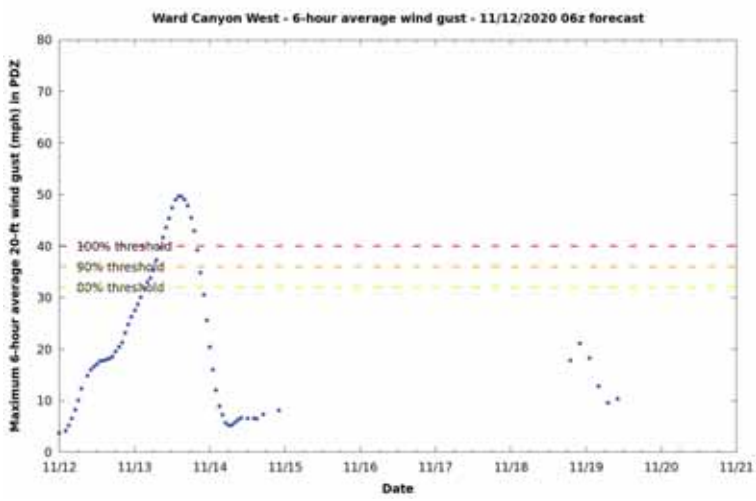
Alpine Backside



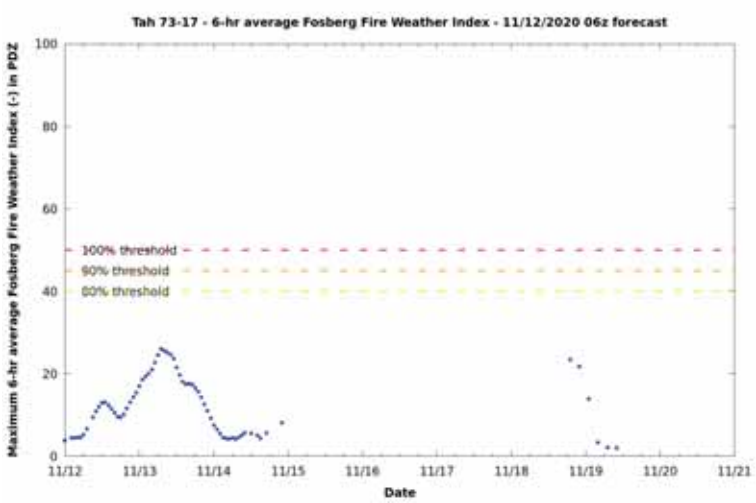


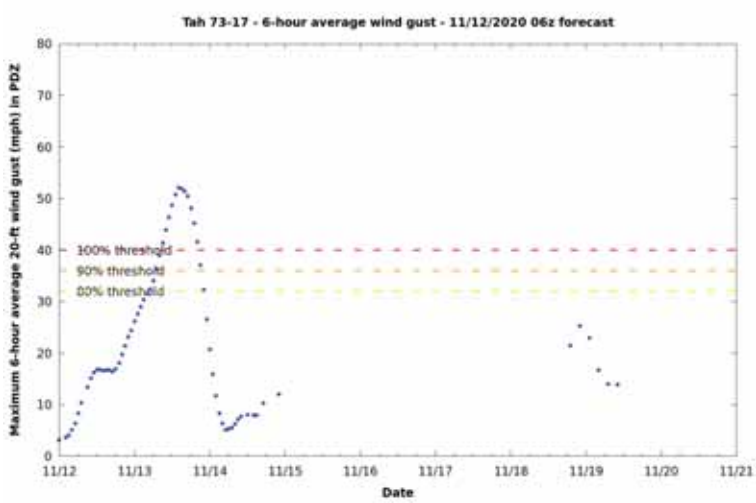
Ward Canyon West



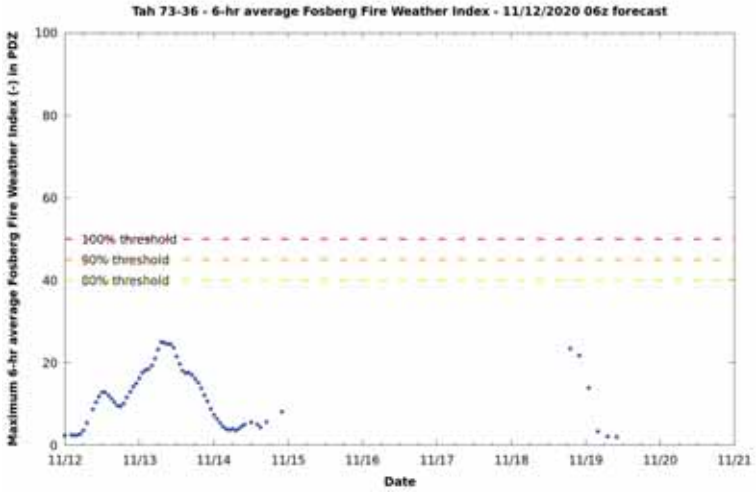


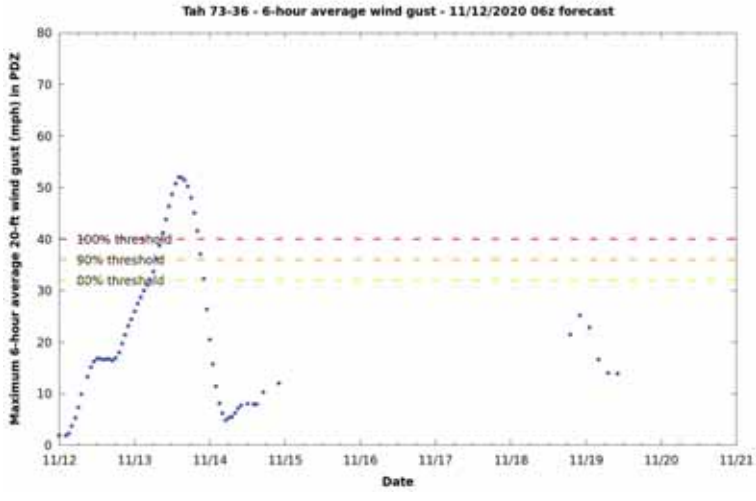
Tah 73-17



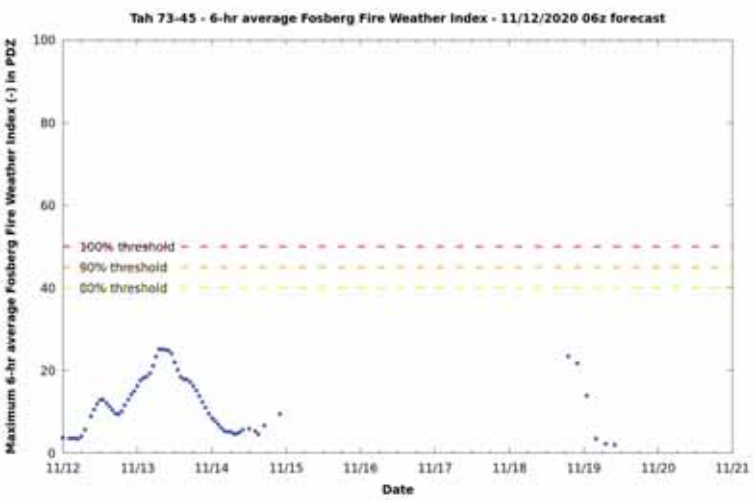


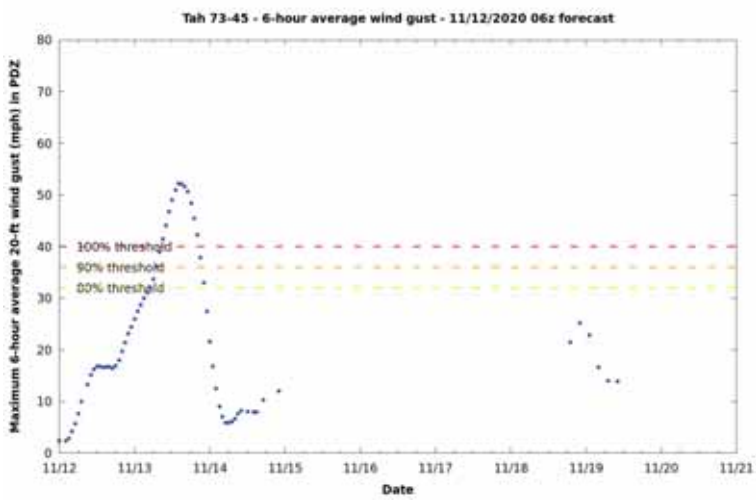
Tah 73-36



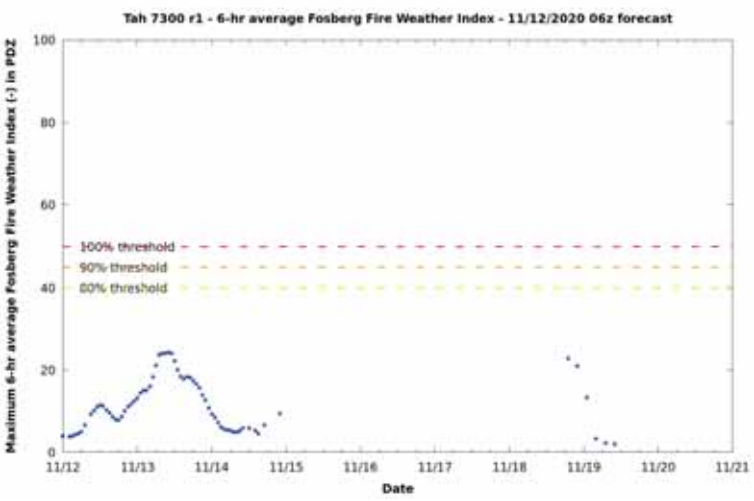


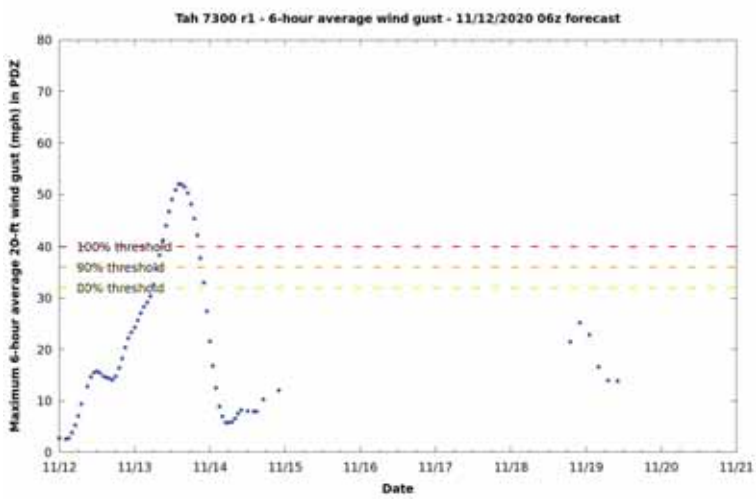
Tah 73-45



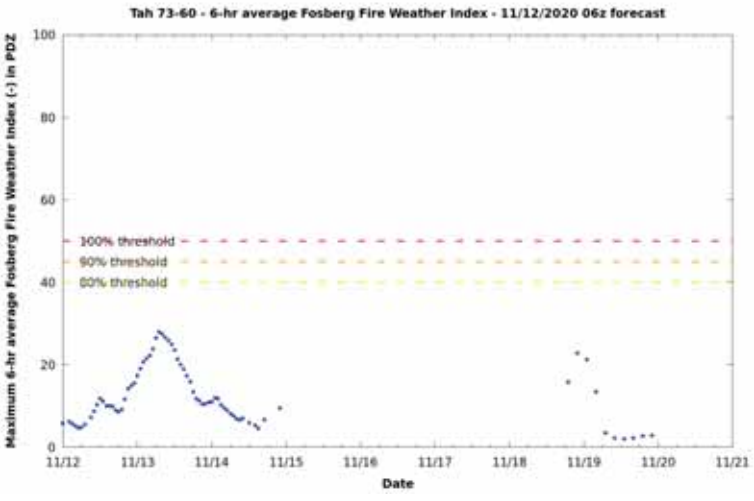


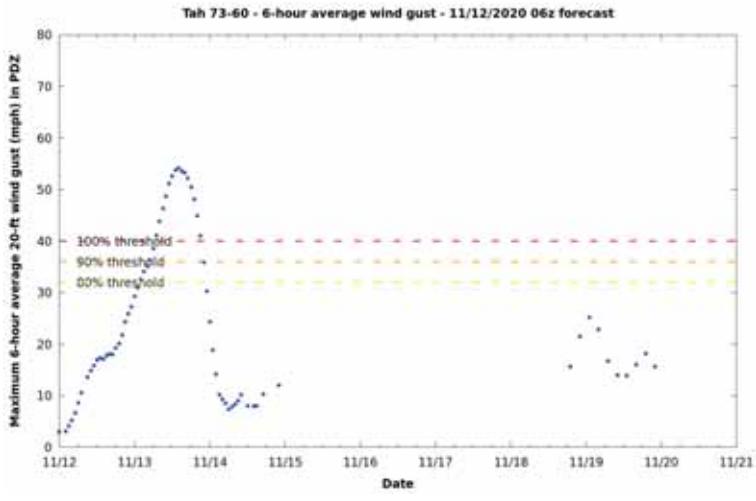
Tah 7300 r1



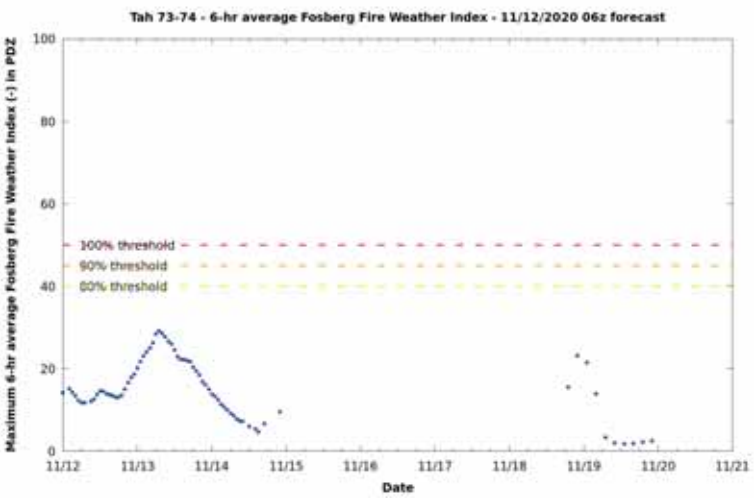


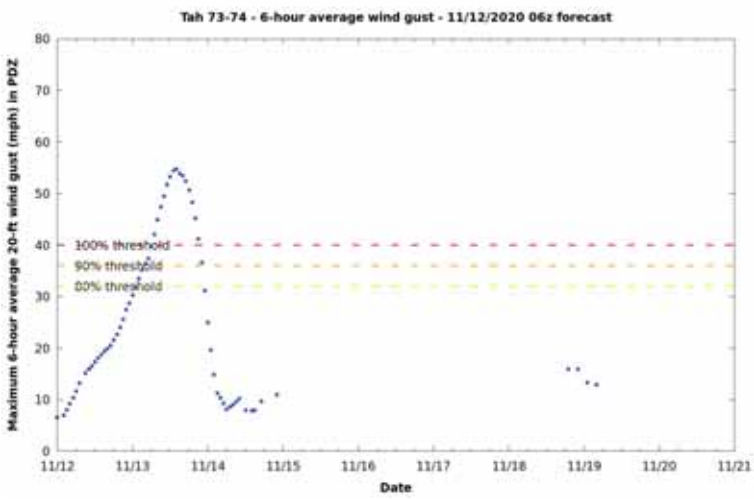
Tah 73-60



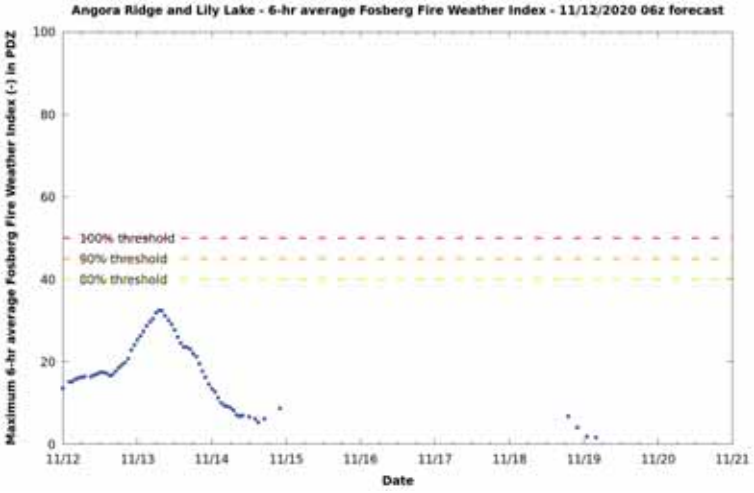


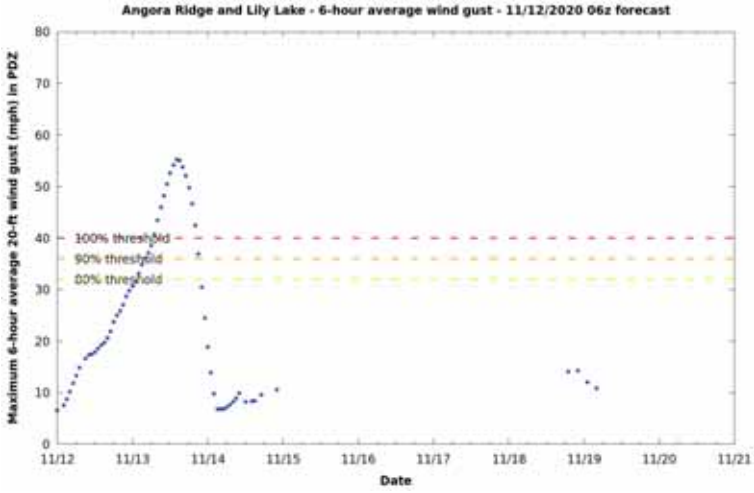
Tah 73-74



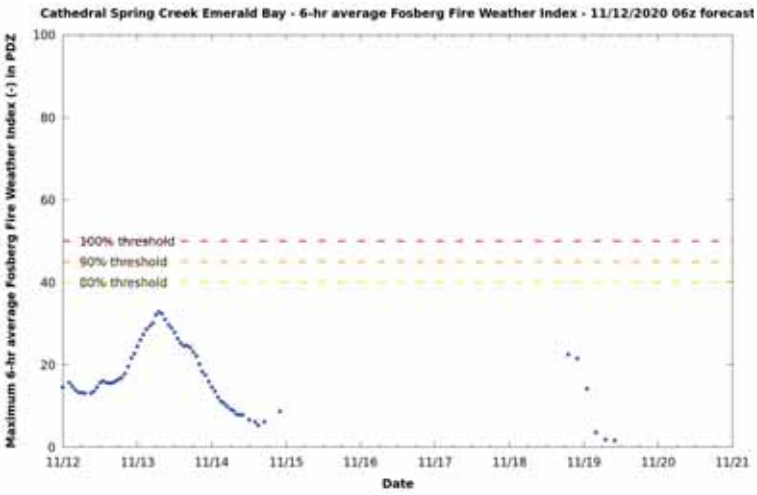


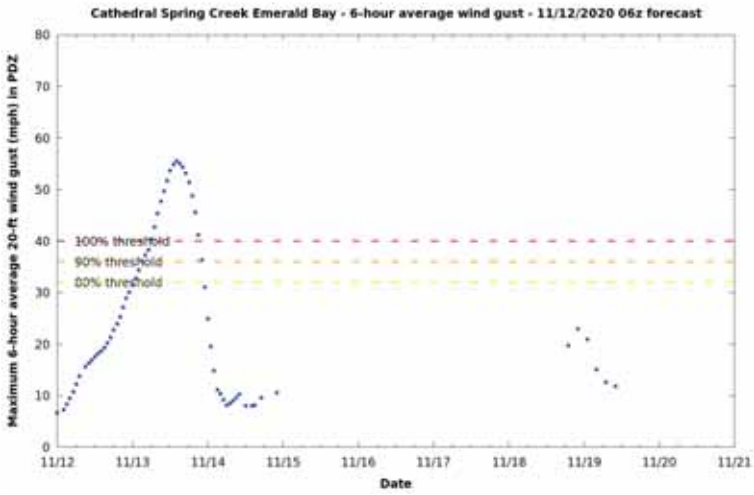
Angora Ridge and Lily Lake



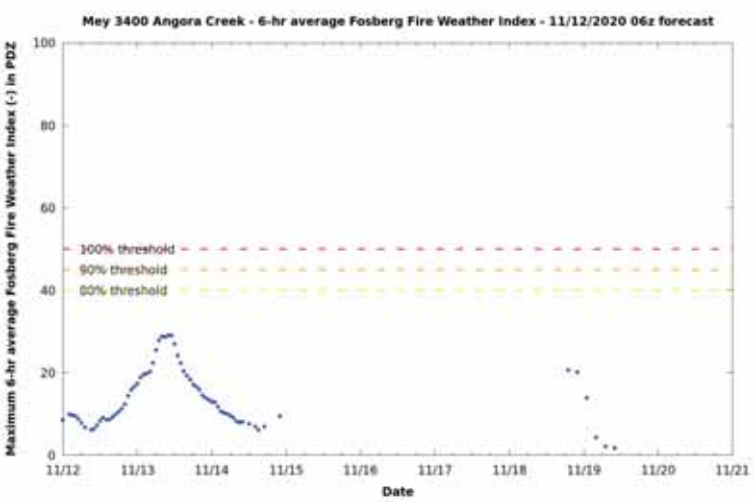


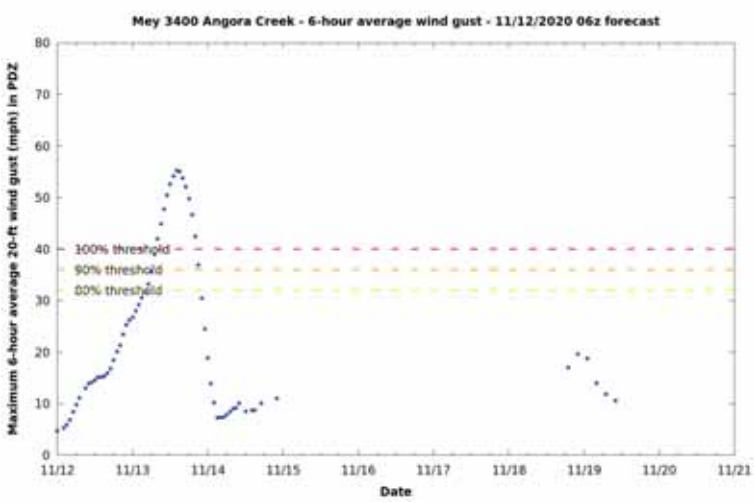
Cathedral Spring Creek Emerald Bay



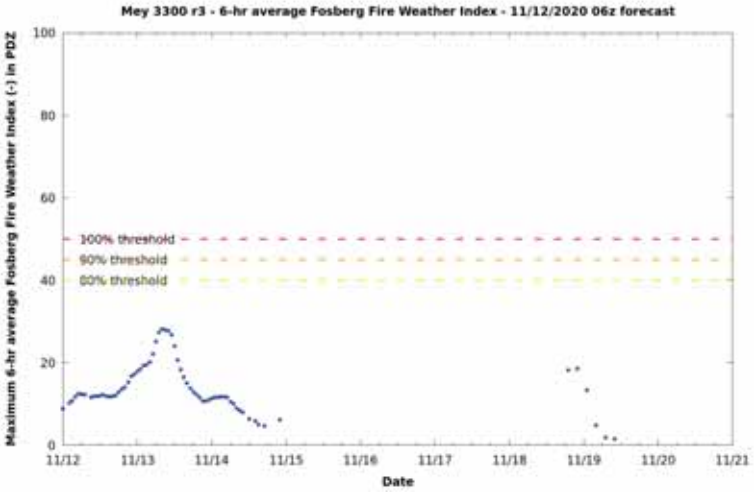


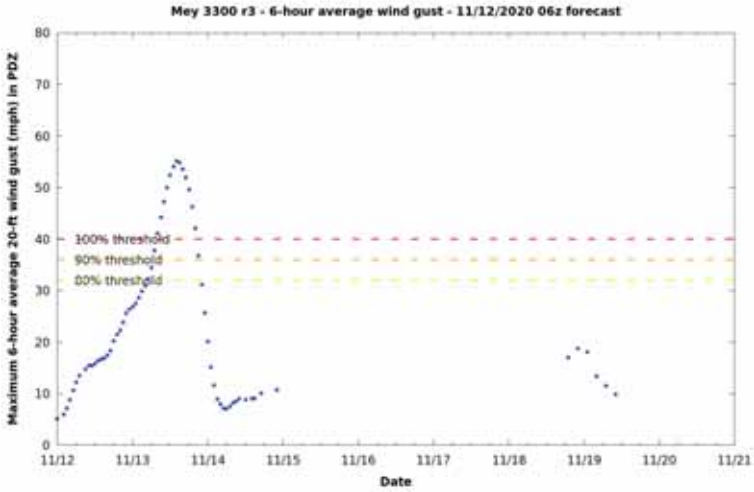
Mey 3400 Angora Creek



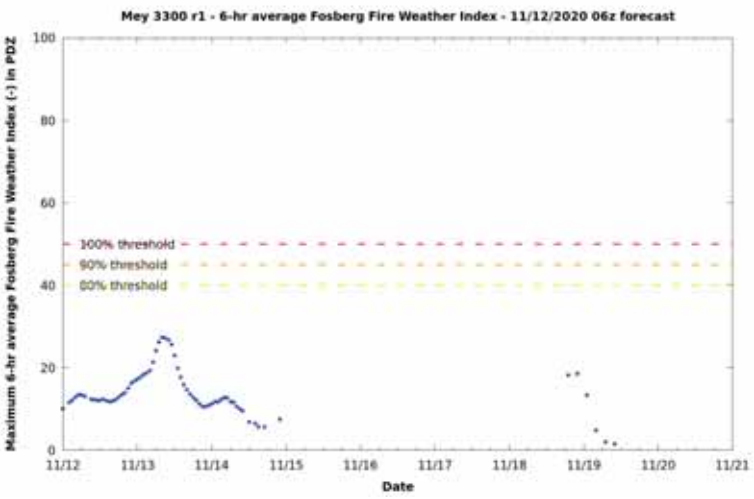


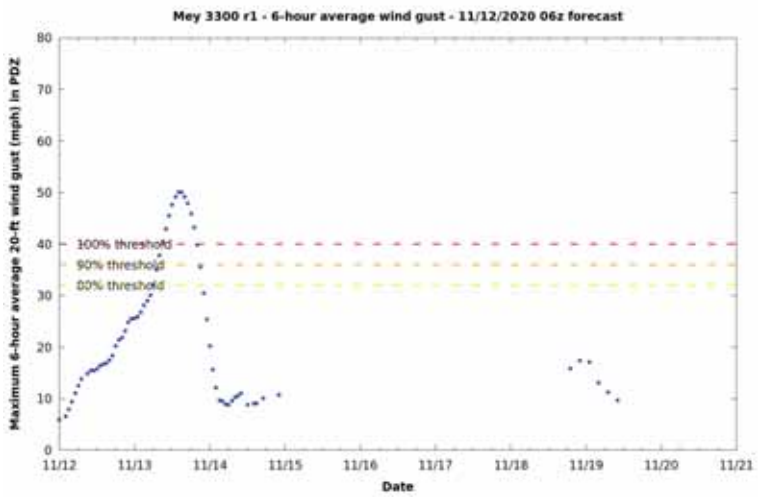
Mey 3300 r3



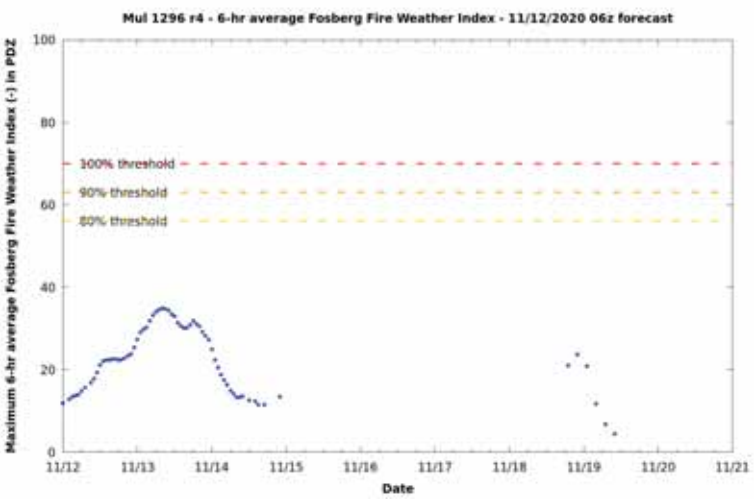


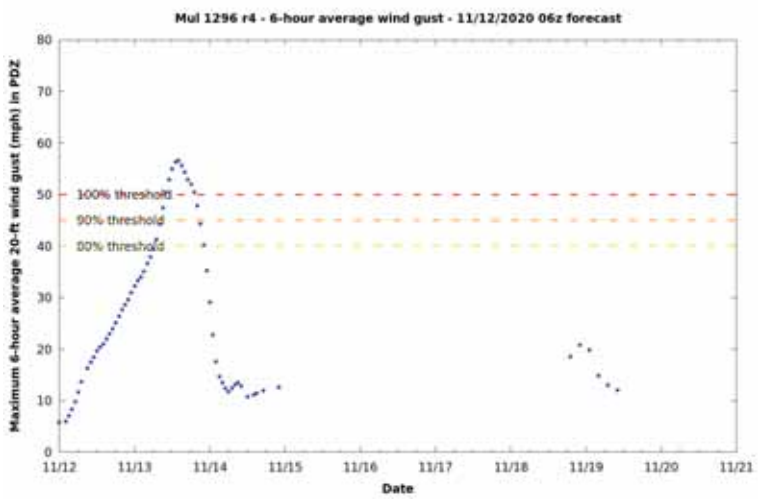
Mey 3300 r1



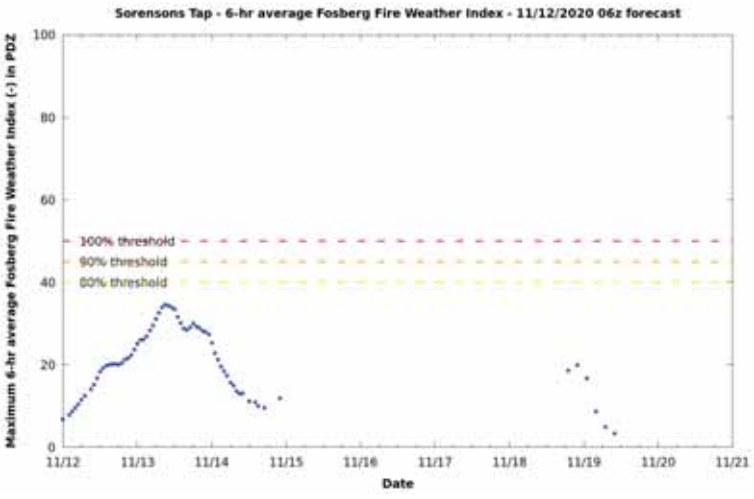


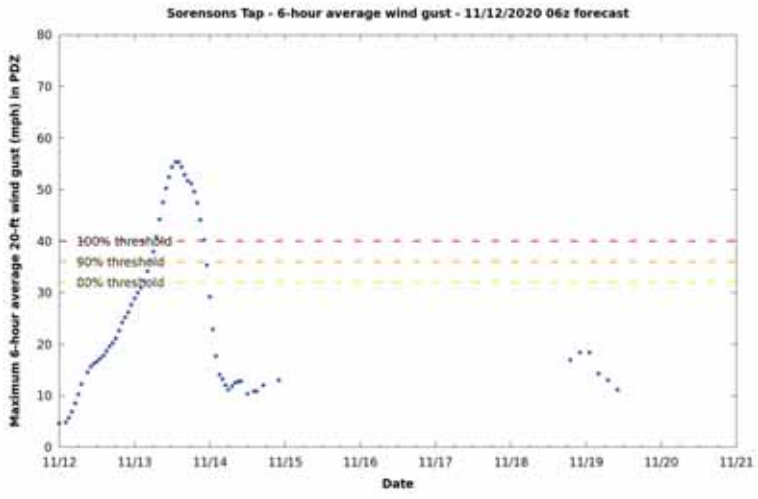
Mul 1296 r4



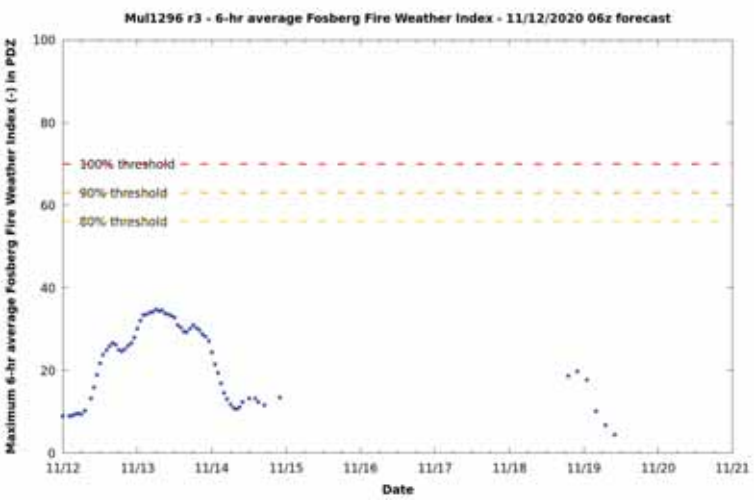


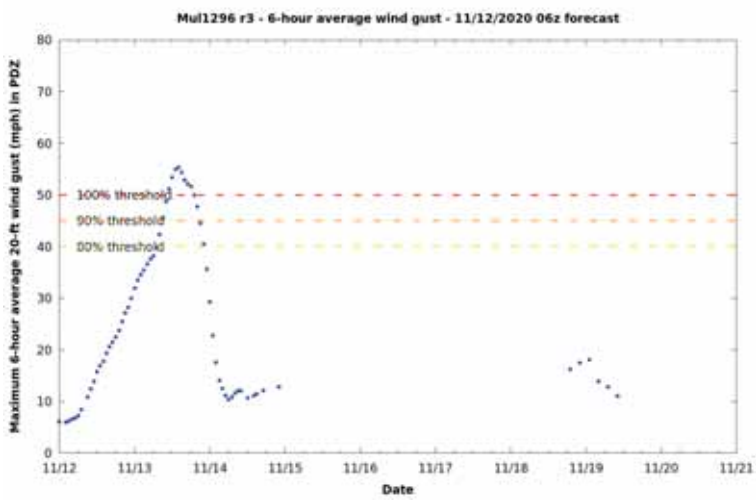
Sorensons Tap



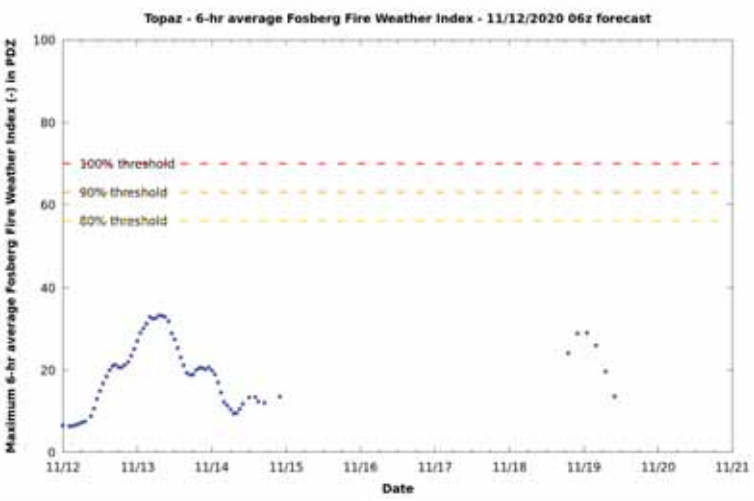


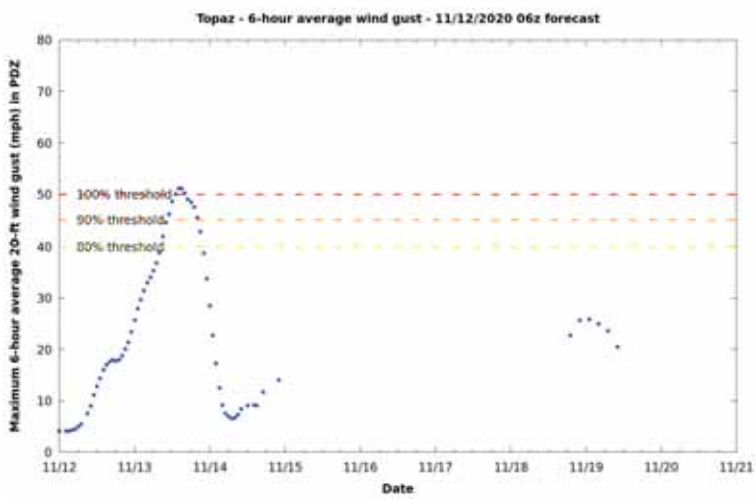
Mul 1296 r3



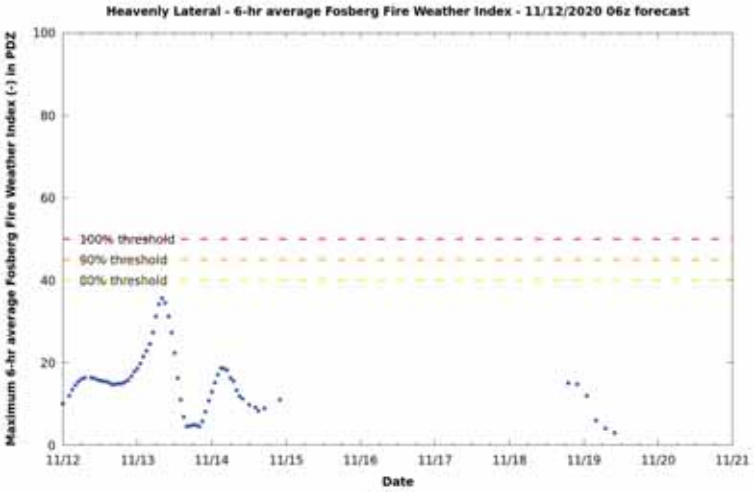


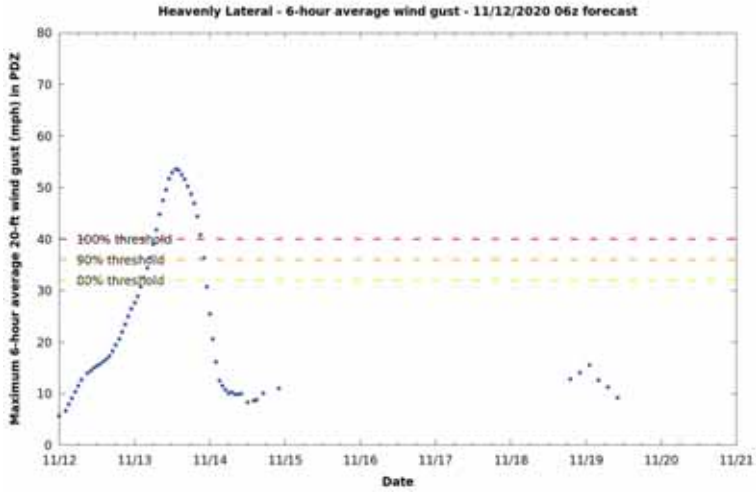
Topaz



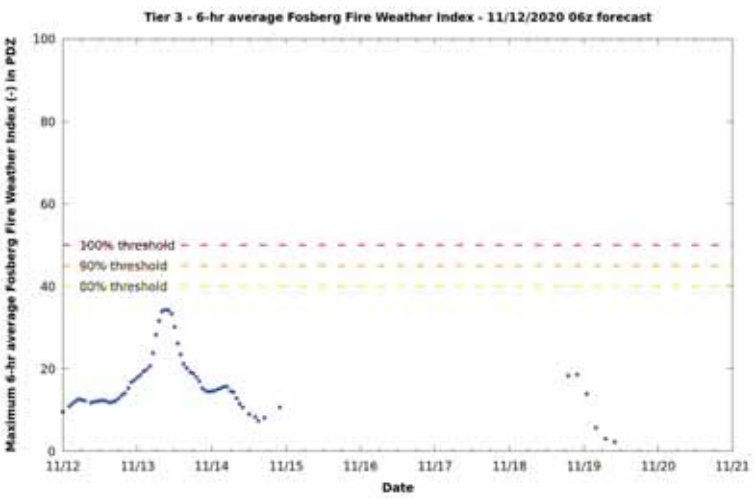


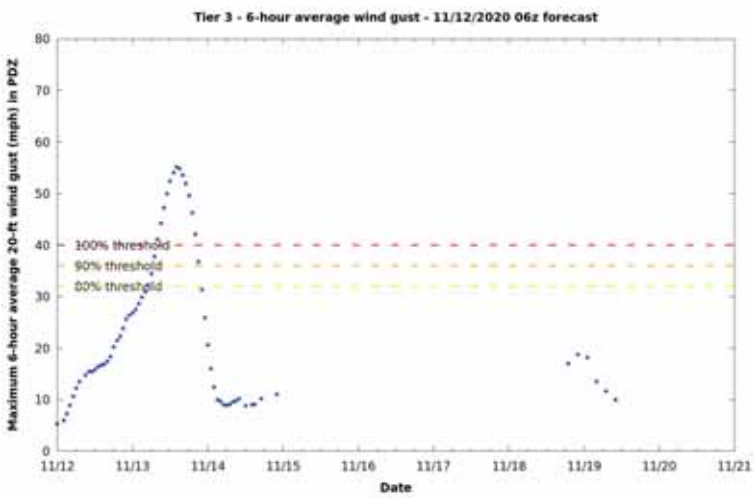
Heavenly Lateral



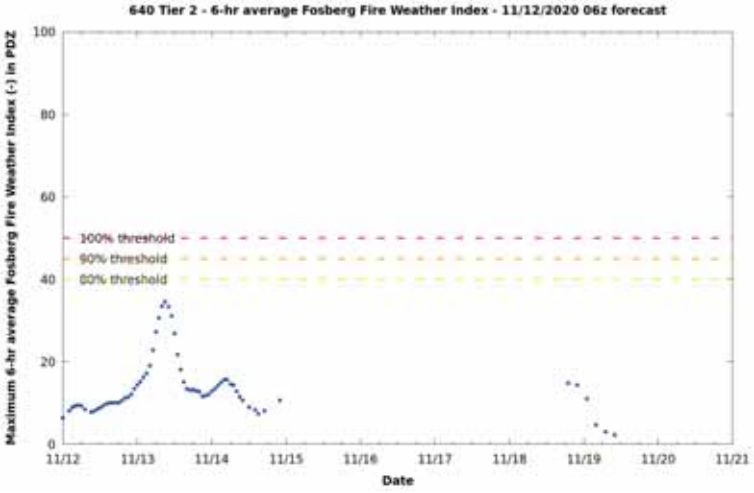


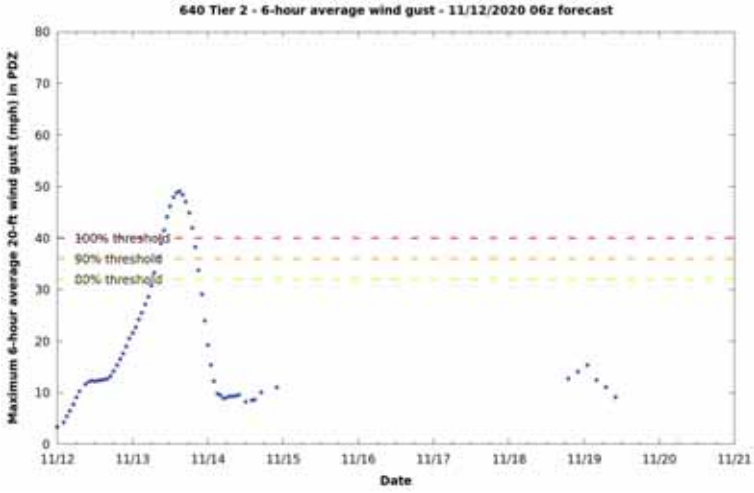
Tier 3



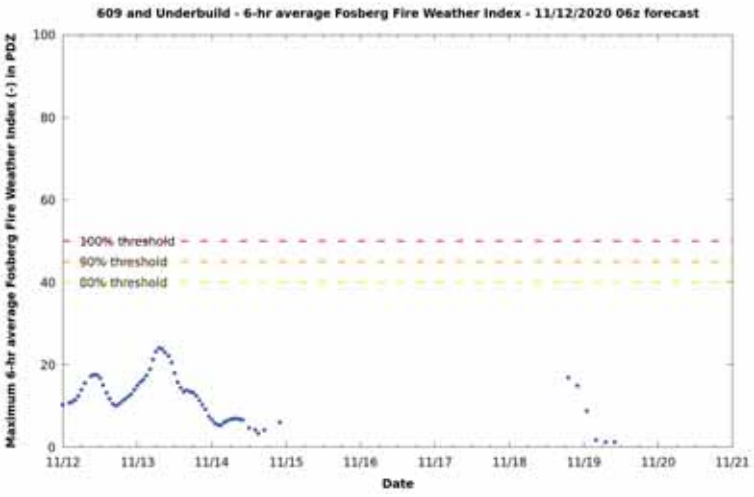


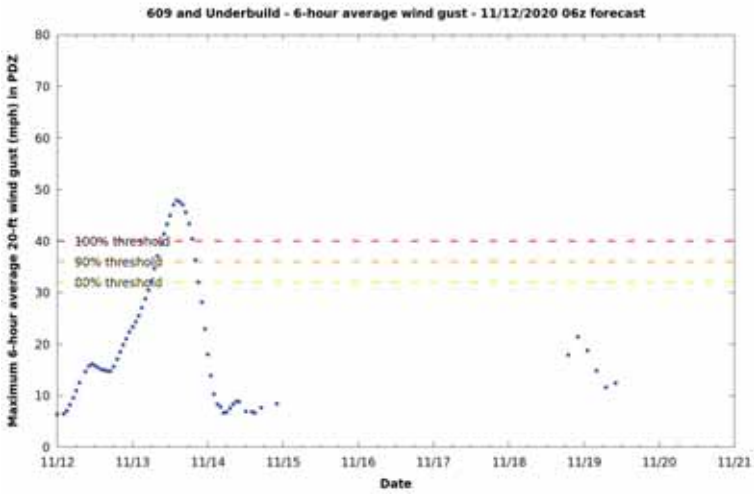
640 Tier 2



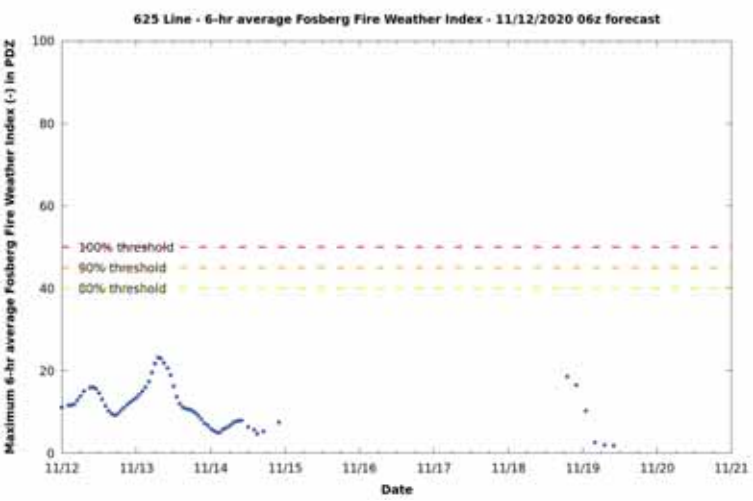


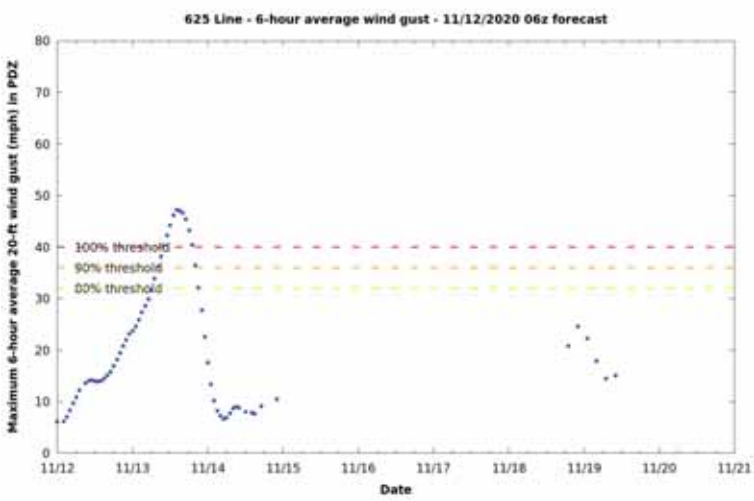
609 and Underbuild



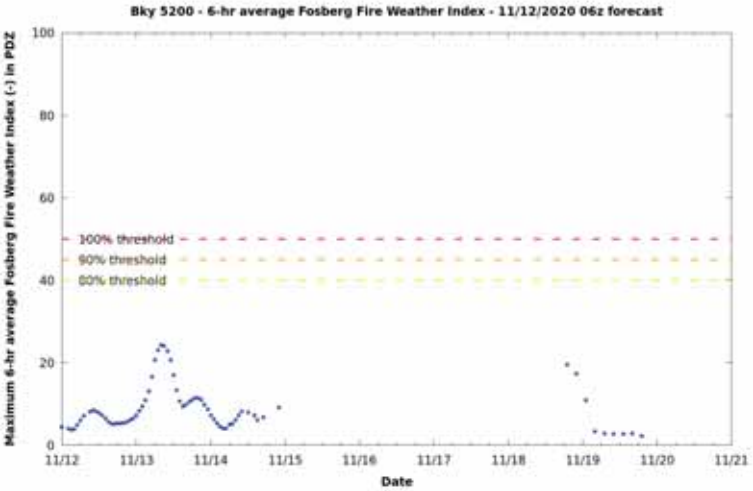


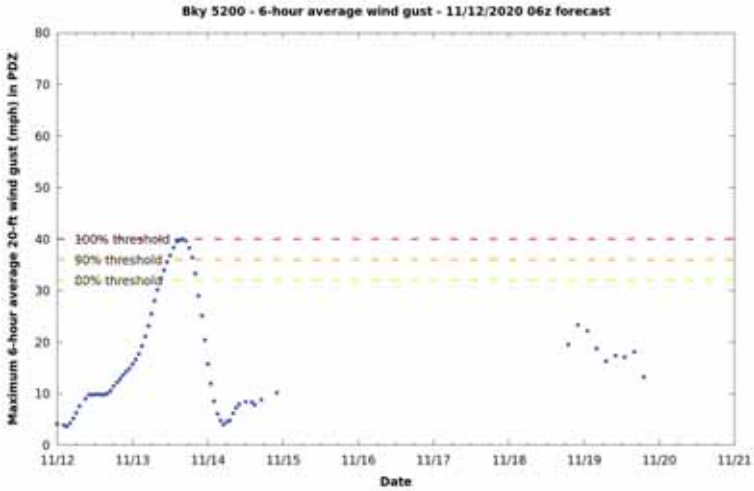
625 Line



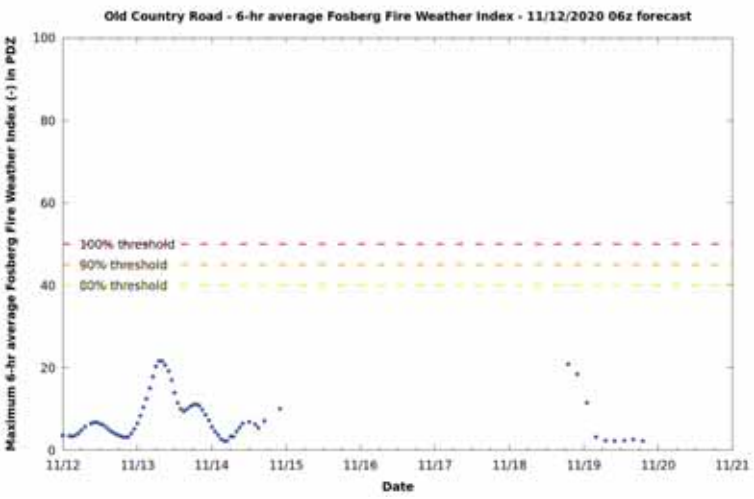


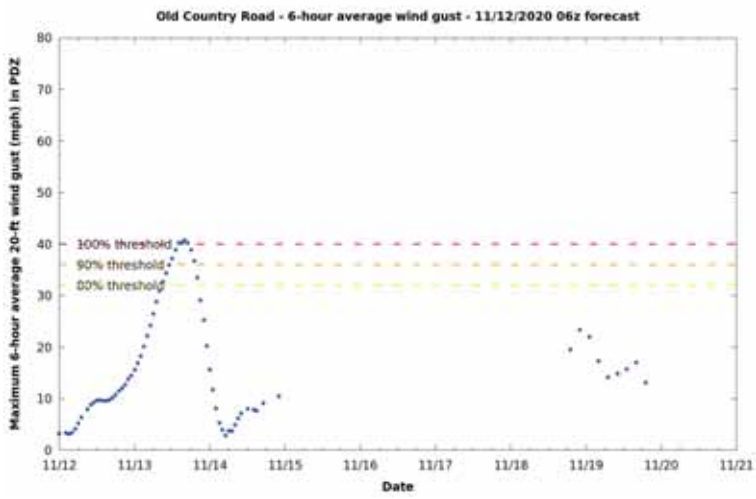
Bky 5200



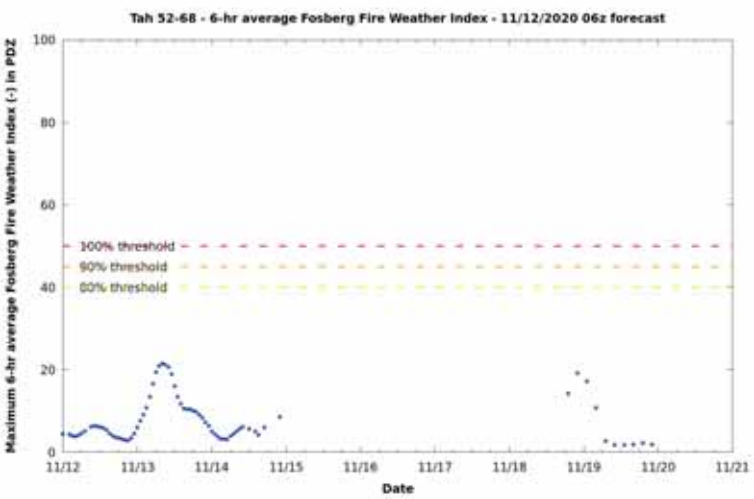


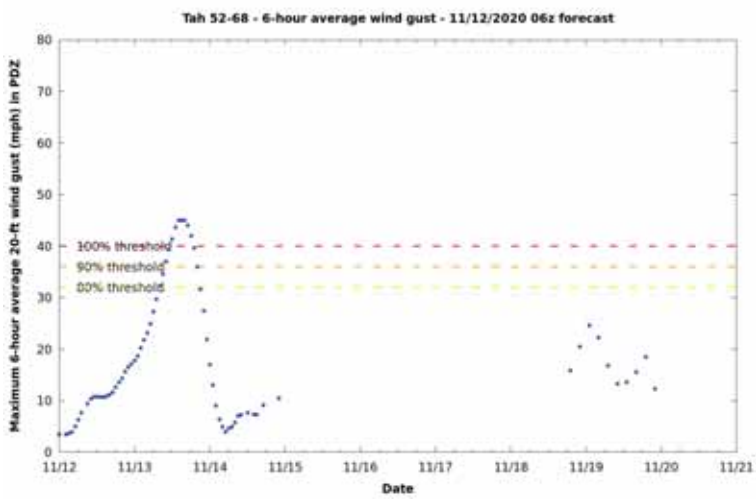
Old Country Road



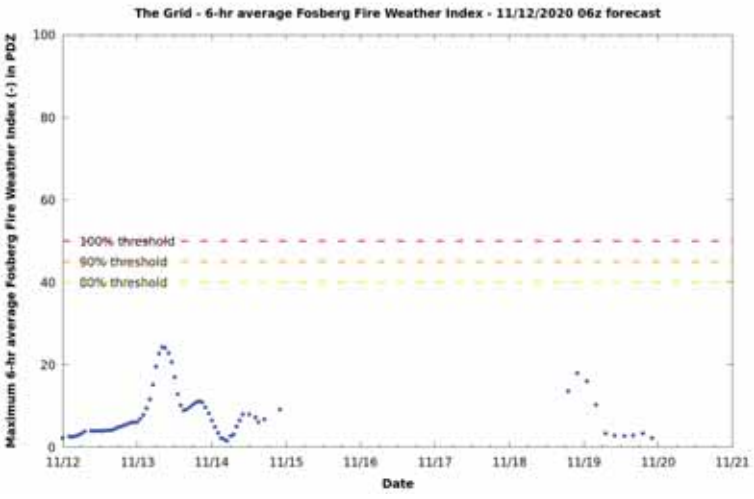


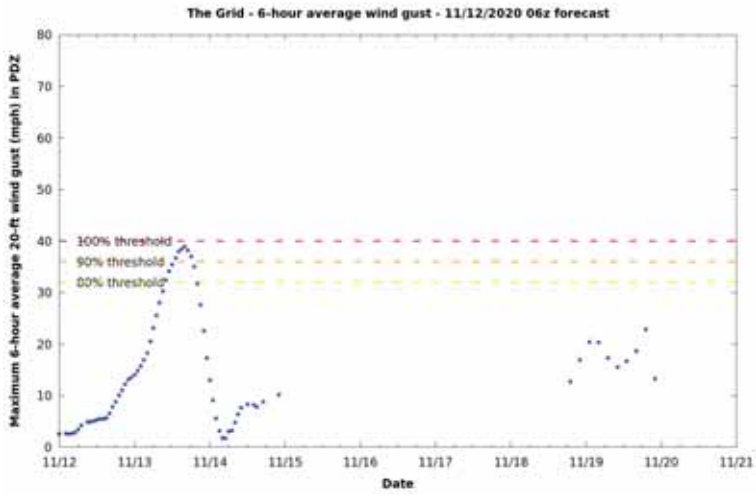
Tah 52-68



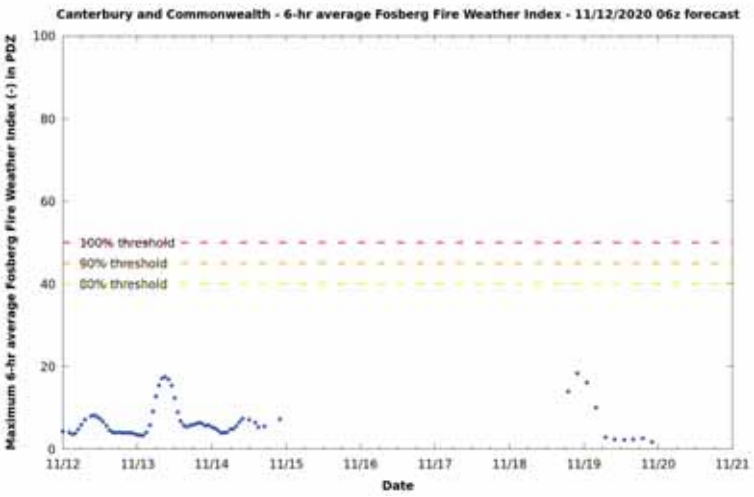


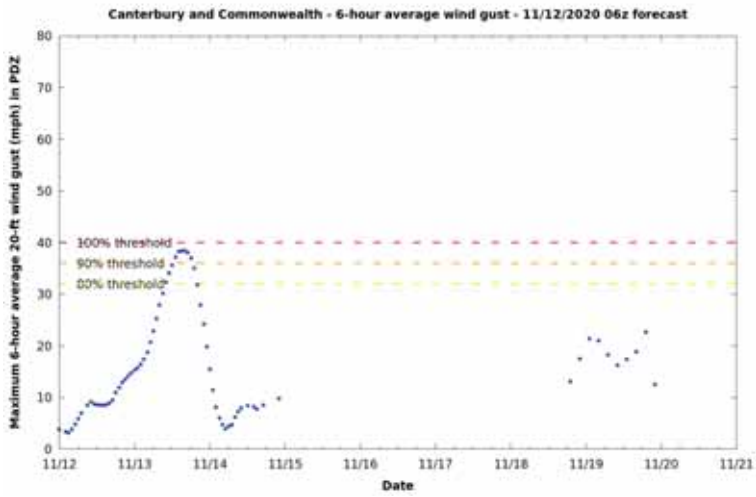
The Grid



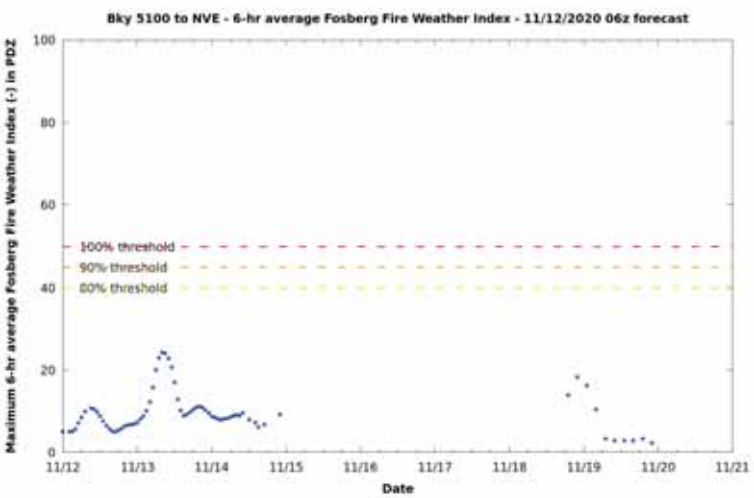


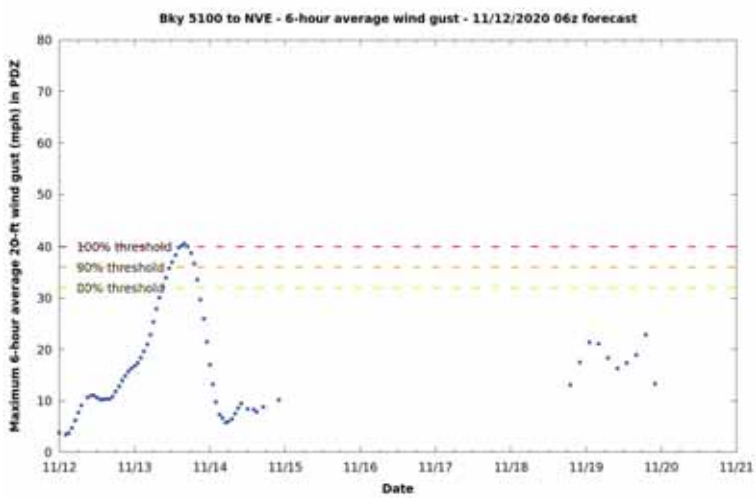
Canterbuy and Commonwealth



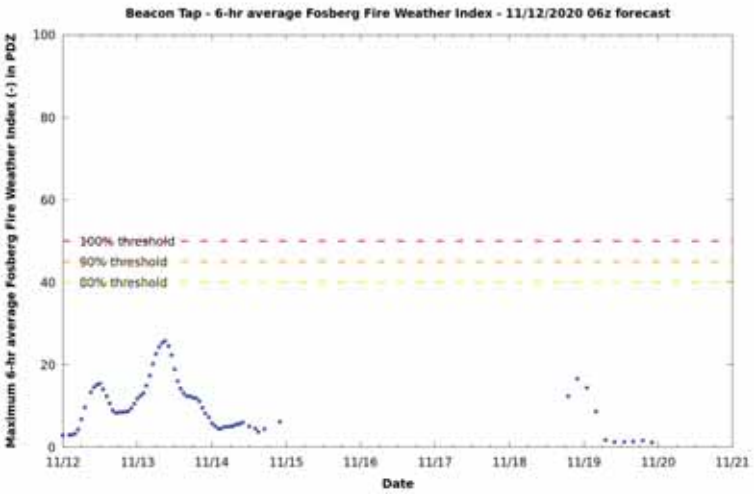


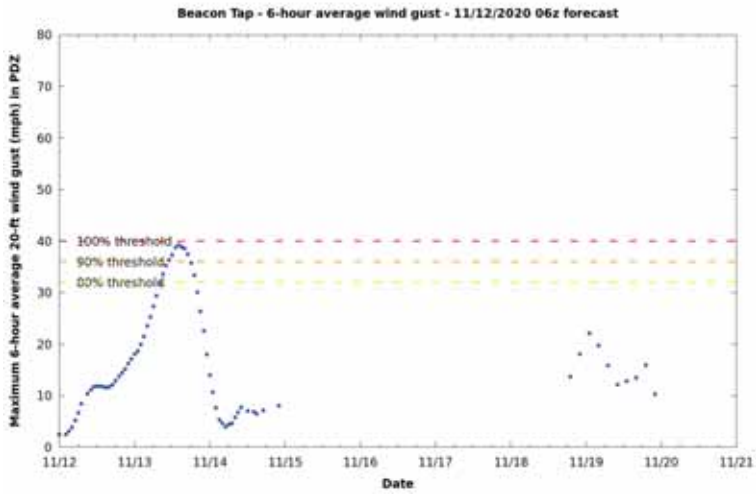
Bky 5100 to NVE



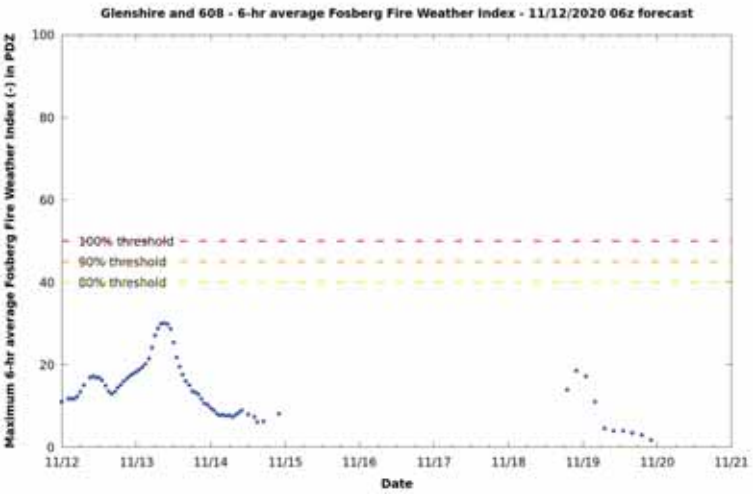


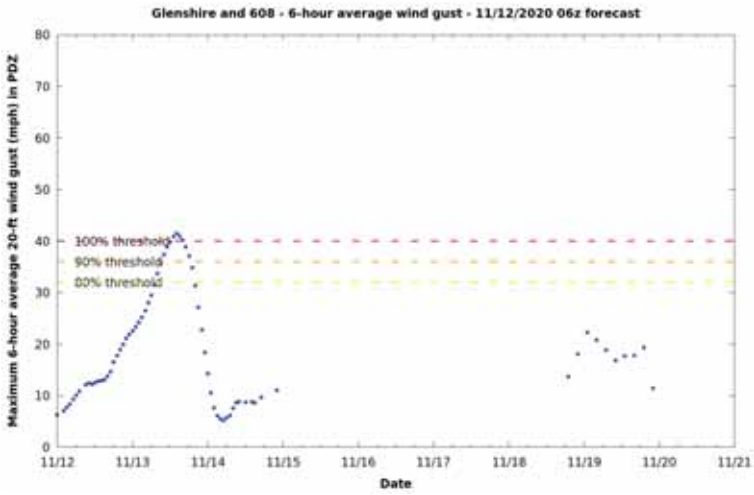
Beacon Tap



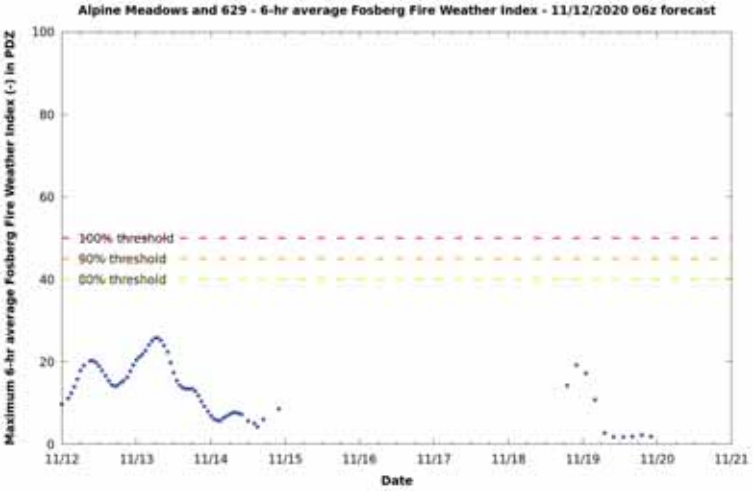


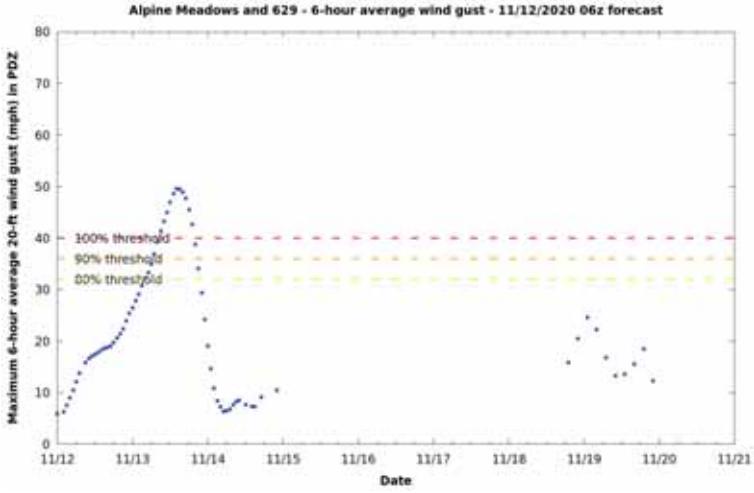
Glenshire and 608



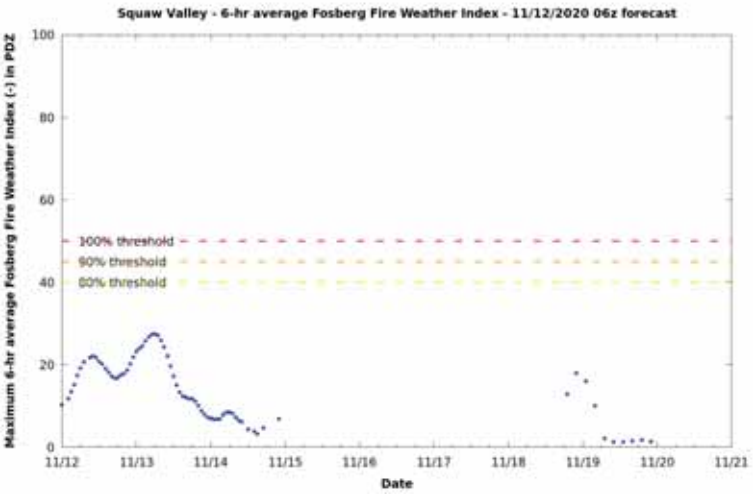


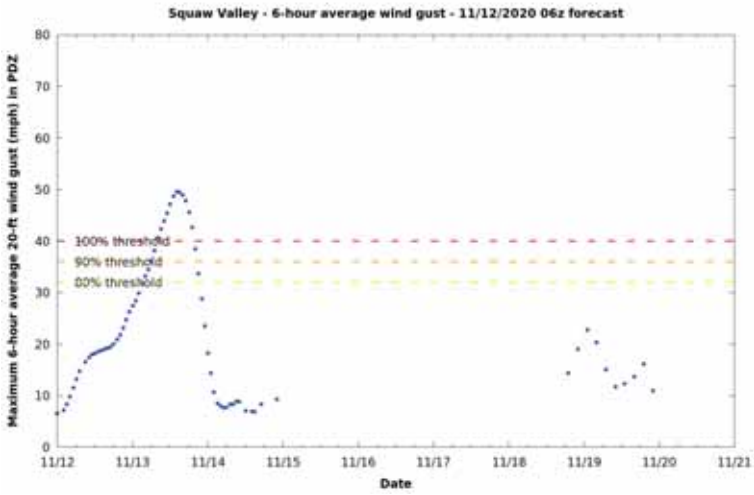
Alpine Meadows and 629



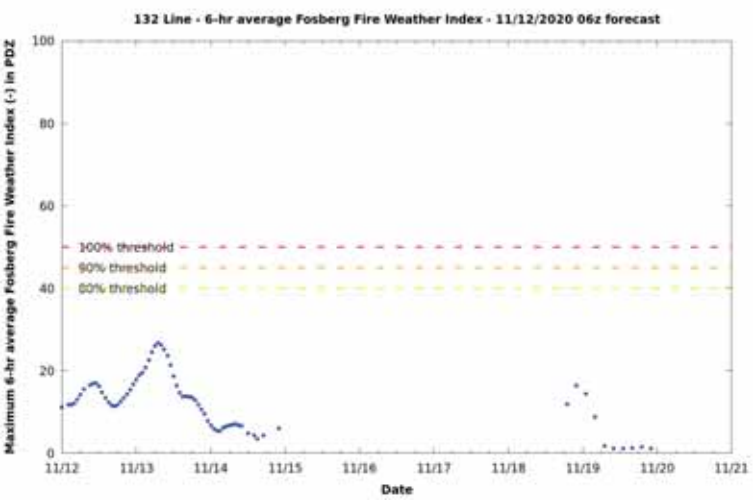


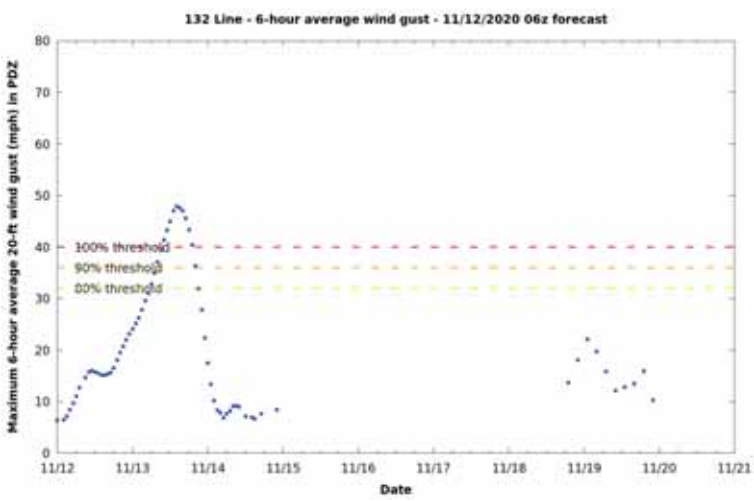
Squaw Valley



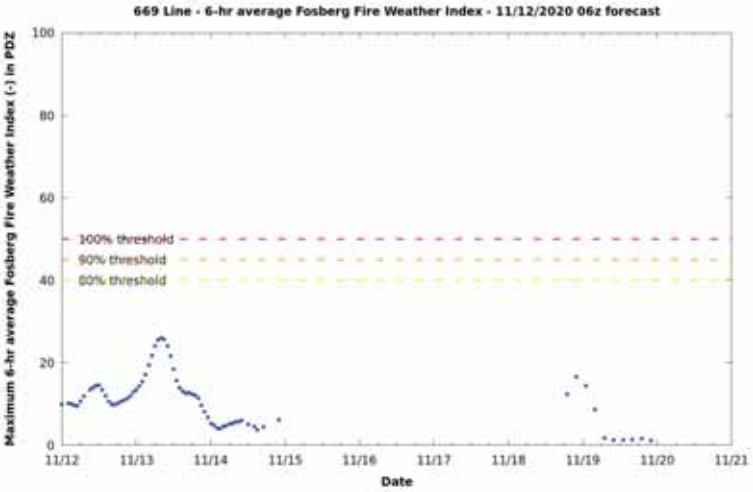


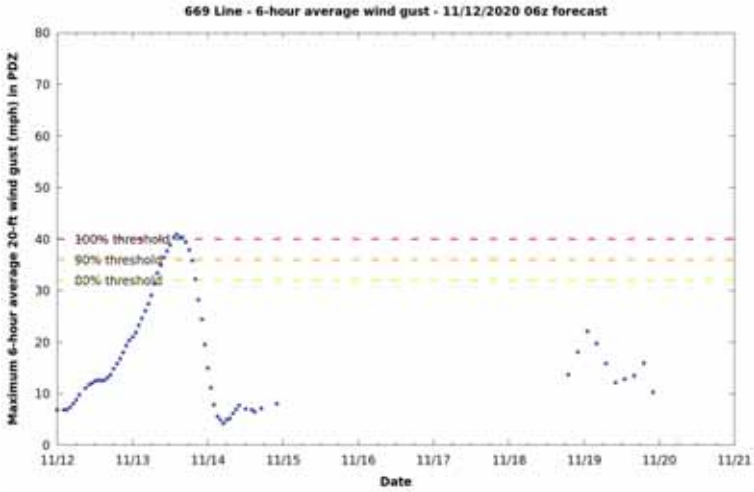
132 Line



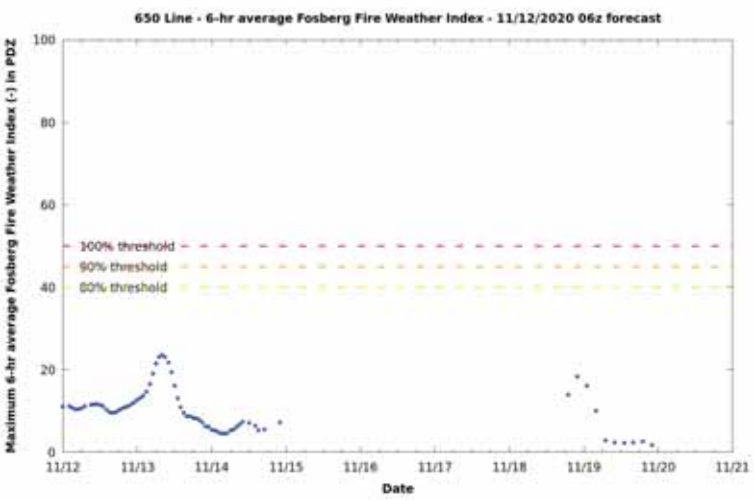


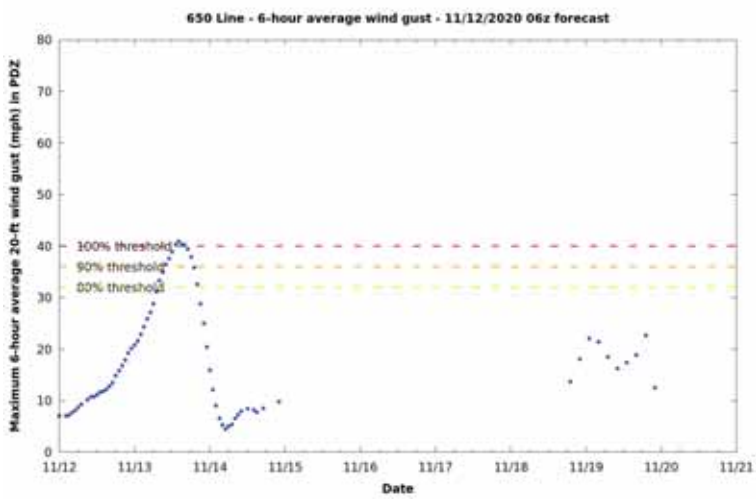
669 Line



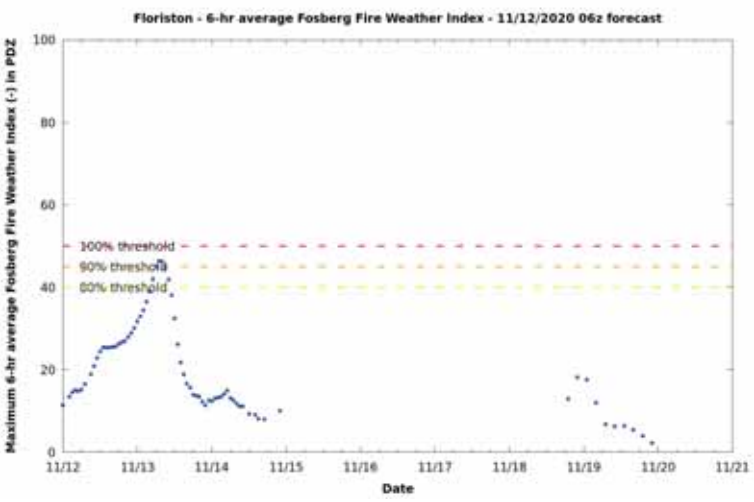


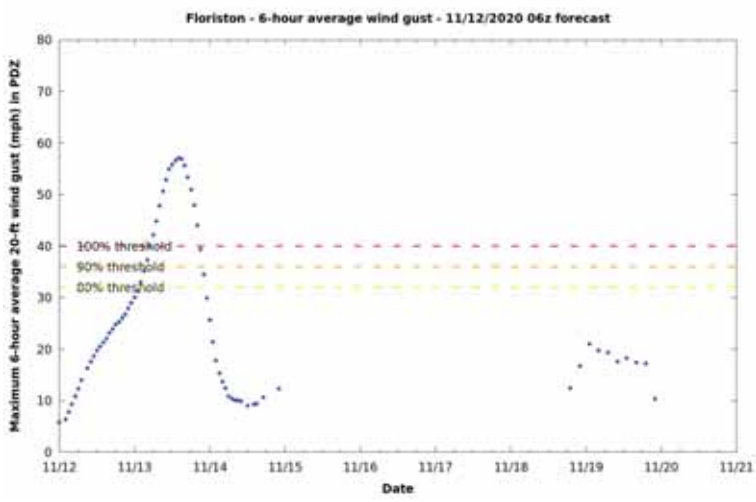
650 Line



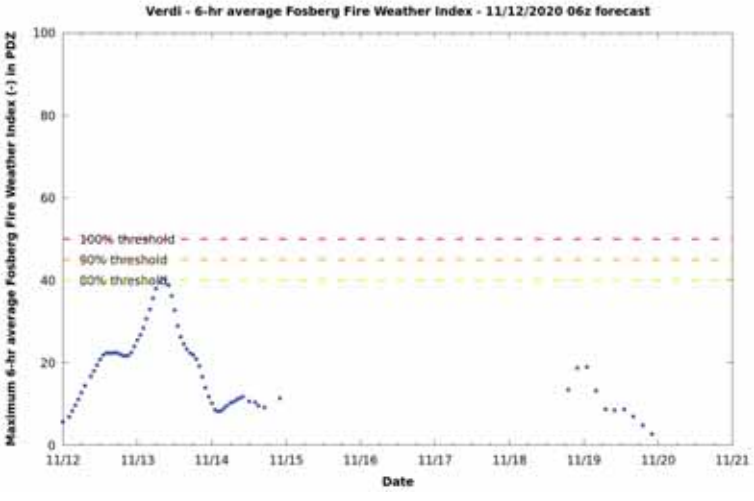


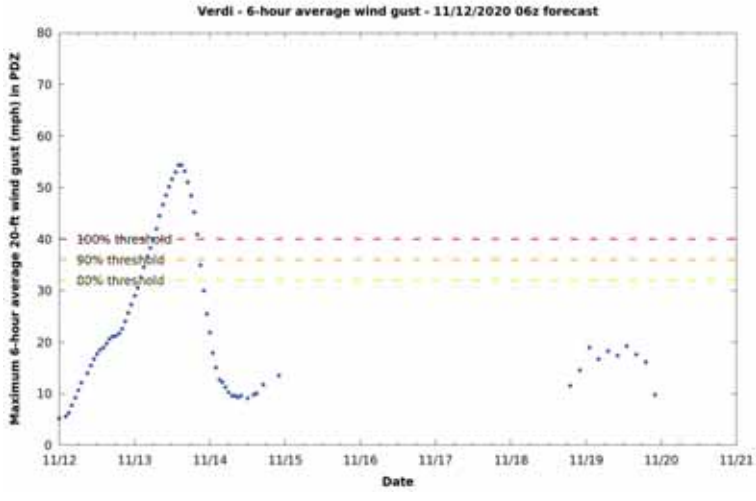
Floriston



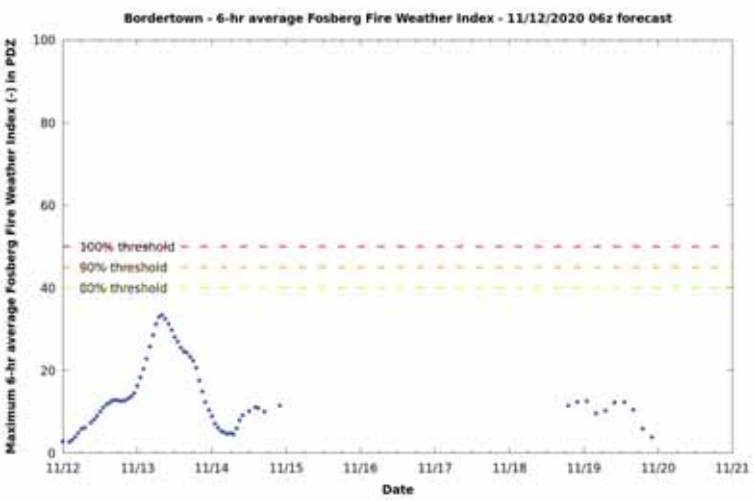


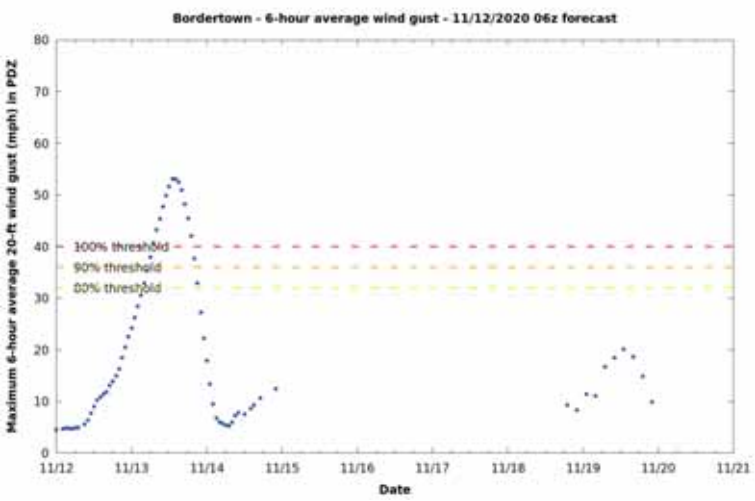
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/12/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/12/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/12/20 - 11/18/20

Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	moderate	moderate	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	moderate	moderate	low	low	low	low	low

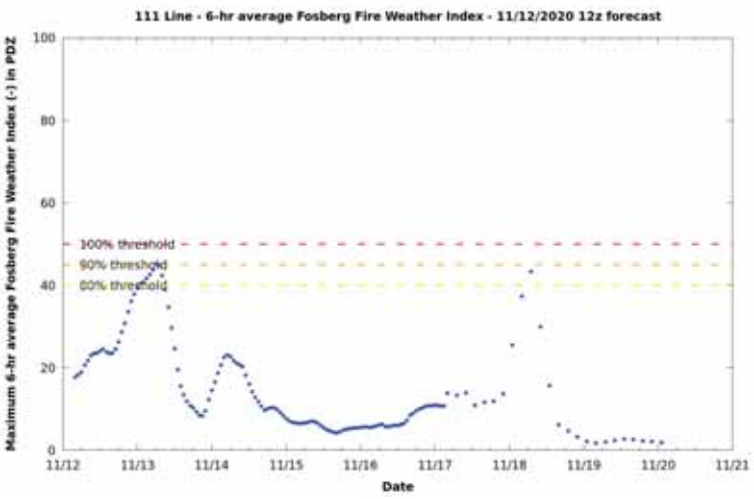
Liberty Utilities Energy Release Component Forecast for 11/12/20 - 11/18/20

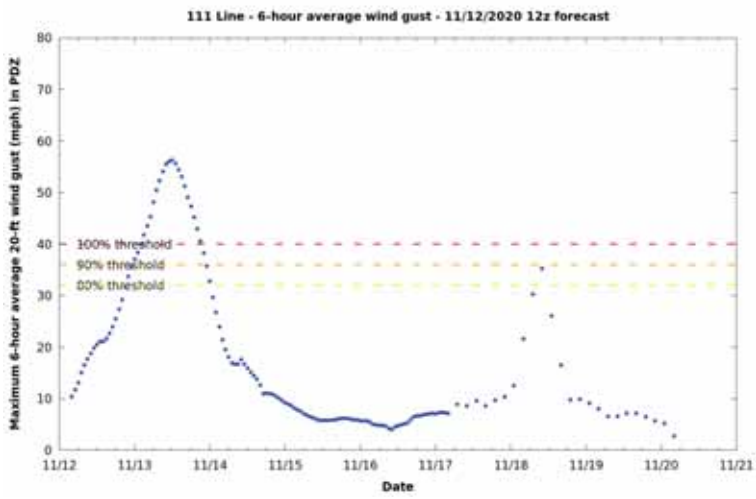
Zone	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	66.0	60.0	55.0	51.0	52.0	56.0	54.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	62.0	48.0	43.0	38.0	36.0	39.0	34.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	58.0	58.0	54.0	50.0	54.0	56.0	56.0

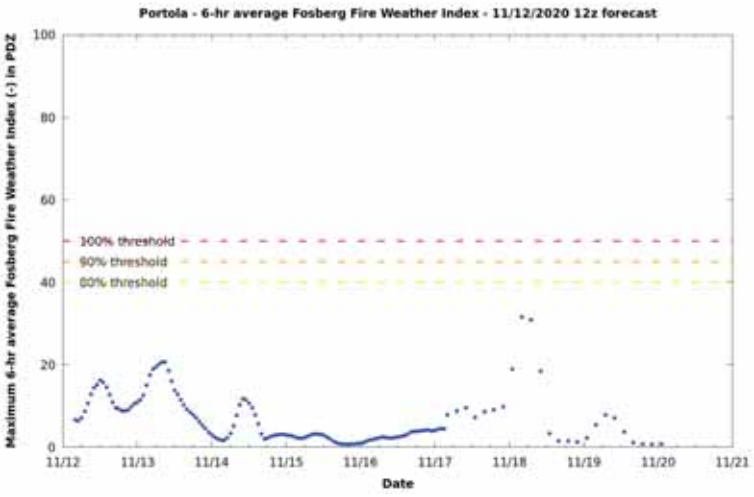
Liberty Utilities Fire Weather Summary Plots - 11/12/2020 12z forecast

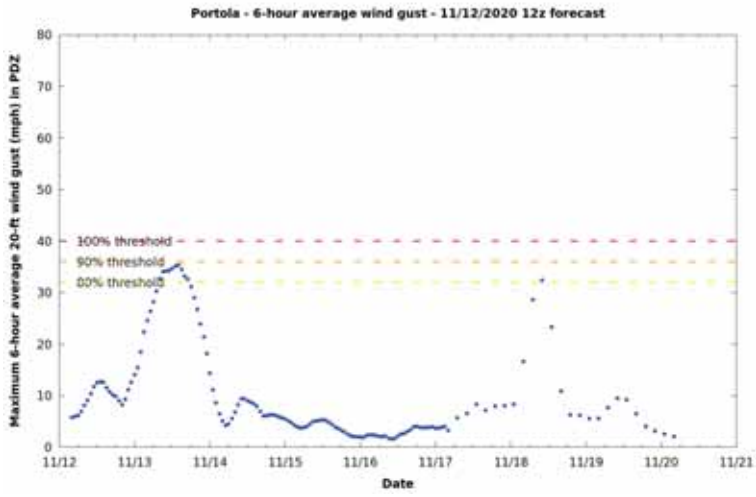
111 Line



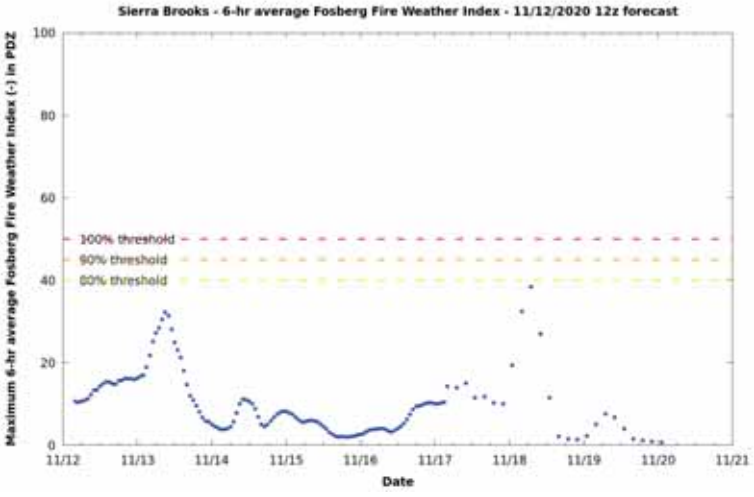


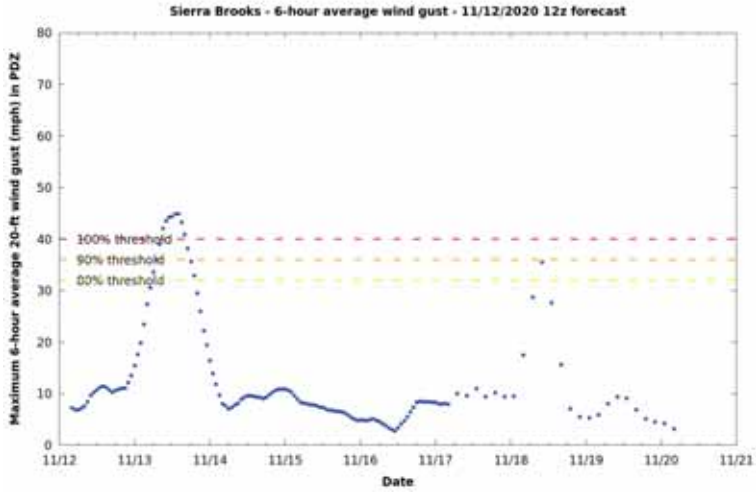
Portola



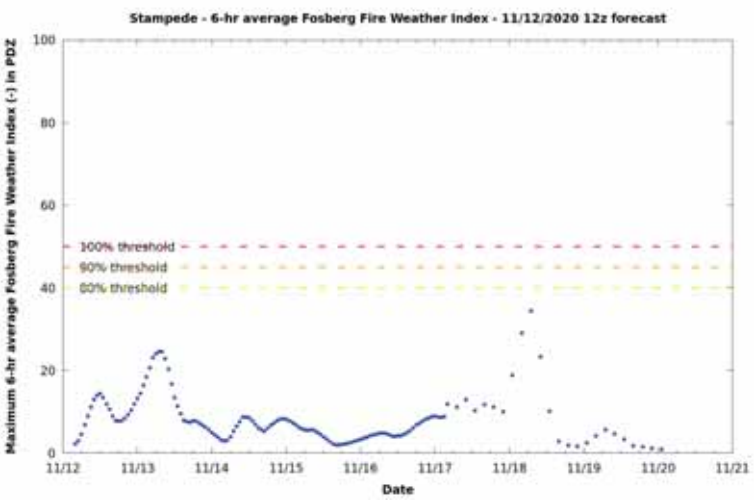


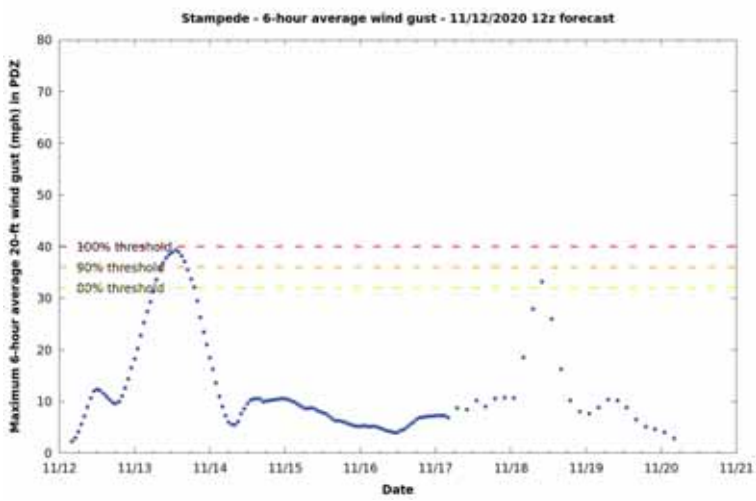
Sierra Brooks



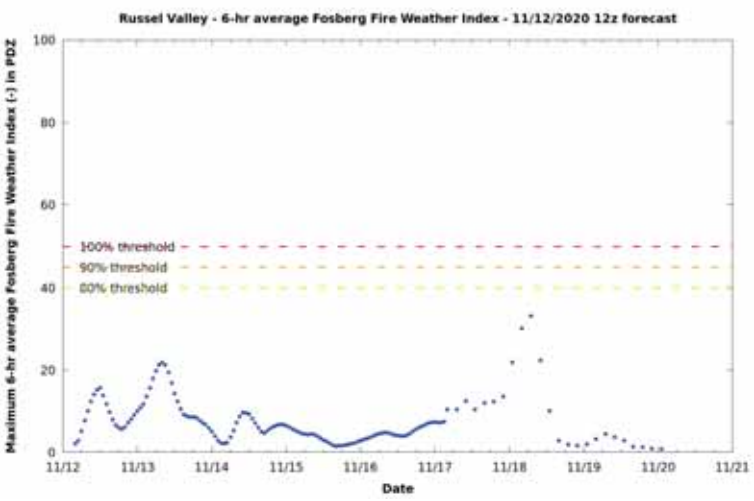


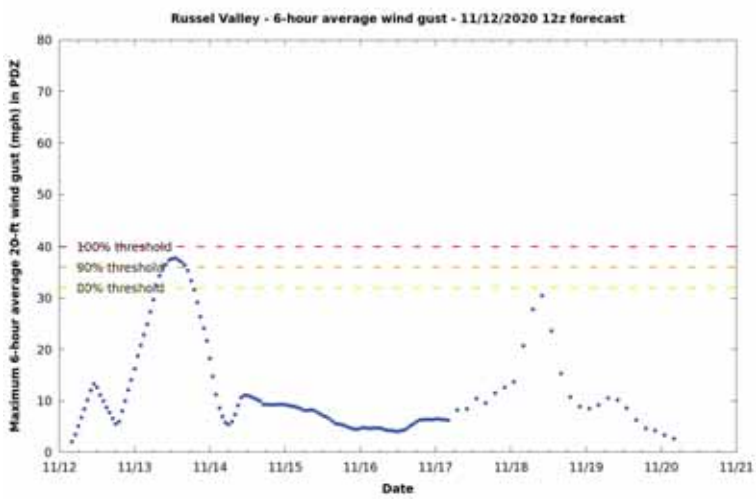
Stampede



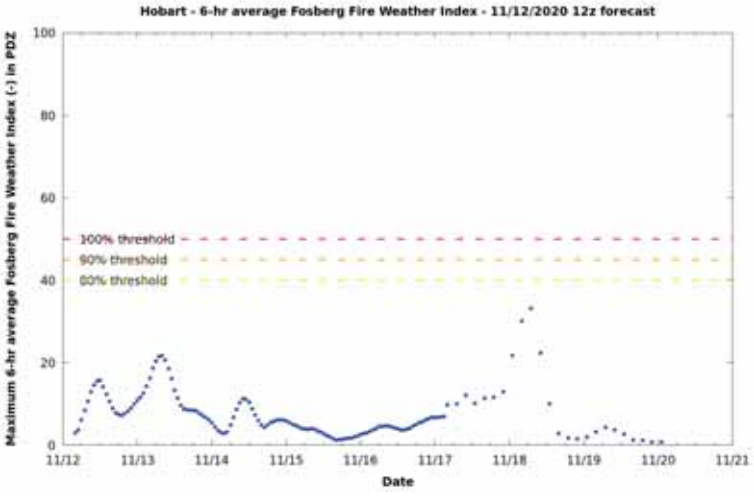


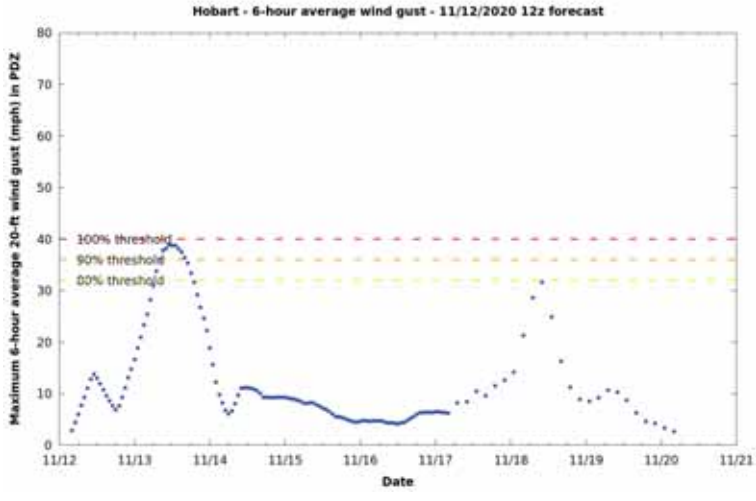
Russell Valley



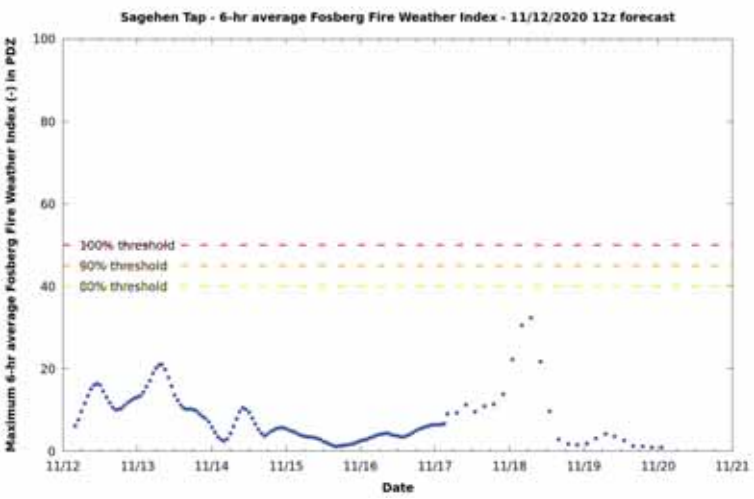


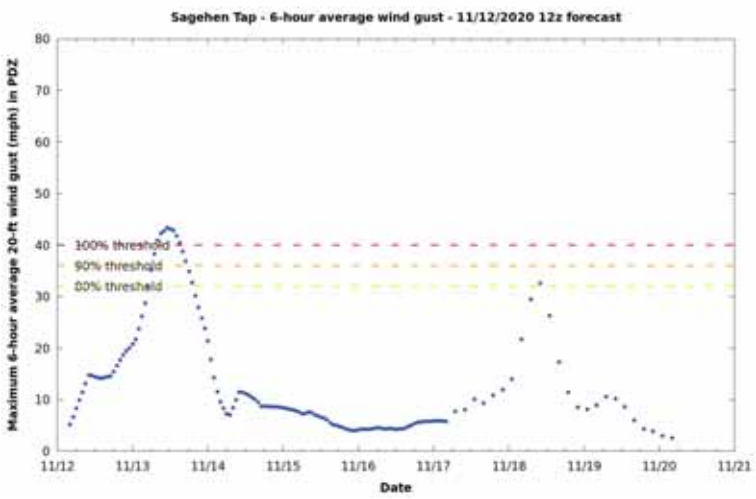
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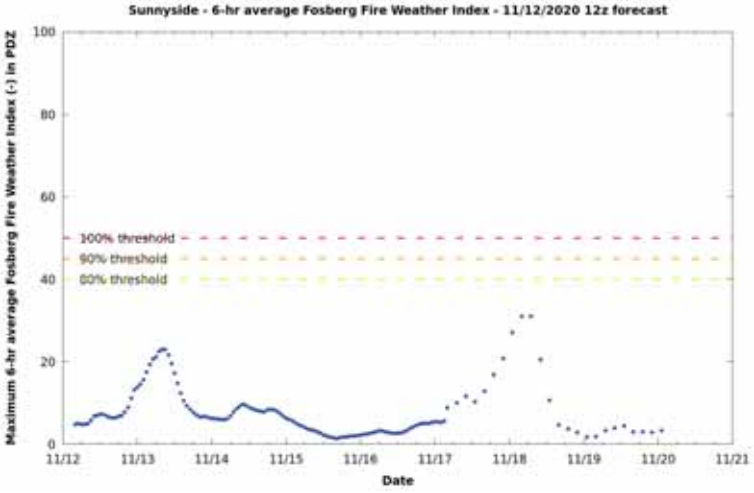


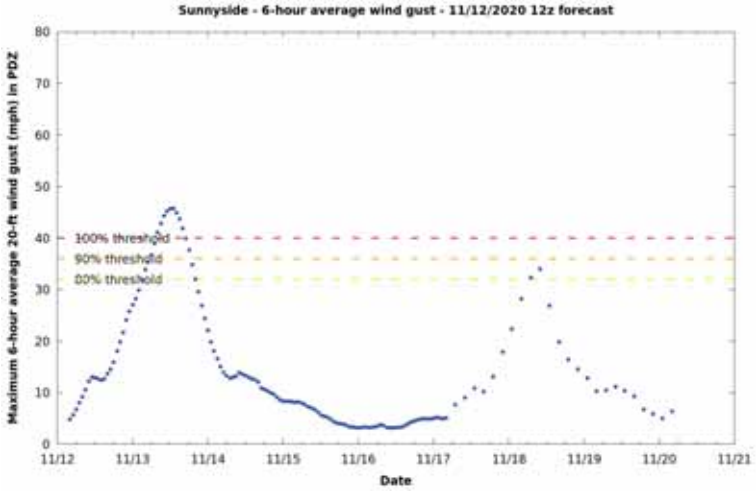
Sagehen tap



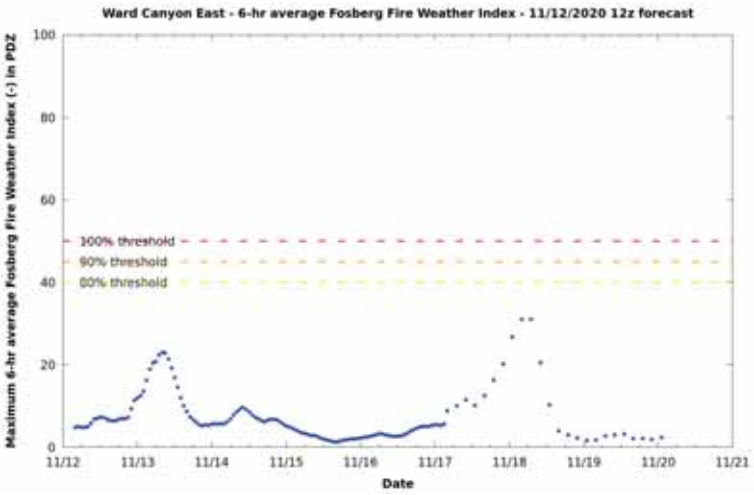


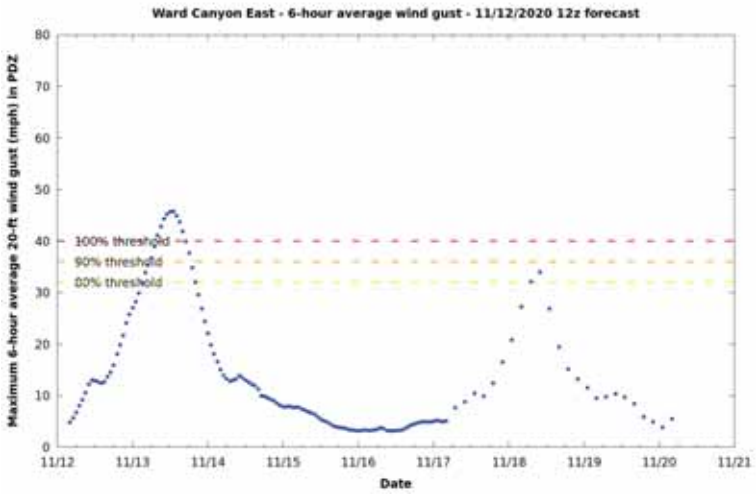
Sunnyside



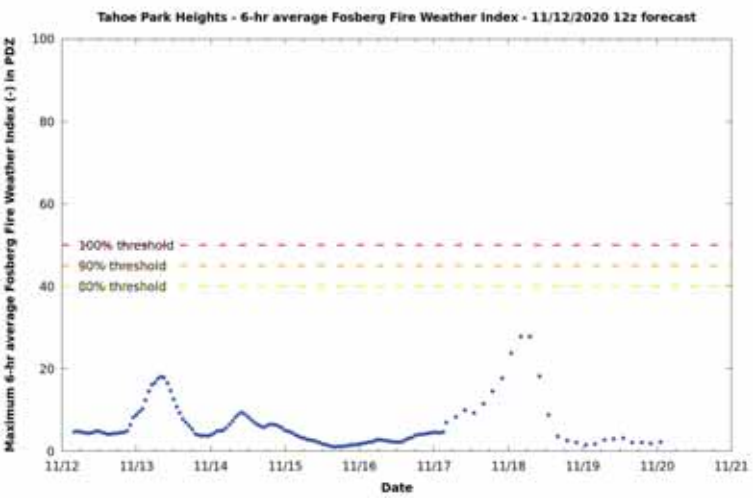


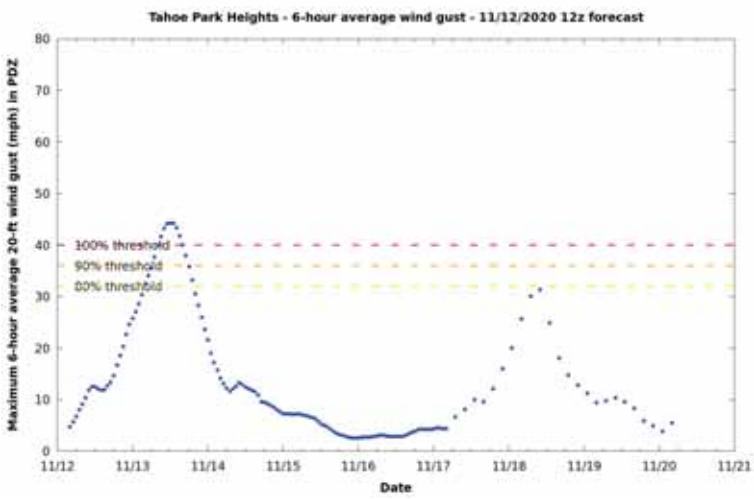
Ward Canyon East



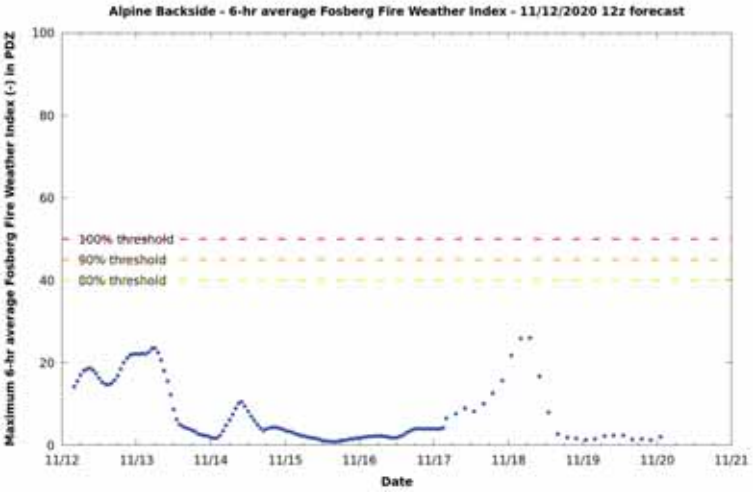


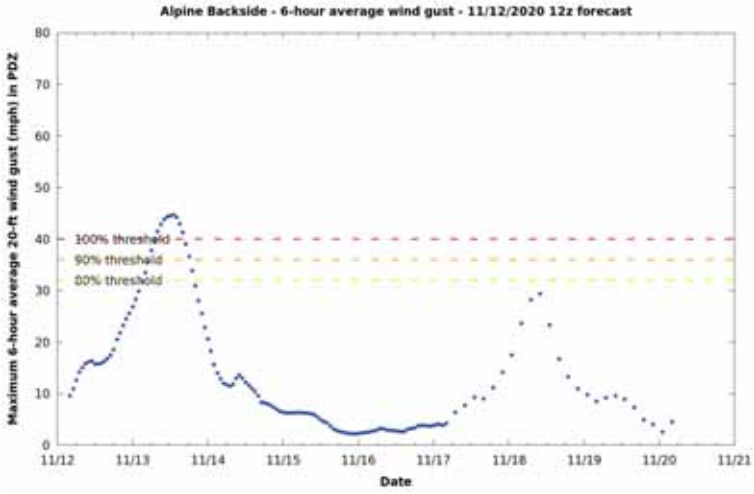
Tahoe Park Heights



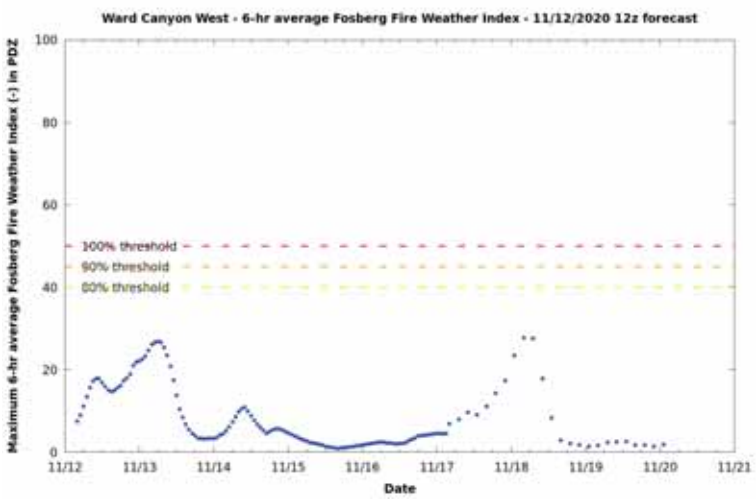


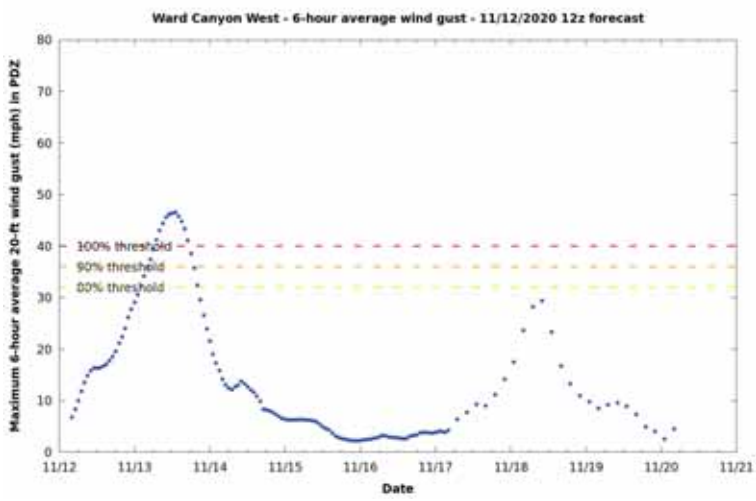
Alpine Backside



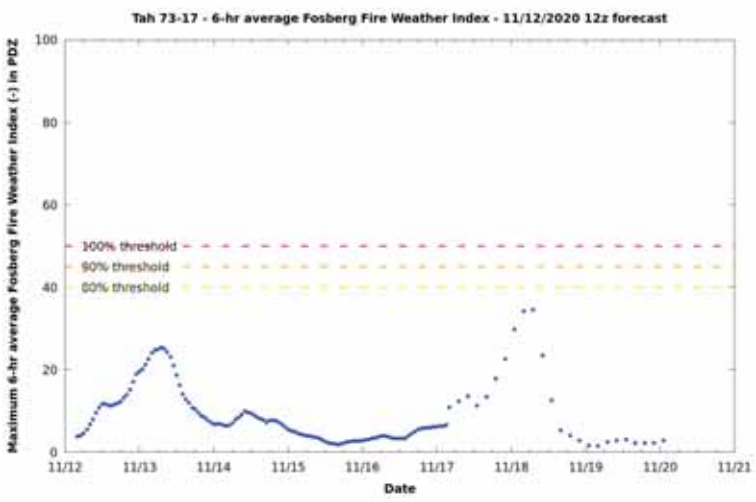


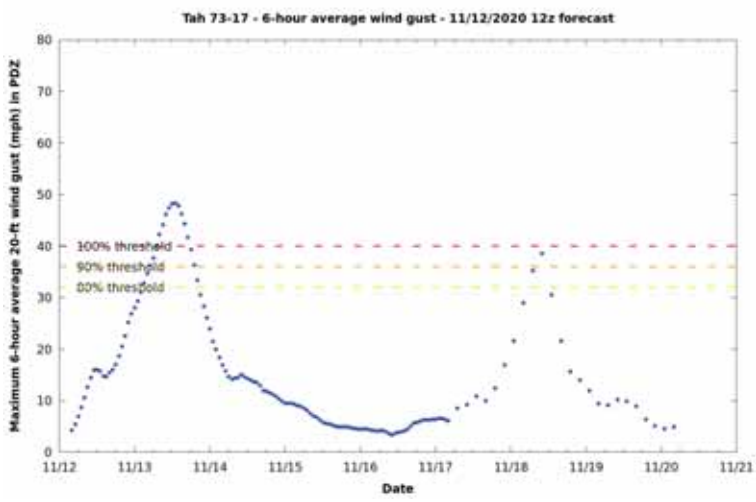
Ward Canyon West



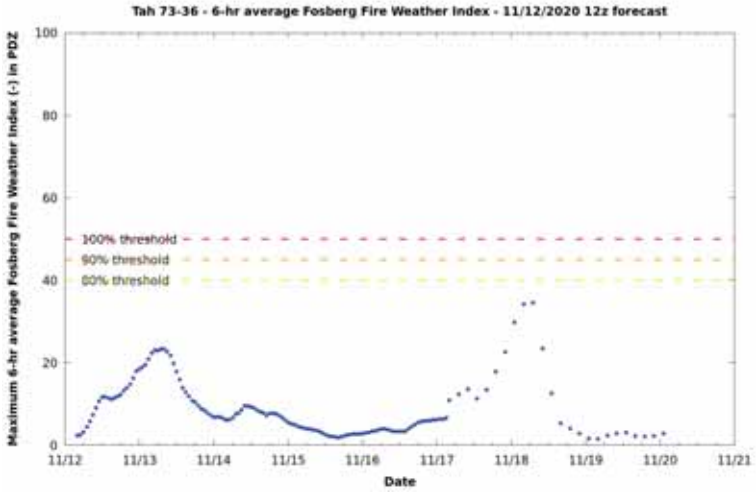


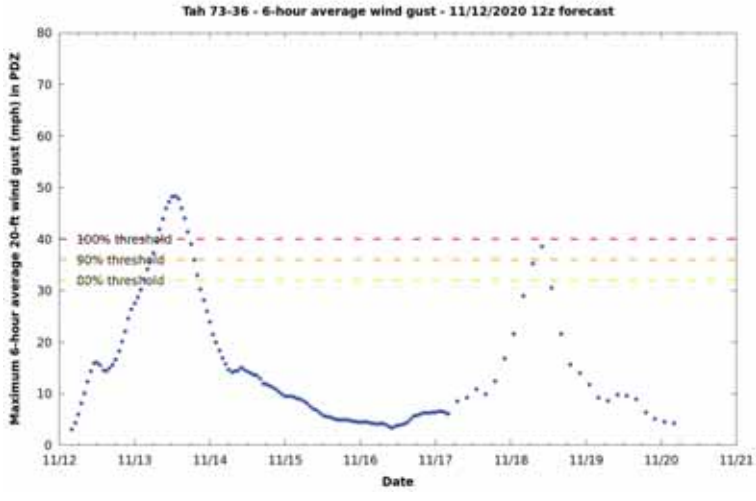
Tah 73-17



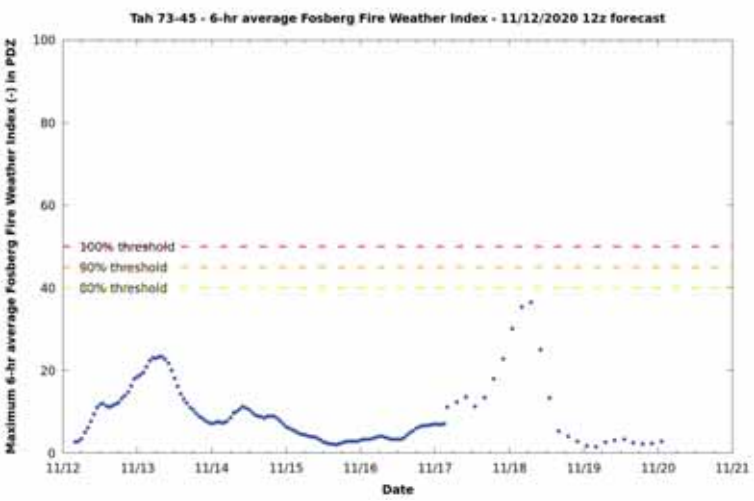


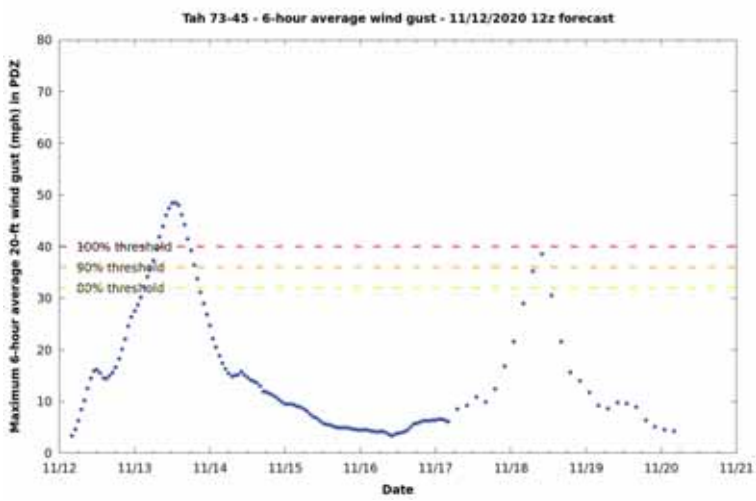
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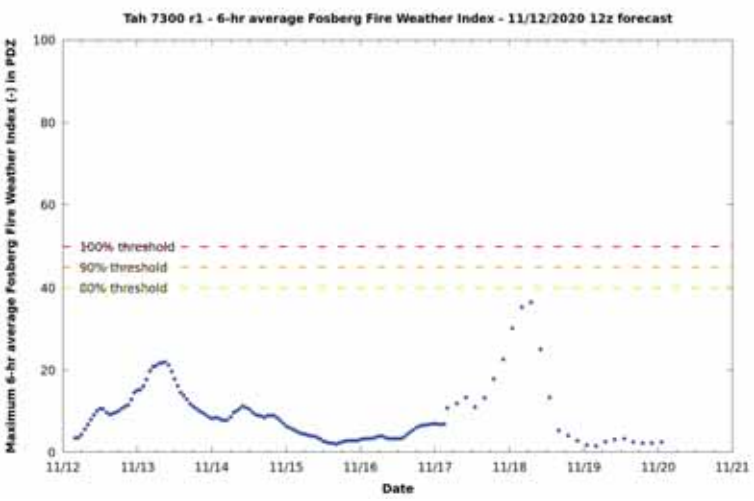


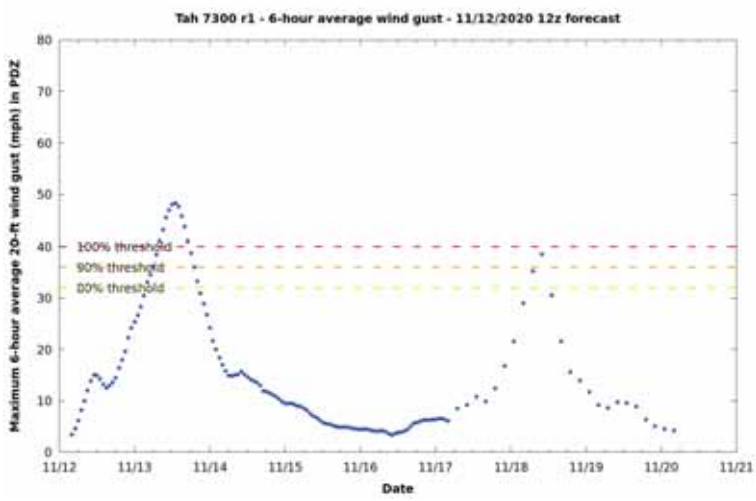
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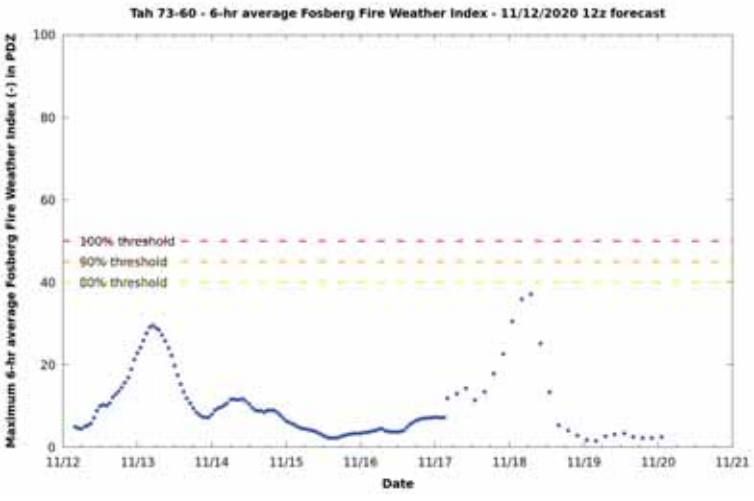


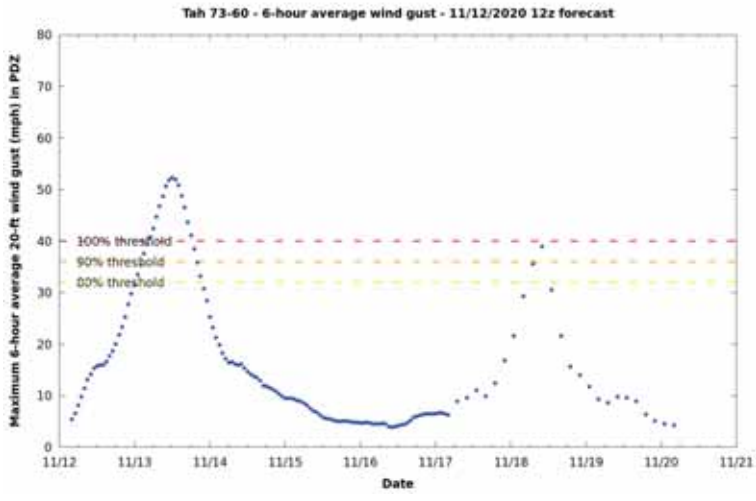
Tah 7300 r1



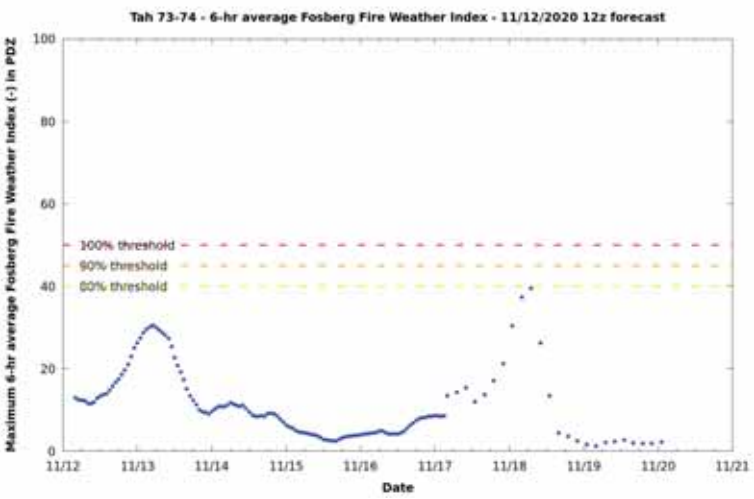


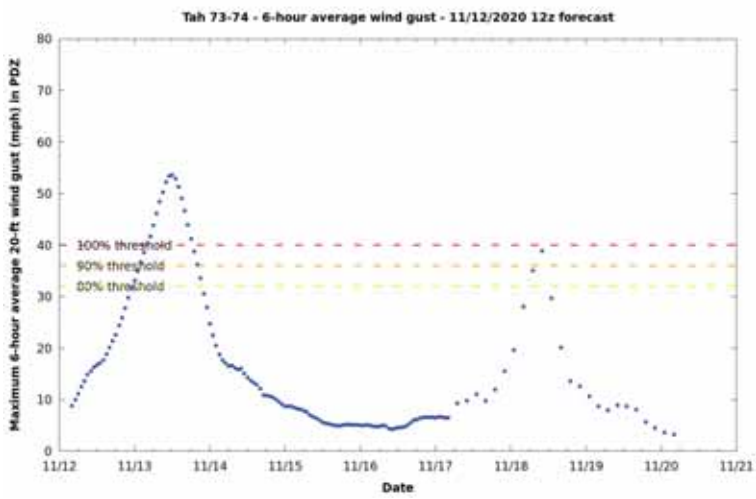
Tah 73-60



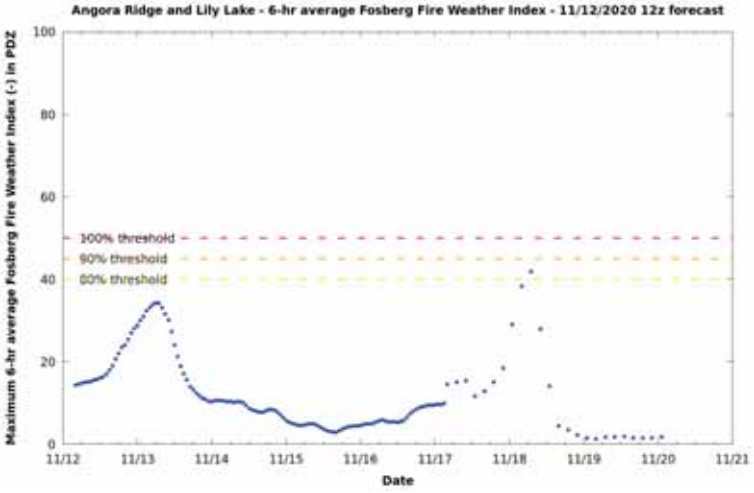


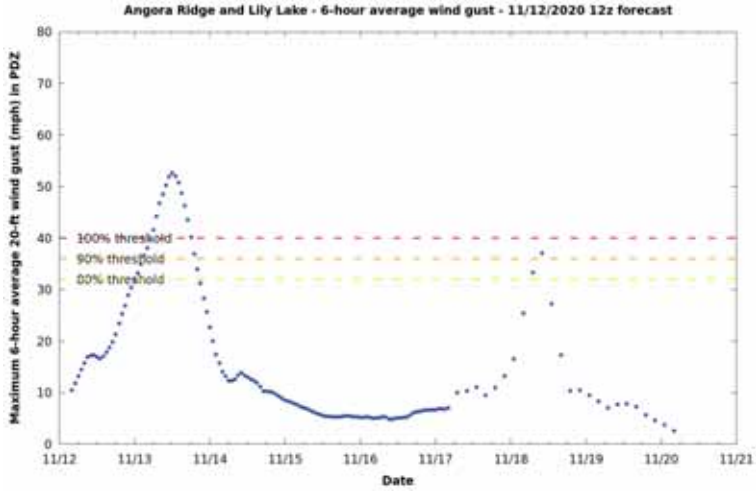
Tah 73-74



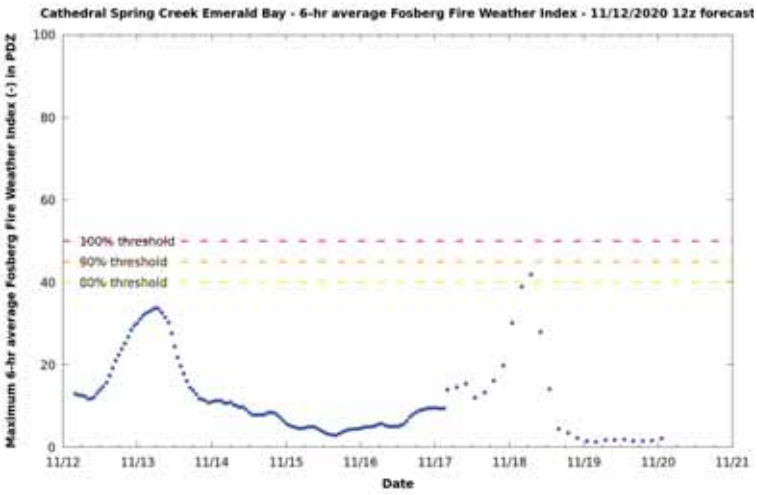


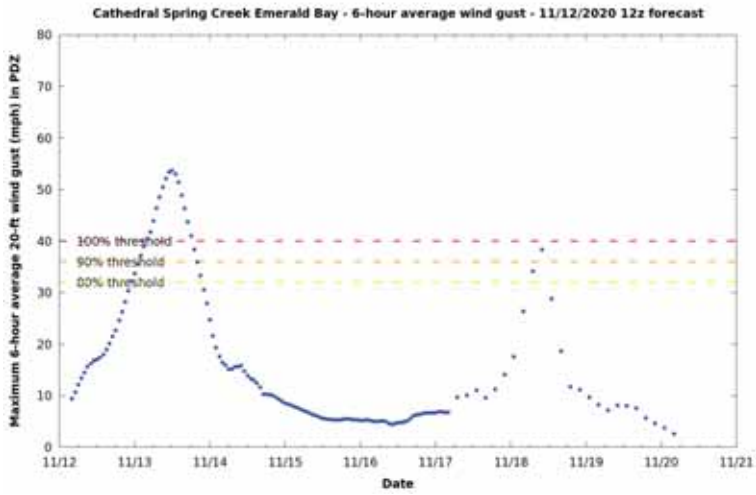
Angora Ridge and Lily Lake



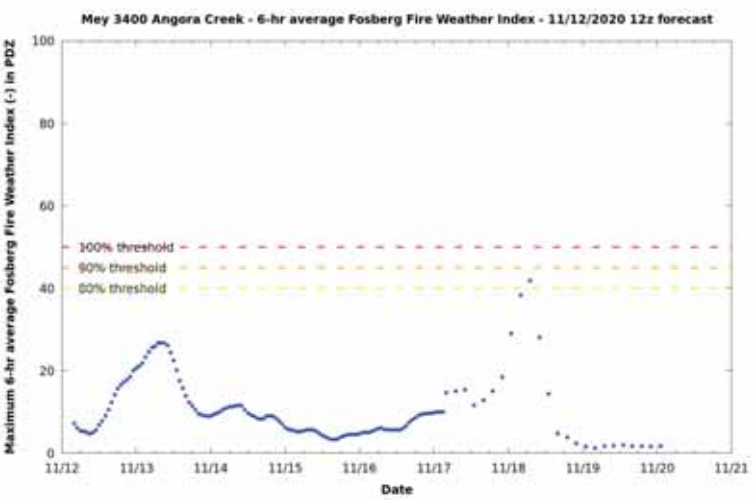


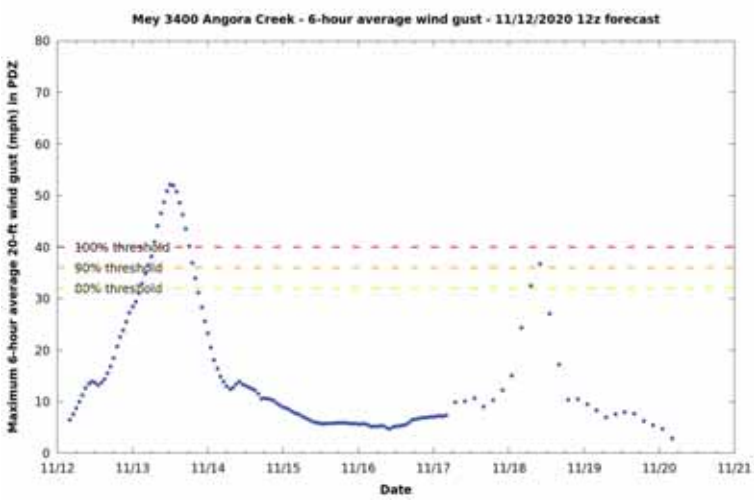
Cathedral Spring Creek Emerald Bay



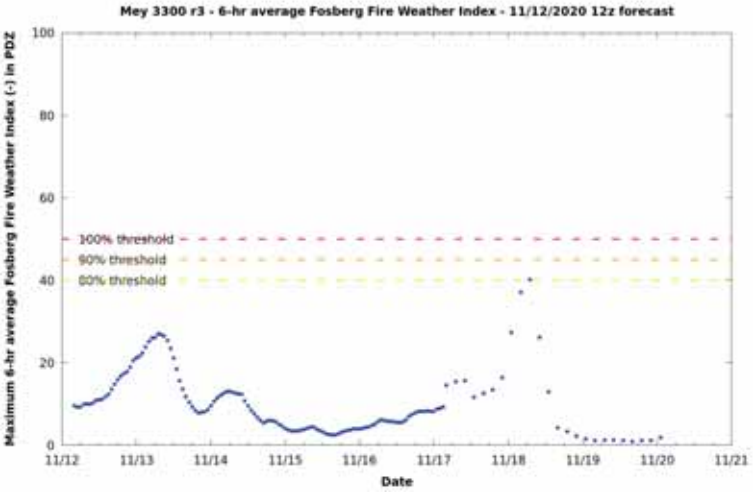


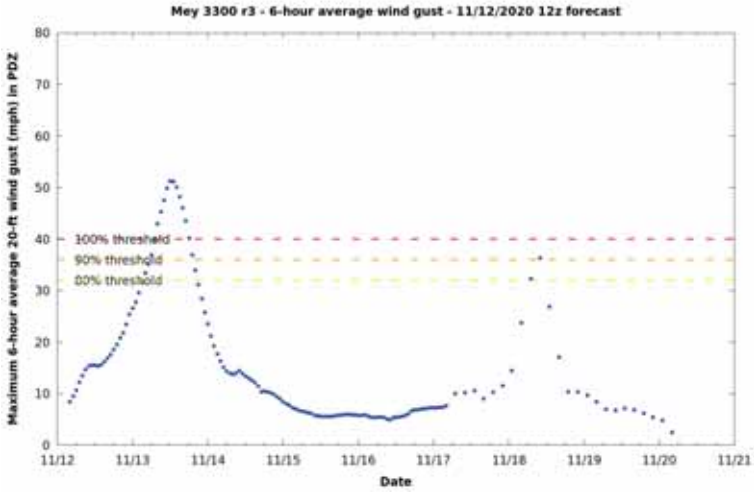
Mey 3400 Angora Creek



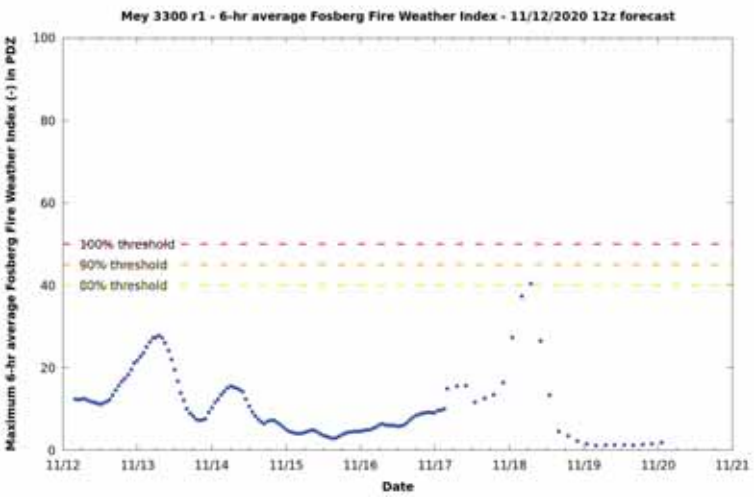


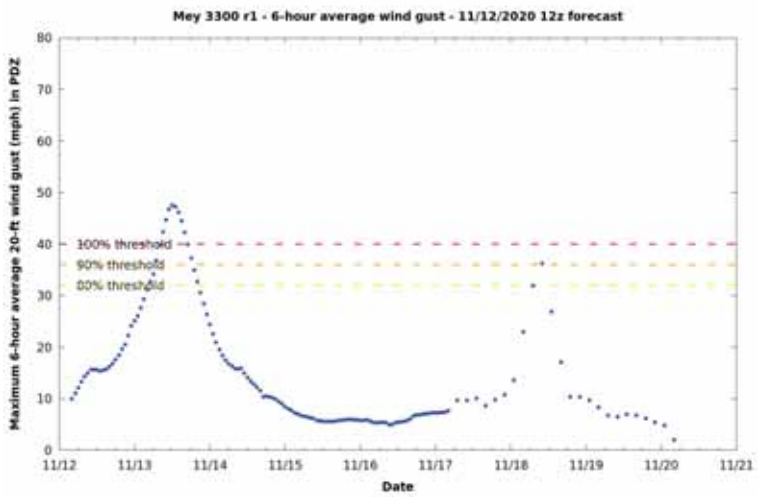
Mey 3300 r3



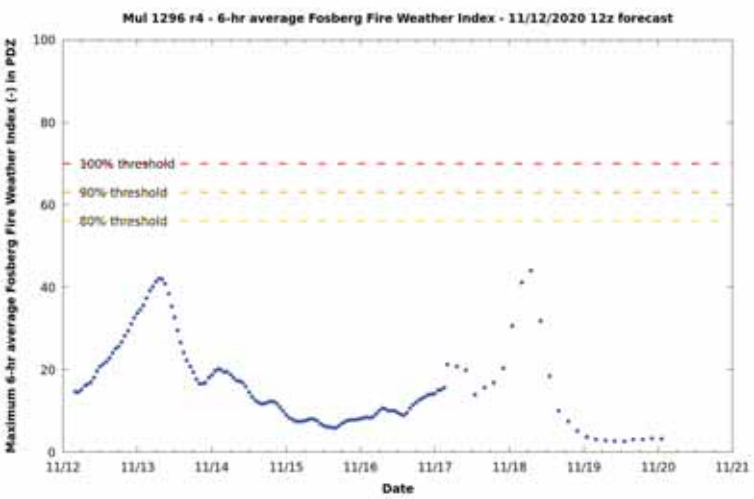


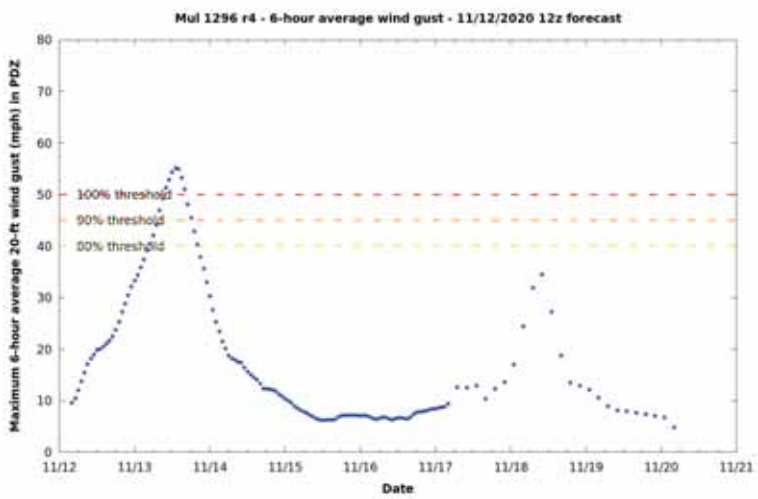
Mey 3300 r1



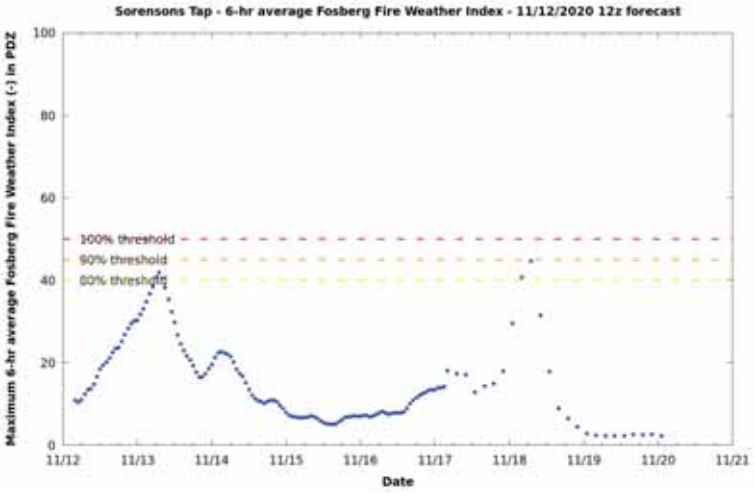


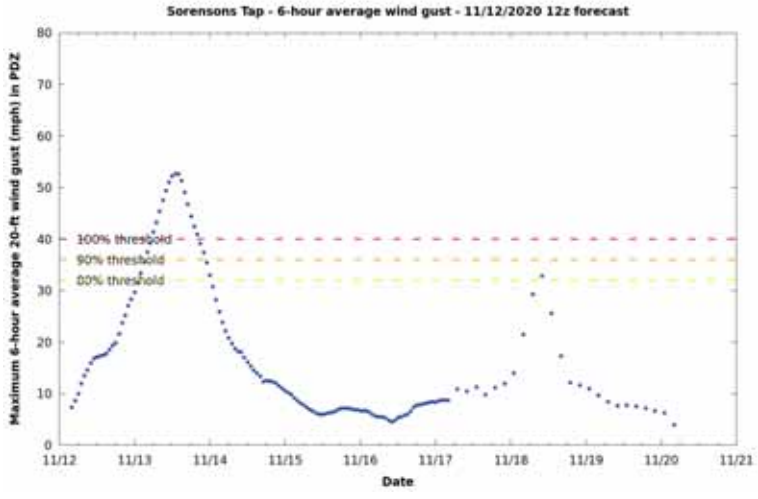
Mul 1296 r4



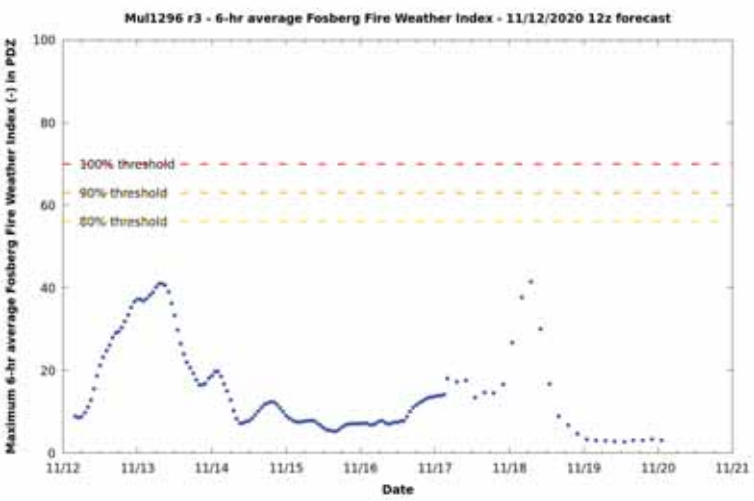


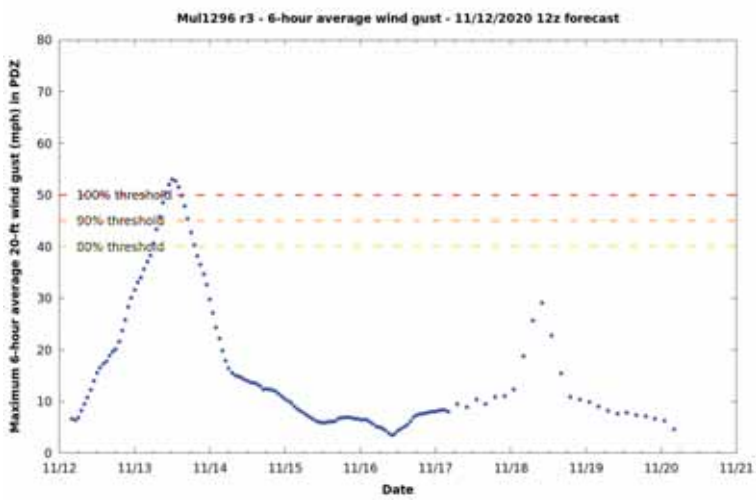
Sorensons Tap



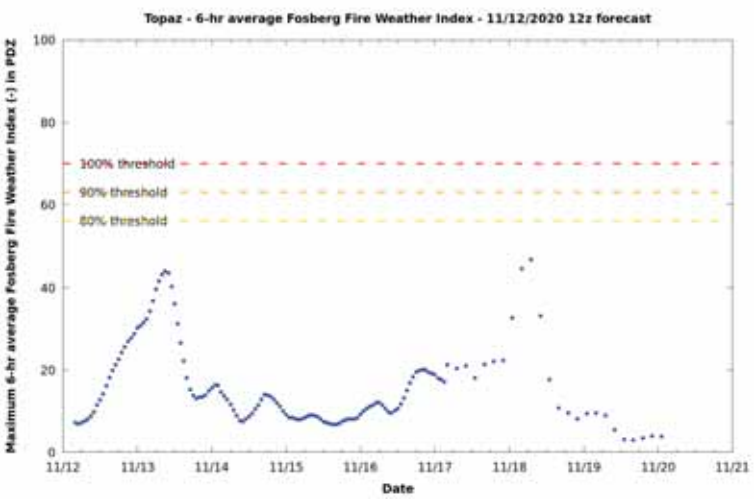


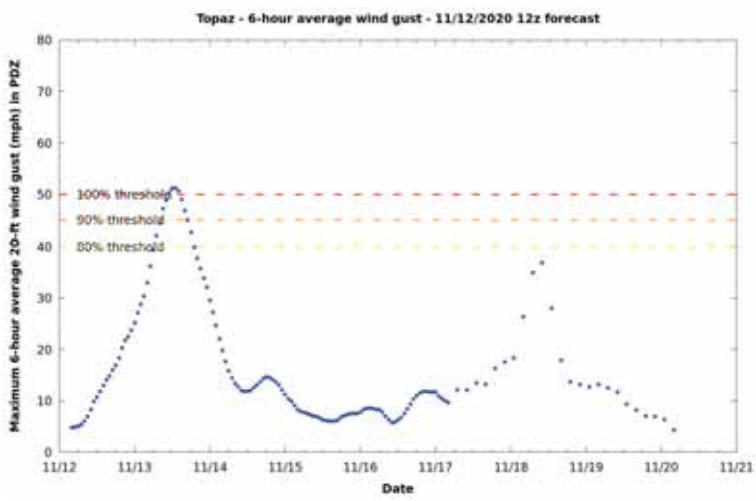
Mul 1296 r3



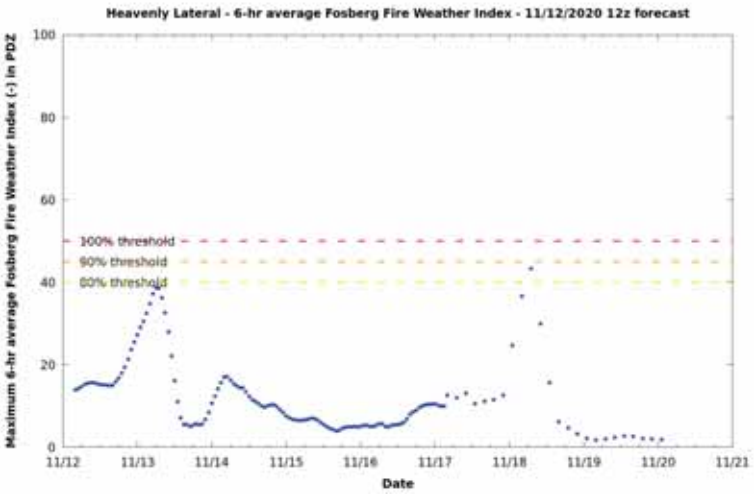


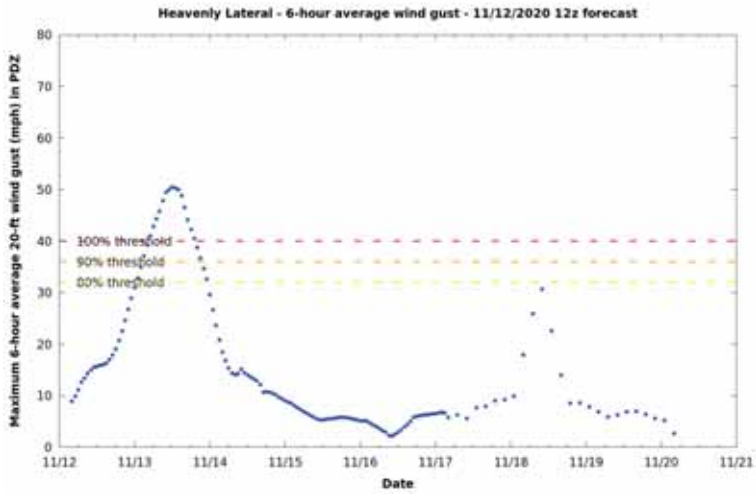
Topaz



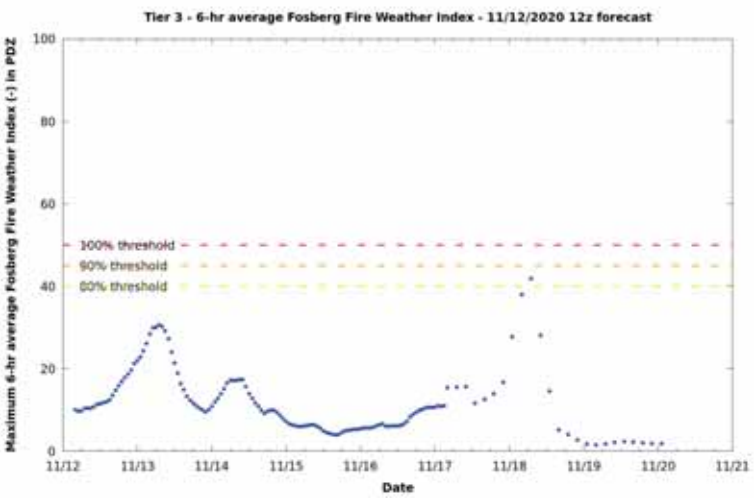


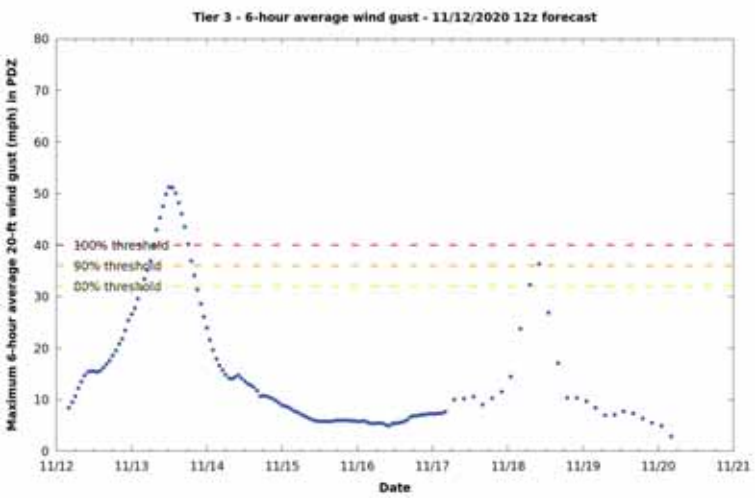
Heavenly Lateral



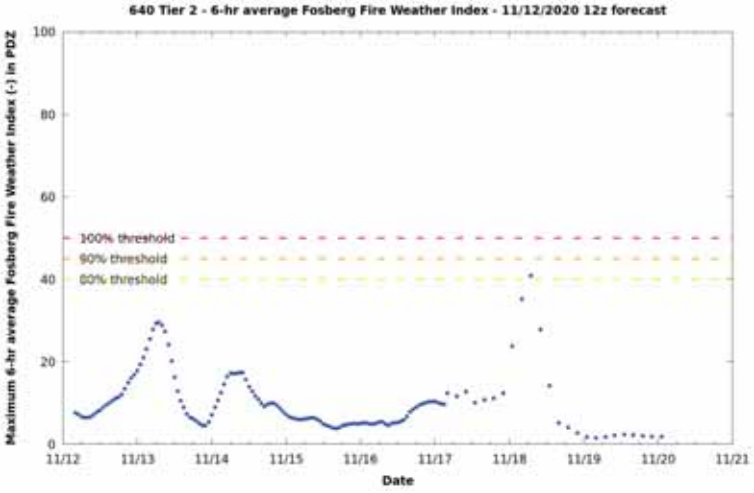


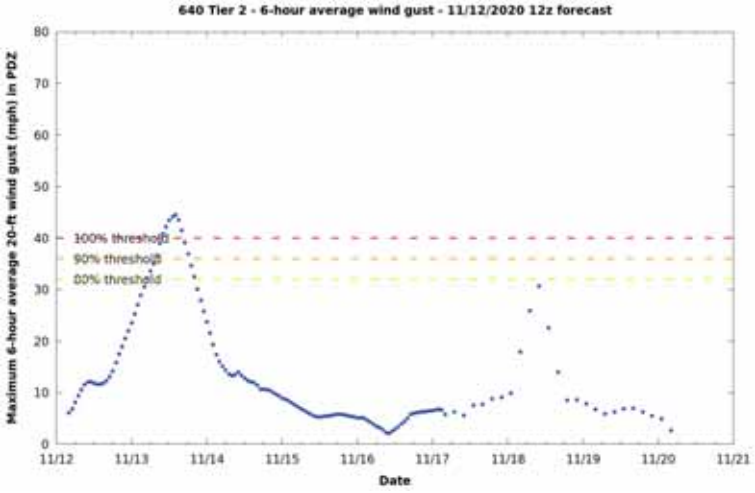
Tier 3



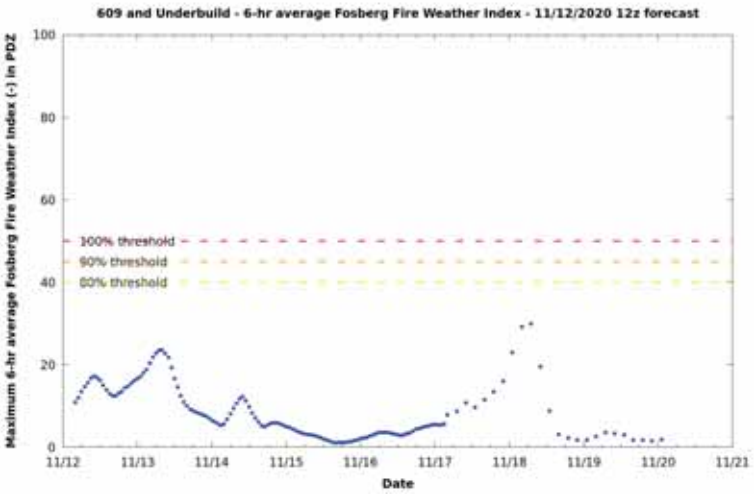


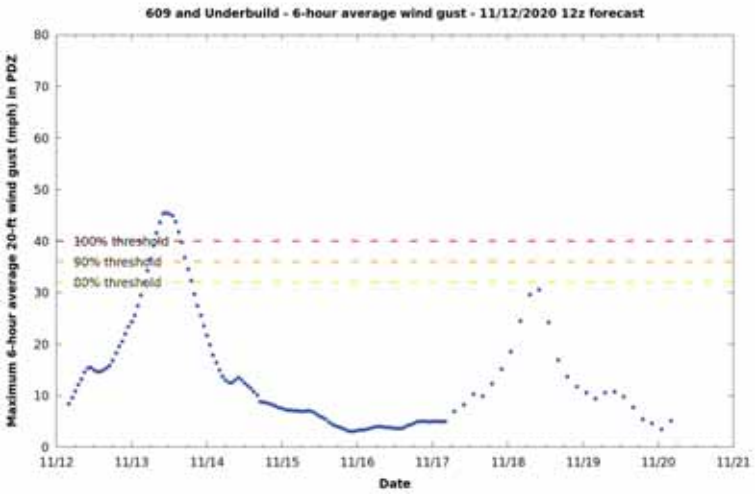
640 Tier 2



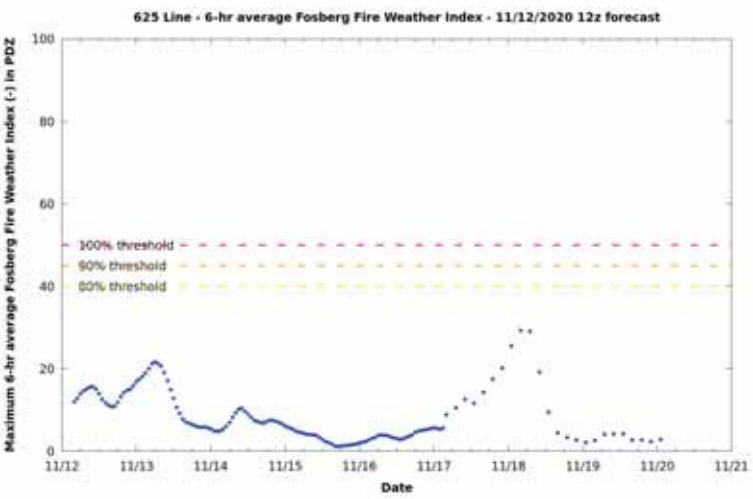


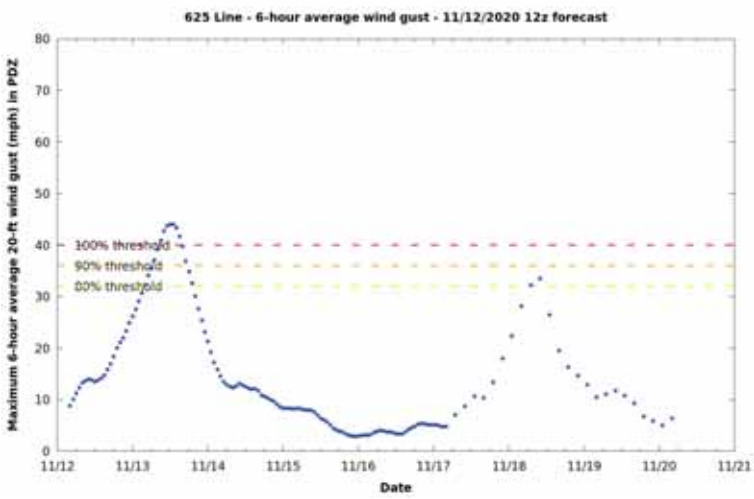
609 and Underbuild



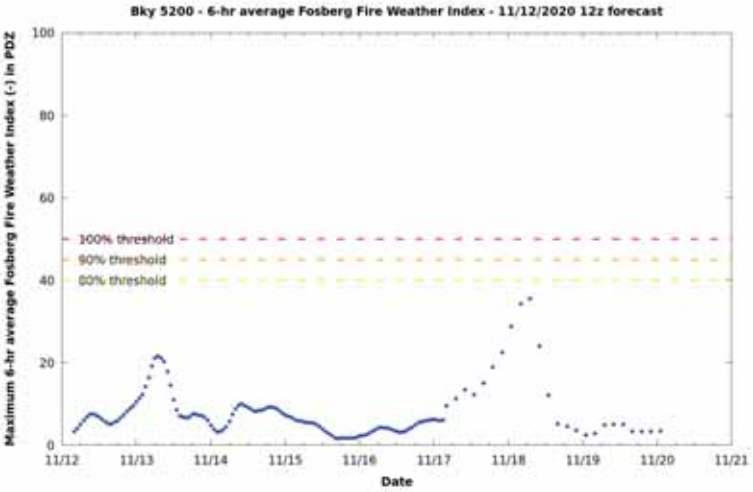


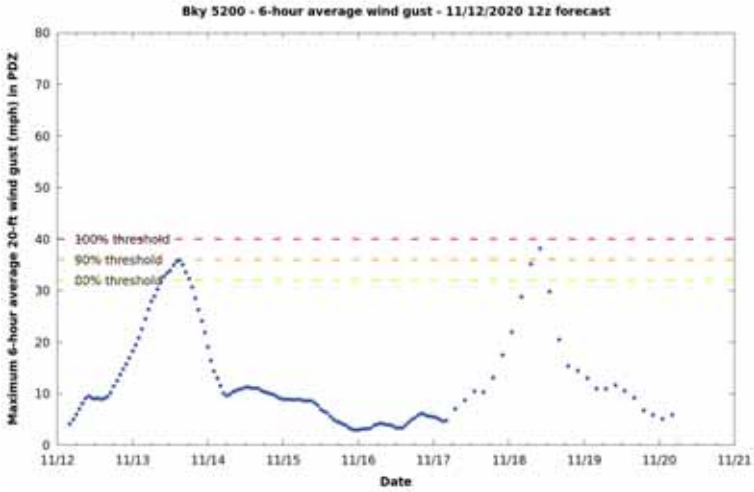
625 Line



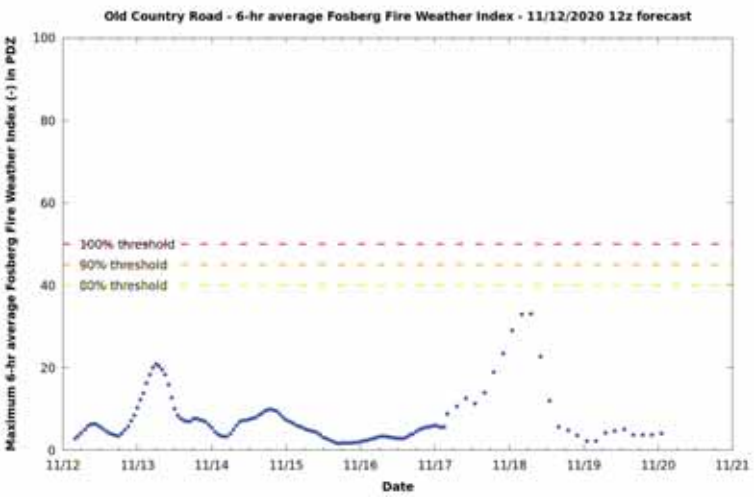


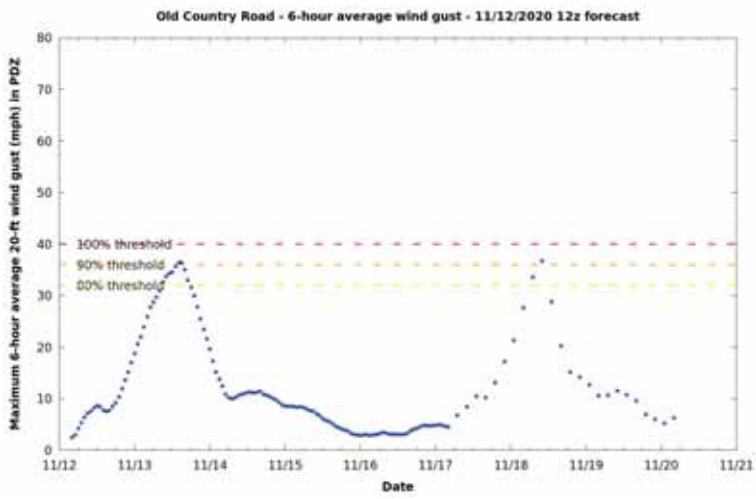
Bky 5200



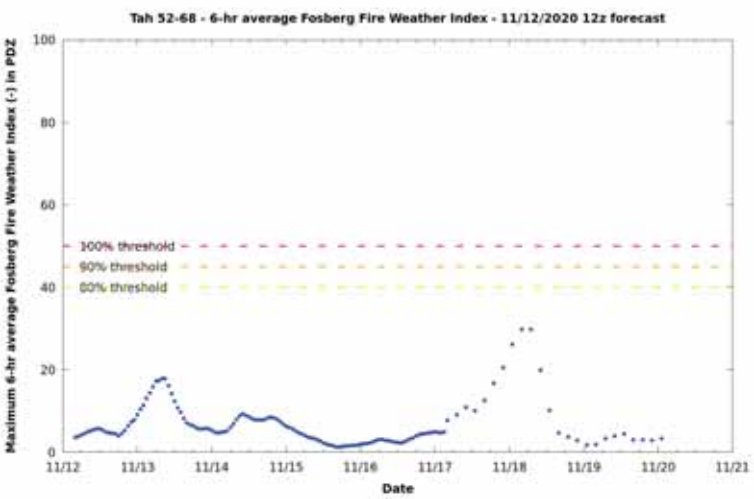


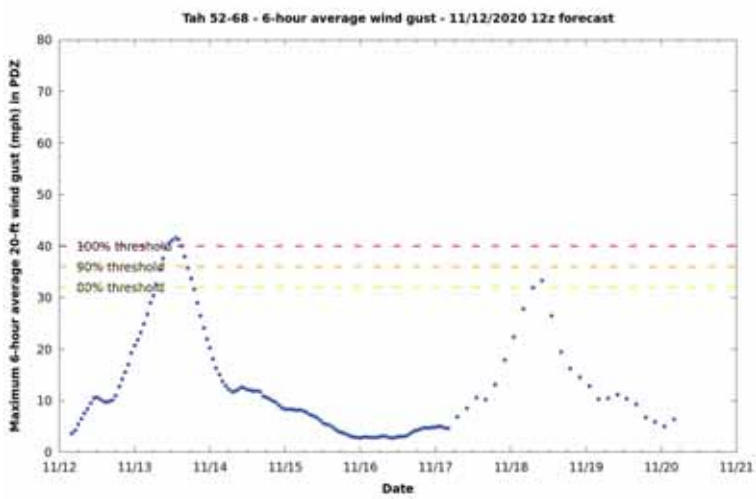
Old Country Road



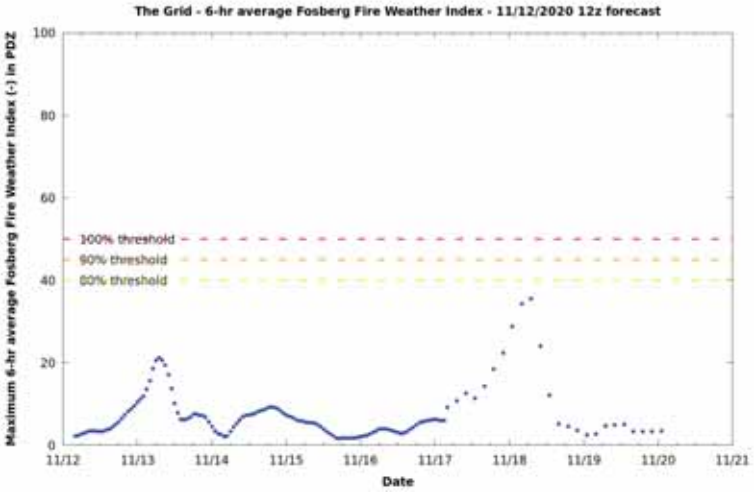


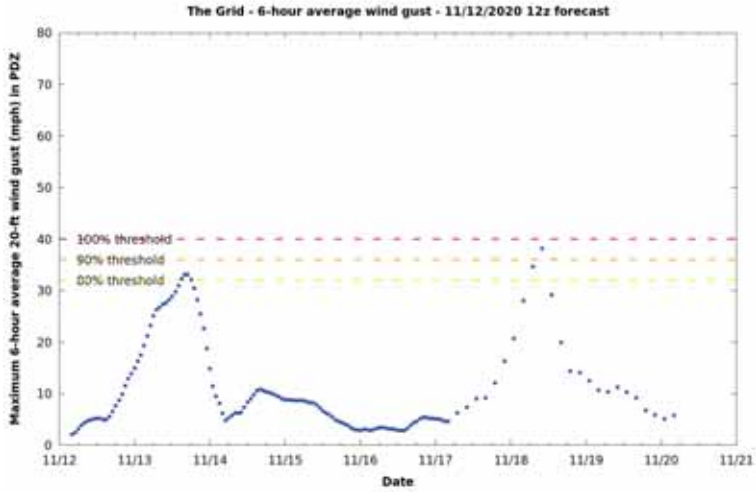
Tah 52-68



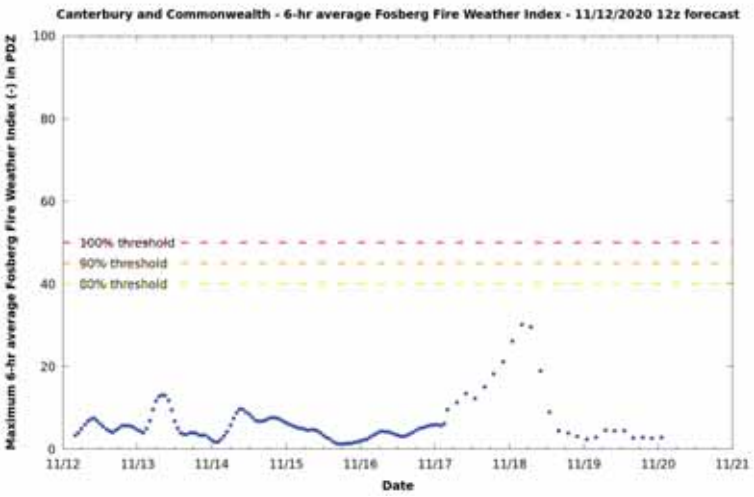


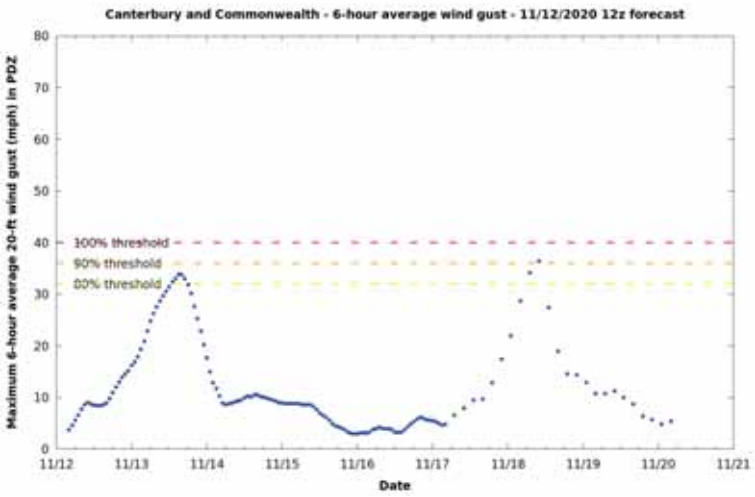
The Grid



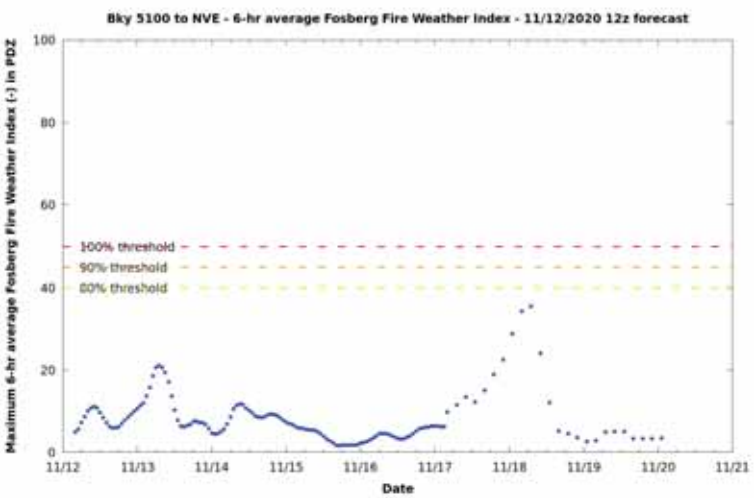


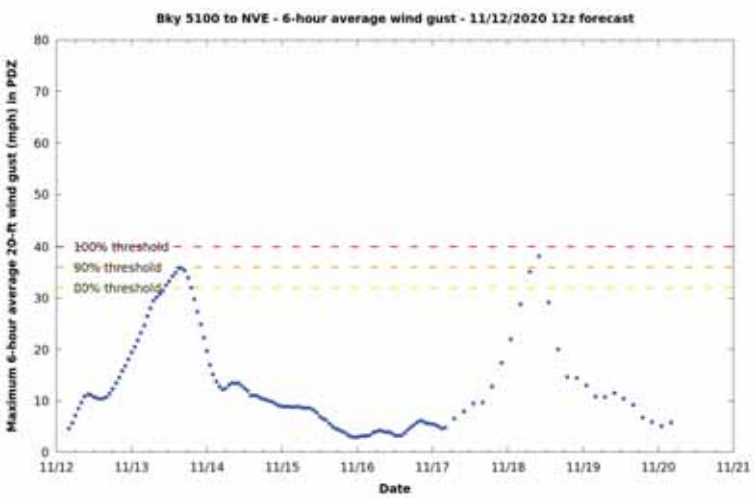
Canterbuy and Commonwealth



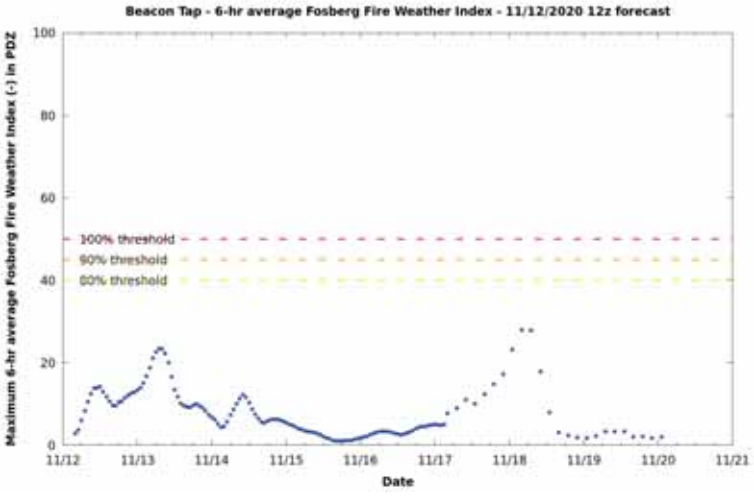


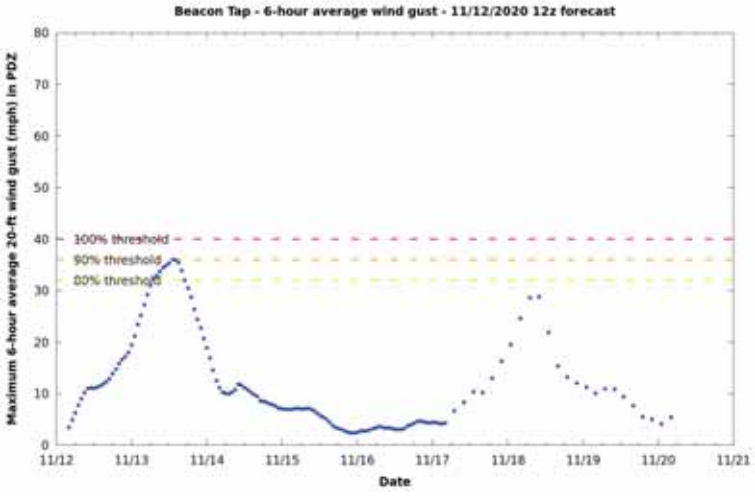
Bky 5100 to NVE



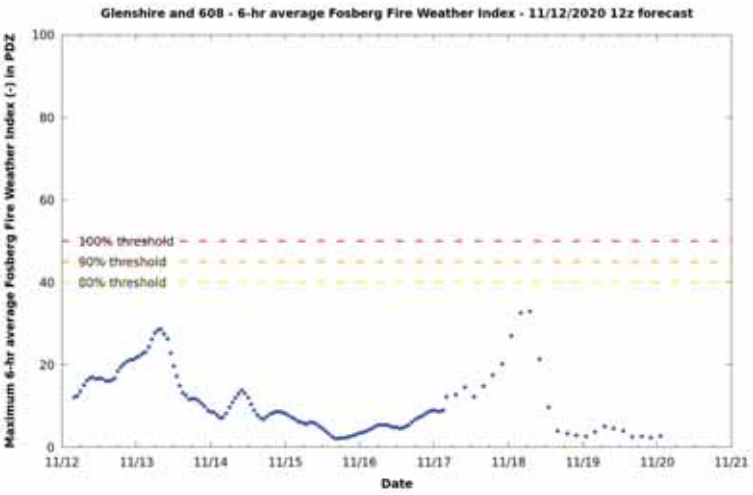


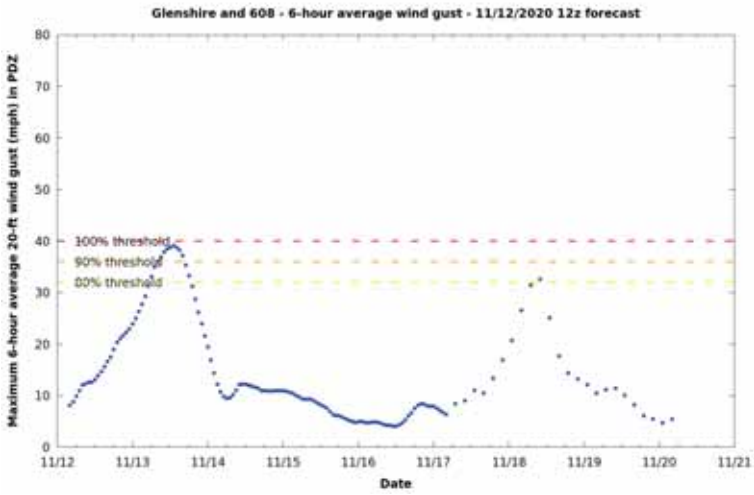
Beacon Tap



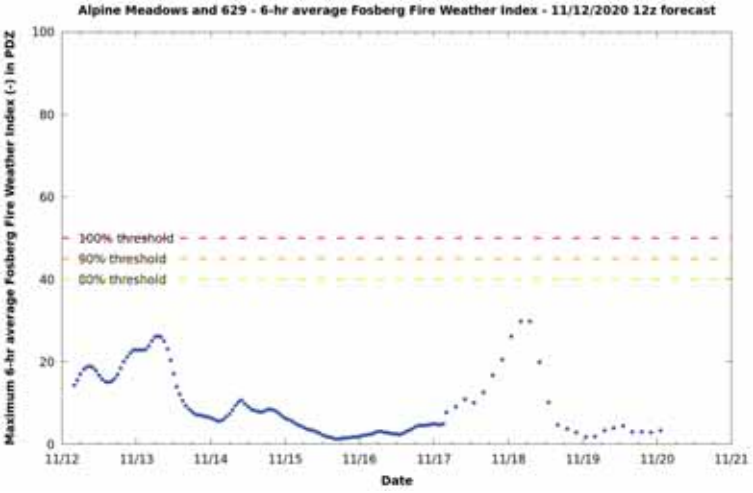


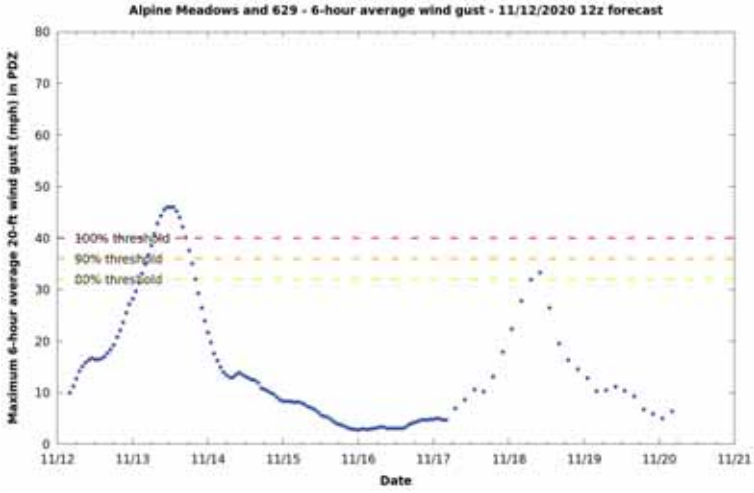
Glenshire and 608



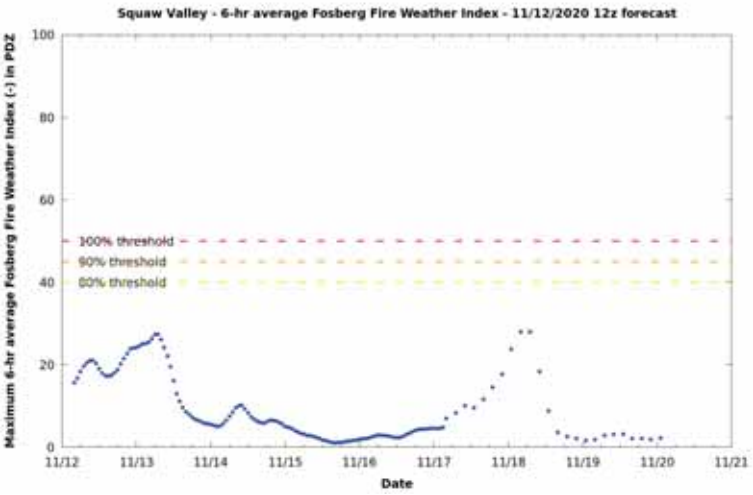


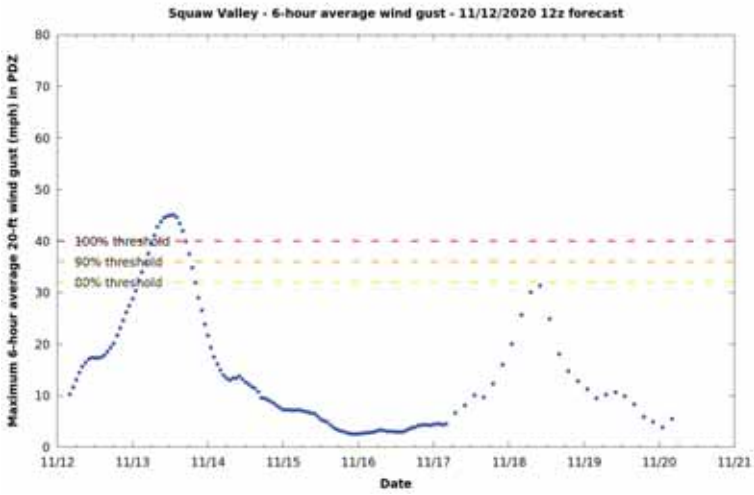
Alpine Meadows and 629



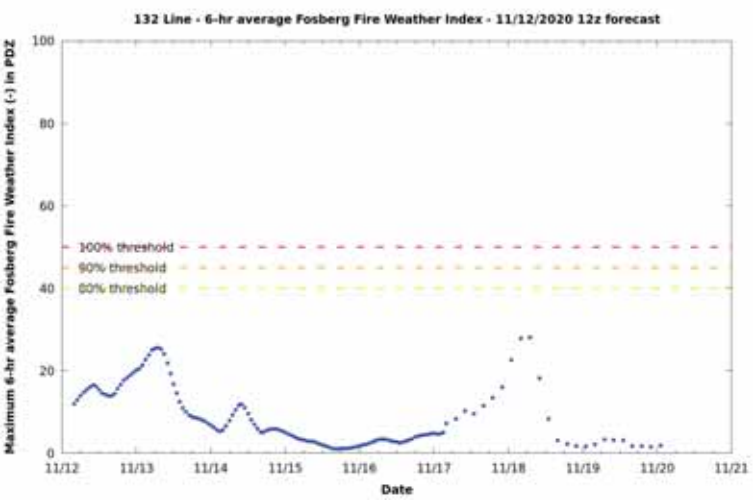


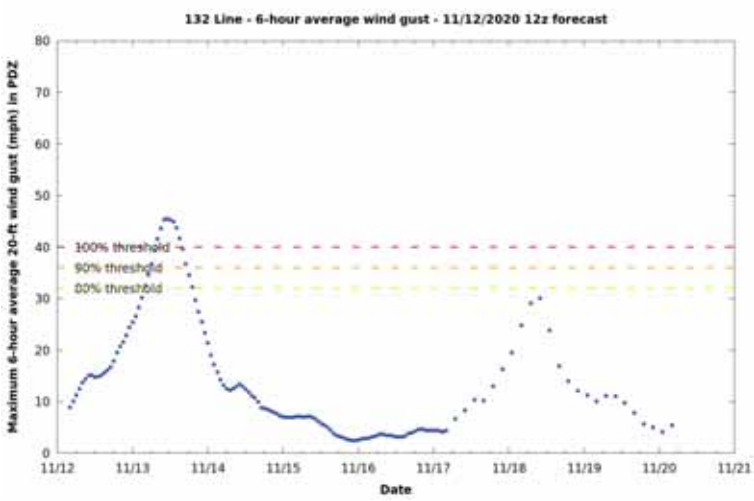
Squaw Valley



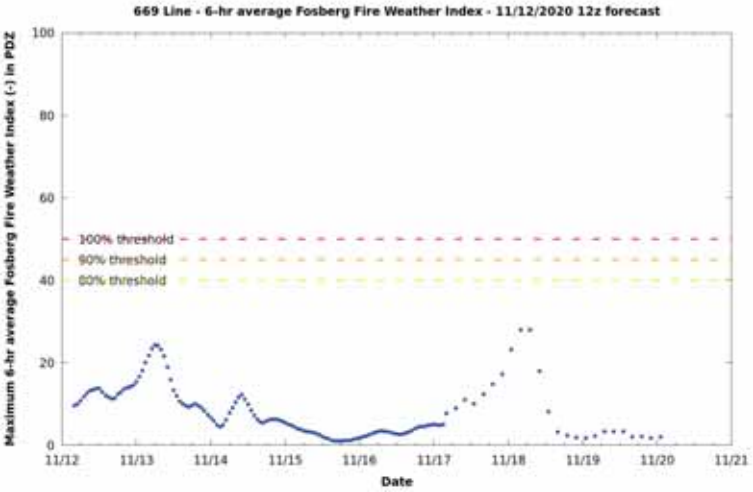


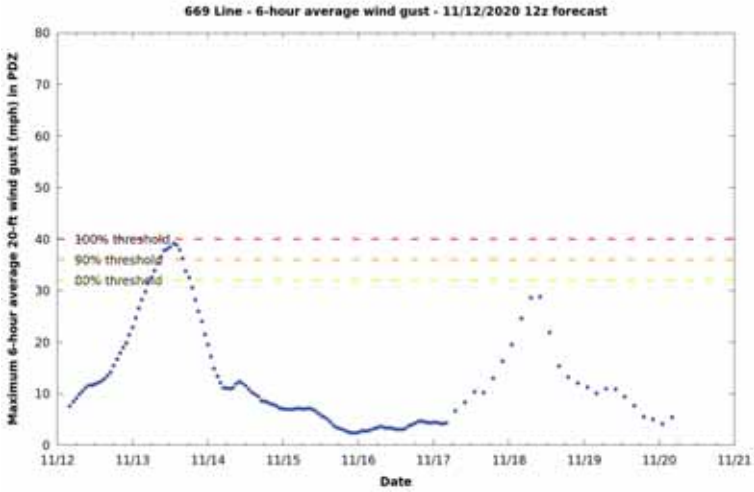
132 Line



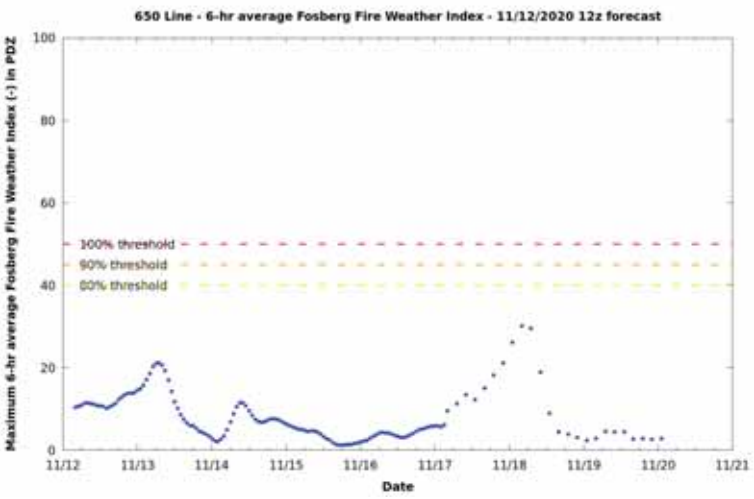


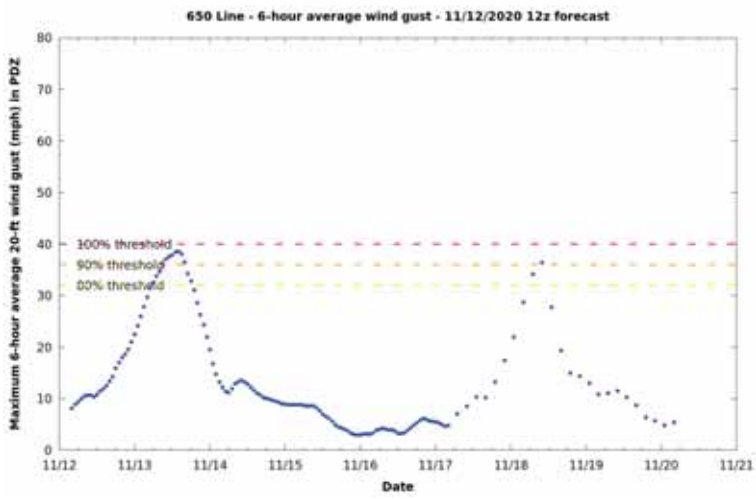
669 Line



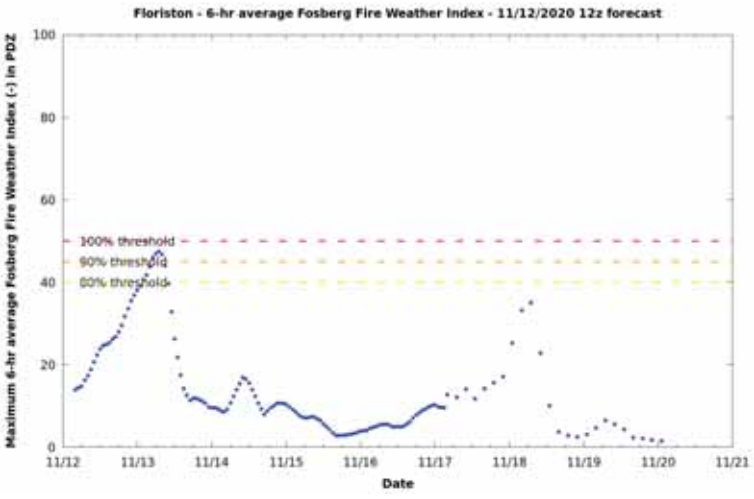


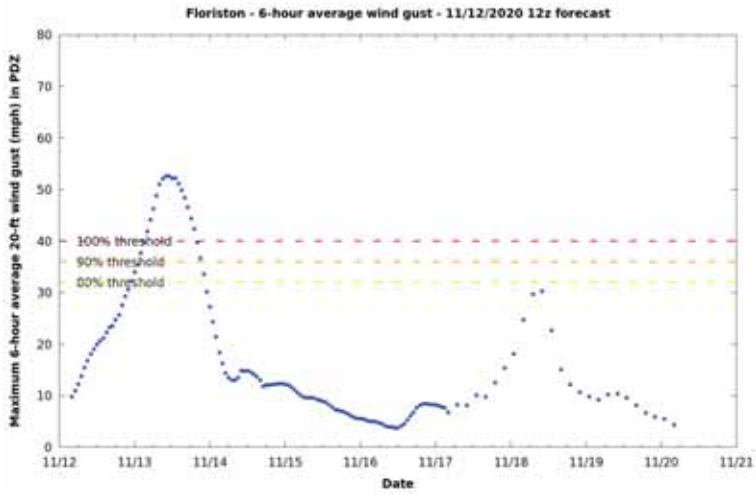
650 Line



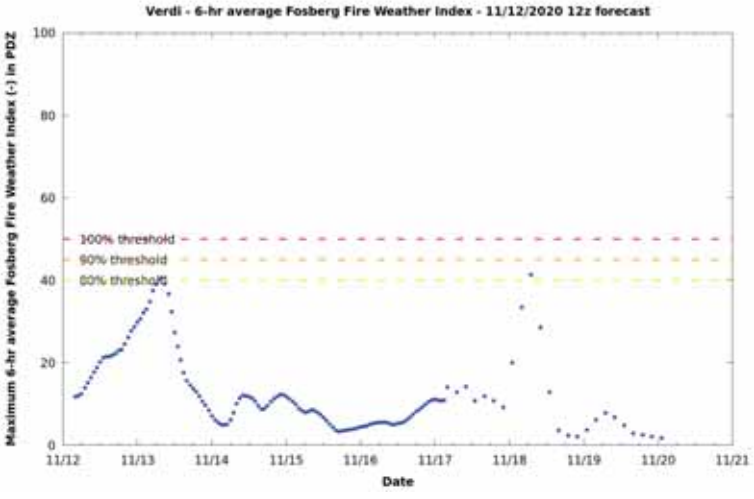


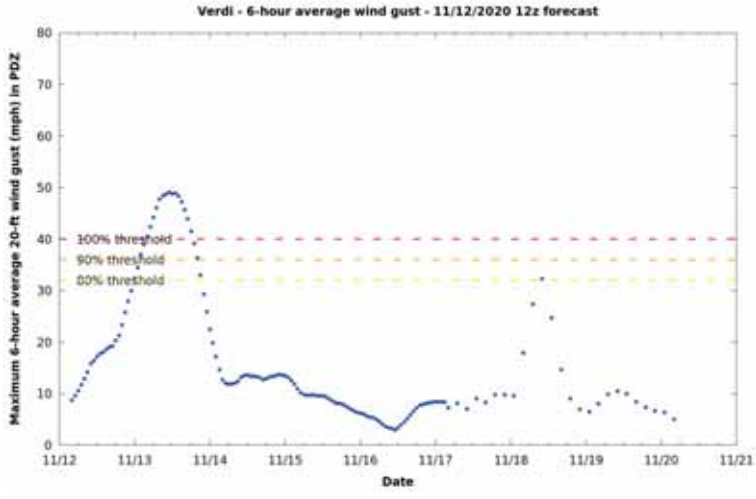
Floriston



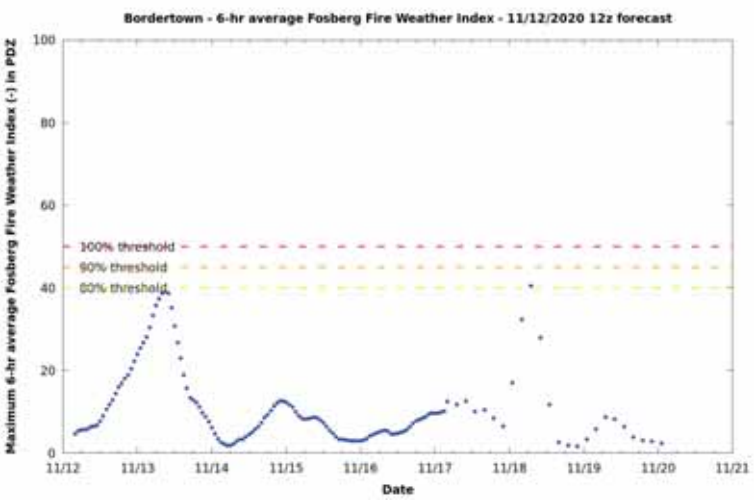


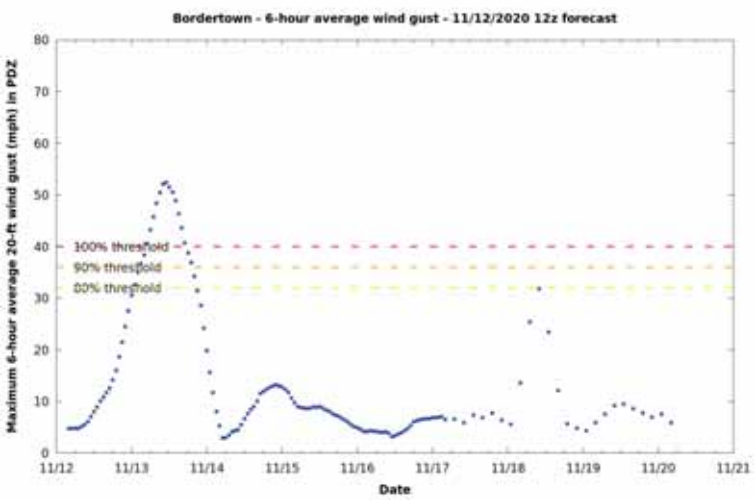
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/12/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21


Bordertown - 6-hour average wind gust - 11/12/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21

Liberty Utilities Fire Potential Index Forecast for 11/13/20 - 11/19/20

Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	moderate	moderate	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	moderate	moderate	low	low	low	low	low

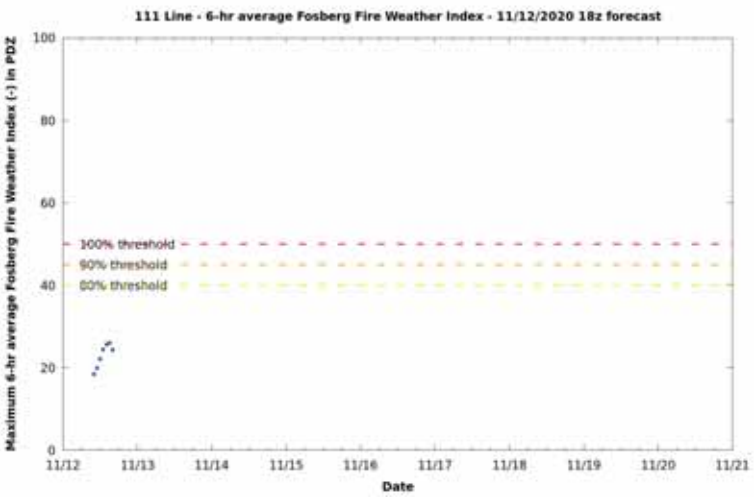
Liberty Utilities Energy Release Component Forecast for 11/13/20 - 11/19/20

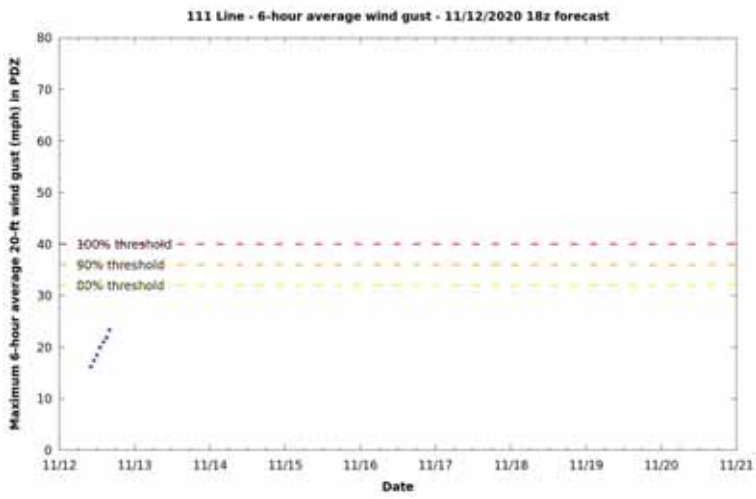
Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	66.0	60.0	55.0	51.0	52.0	56.0	54.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	62.0	48.0	43.0	38.0	36.0	39.0	34.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	58.0	58.0	54.0	50.0	54.0	56.0	56.0

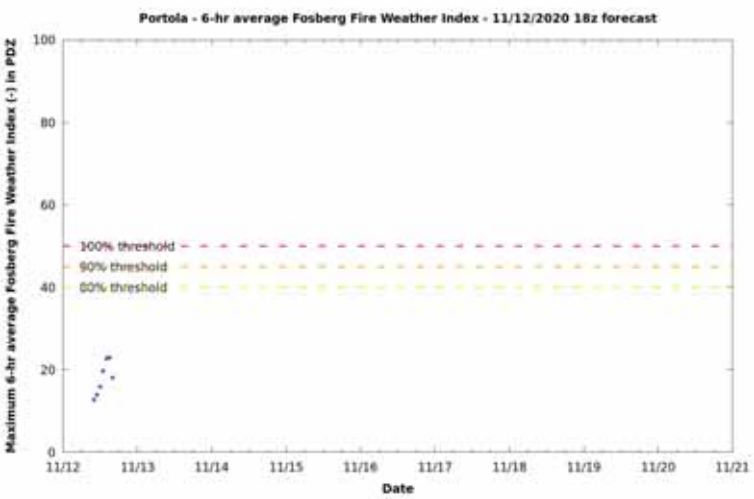
Liberty Utilities Fire Weather Summary Plots - 11/12/2020 18z forecast

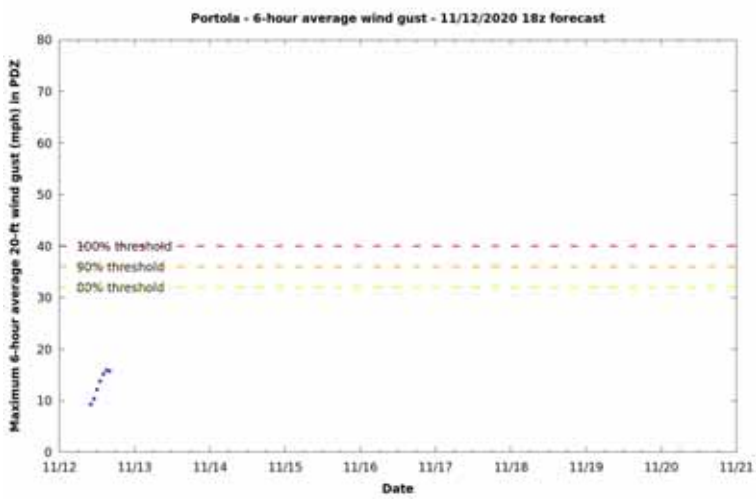
111 Line



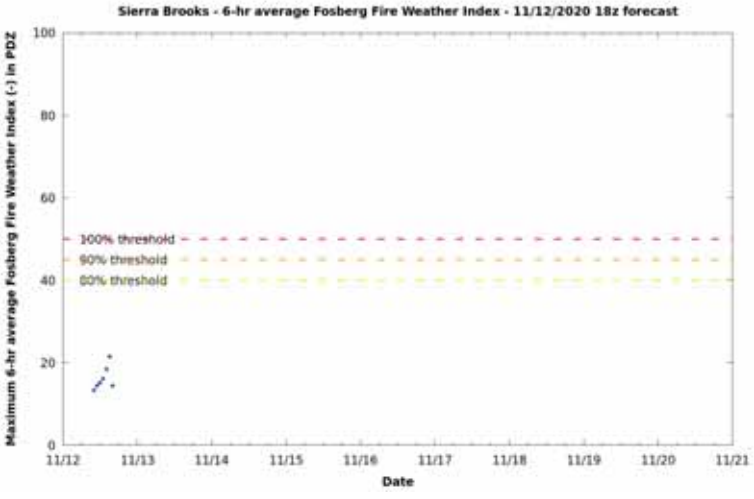


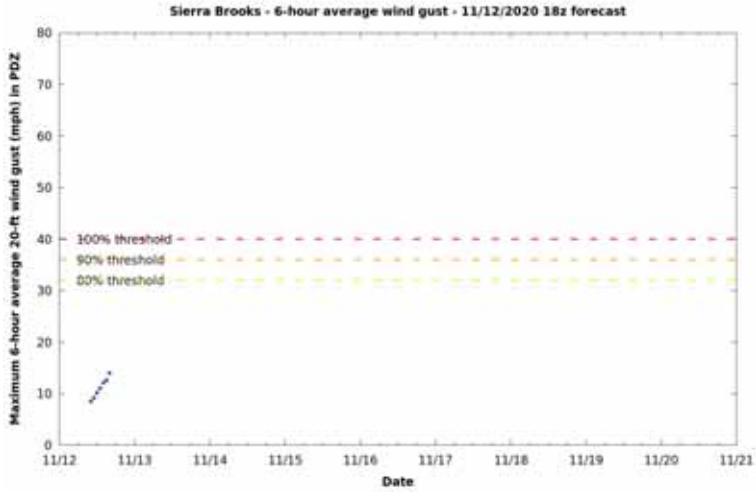
Portola



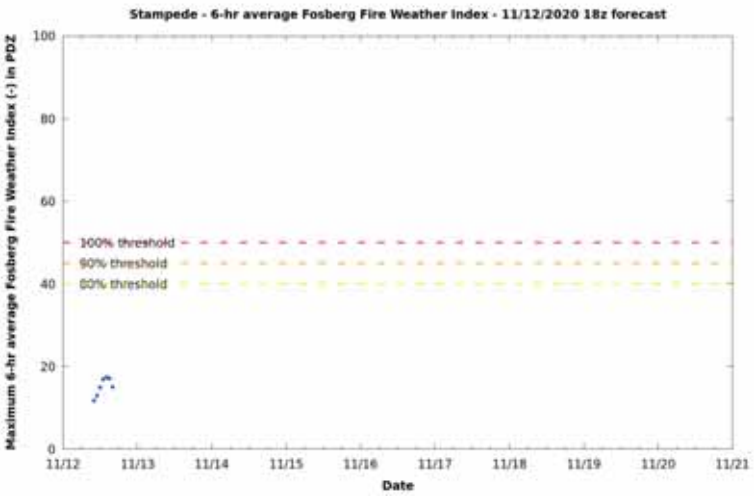


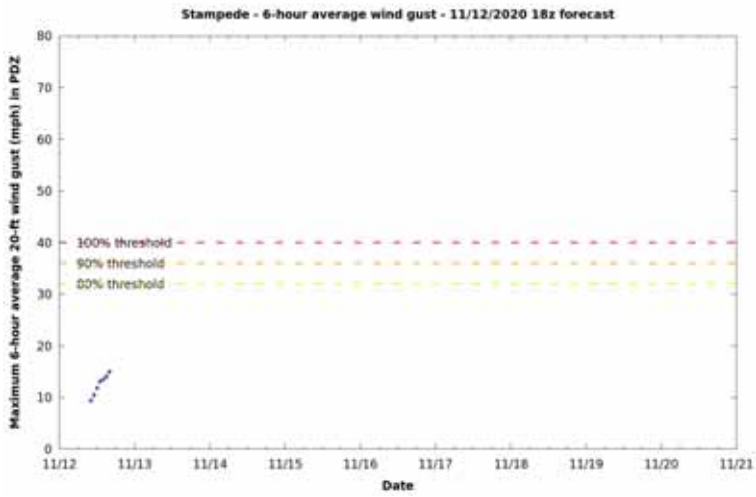
Sierra Brooks



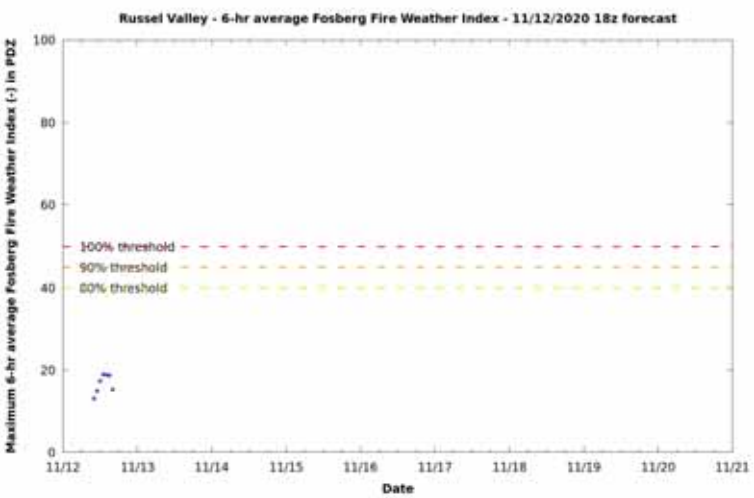


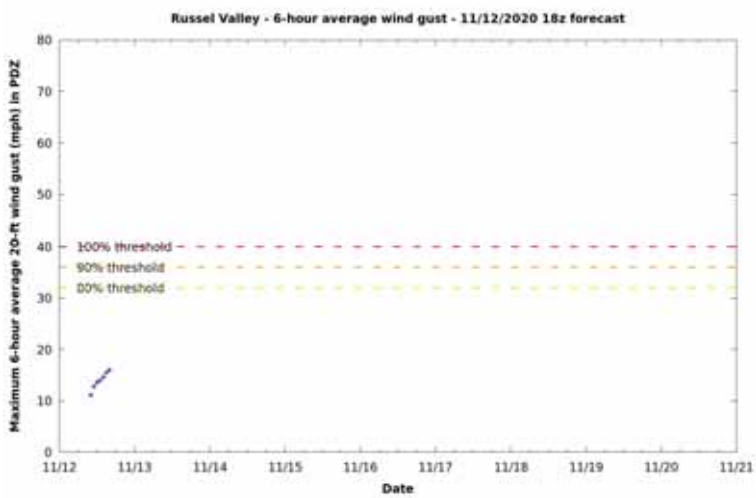
Stampede



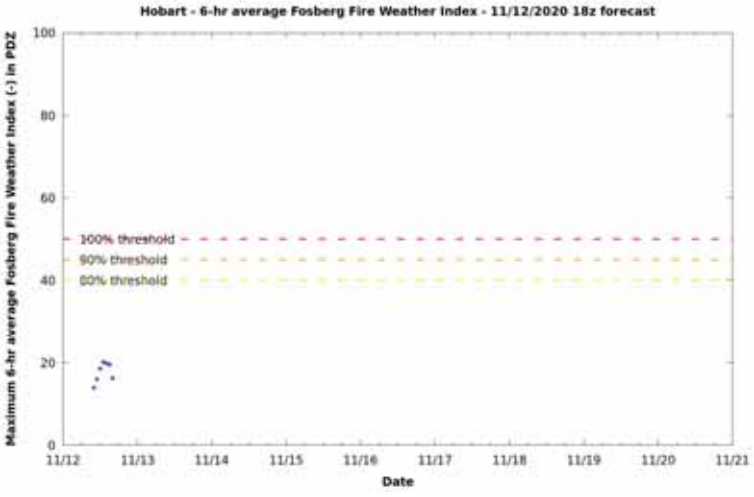


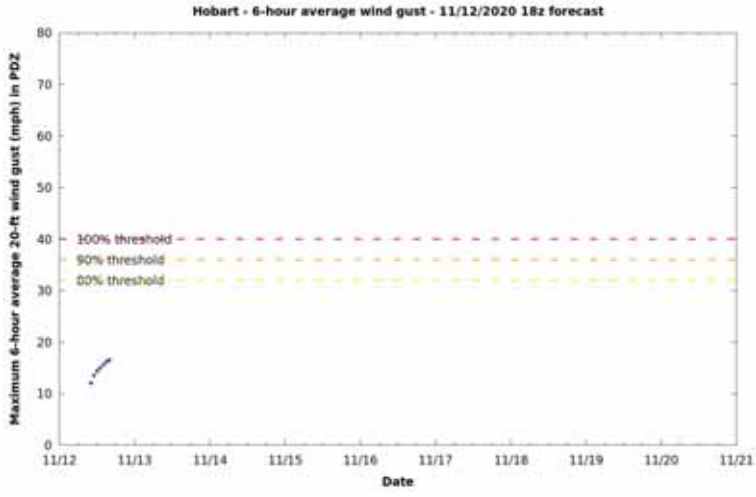
Russell Valley



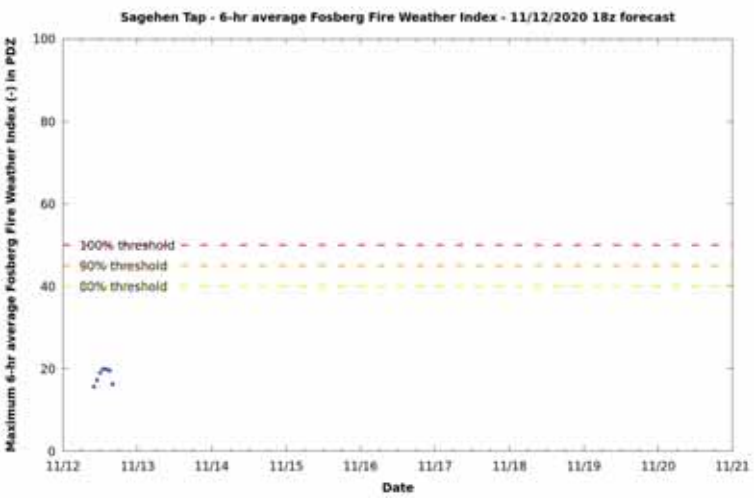


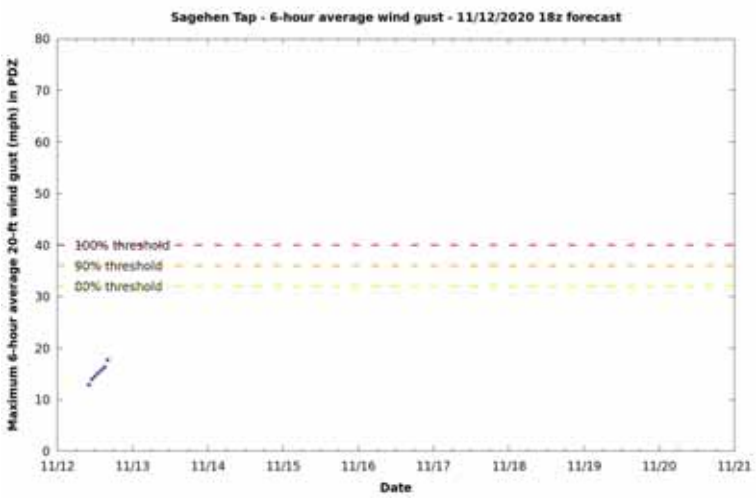
Hobart



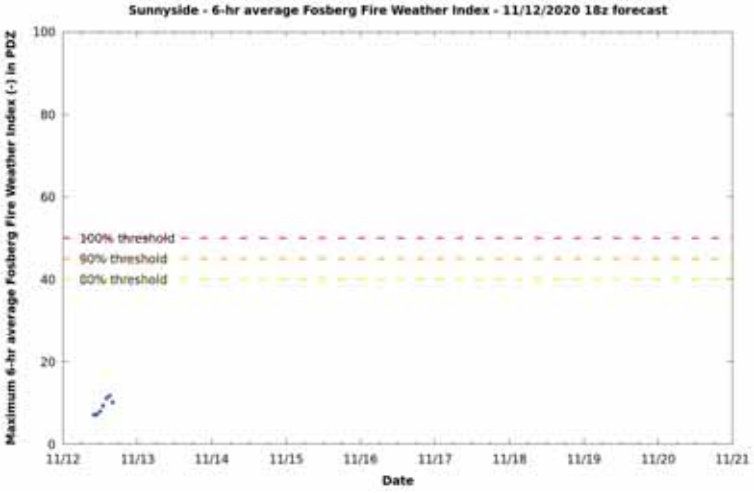


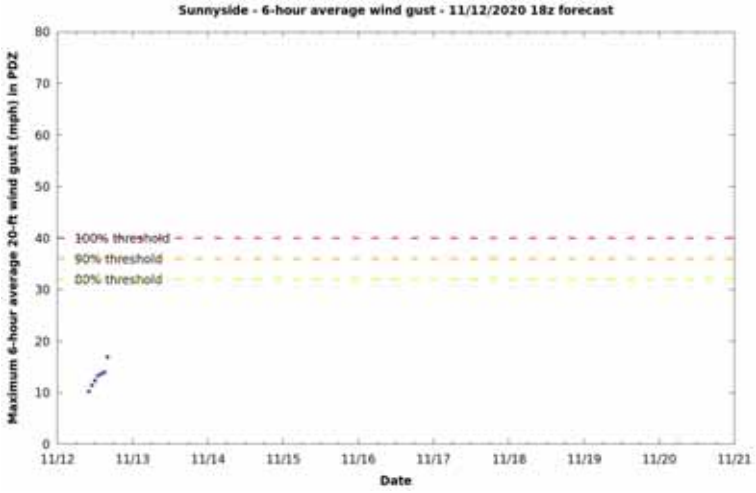
Sagehen tap



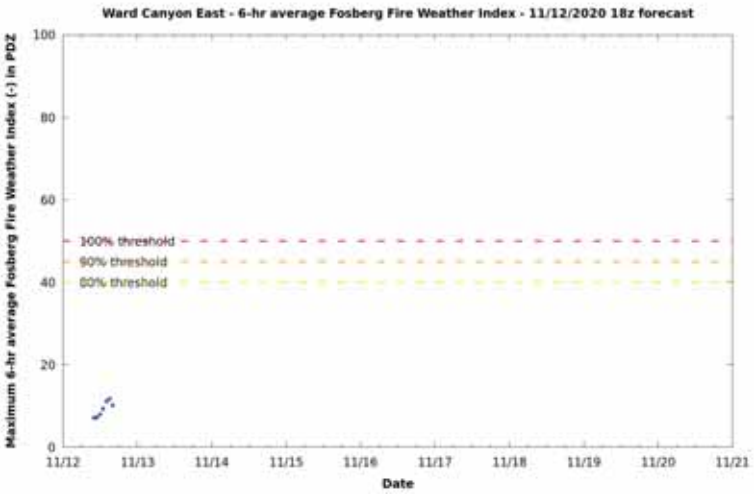


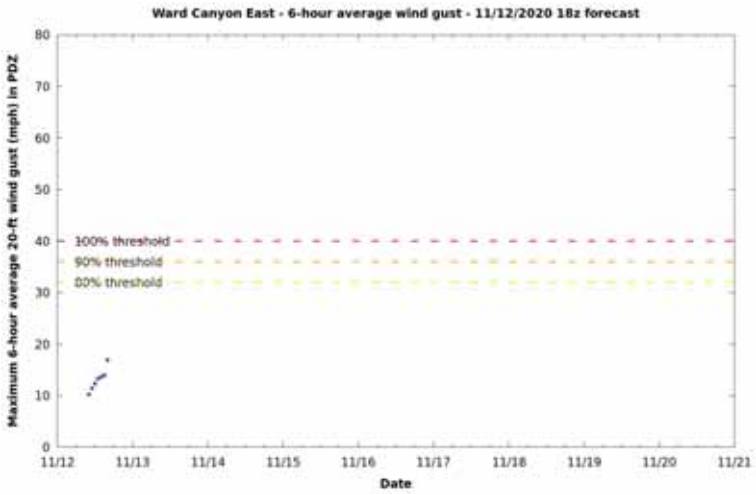
Sunnyside



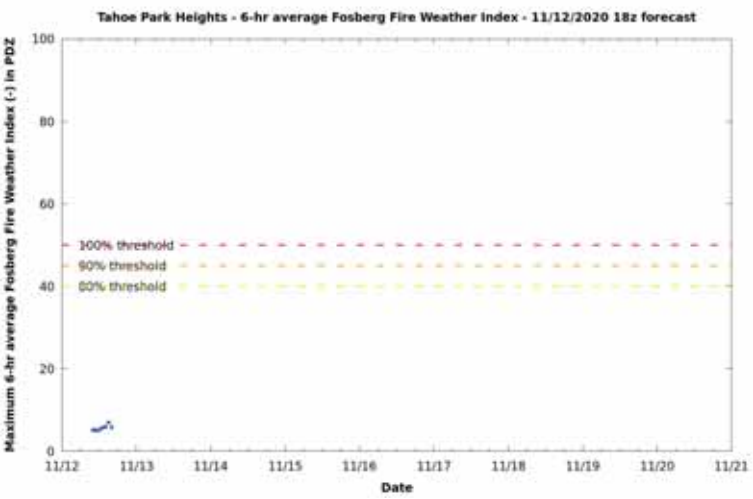


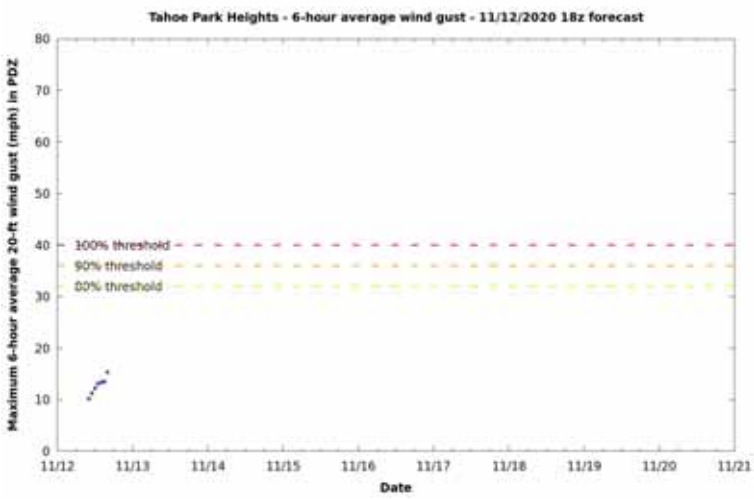
Ward Canyon East



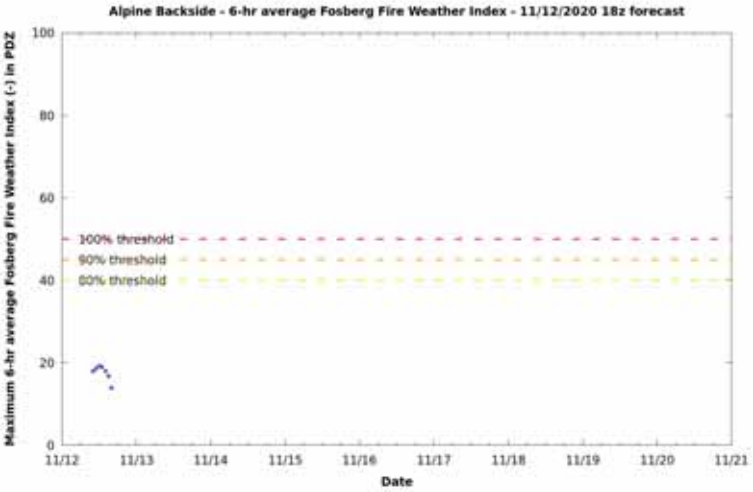


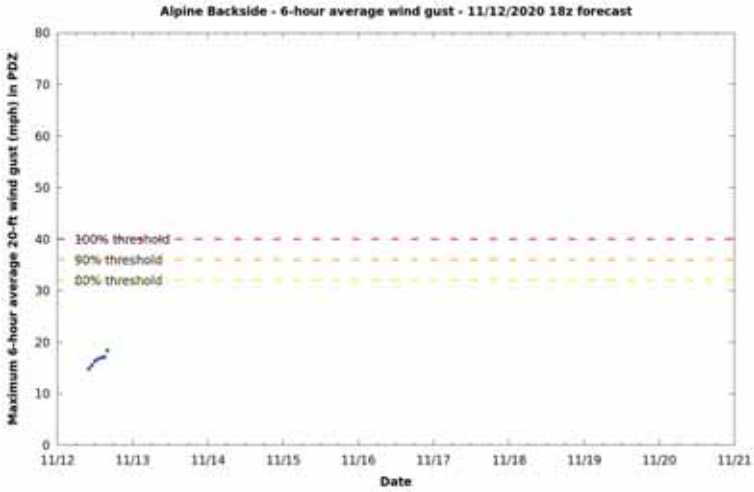
Tahoe Park Heights



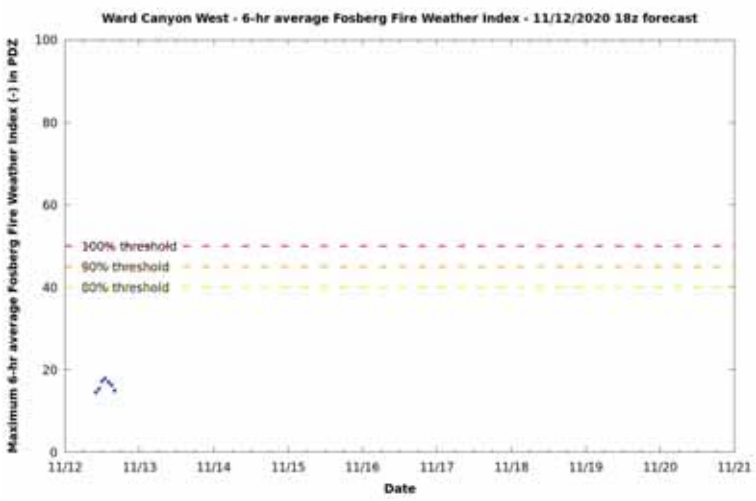


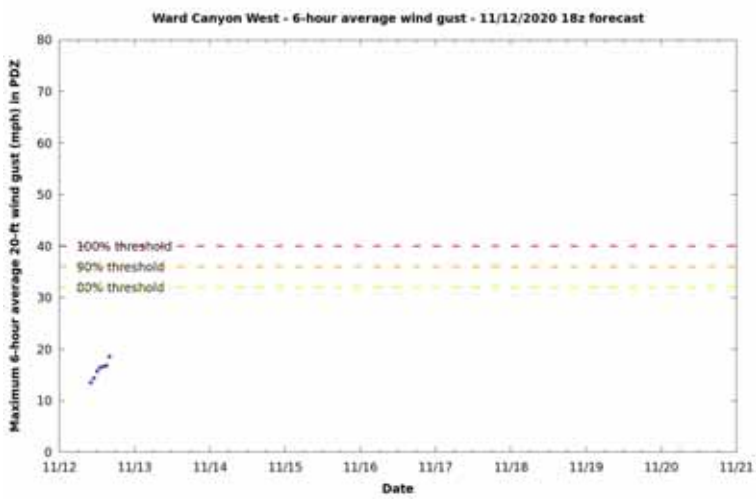
Alpine Backside



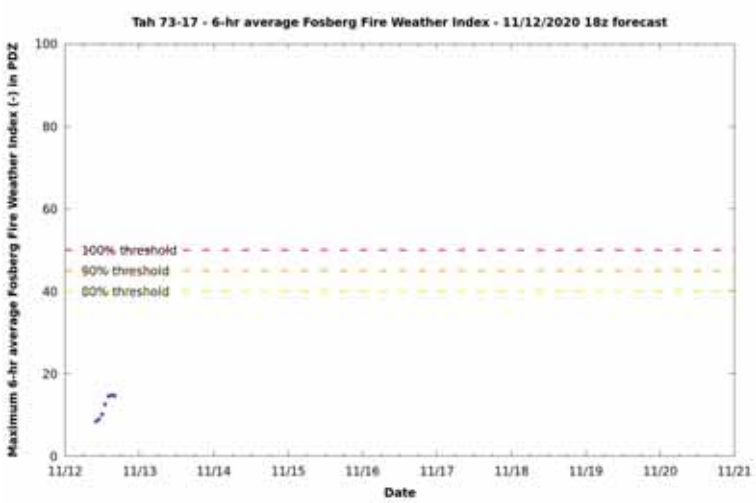


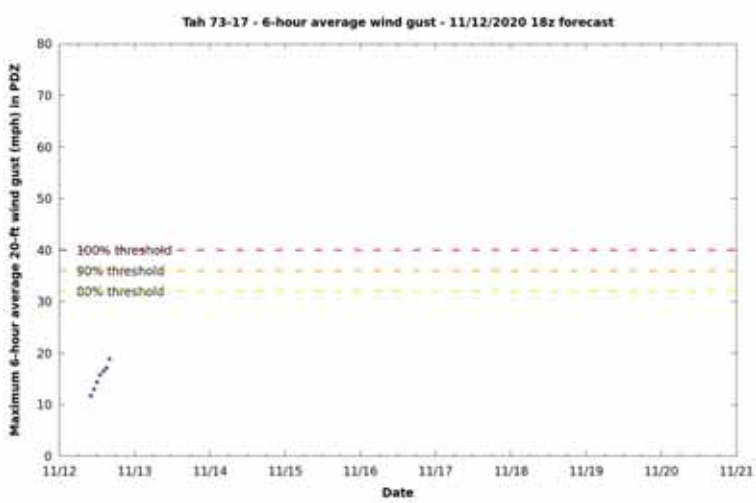
Ward Canyon West



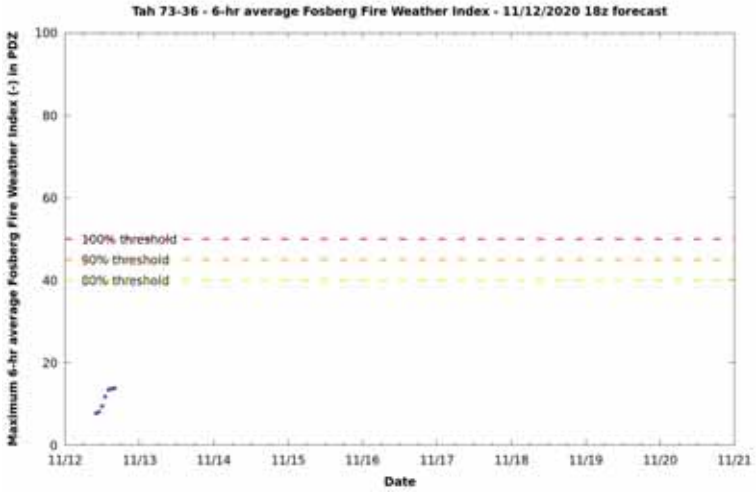


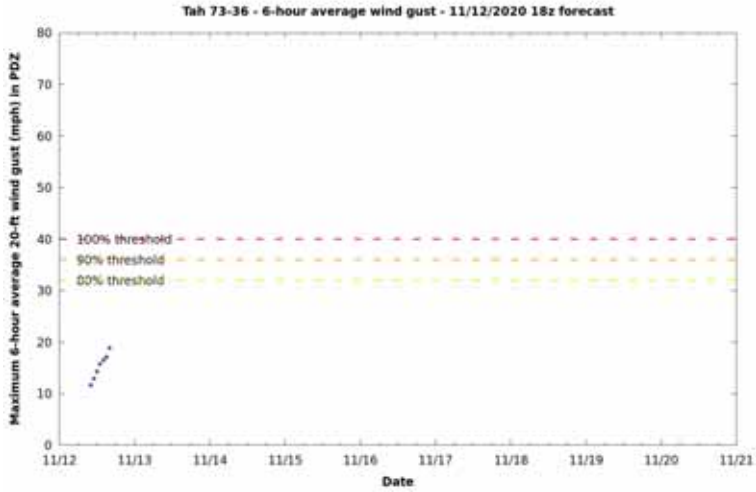
Tah 73-17



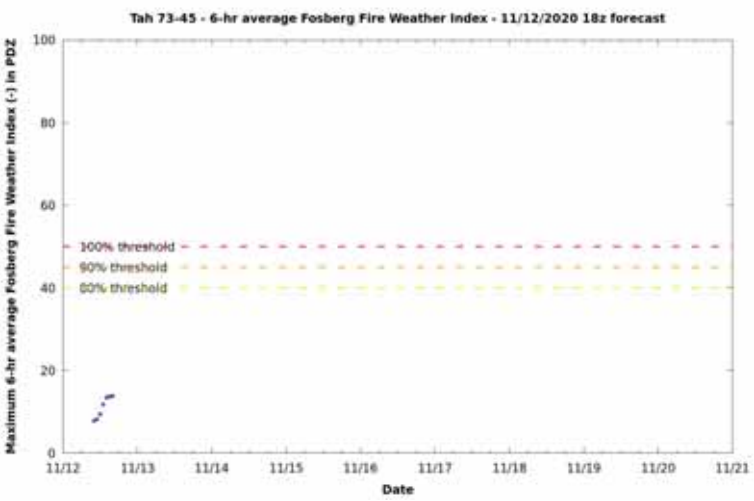


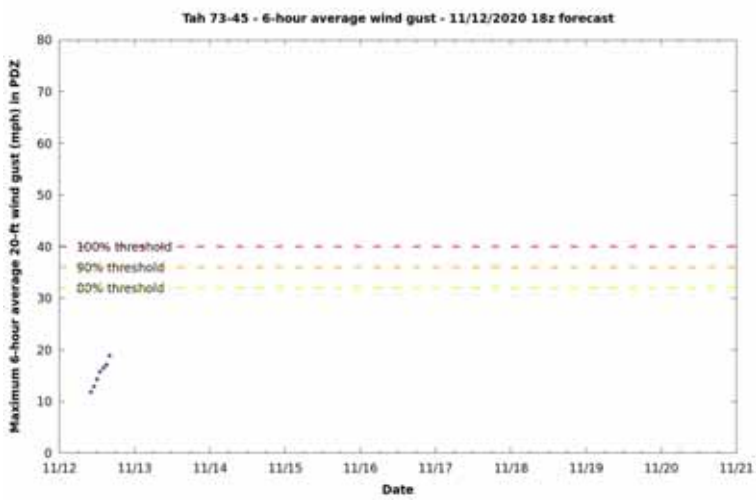
Tah 73-36



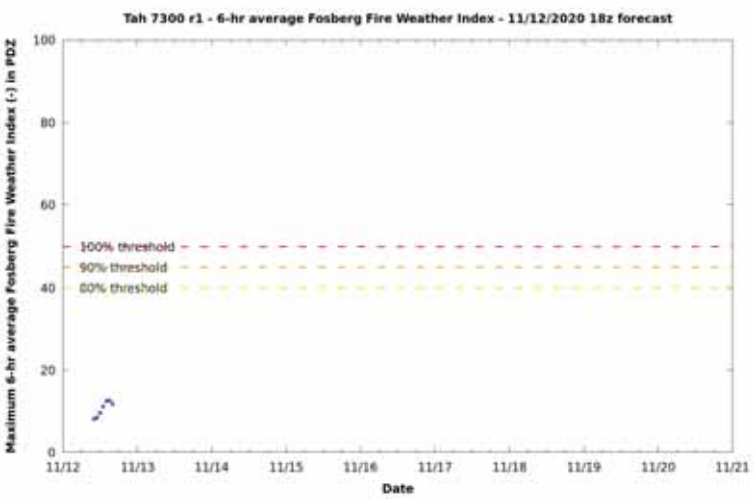


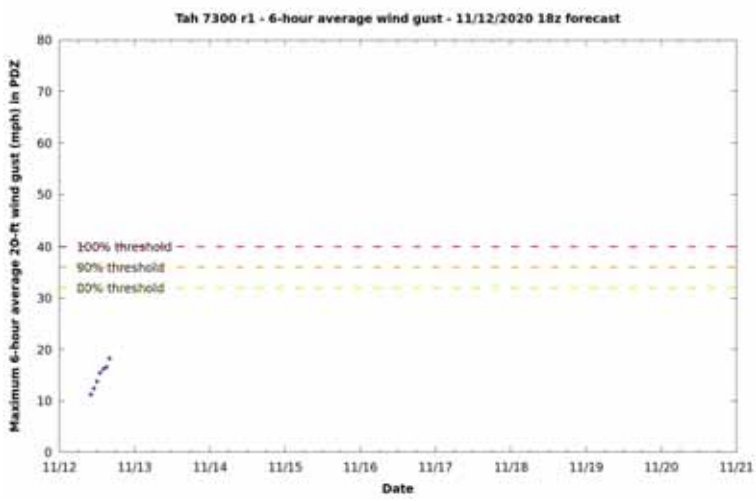
Tah 73-45



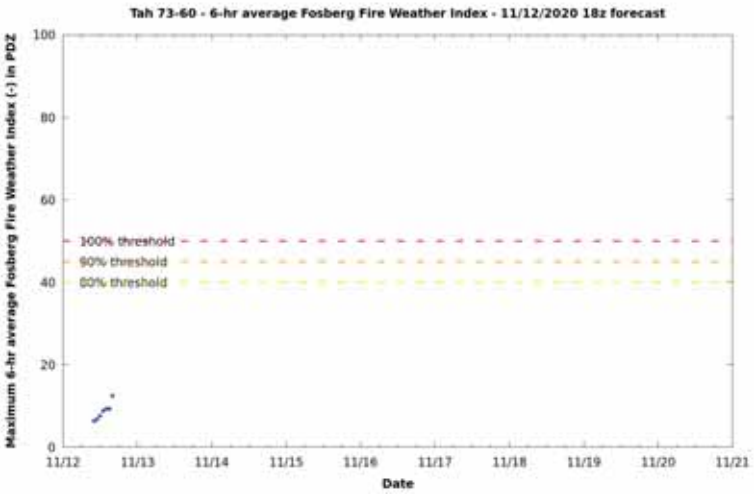


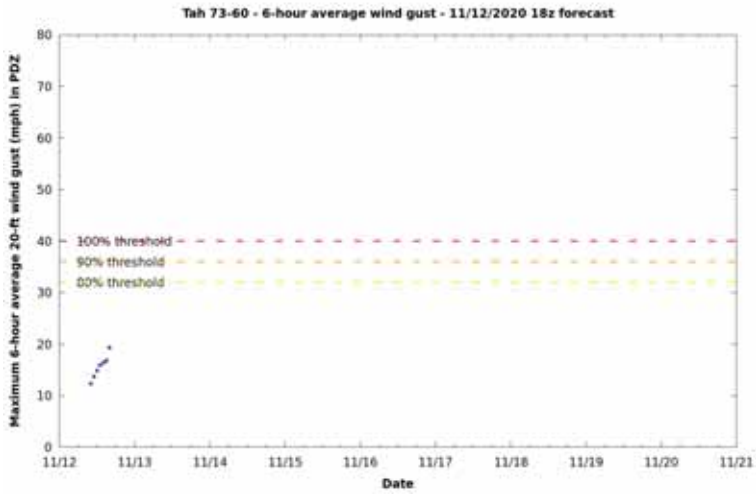
Tah 7300 r1



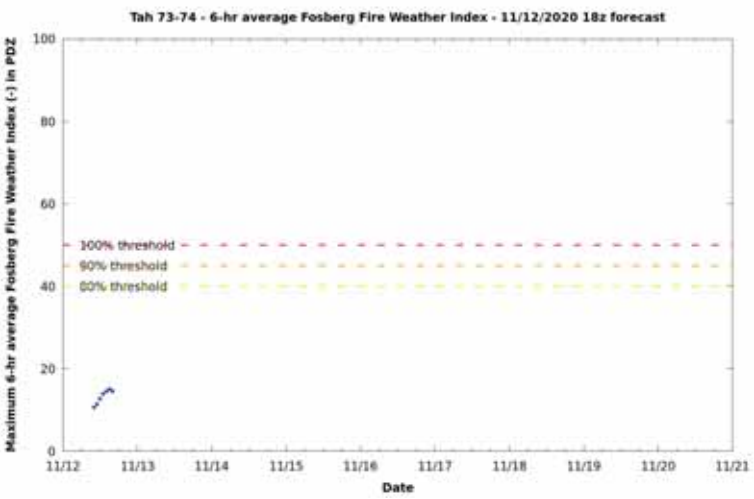


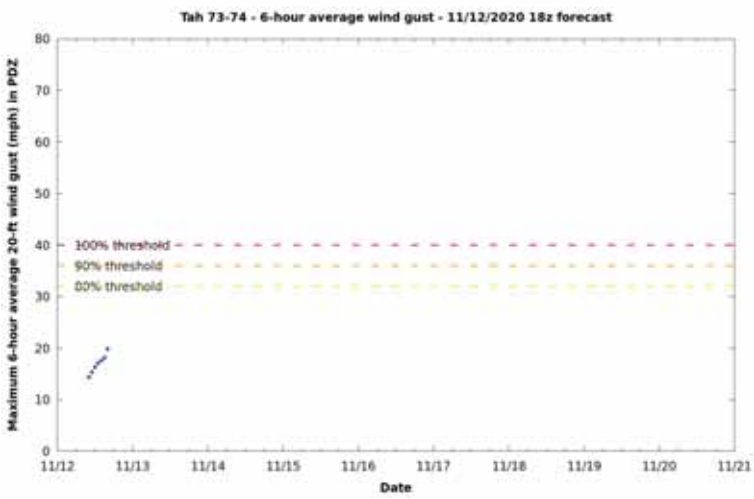
Tah 73-60



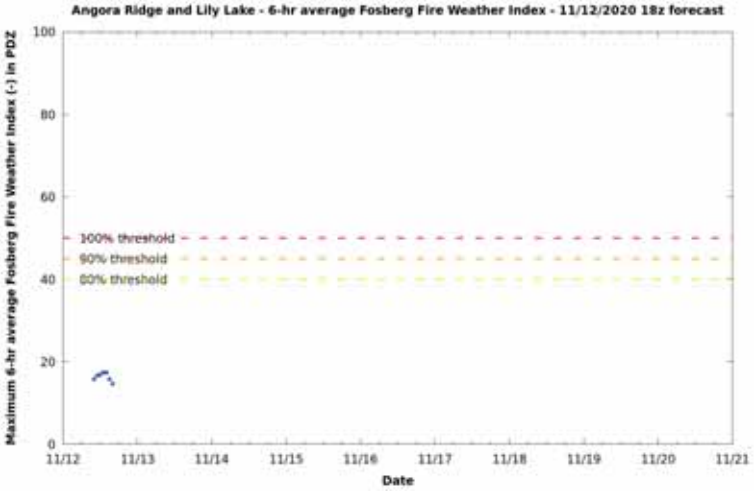


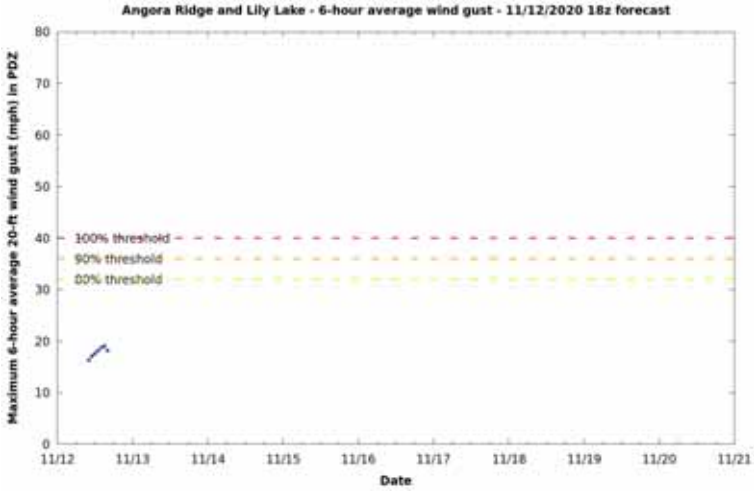
Tah 73-74



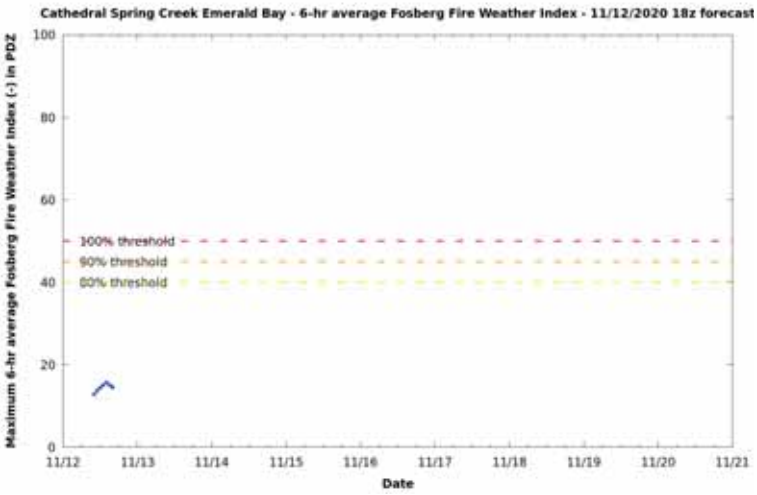


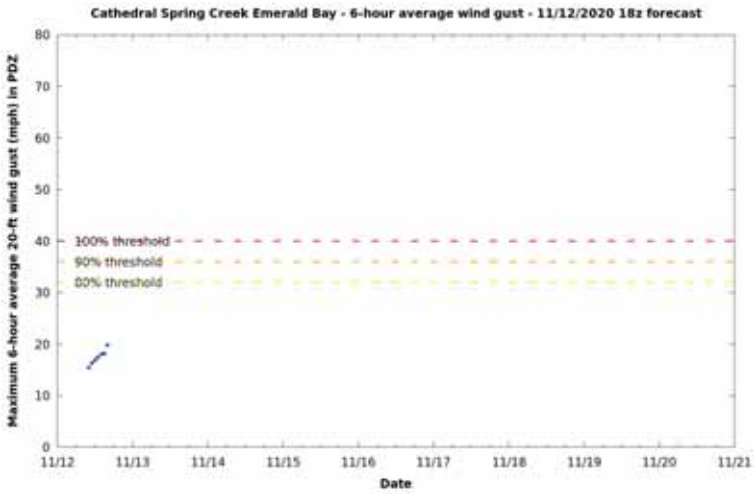
Angora Ridge and Lily Lake



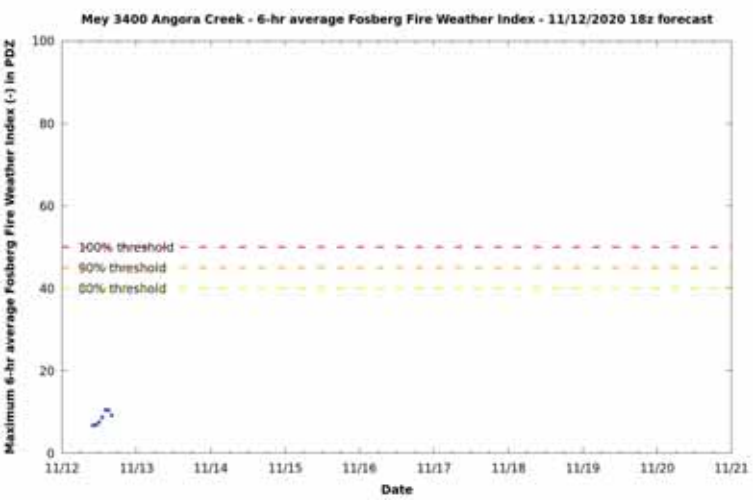


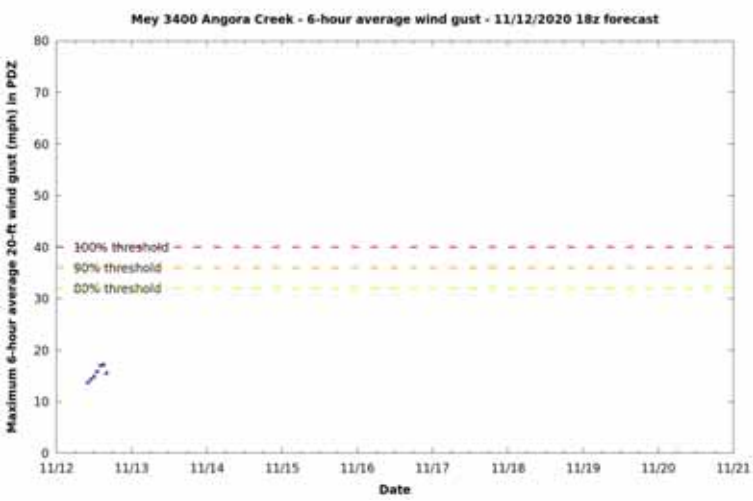
Cathedral Spring Creek Emerald Bay



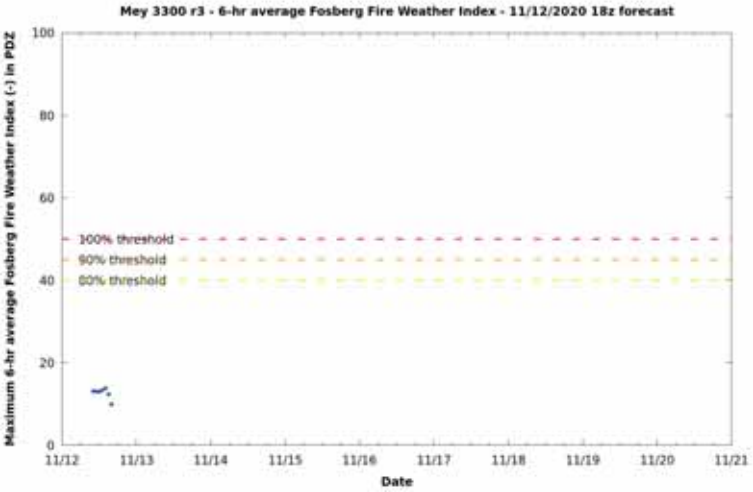


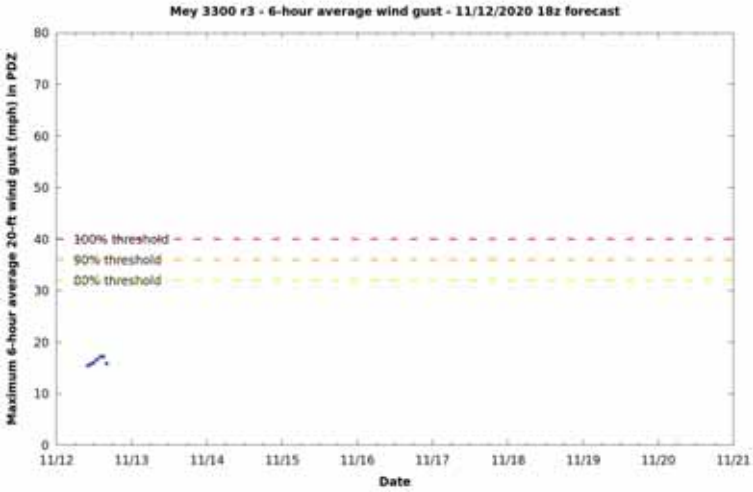
Mey 3400 Angora Creek



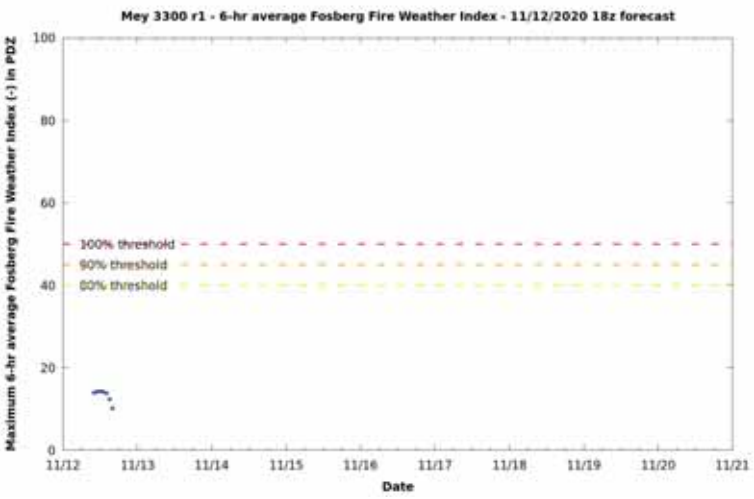


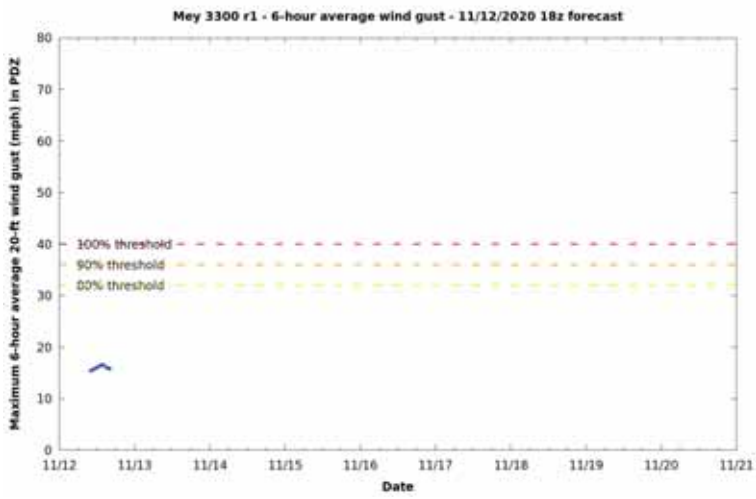
Mey 3300 r3



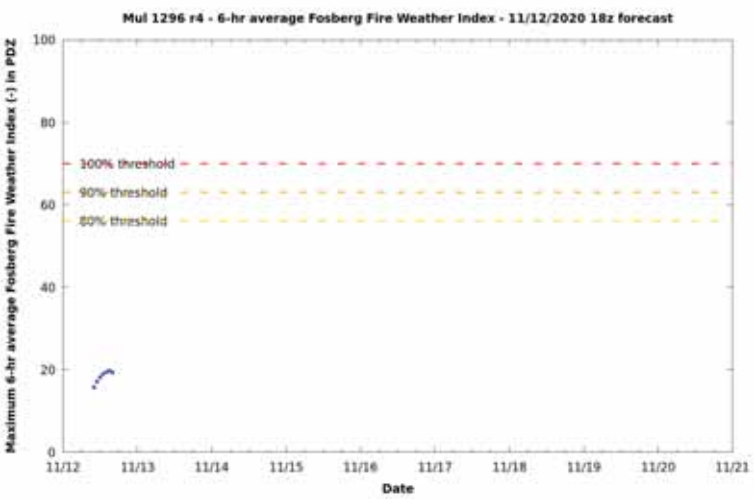


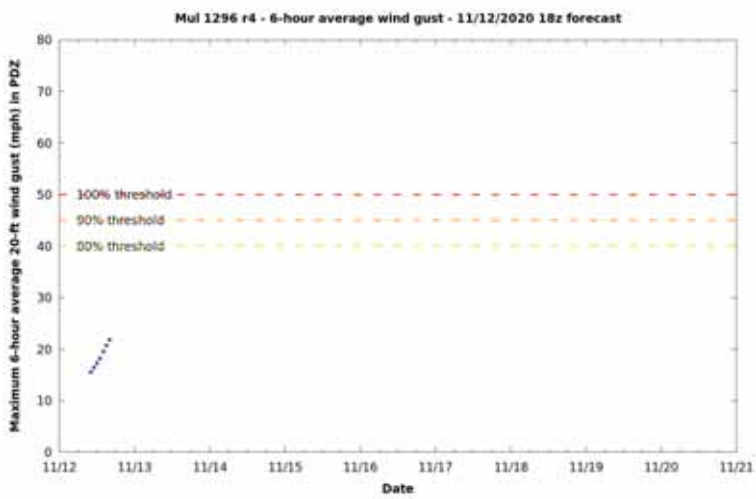
Mey 3300 r1



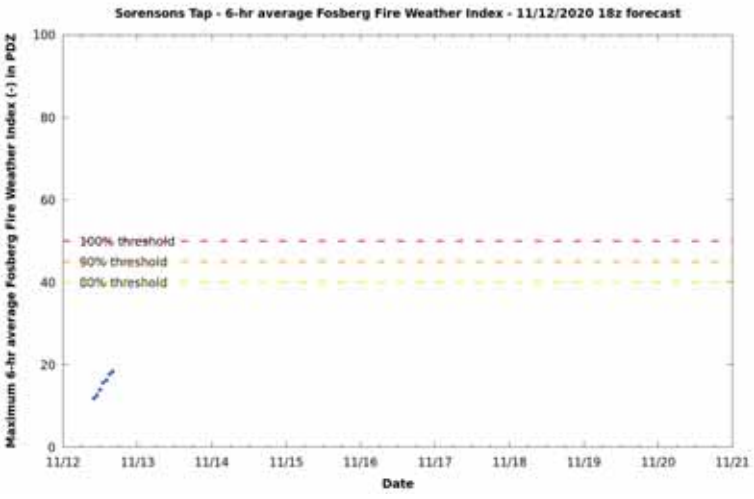


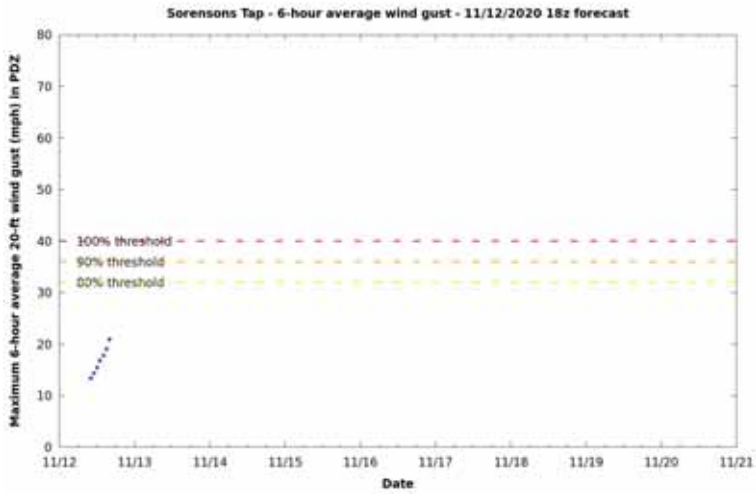
Mul 1296 r4



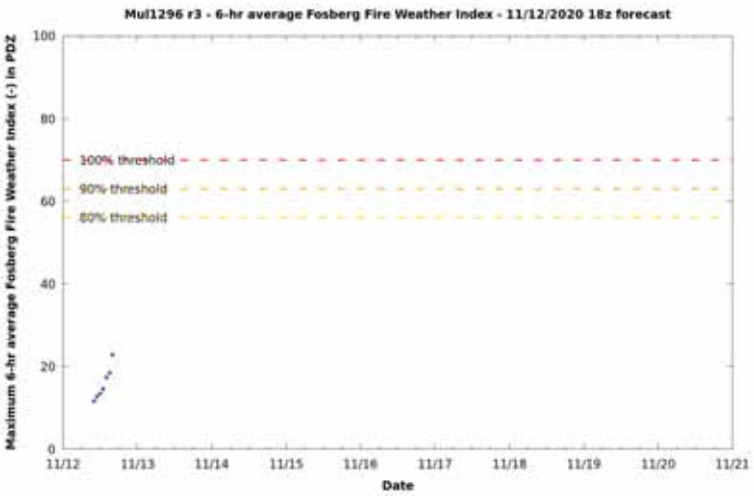


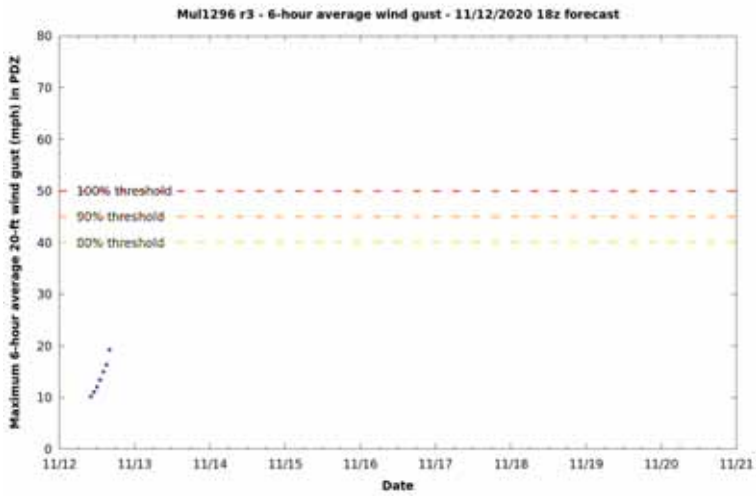
Sorensons Tap



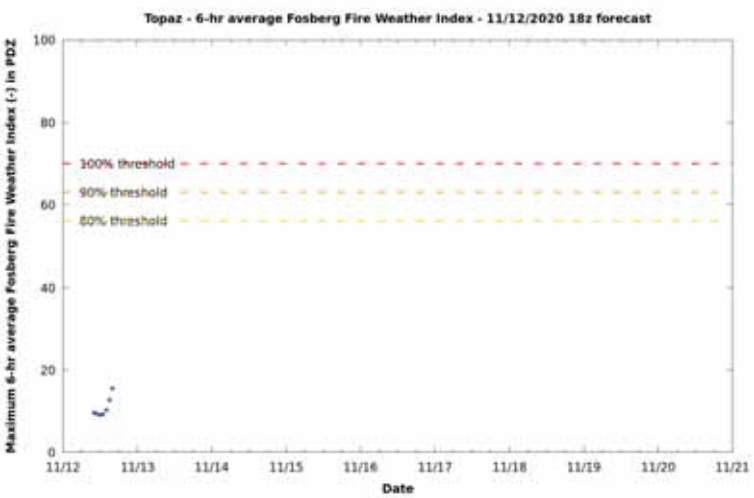


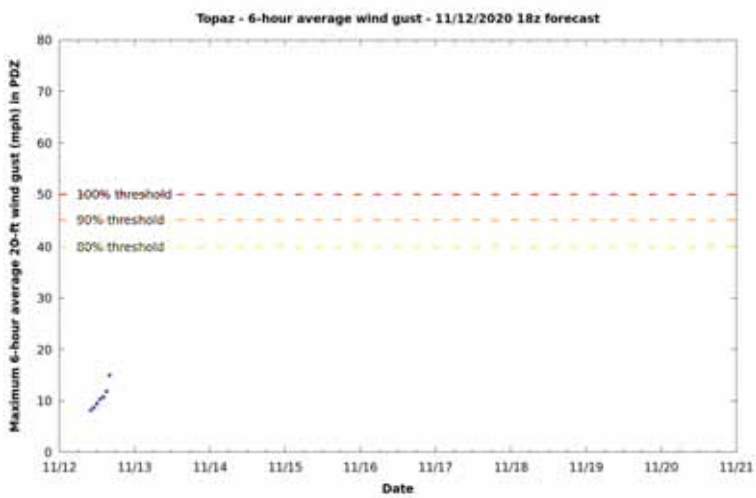
Mul 1296 r3



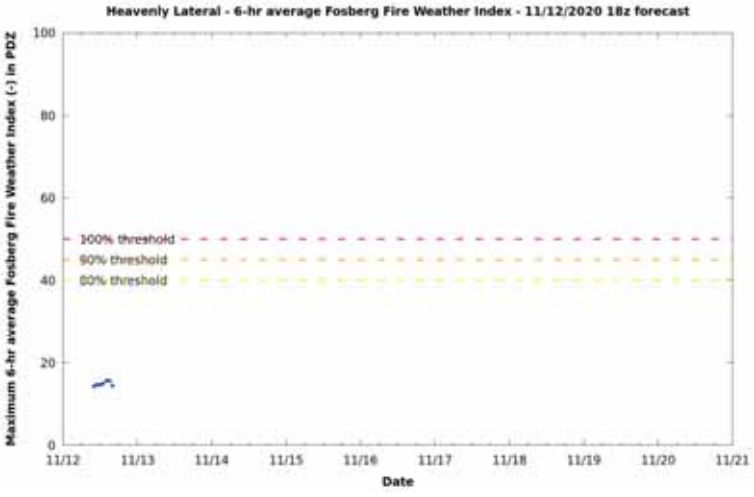


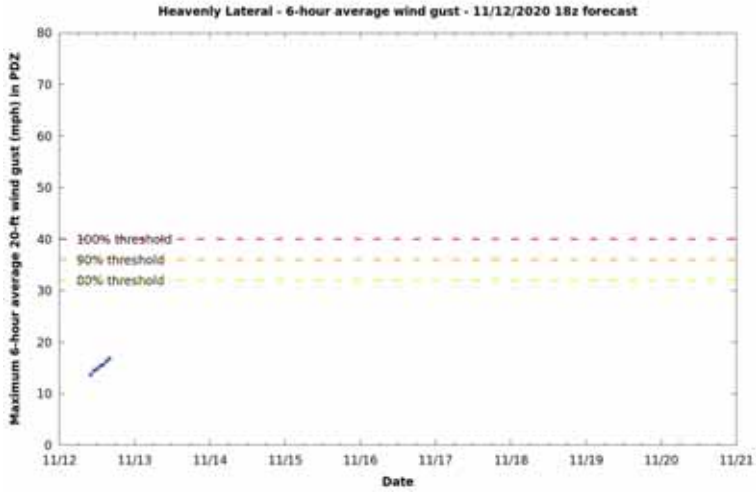
Topaz



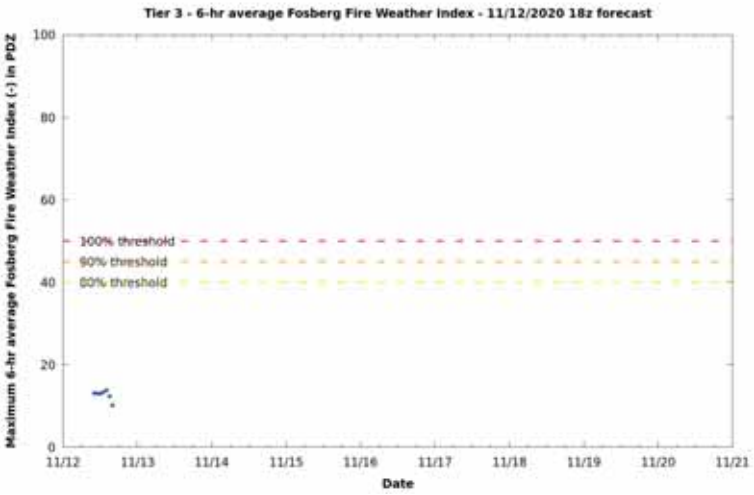


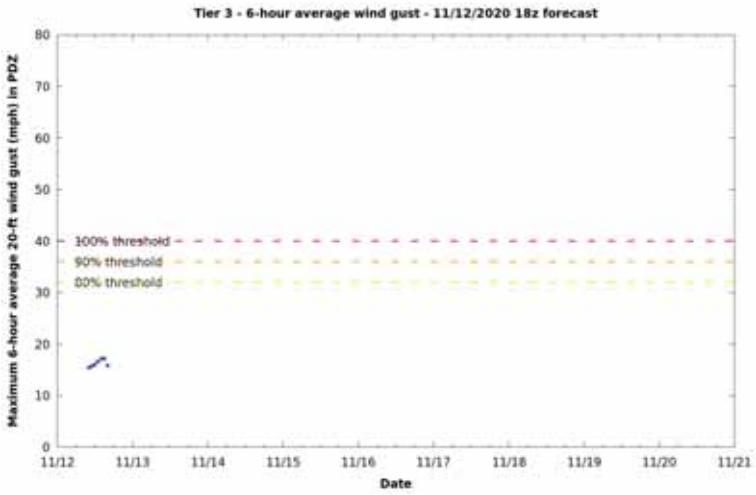
Heavenly Lateral



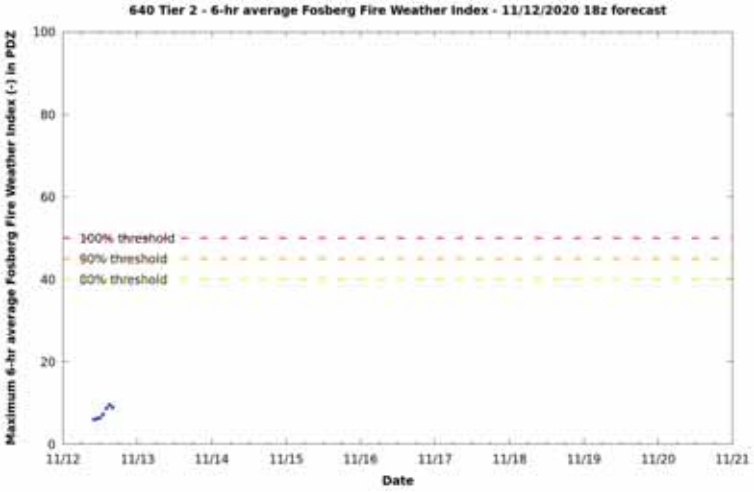


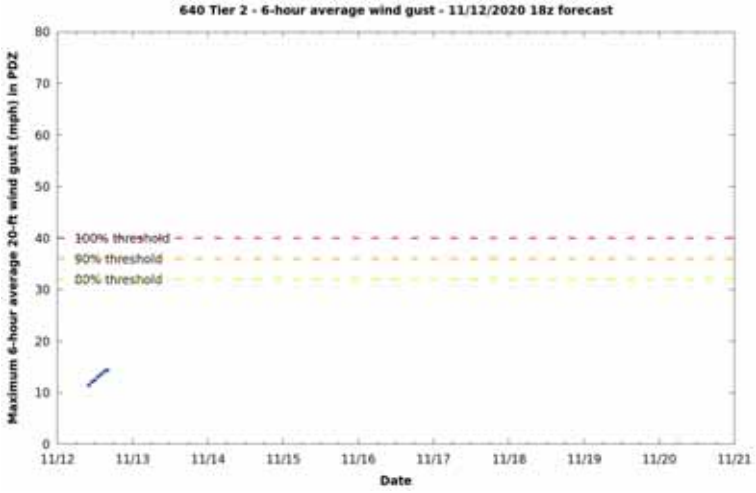
Tier 3



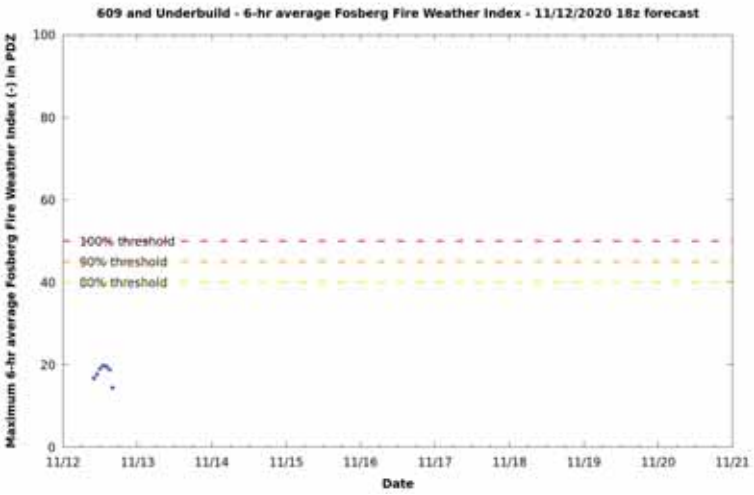


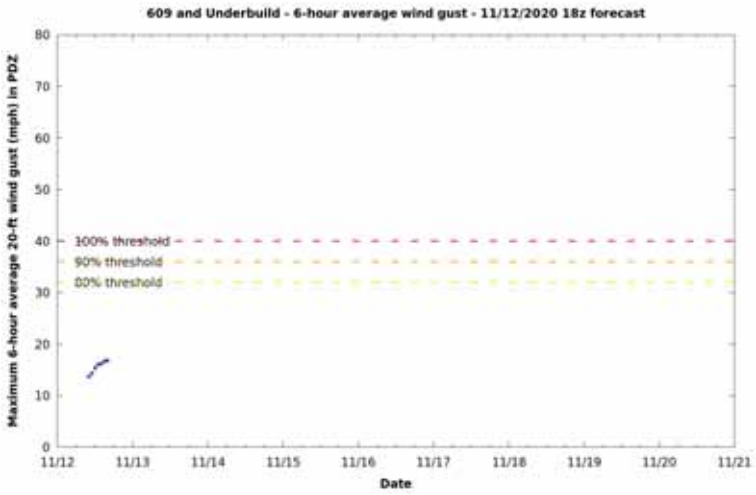
640 Tier 2



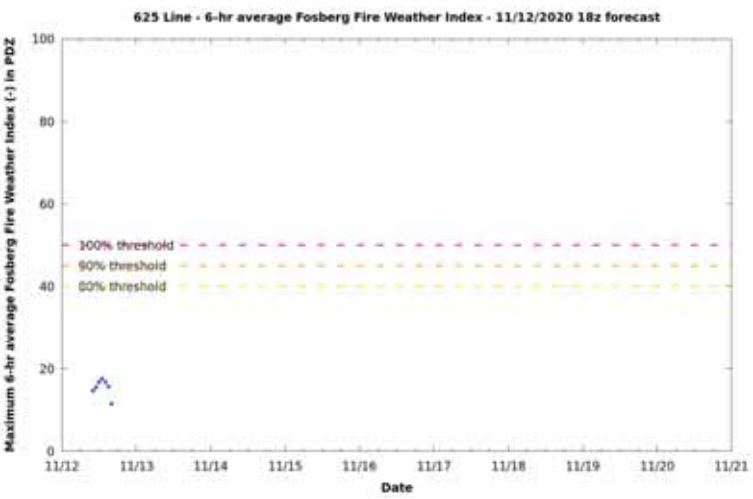


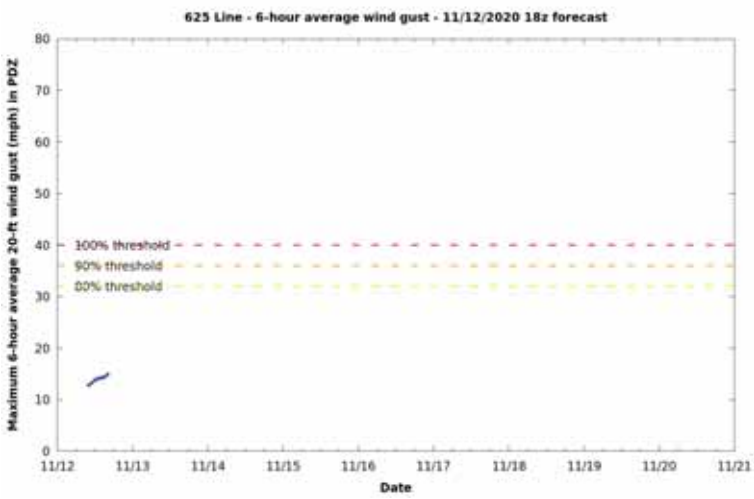
609 and Underbuild



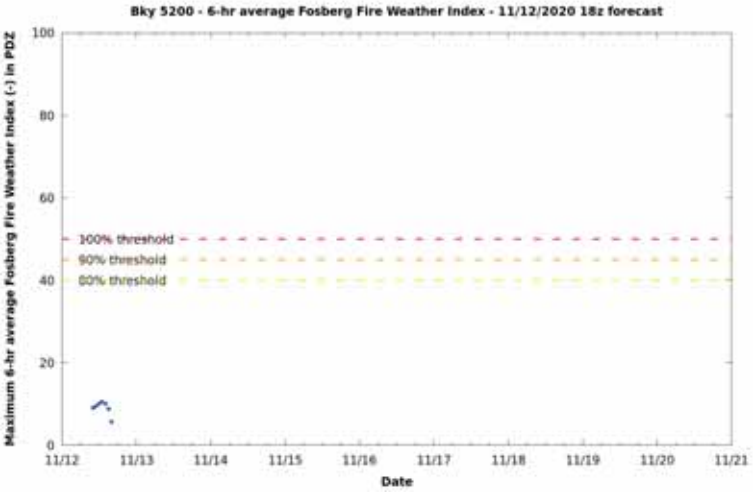


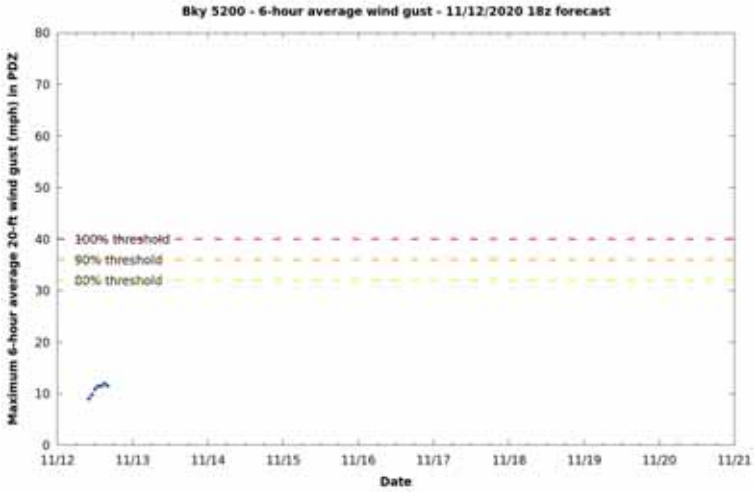
625 Line



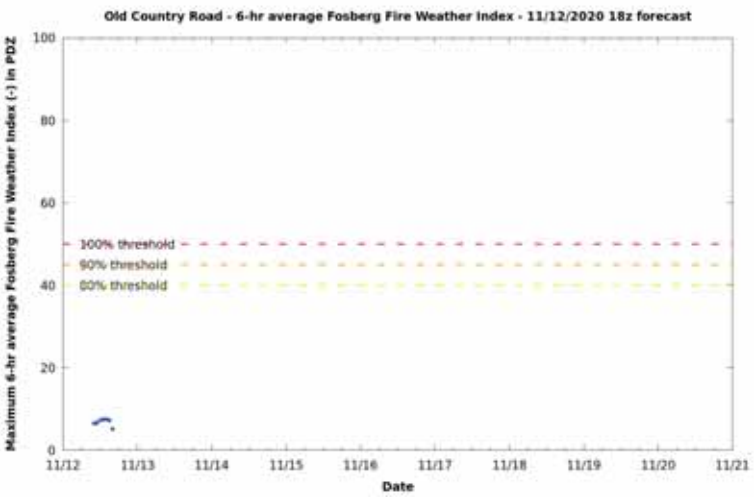


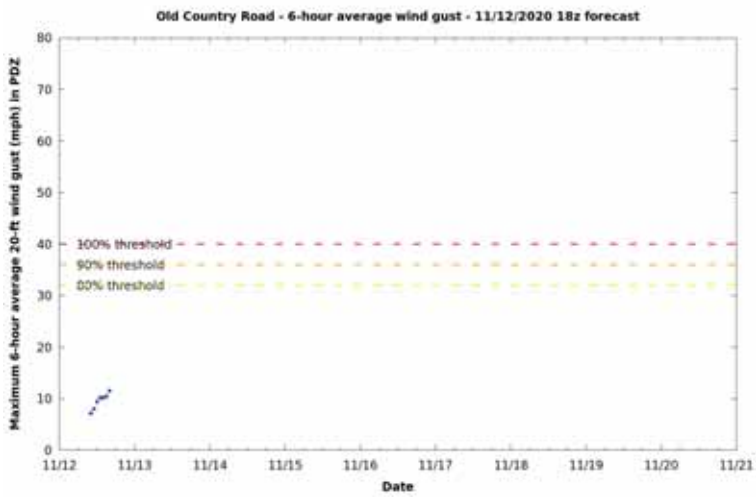
Bky 5200



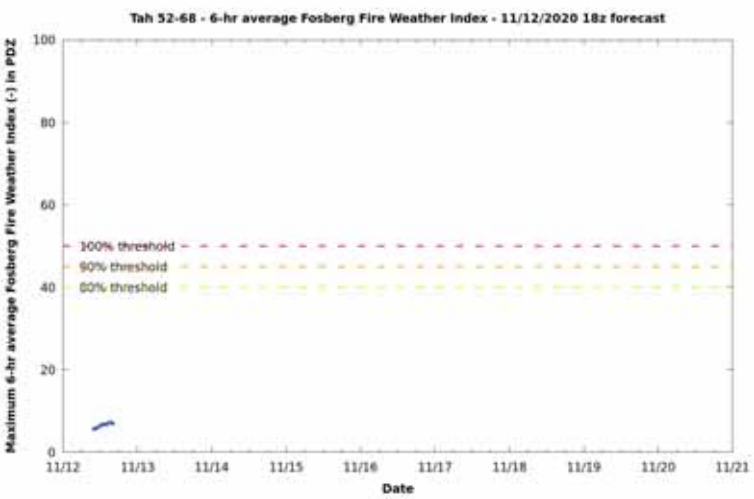


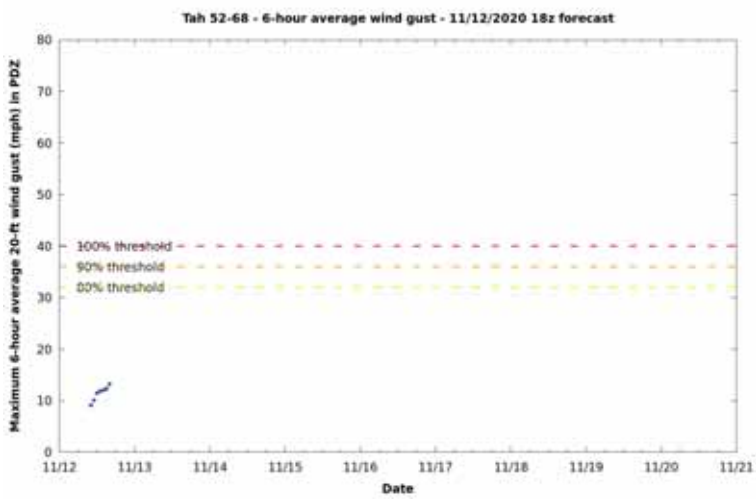
Old Country Road



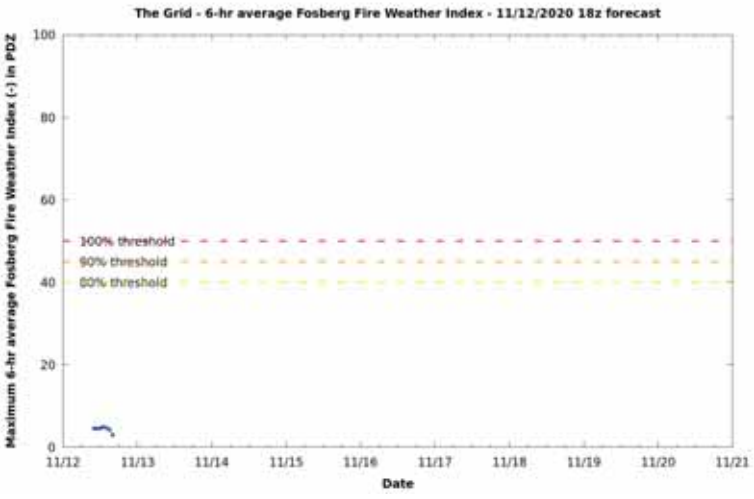


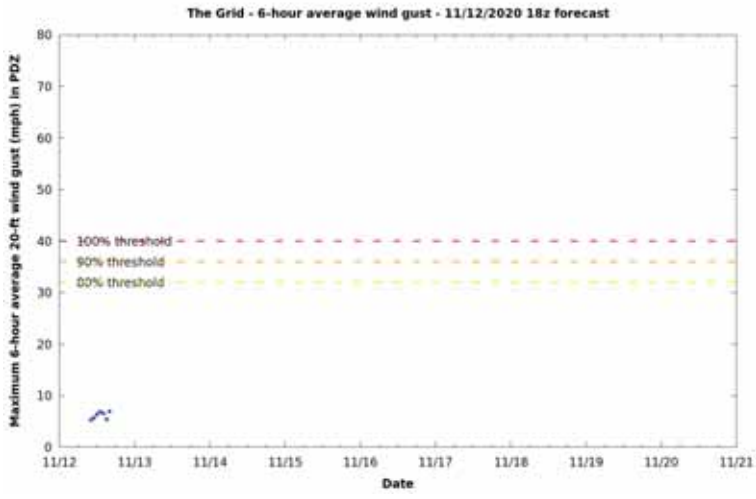
Tah 52-68



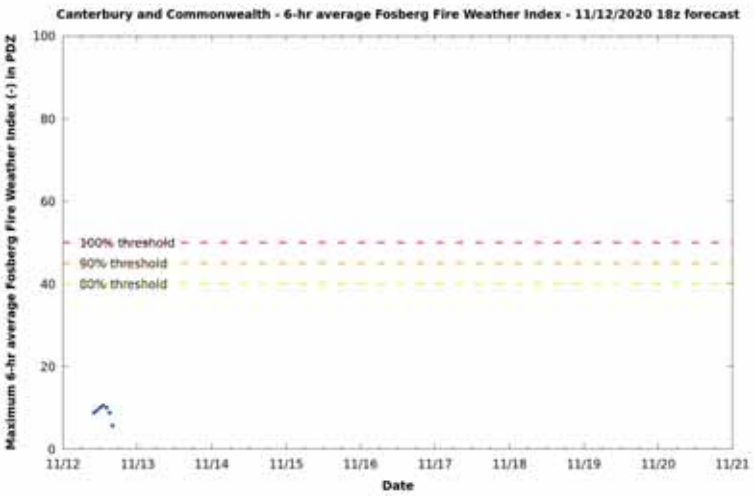


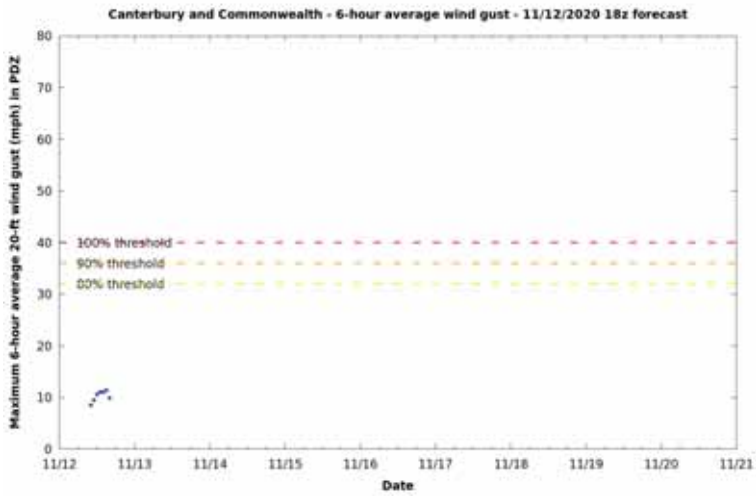
The Grid



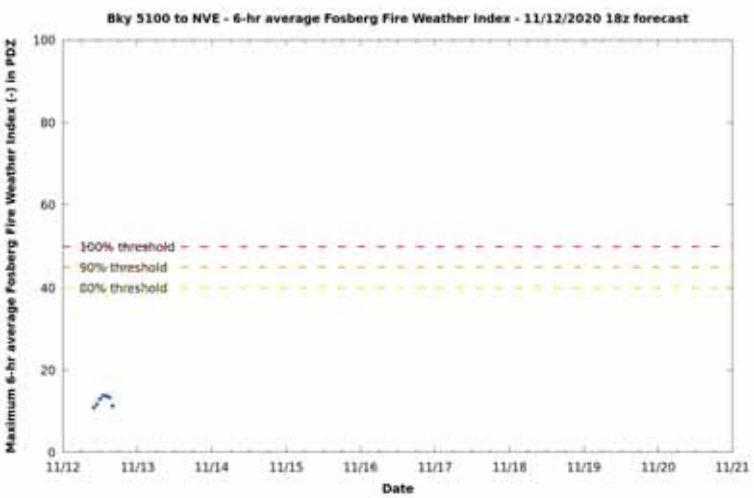


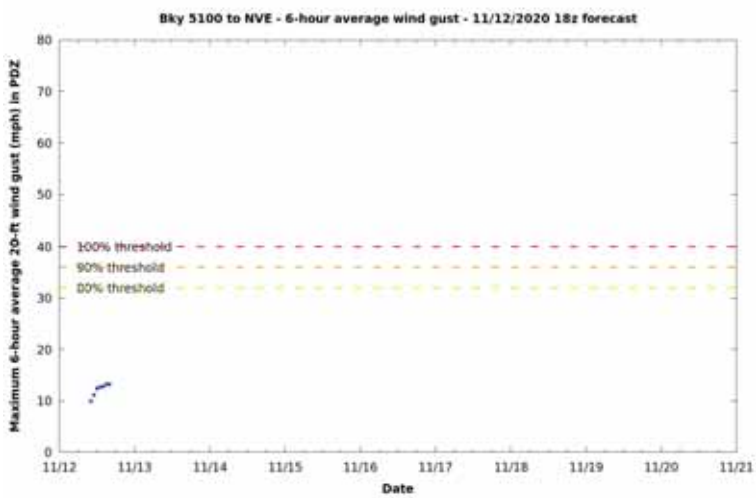
Canterbuy and Commonwealth



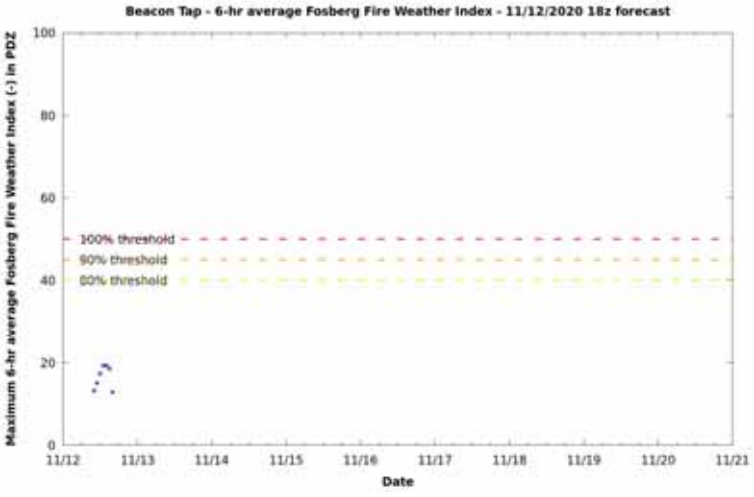


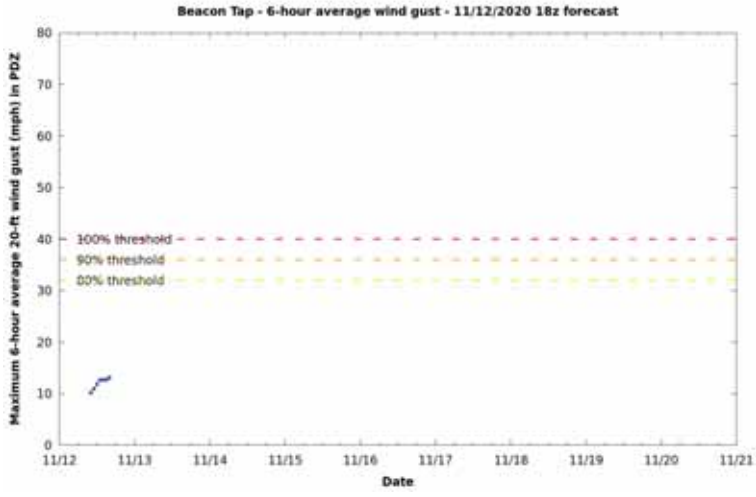
Bky 5100 to NVE



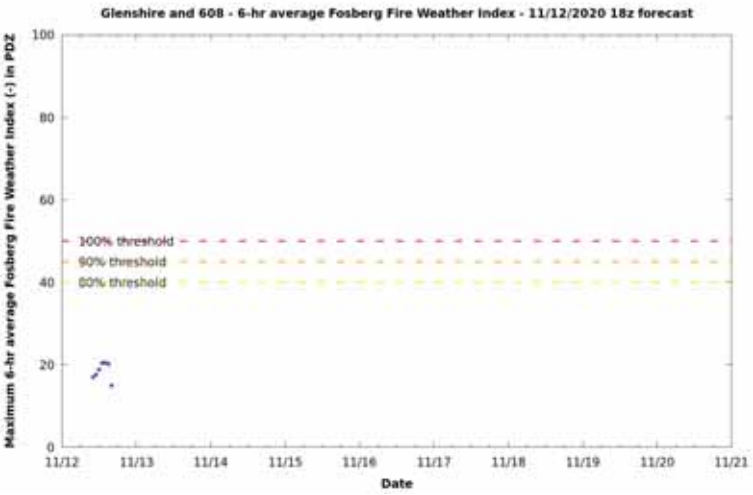


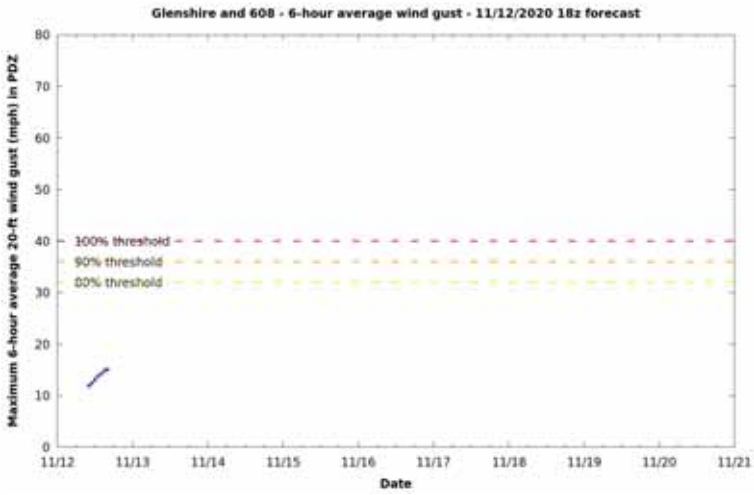
Beacon Tap



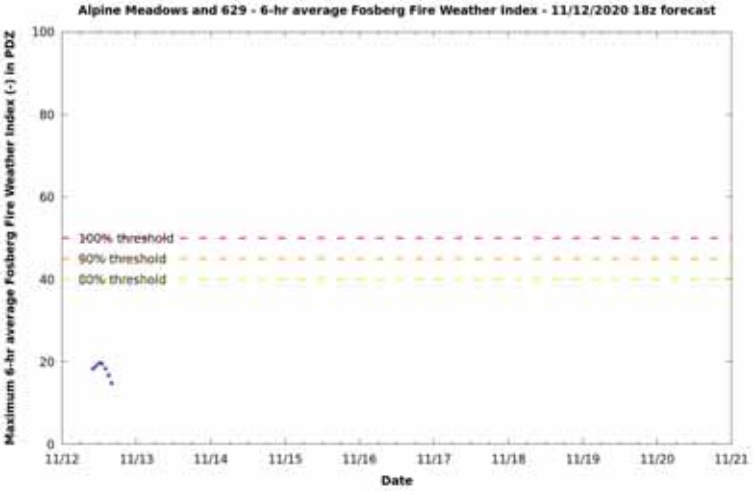


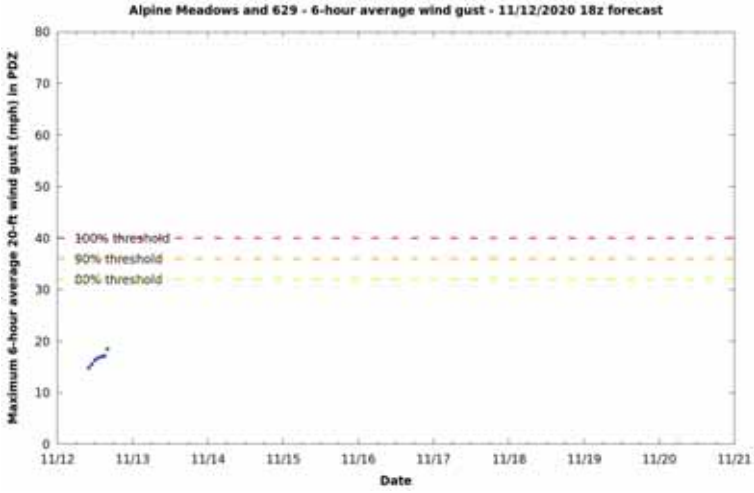
Glenshire and 608



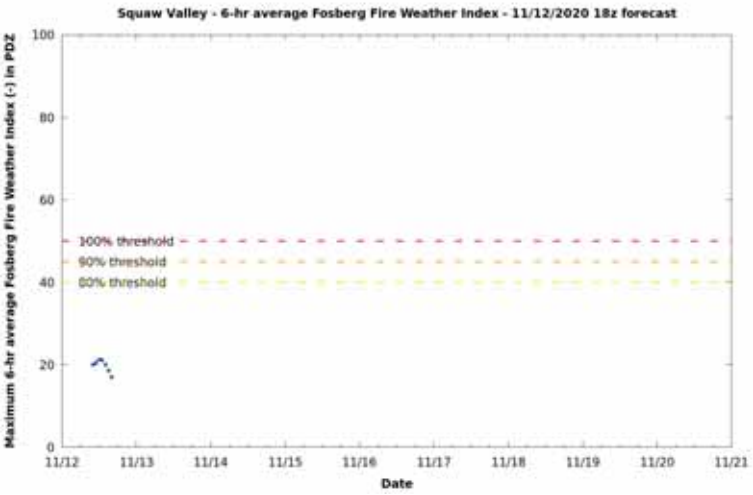


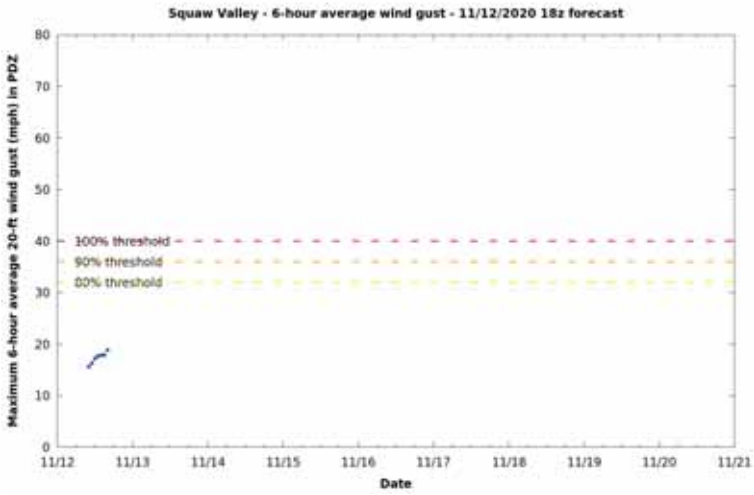
Alpine Meadows and 629



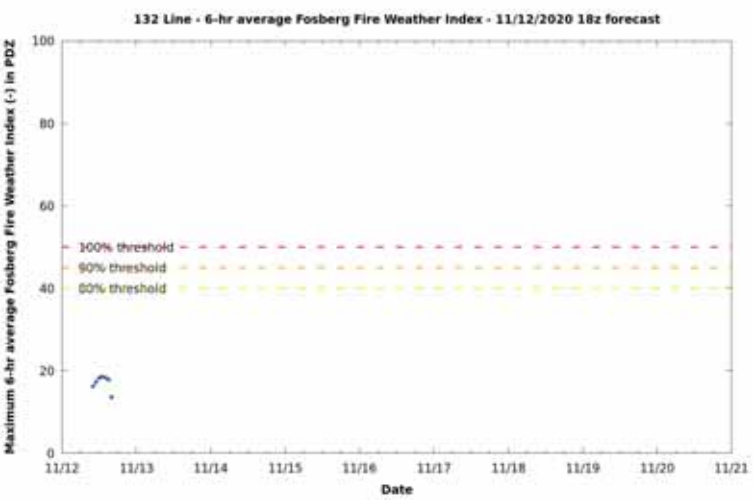


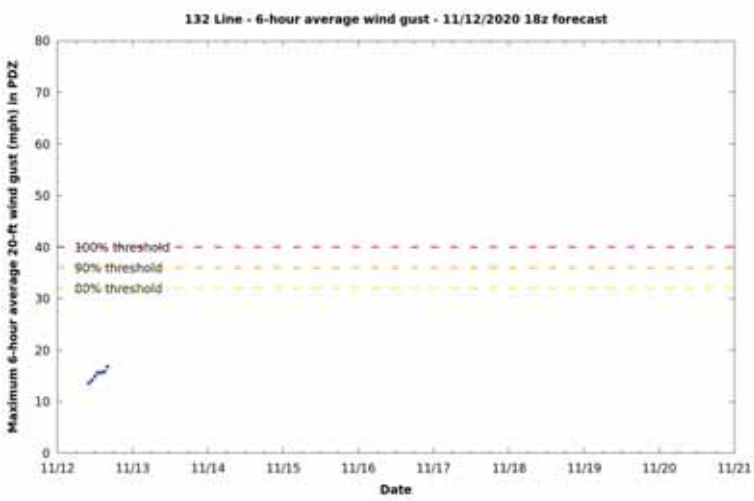
Squaw Valley



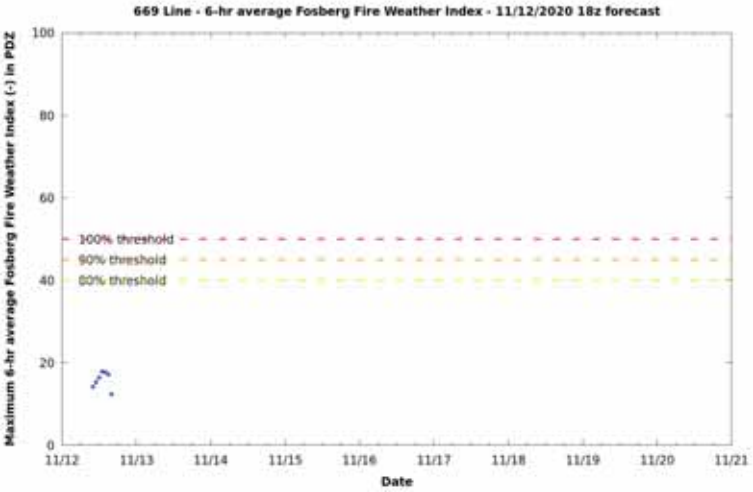


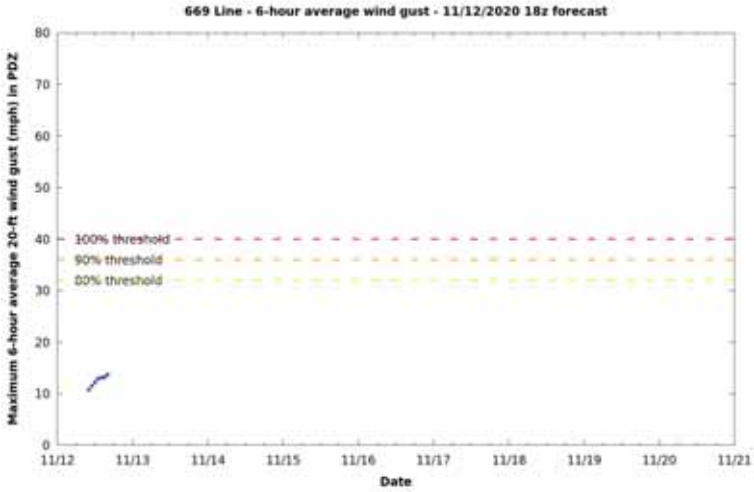
132 Line



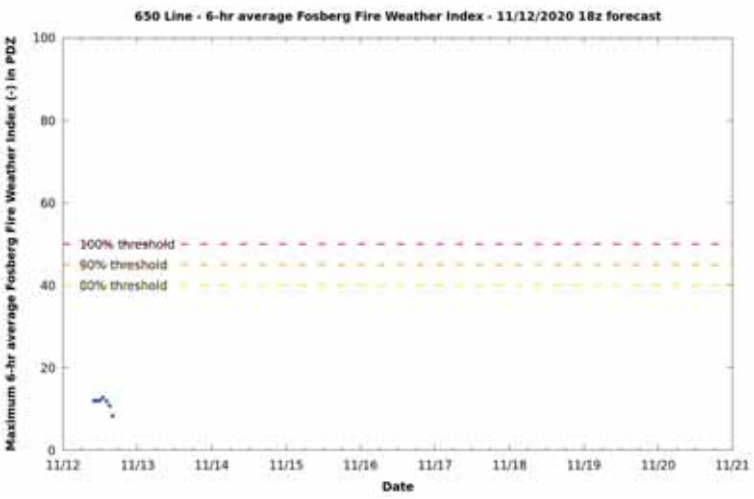


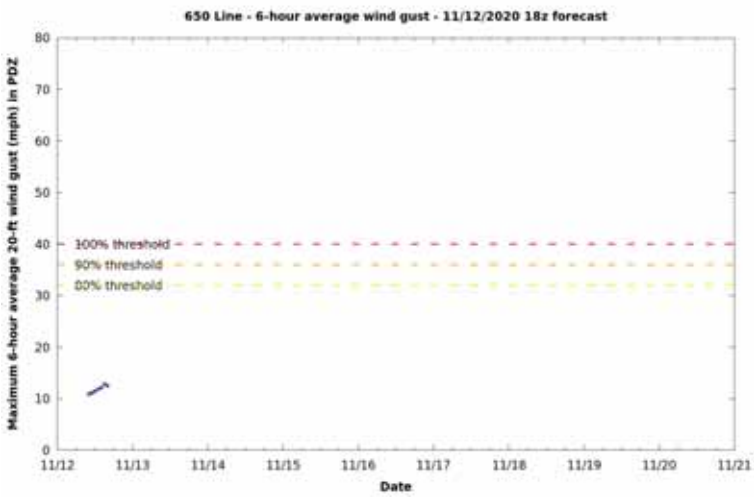
669 Line



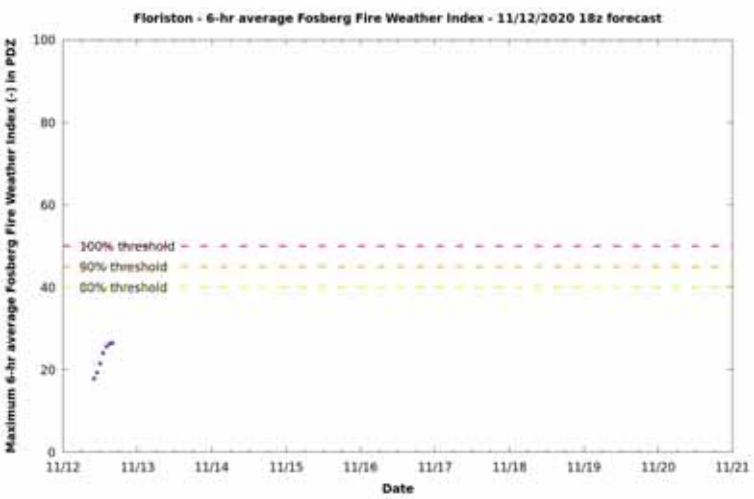


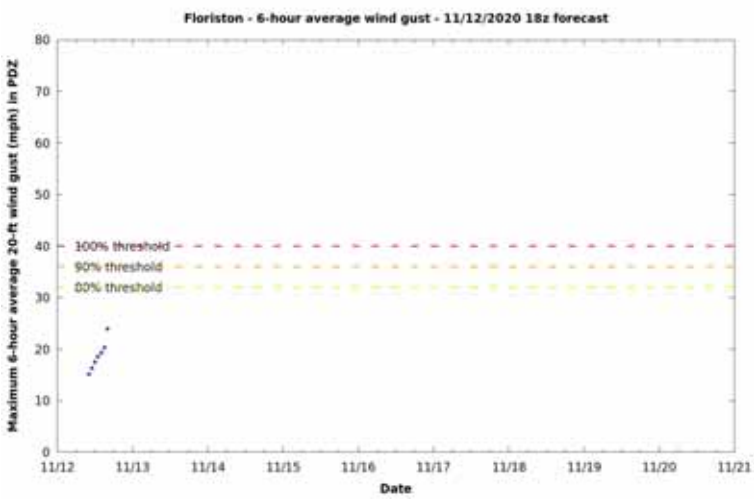
650 Line



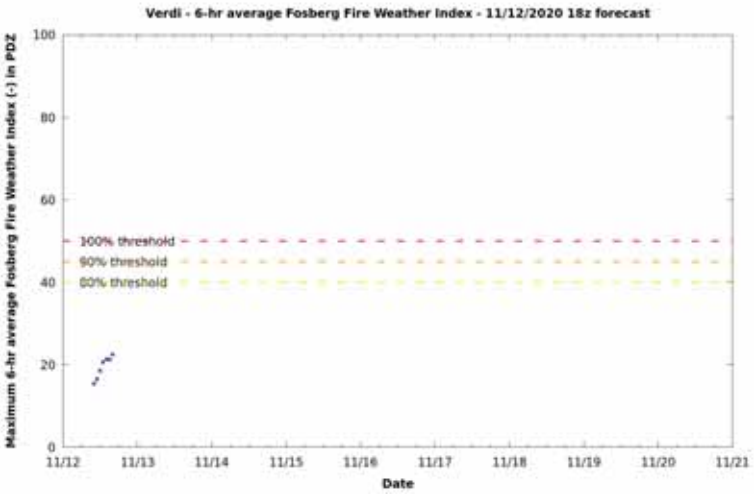


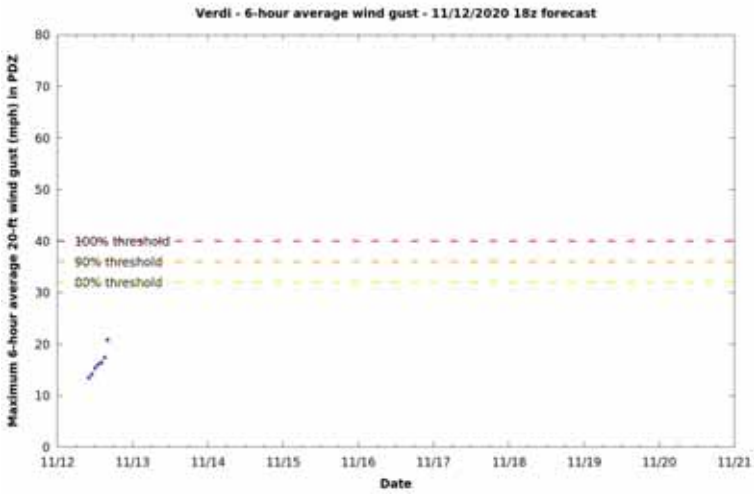
Floriston



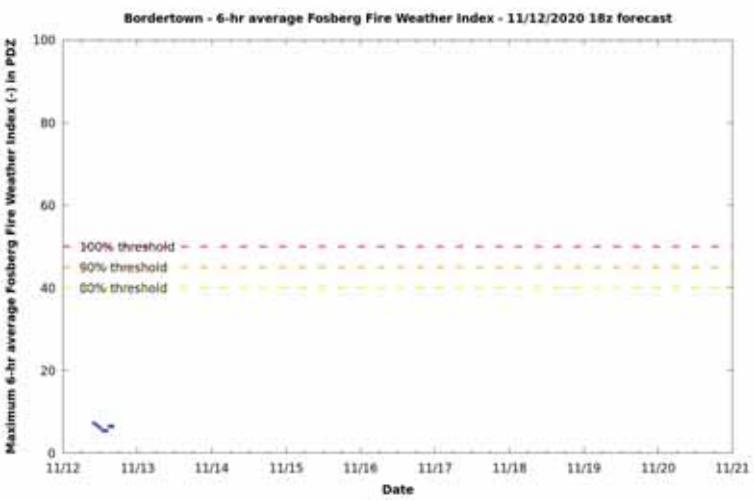


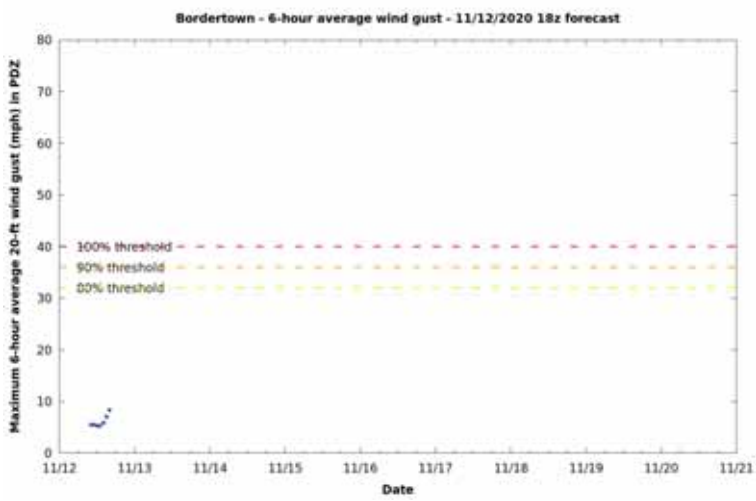
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/12/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100
80
60
40
20
0
100% threshold
90% threshold
80% threshold
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
Date


Bordertown - 6-hour average wind gust - 11/12/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
80
70
60
50
40
30
20
10
0
100% threshold
90% threshold
80% threshold
11/12
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
Date

Liberty Utilities Fire Potential Index Forecast for 11/13/20 - 11/19/20

Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	moderate	moderate	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	moderate	moderate	low	low	low	low	low

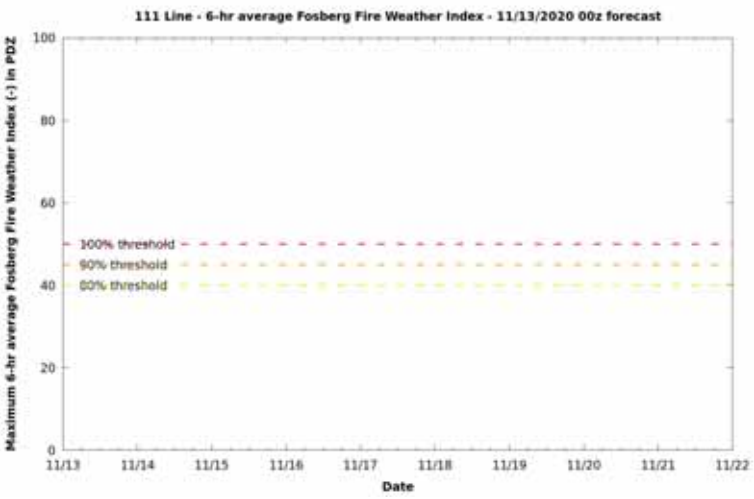
Liberty Utilities Energy Release Component Forecast for 11/13/20 - 11/19/20

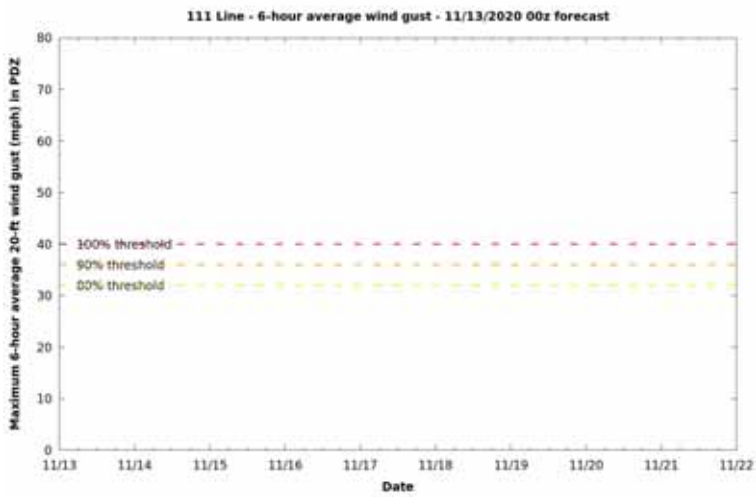
Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	66.0	60.0	55.0	51.0	52.0	56.0	54.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	62.0	48.0	43.0	38.0	36.0	39.0	34.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	58.0	58.0	54.0	50.0	54.0	56.0	56.0

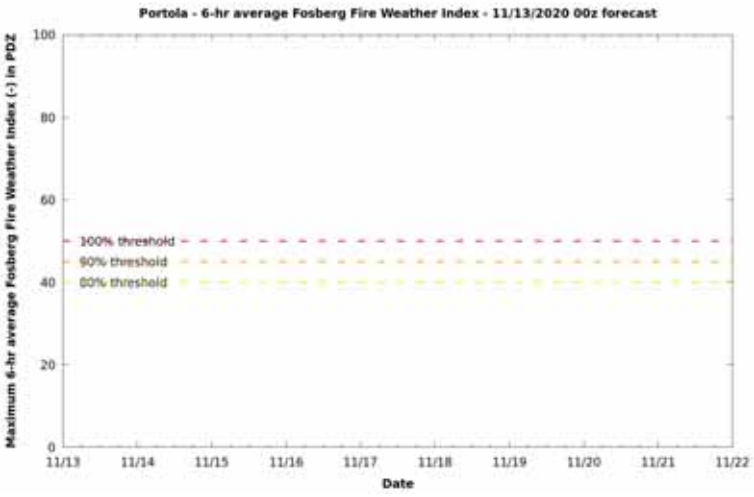
Liberty Utilities Fire Weather Summary Plots - 11/13/2020 00z forecast

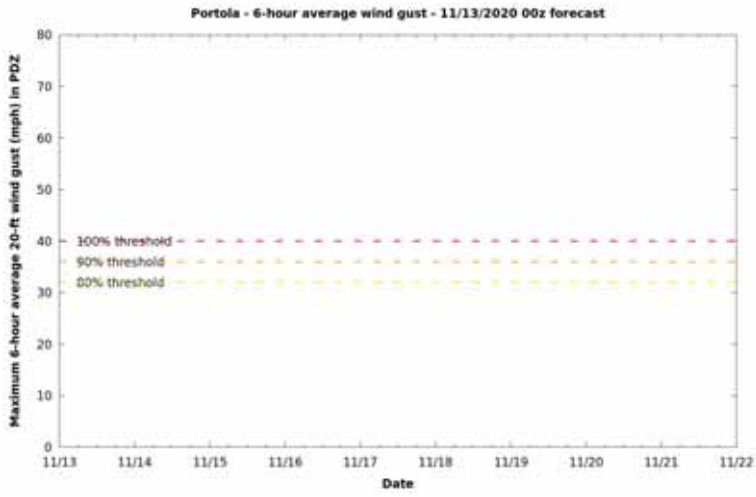
111 Line



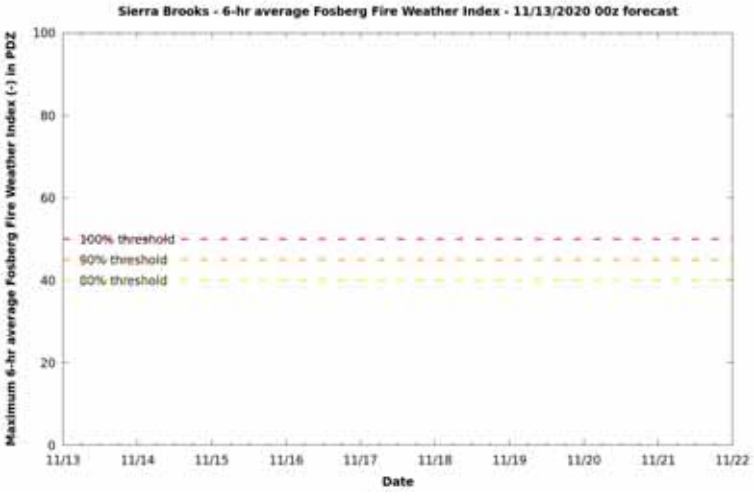


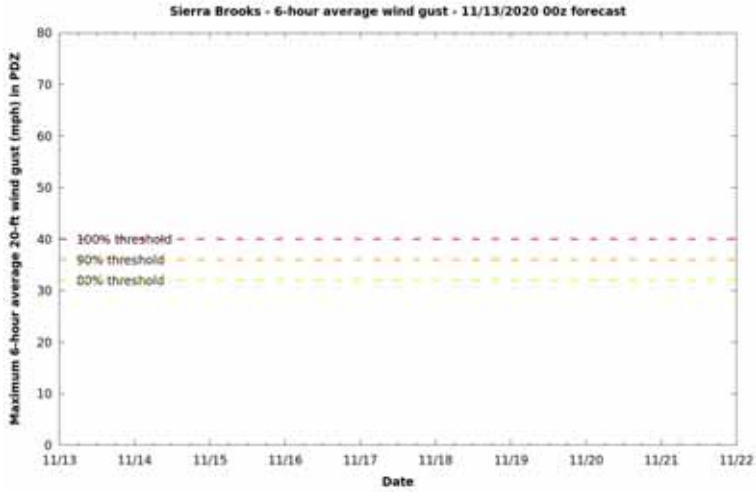
Portola



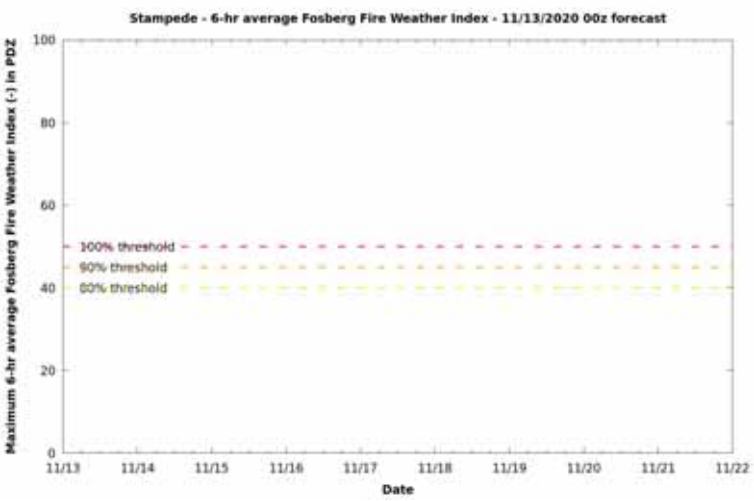


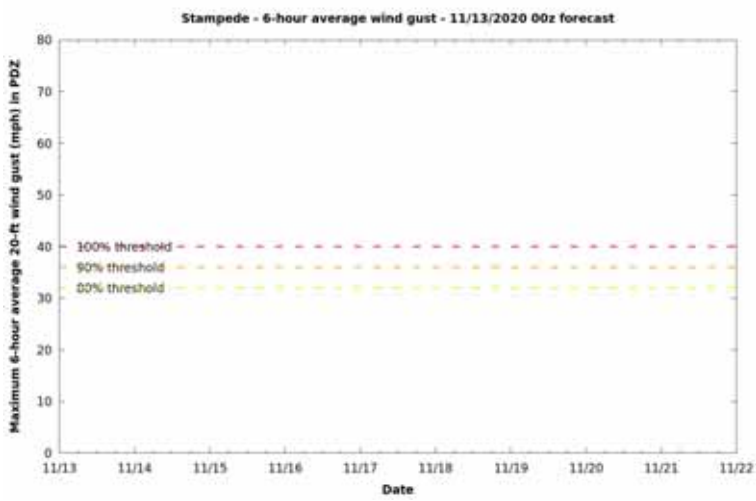
Sierra Brooks



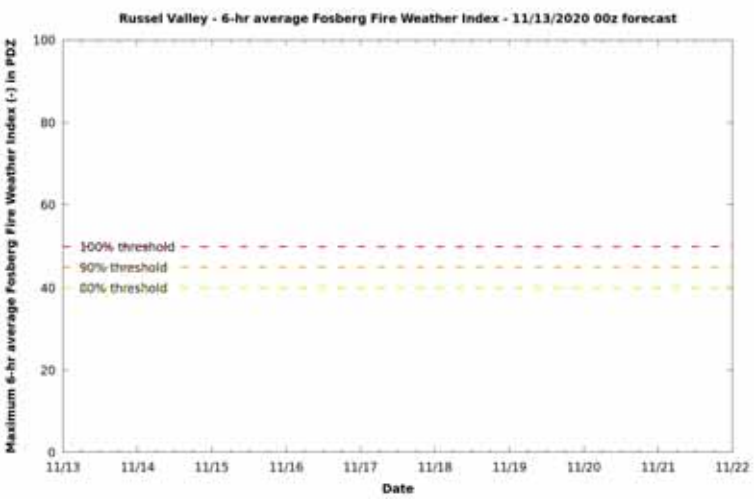


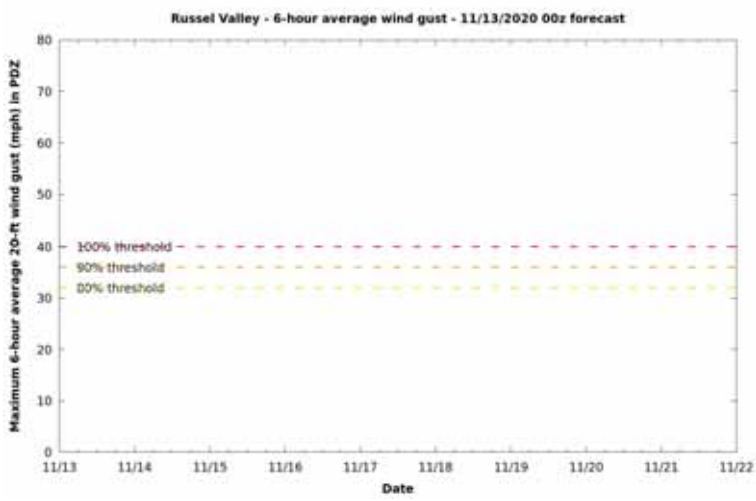
Stampede



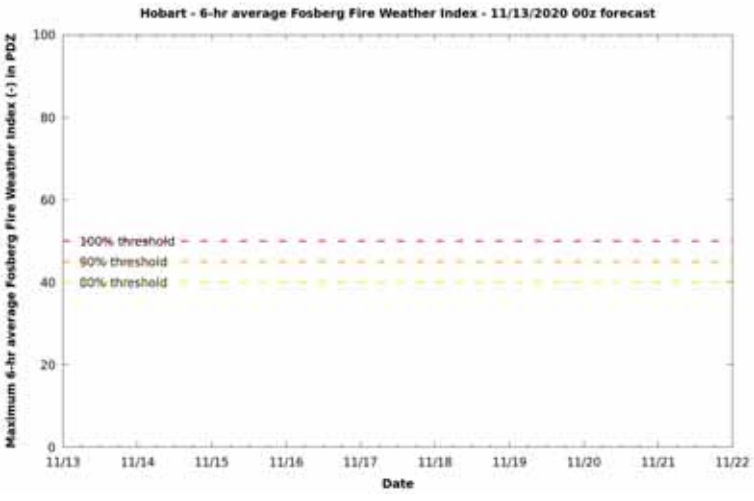


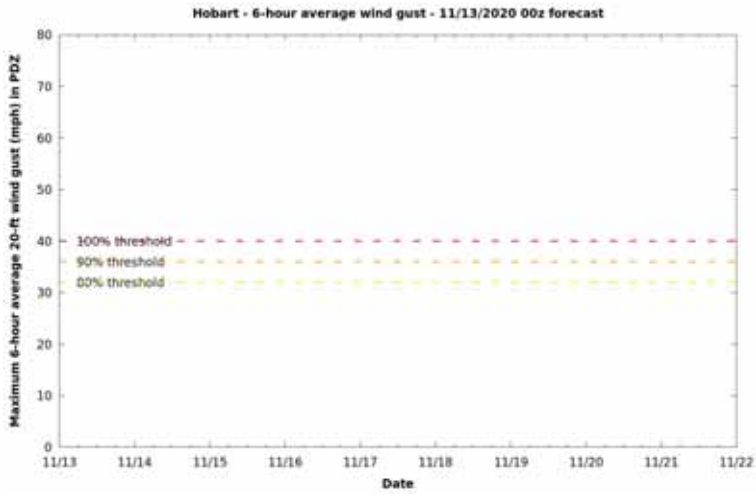
Russell Valley



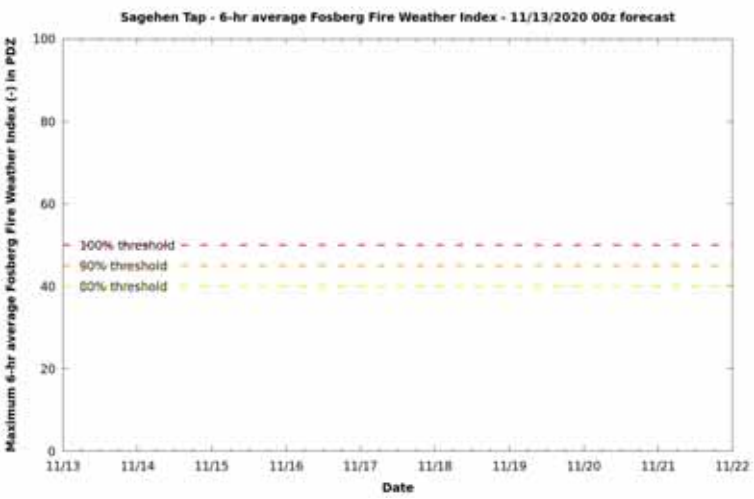


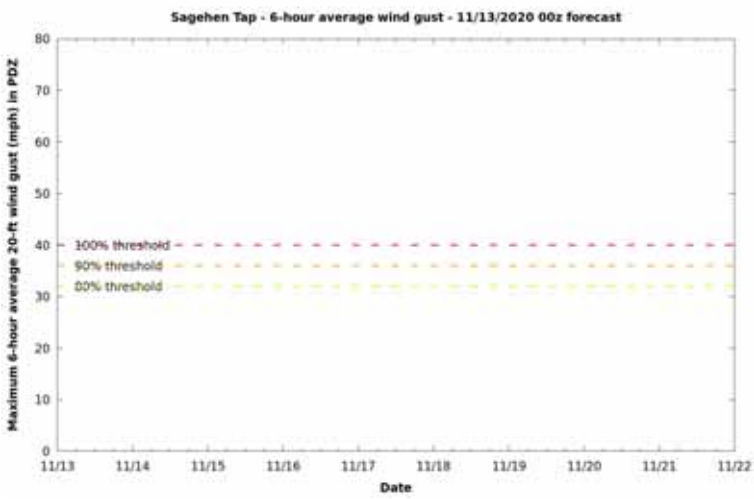
Hobart



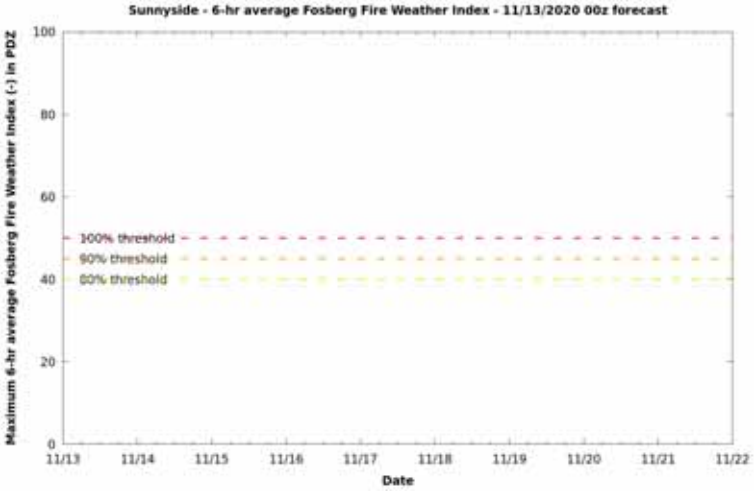


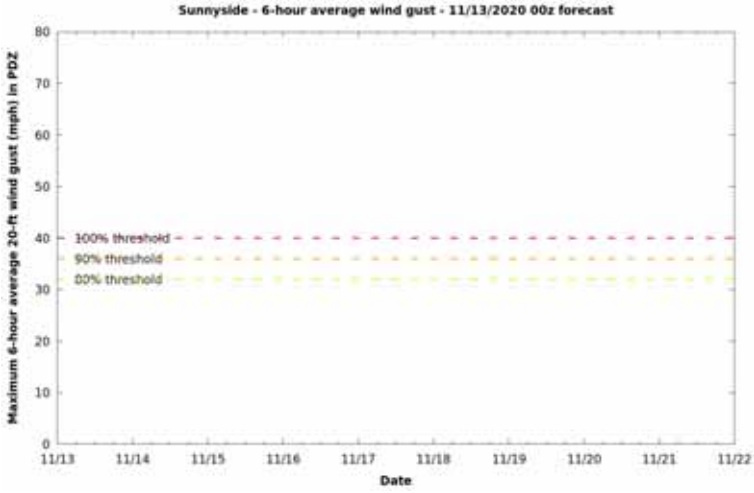
Sagehen tap



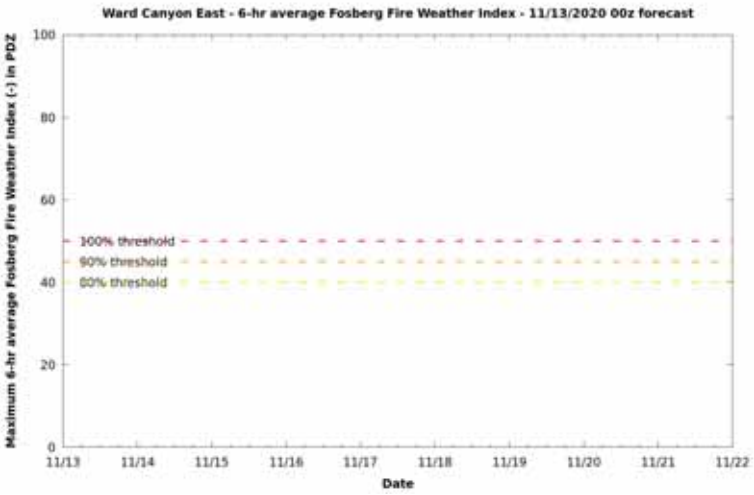


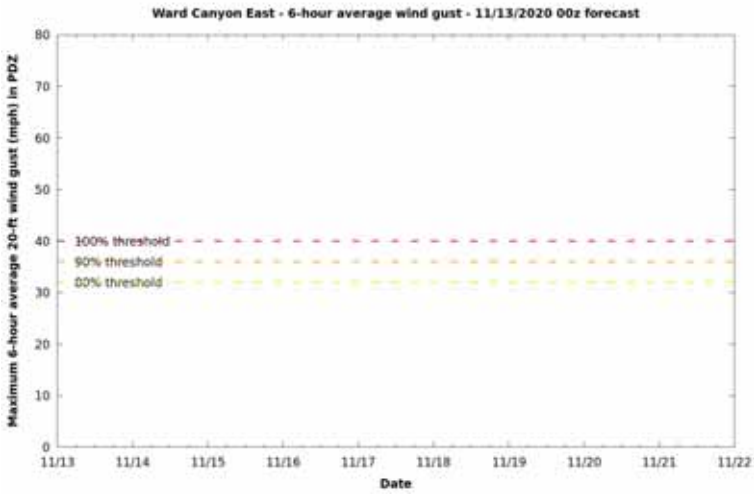
Sunnyside



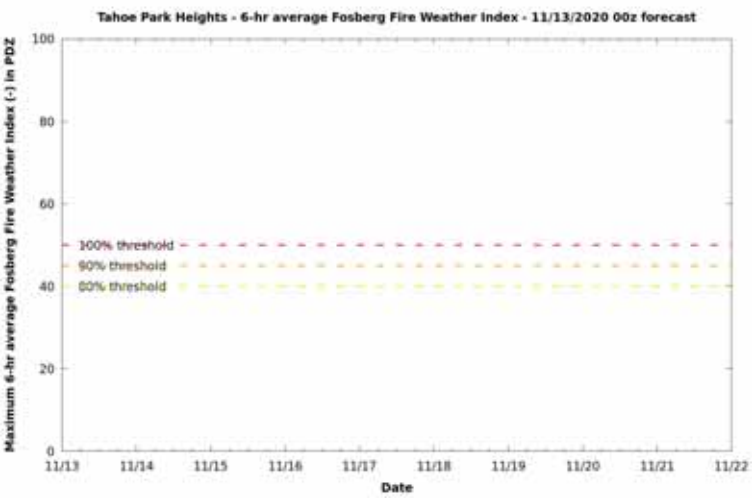


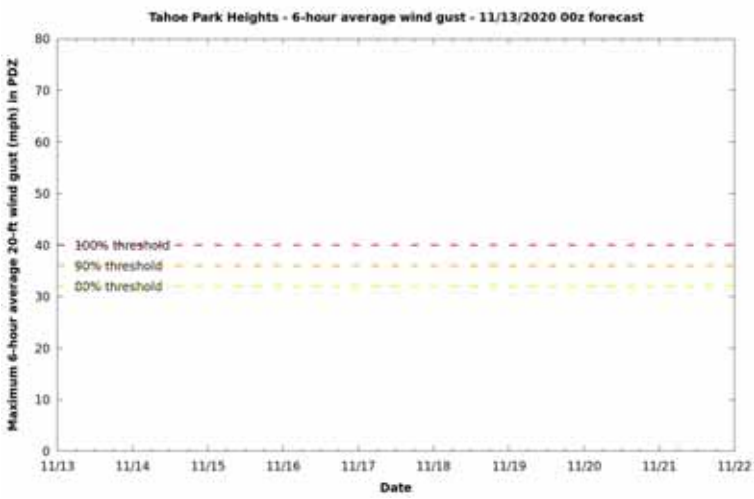
Ward Canyon East



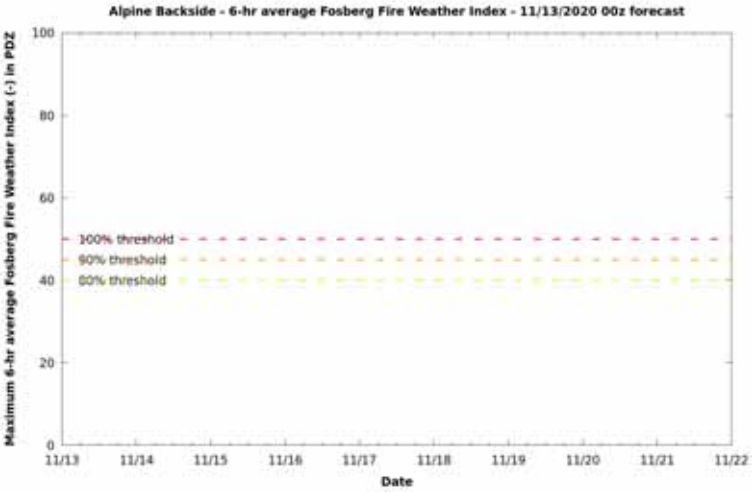


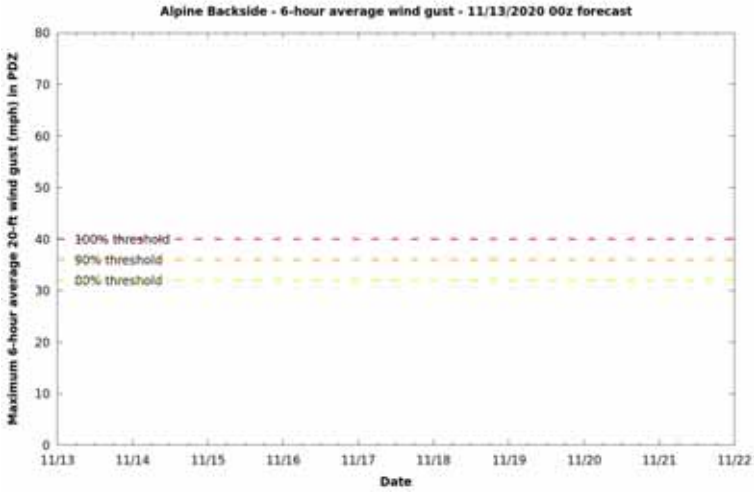
Tahoe Park Heights



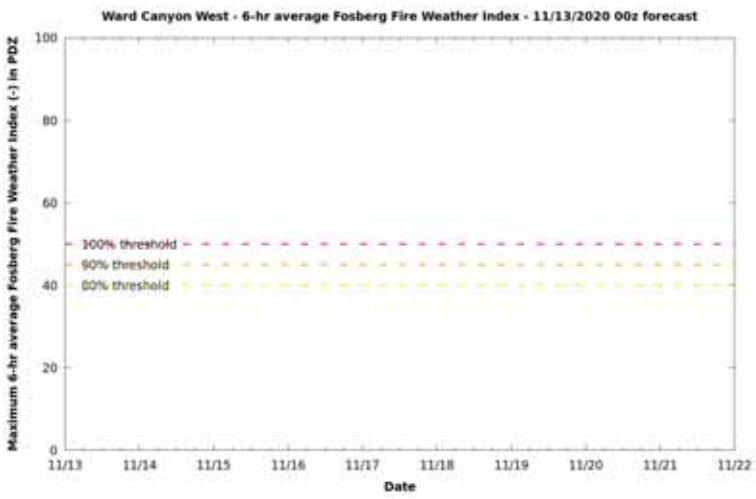


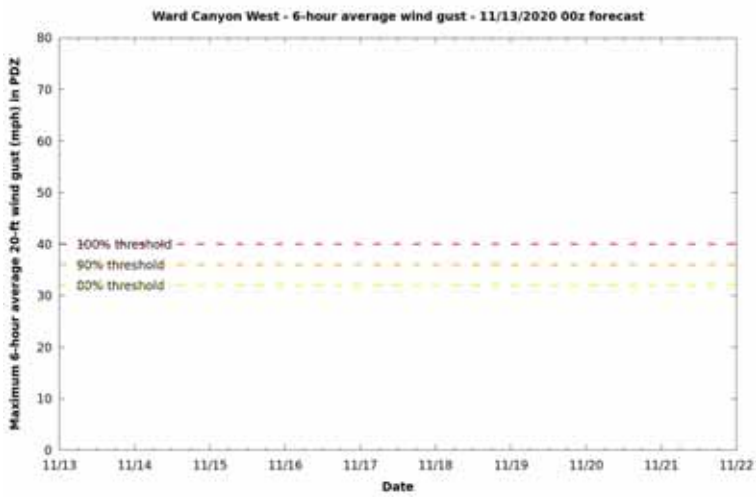
Alpine Backside



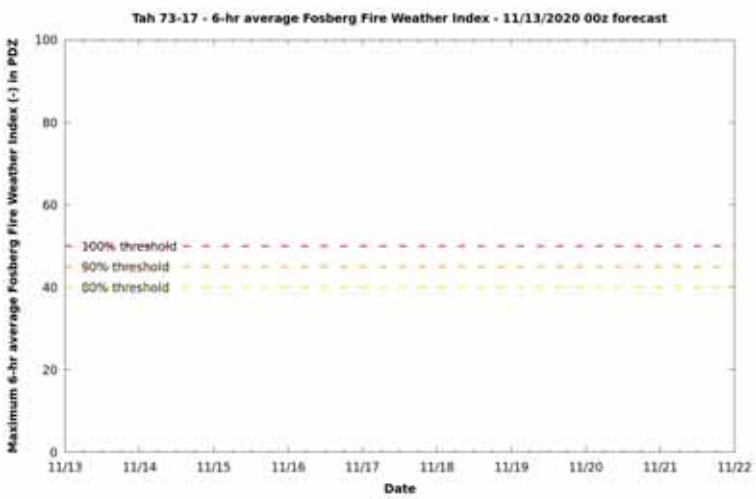


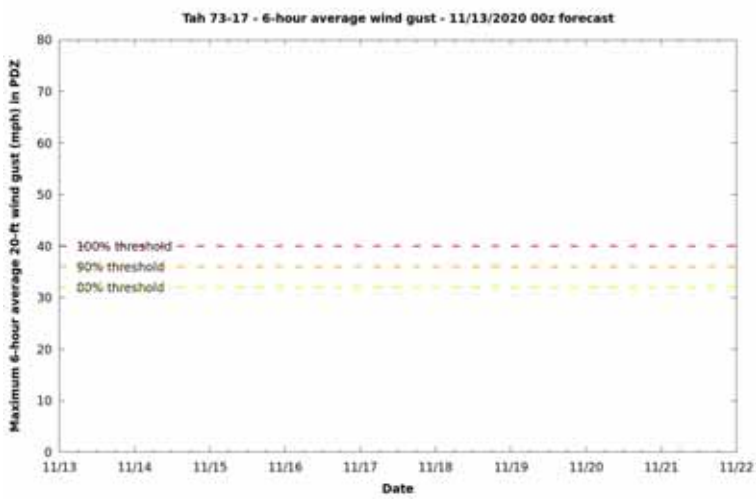
Ward Canyon West



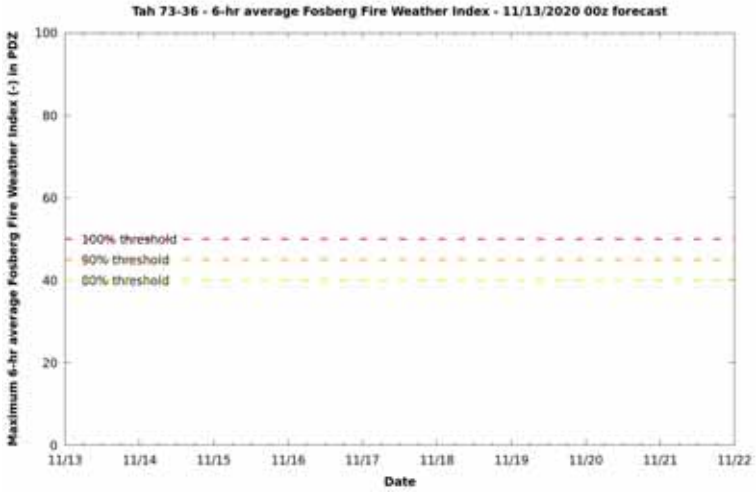


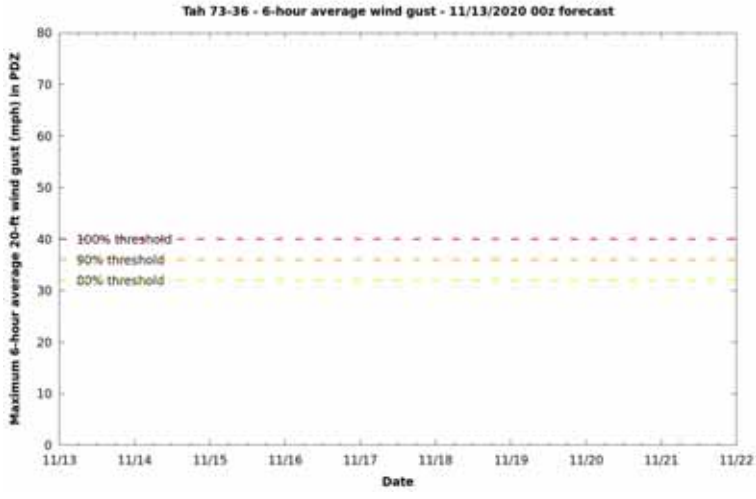
Tah 73-17



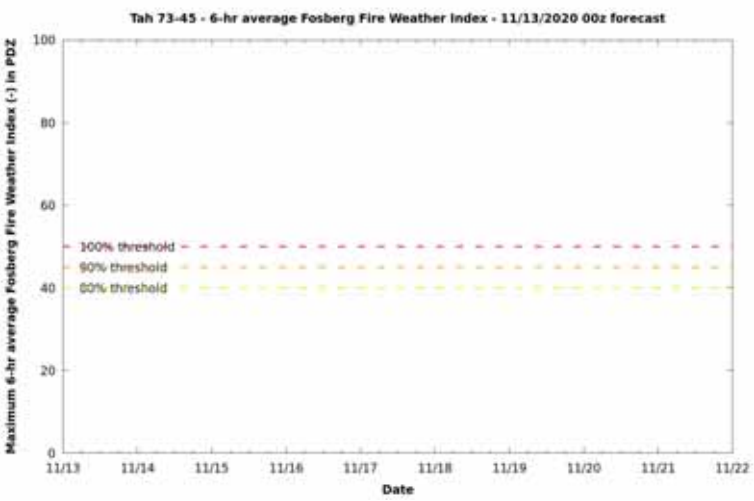


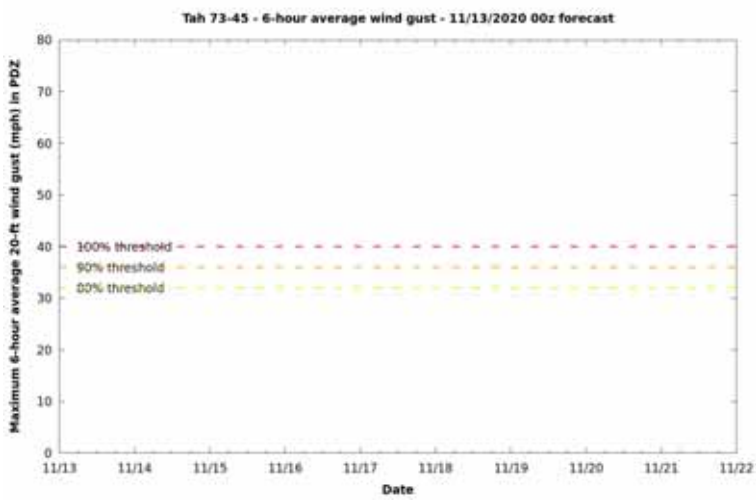
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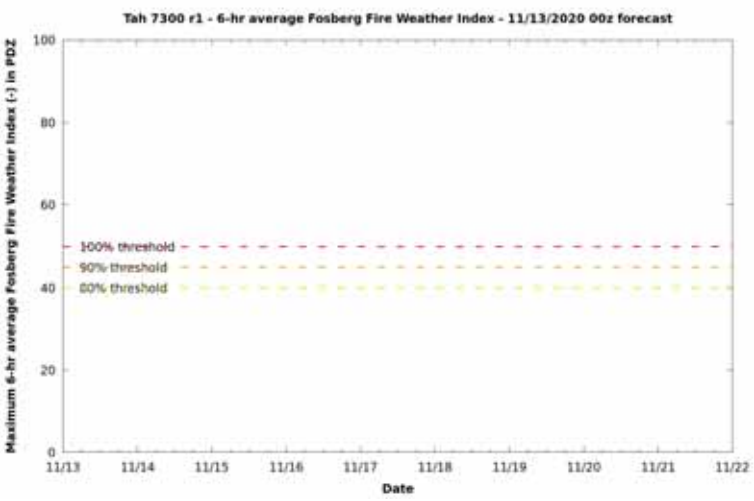


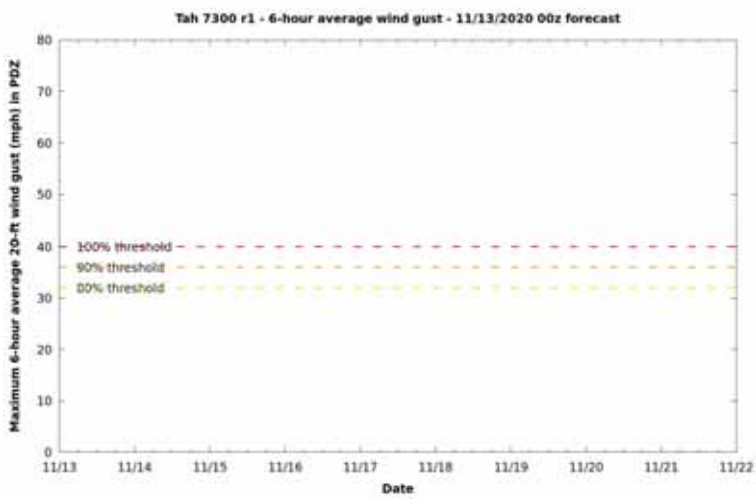
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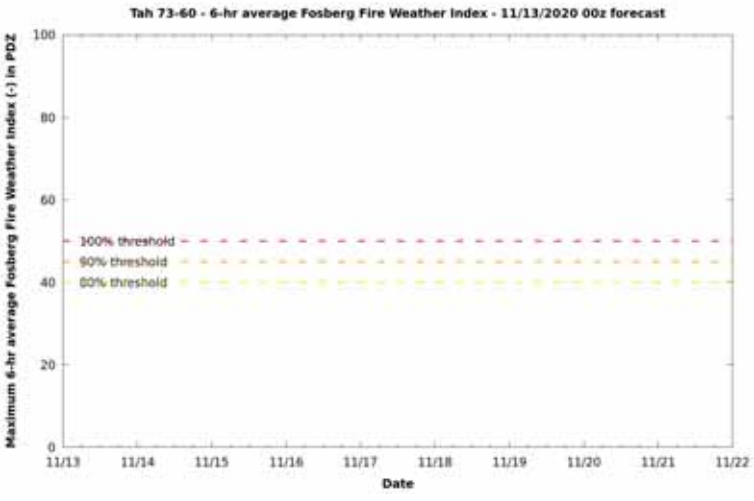


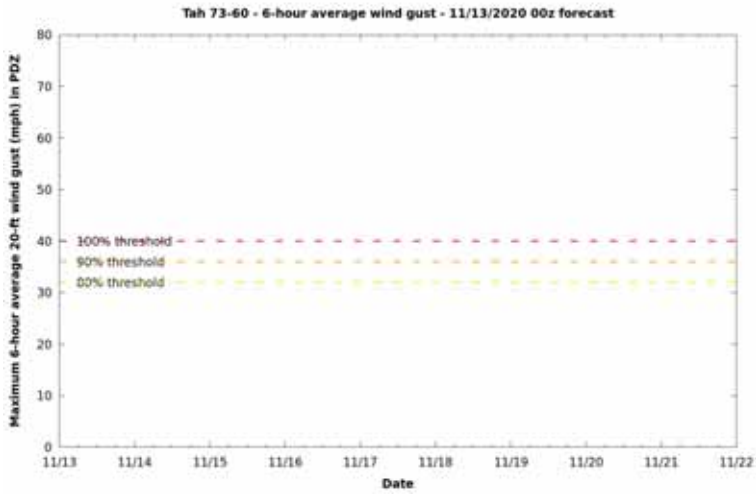
Tah 7300 r1



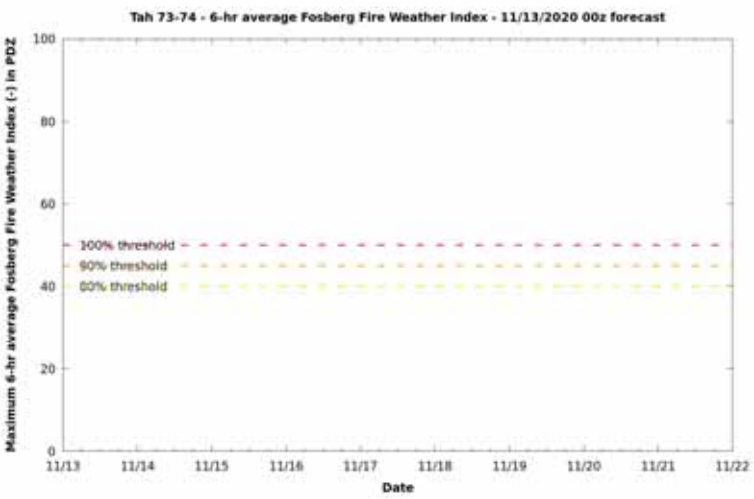


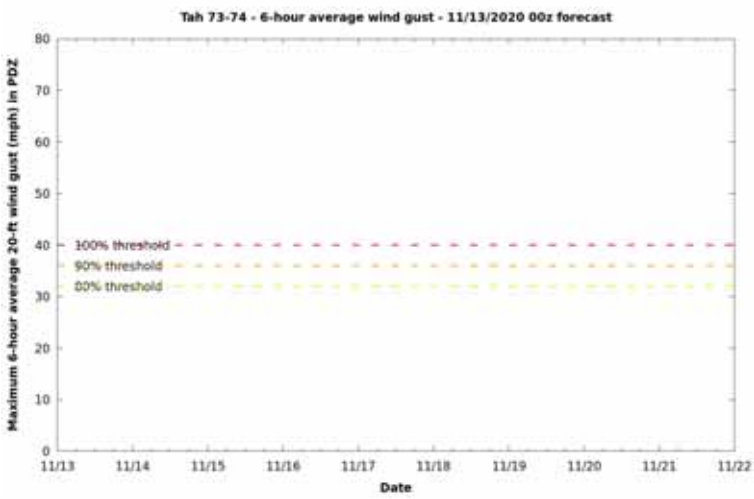
Tah 73-60



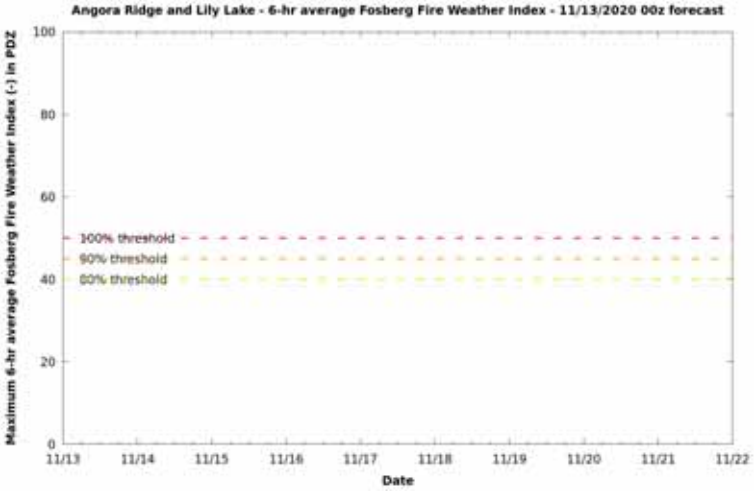


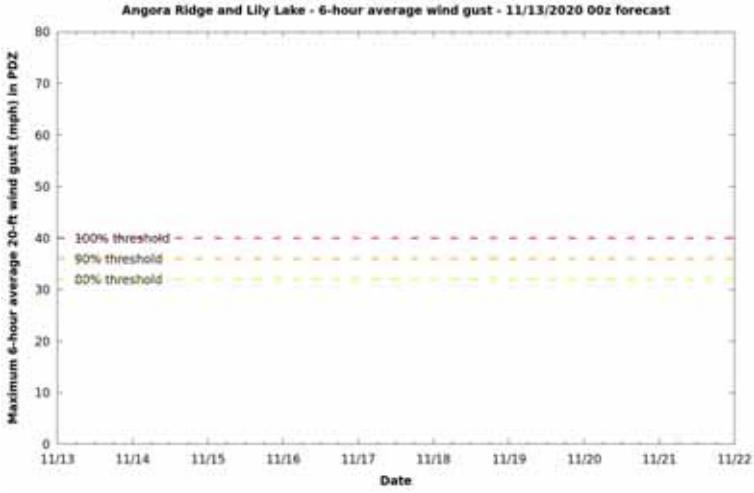
Tah 73-74



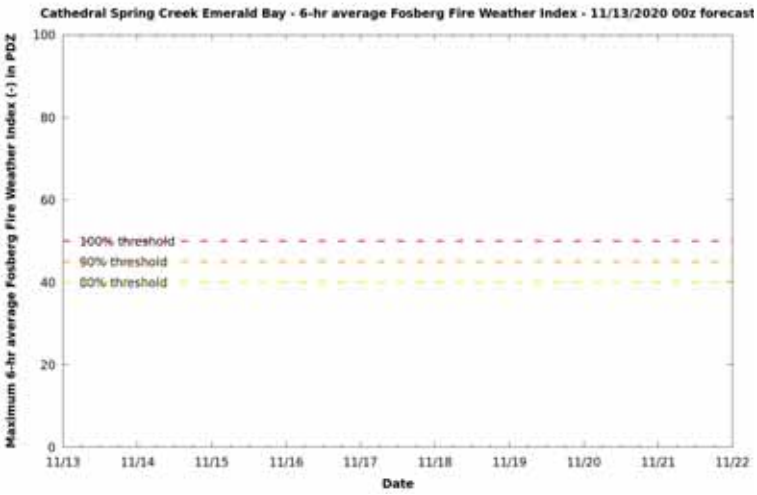


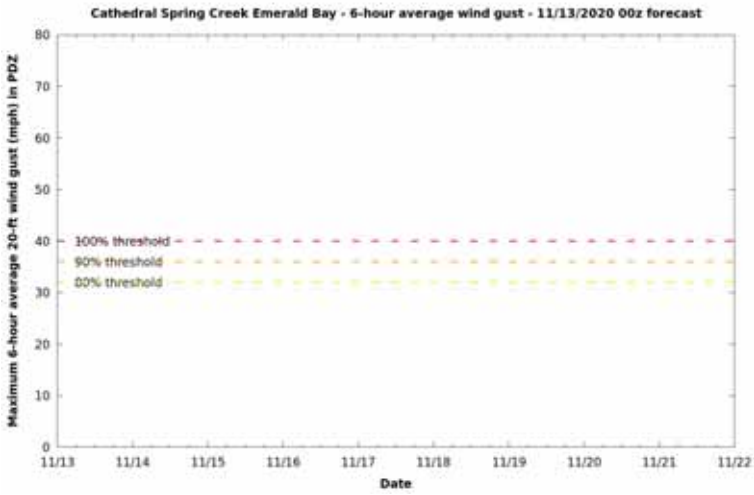
Angora Ridge and Lily Lake



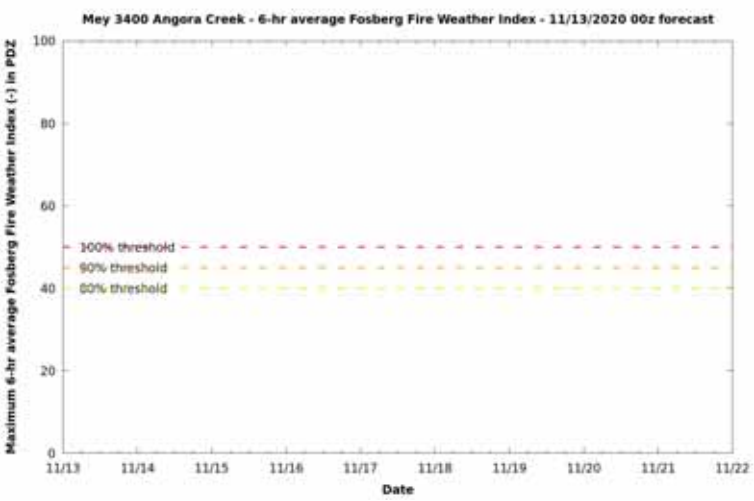


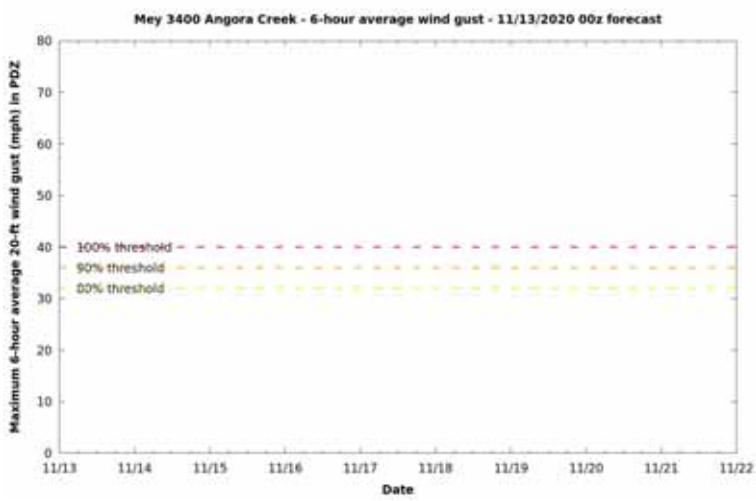
Cathedral Spring Creek Emerald Bay



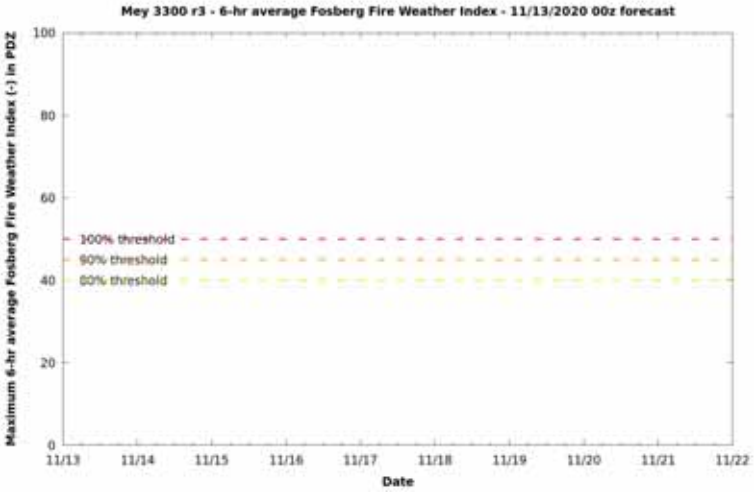


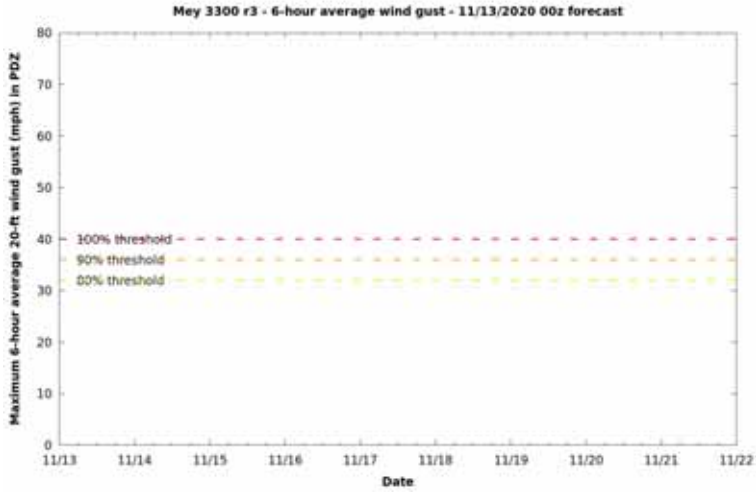
Mey 3400 Angora Creek



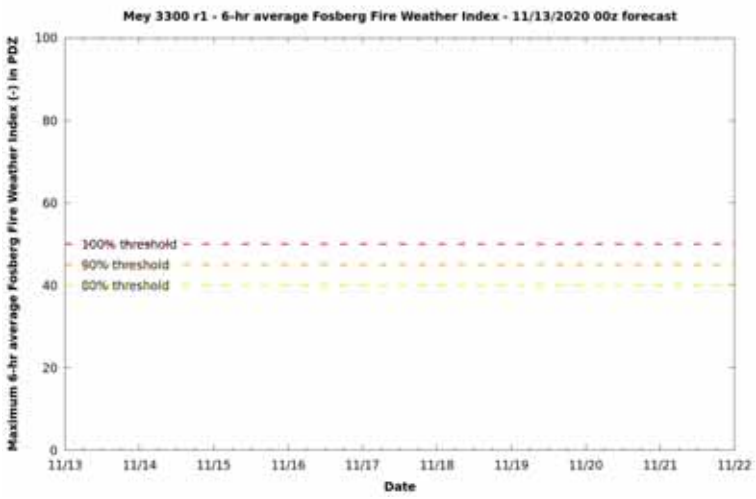


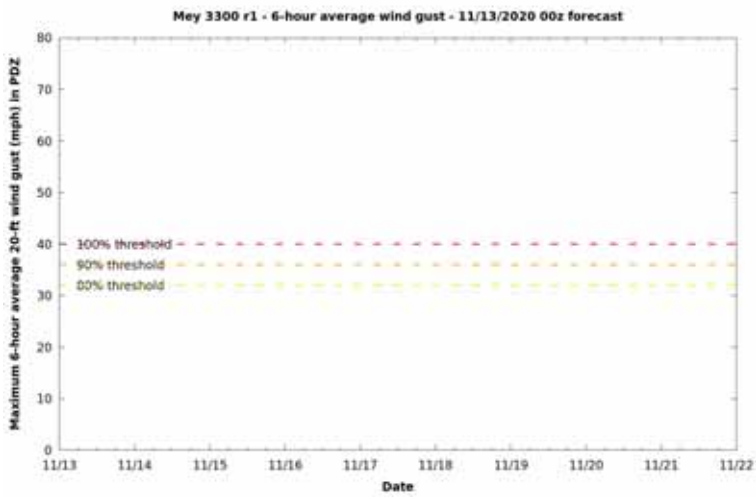
Mey 3300 r3



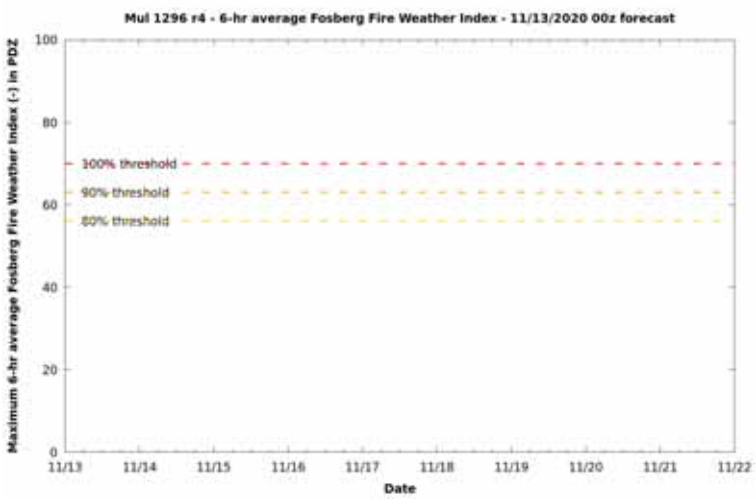


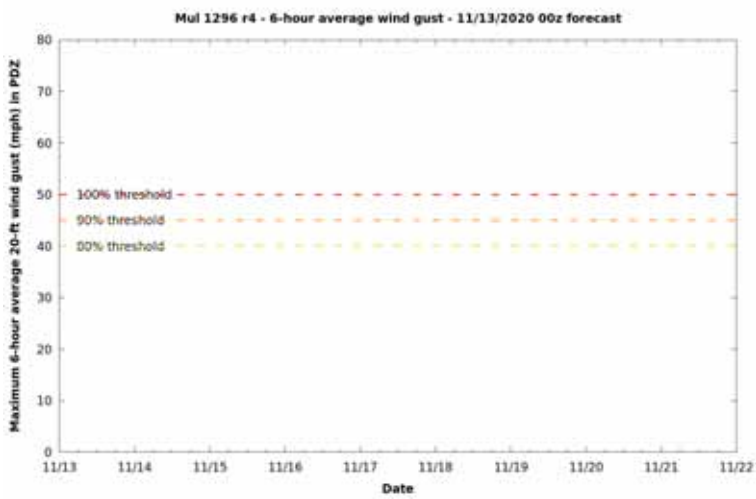
Mey 3300 r1



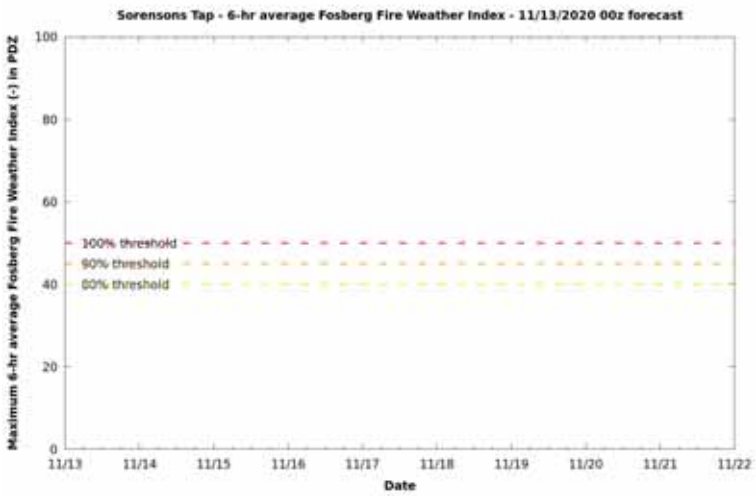


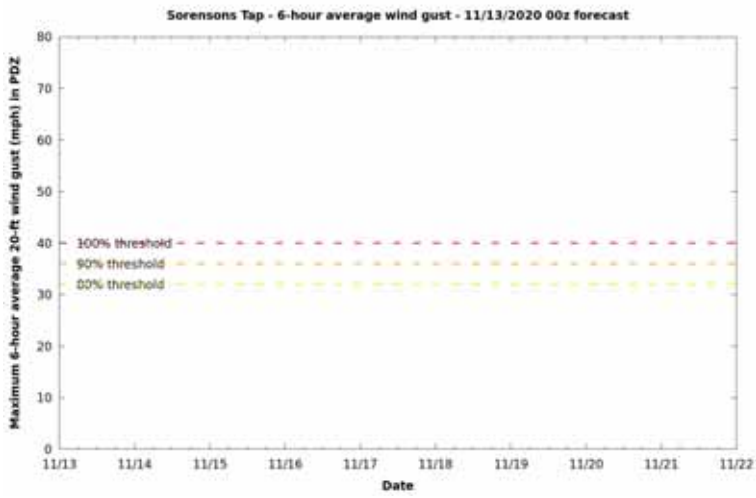
Mul 1296 r4



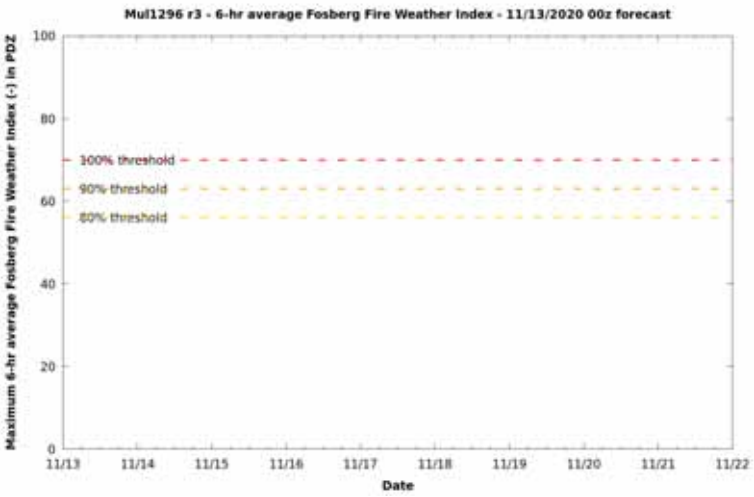


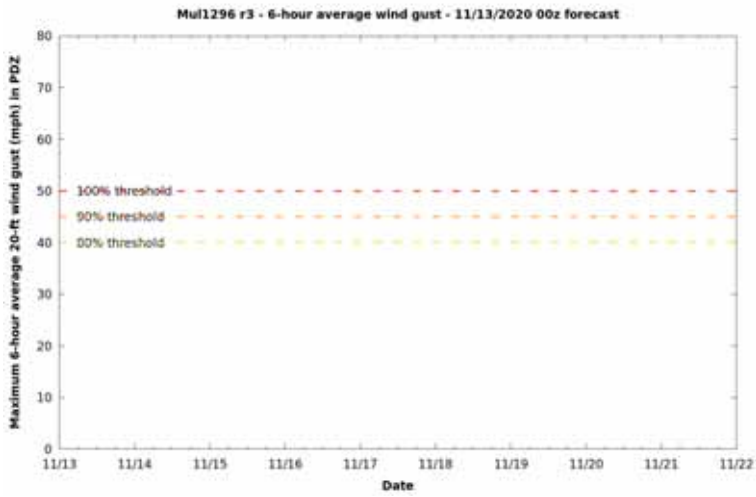
Sorensons Tap



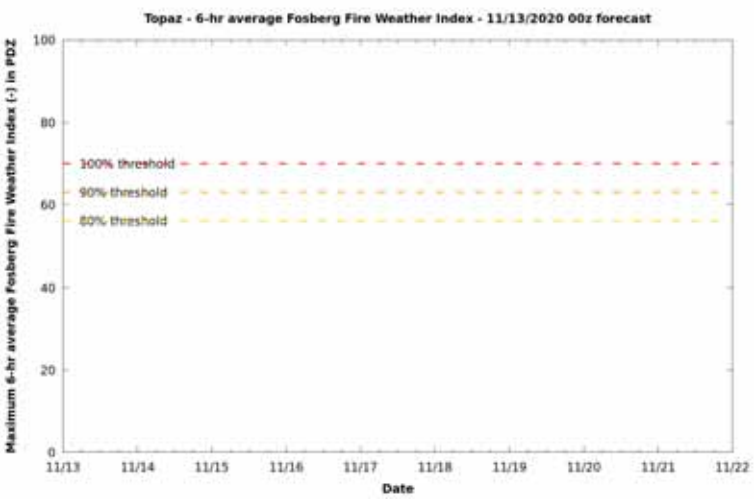


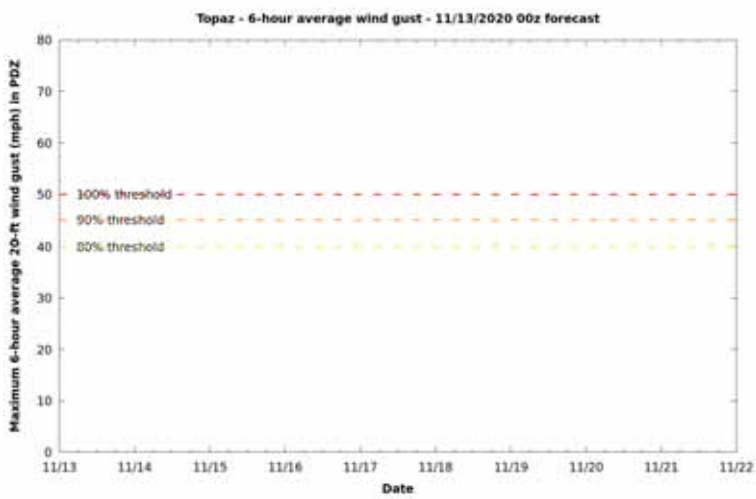
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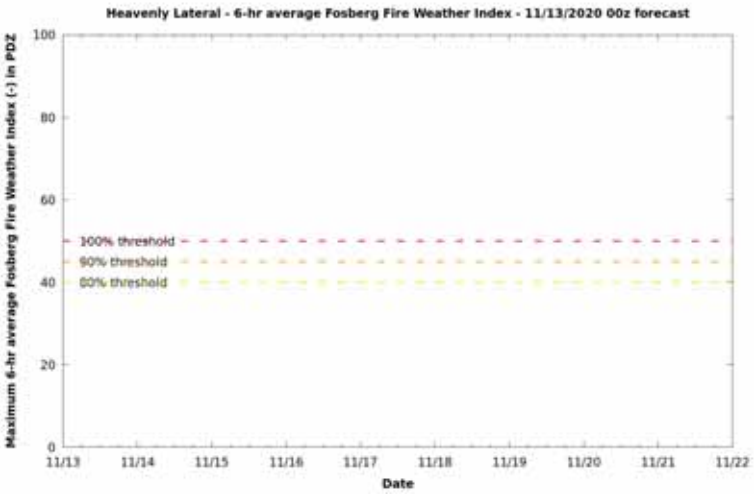


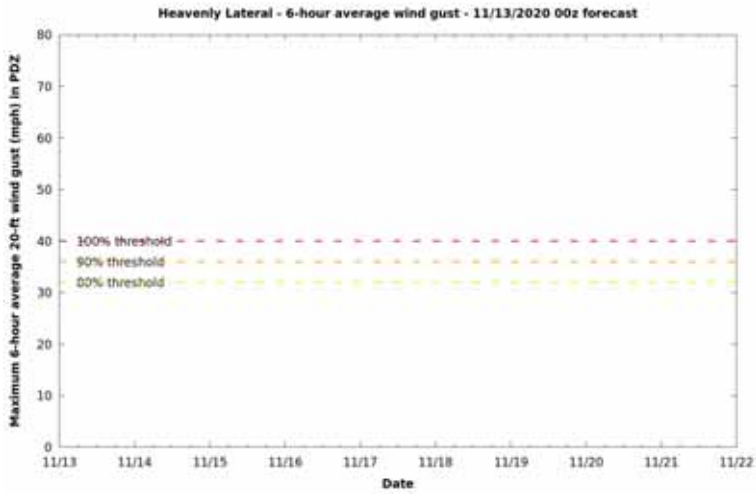
Topaz



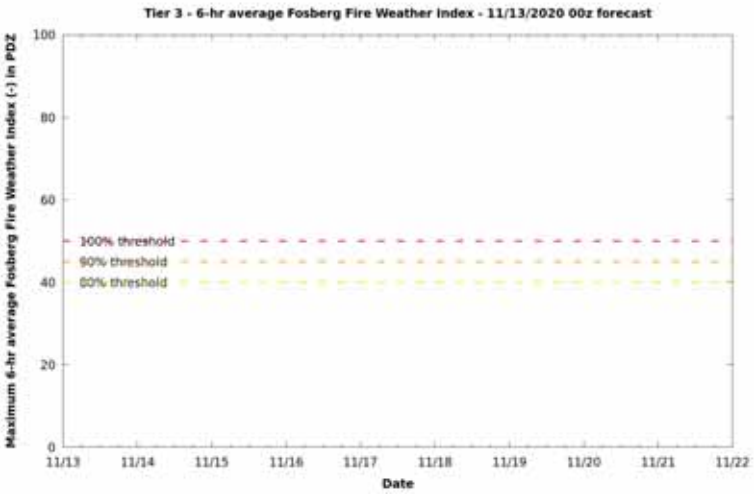


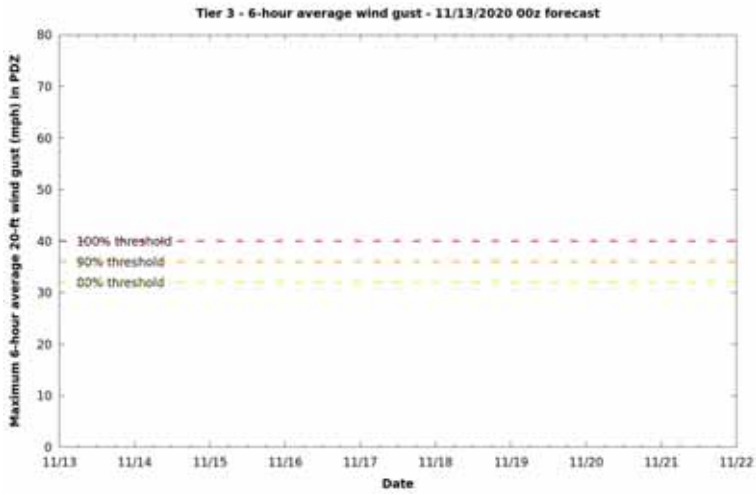
Heavenly Lateral



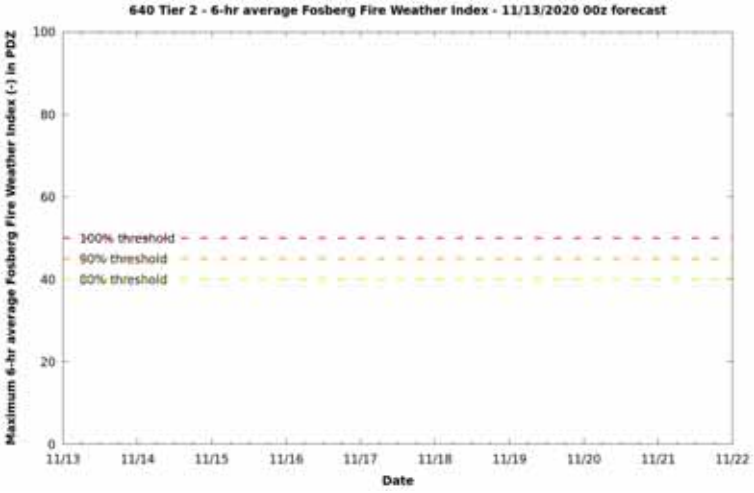


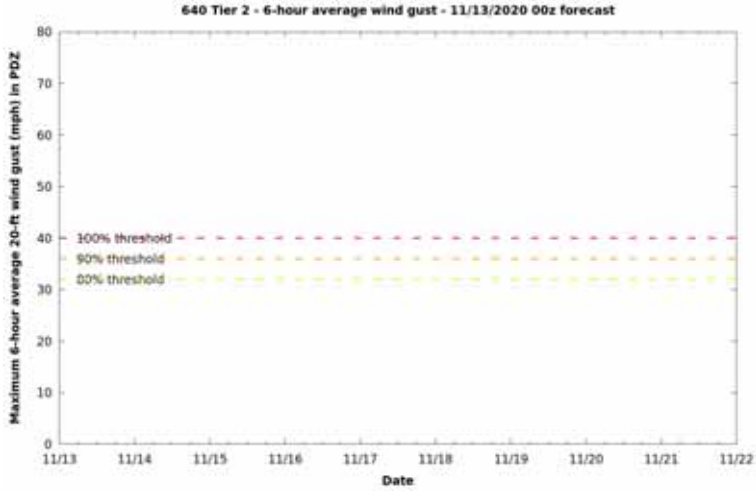
Tier 3



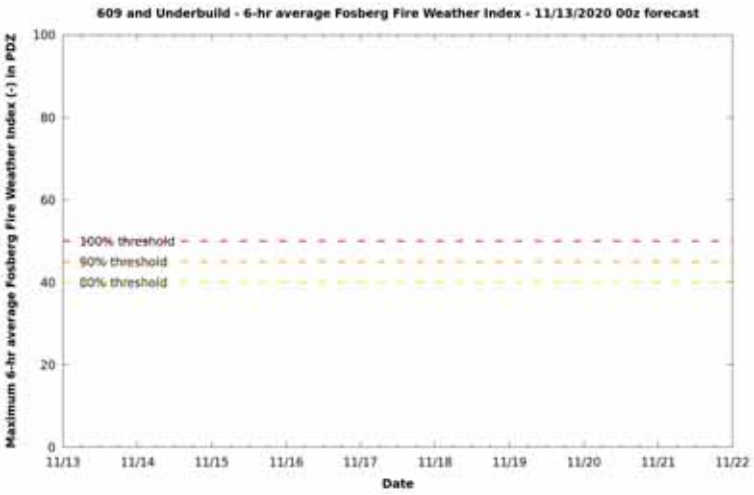


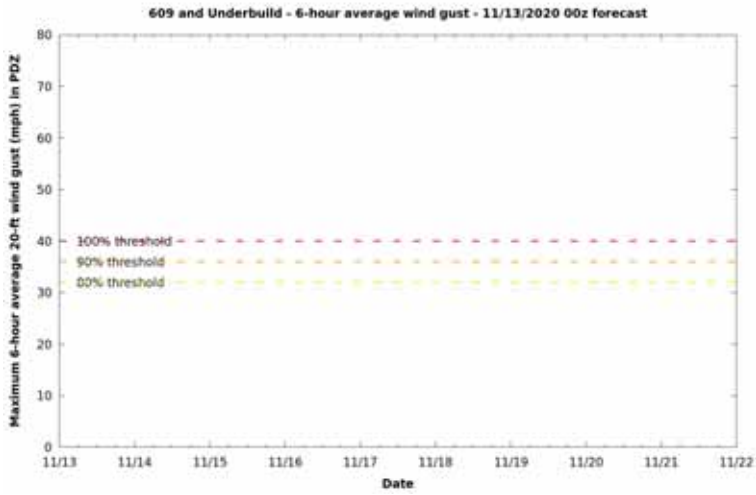
640 Tier 2



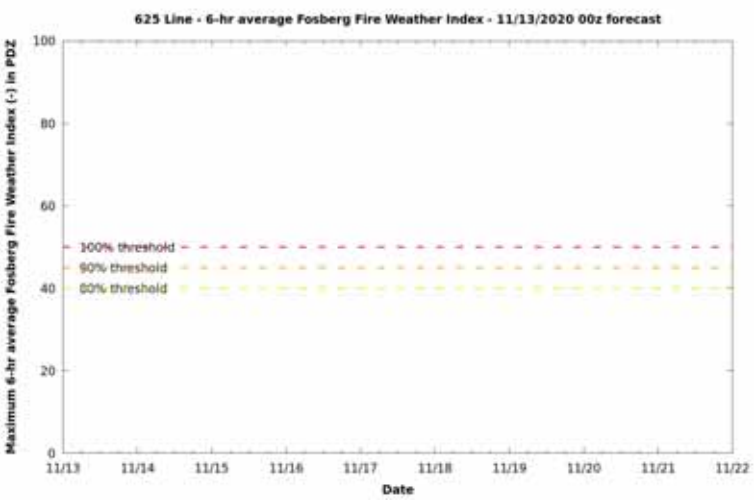


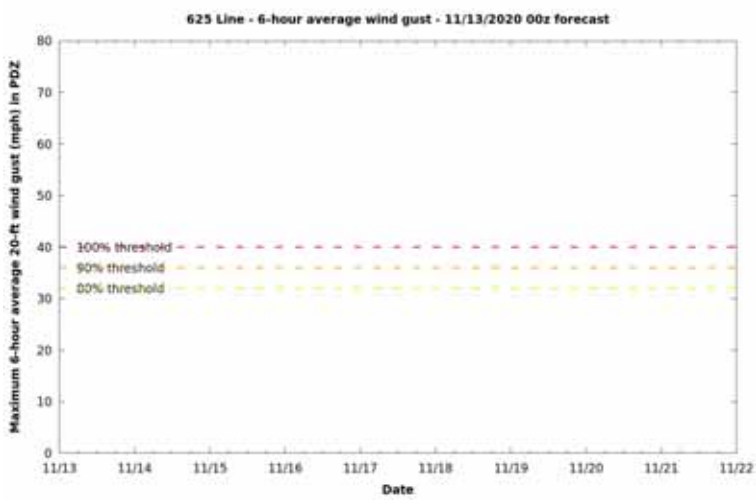
609 and Underbuild



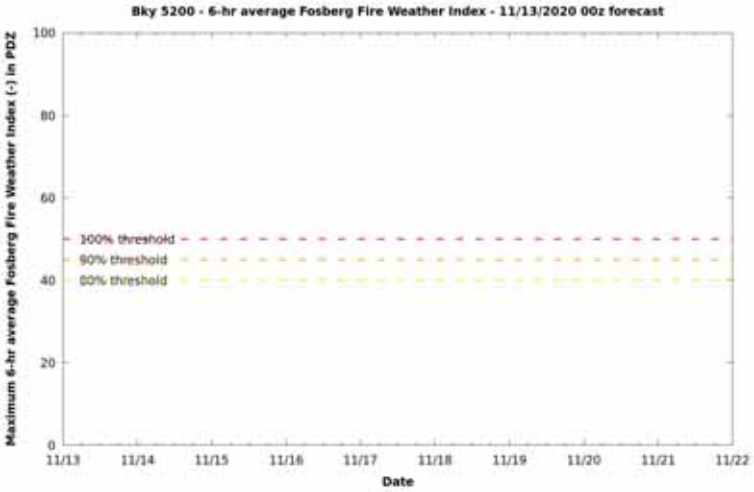


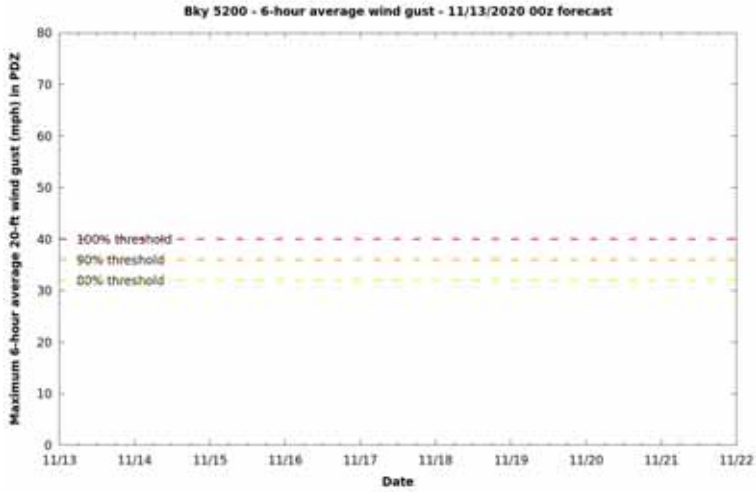
625 Line



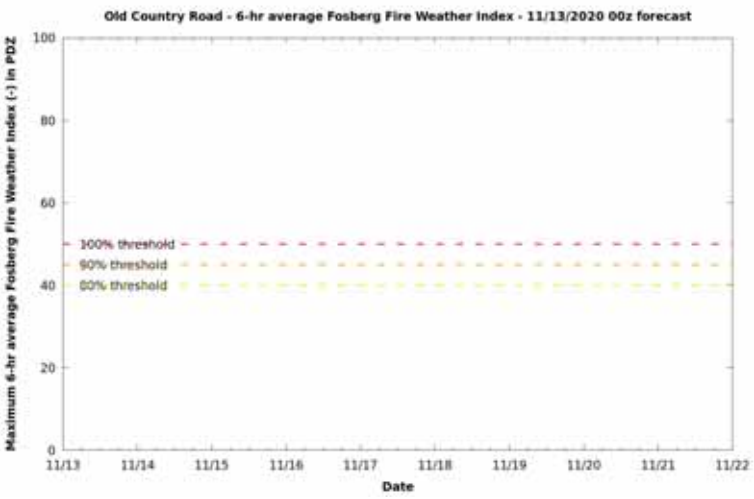


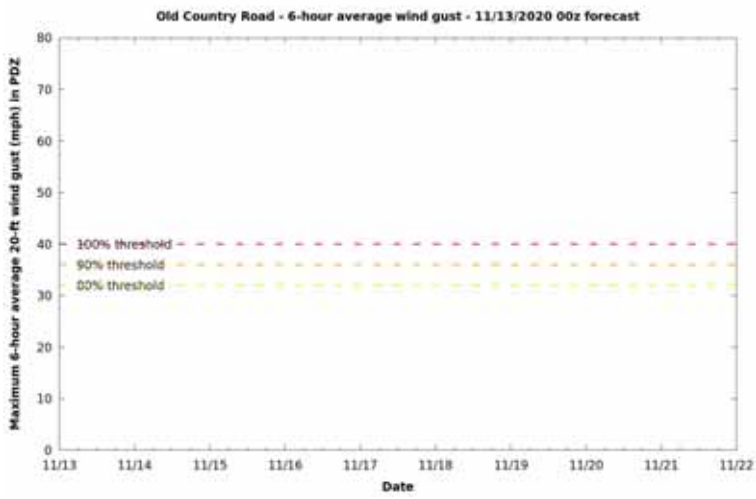
Bky 5200



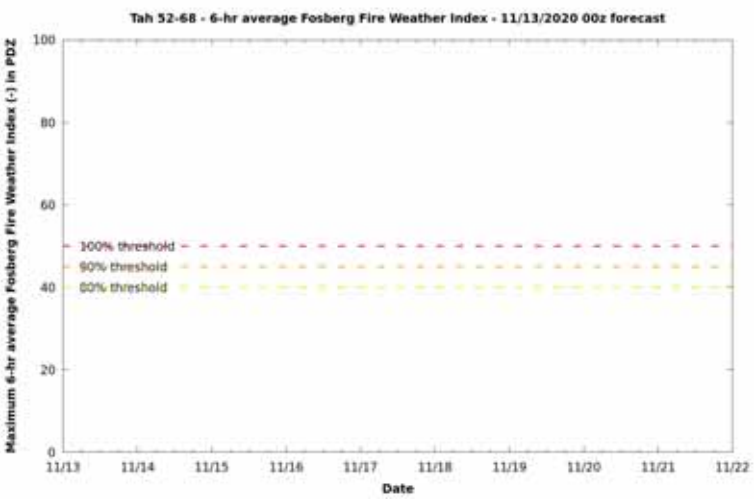


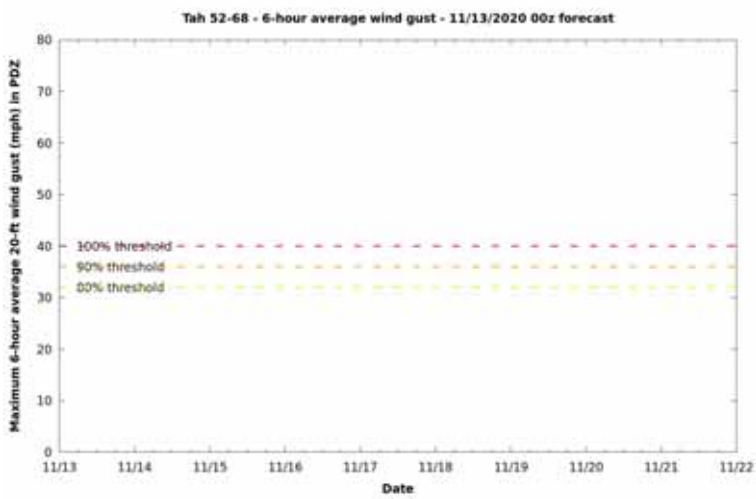
Old Country Road



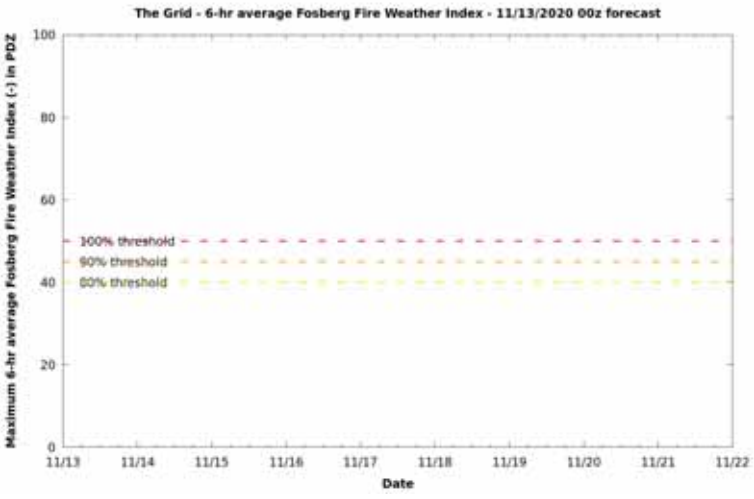


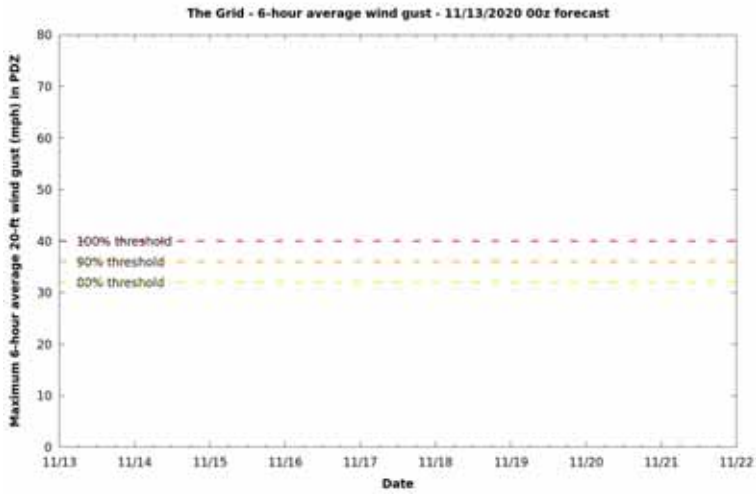
Tah 52-68



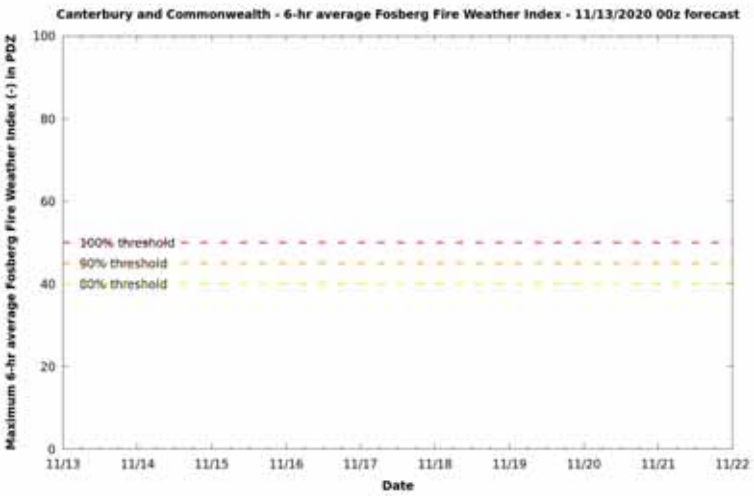


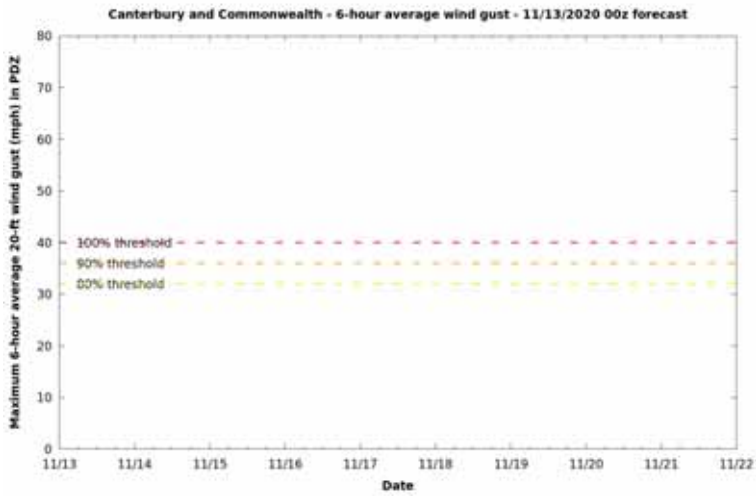
The Grid



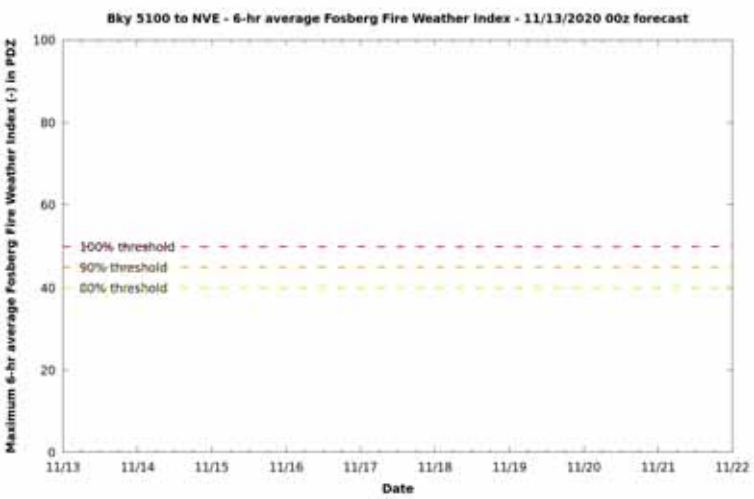


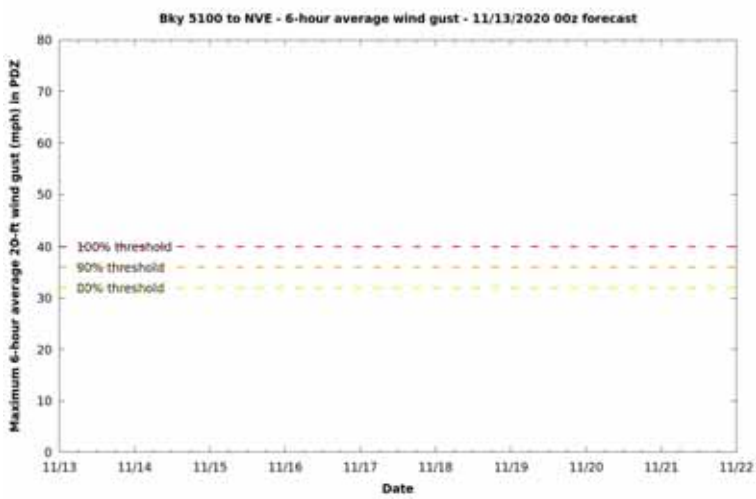
Canterbuy and Commonwealth



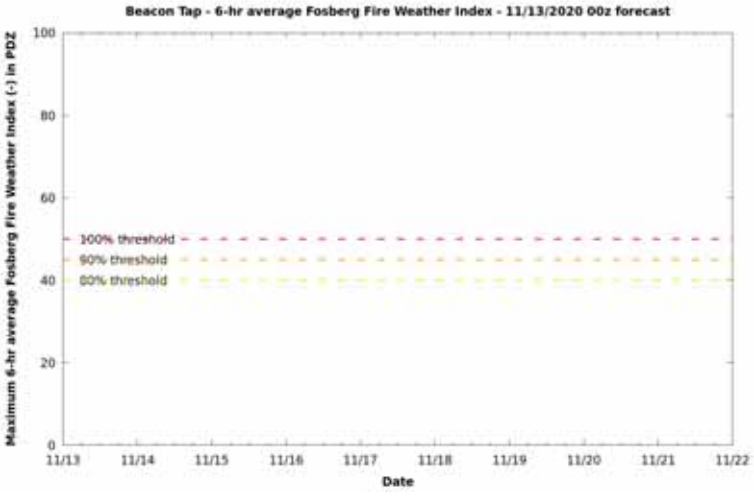


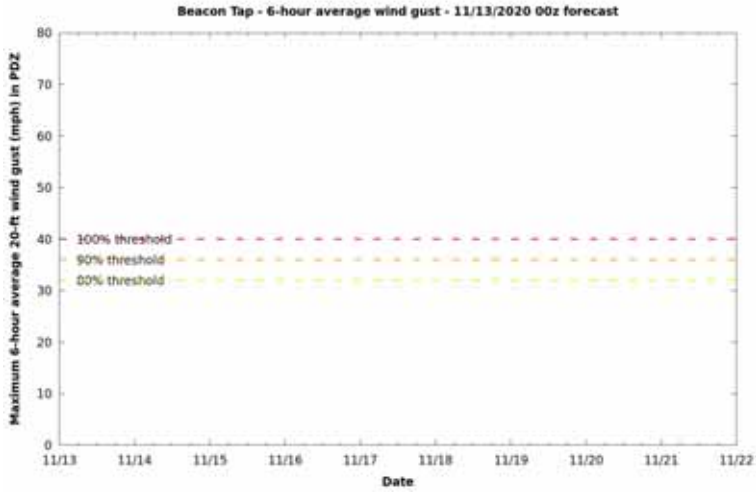
Bky 5100 to NVE



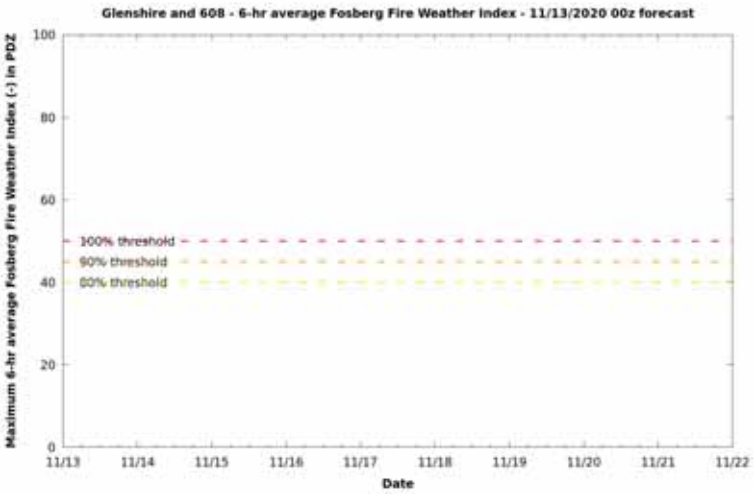


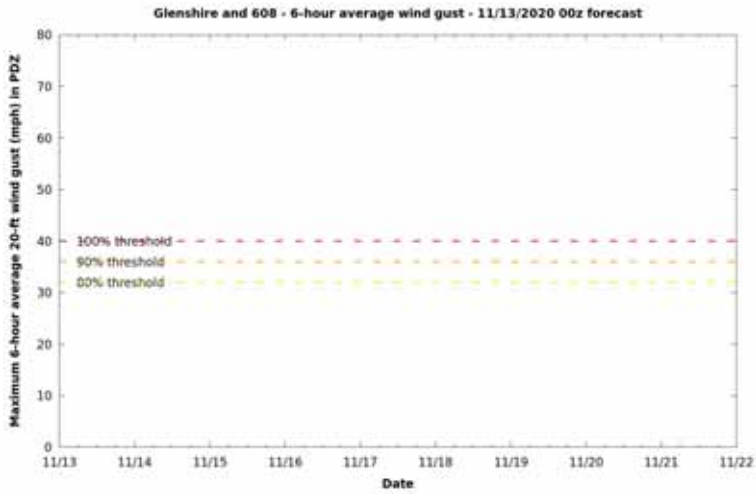
Beacon Tap



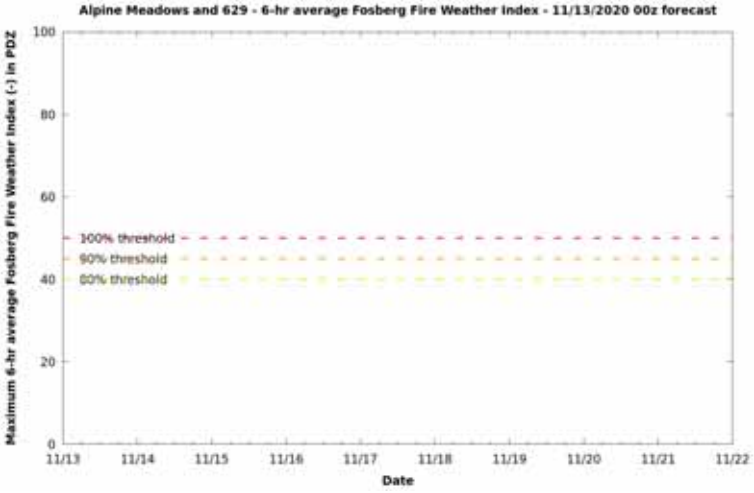


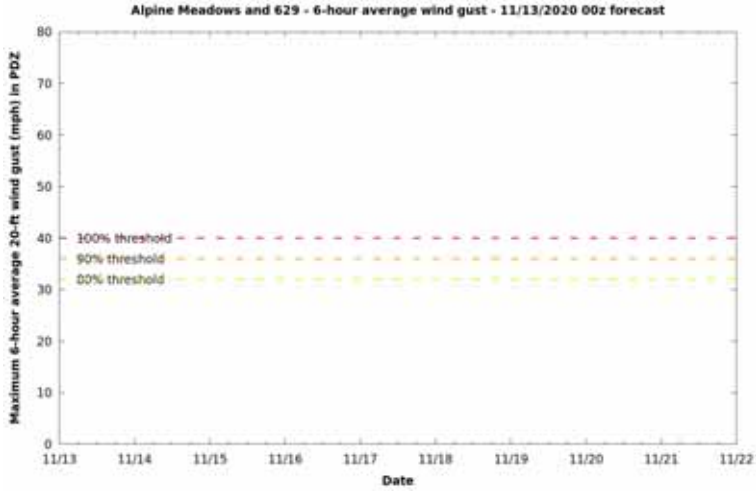
Glenshire and 608



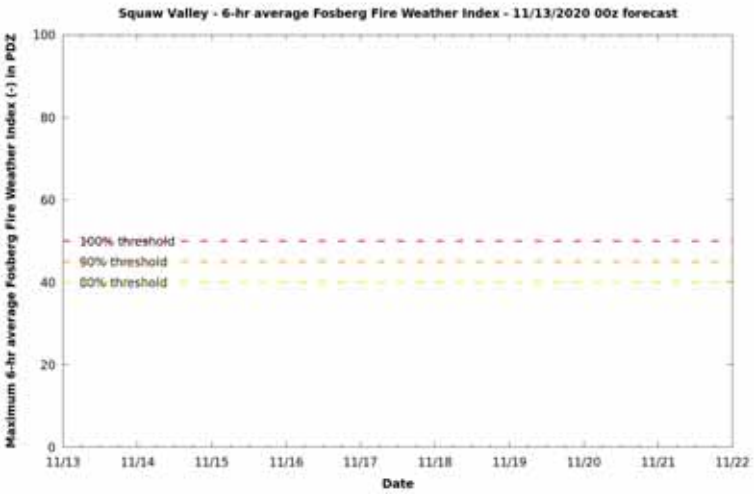


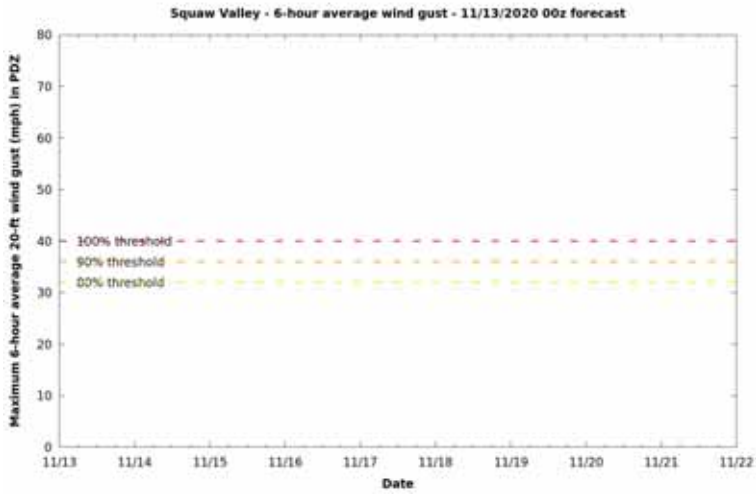
Alpine Meadows and 629



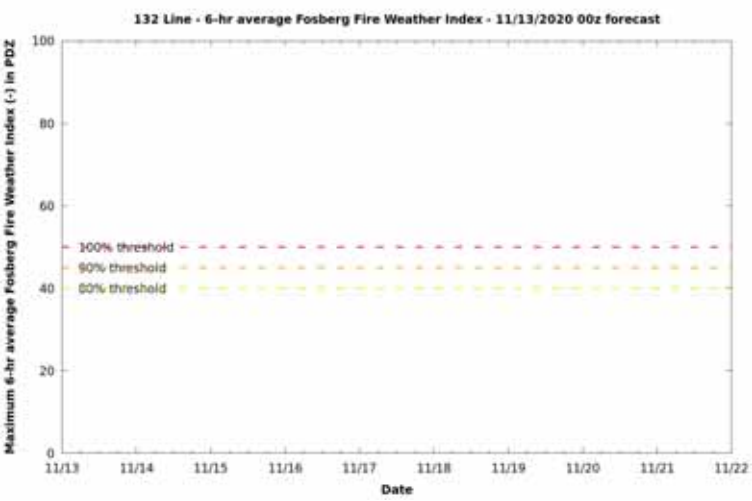


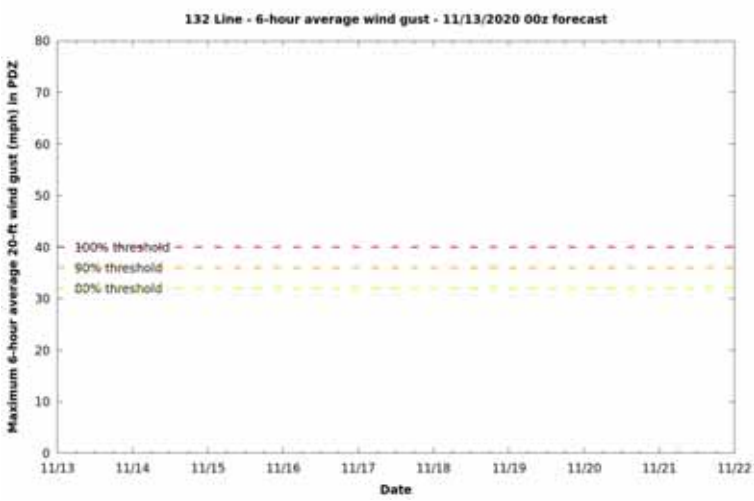
Squaw Valley



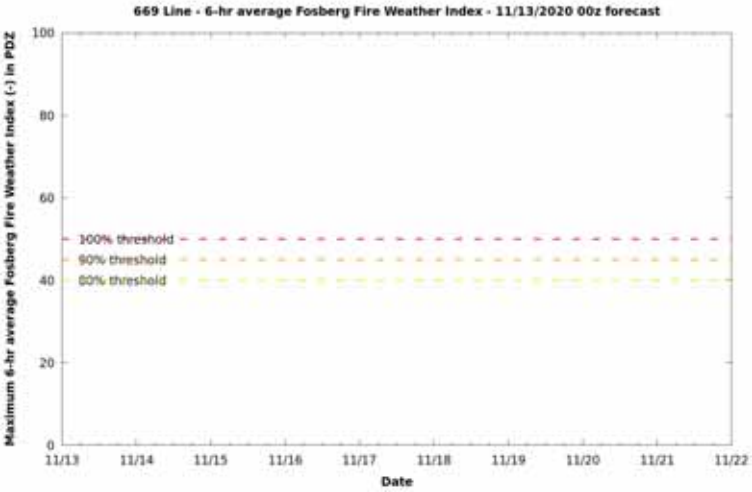


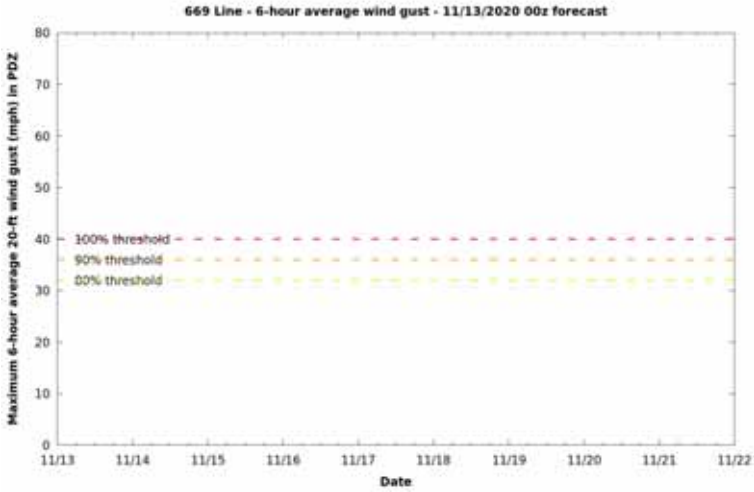
132 Line



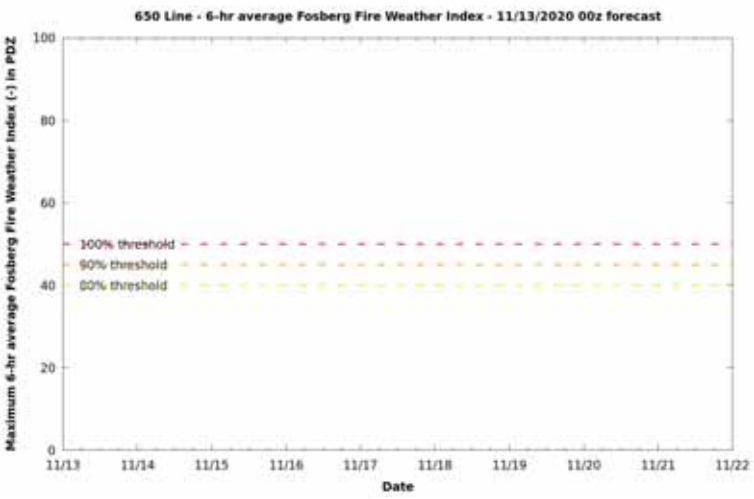


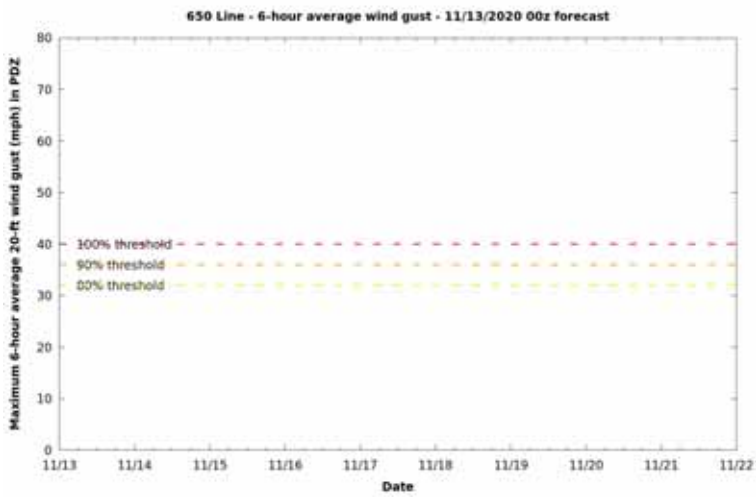
669 Line



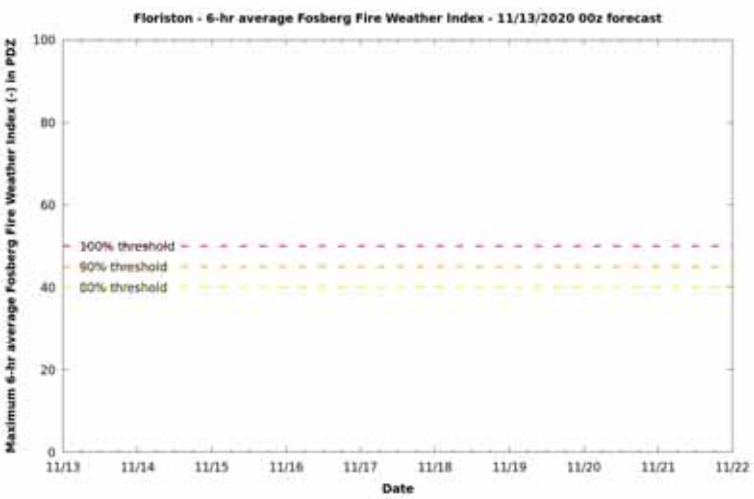


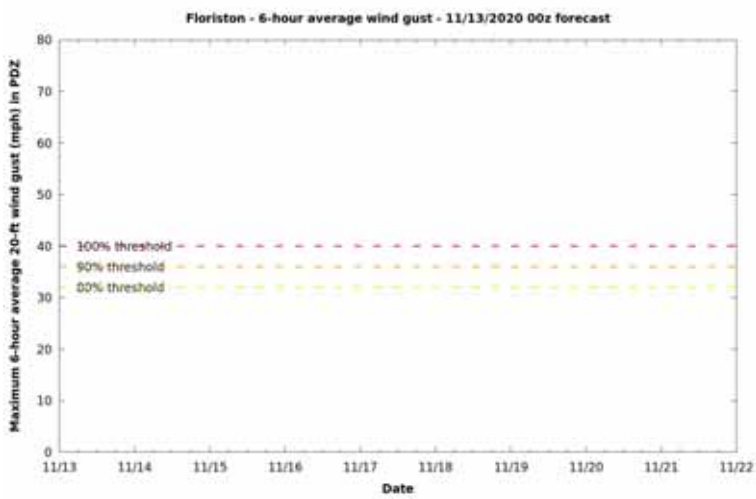
650 Line



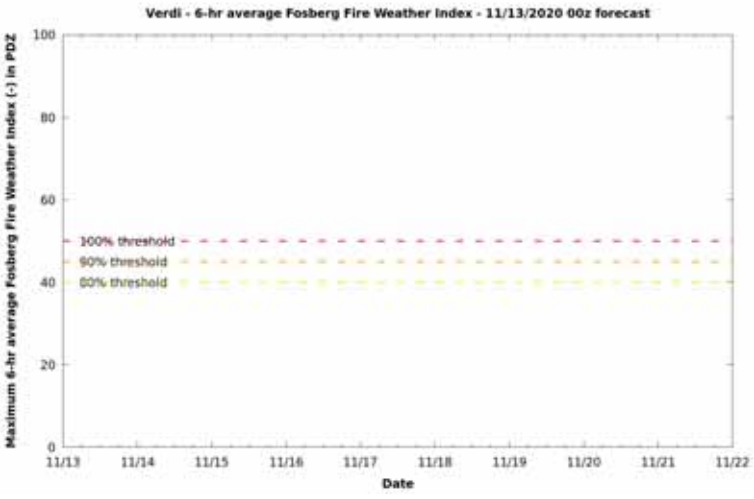


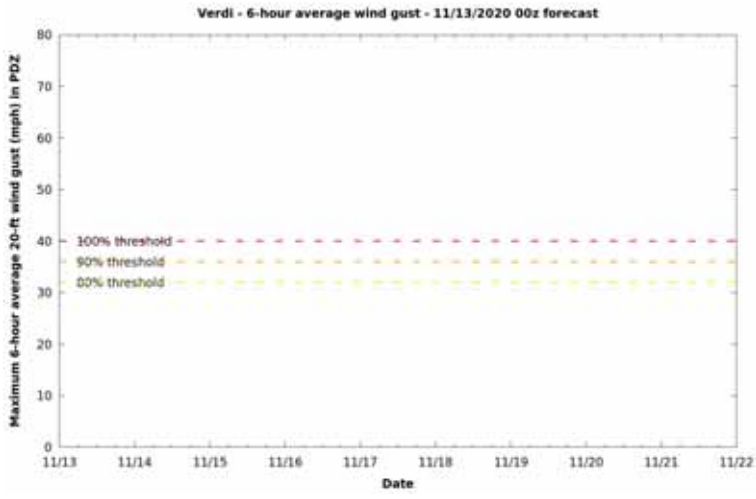
Floriston



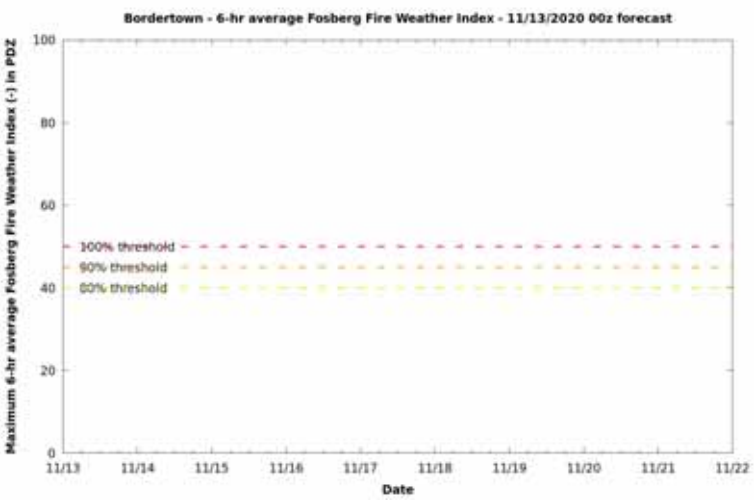


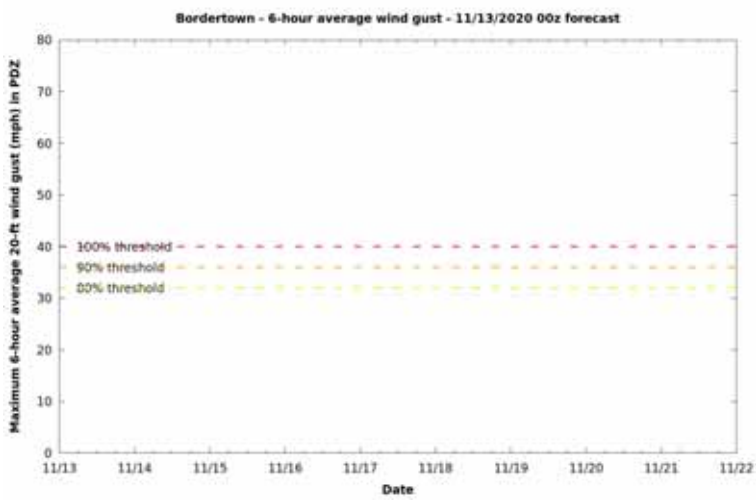
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/13/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100
80
60
40
20
0
100% threshold
90% threshold
00% threshold
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
Date


Bordertown - 6-hour average wind gust - 11/13/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
80
70
60
50
40
30
20
10
0
100% threshold
90% threshold
00% threshold
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
Date

Liberty Utilities Fire Potential Index Forecast for 11/13/20 - 11/19/20

Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	moderate	moderate	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	moderate	moderate	low	low	low	low	low

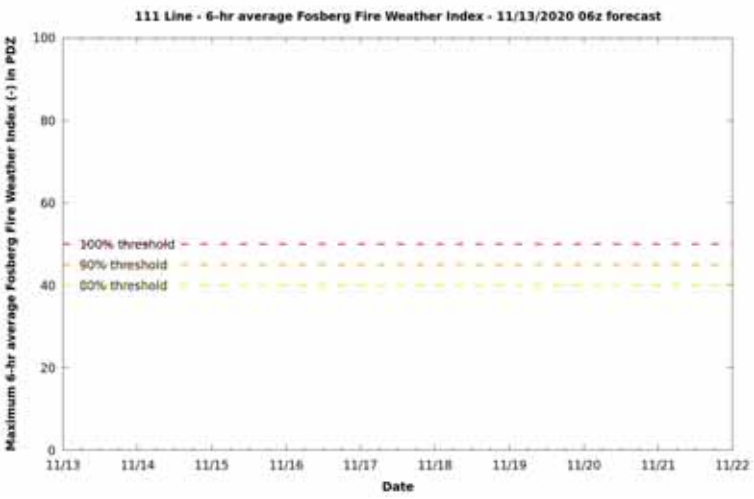
Liberty Utilities Energy Release Component Forecast for 11/13/20 - 11/19/20

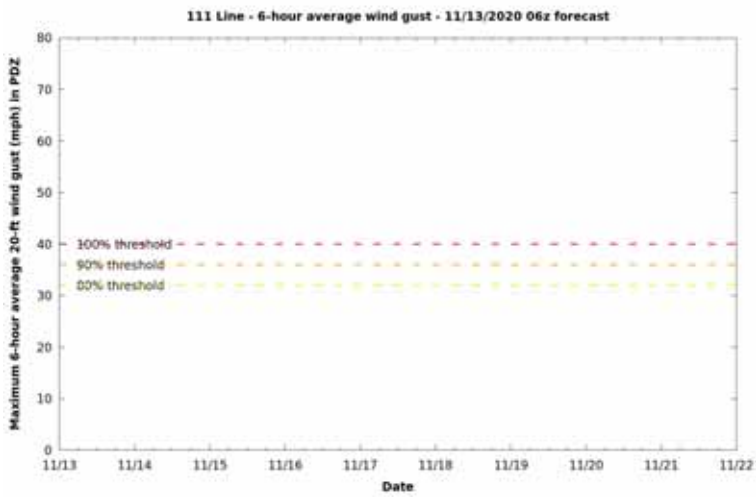
Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	66.0	60.0	55.0	51.0	52.0	56.0	54.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	62.0	48.0	43.0	38.0	36.0	39.0	34.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	58.0	58.0	54.0	50.0	54.0	56.0	56.0

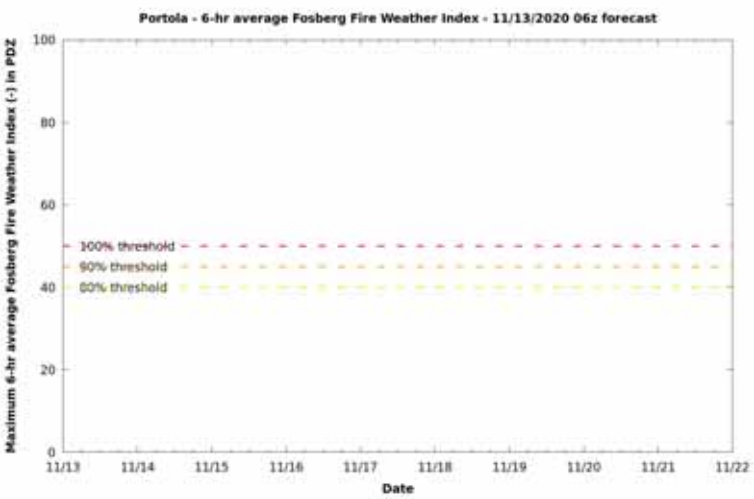
Liberty Utilities Fire Weather Summary Plots - 11/13/2020 06z forecast

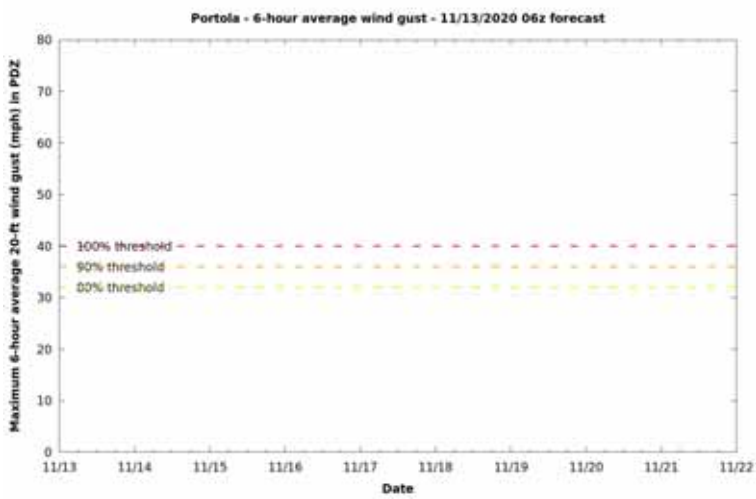
111 Line



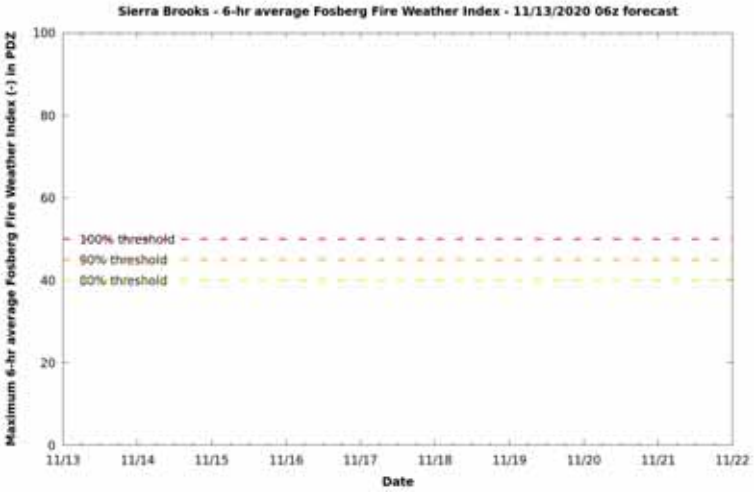


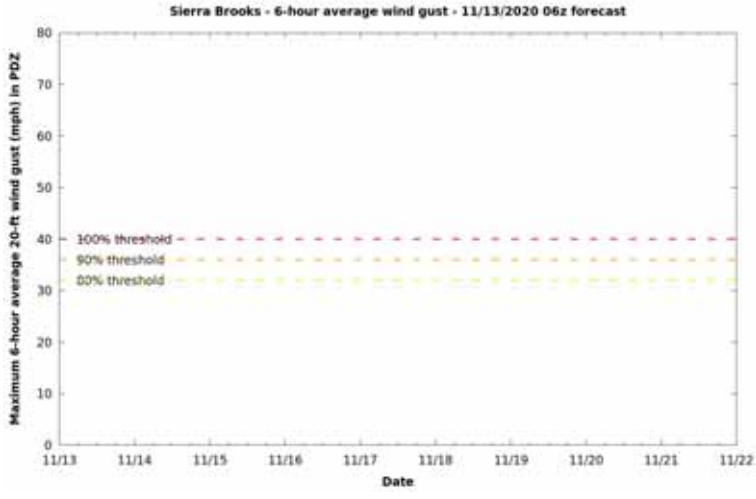
Portola



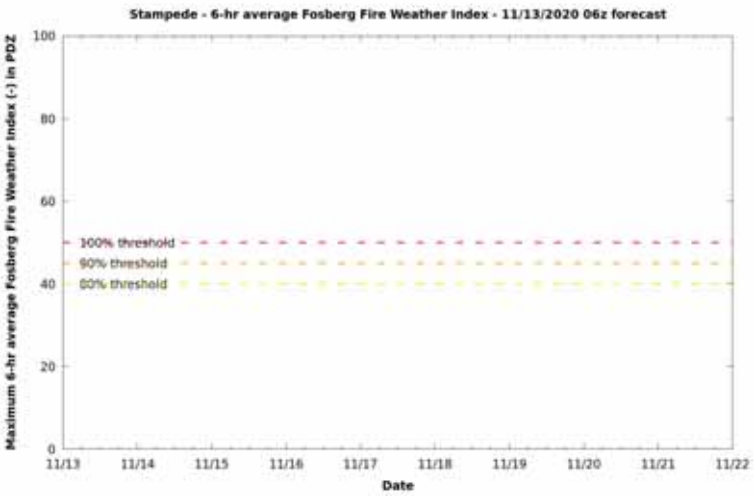


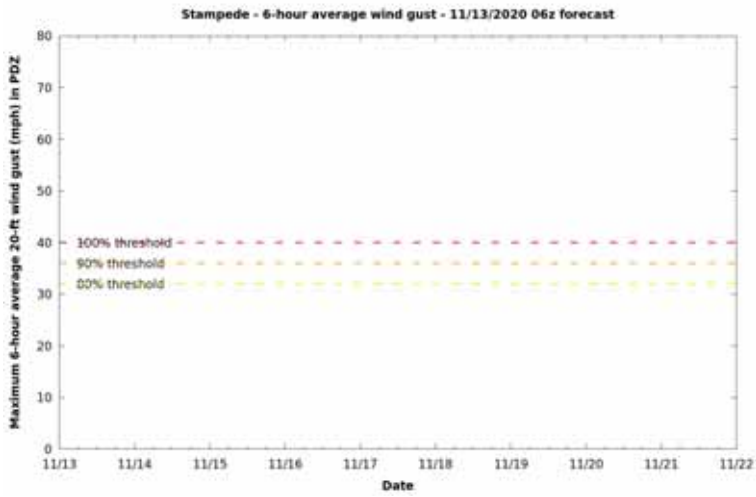
Sierra Brooks



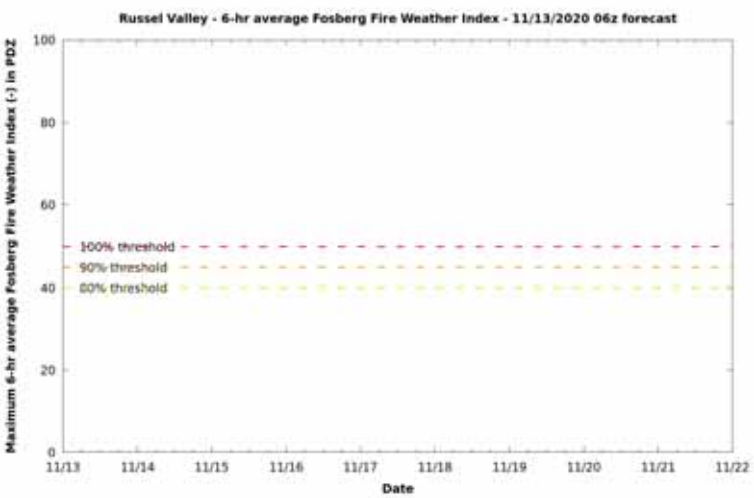


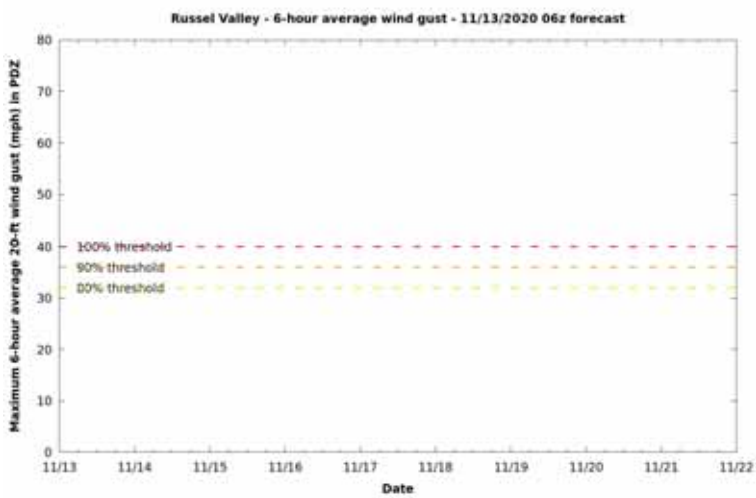
Stampede



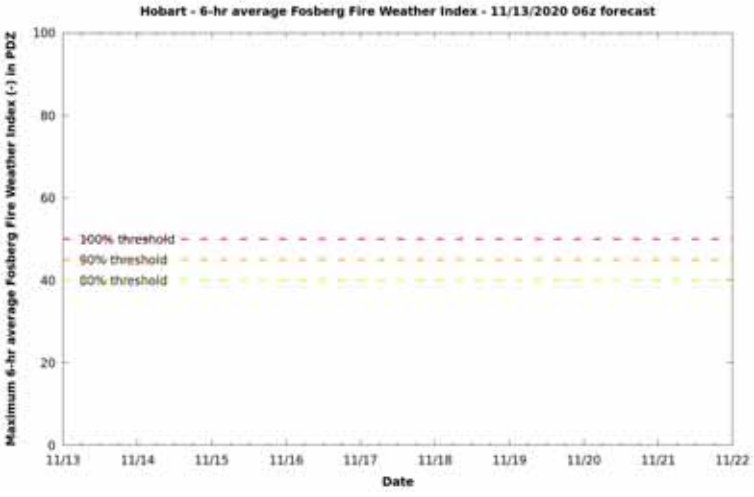


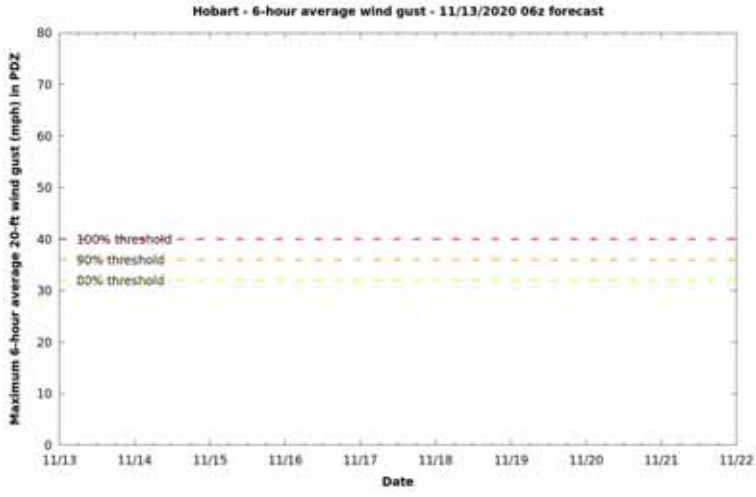
Russell Valley



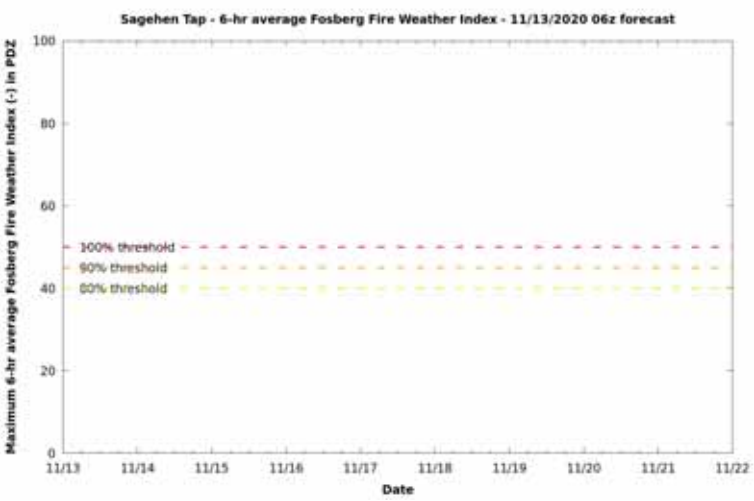


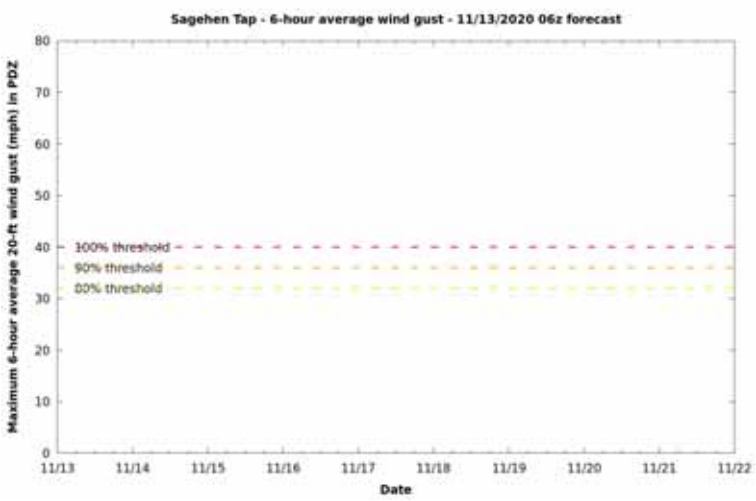
Hobart



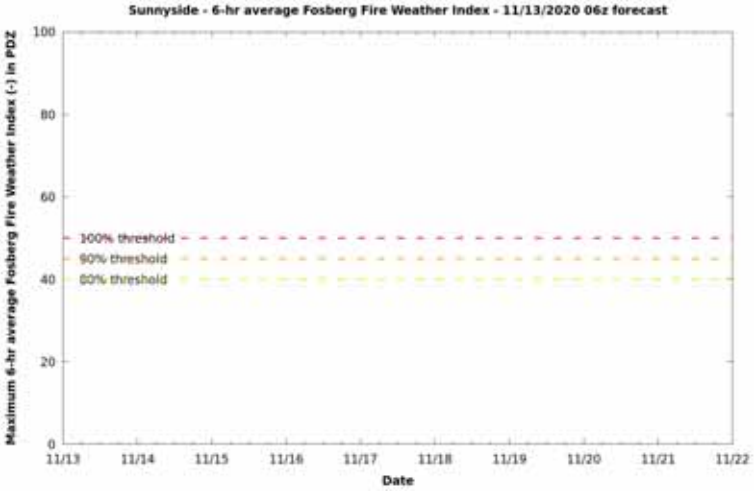


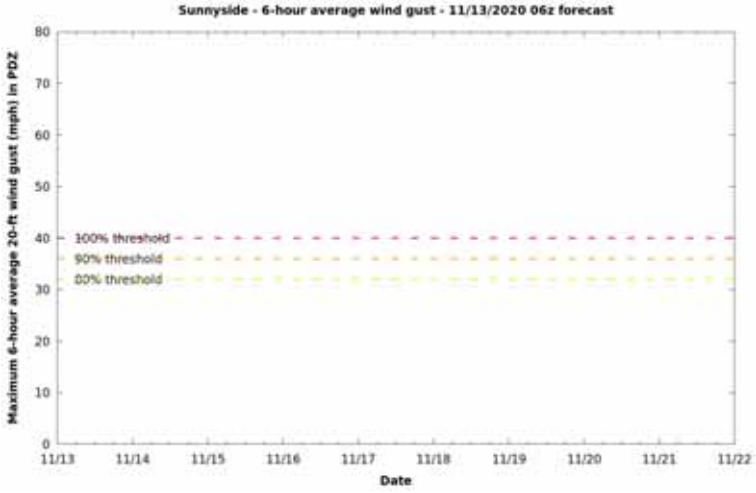
Sagehen tap



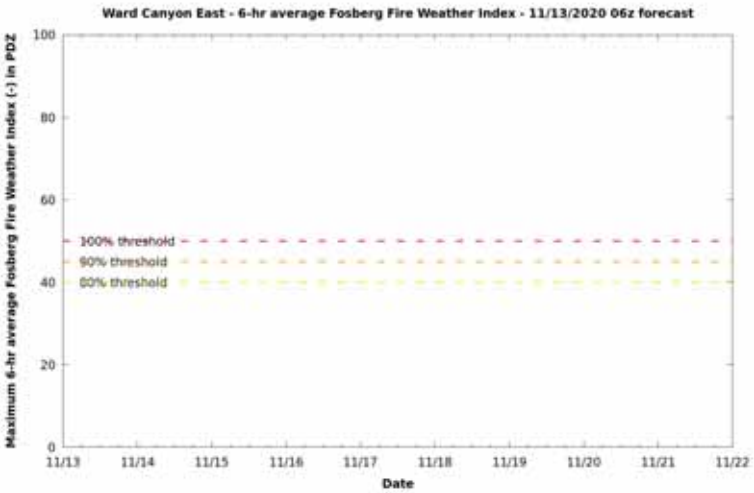


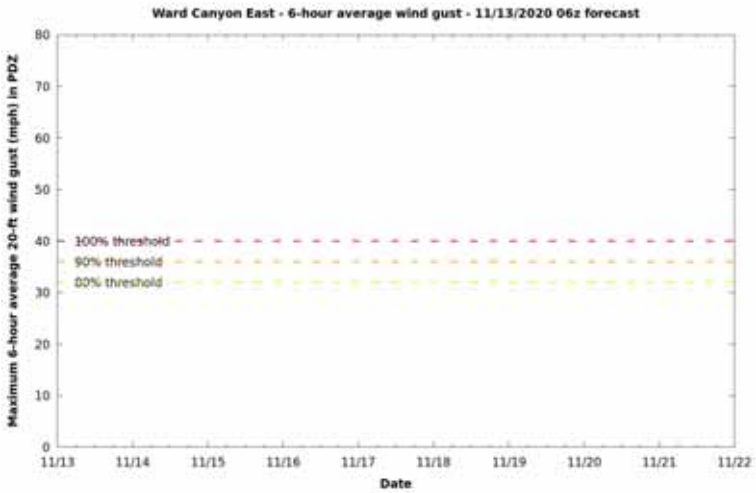
Sunnyside



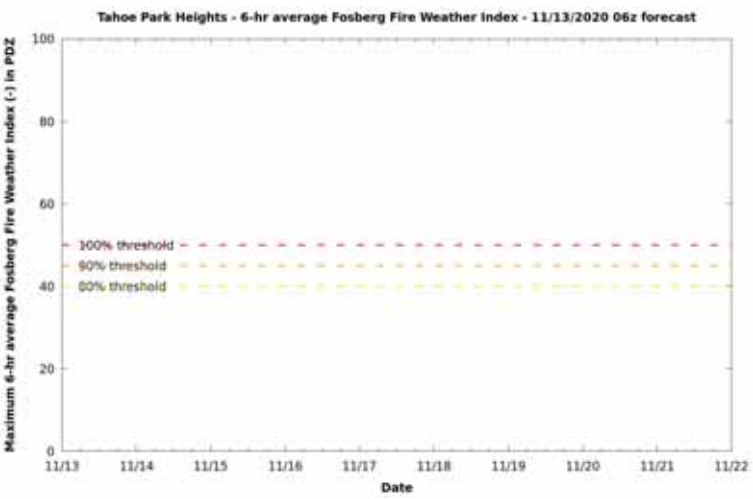


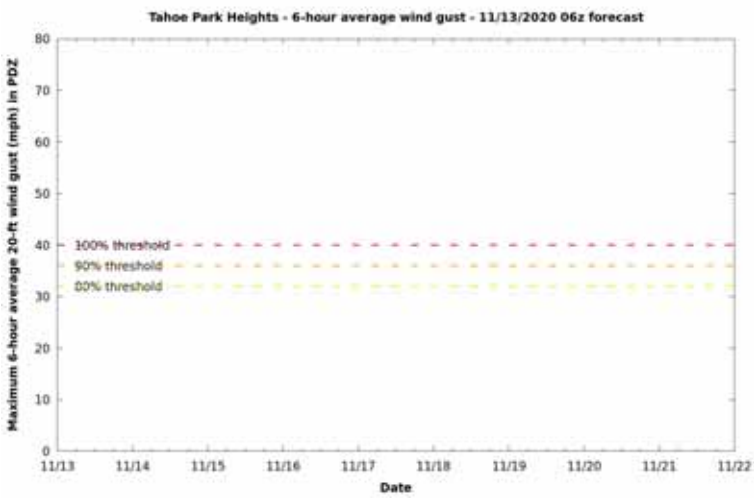
Ward Canyon East



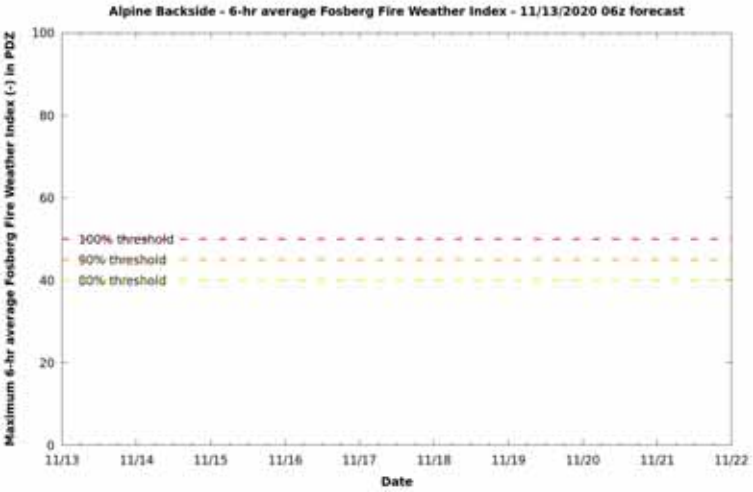


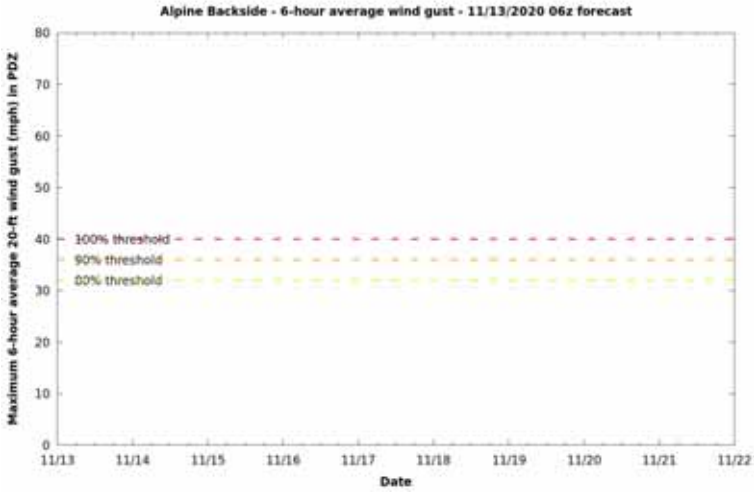
Tahoe Park Heights



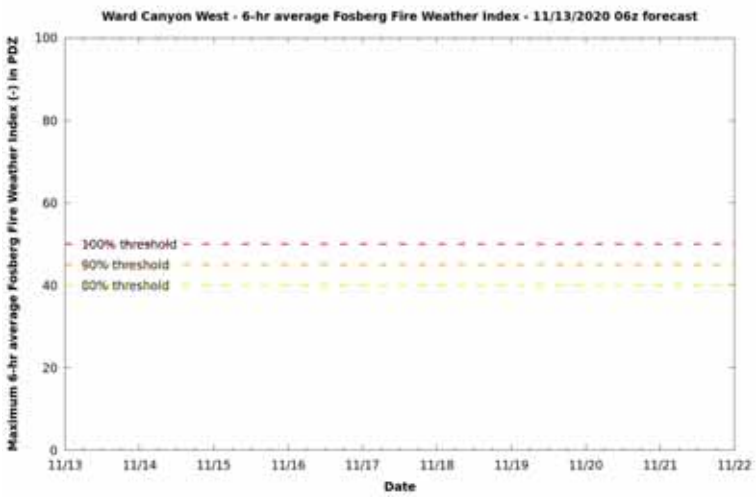


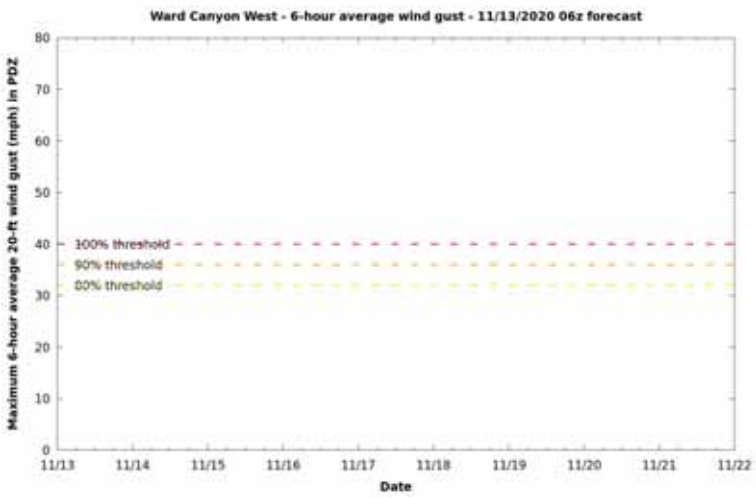
Alpine Backside



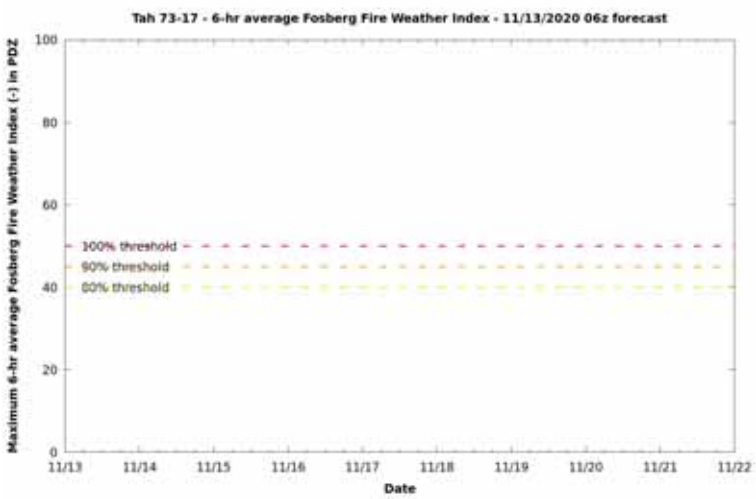


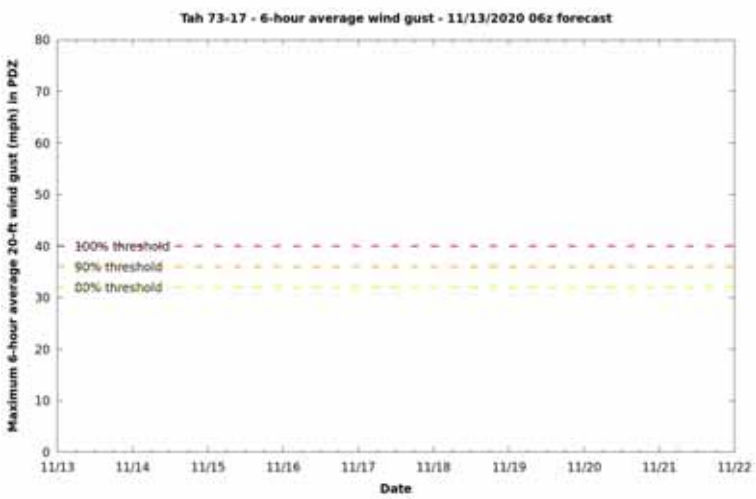
Ward Canyon West



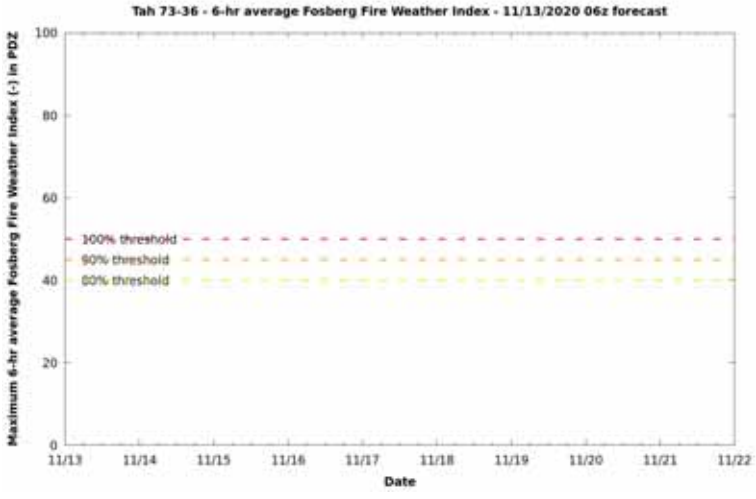


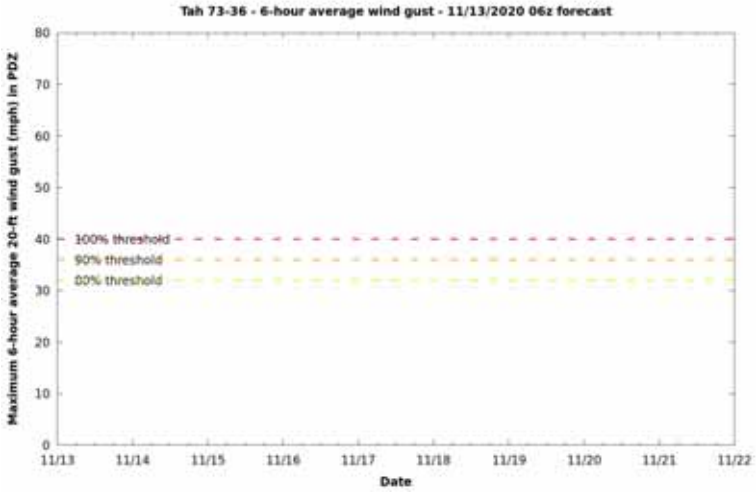
Tah 73-17



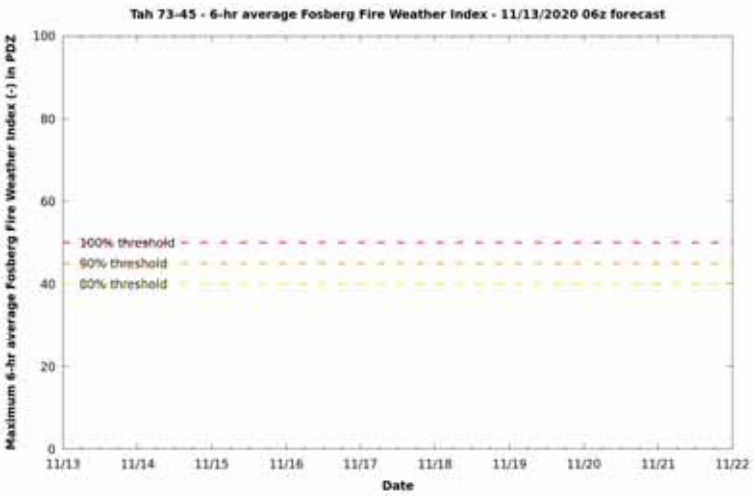


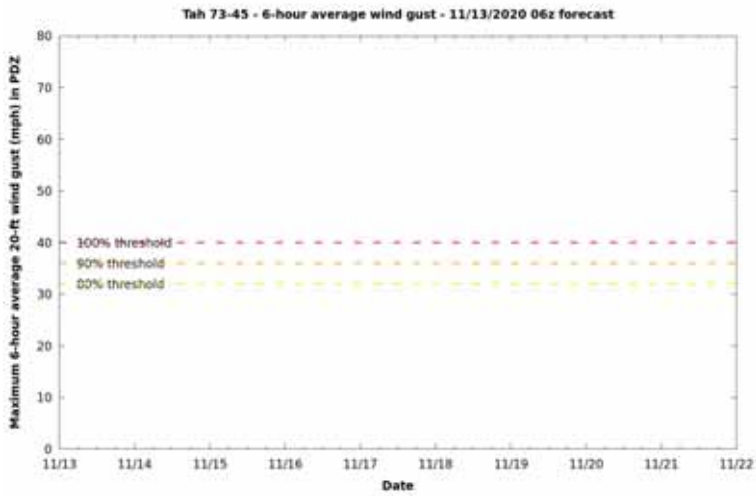
Tah 73-36



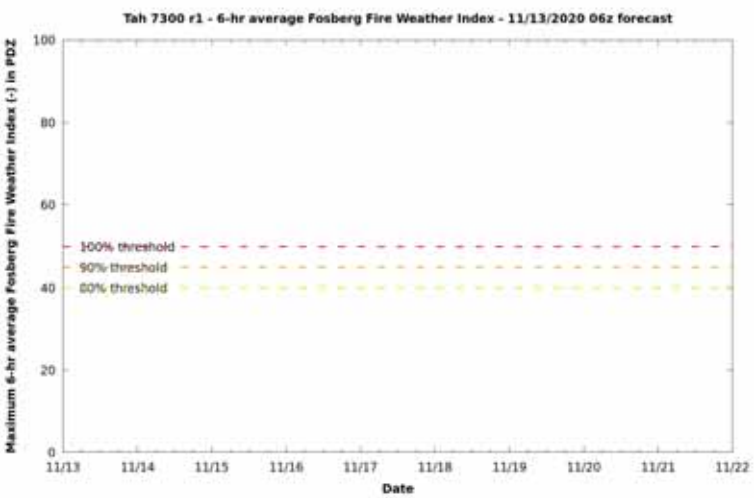


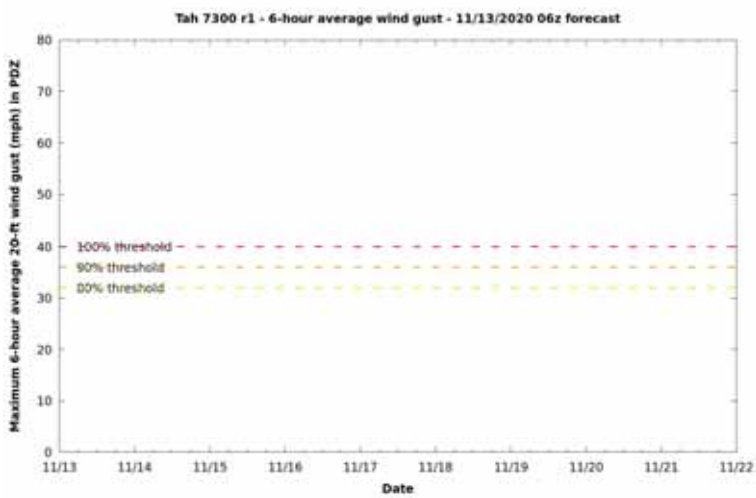
Tah 73-45



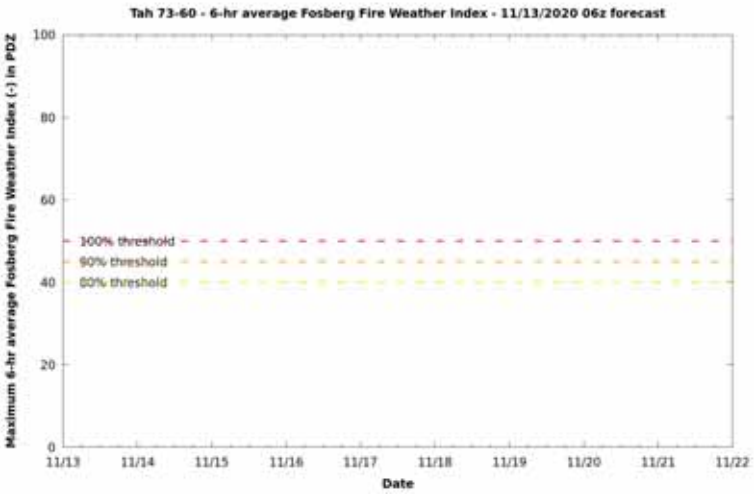


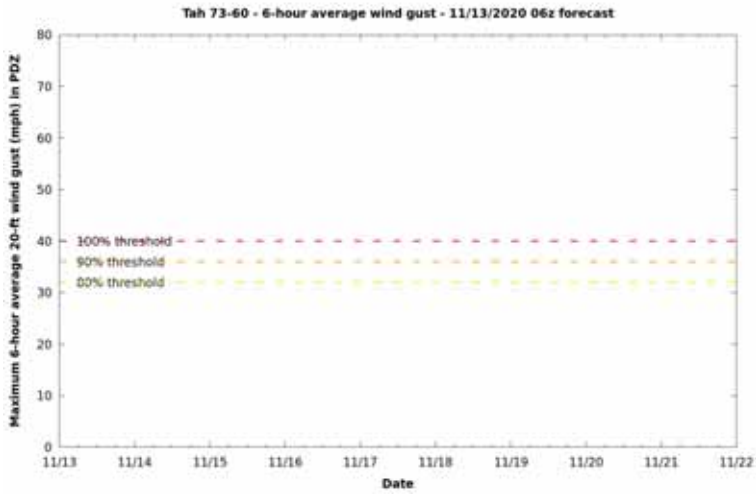
Tah 7300 r1



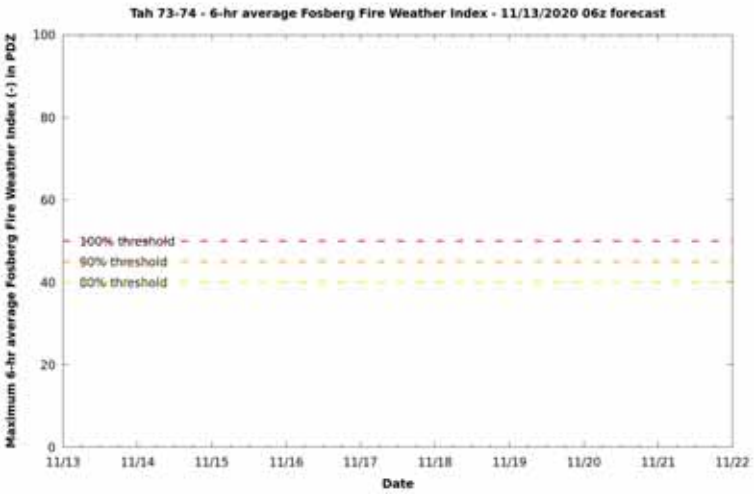


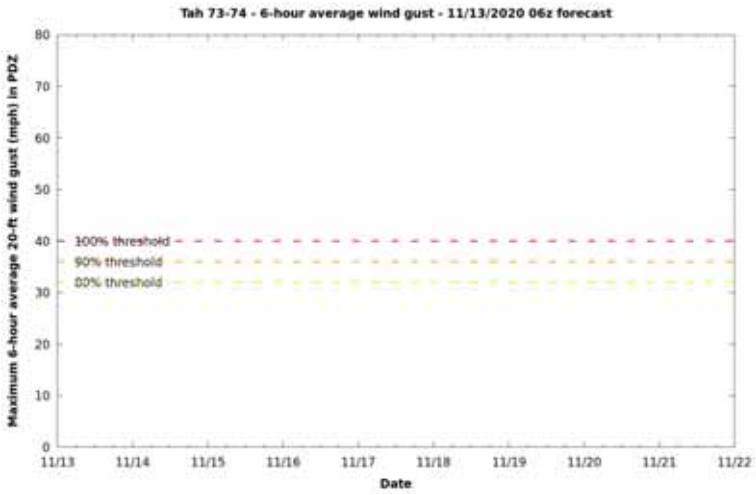
Tah 73-60



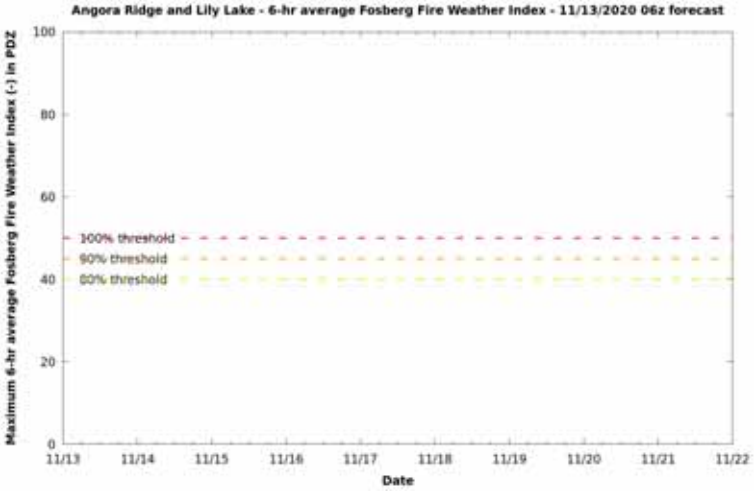


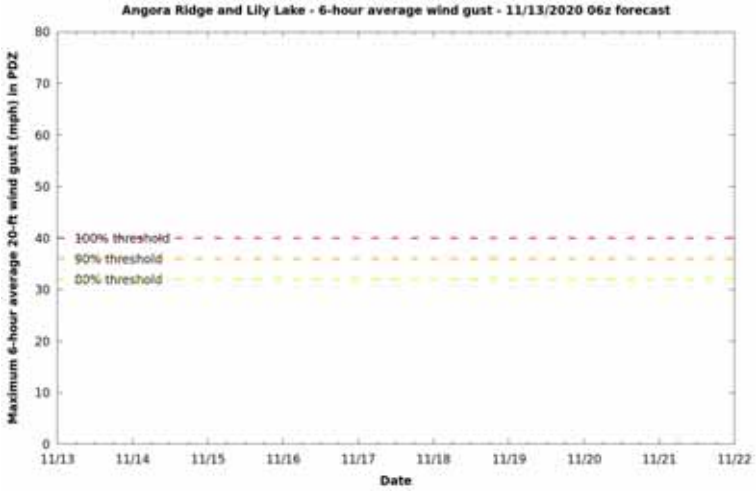
Tah 73-74



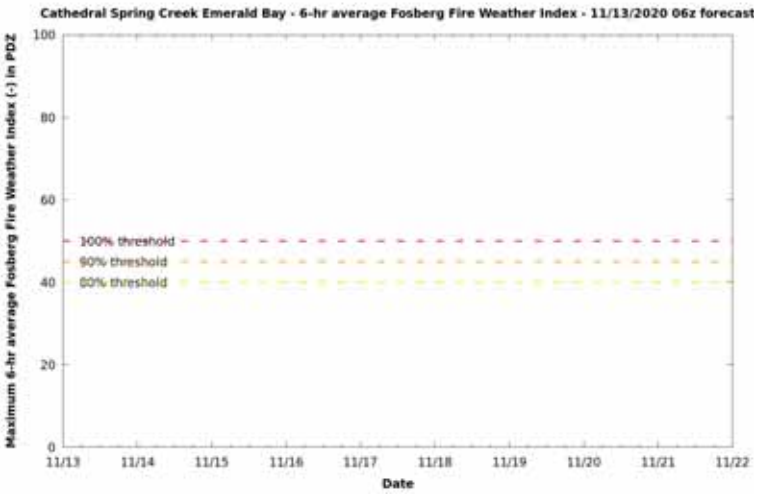


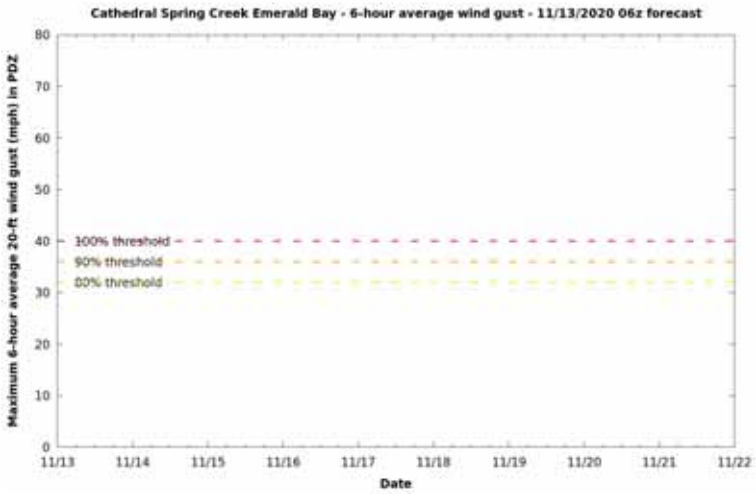
Angora Ridge and Lily Lake



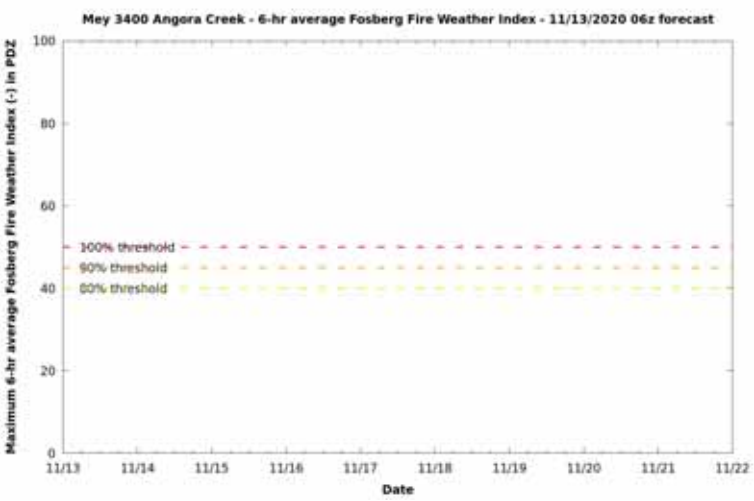


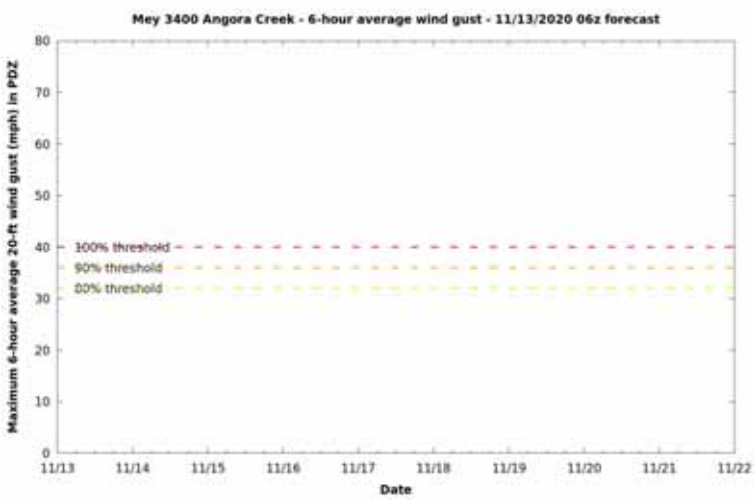
Cathedral Spring Creek Emerald Bay



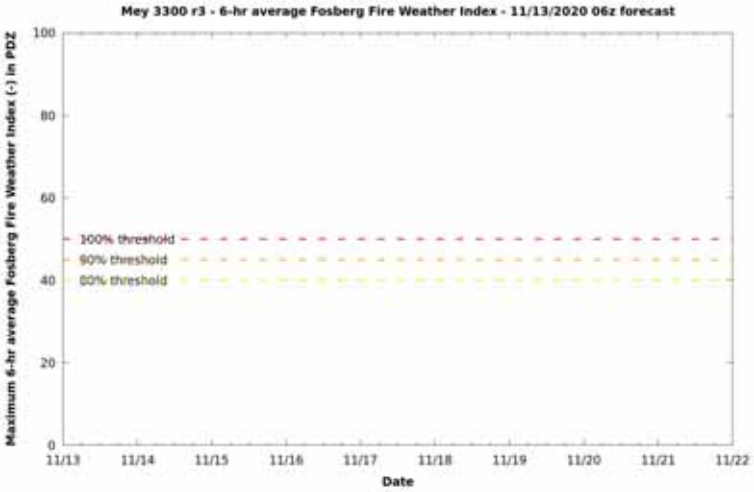


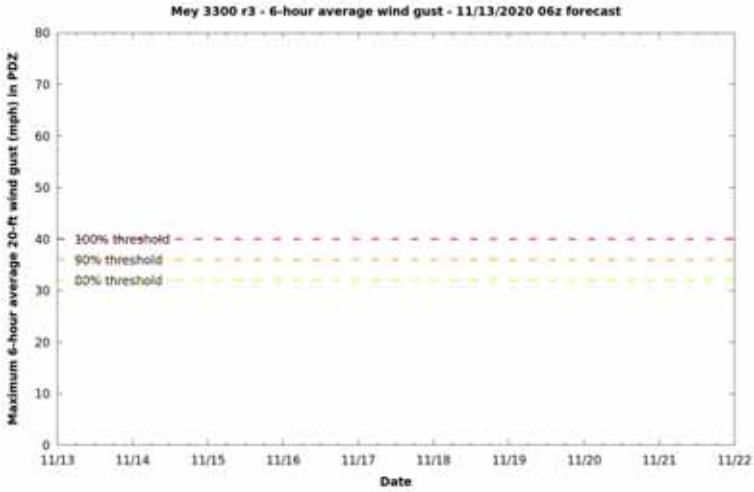
Mey 3400 Angora Creek



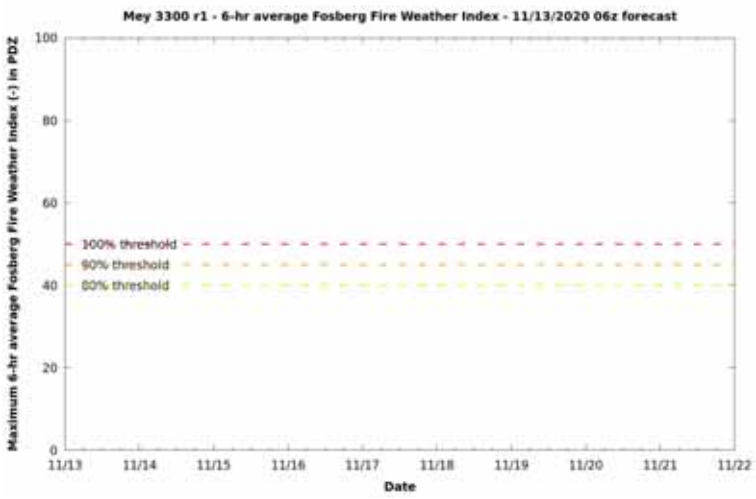


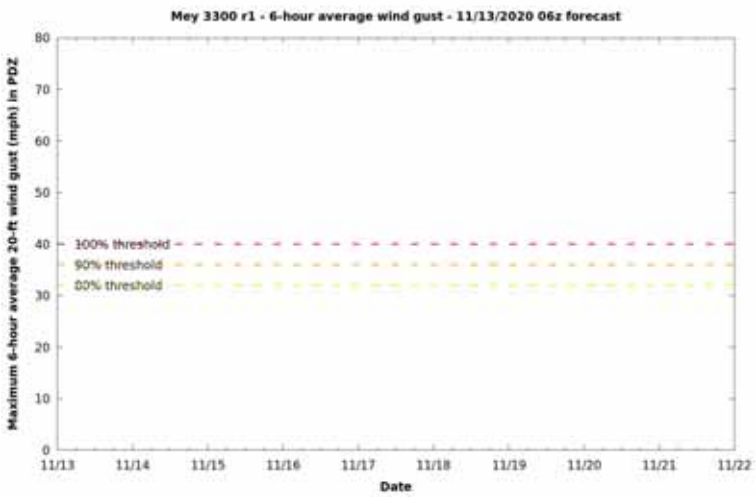
Mey 3300 r3



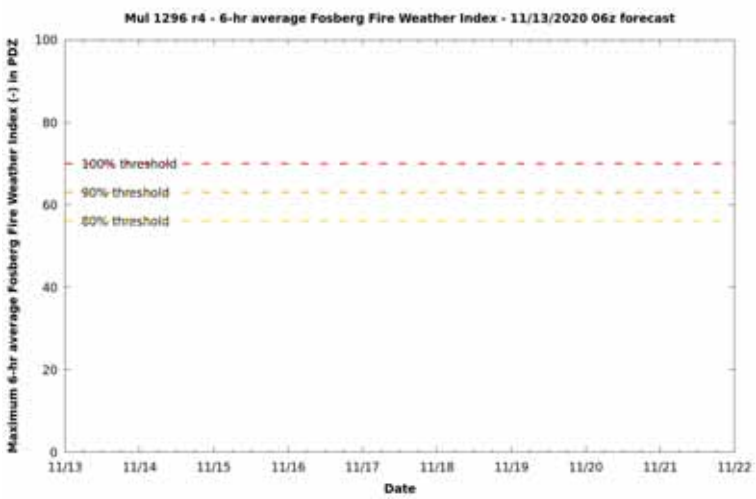


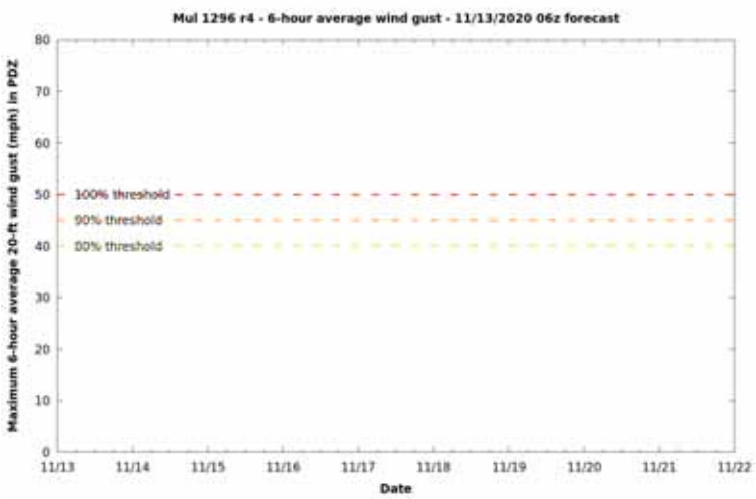
Mey 3300 r1



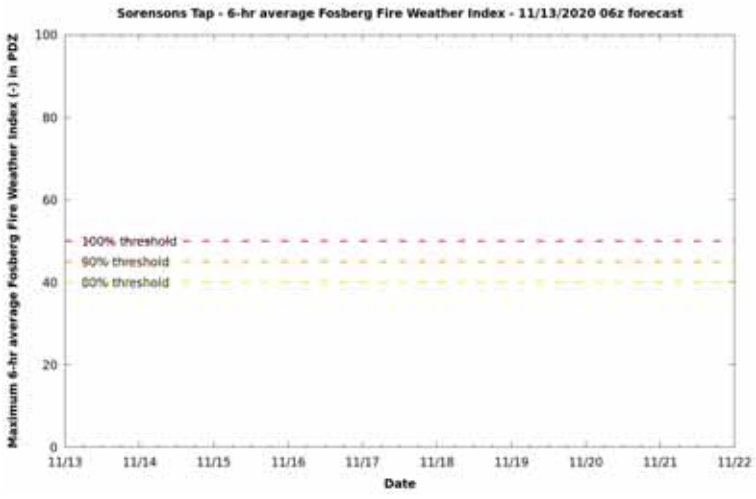


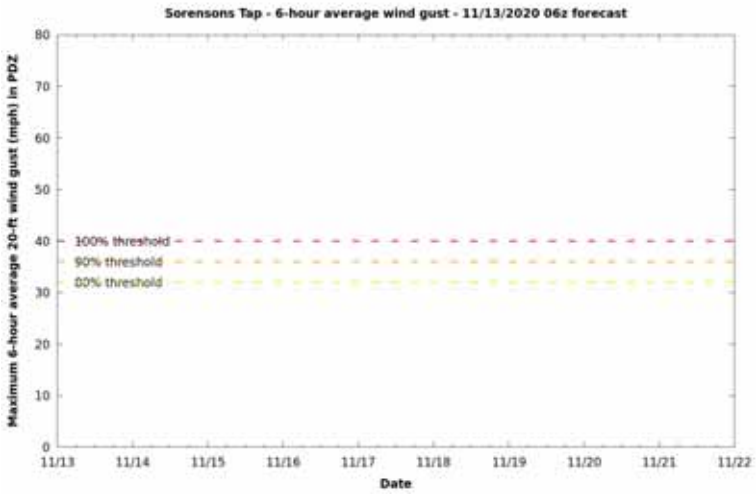
Mul 1296 r4



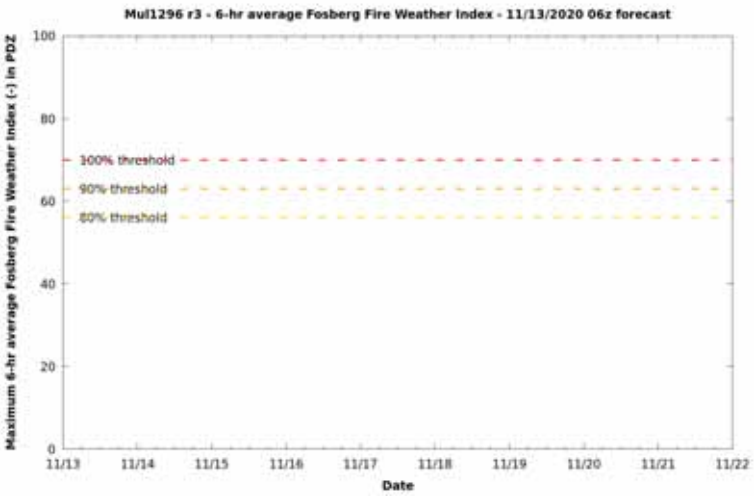


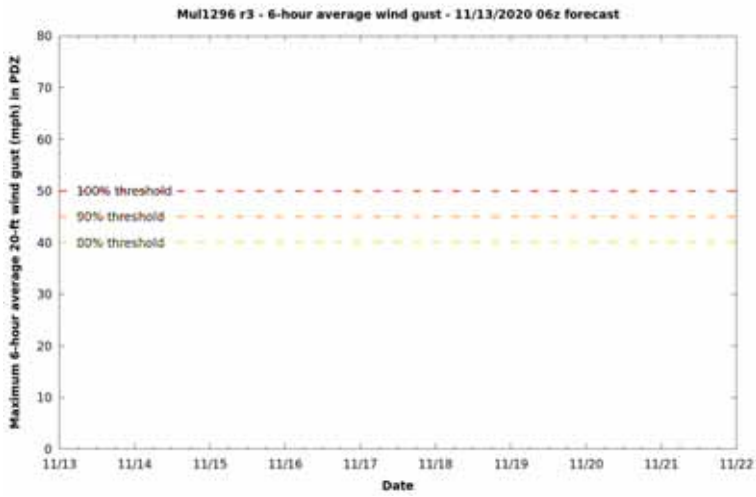
Sorensons Tap



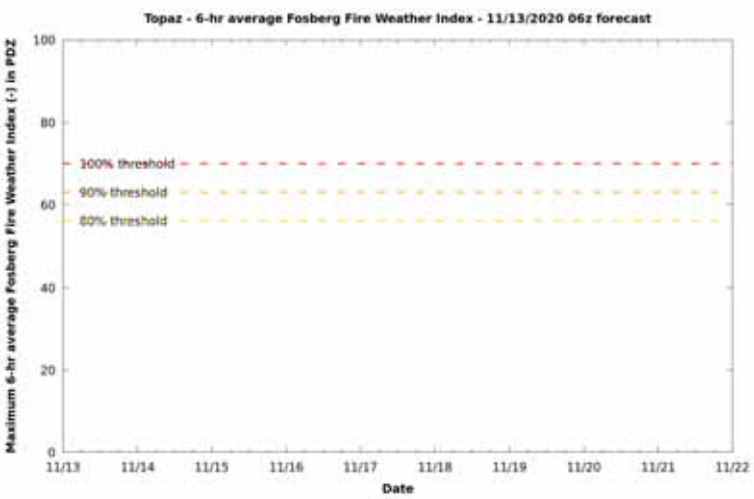


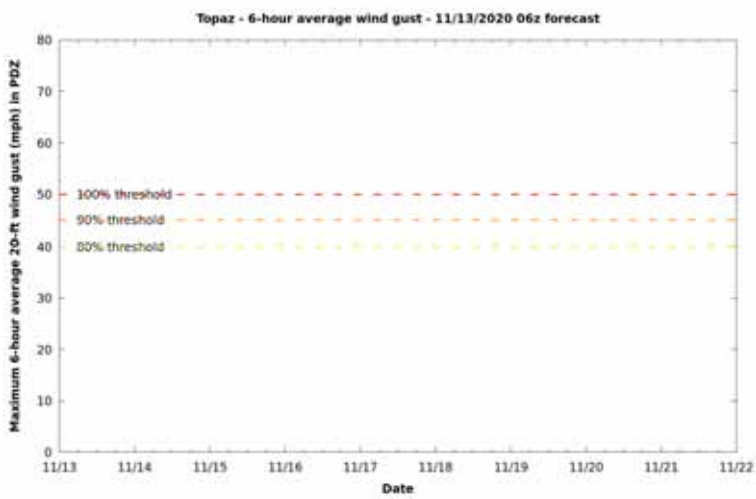
Mul 1296 r3



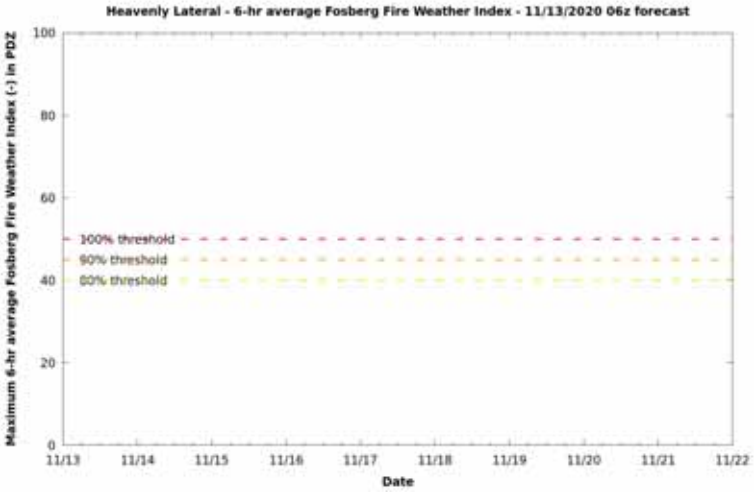


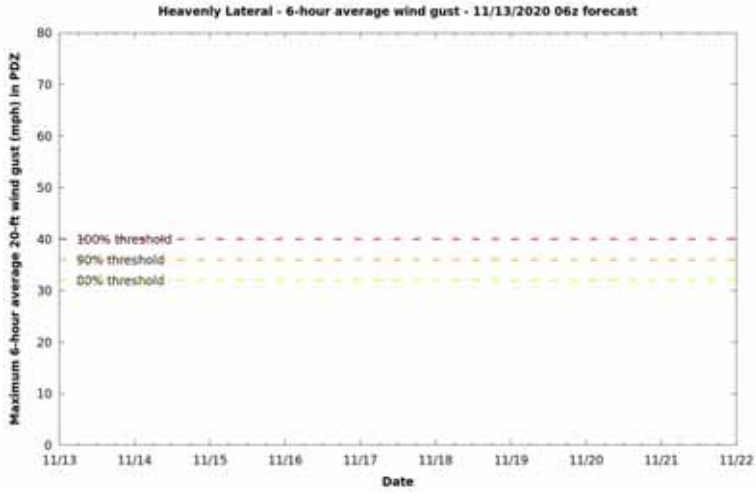
Topaz



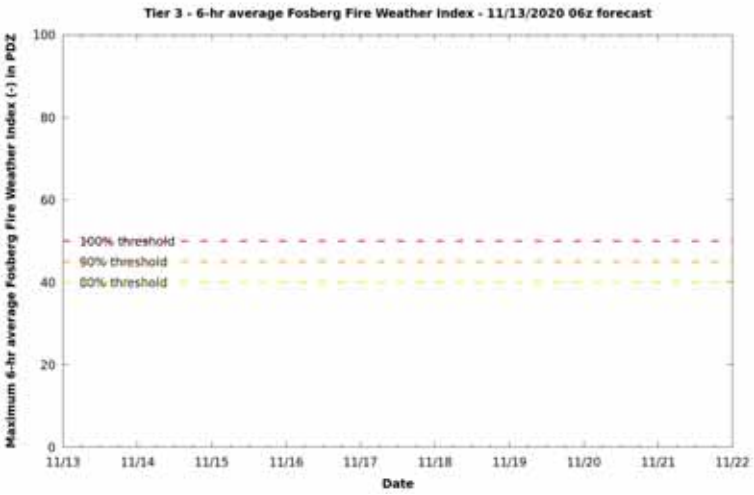


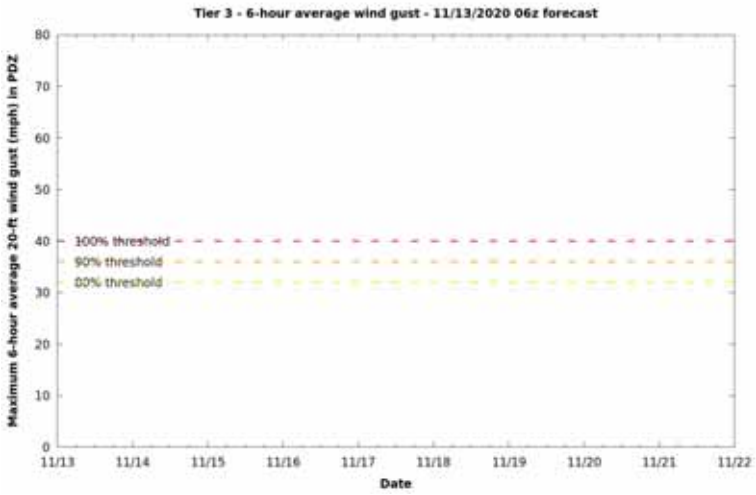
Heavenly Lateral



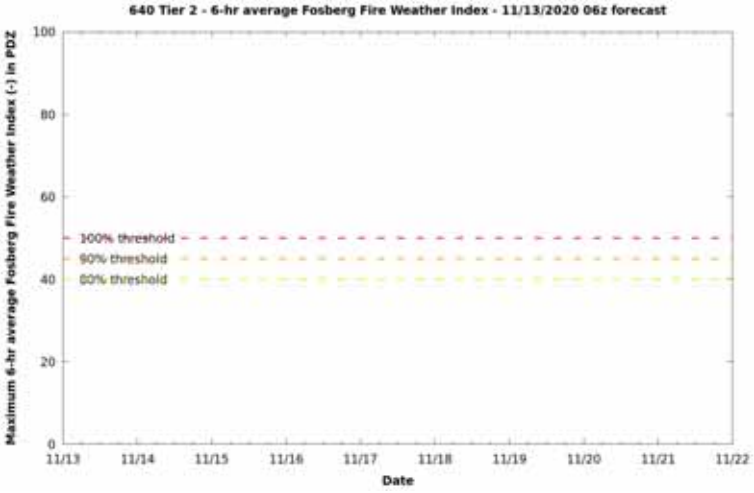


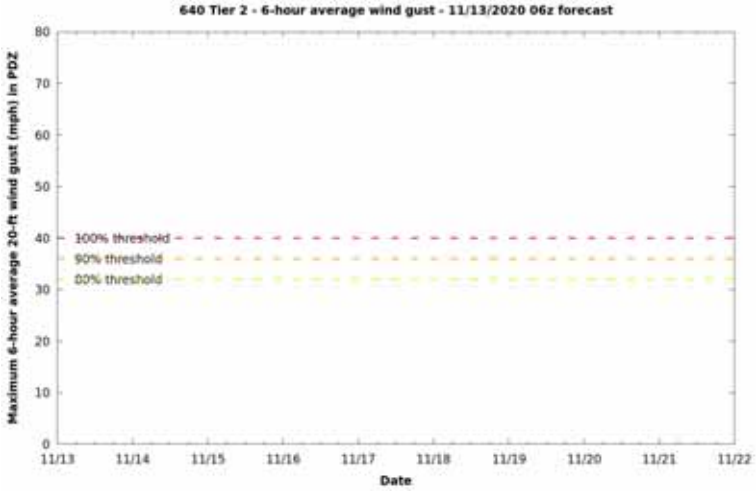
Tier 3



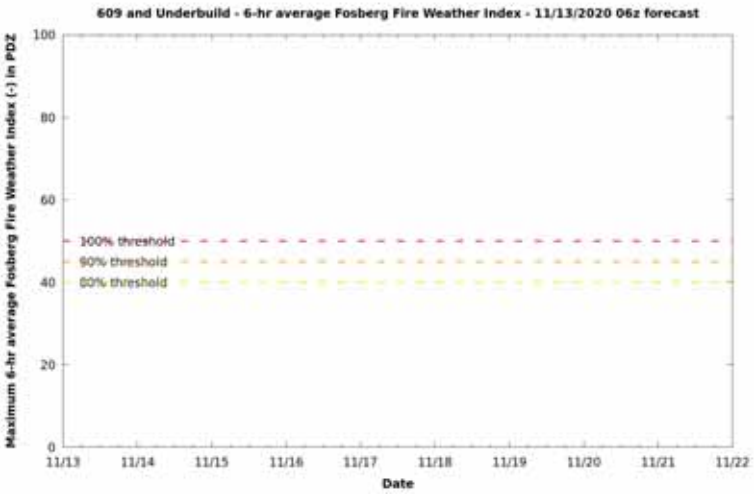


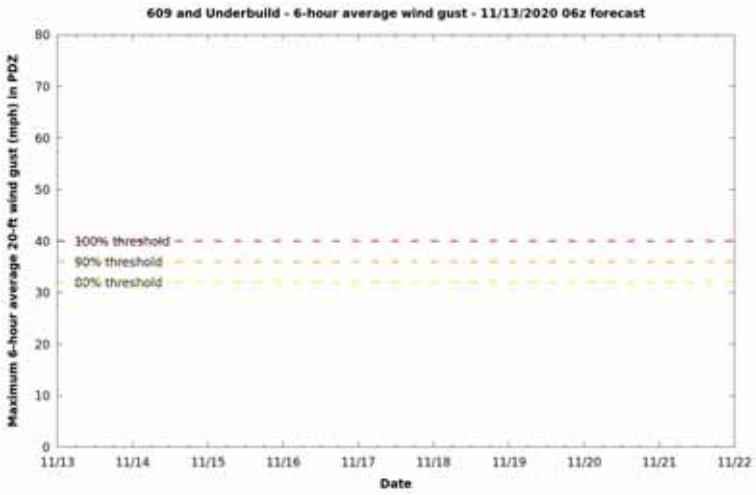
640 Tier 2



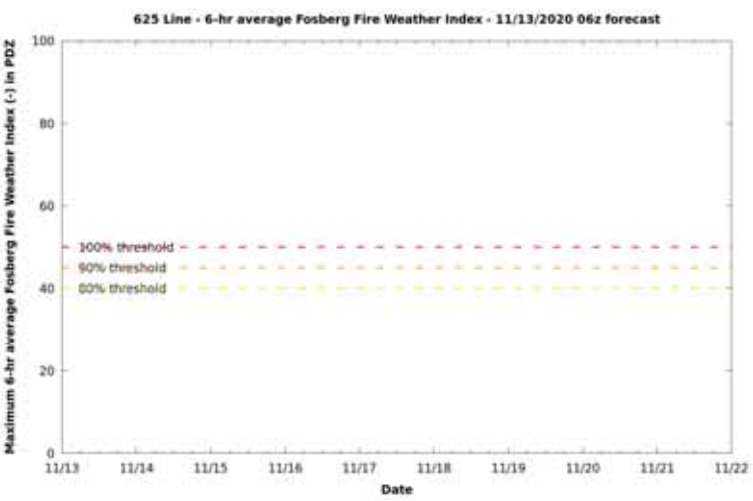


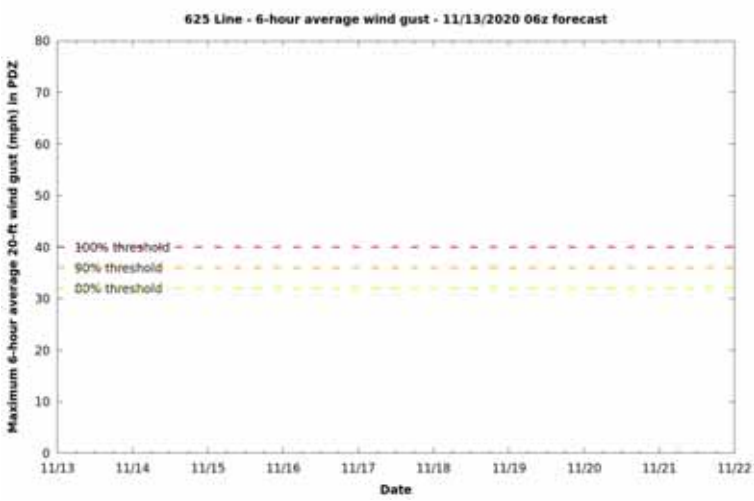
609 and Underbuild



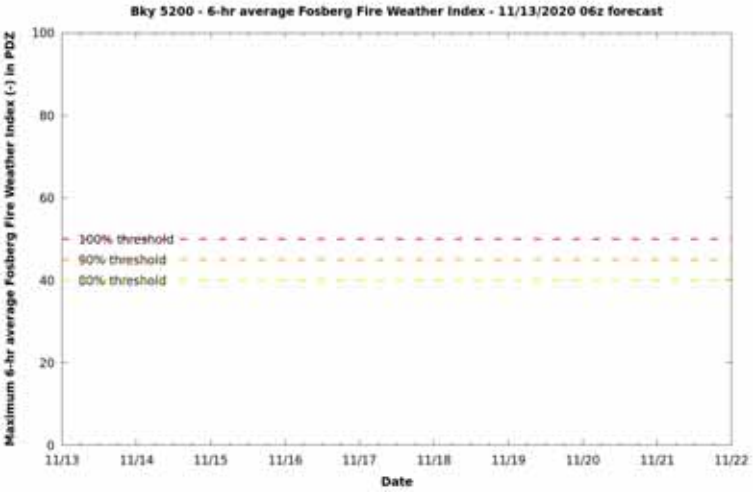


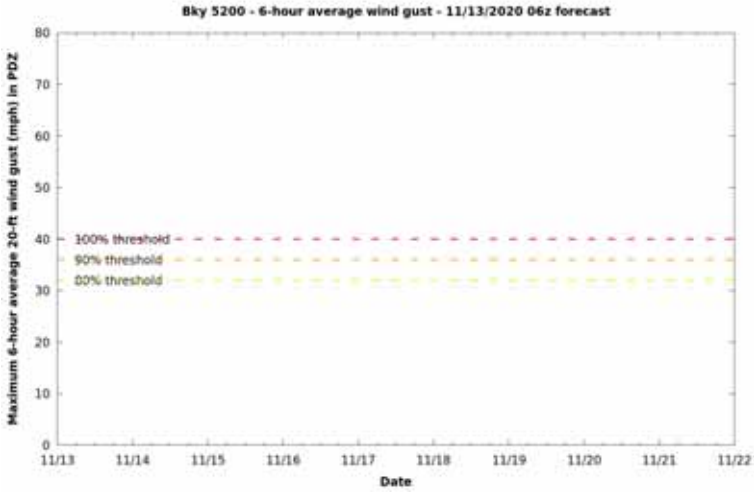
625 Line



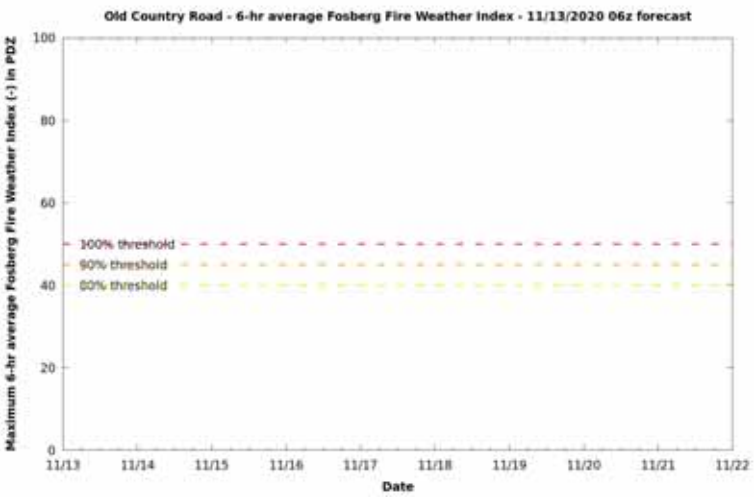


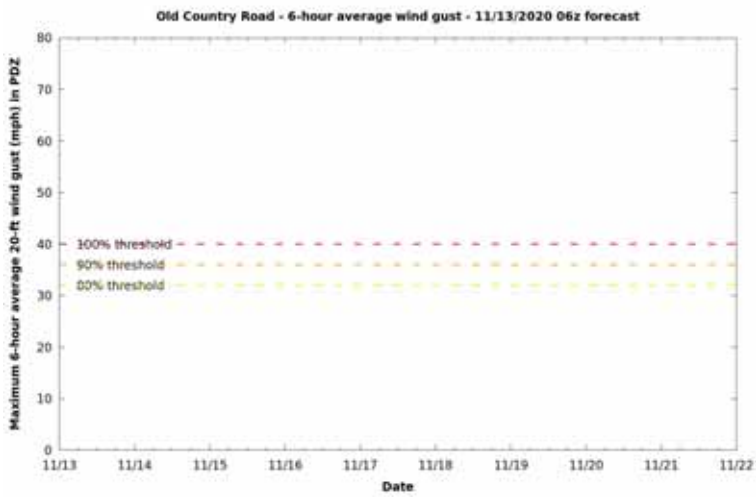
Bky 5200



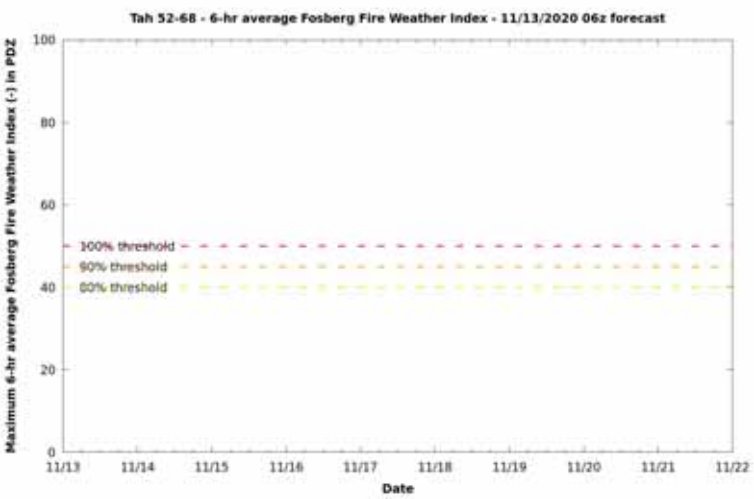


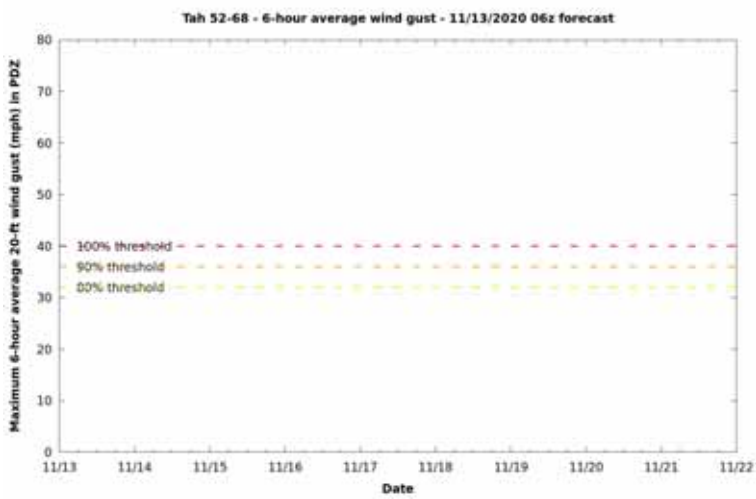
Old Country Road



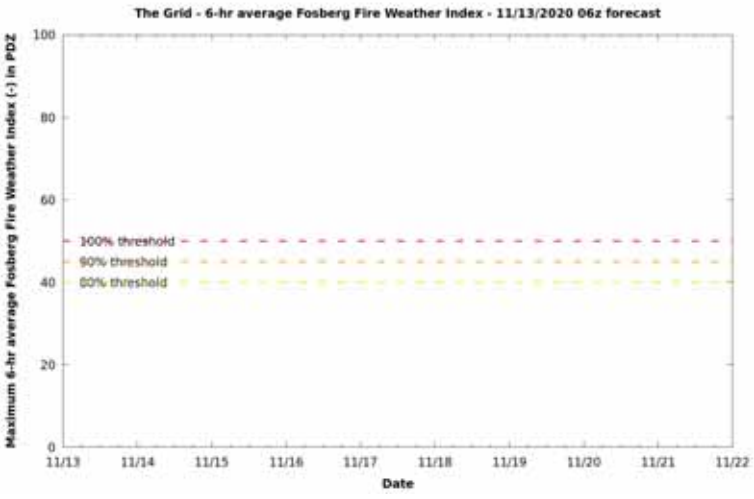


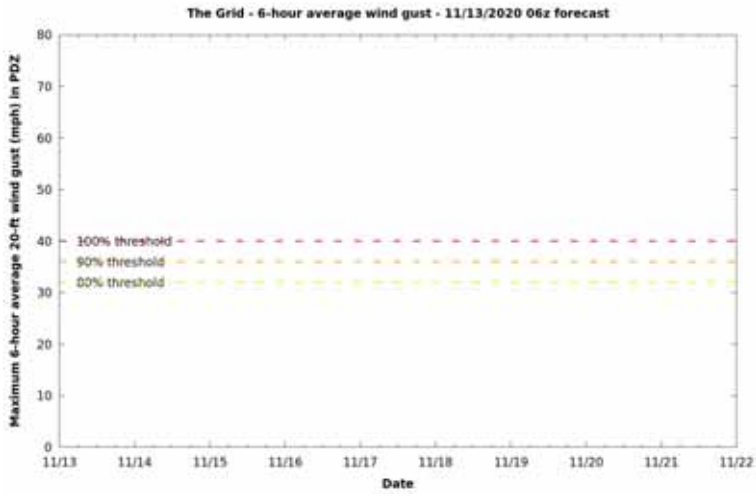
Tah 52-68



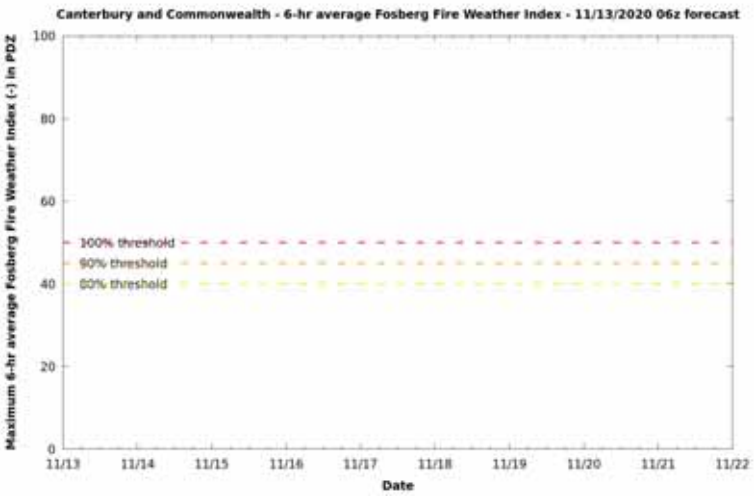


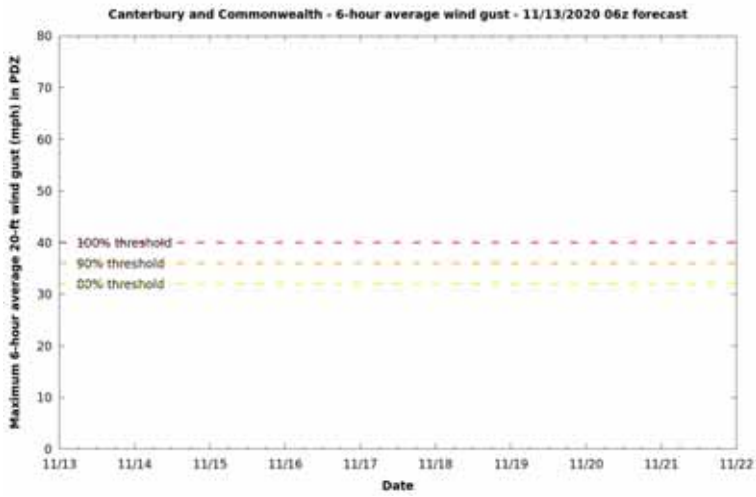
The Grid



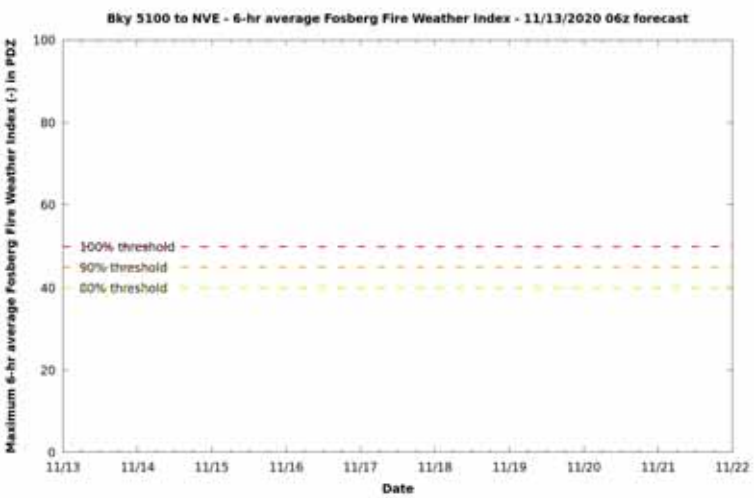


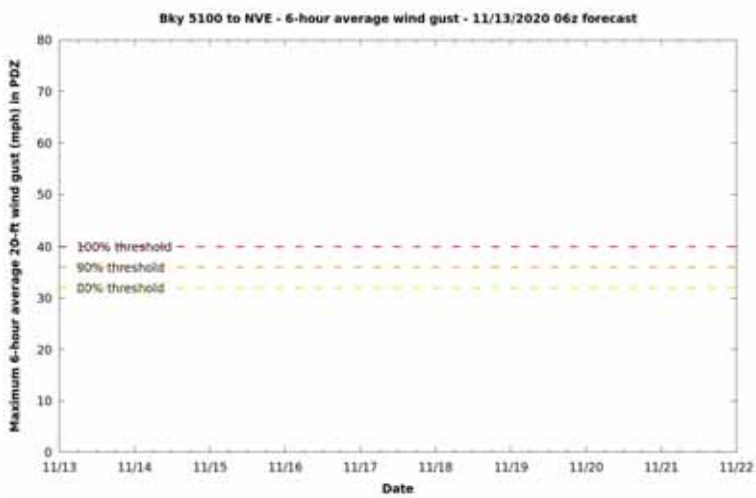
Canterbuy and Commonwealth



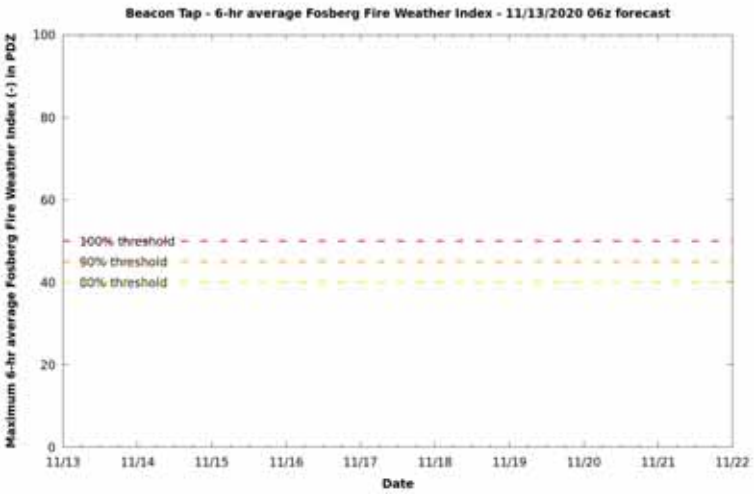


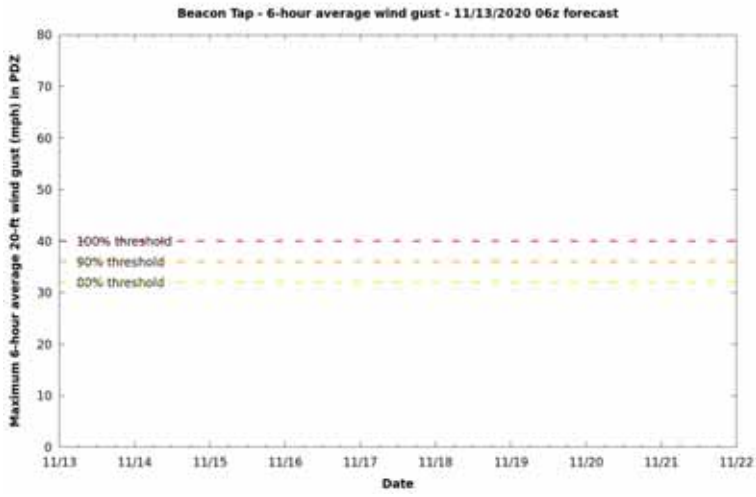
Bky 5100 to NVE



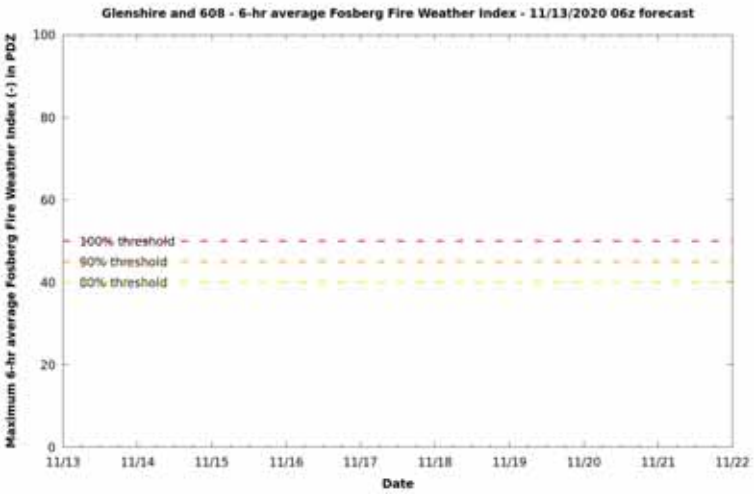


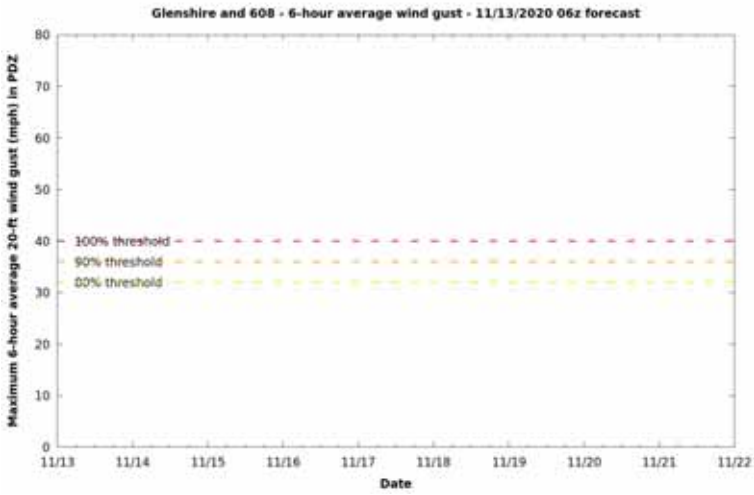
Beacon Tap



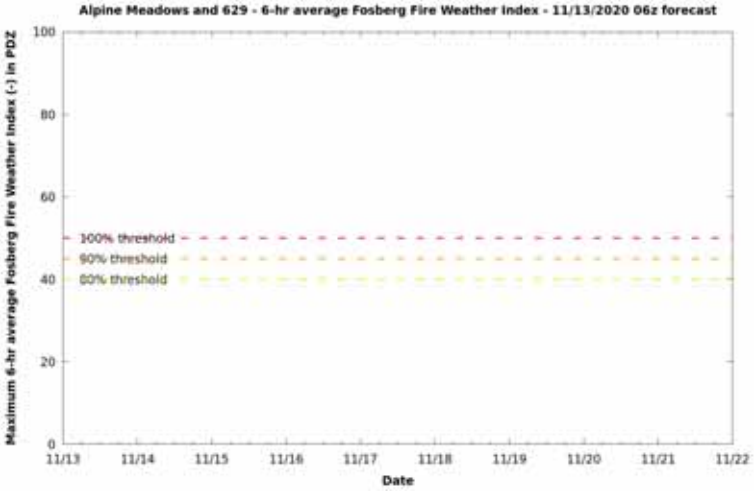


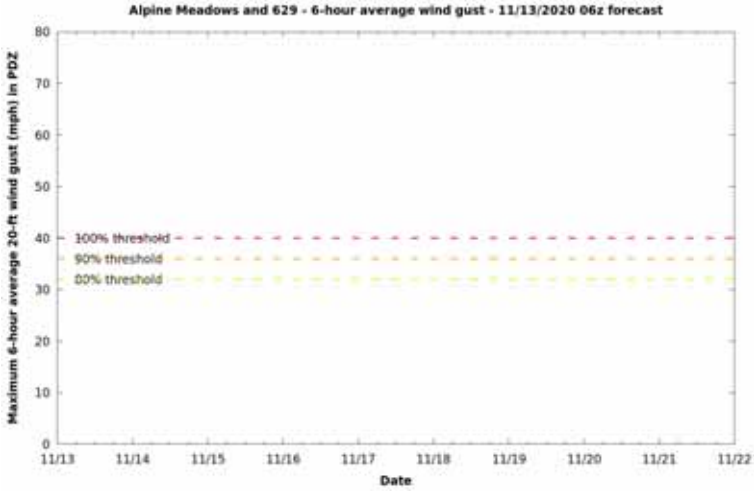
Glenshire and 608



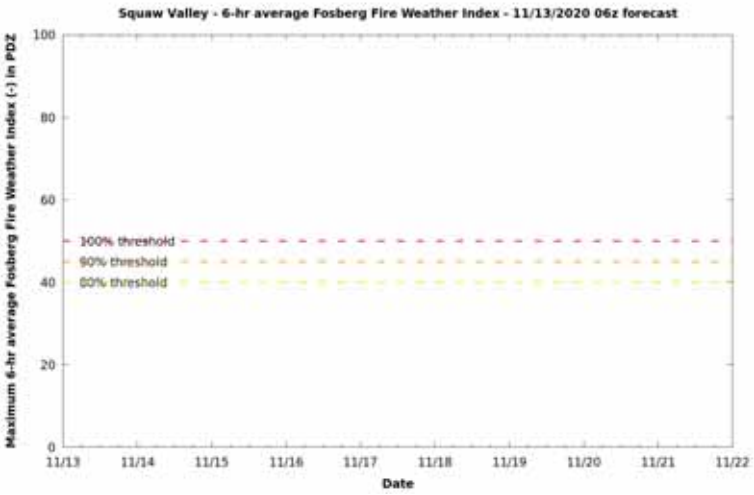


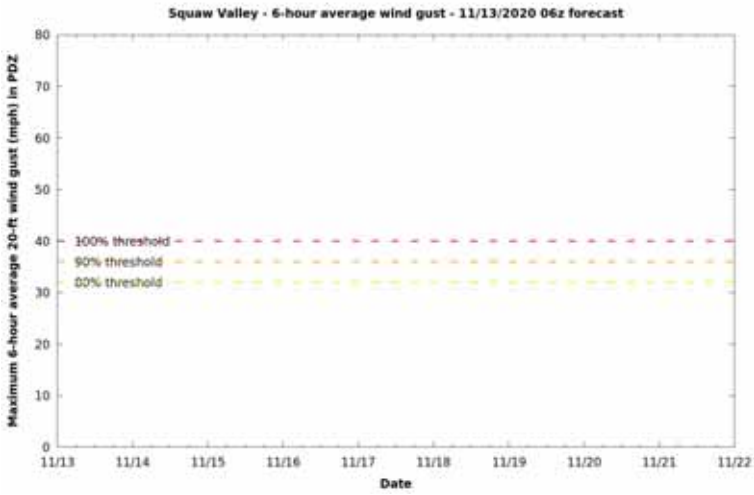
Alpine Meadows and 629



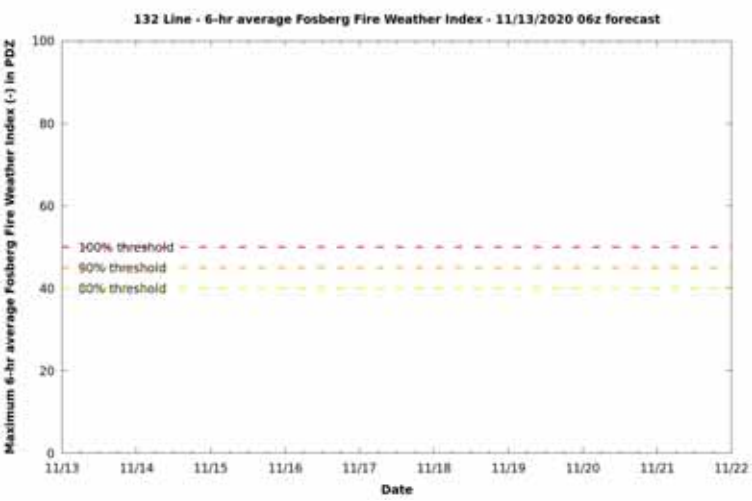


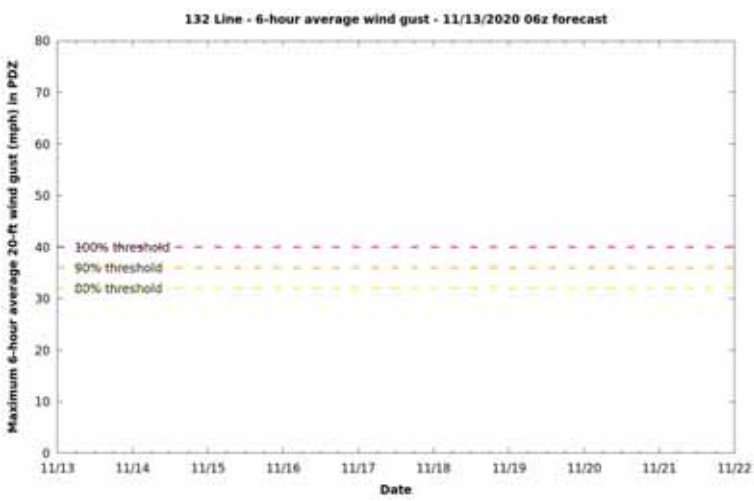
Squaw Valley



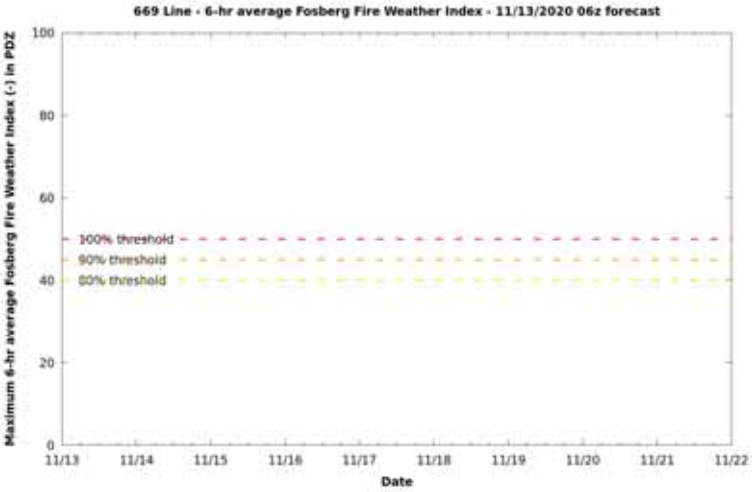


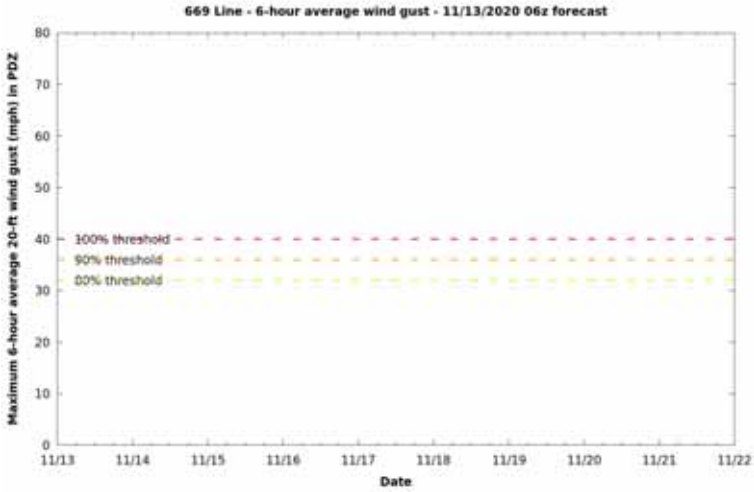
132 Line



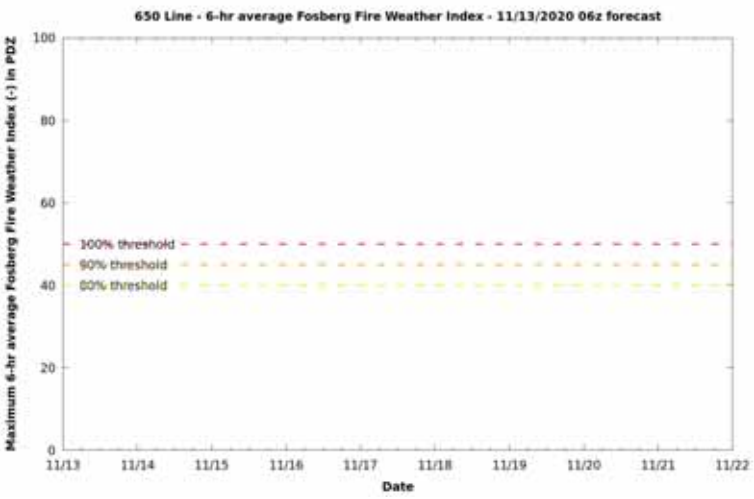


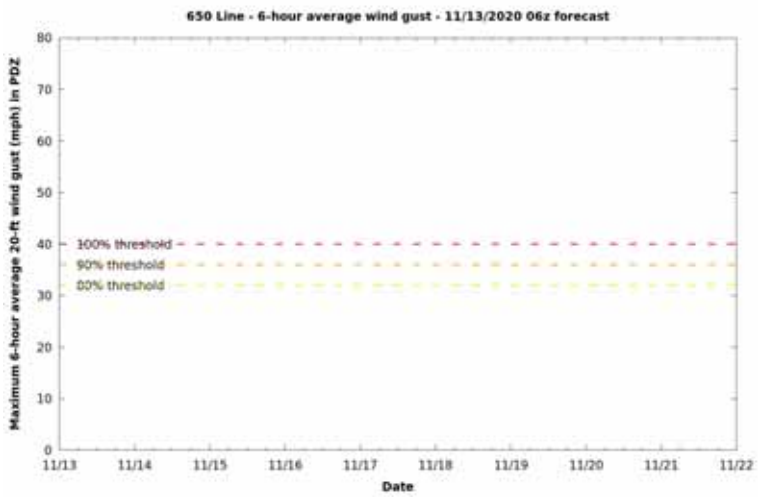
669 Line



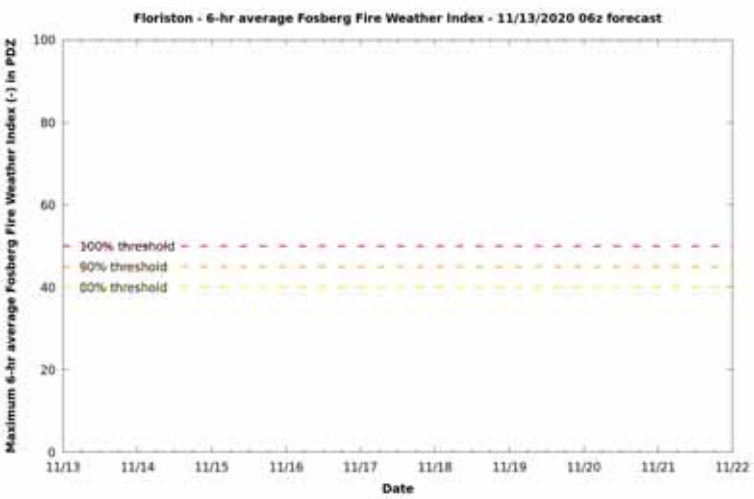


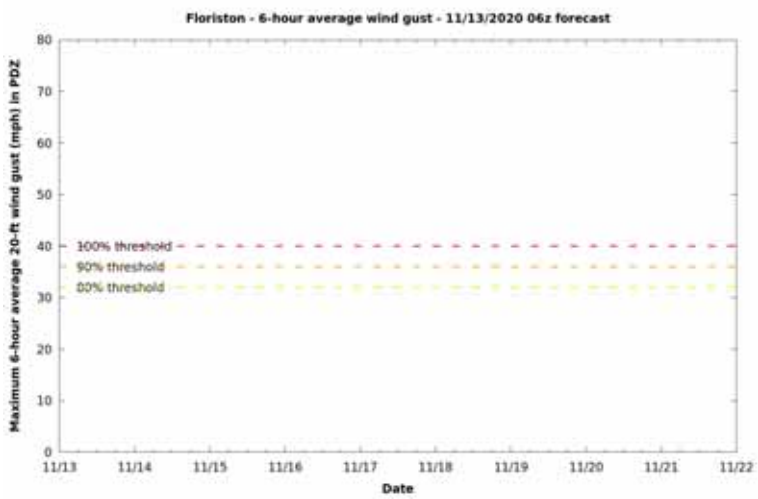
650 Line



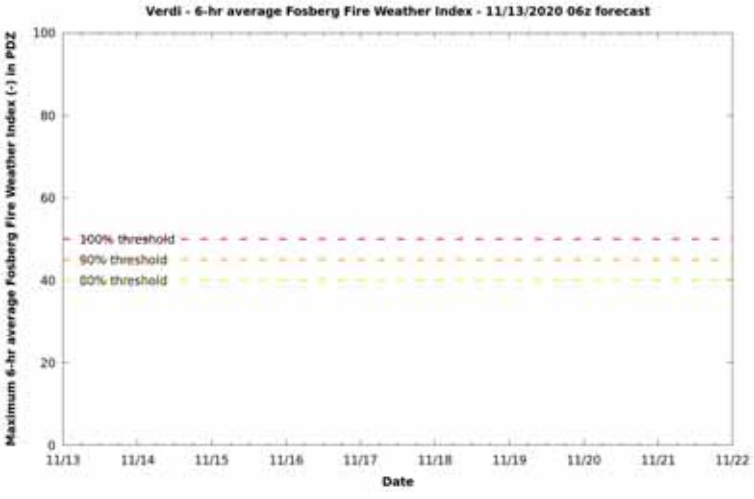


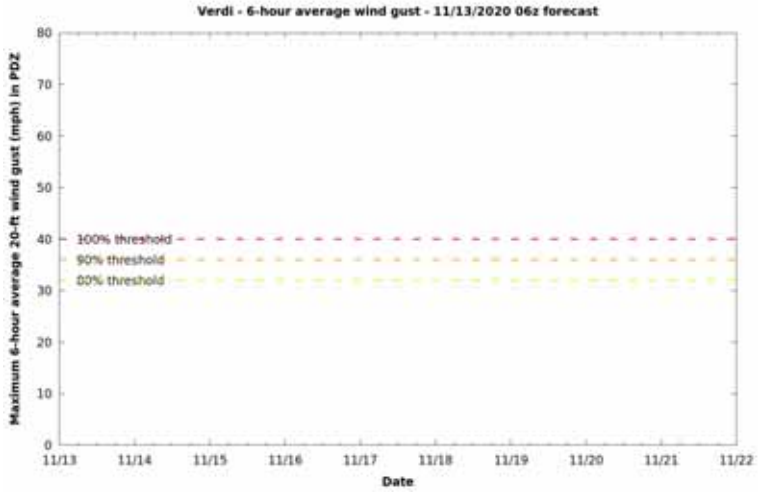
Floriston



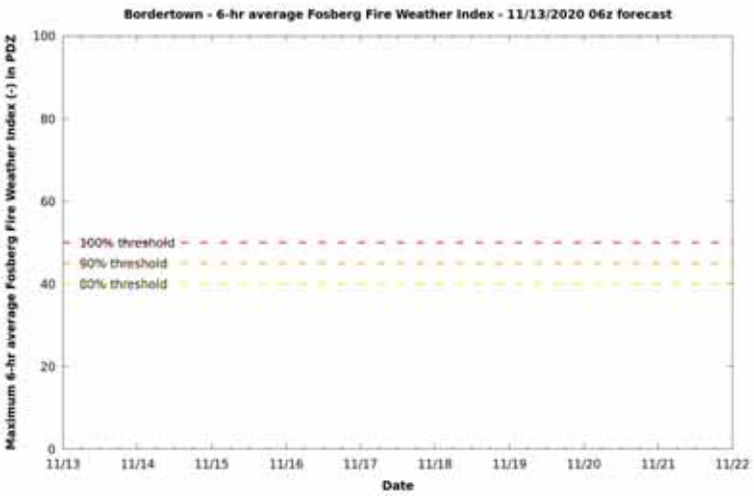


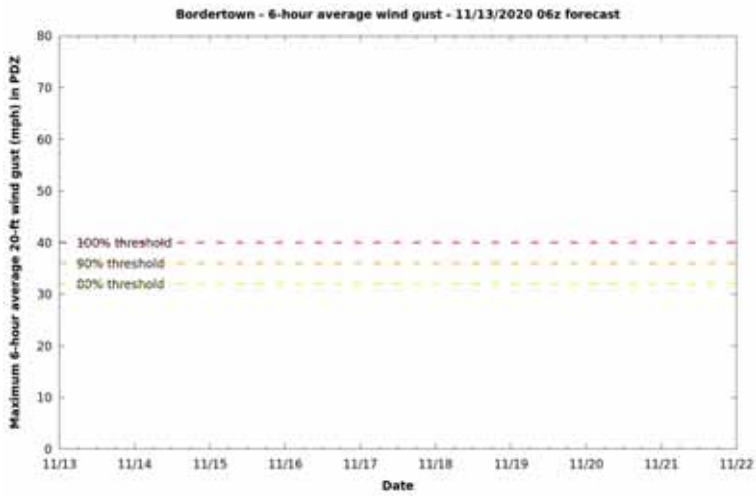
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/13/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100
80
60
40
20
0
100% threshold
90% threshold
00% threshold
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
Date


Bordertown - 6-hour average wind gust - 11/13/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
80
70
60
50
40
30
20
10
0
100% threshold
90% threshold
00% threshold
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
Date

Liberty Utilities Fire Potential Index Forecast for 11/13/20 - 11/19/20

Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

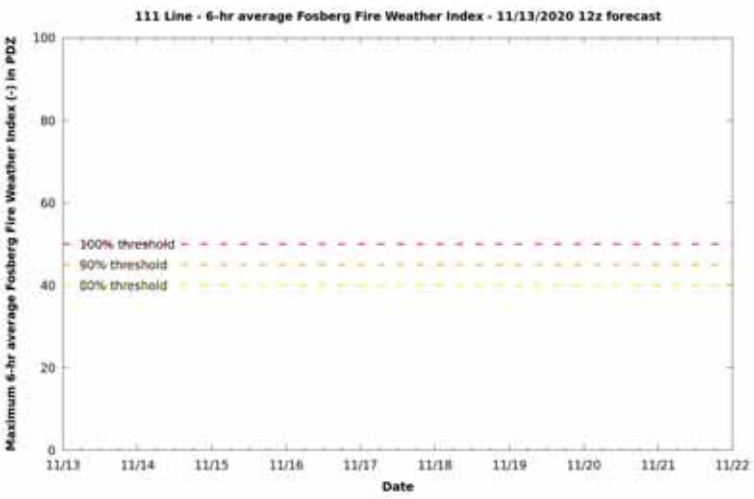
Liberty Utilities Energy Release Component Forecast for 11/13/20 - 11/19/20

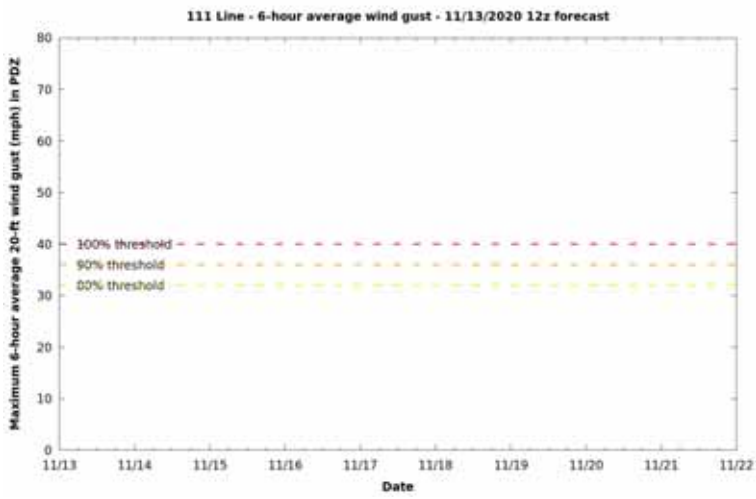
Zone	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	57.0	57.0	55.0	51.0	56.0	58.0	55.0
Sierra Brooks	58.0	61.0	58.0	55.0	61.0	62.0	62.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	51.0	43.0	48.0	42.0	35.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	56.0	56.0	53.0	50.0	56.0	57.0	57.0

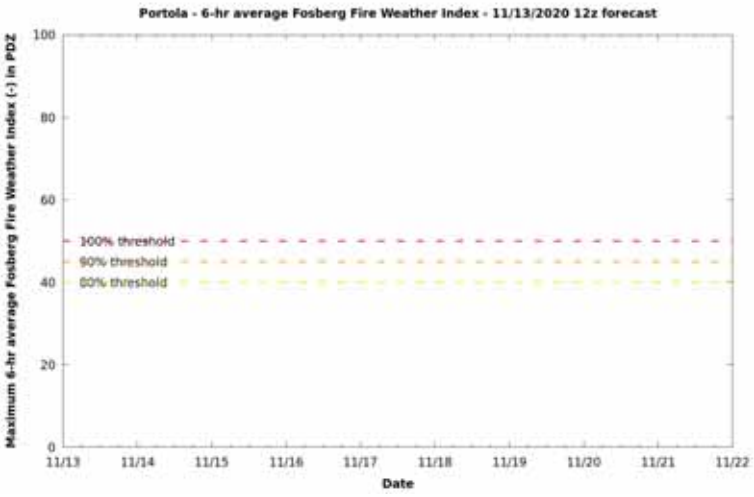
Liberty Utilities Fire Weather Summary Plots - 11/13/2020 12z forecast

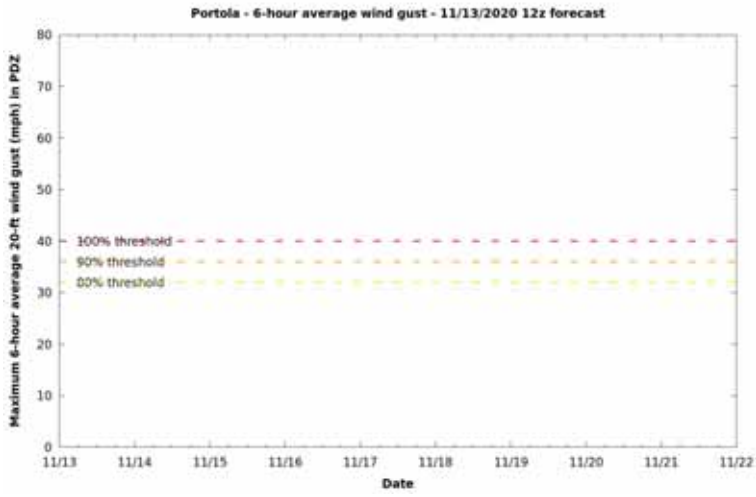
111 Line



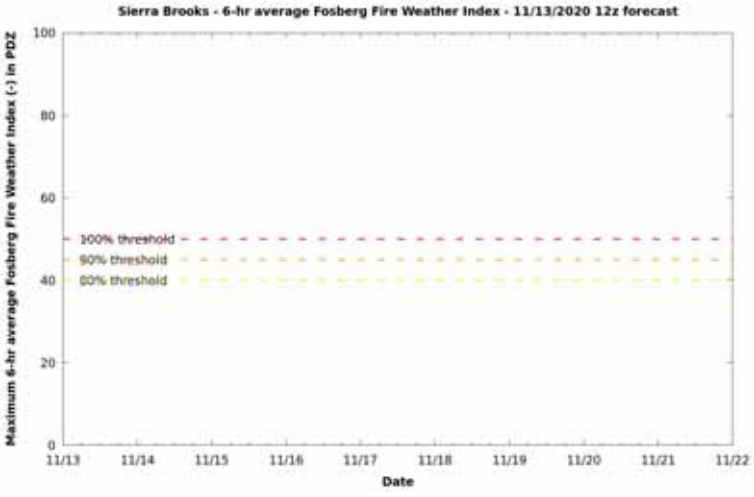


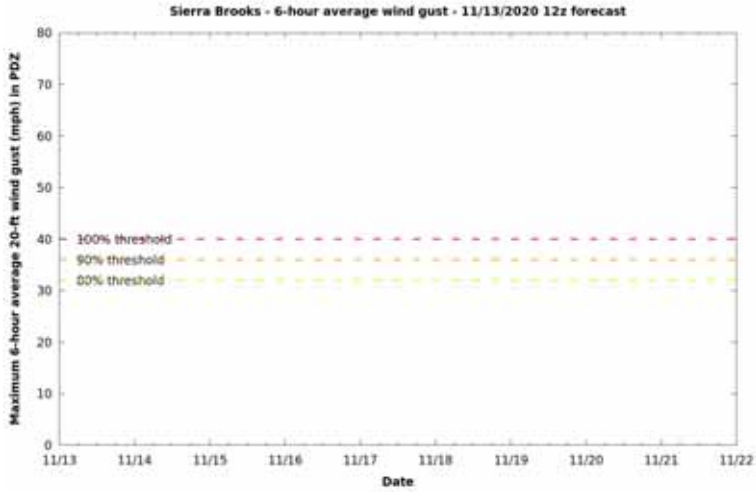
Portola



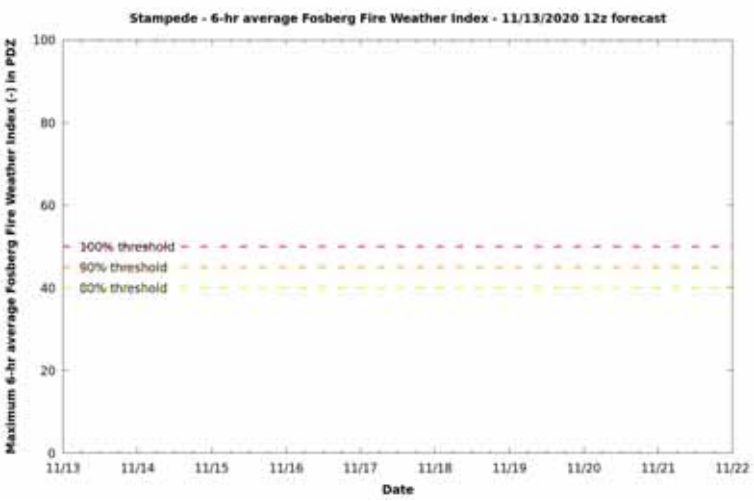


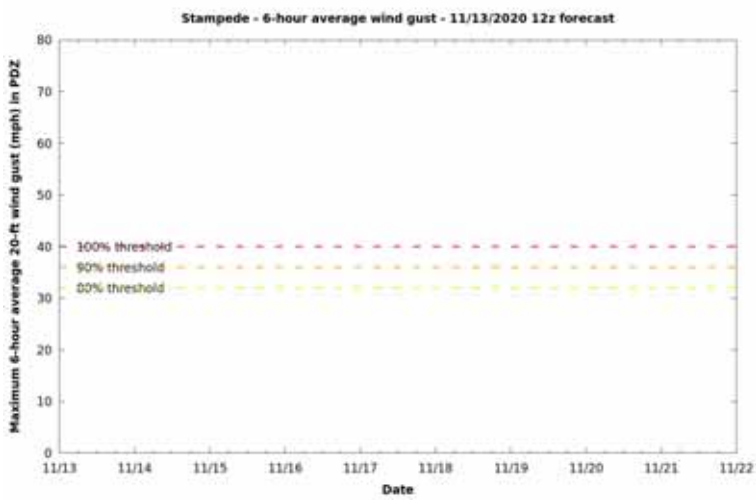
Sierra Brooks



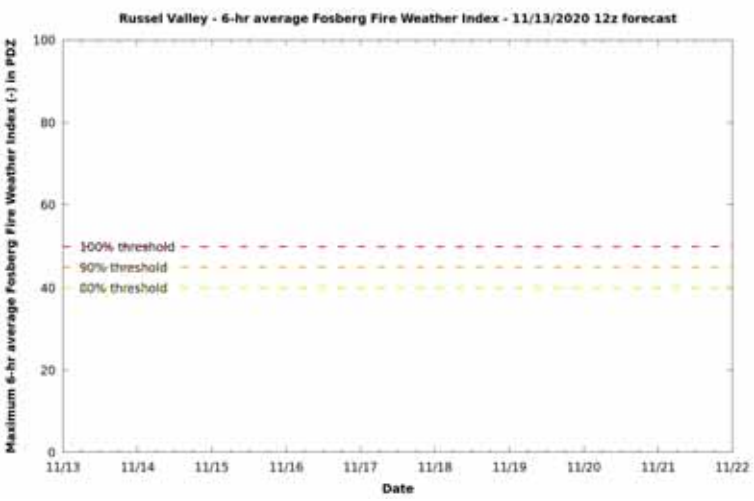


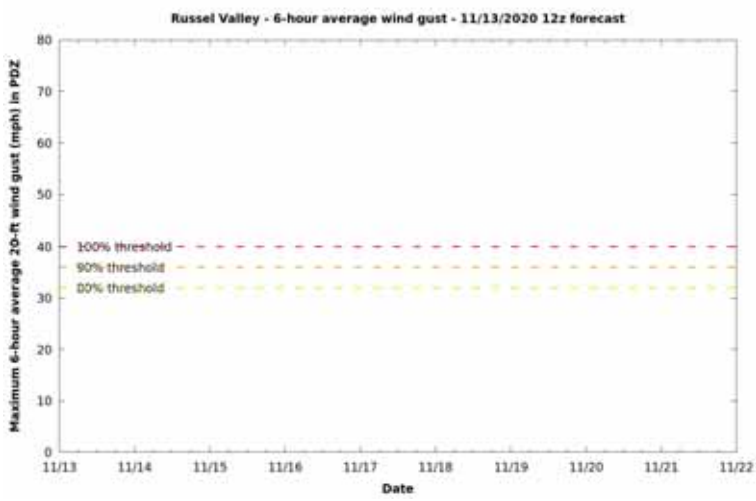
Stampede



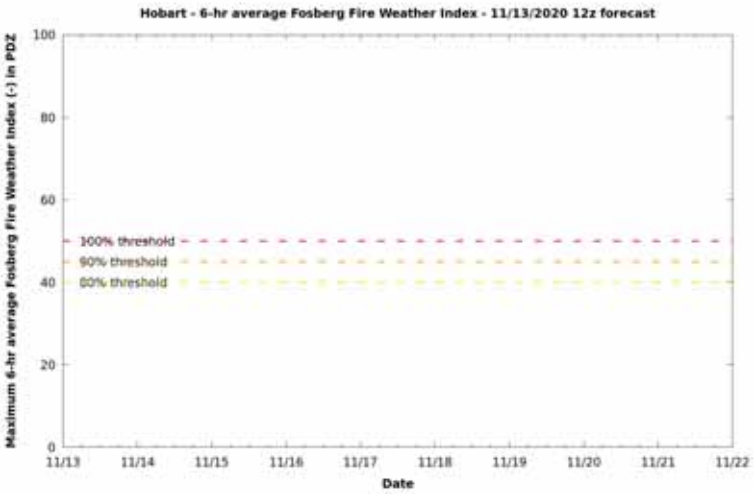


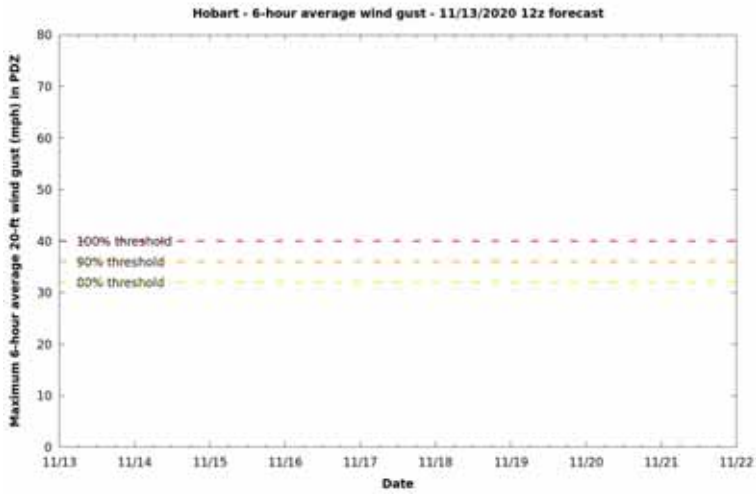
Russell Valley



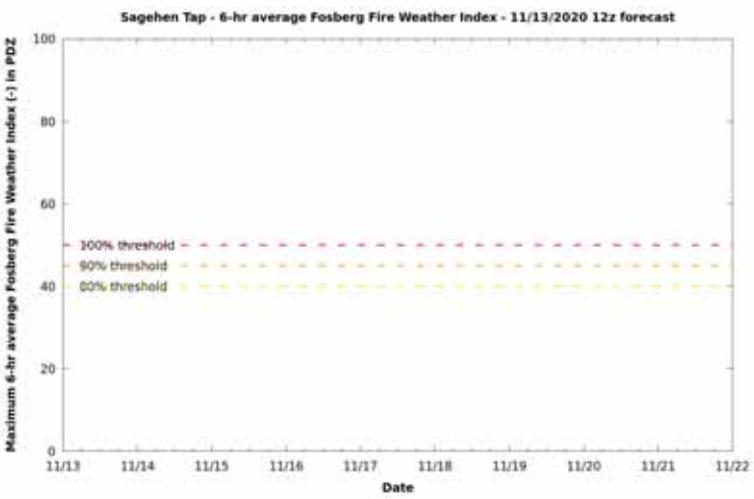


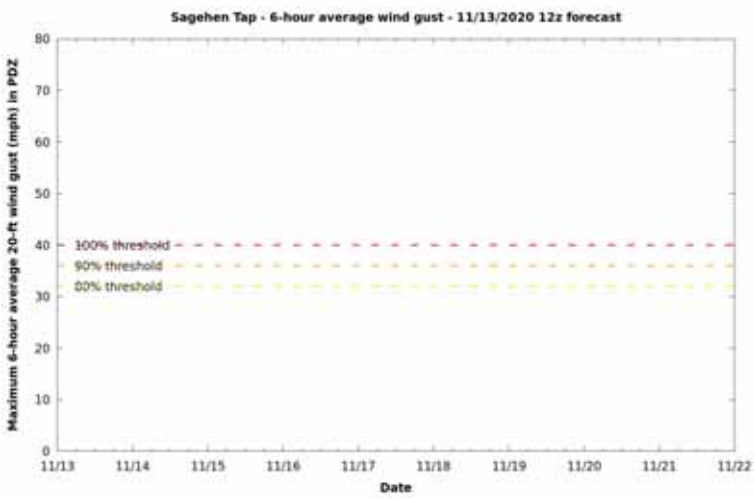
Hobart



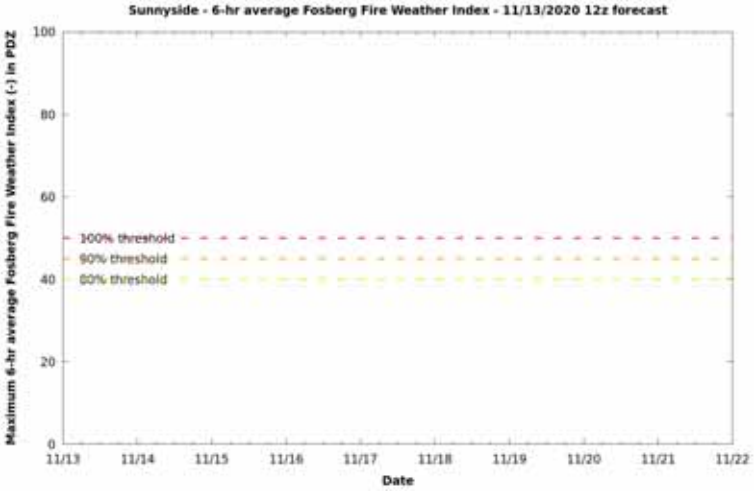


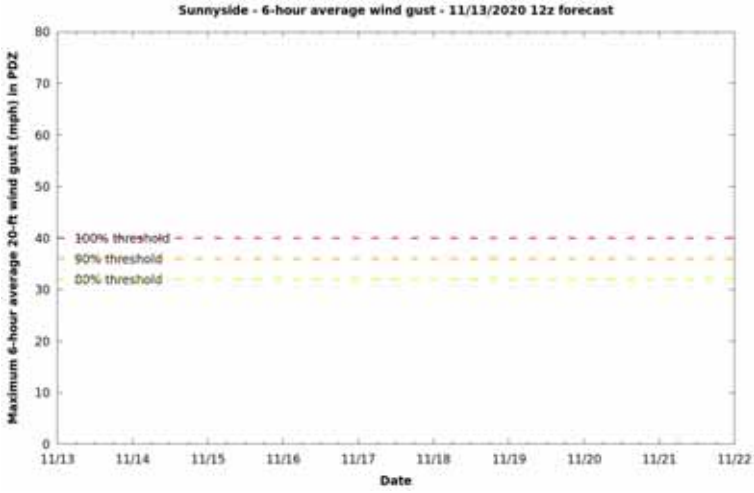
Sagehen tap



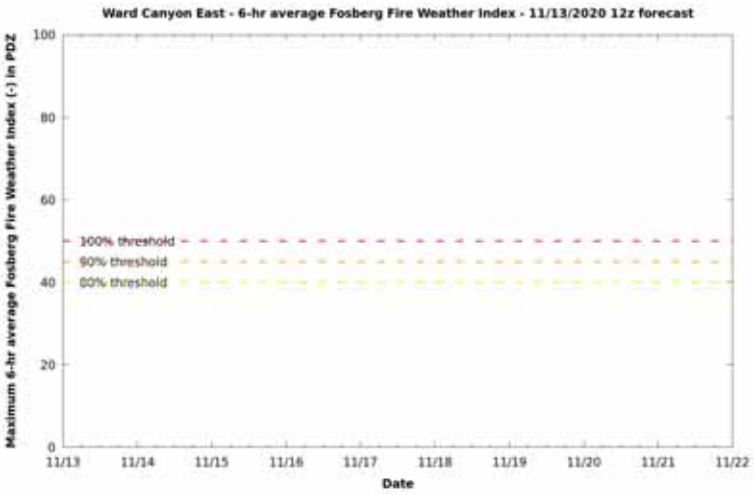


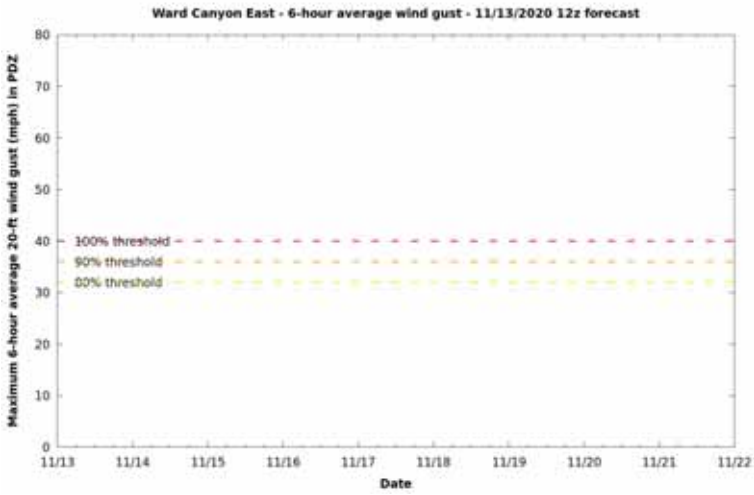
Sunnyside



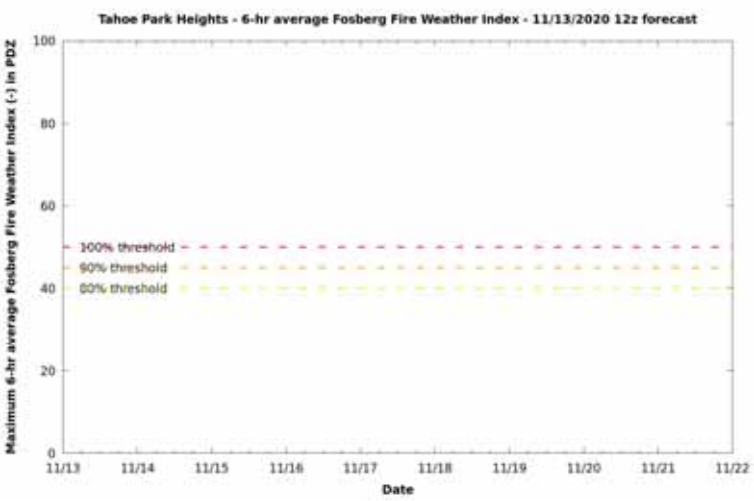


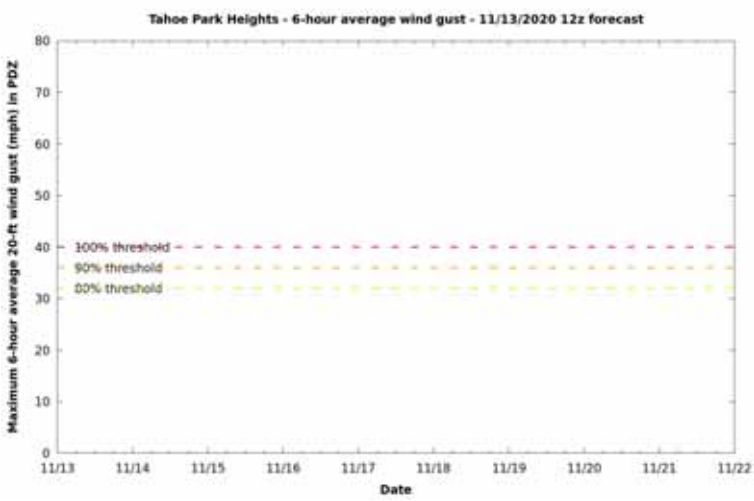
Ward Canyon East



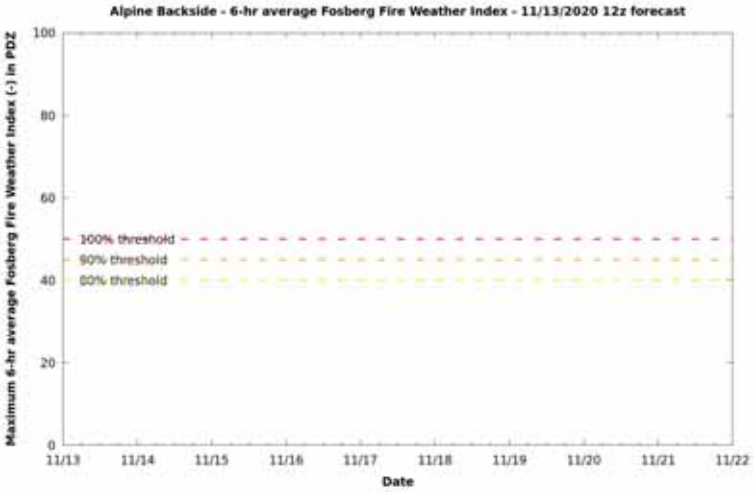


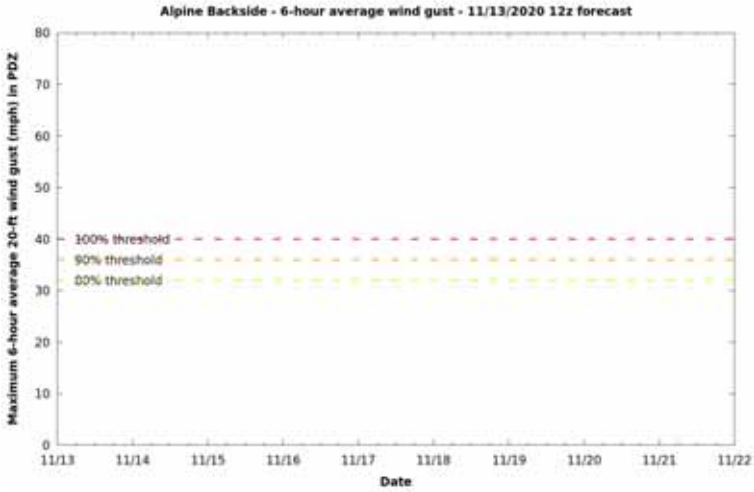
Tahoe Park Heights



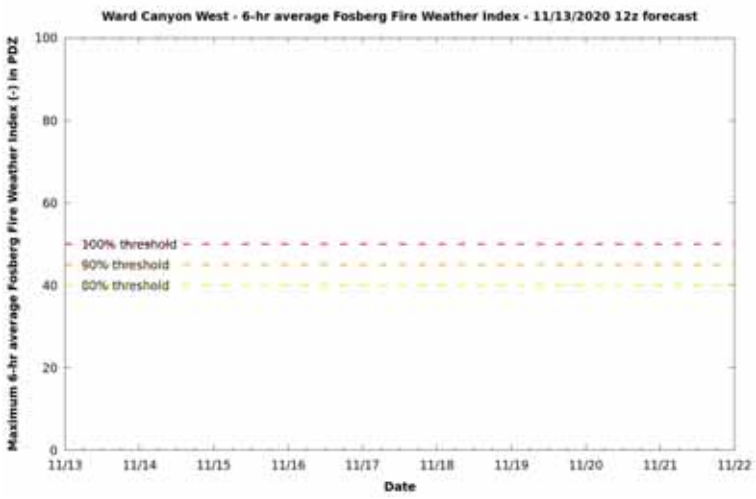


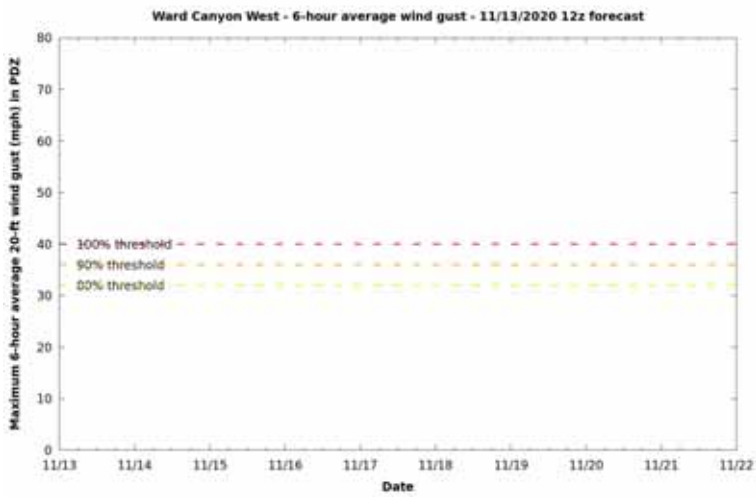
Alpine Backside



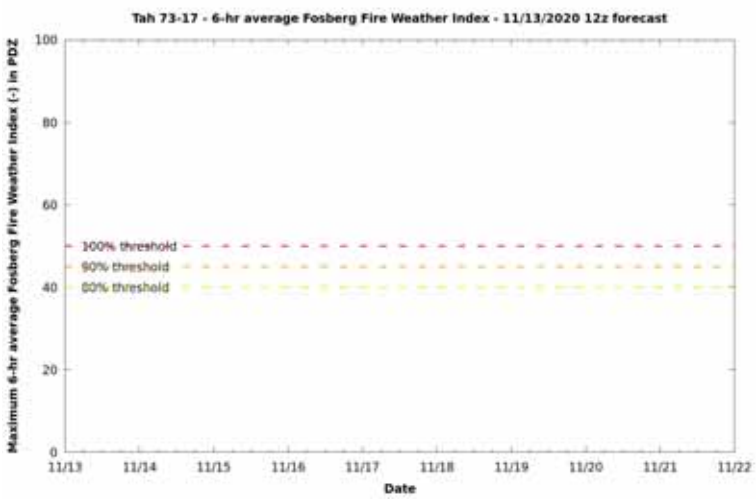


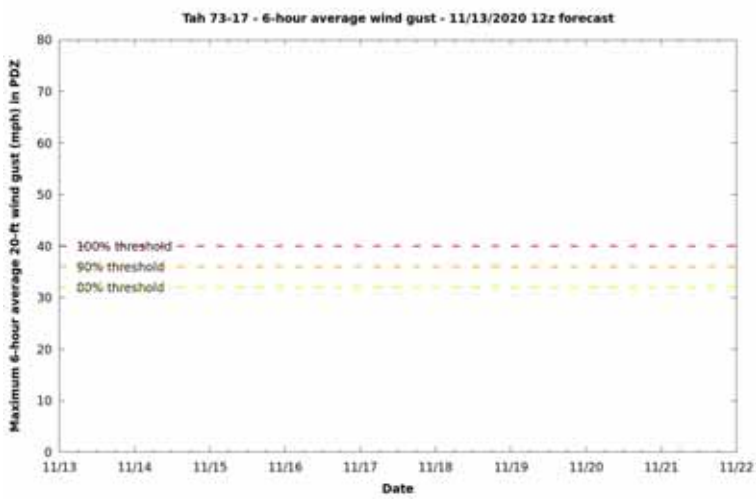
Ward Canyon West



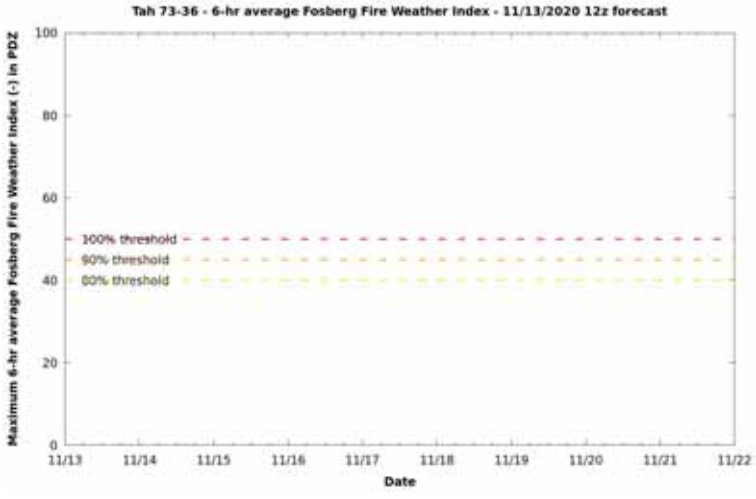


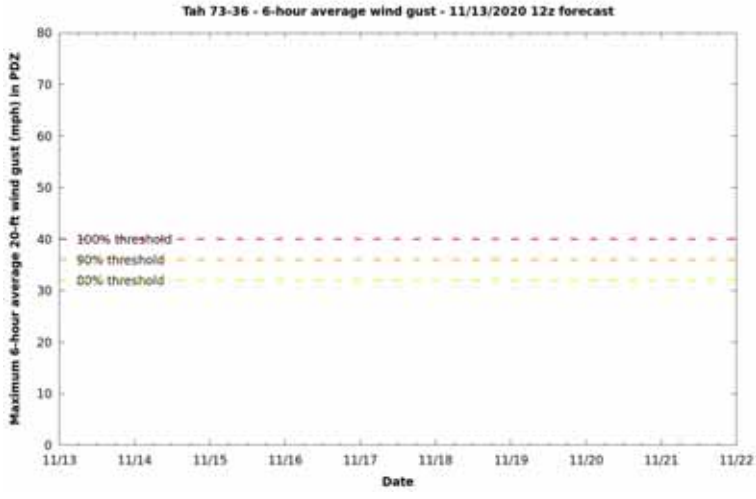
Tah 73-17



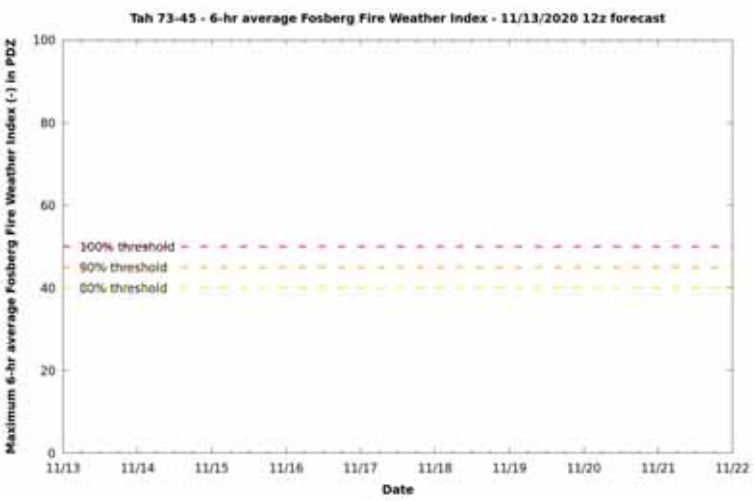


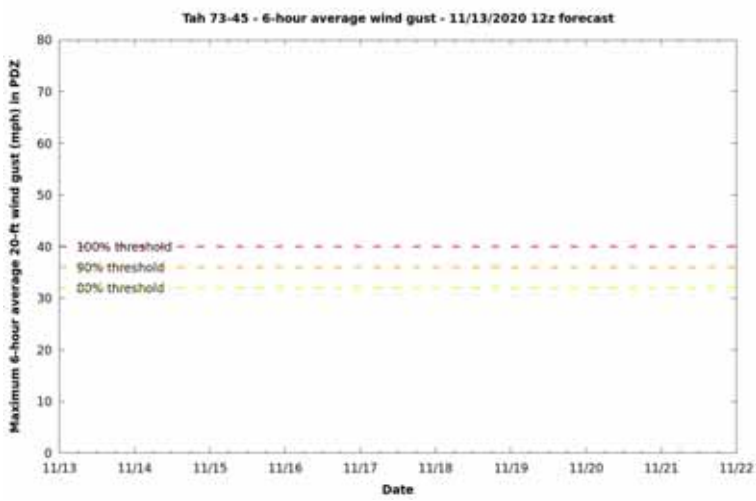
Tah 73-36



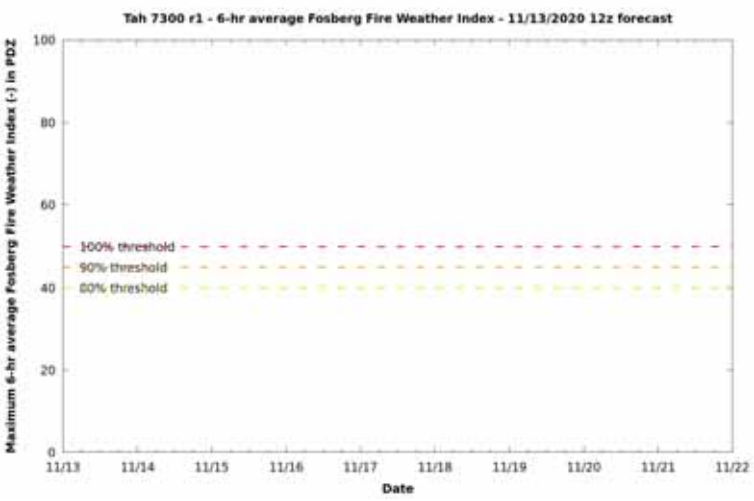


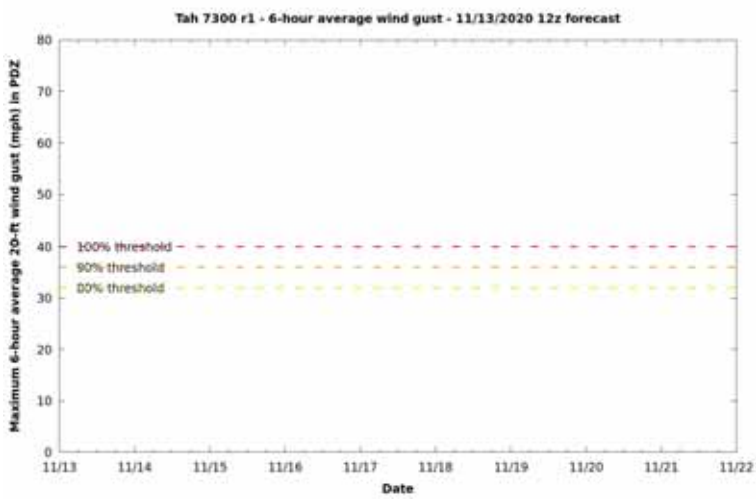
Tah 73-45



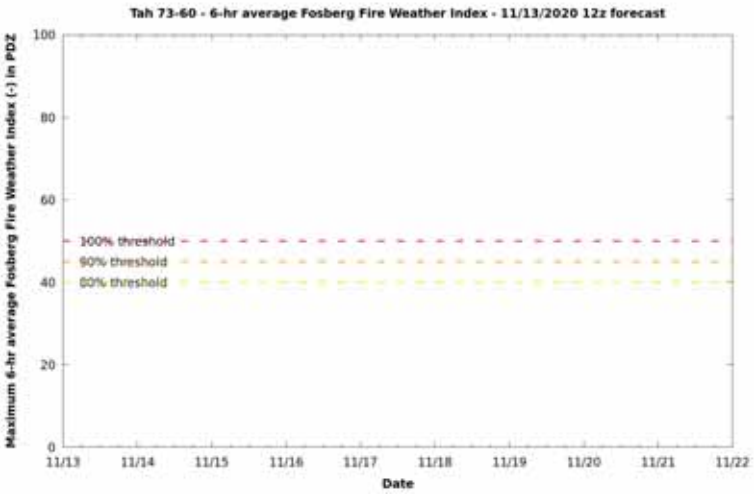


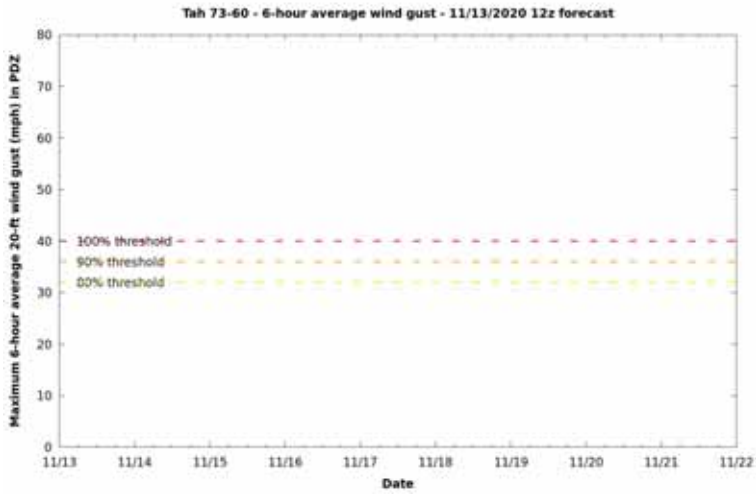
Tah 7300 r1



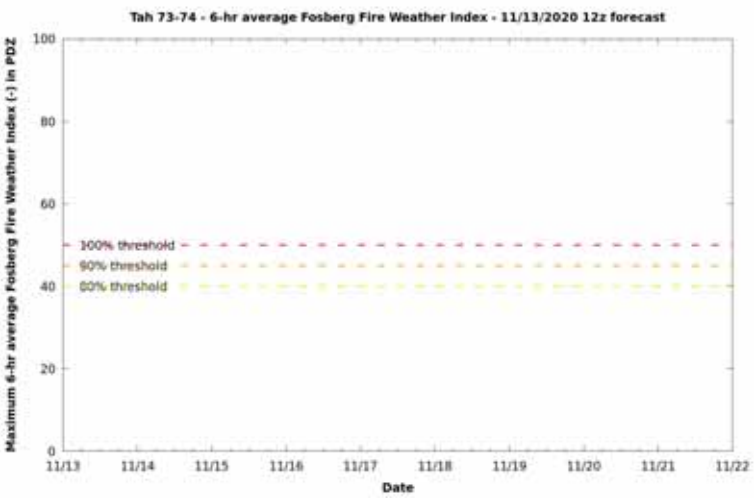


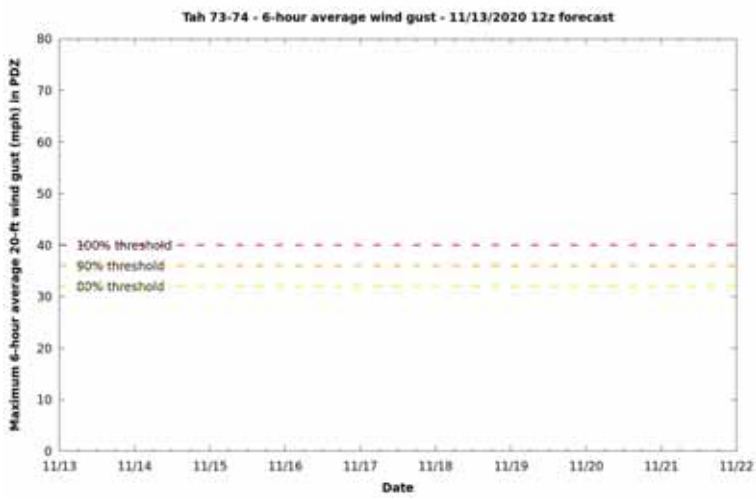
Tah 73-60



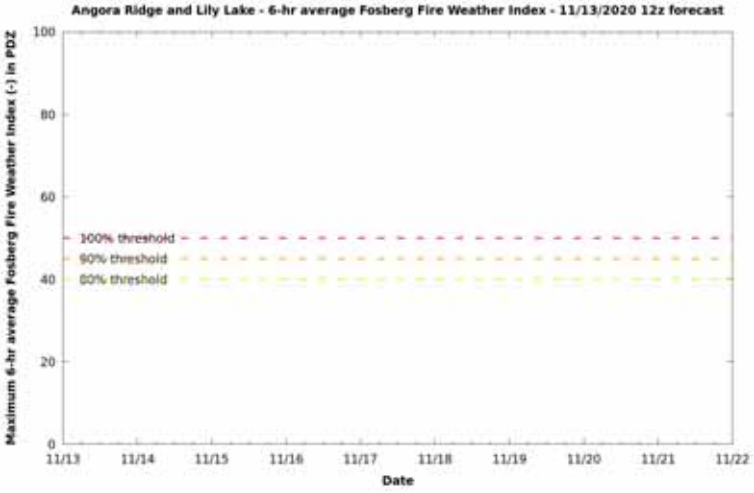


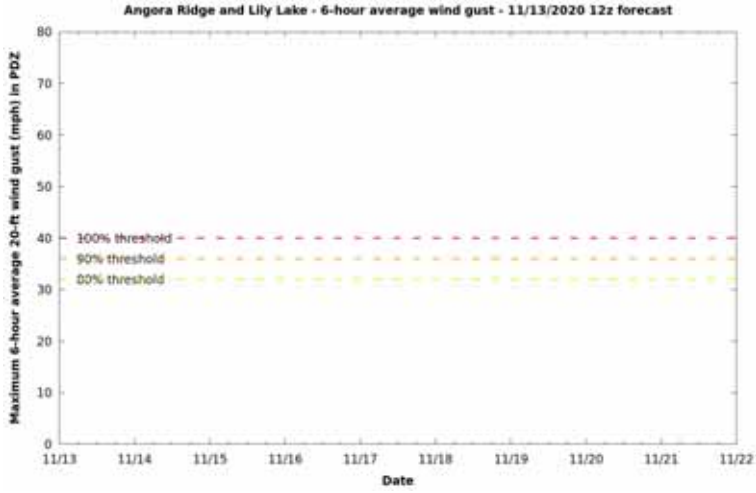
Tah 73-74



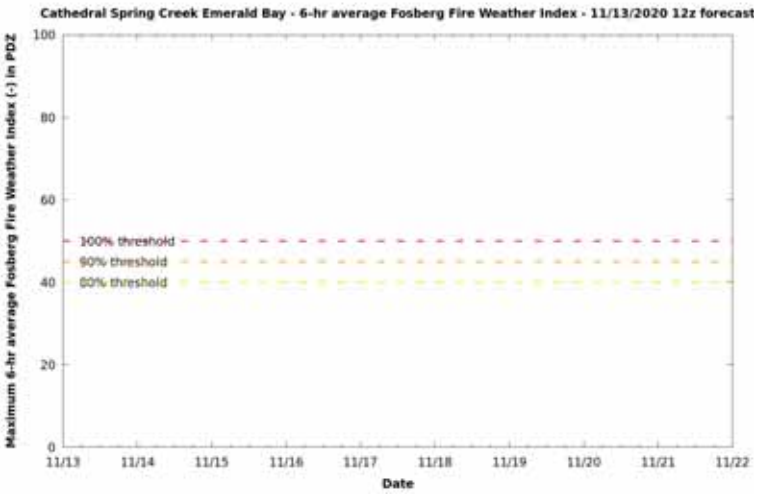


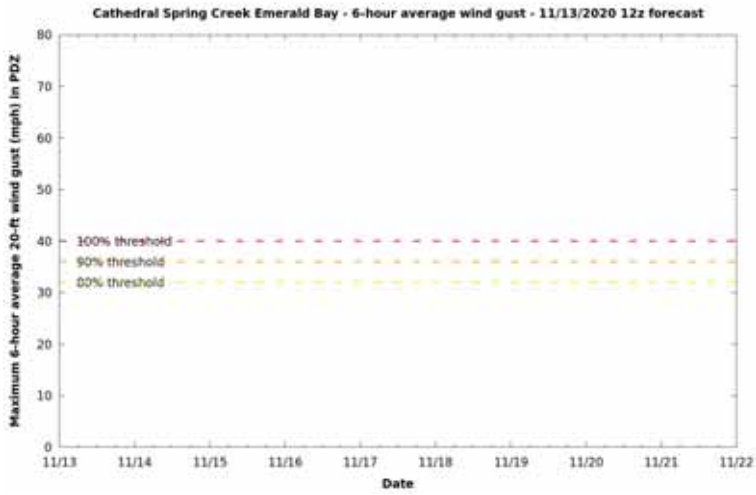
Angora Ridge and Lily Lake



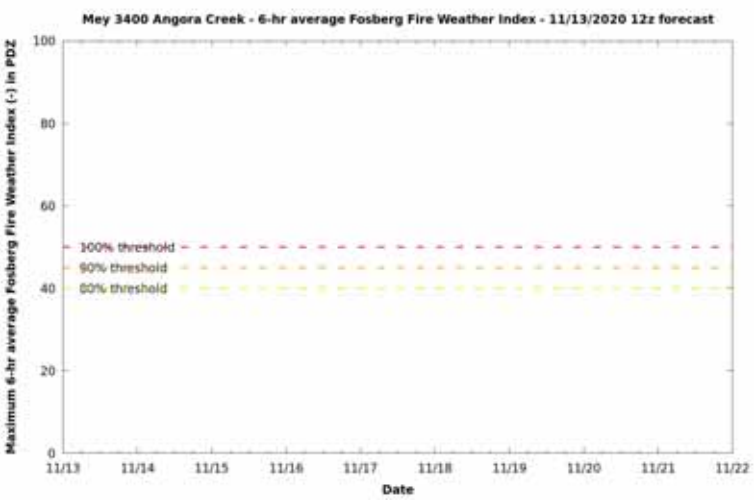


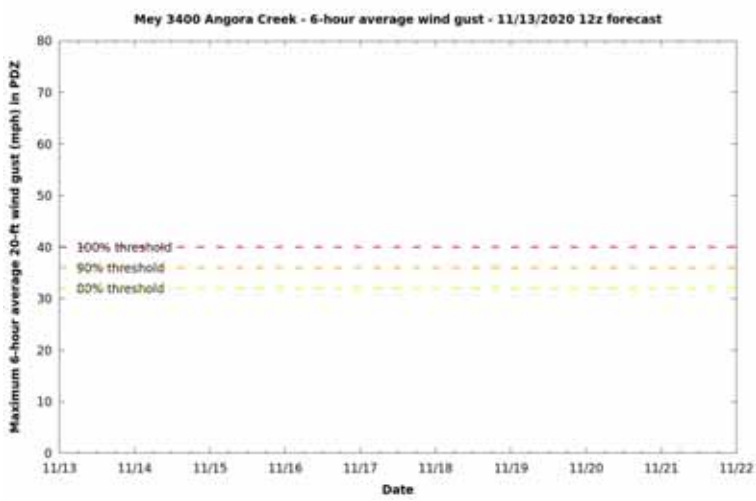
Cathedral Spring Creek Emerald Bay



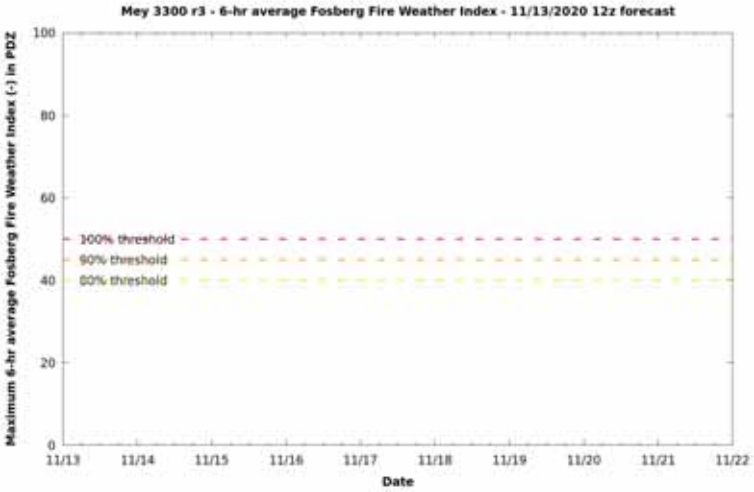


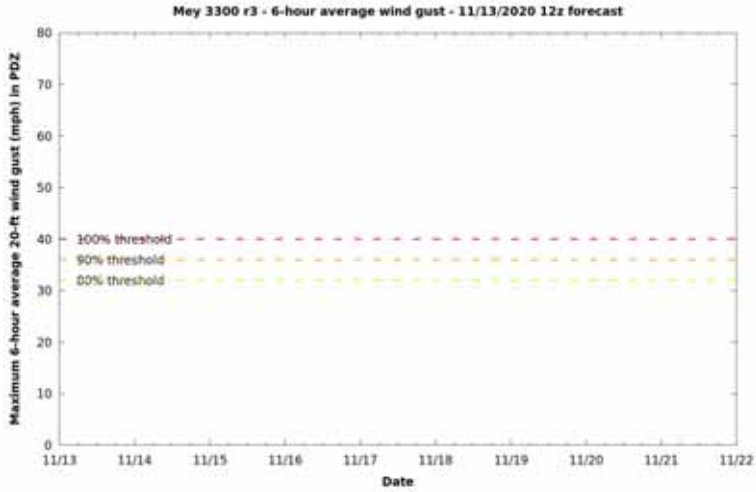
Mey 3400 Angora Creek



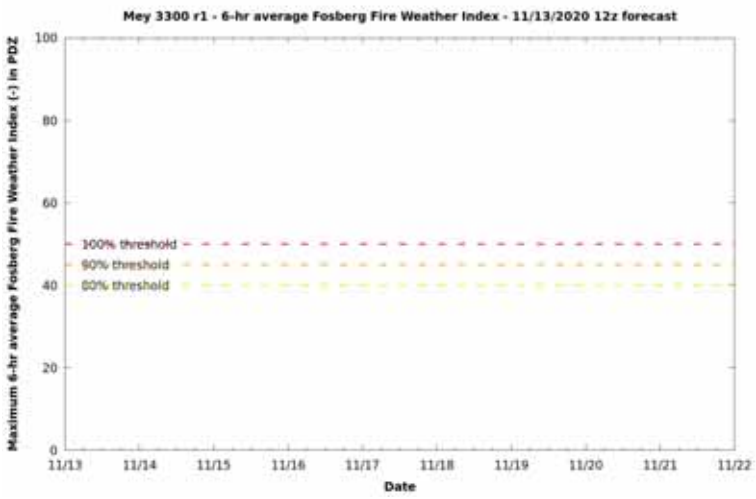


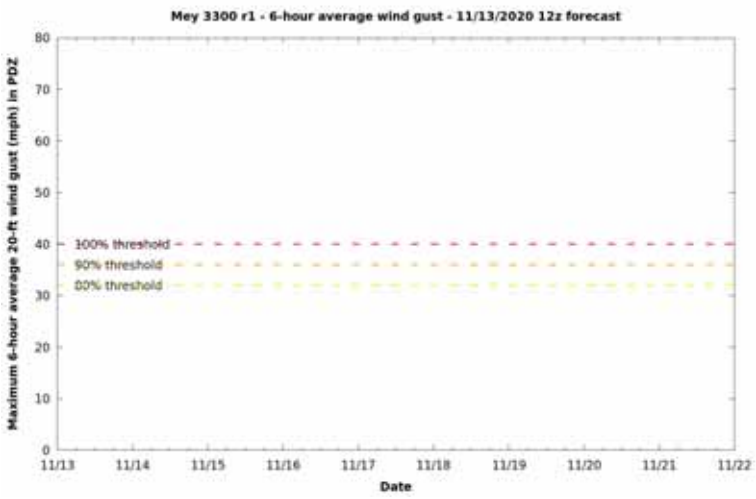
Mey 3300 r3



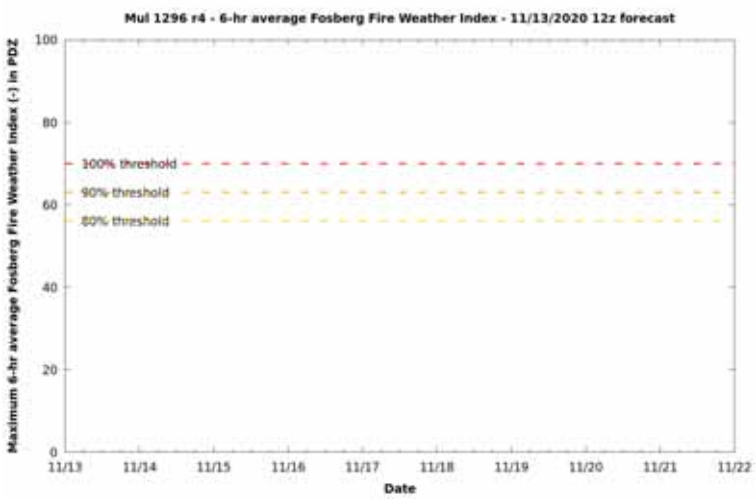


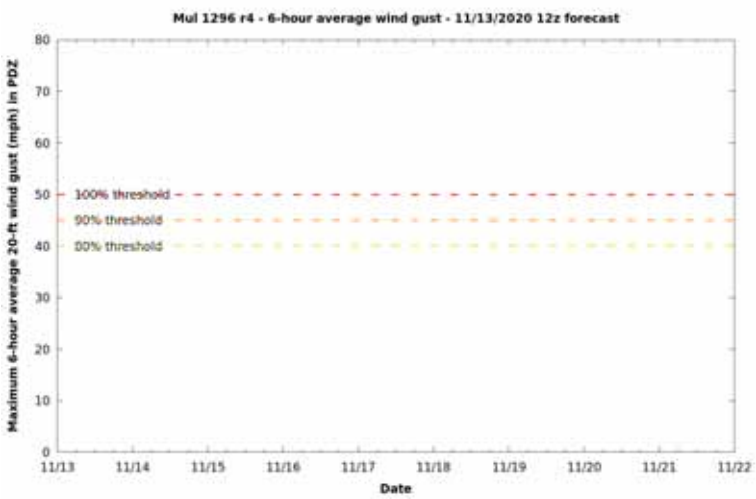
Mey 3300 r1



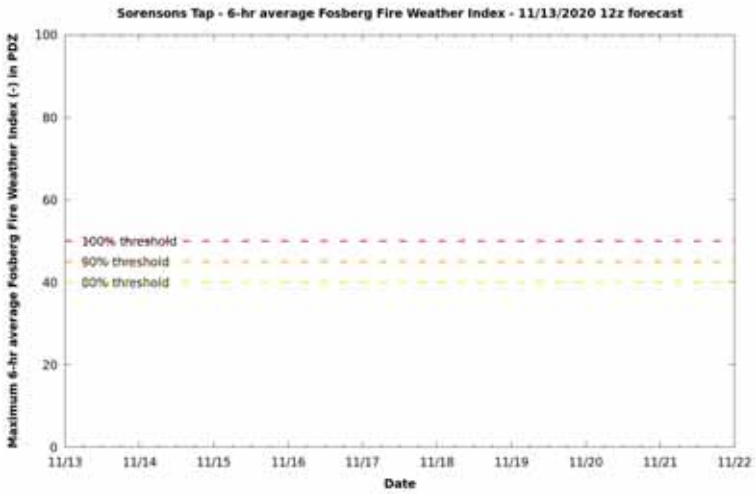


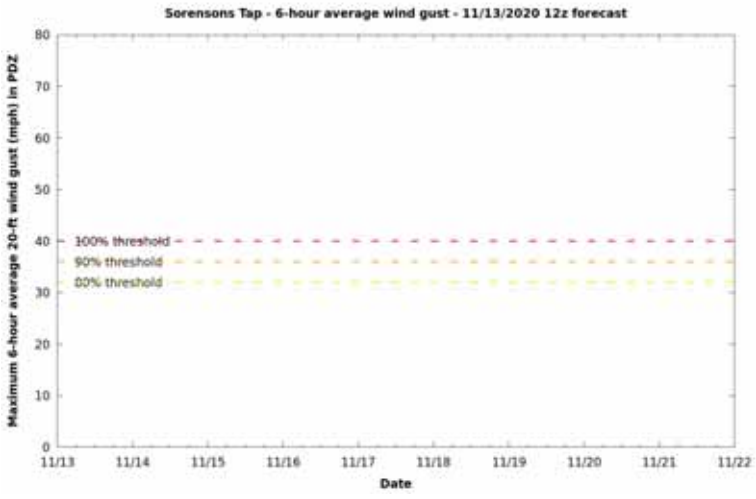
Mul 1296 r4



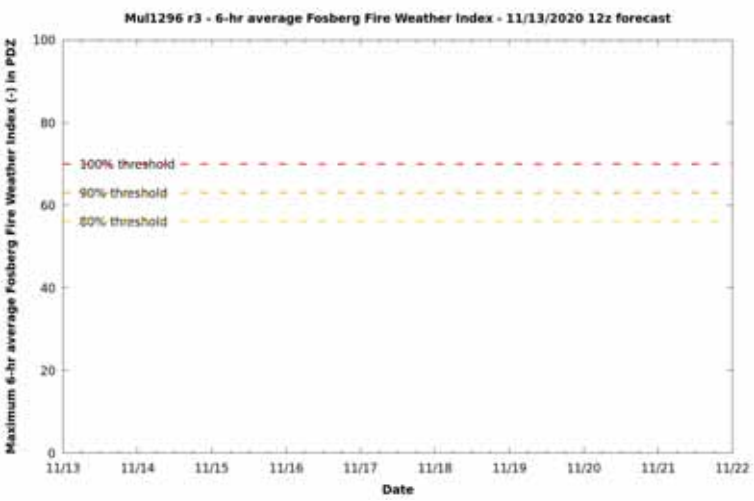


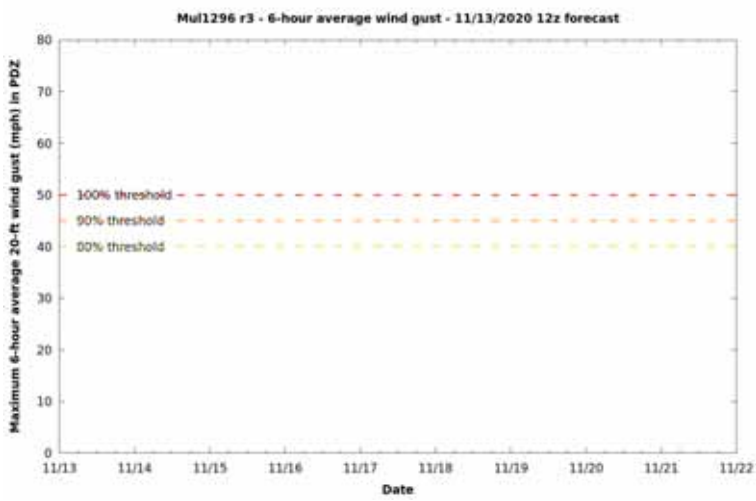
Sorensons Tap



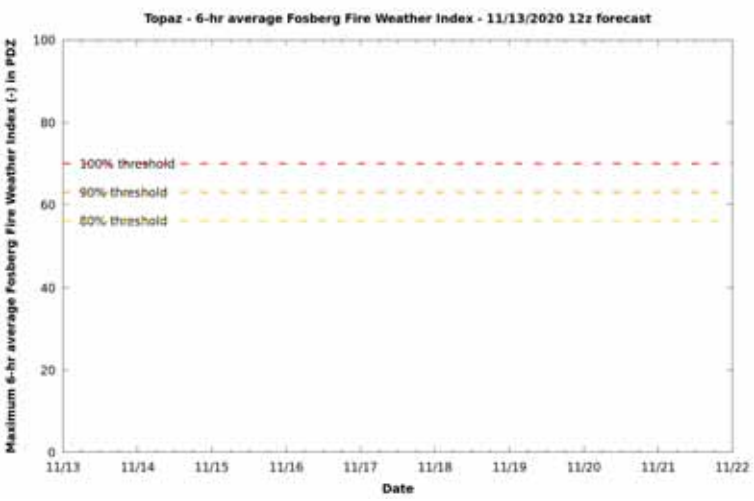


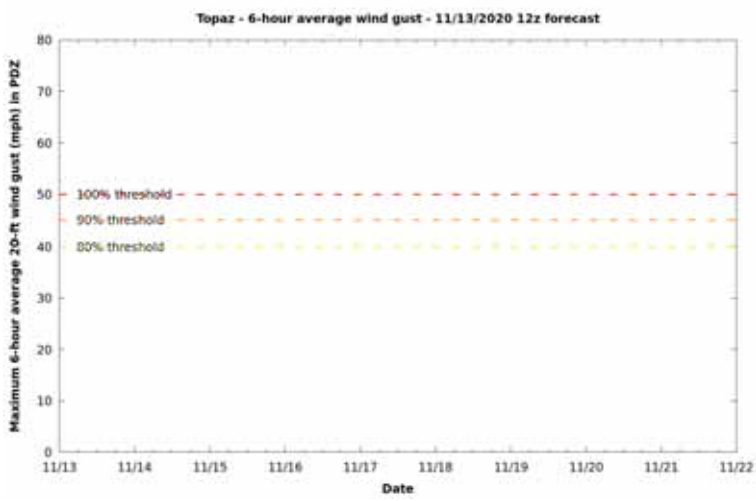
Mul 1296 r3



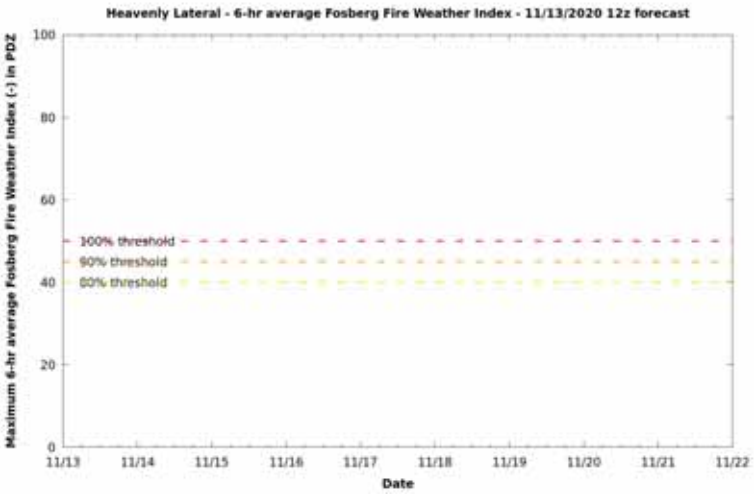


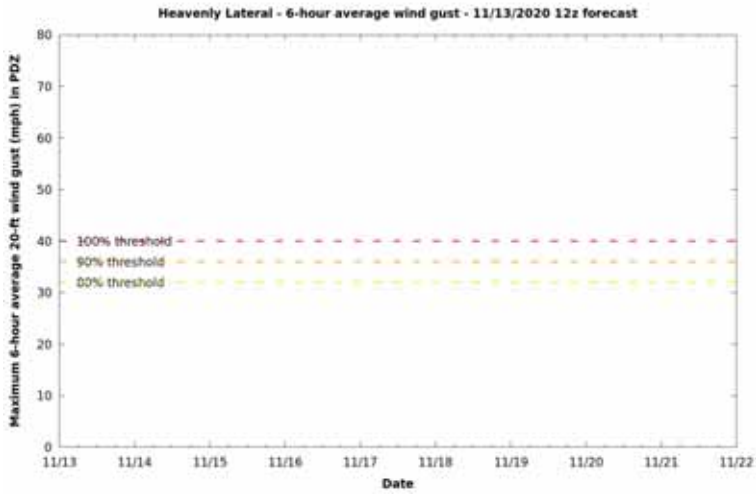
Topaz



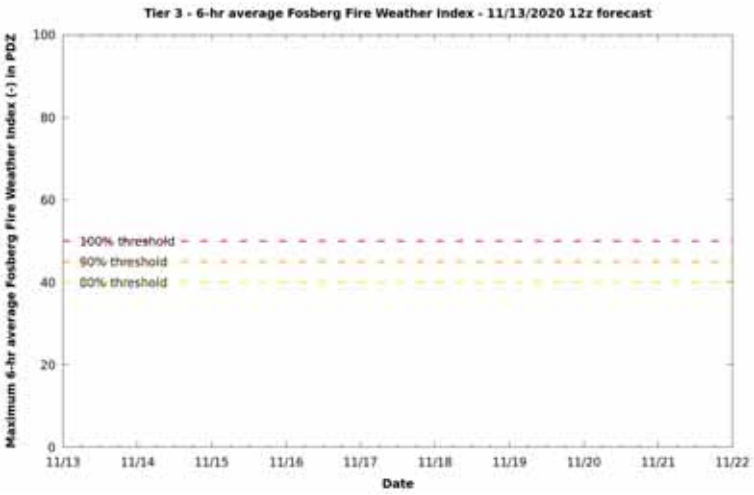


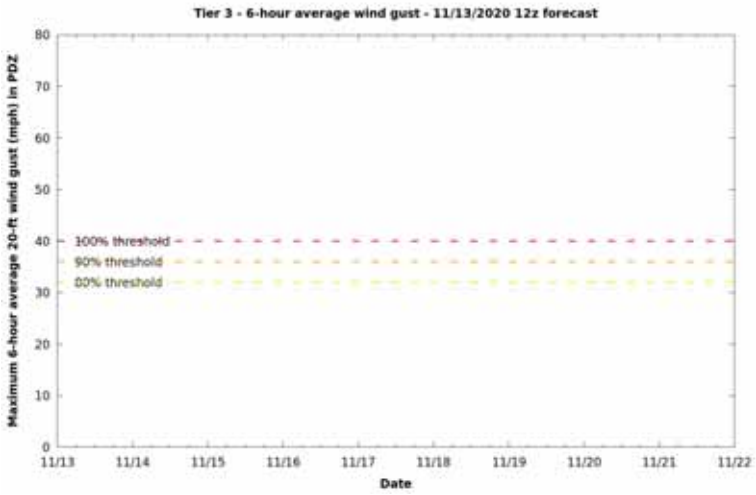
Heavenly Lateral



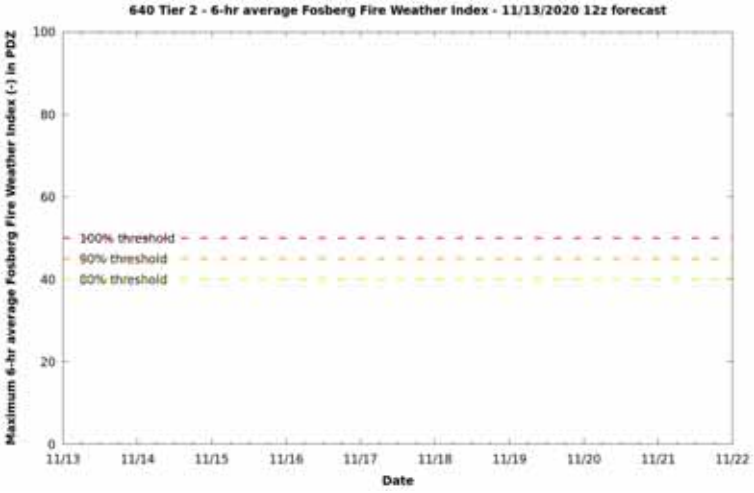


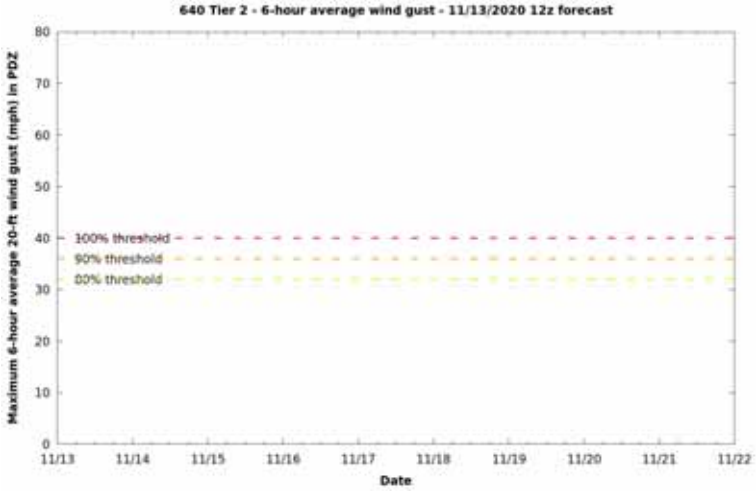
Tier 3



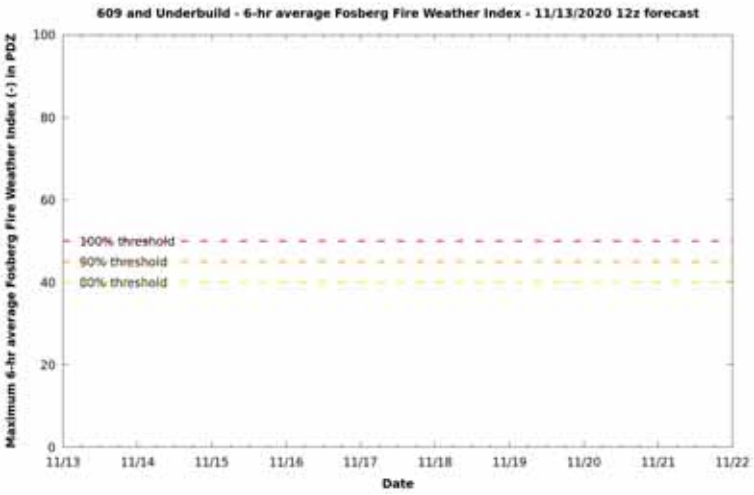


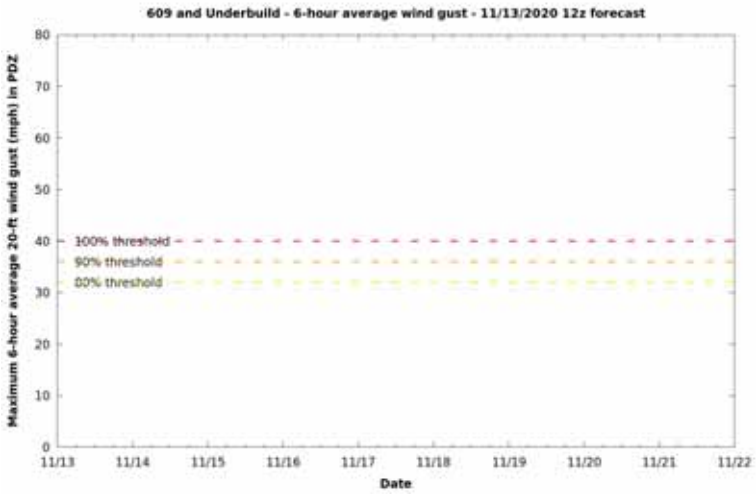
640 Tier 2



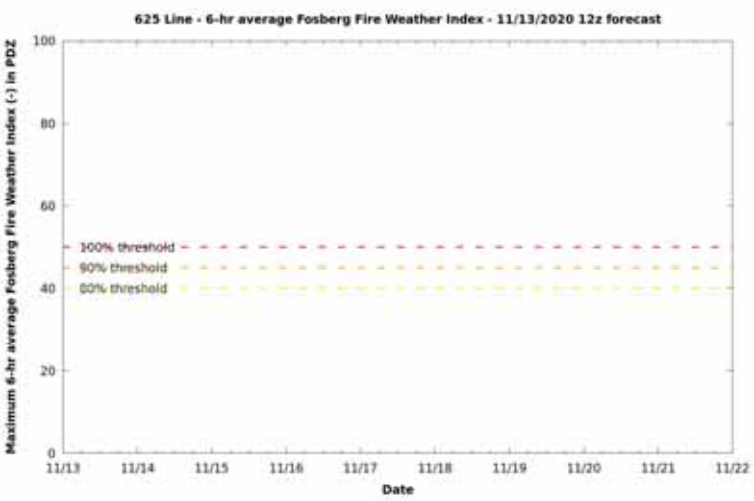


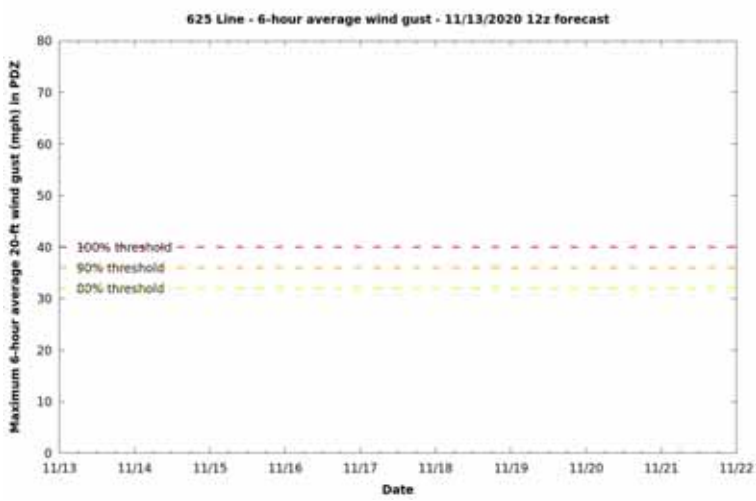
609 and Underbuild



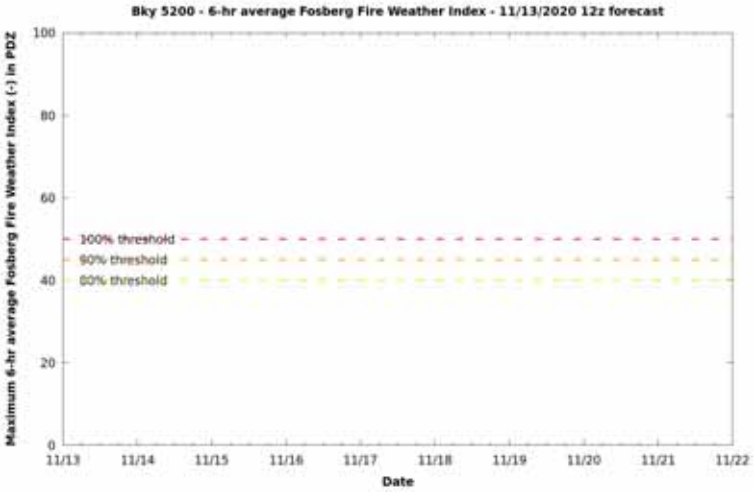


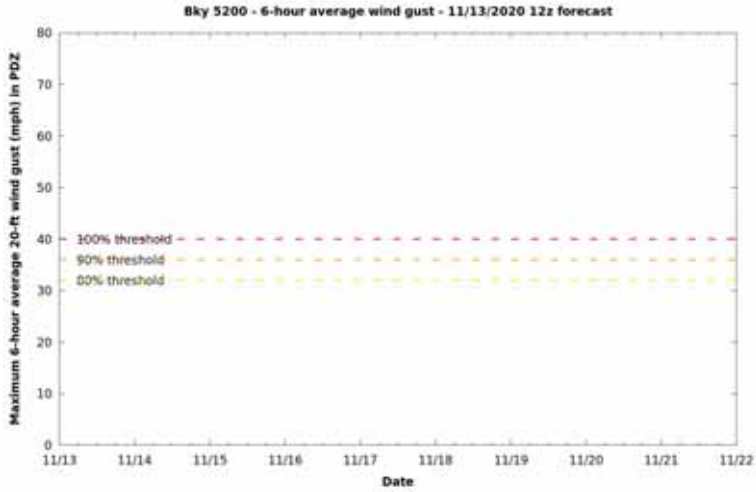
625 Line



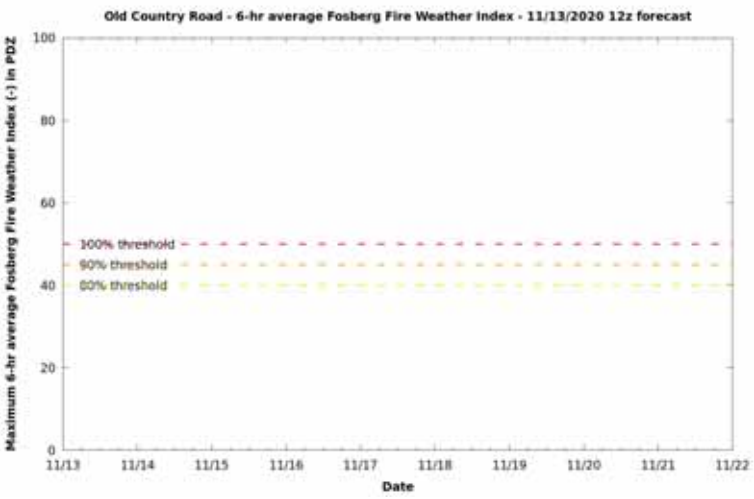


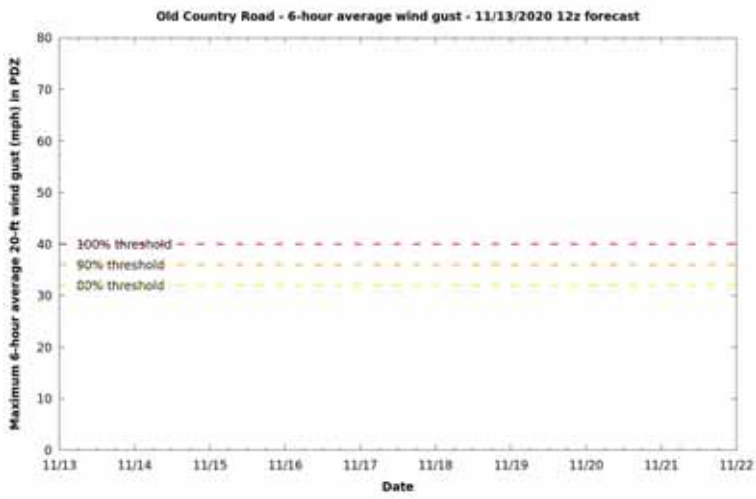
Bky 5200



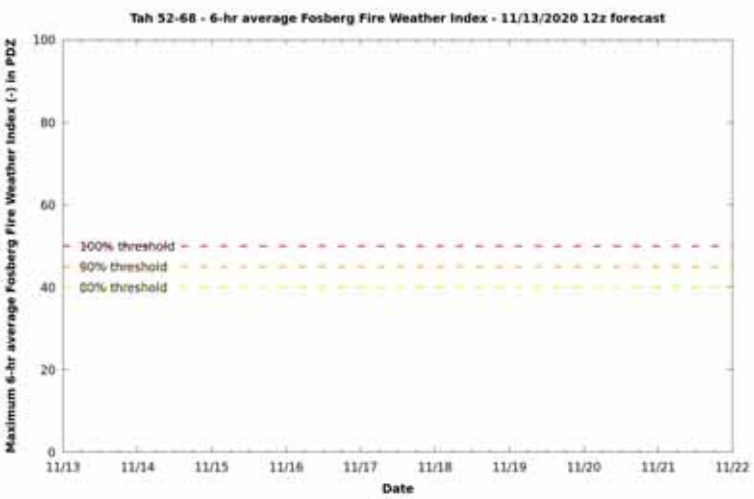


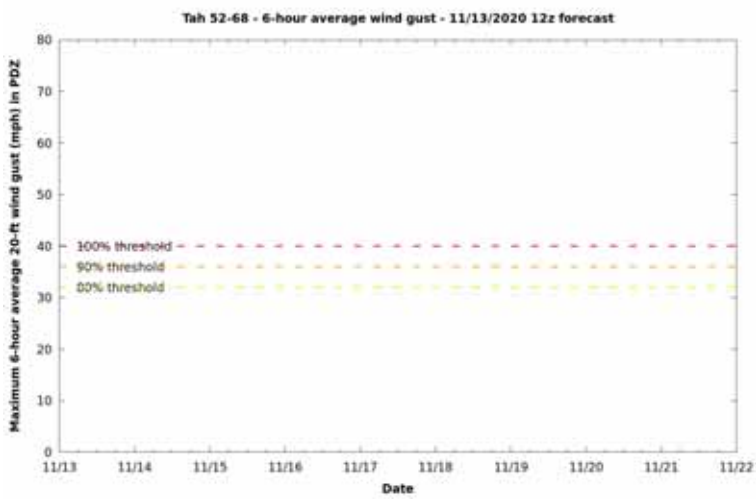
Old Country Road



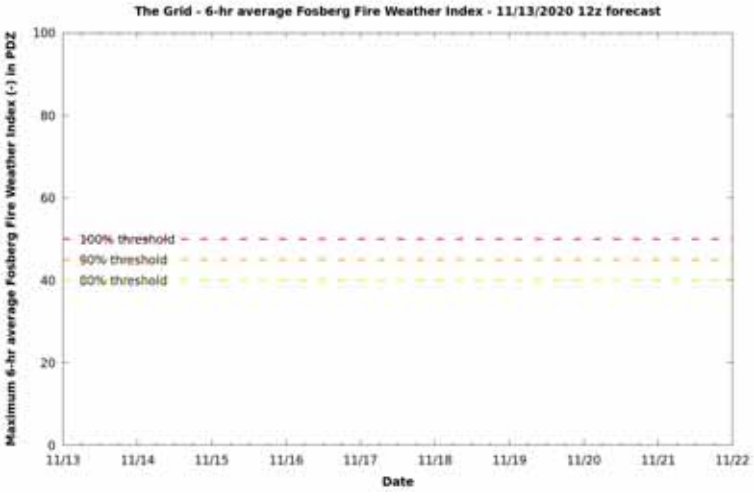


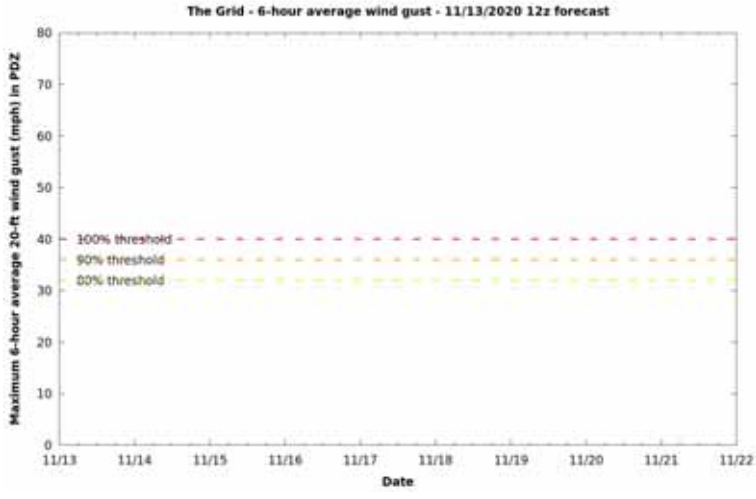
Tah 52-68



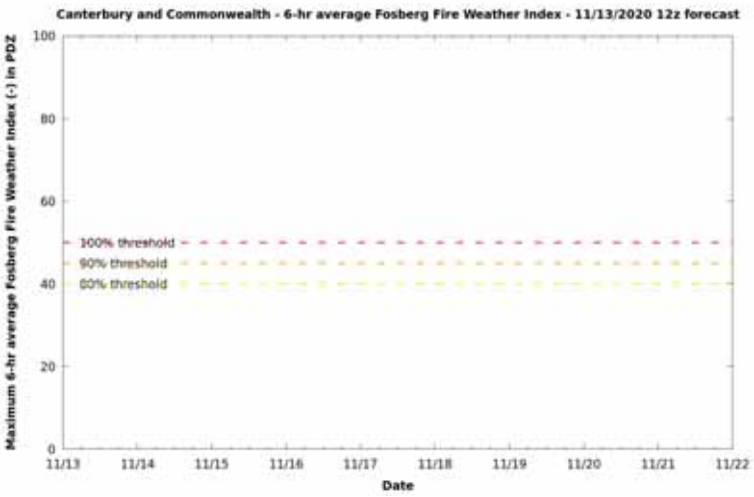


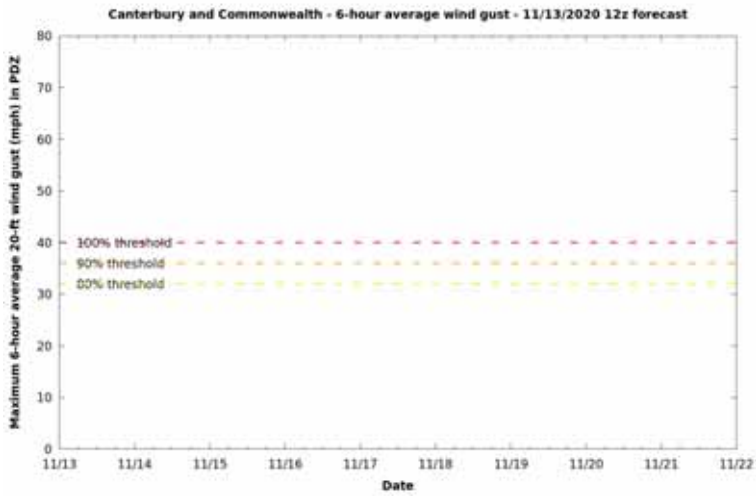
The Grid



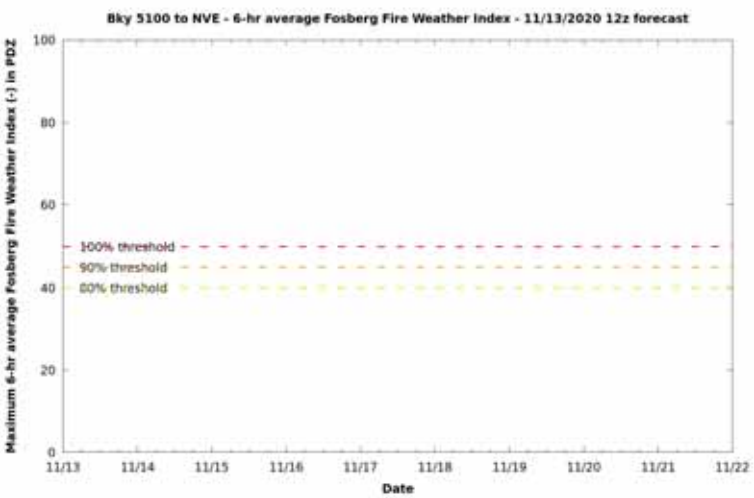


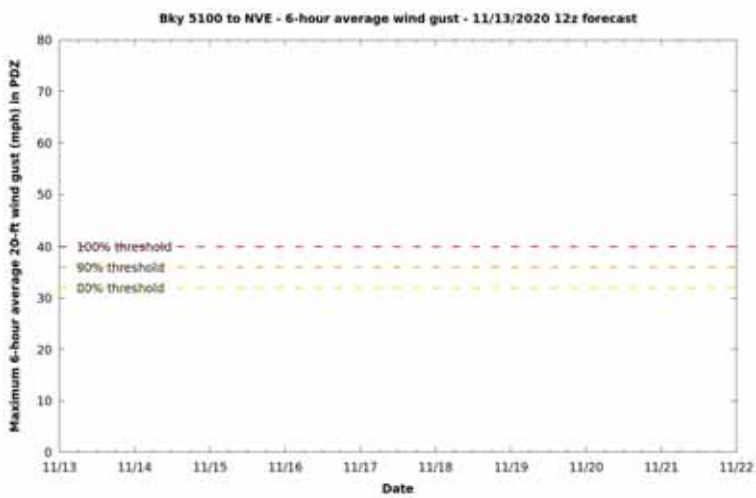
Canterbuy and Commonwealth



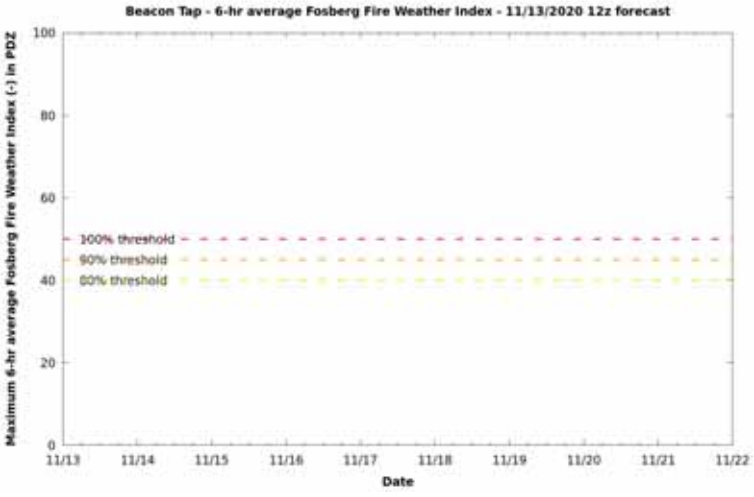


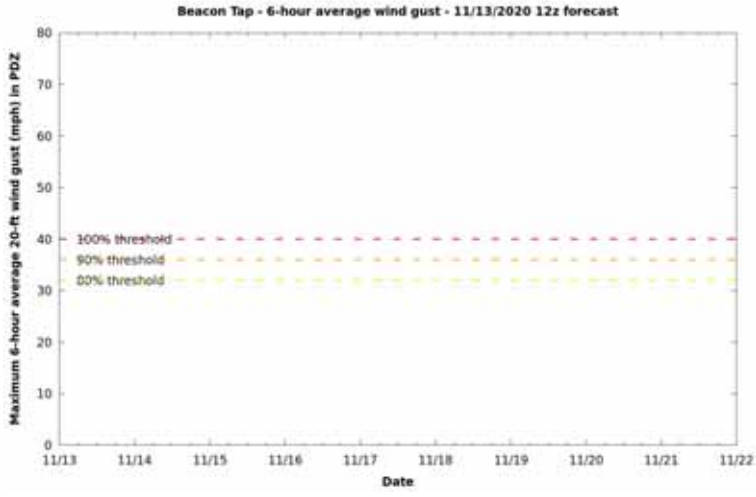
Bky 5100 to NVE



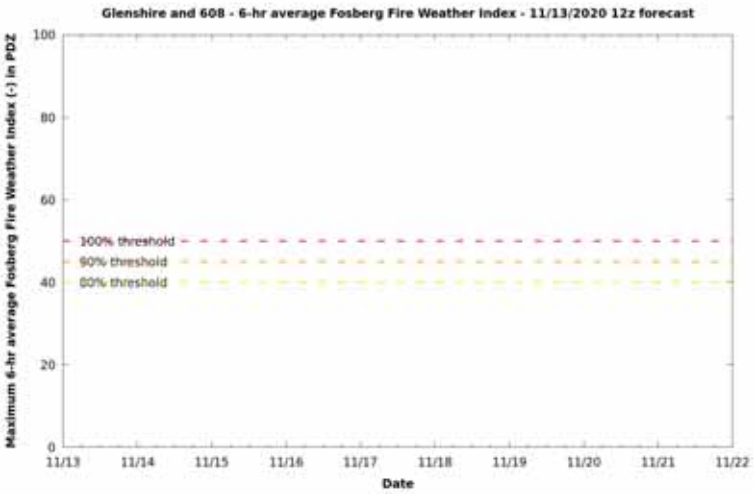


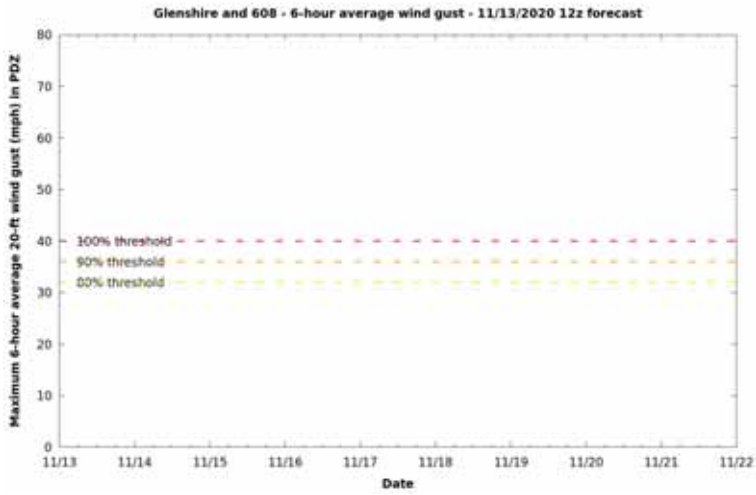
Beacon Tap



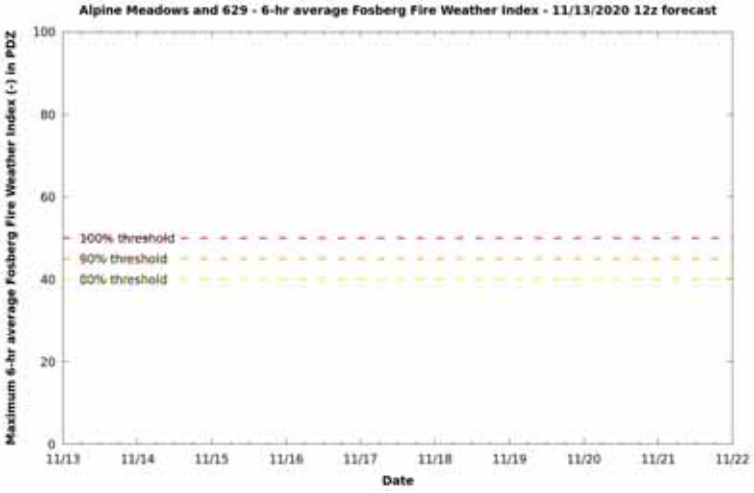


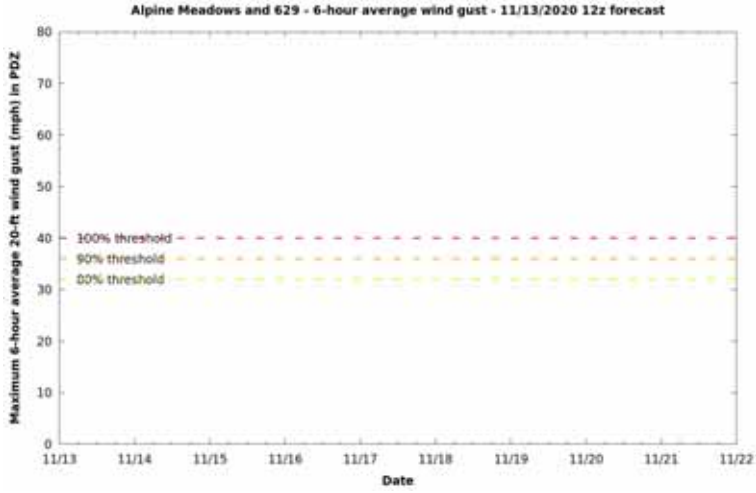
Glenshire and 608



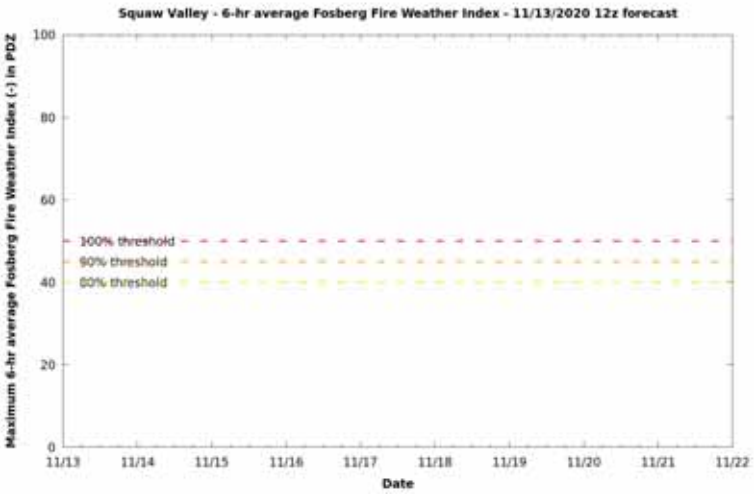


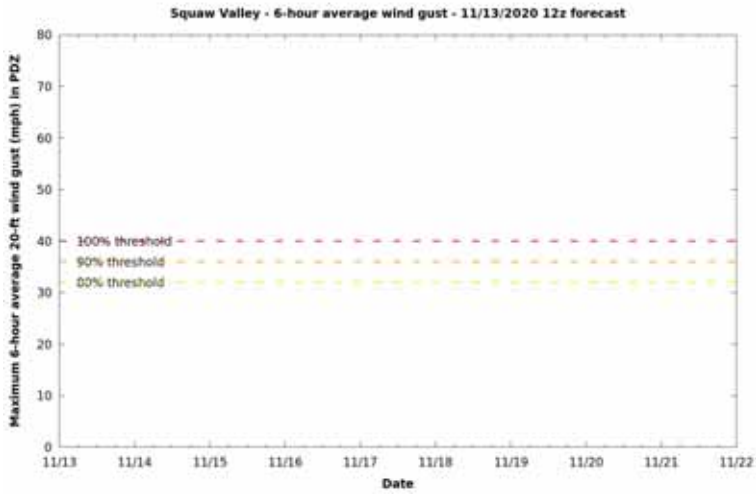
Alpine Meadows and 629



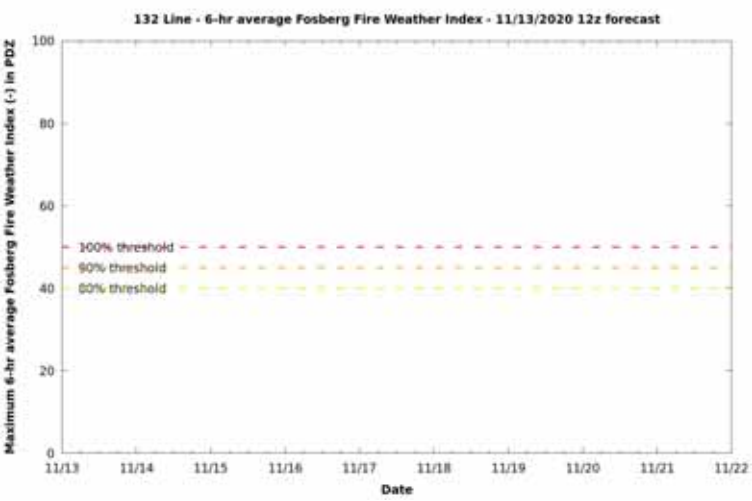


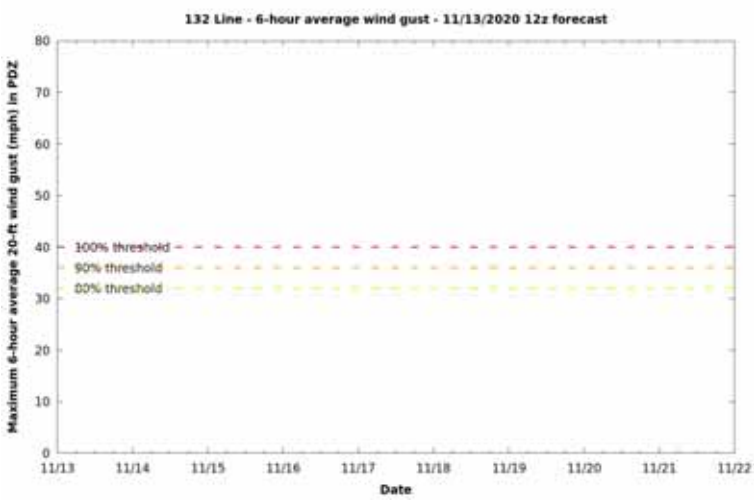
Squaw Valley



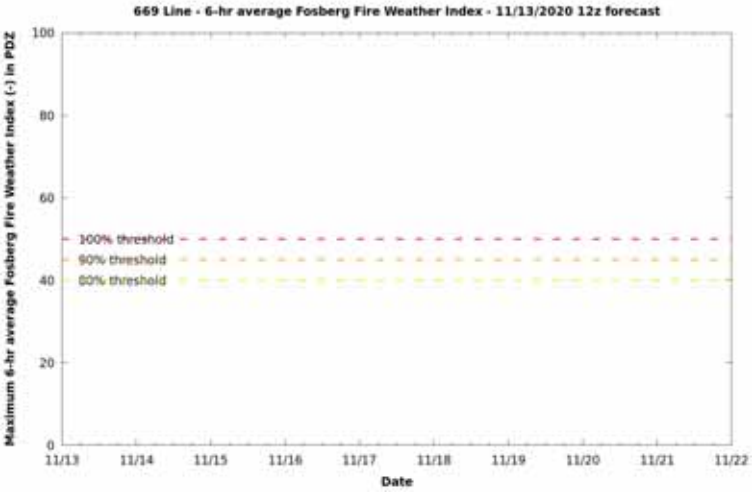


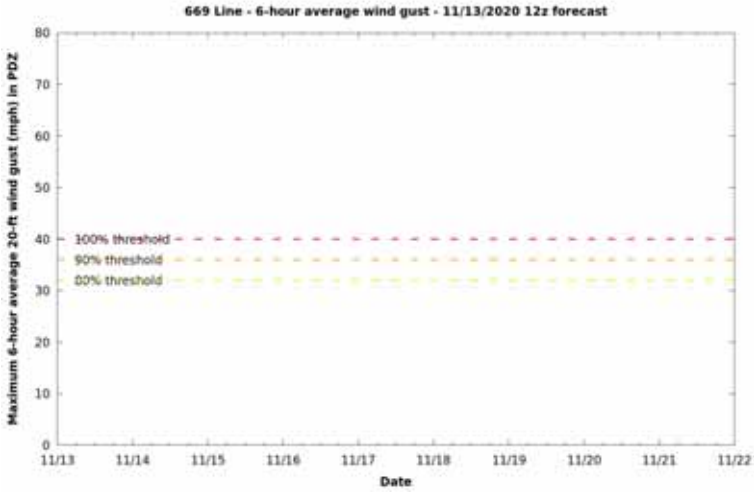
132 Line



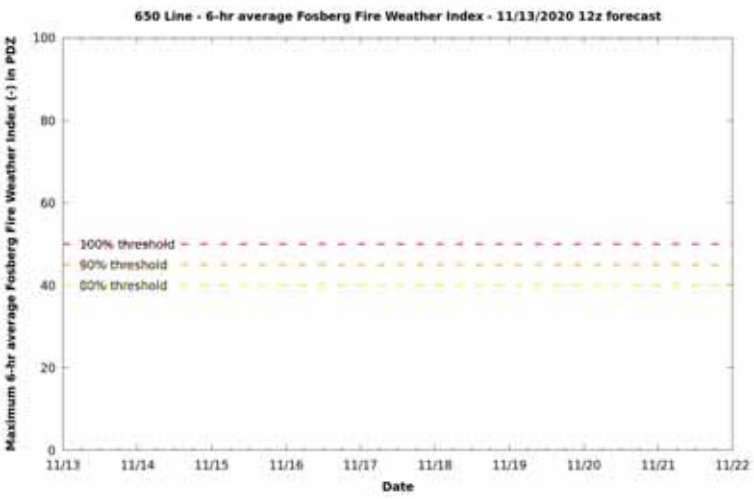


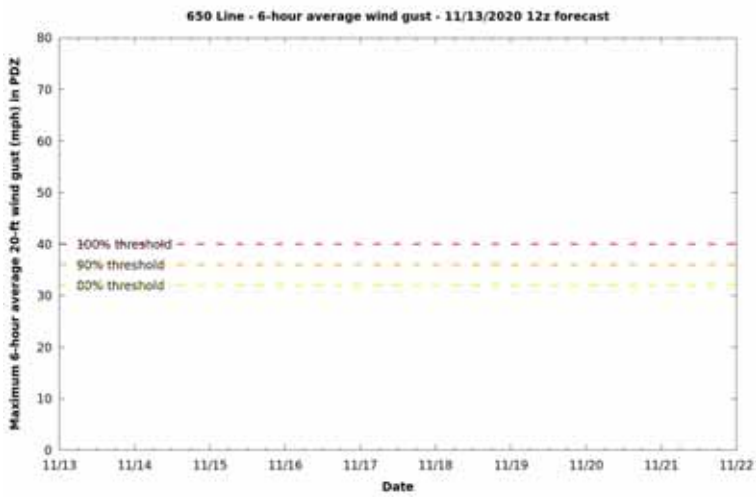
669 Line



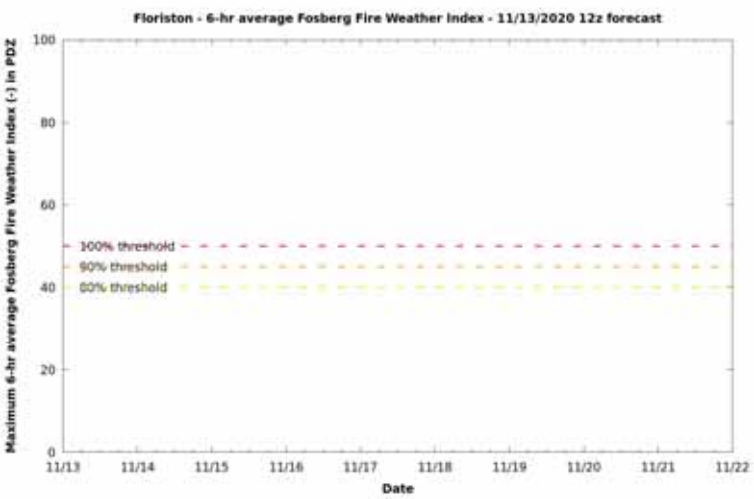


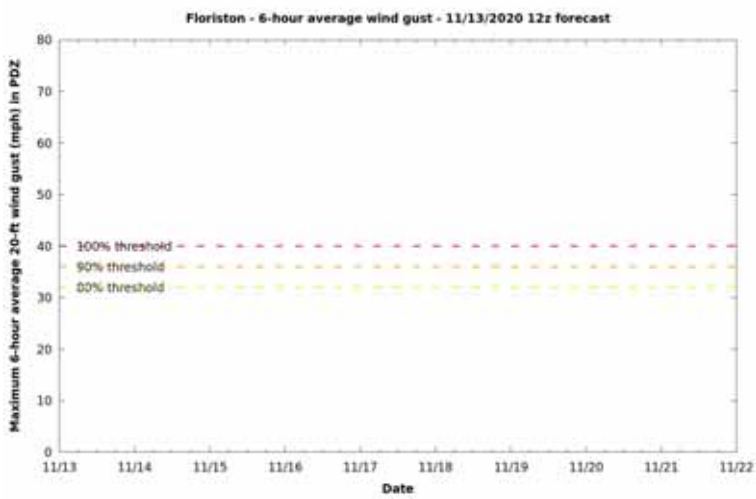
650 Line



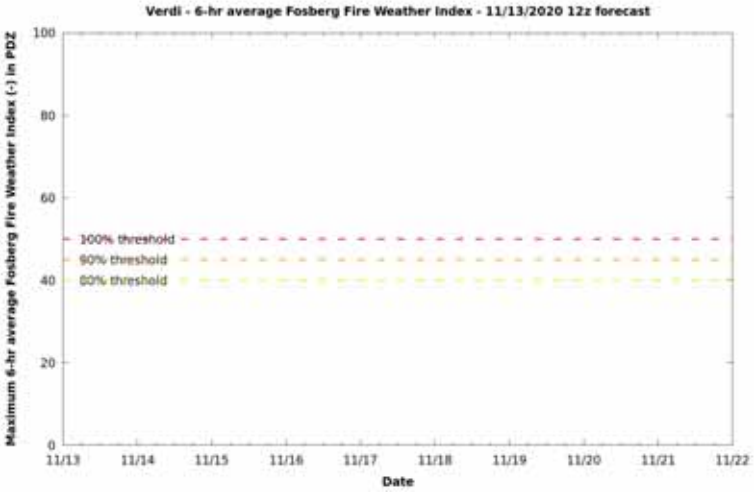


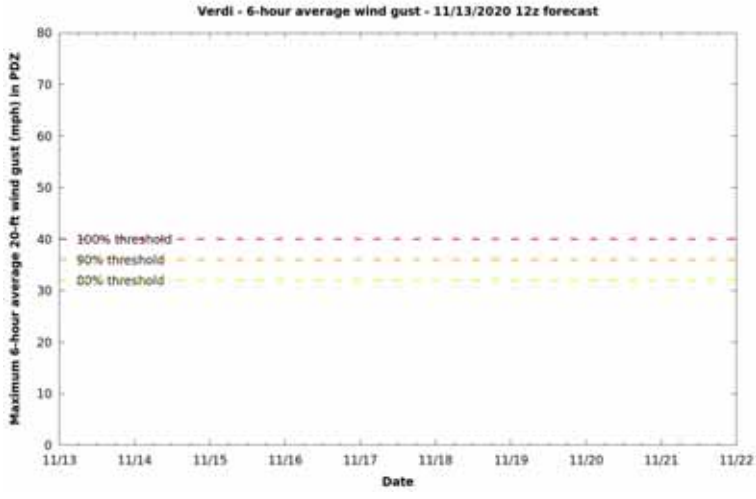
Floriston



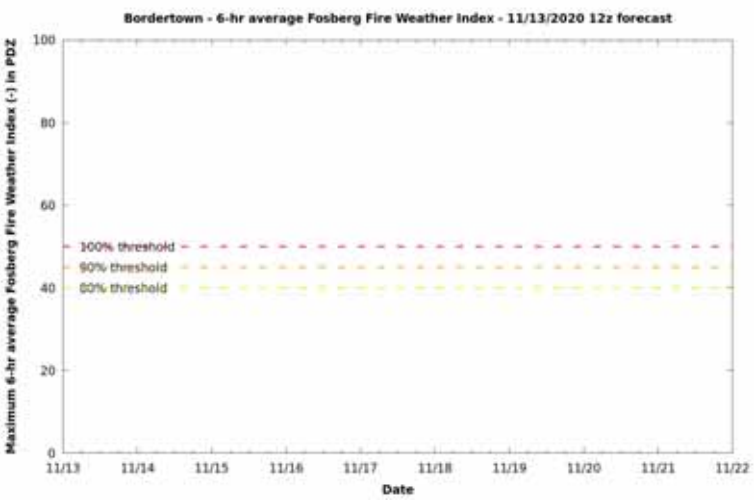


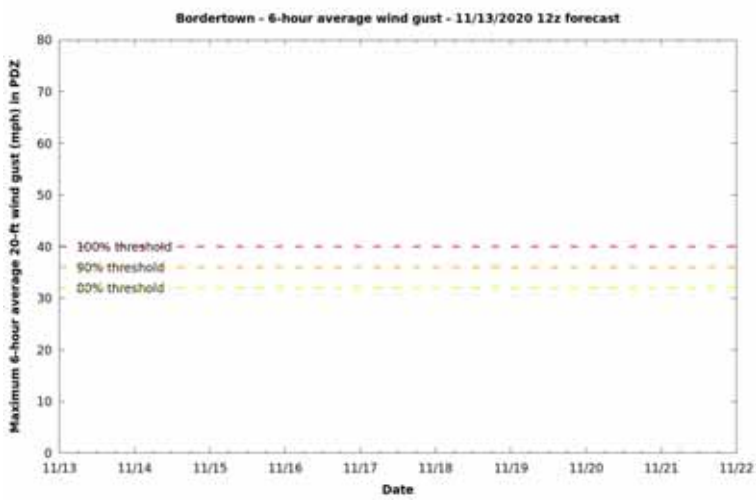
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/13/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100
80
60
40
20
0
100% threshold
90% threshold
80% threshold
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
Date


Bordertown - 6-hour average wind gust - 11/13/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
80
70
60
50
40
30
20
10
0
100% threshold
90% threshold
80% threshold
11/13
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
Date

Liberty Utilities Fire Potential Index Forecast for 11/14/20 - 11/20/20

Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

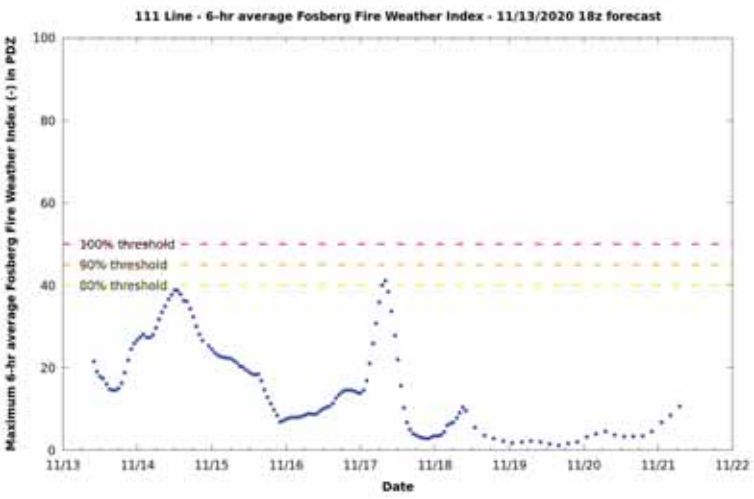
Liberty Utilities Energy Release Component Forecast for 11/14/20 - 11/20/20

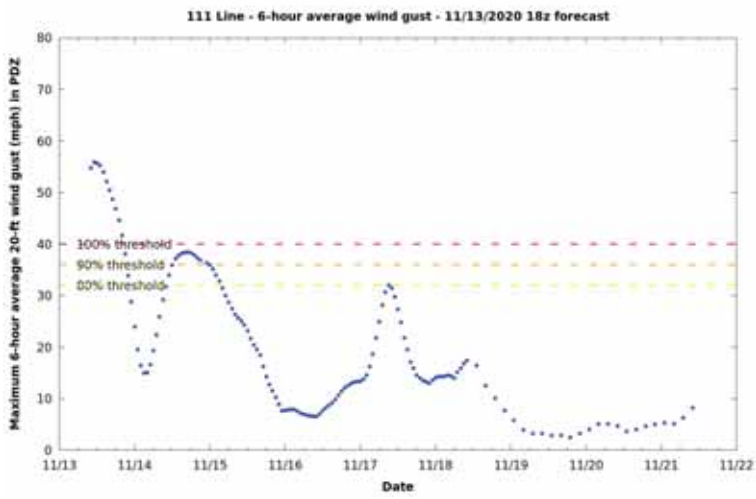
Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	57.0	57.0	55.0	51.0	56.0	58.0	55.0
Sierra Brooks	58.0	61.0	58.0	55.0	61.0	62.0	62.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	51.0	43.0	48.0	42.0	35.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	56.0	56.0	53.0	50.0	56.0	57.0	57.0

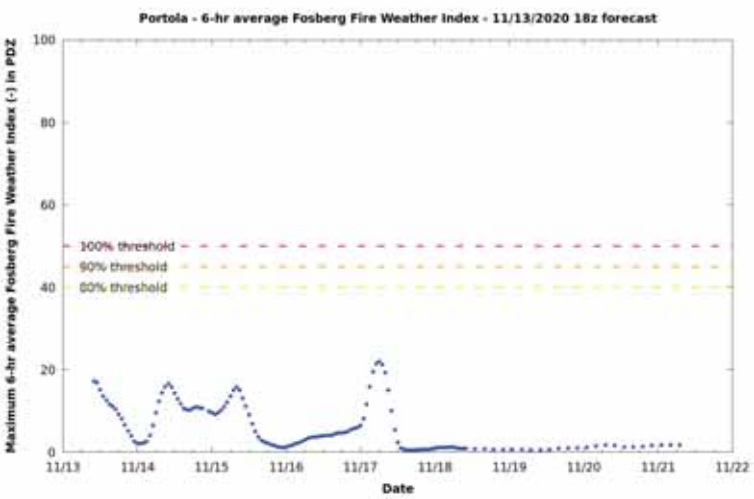
Liberty Utilities Fire Weather Summary Plots - 11/13/2020 18z forecast

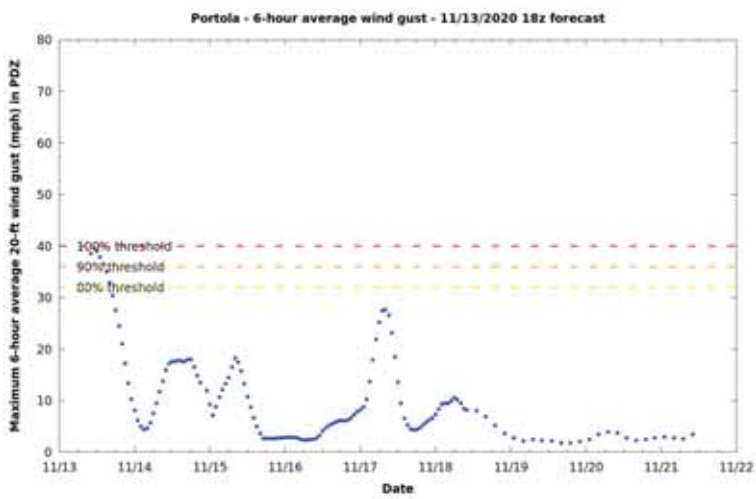
111 Line



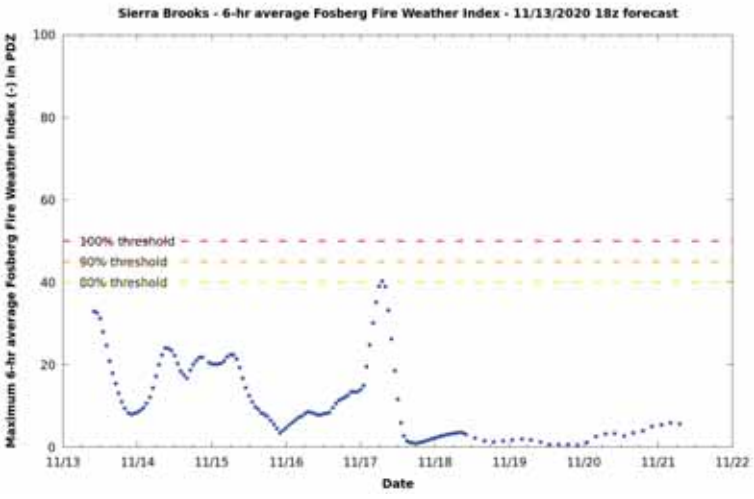


Portola



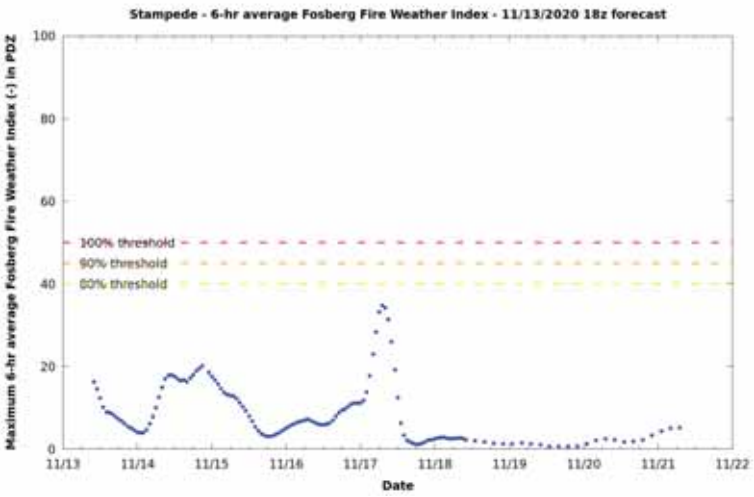


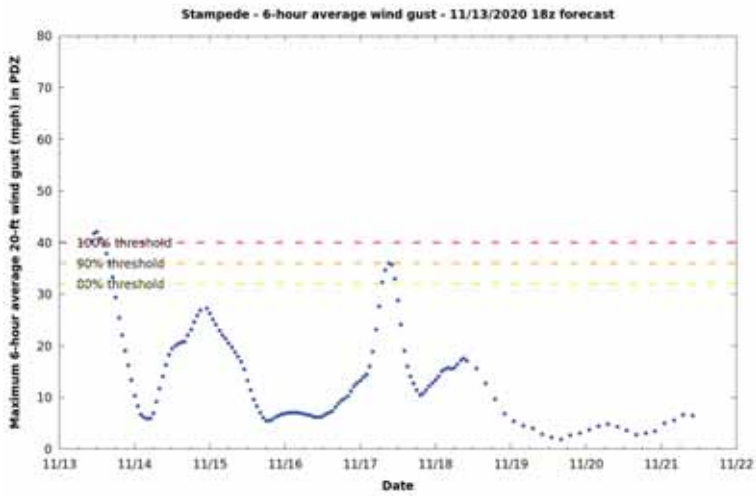
Sierra Brooks



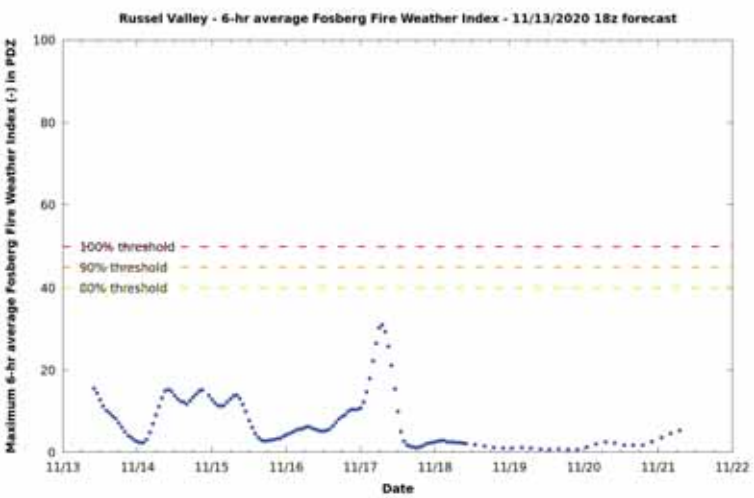


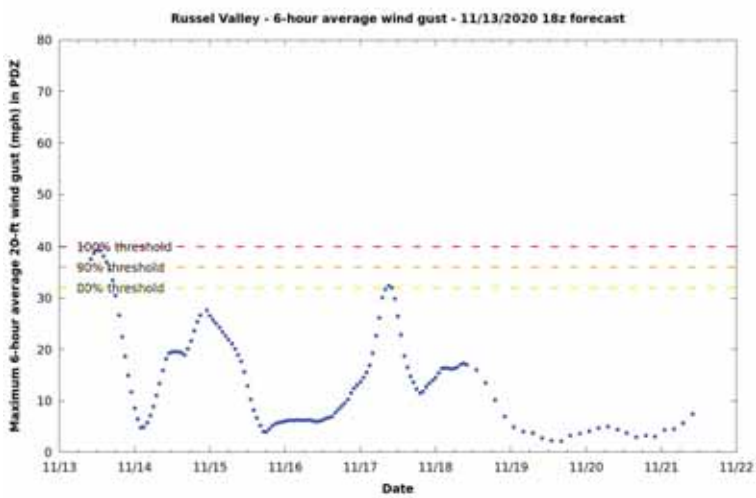
Stampede



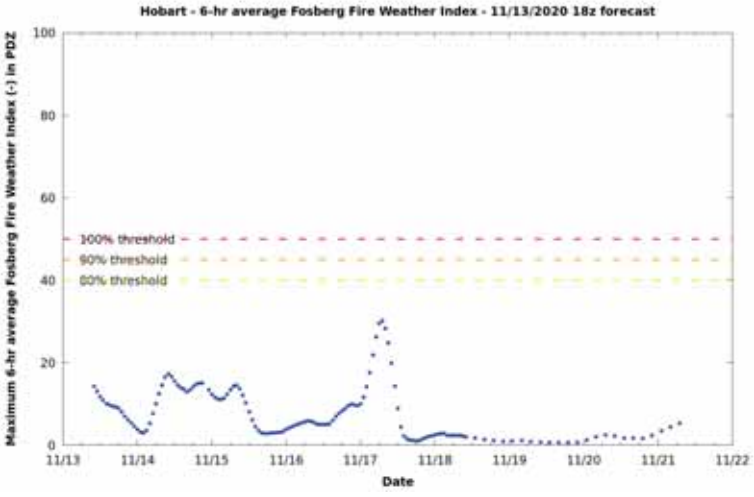


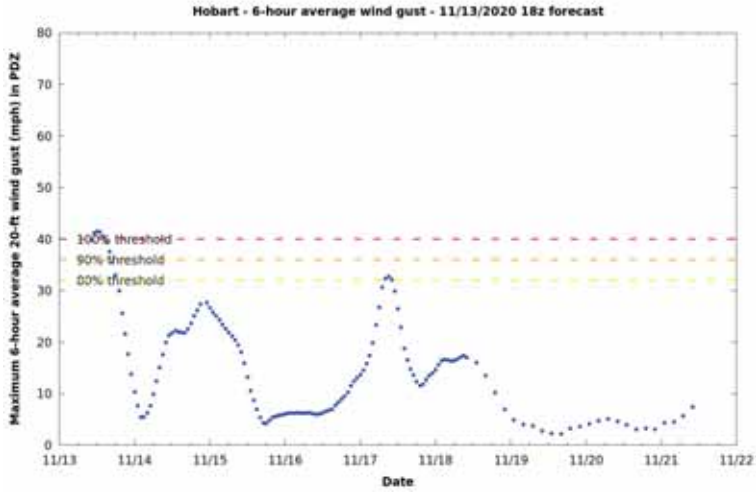
Russell Valley



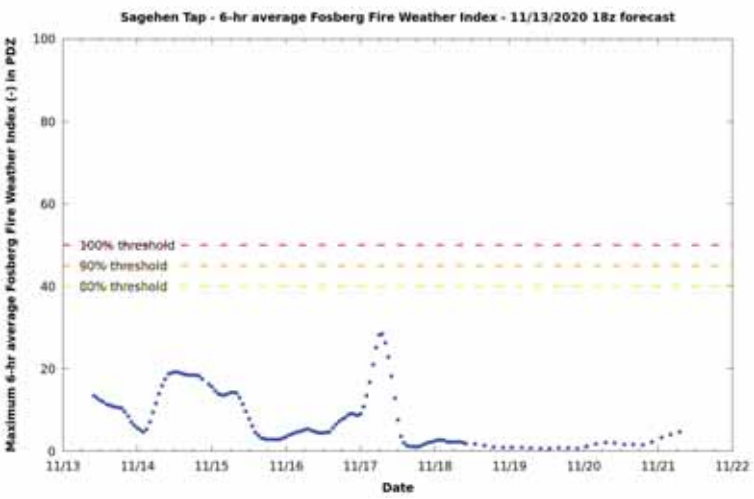


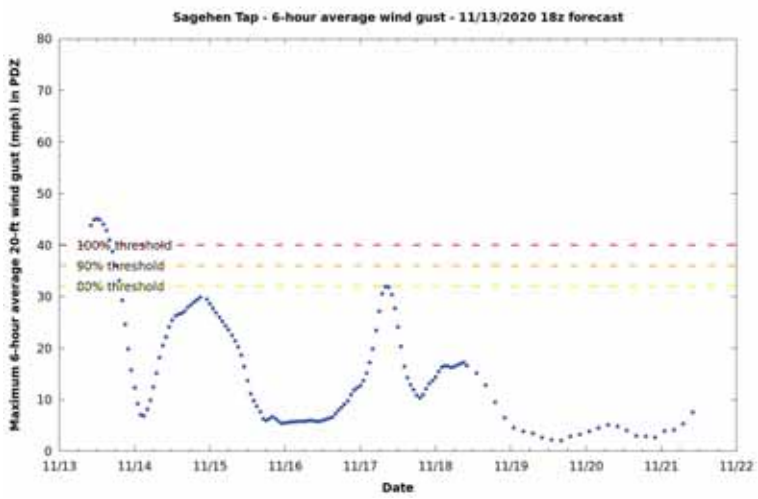
Hobart



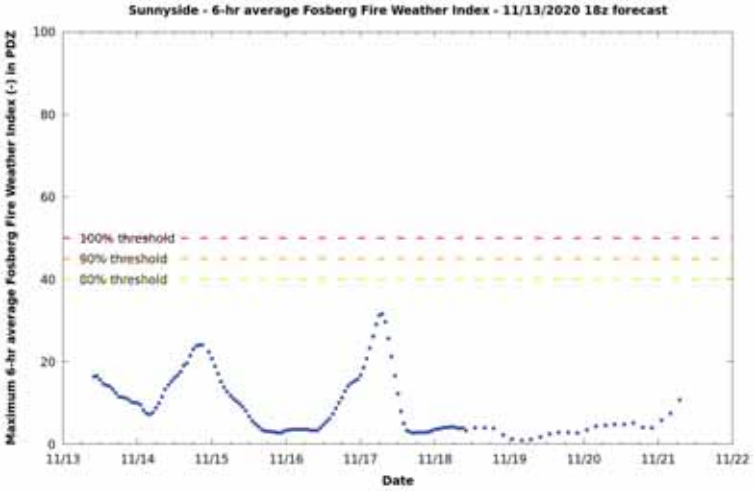


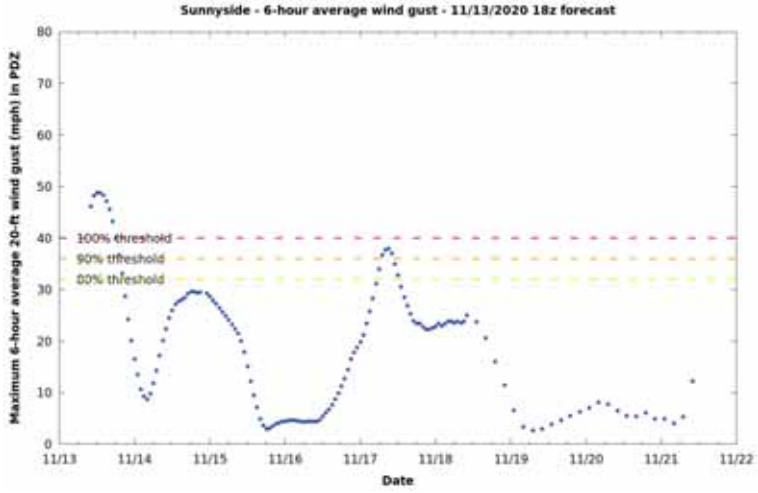
Sagehen tap



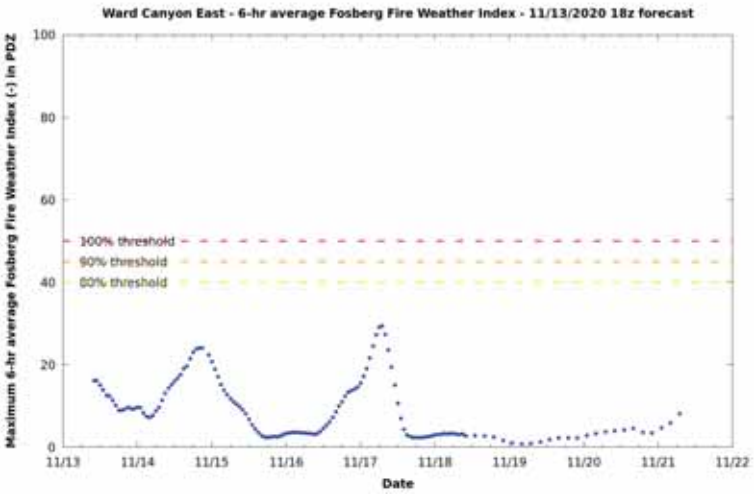


Sunnyside



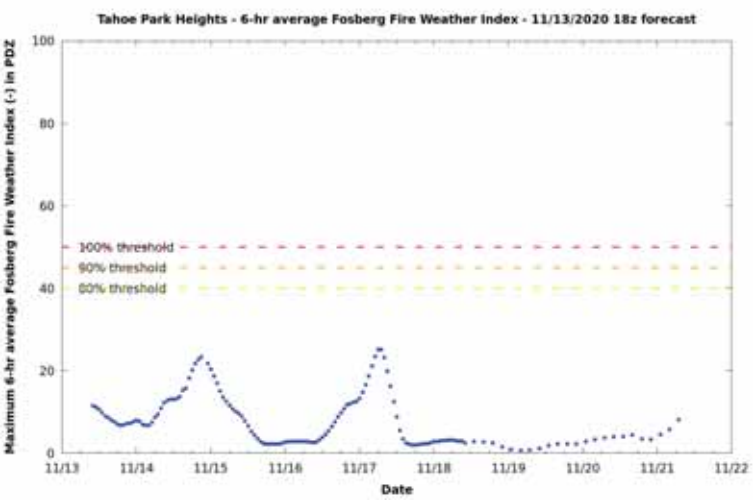


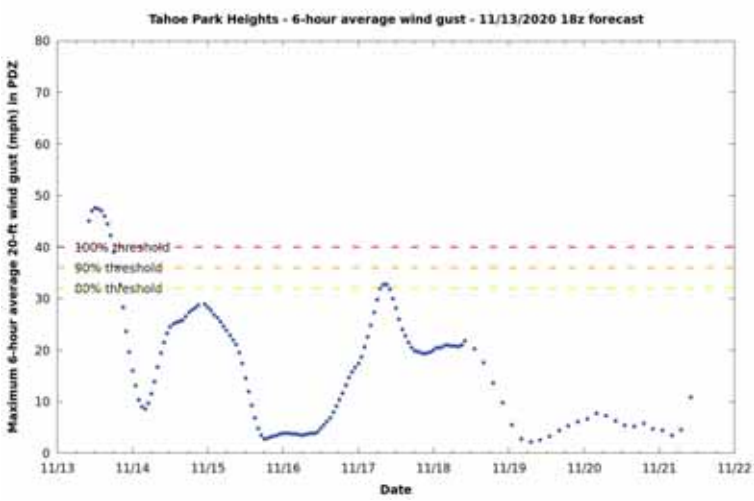
Ward Canyon East



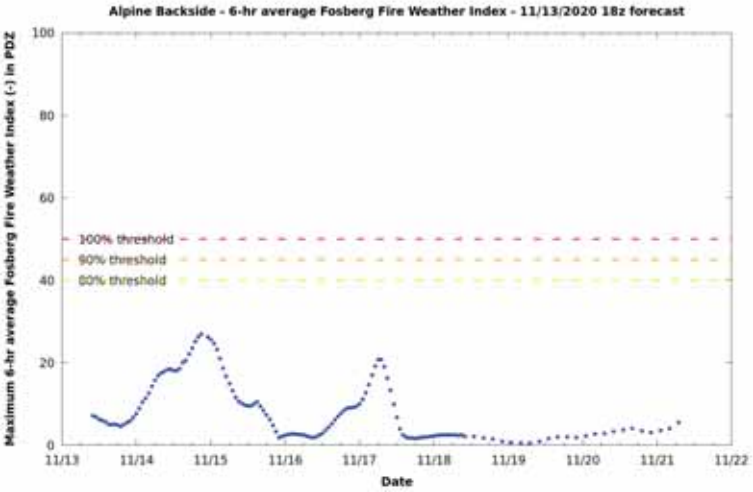


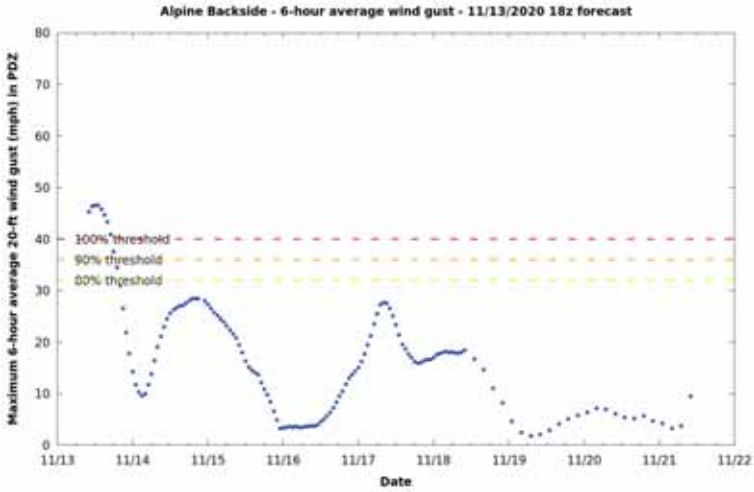
Tahoe Park Heights



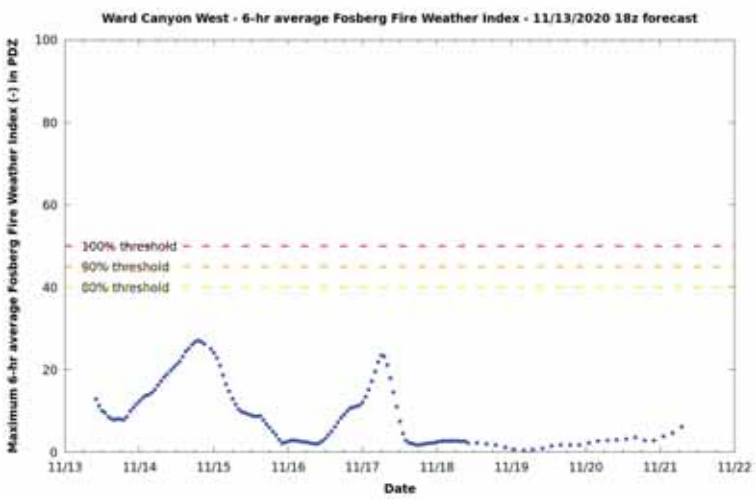


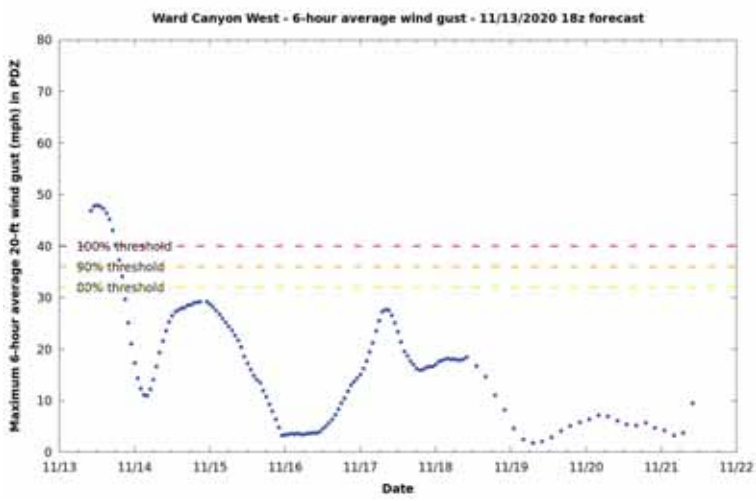
Alpine Backside



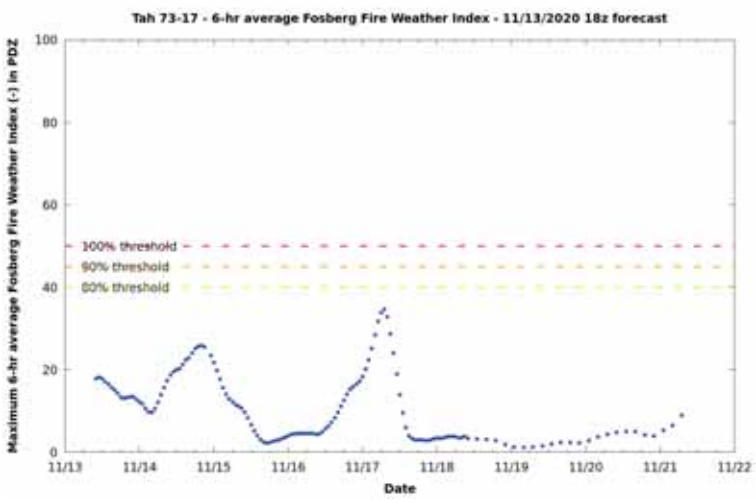


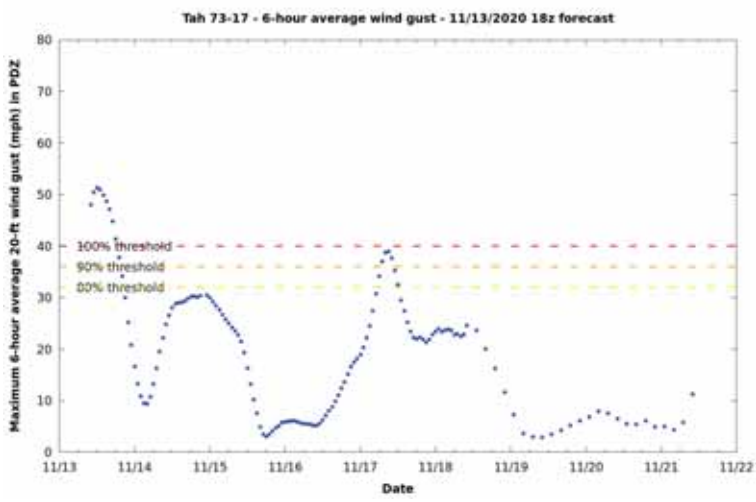
Ward Canyon West



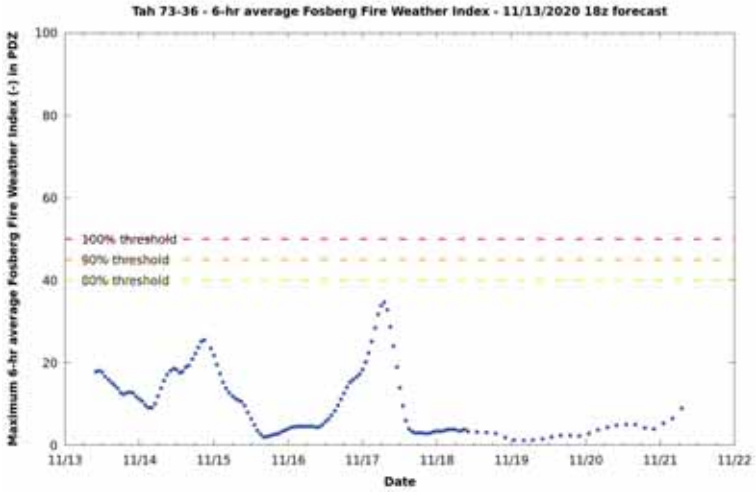


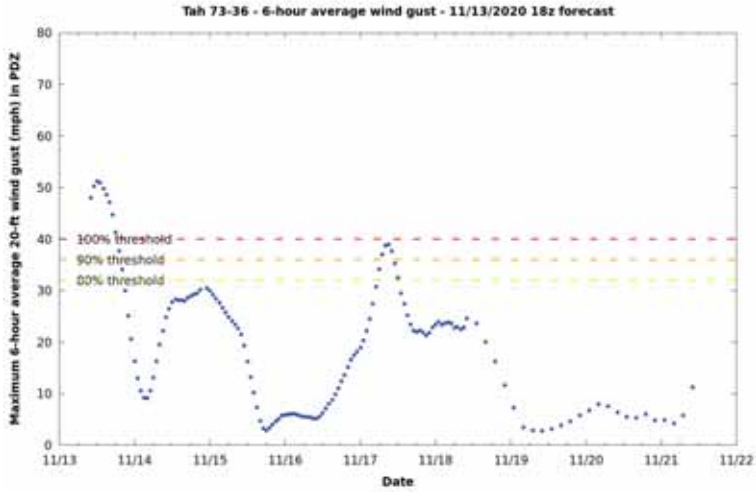
Tah 73-17



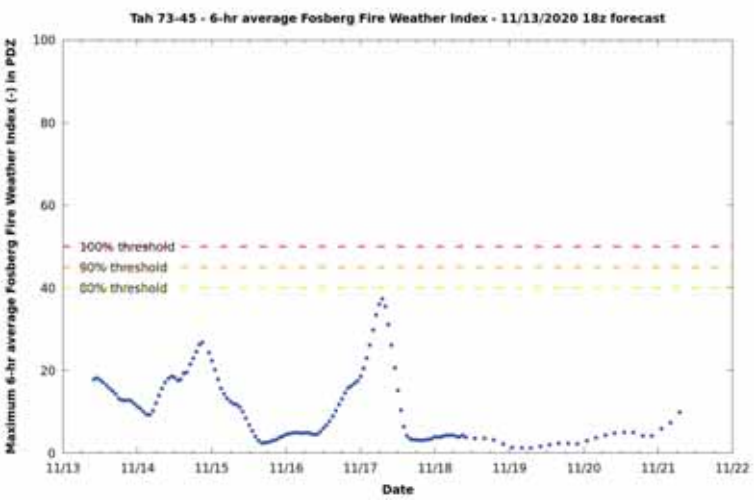


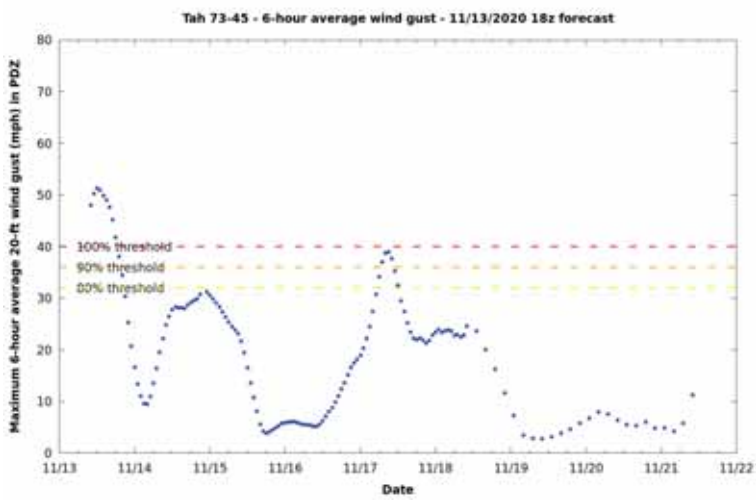
Tah 73-36



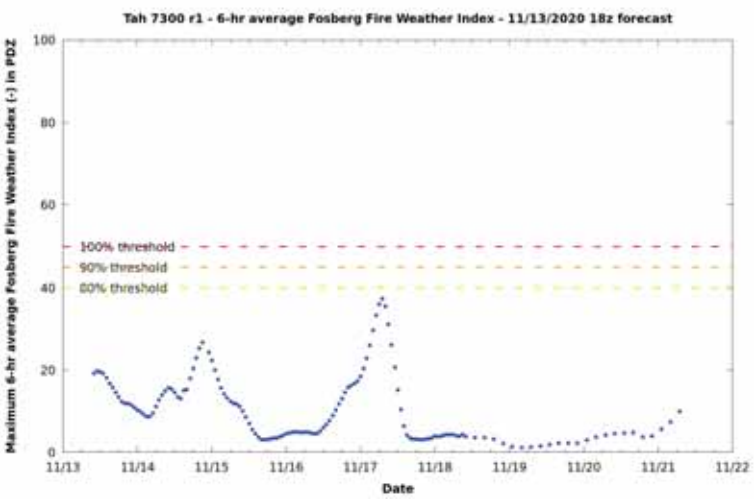


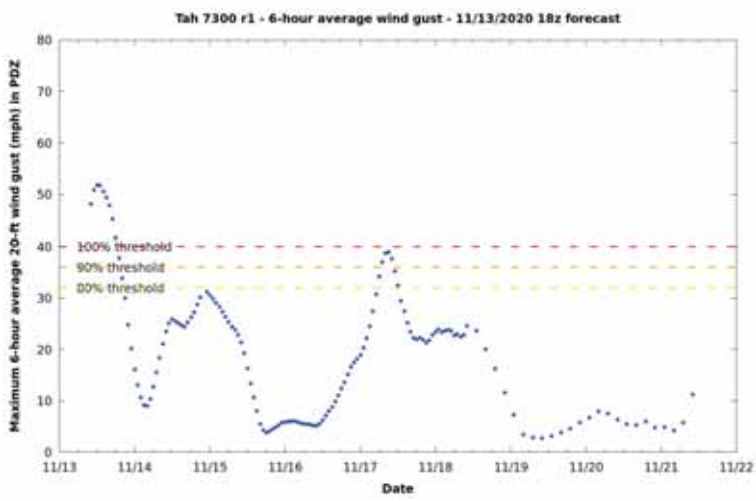
Tah 73-45



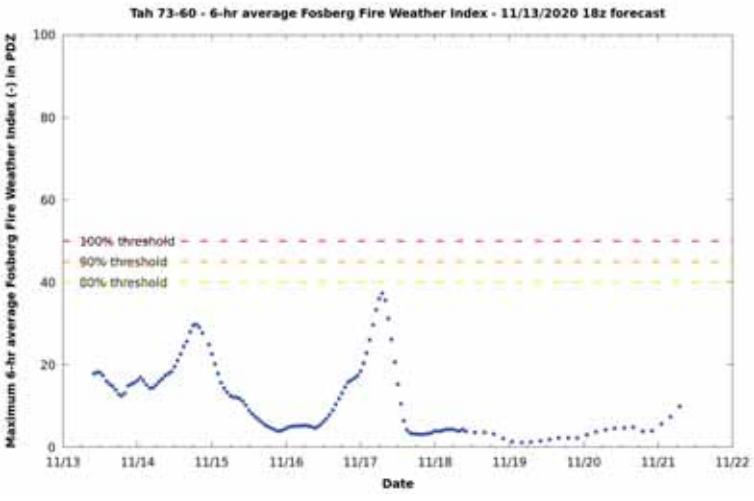


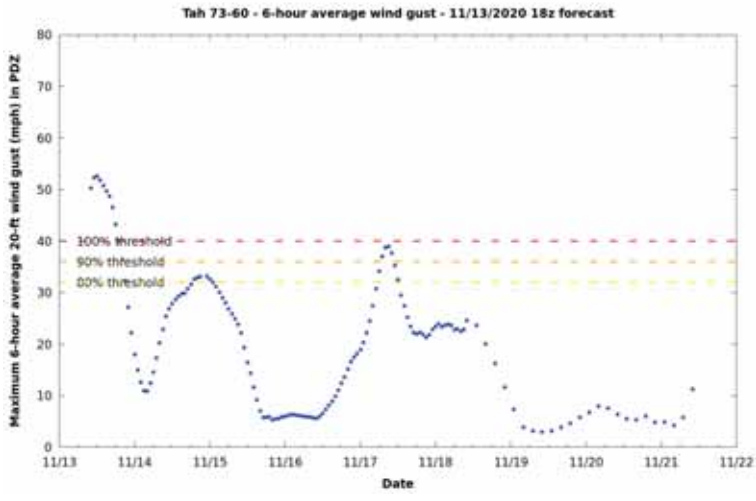
Tah 7300 r1



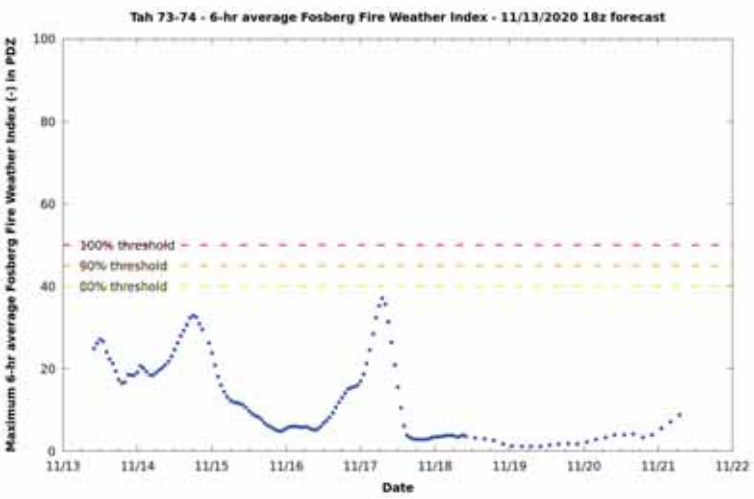


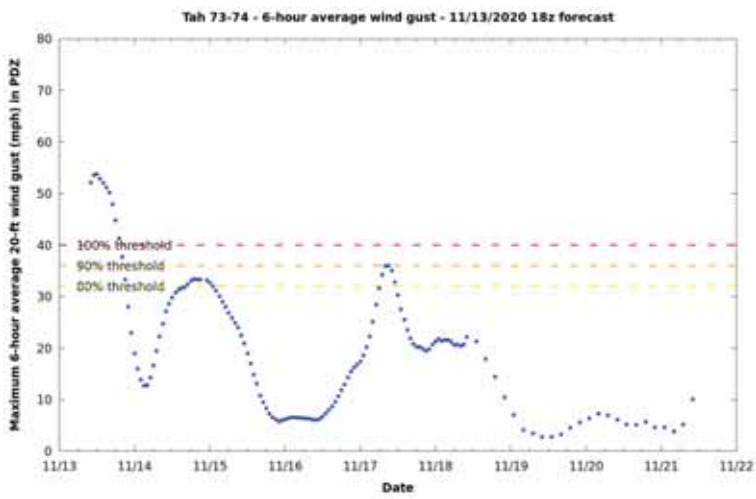
Tah 73-60



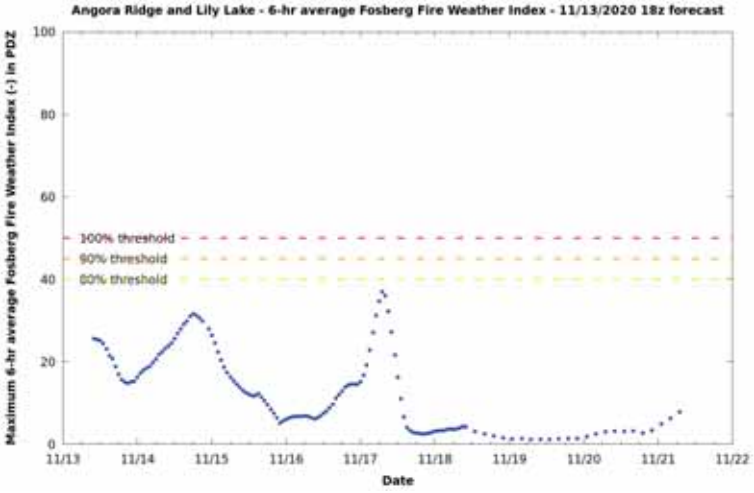


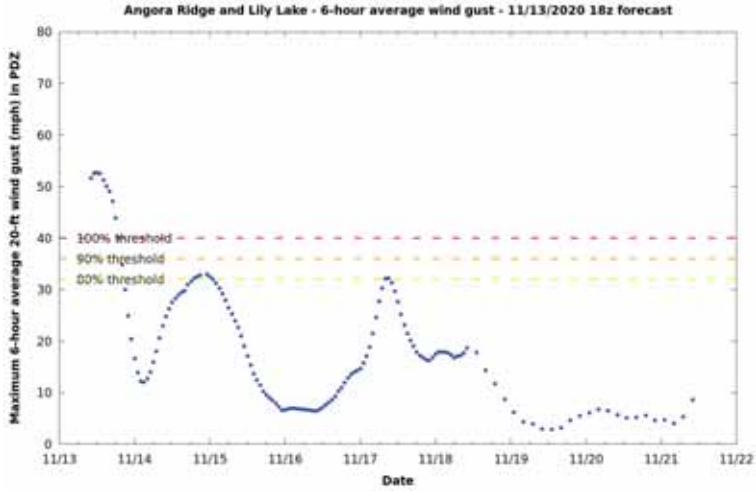
Tah 73-74



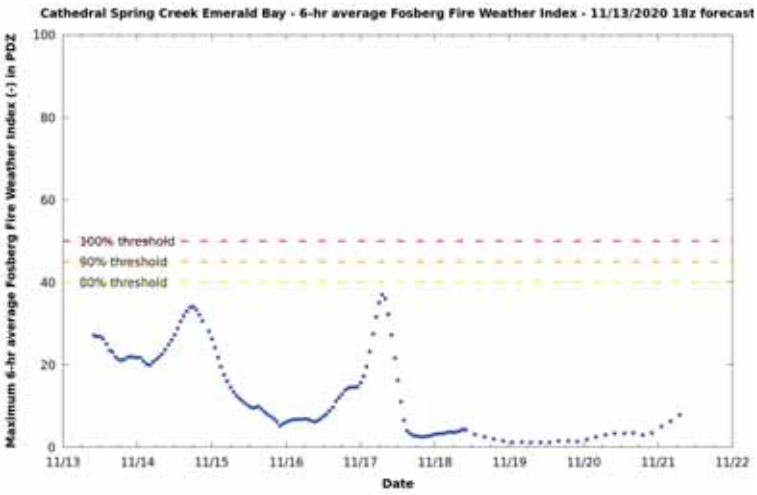


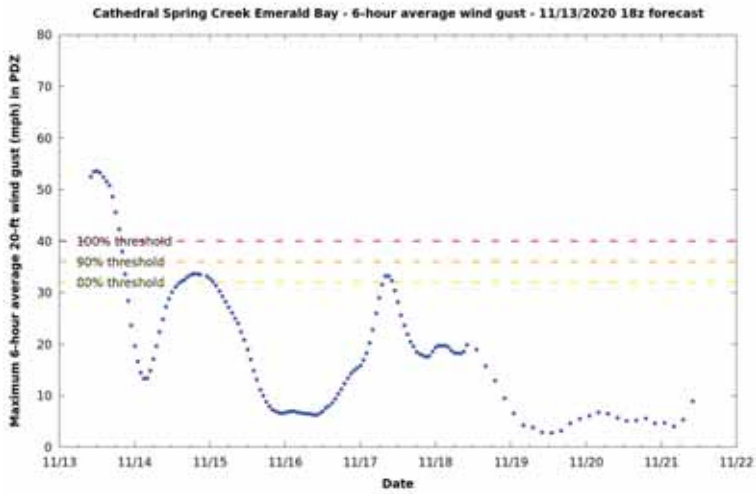
Angora Ridge and Lily Lake



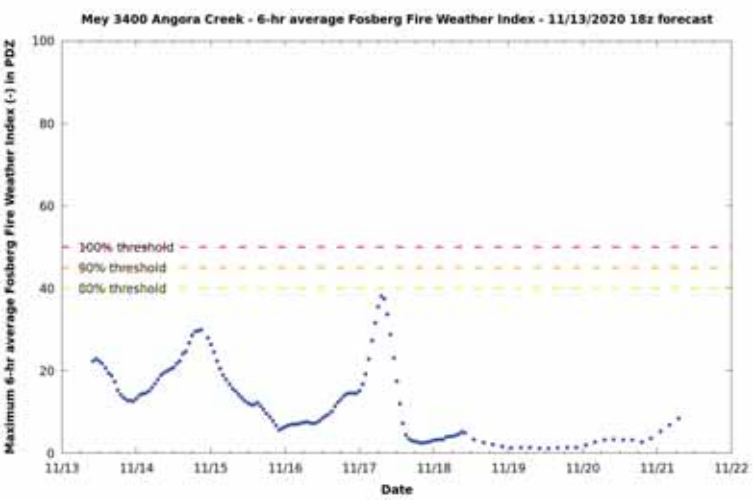


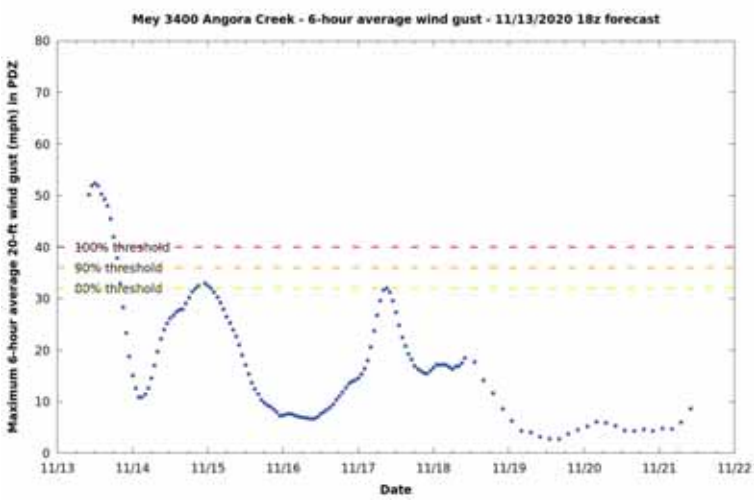
Cathedral Spring Creek Emerald Bay



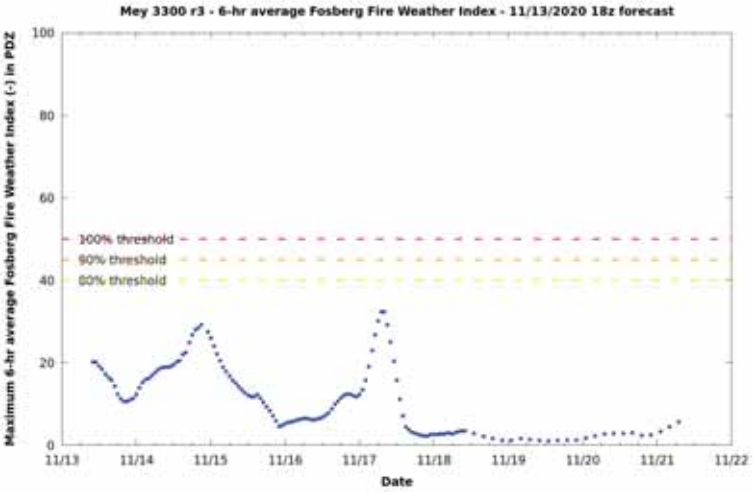


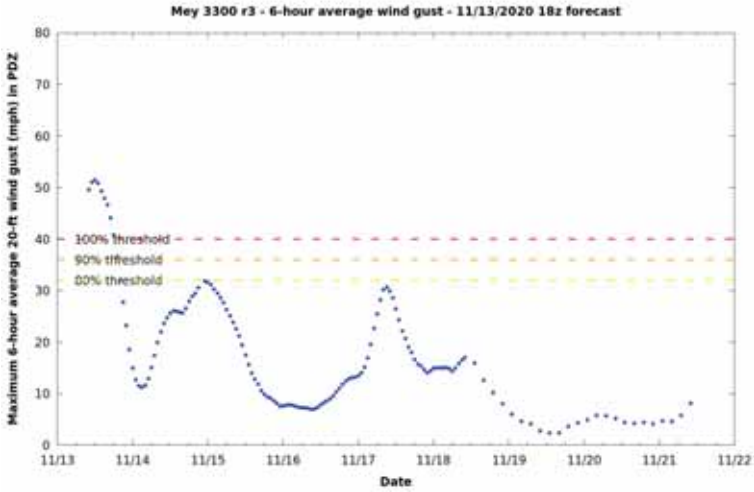
Mey 3400 Angora Creek



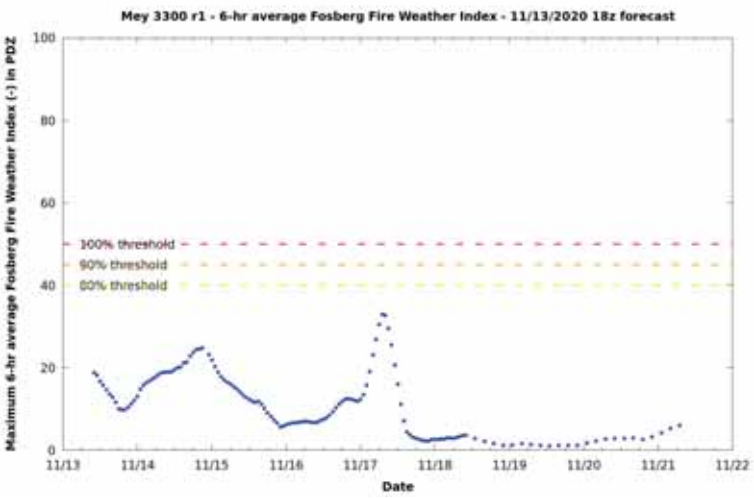


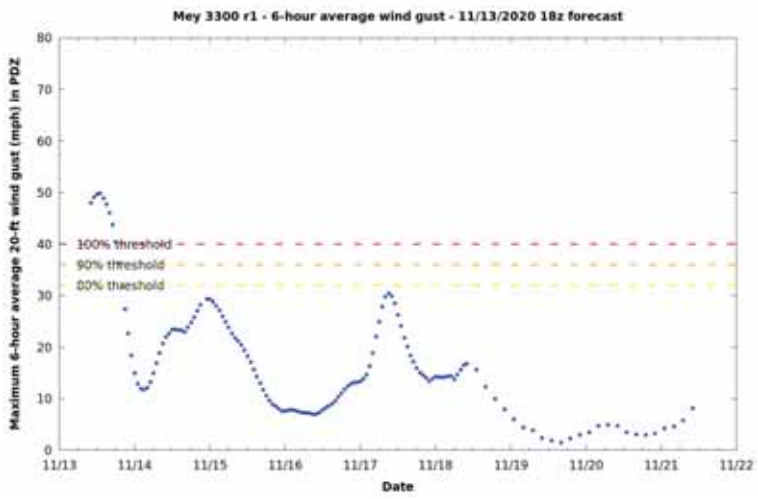
Mey 3300 r3



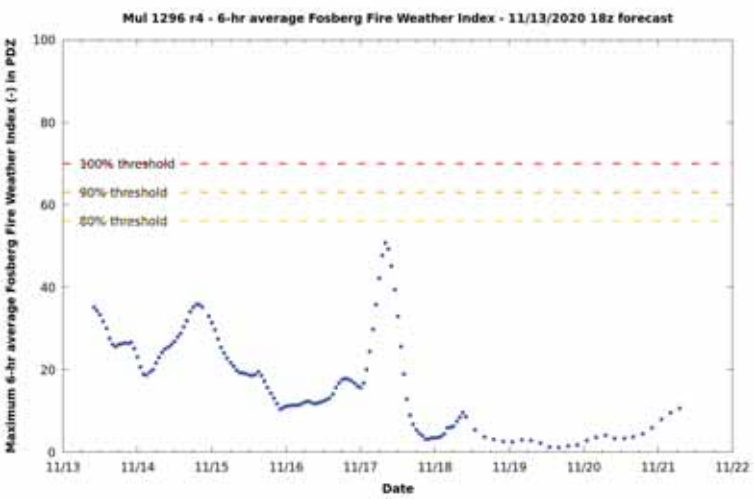


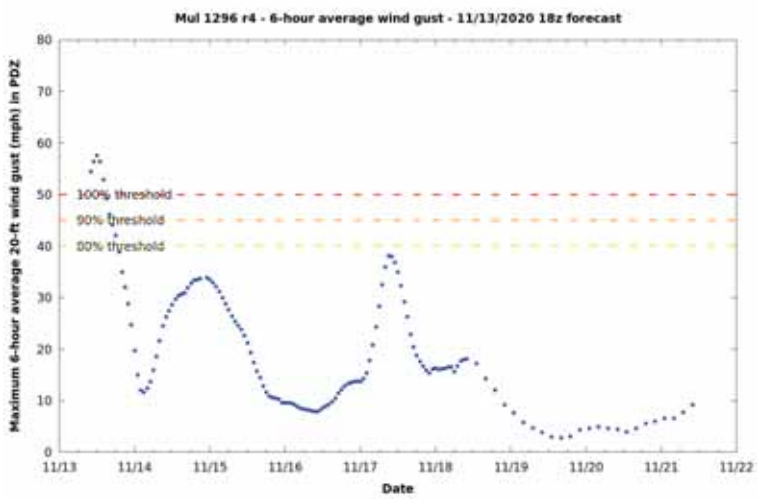
Mey 3300 r1



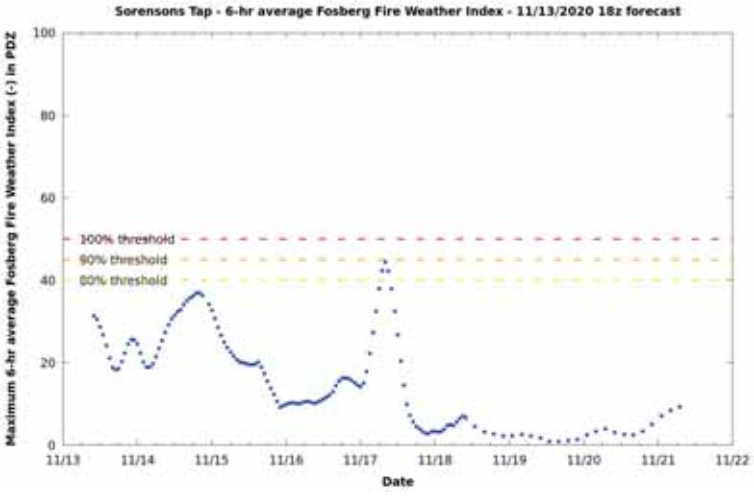


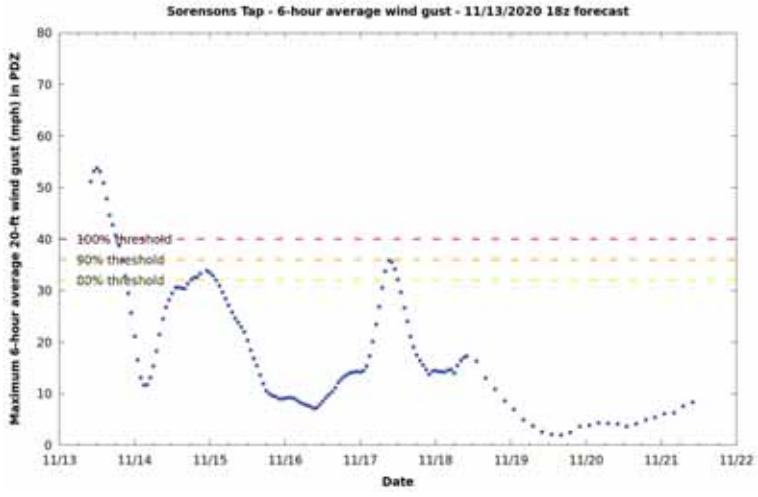
Mul 1296 r4



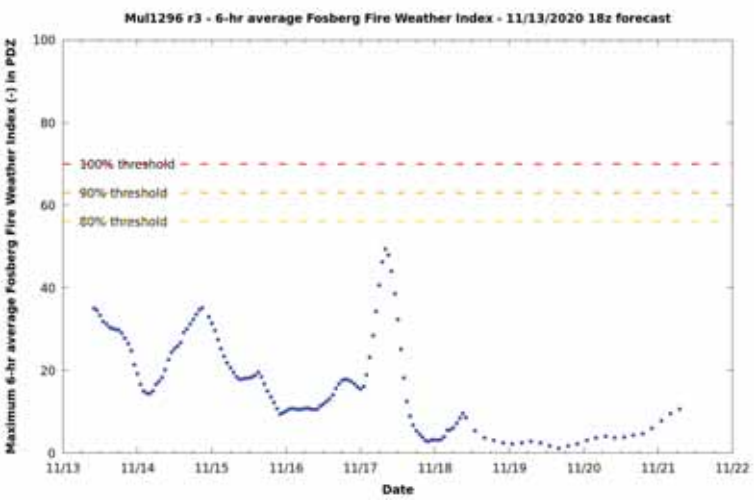


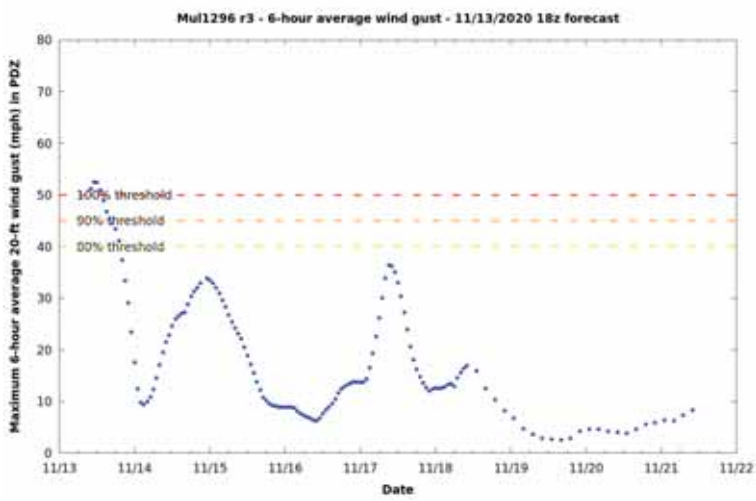
Sorensons Tap



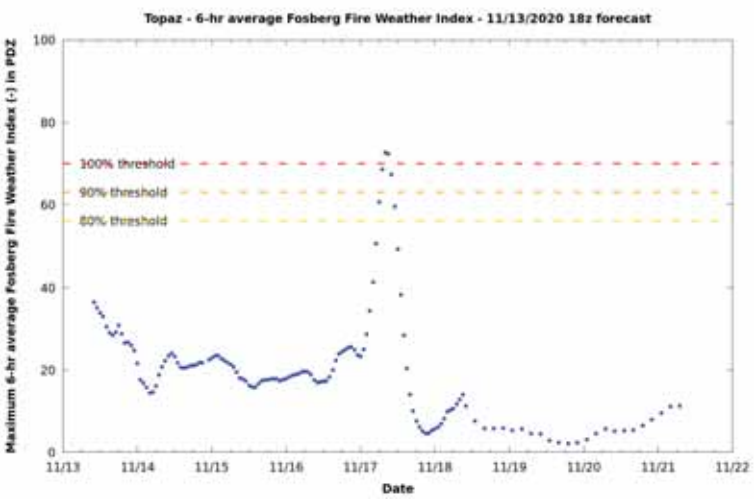


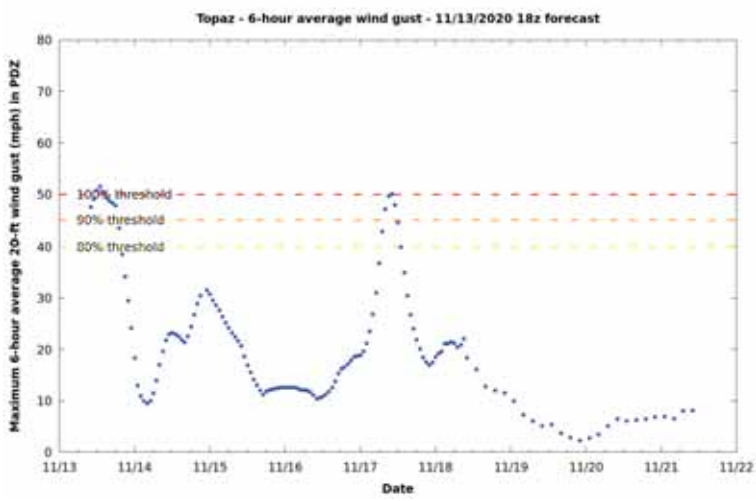
Mul 1296 r3



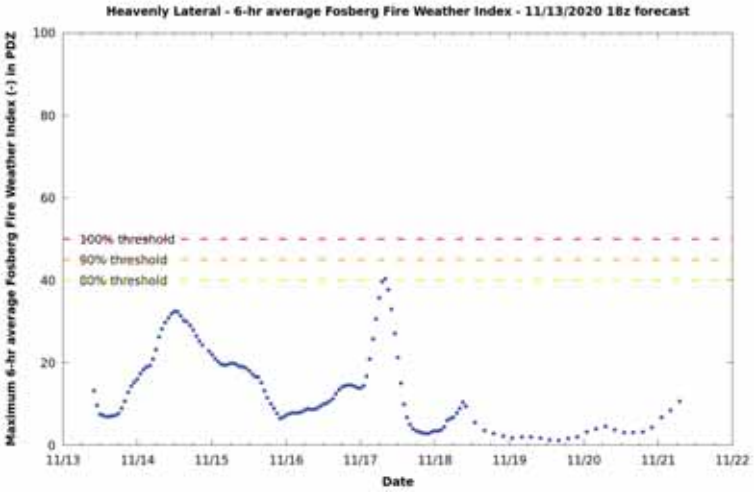


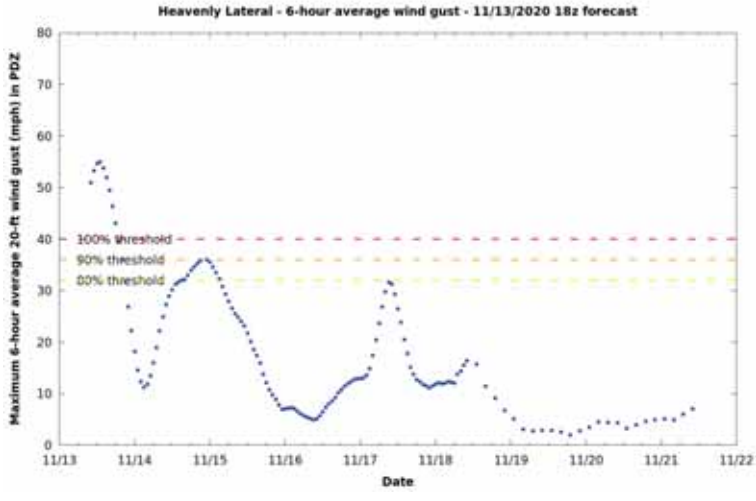
Topaz



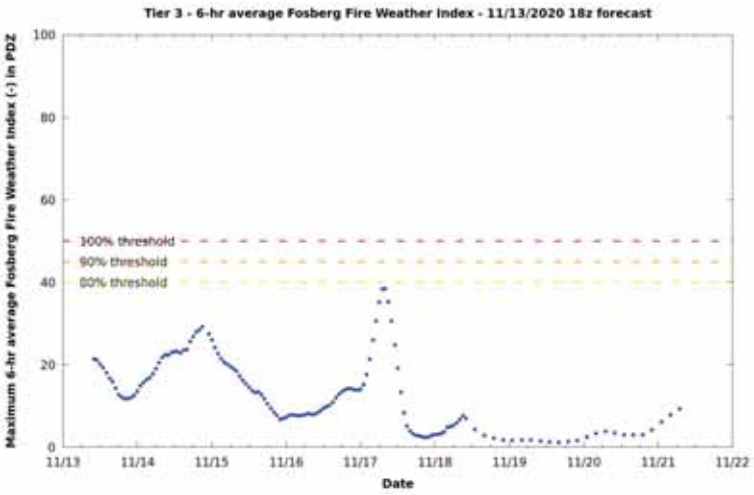


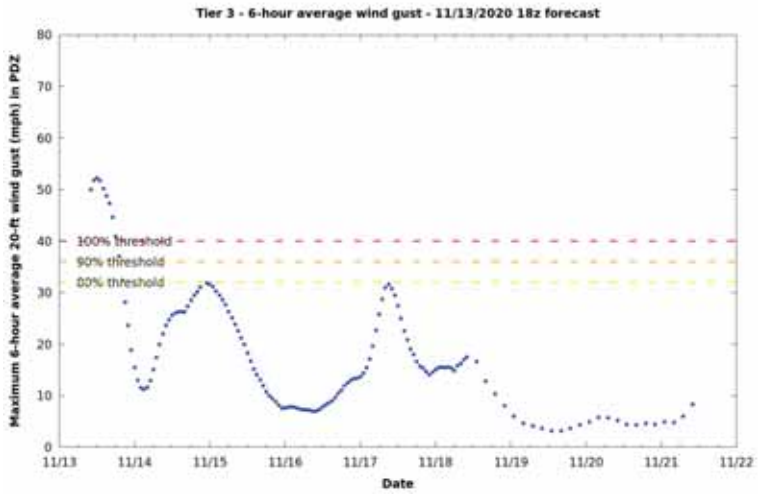
Heavenly Lateral



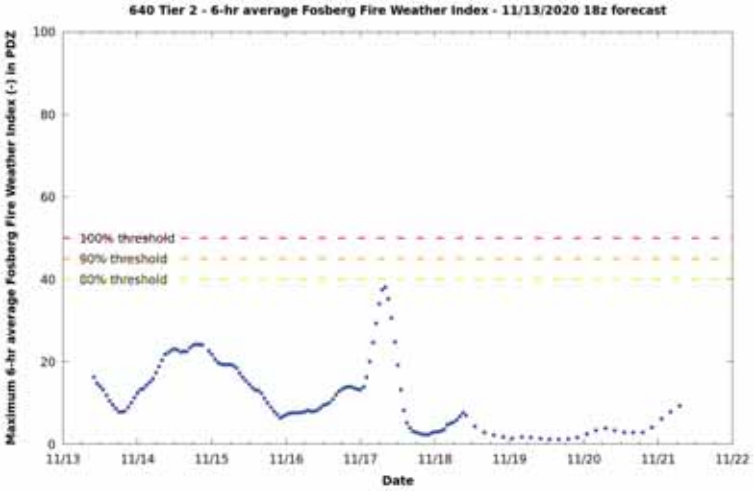


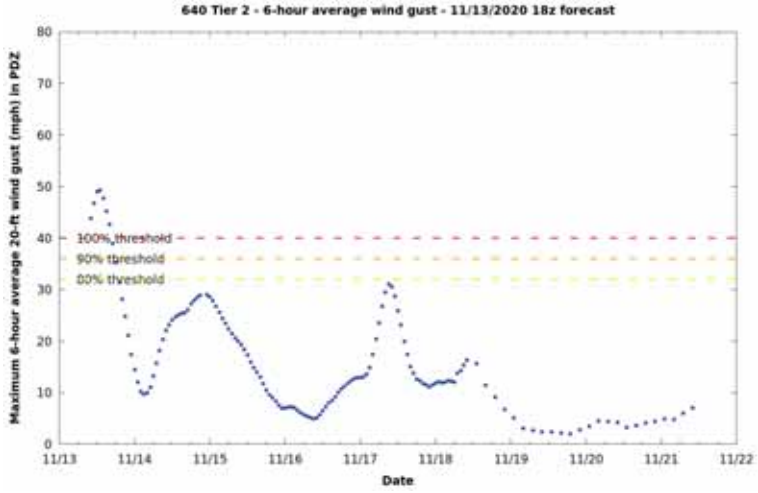
Tier 3



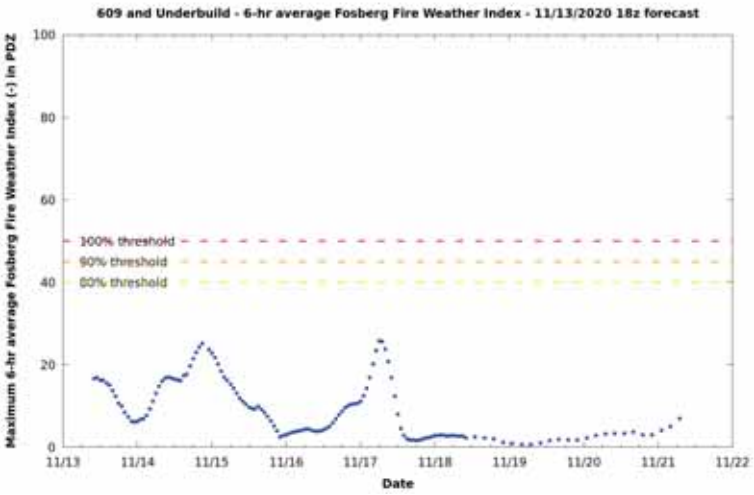


640 Tier 2



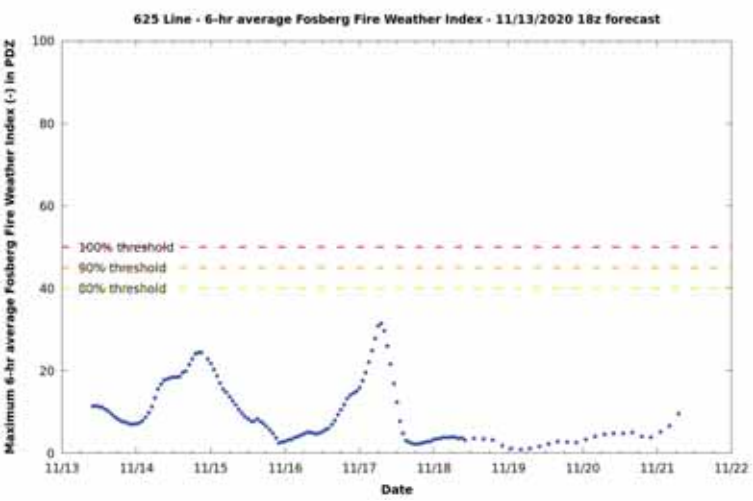


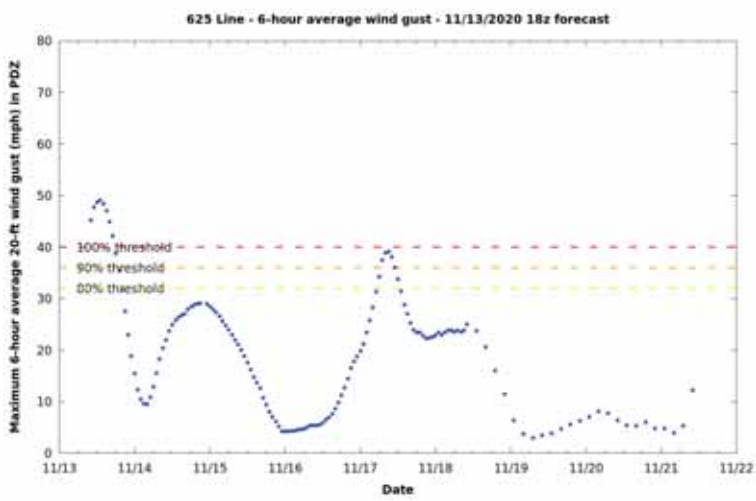
609 and Underbuild



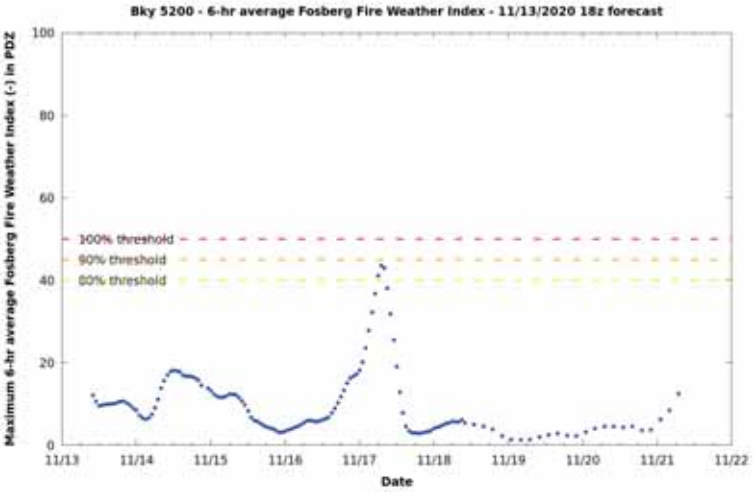


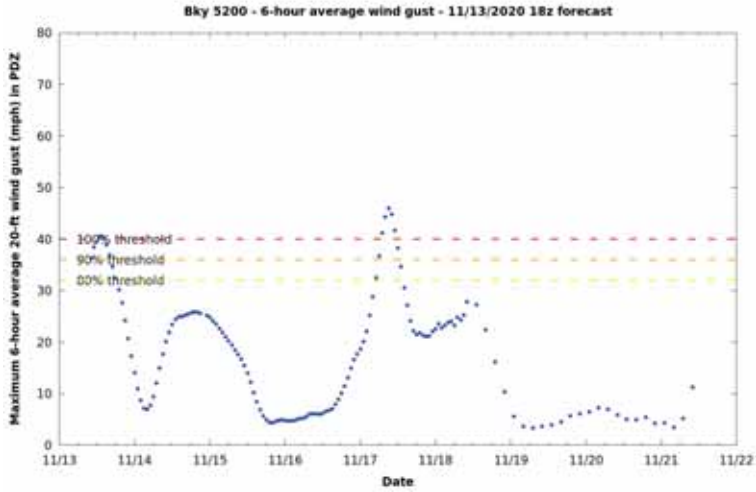
625 Line



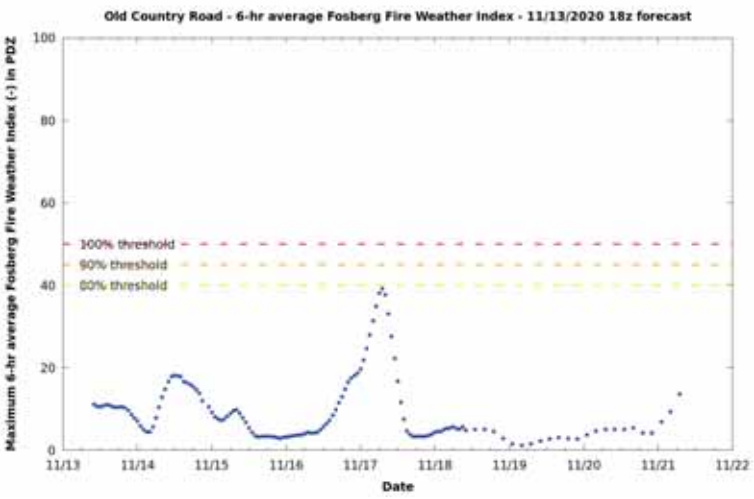


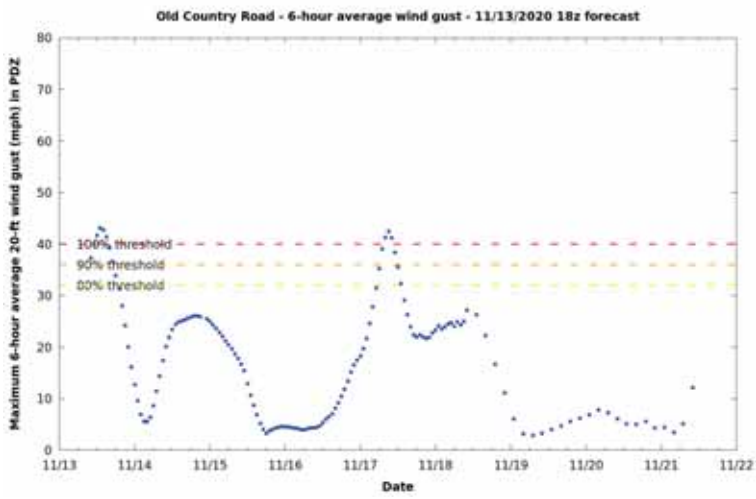
Bky 5200



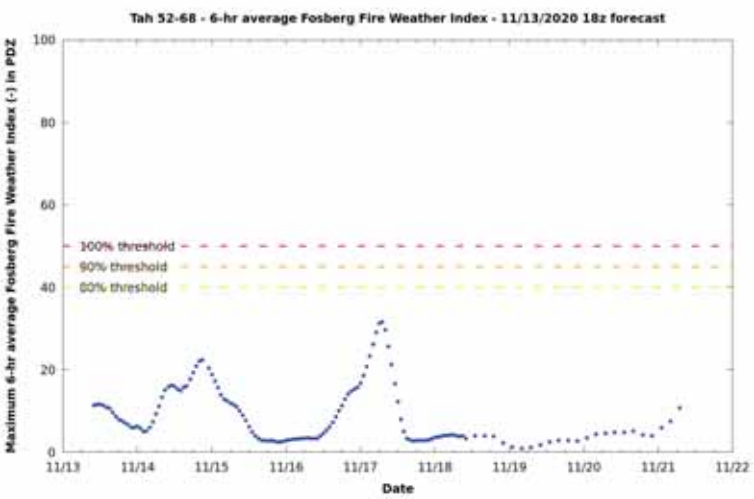


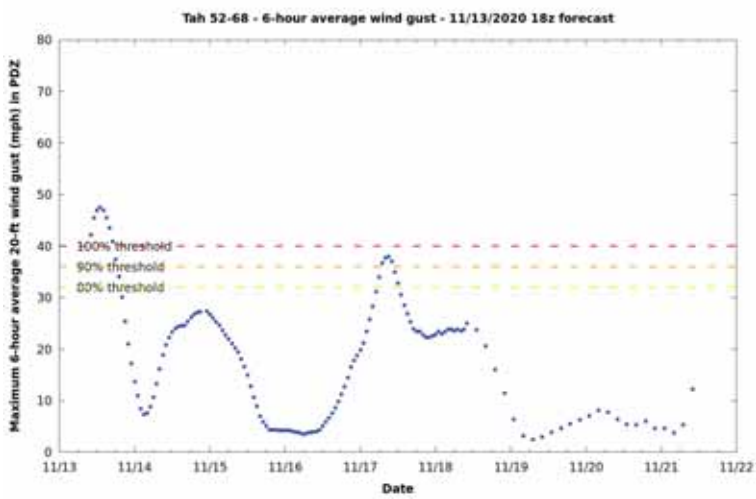
Old Country Road



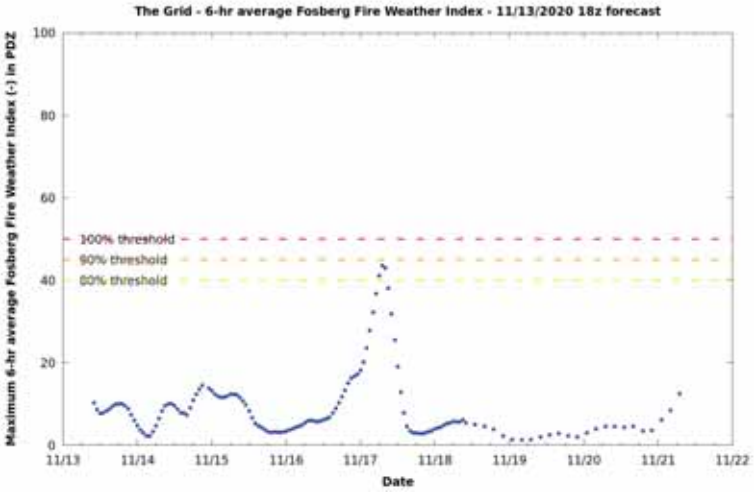


Tah 52-68



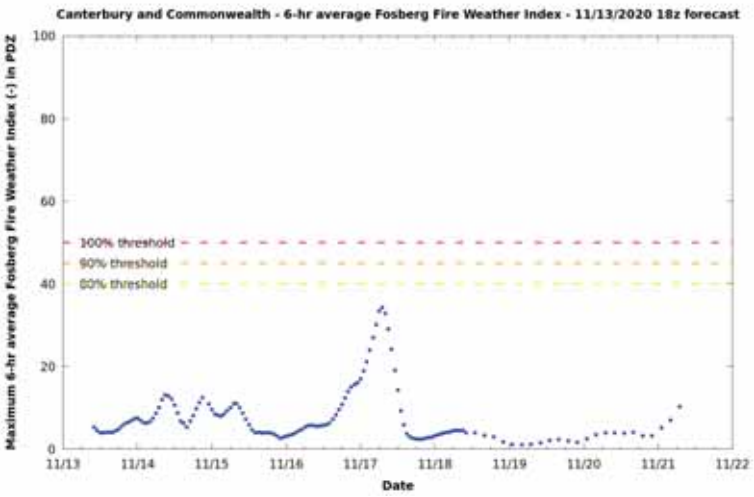


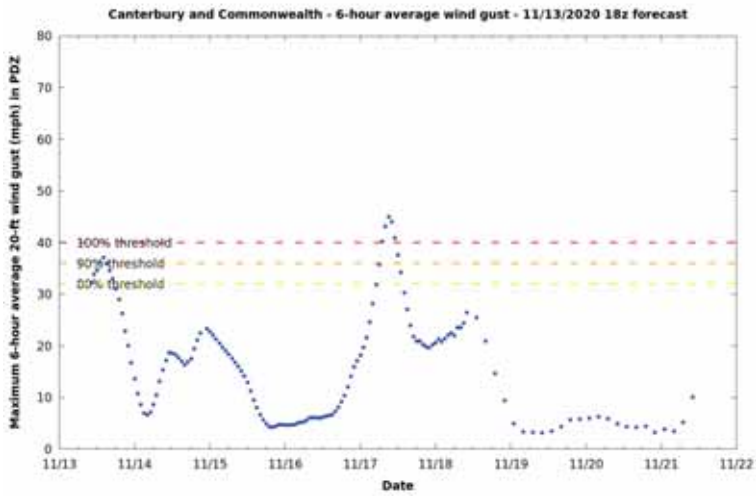
The Grid



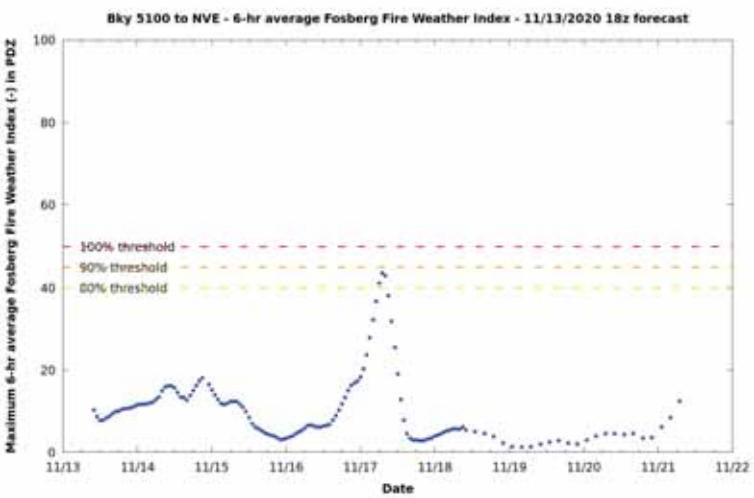


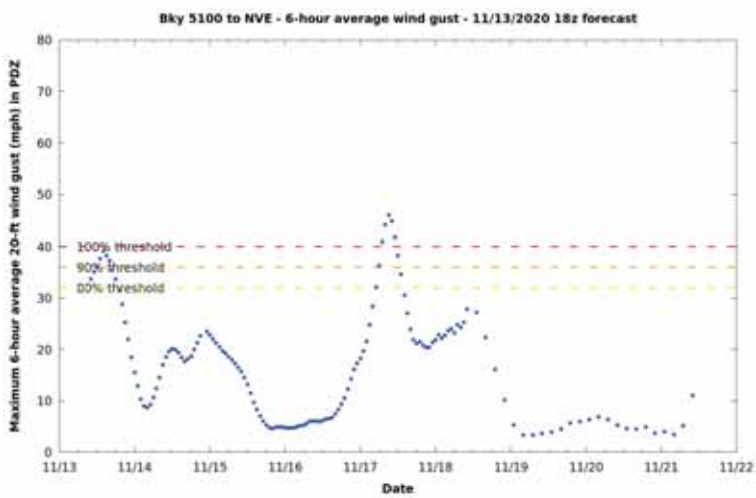
Canterbuy and Commonwealth



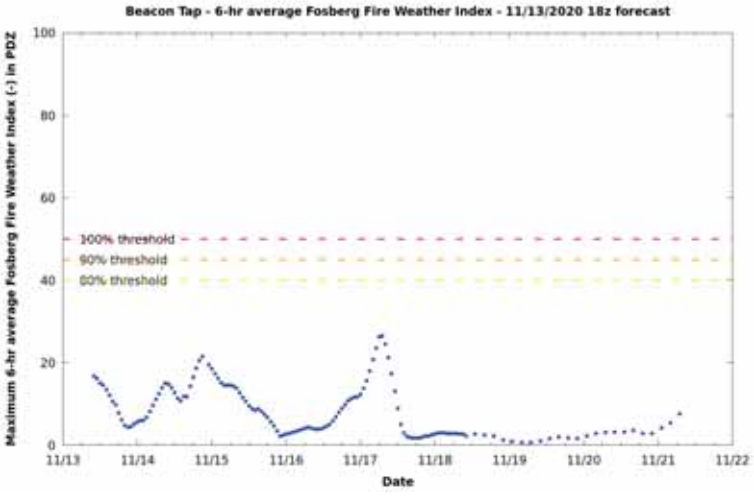


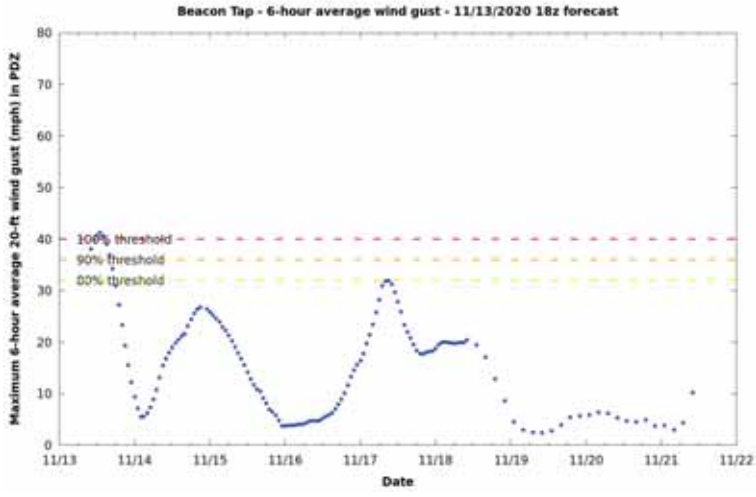
Bky 5100 to NVE



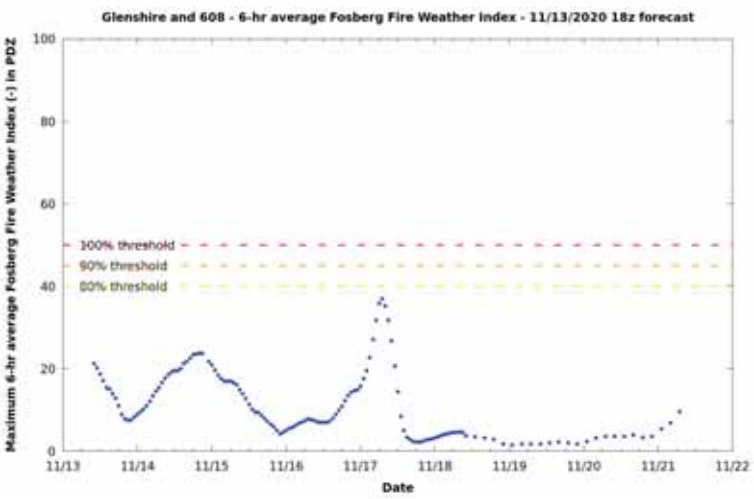


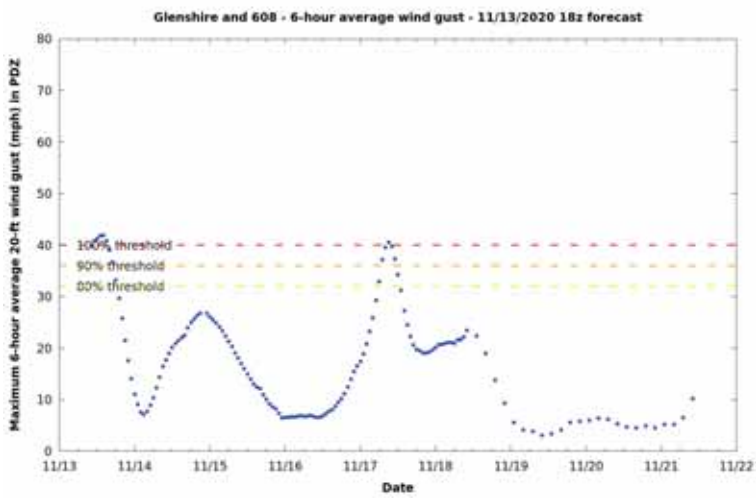
Beacon Tap



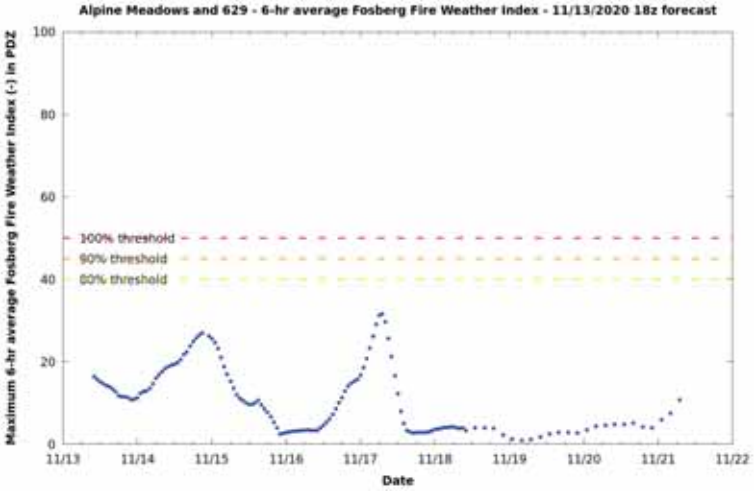


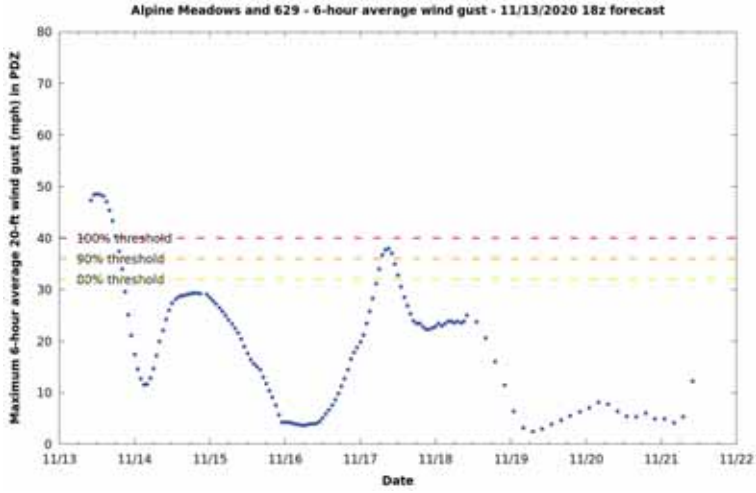
Glenshire and 608



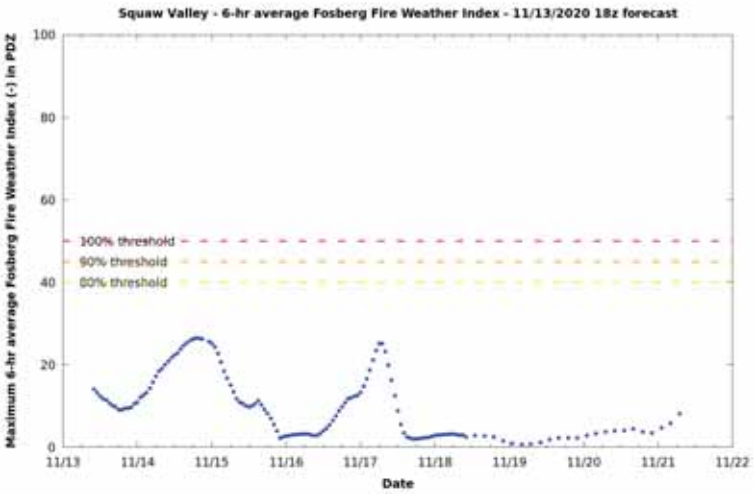


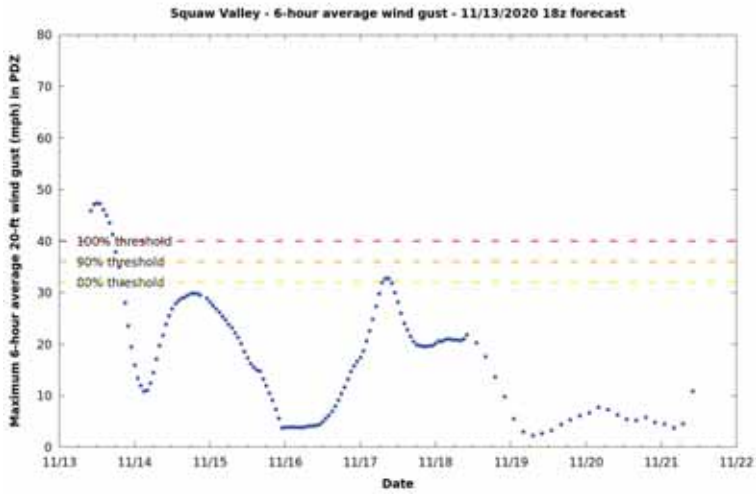
Alpine Meadows and 629



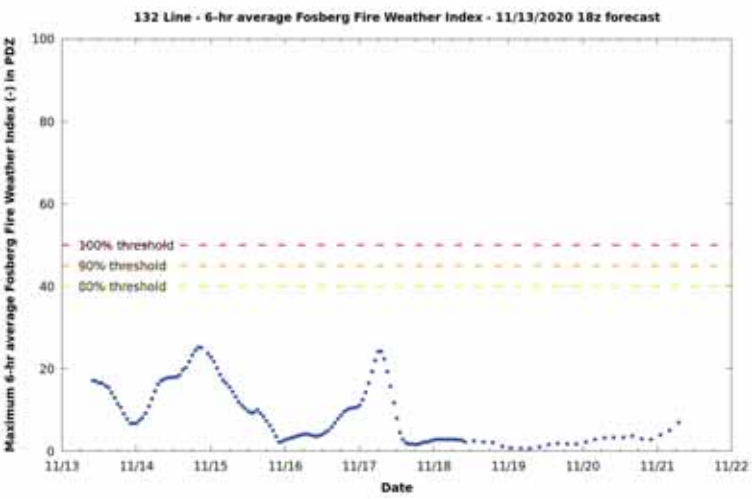


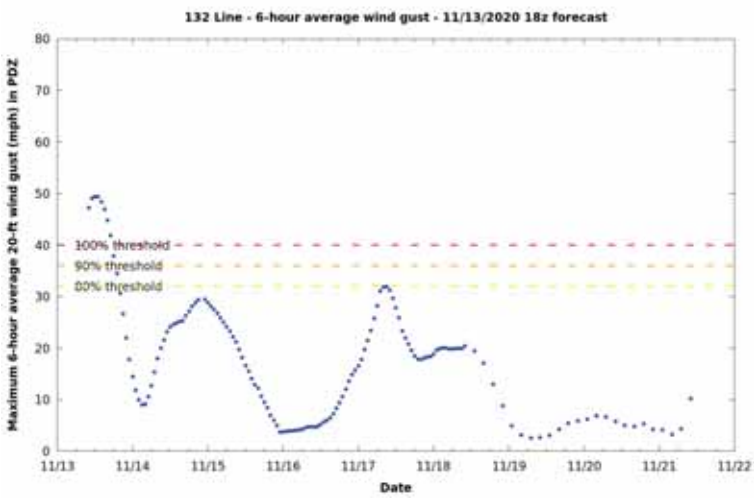
Squaw Valley



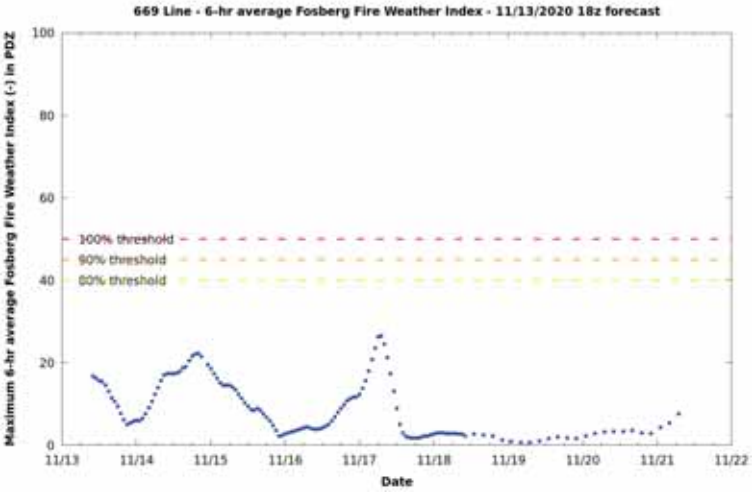


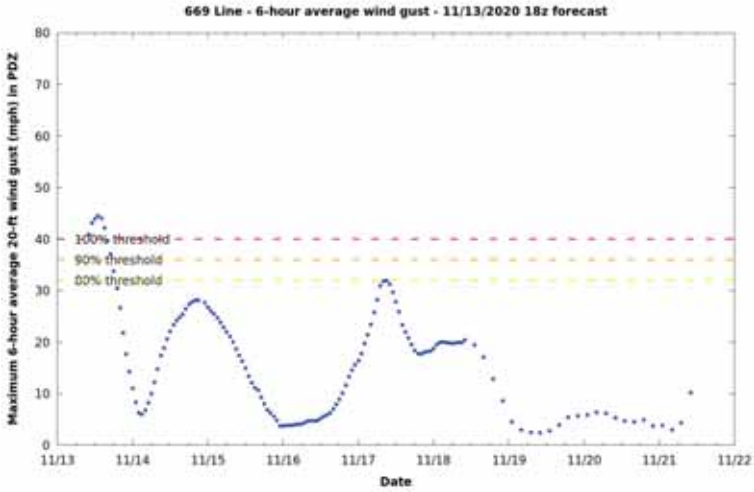
132 Line



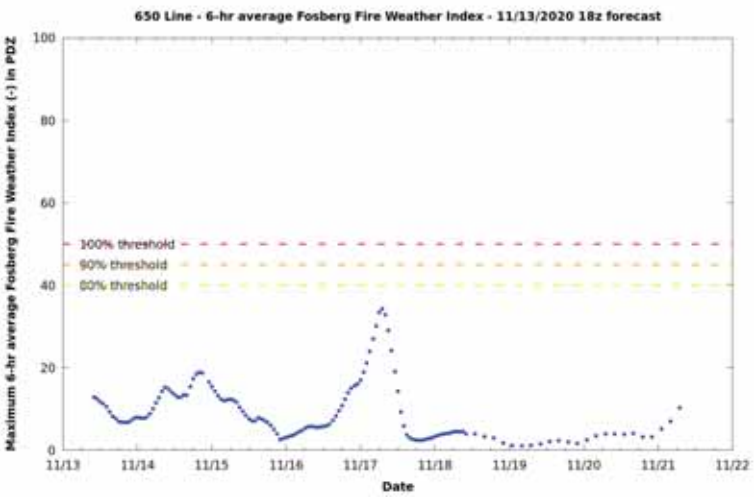


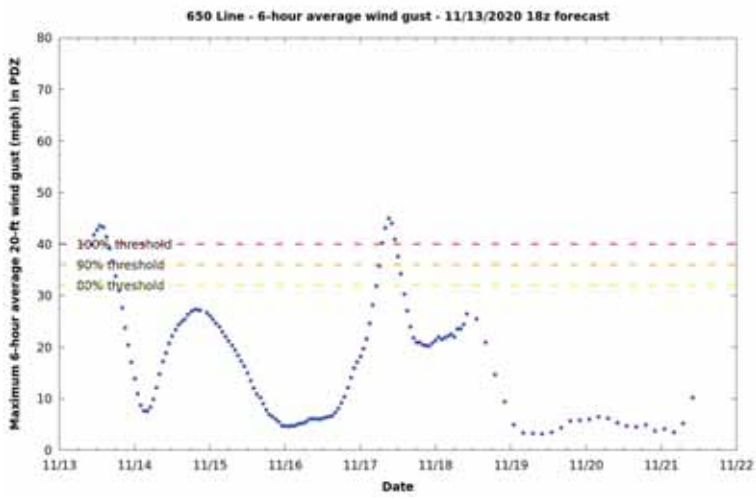
669 Line



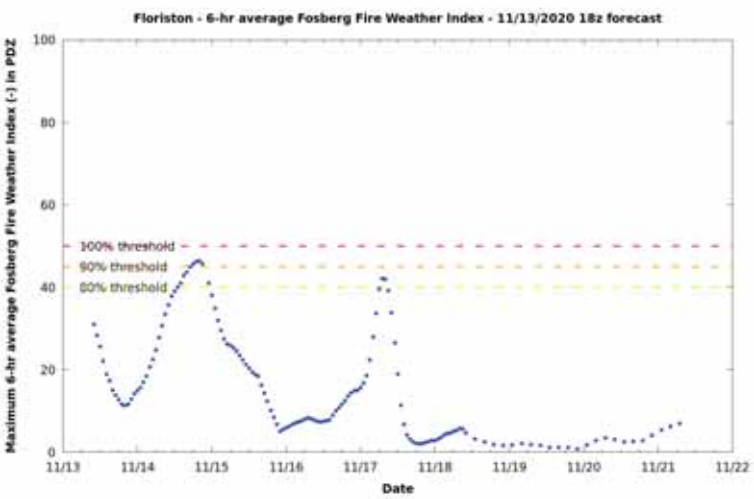


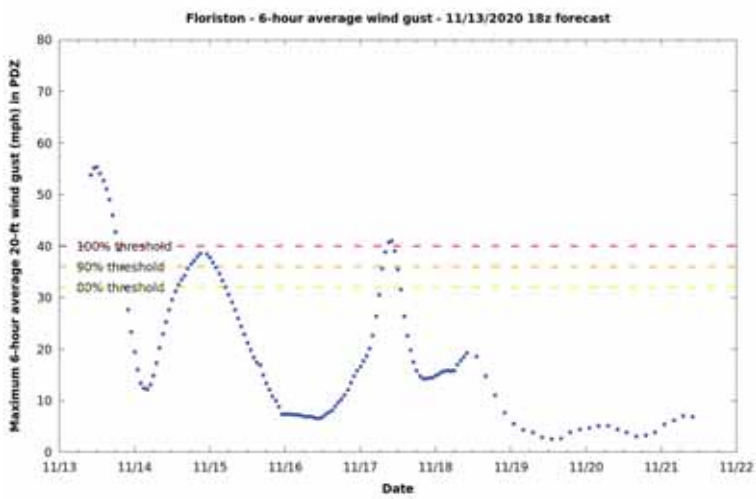
650 Line



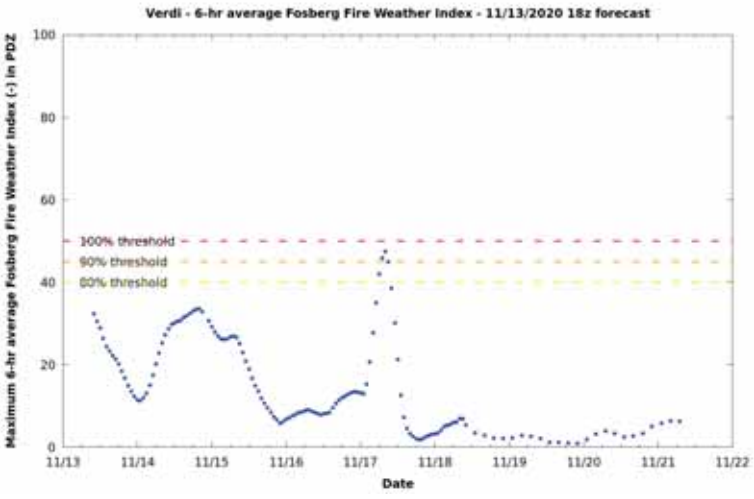


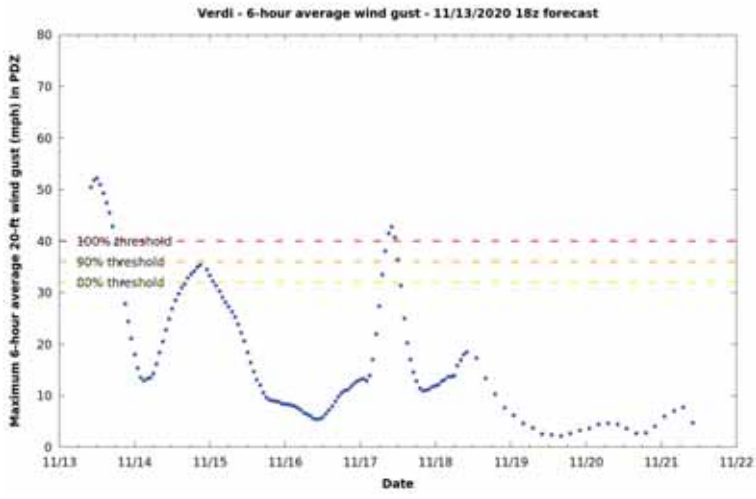
Floriston



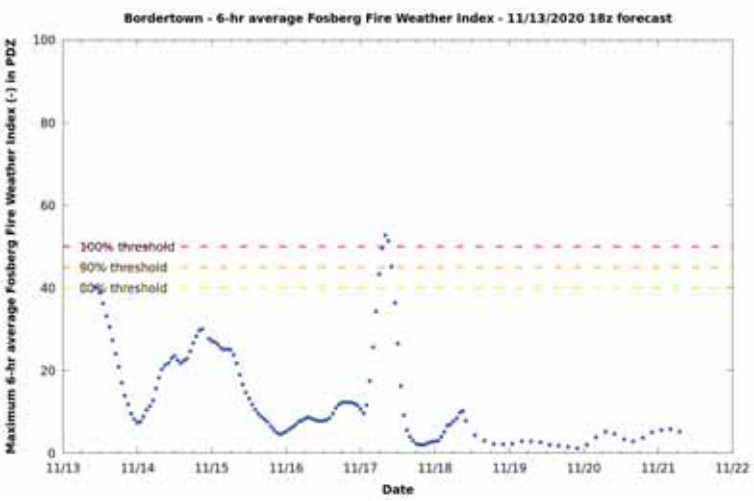


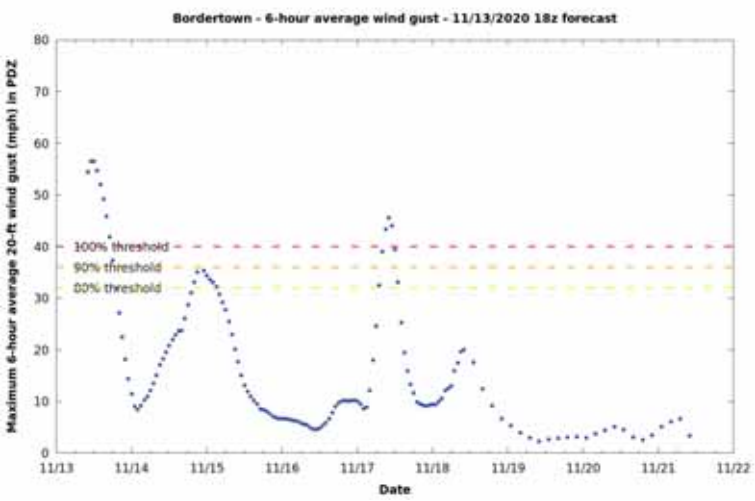
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/13/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/13/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/14/20 - 11/20/20

Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

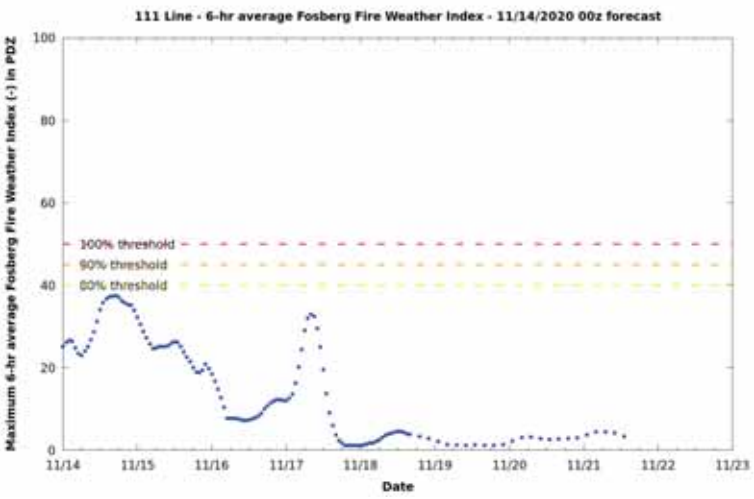
Liberty Utilities Energy Release Component Forecast for 11/14/20 - 11/20/20

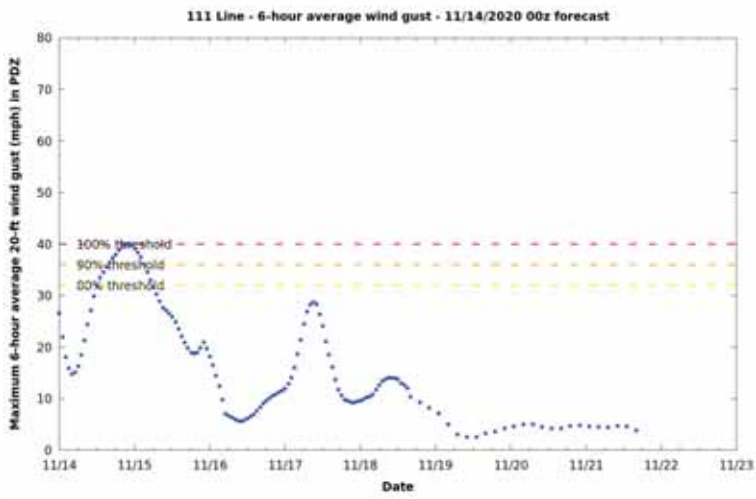
Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	57.0	57.0	55.0	51.0	56.0	58.0	55.0
Sierra Brooks	58.0	61.0	58.0	55.0	61.0	62.0	62.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	51.0	43.0	48.0	42.0	35.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	56.0	56.0	53.0	50.0	56.0	57.0	57.0

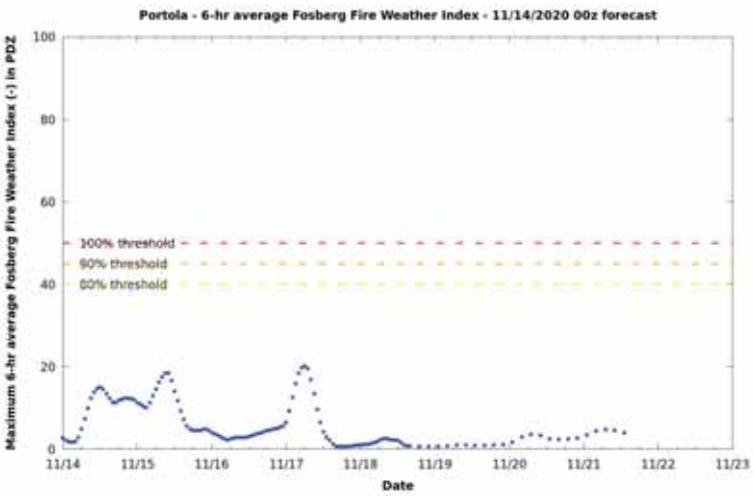
Liberty Utilities Fire Weather Summary Plots - 11/14/2020 00z forecast

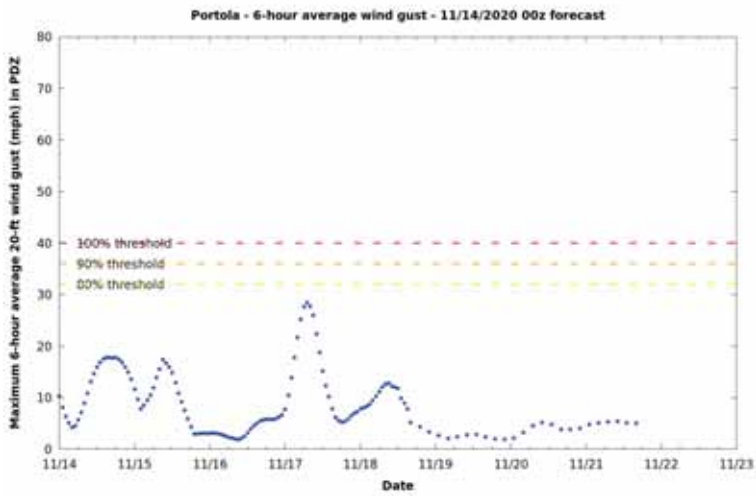
111 Line



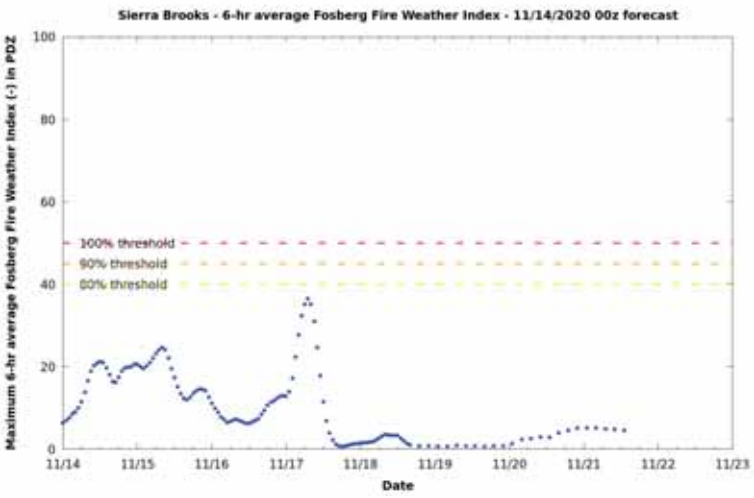


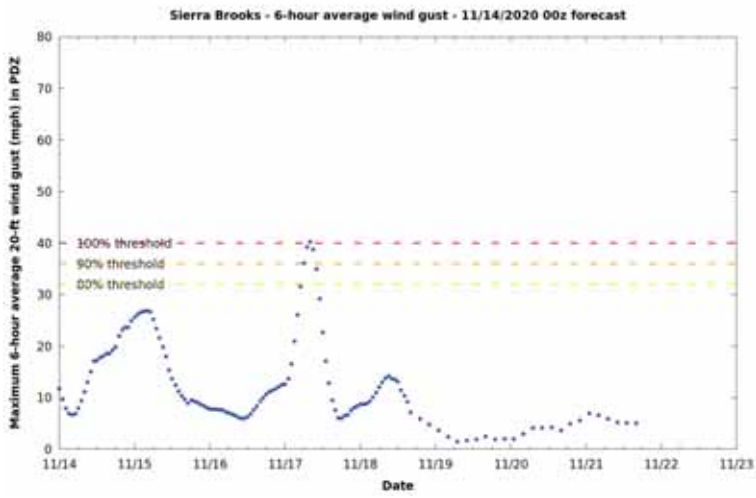
Portola



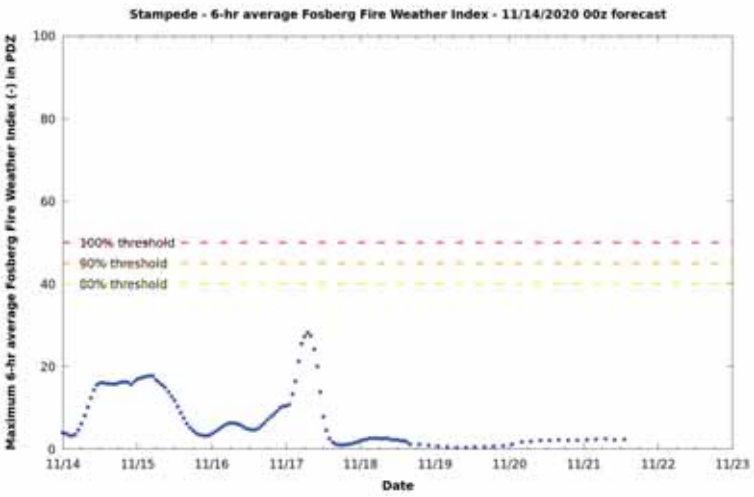


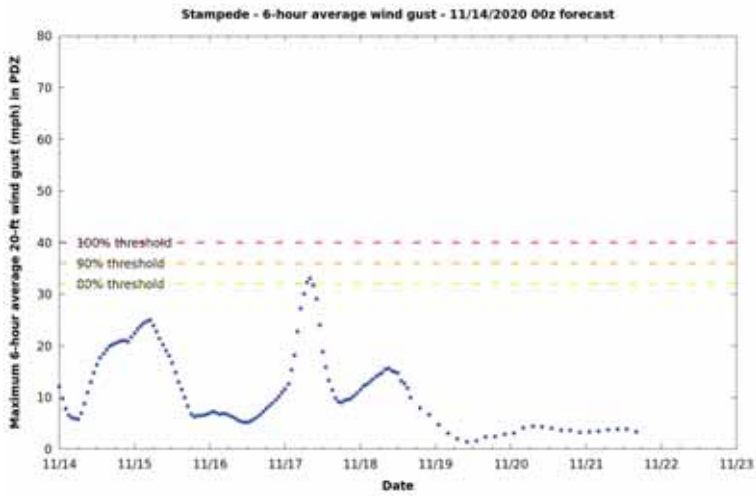
Sierra Brooks



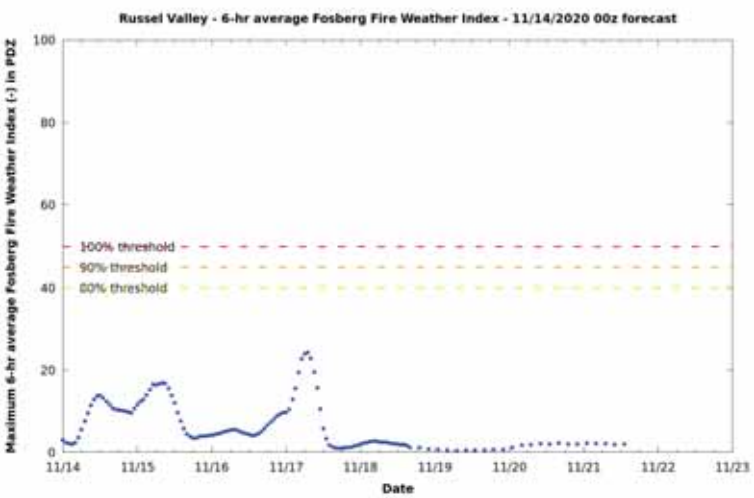


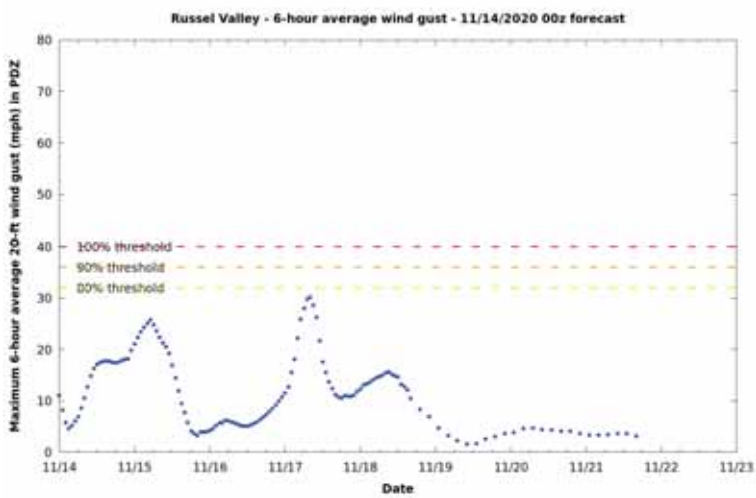
Stampede



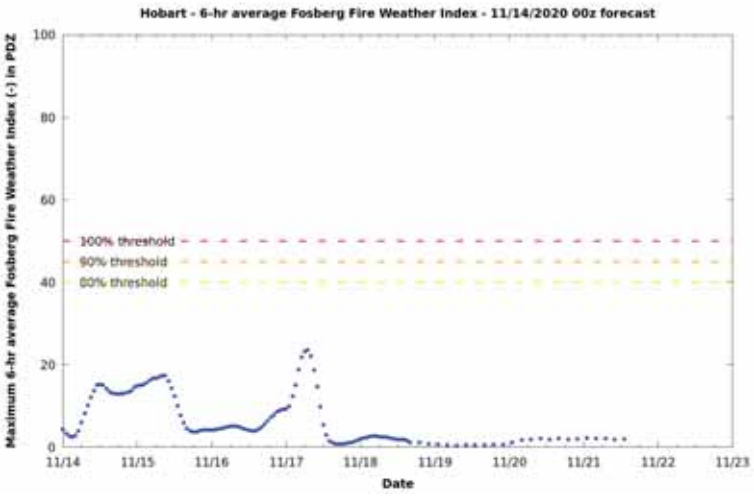


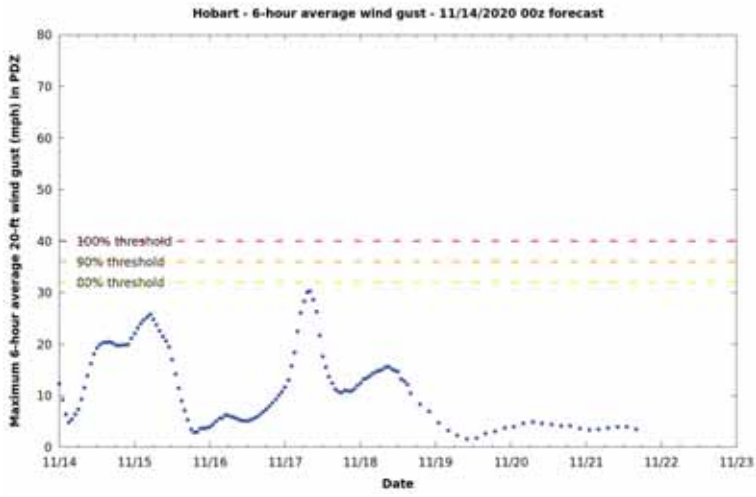
Russell Valley



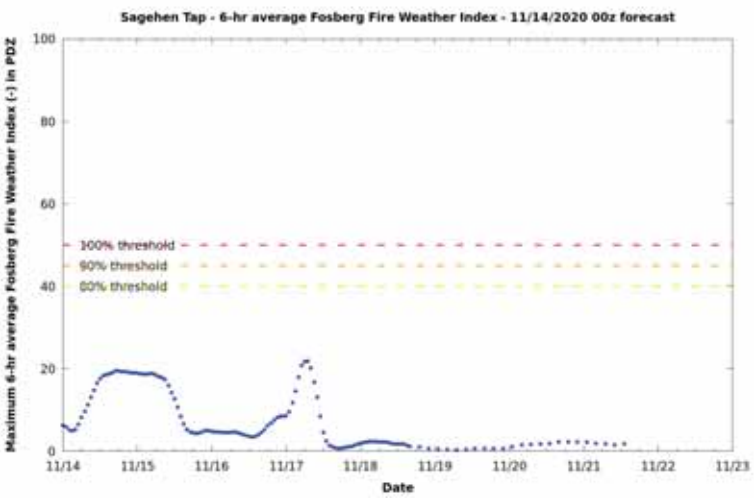


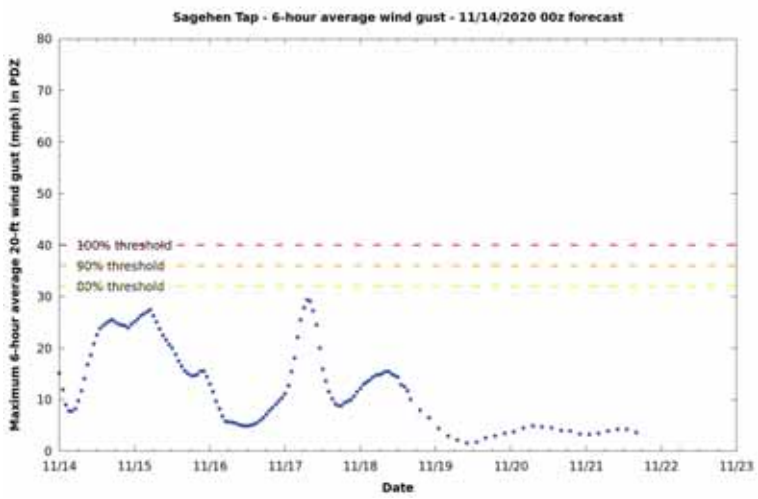
Hobart



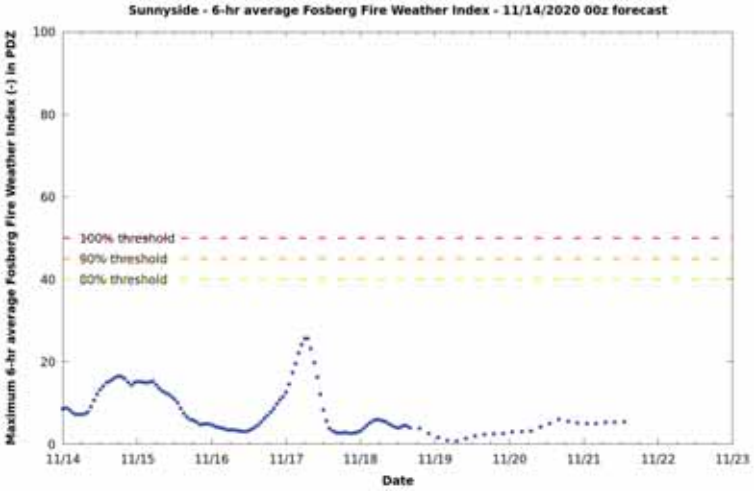


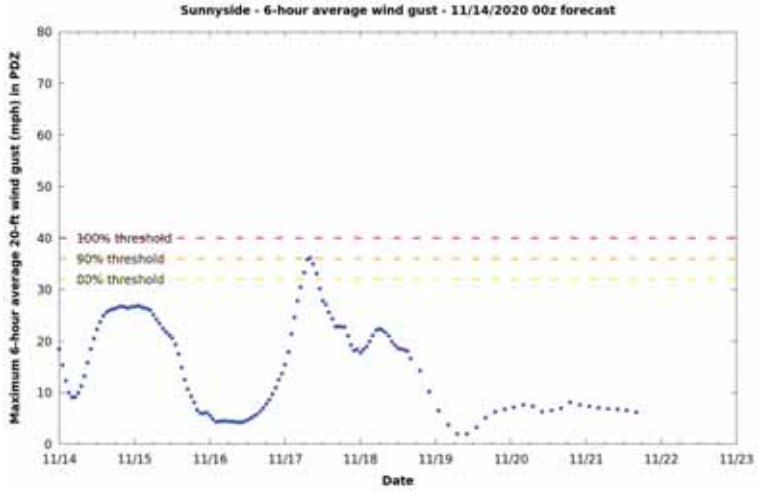
Sagehen tap



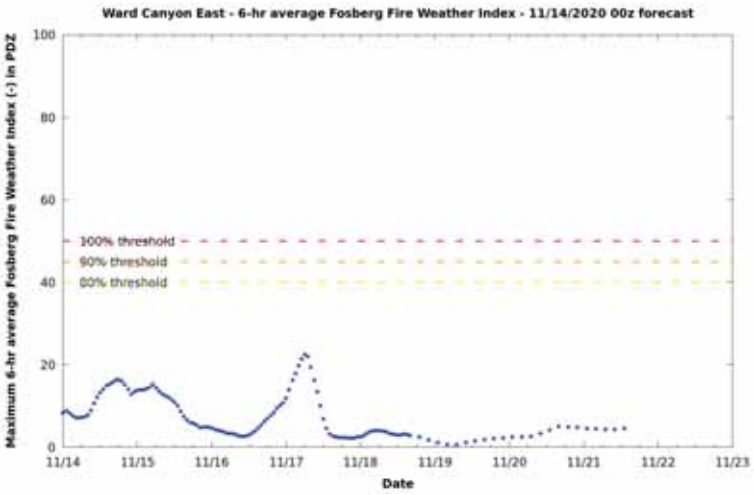


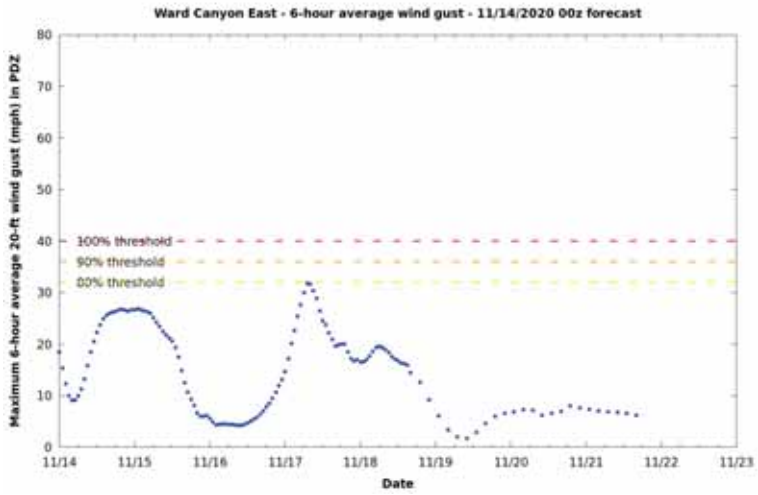
Sunnyside



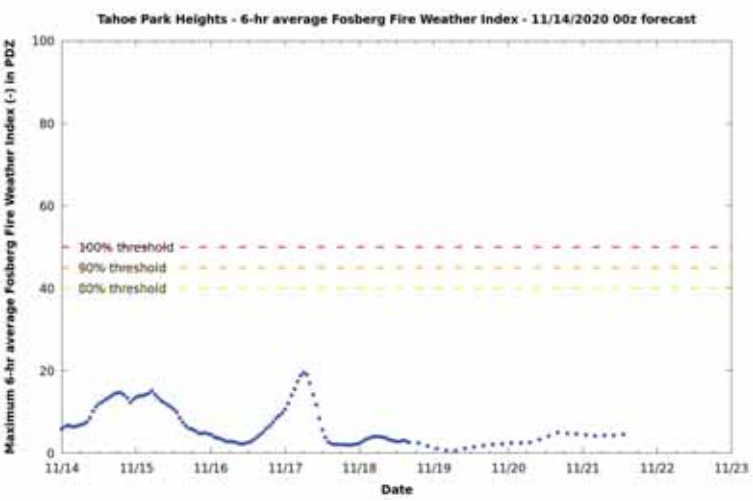


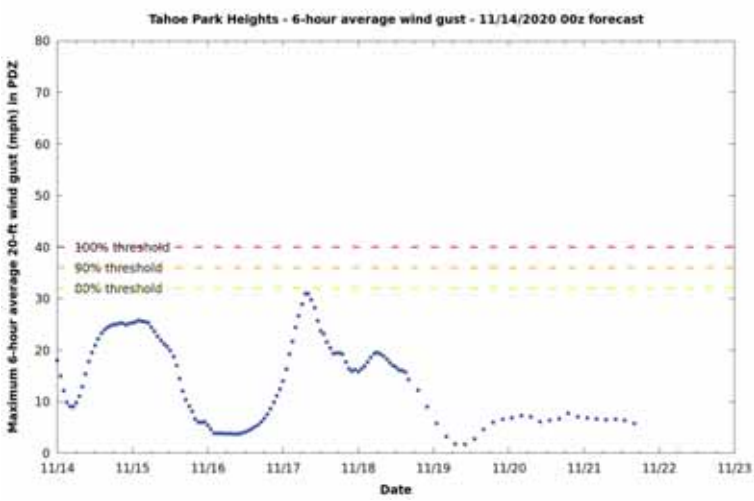
Ward Canyon East



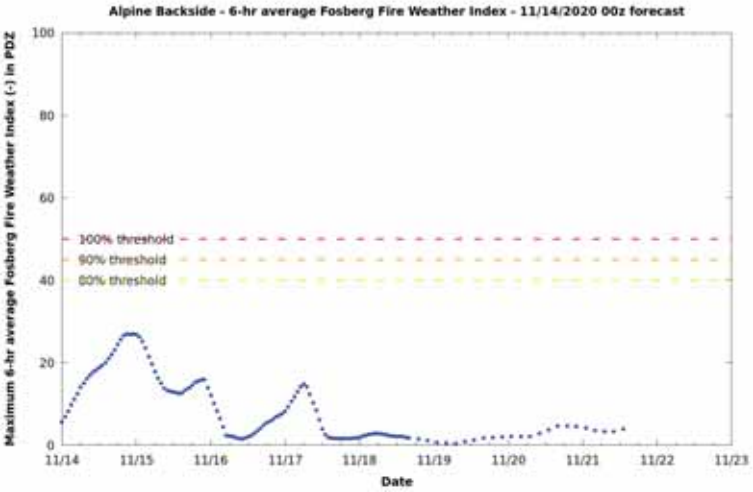


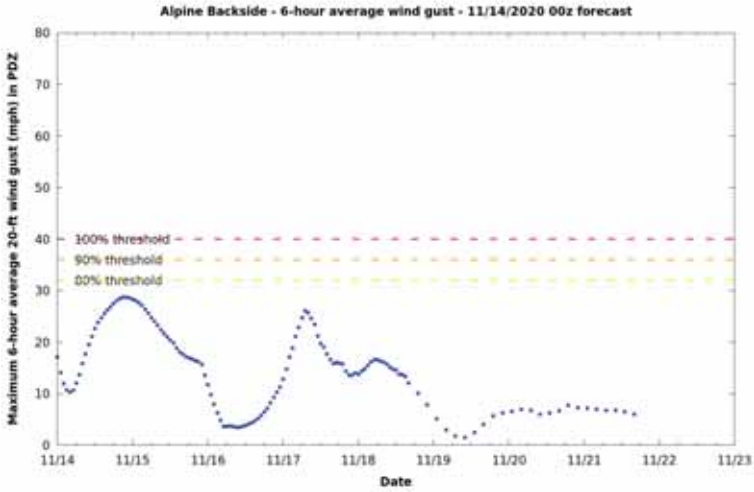
Tahoe Park Heights



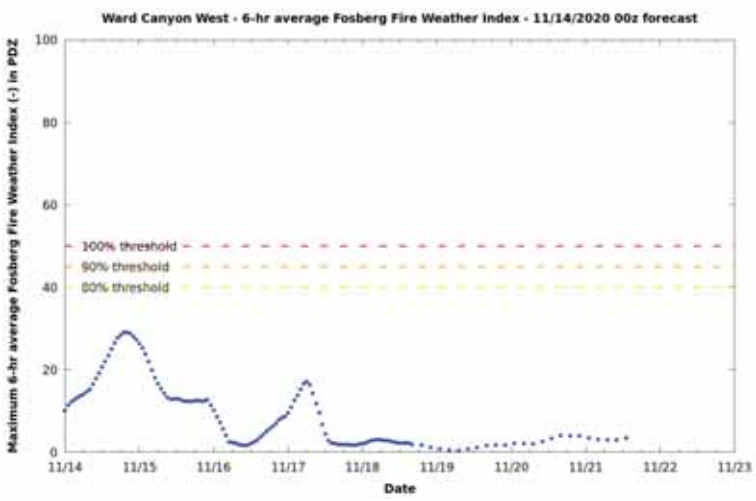


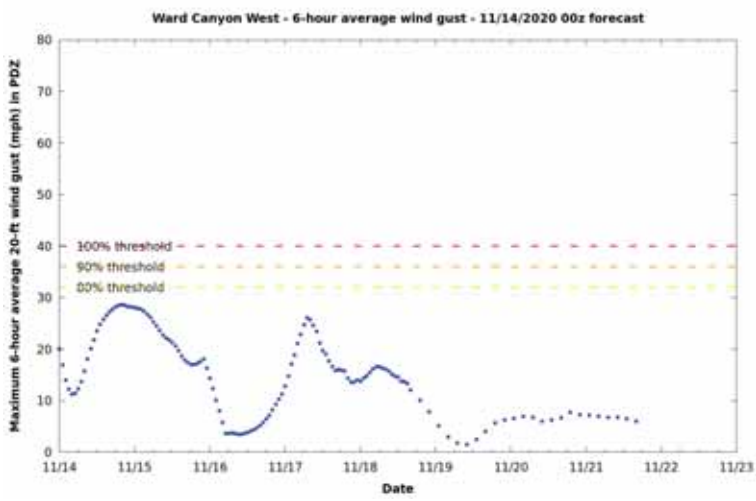
Alpine Backside



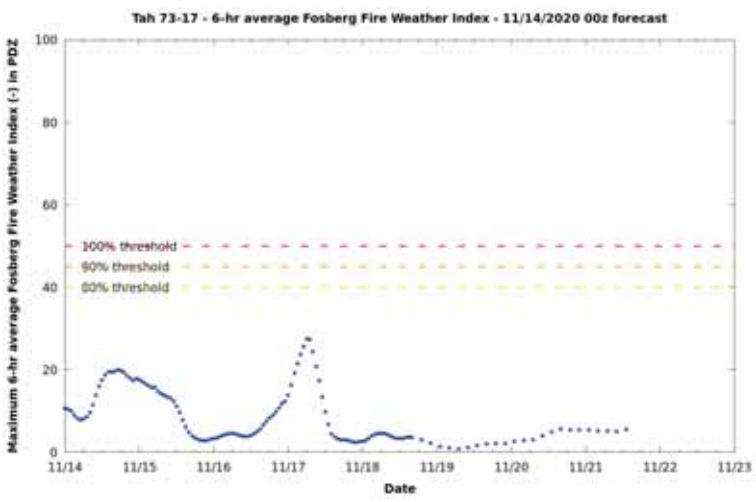


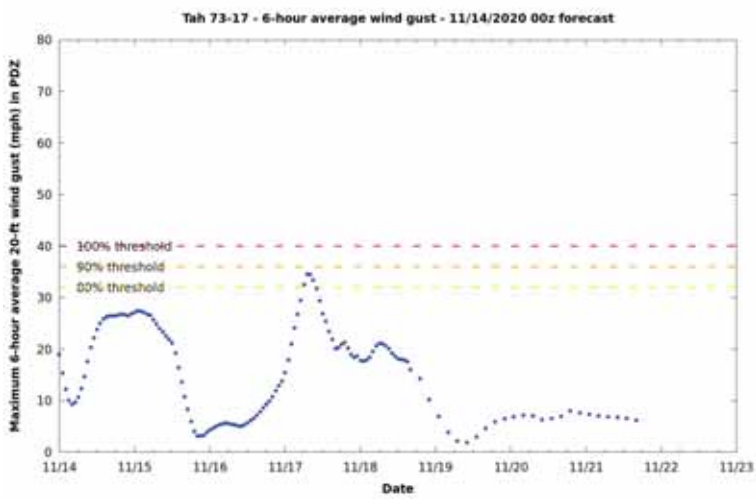
Ward Canyon West



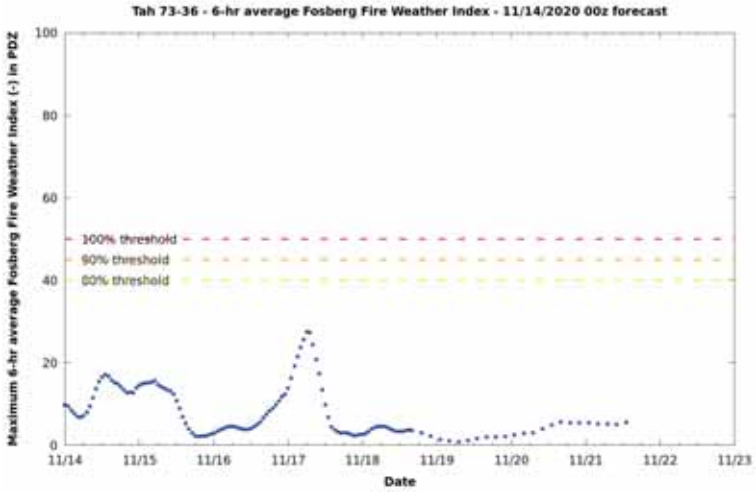


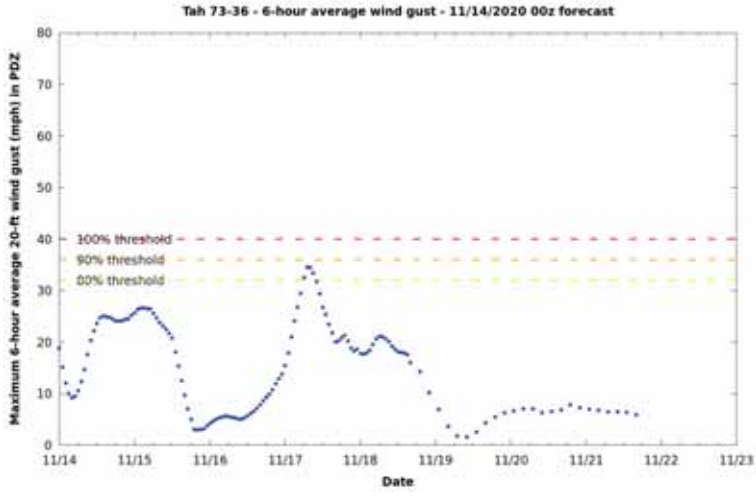
Tah 73-17



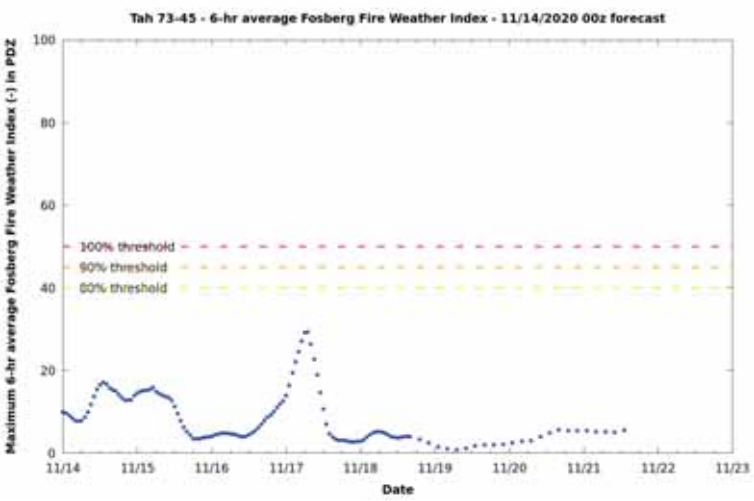


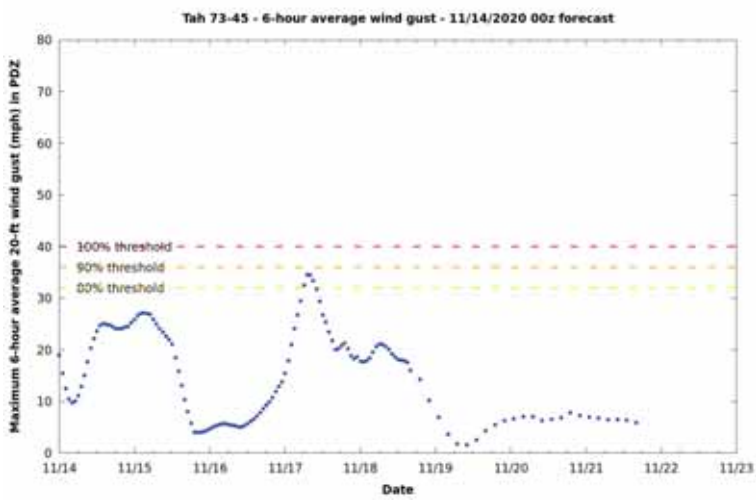
Tah 73-36



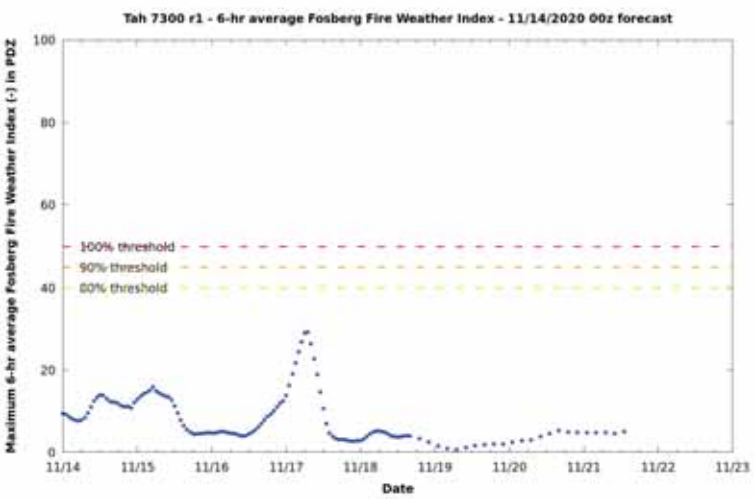


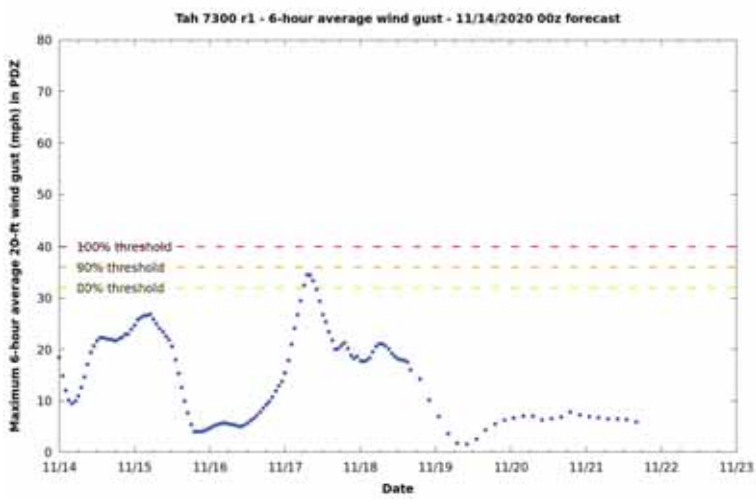
Tah 73-45



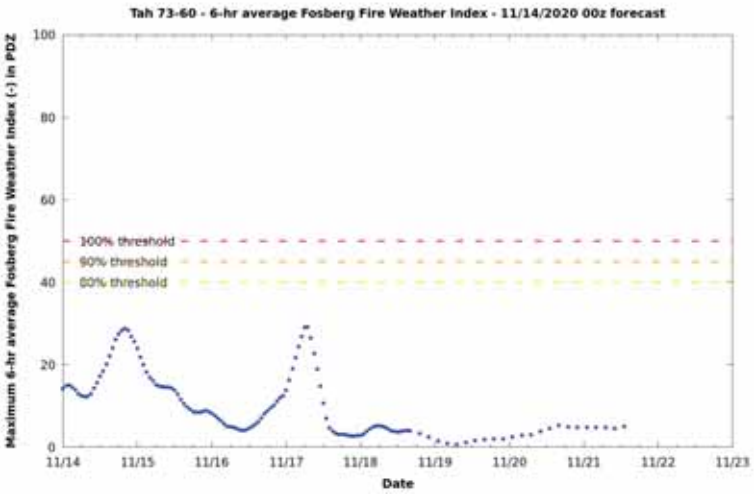


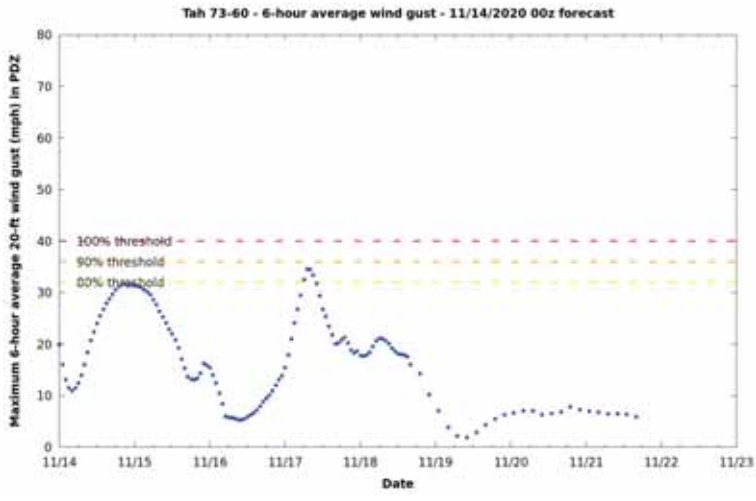
Tah 7300 r1



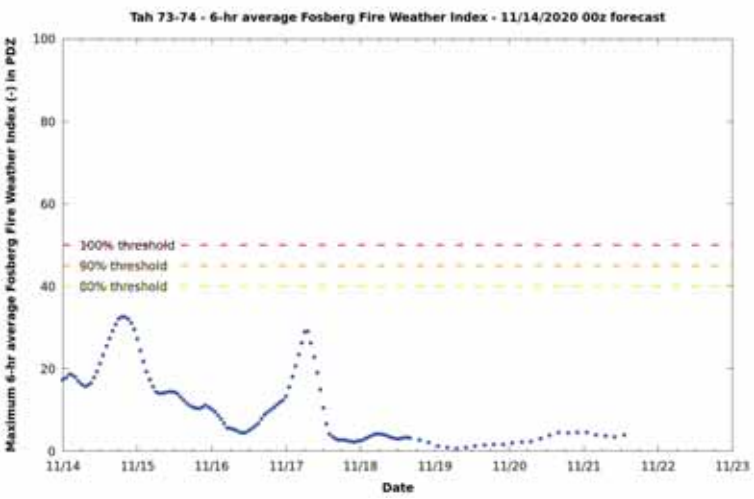


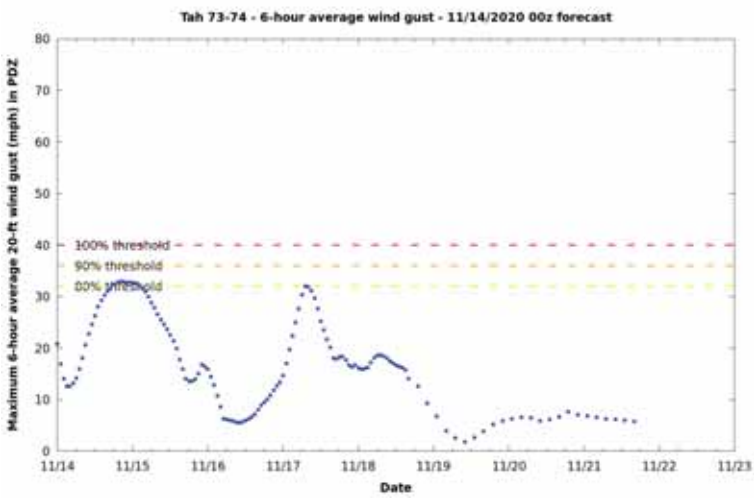
Tah 73-60



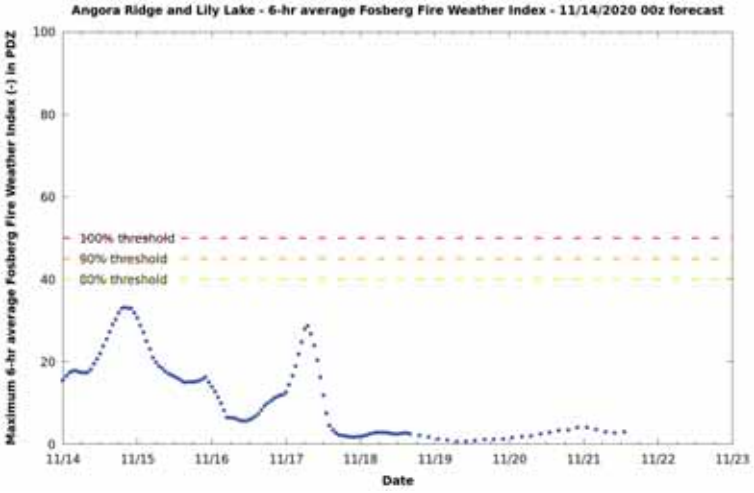


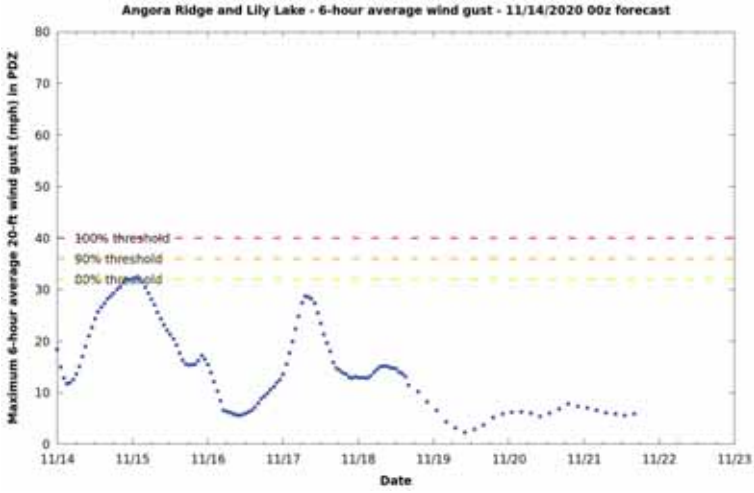
Tah 73-74



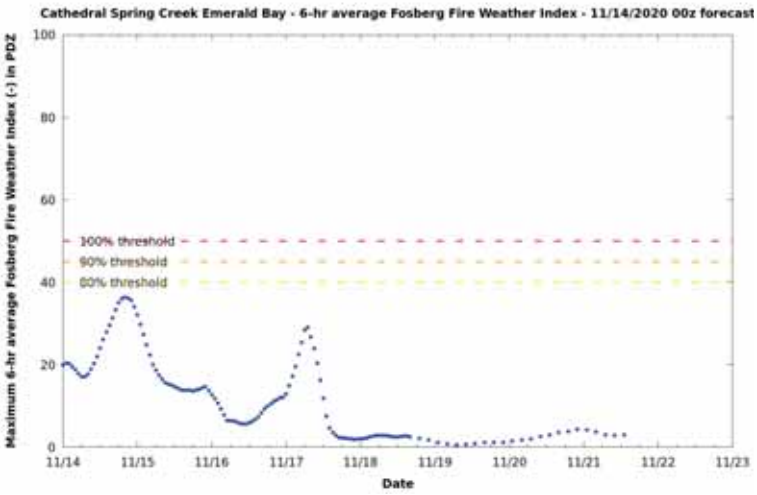


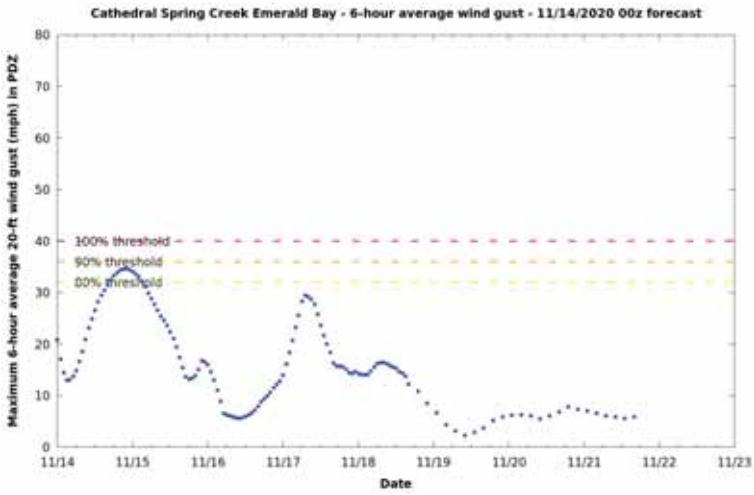
Angora Ridge and Lily Lake



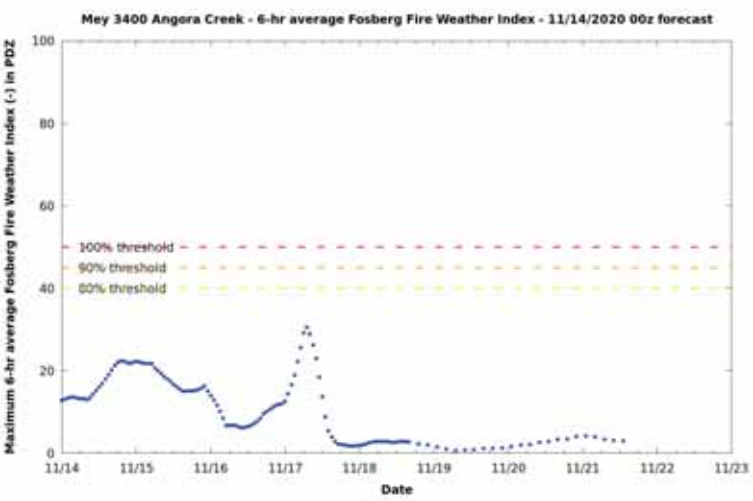


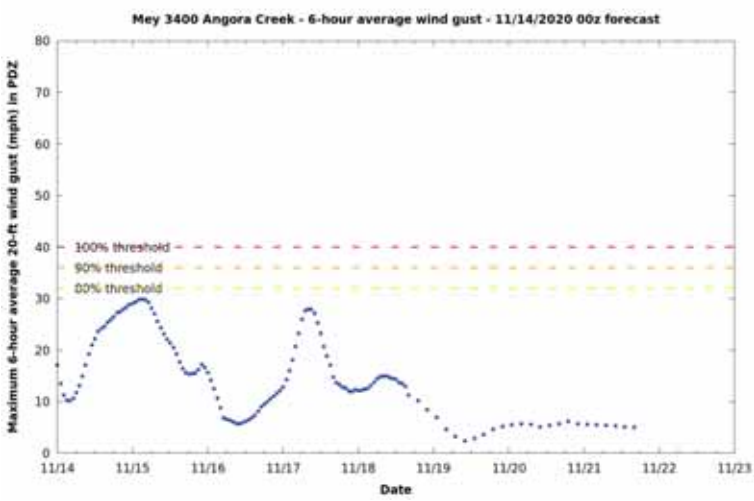
Cathedral Spring Creek Emerald Bay



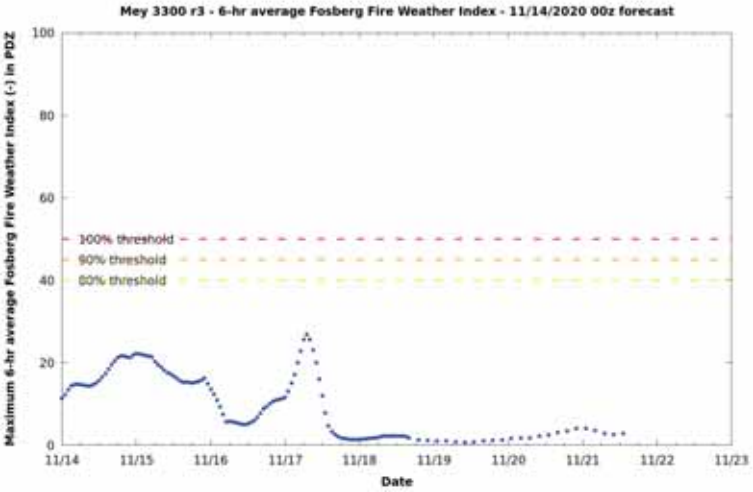


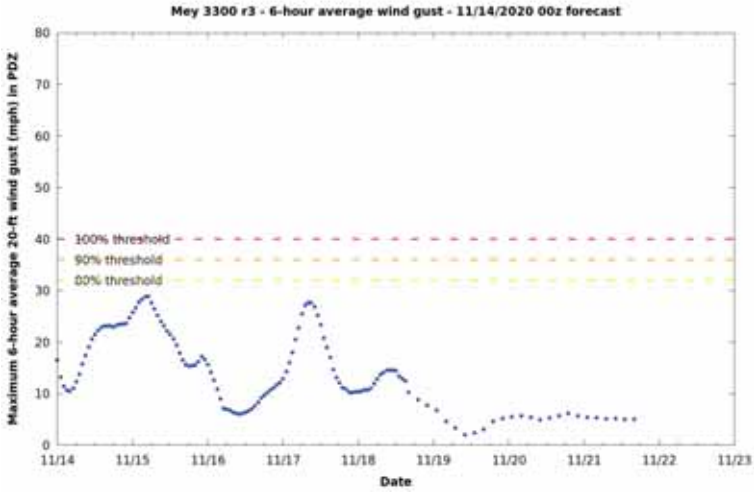
Mey 3400 Angora Creek



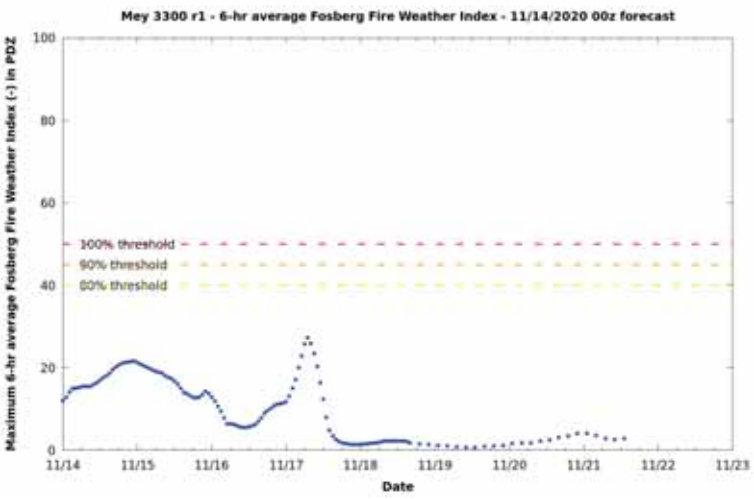


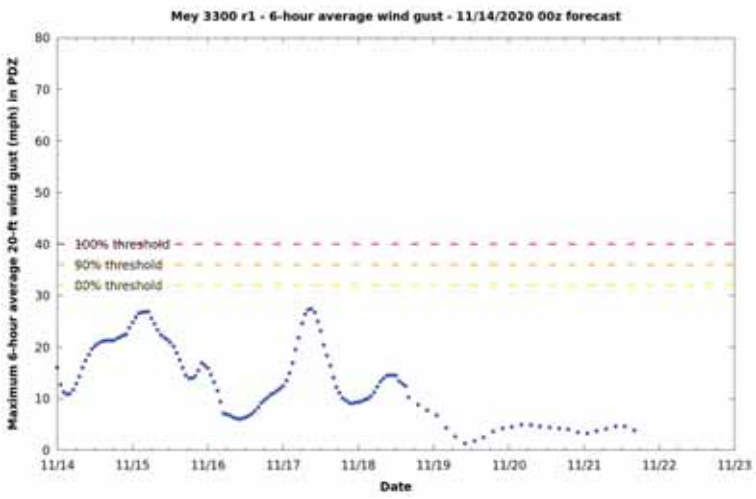
Mey 3300 r3



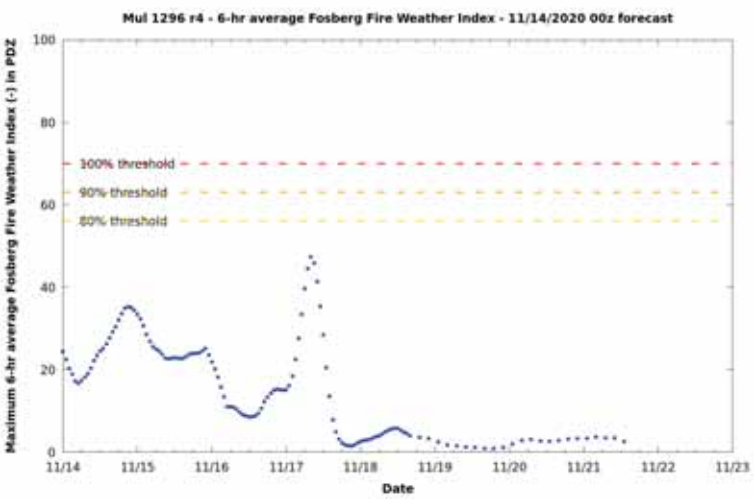


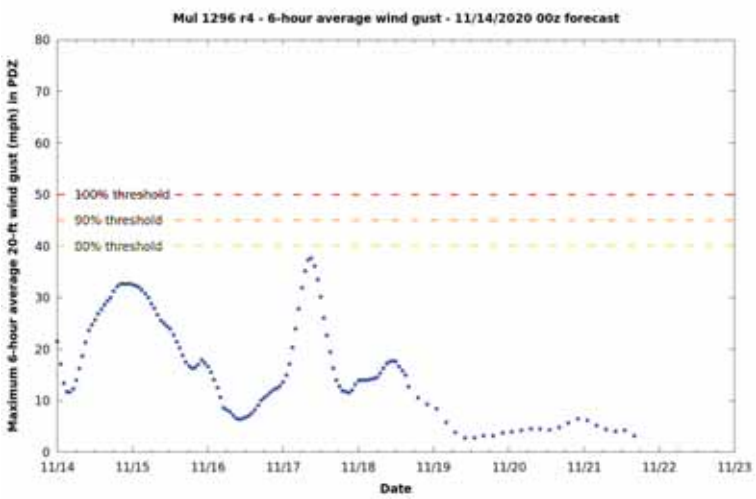
Mey 3300 r1



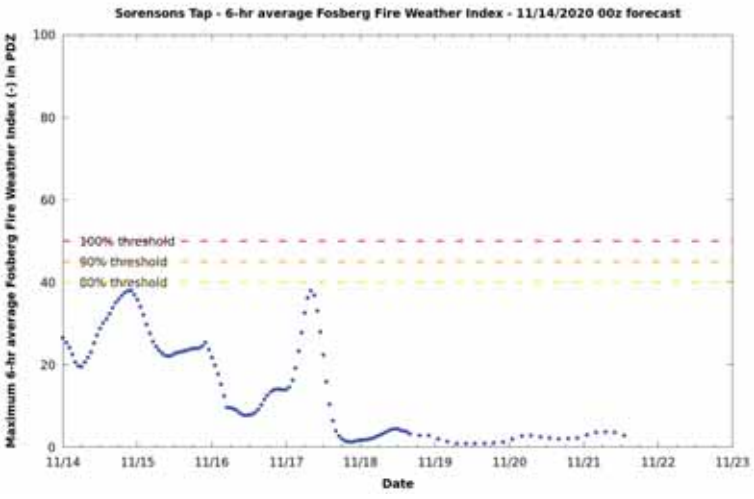


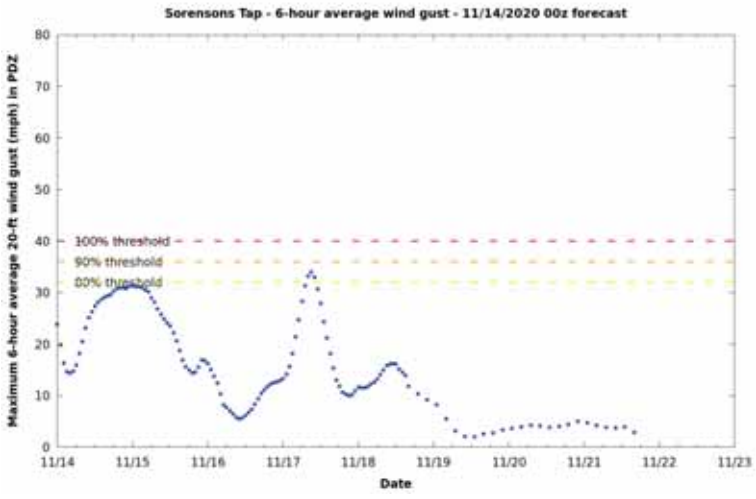
Mul 1296 r4



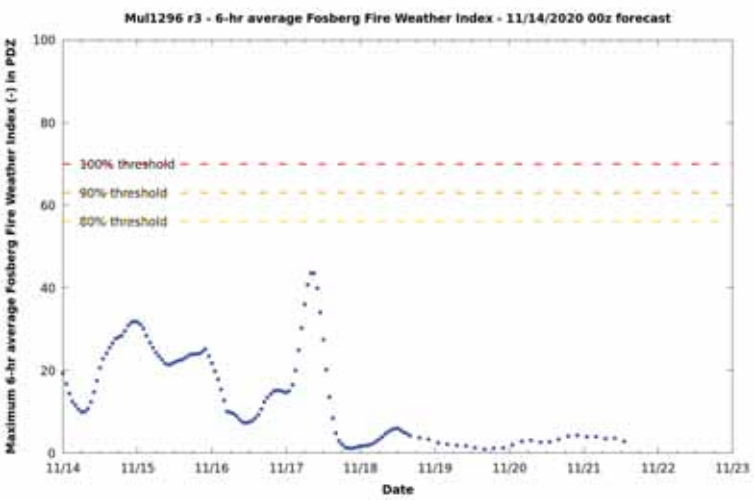


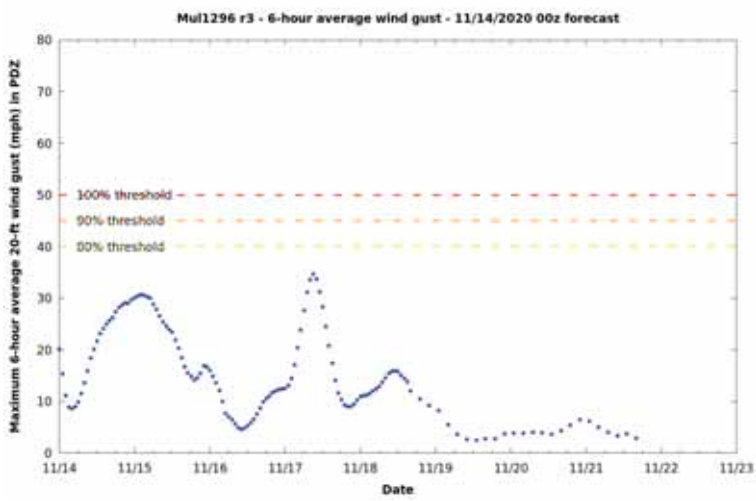
Sorensons Tap



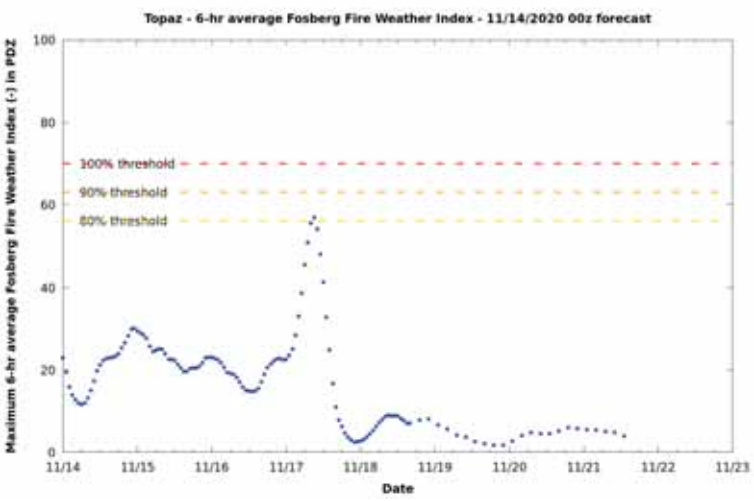


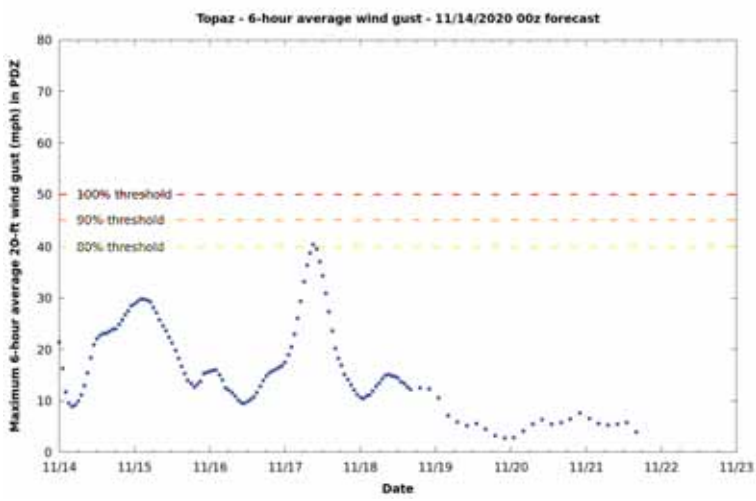
Mul 1296 r3



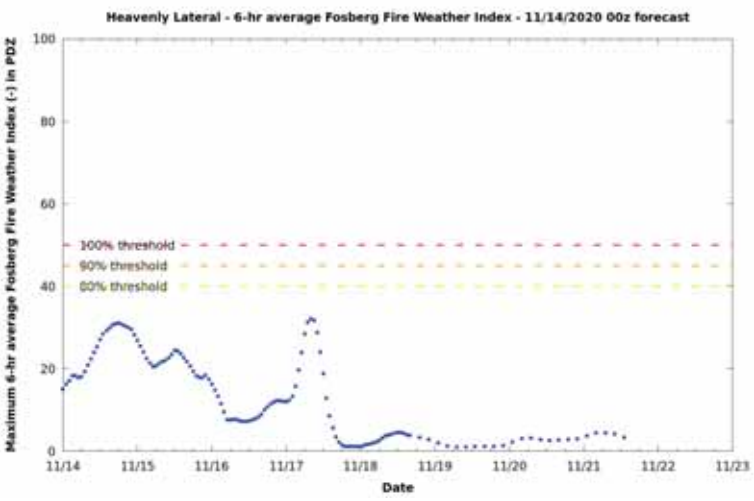


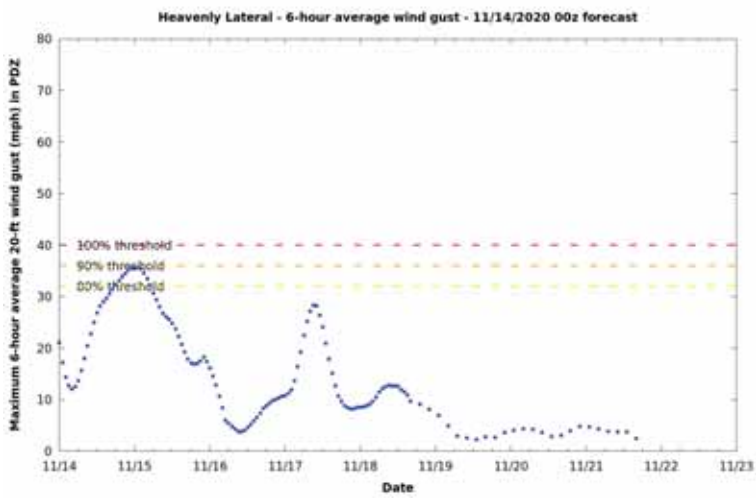
Topaz



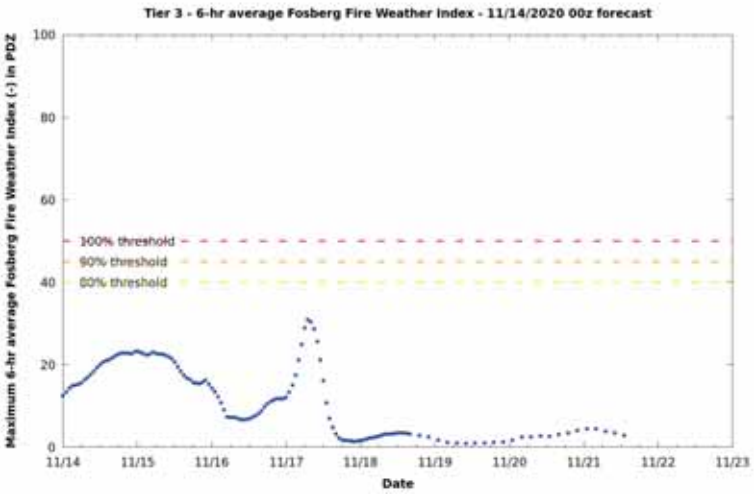


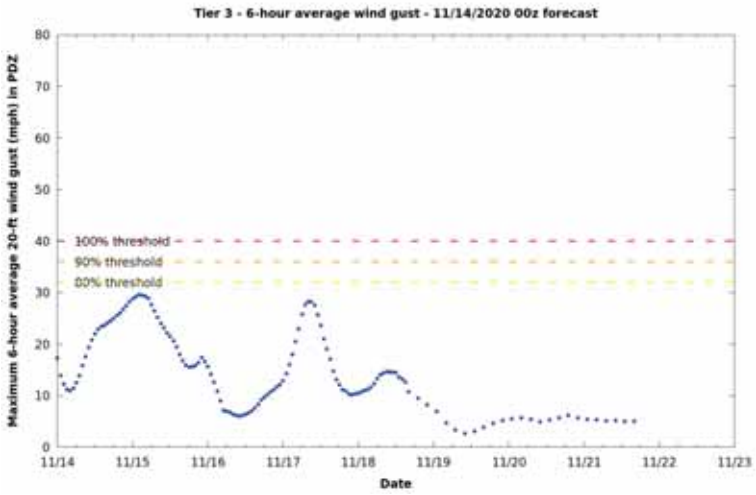
Heavenly Lateral



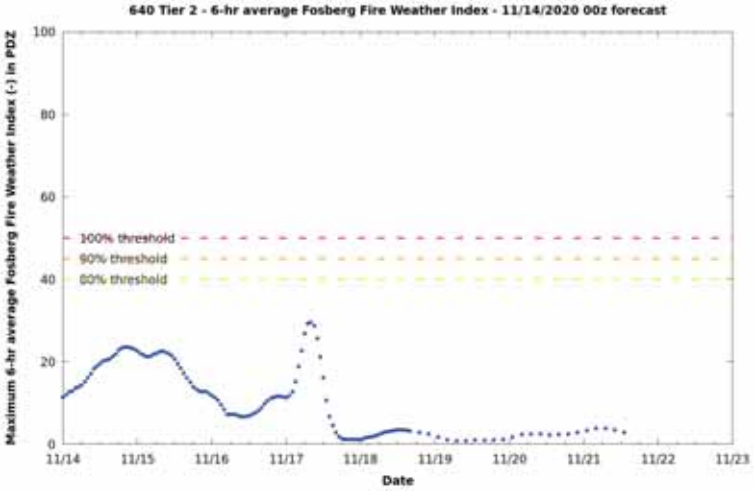


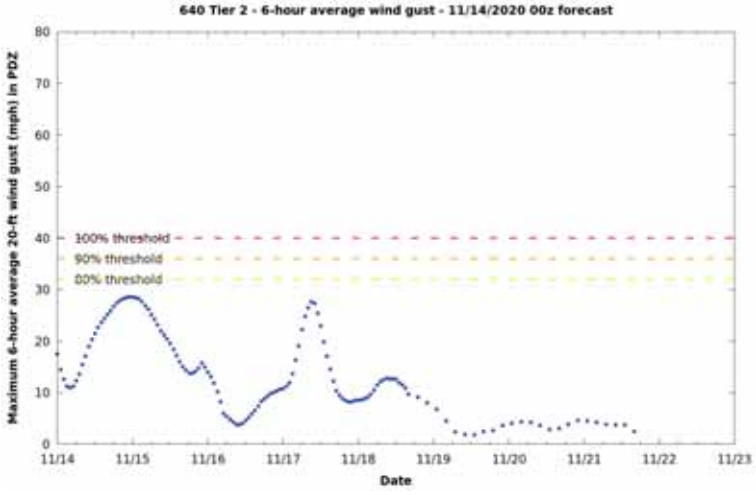
Tier 3



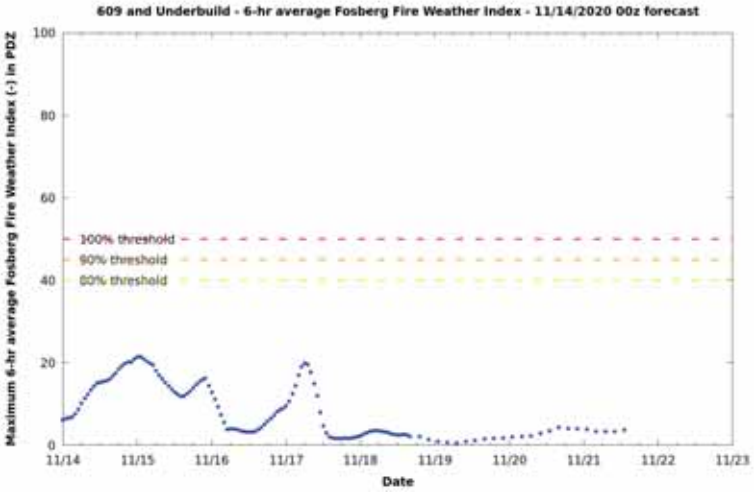


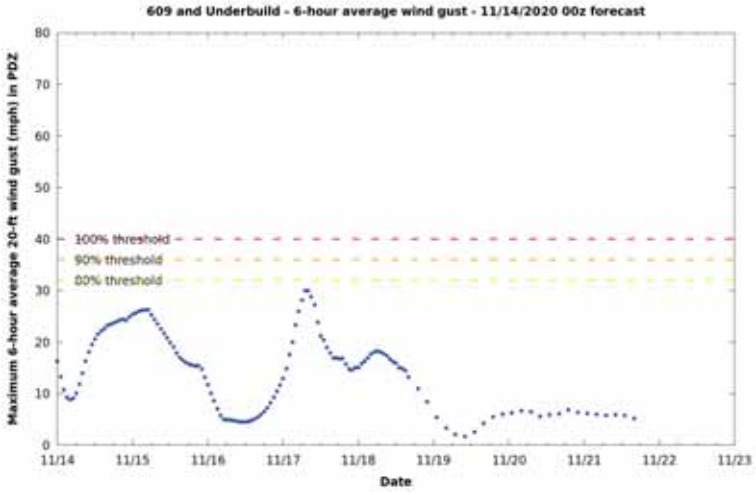
640 Tier 2



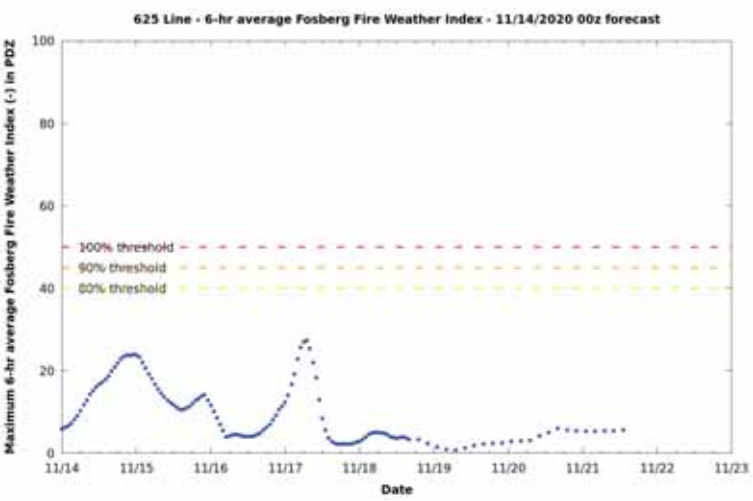


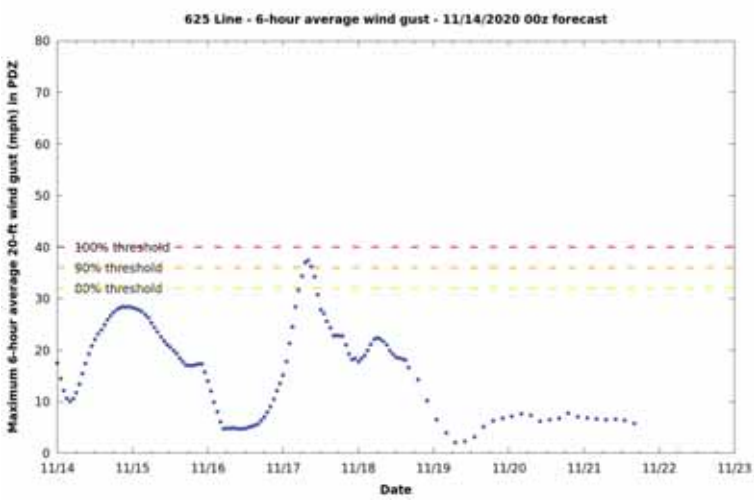
609 and Underbuild



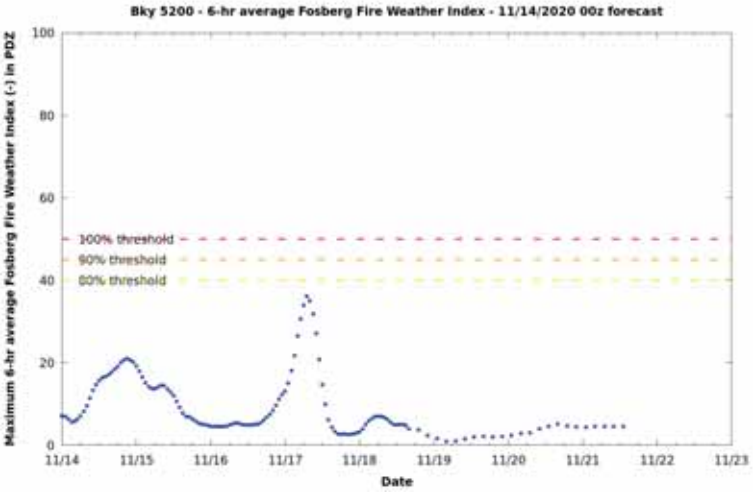


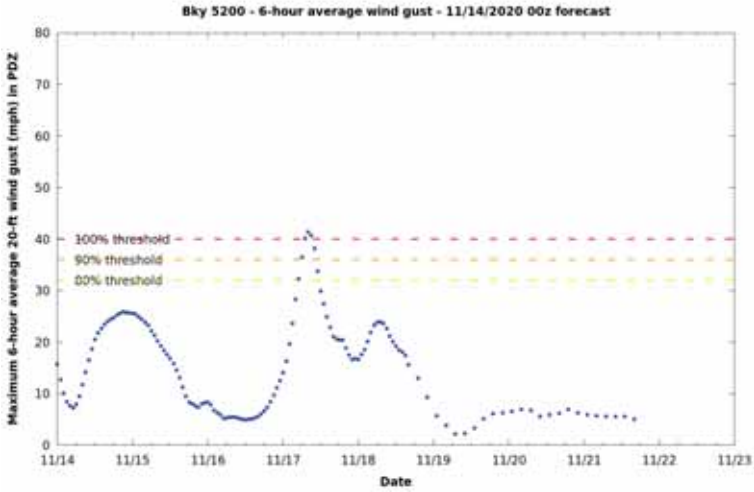
625 Line



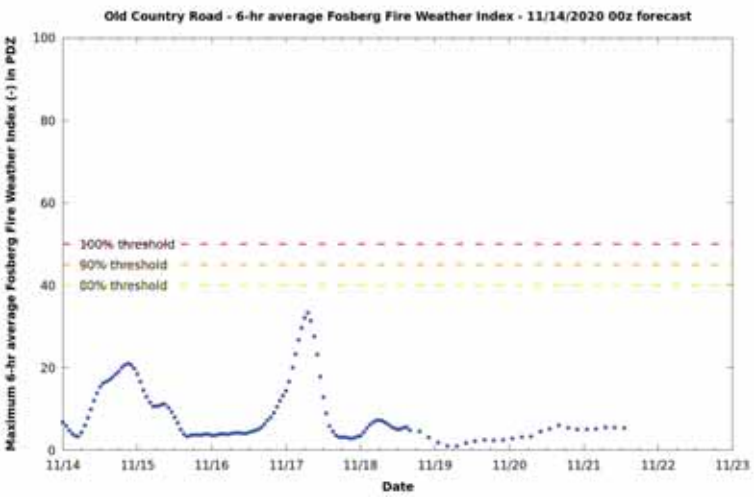


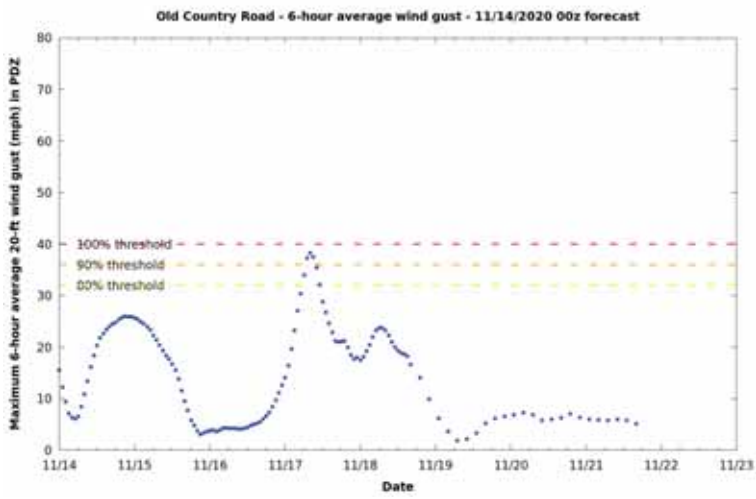
Bky 5200



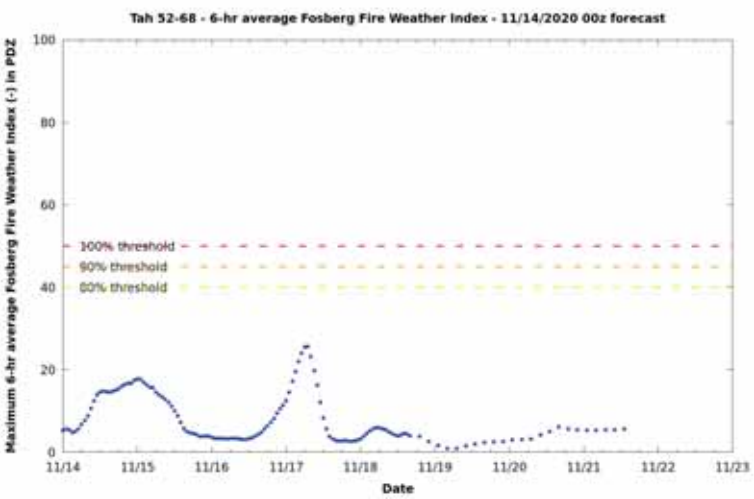


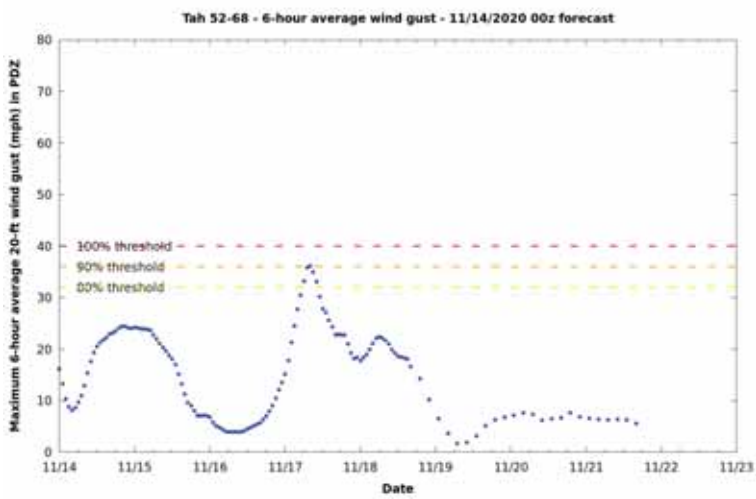
Old Country Road



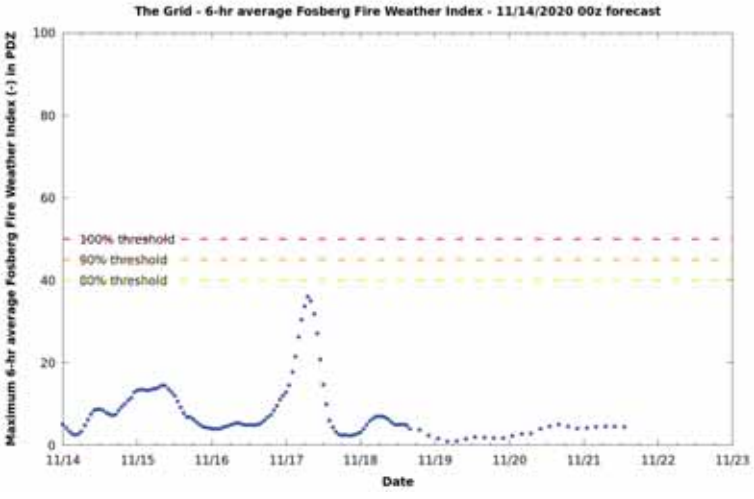


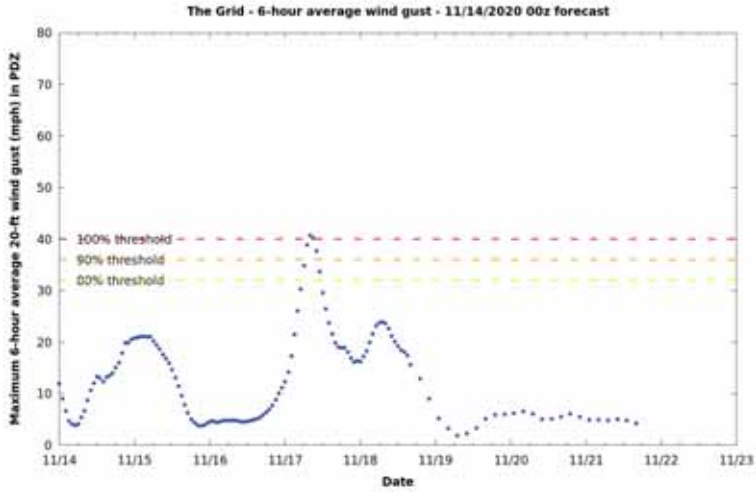
Tah 52-68



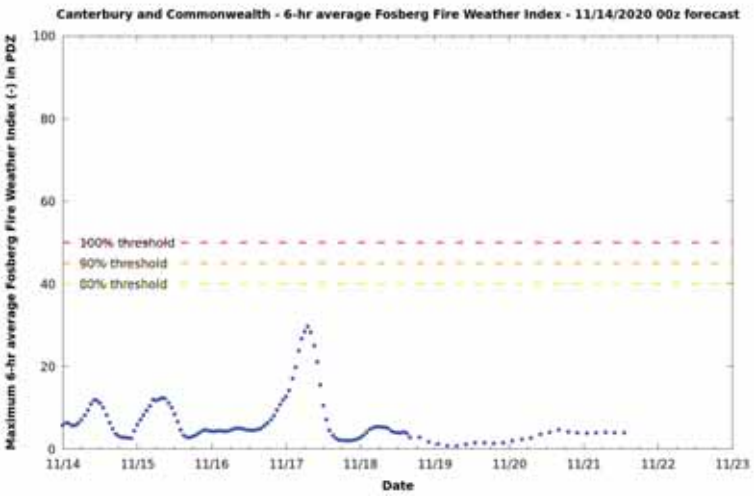


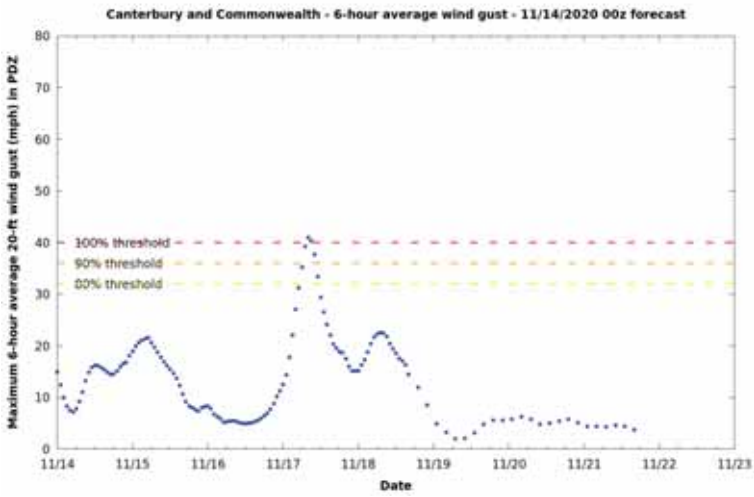
The Grid



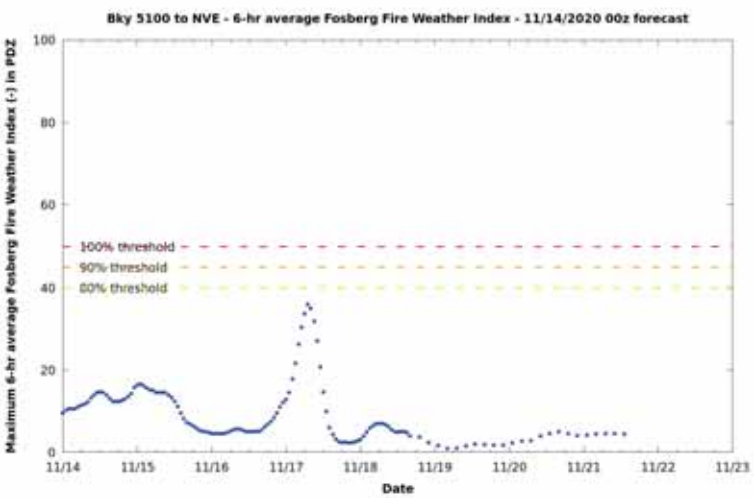


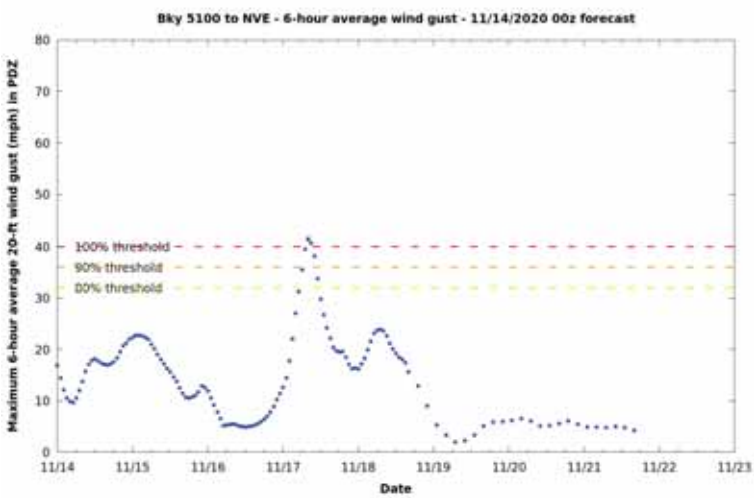
Canterbuy and Commonwealth



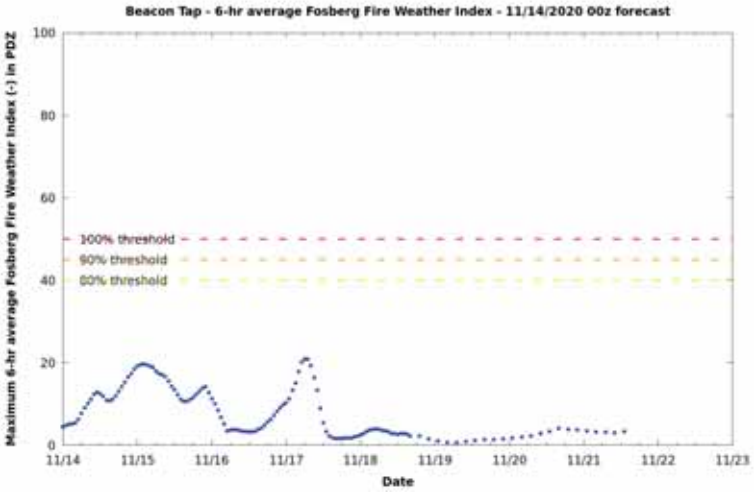


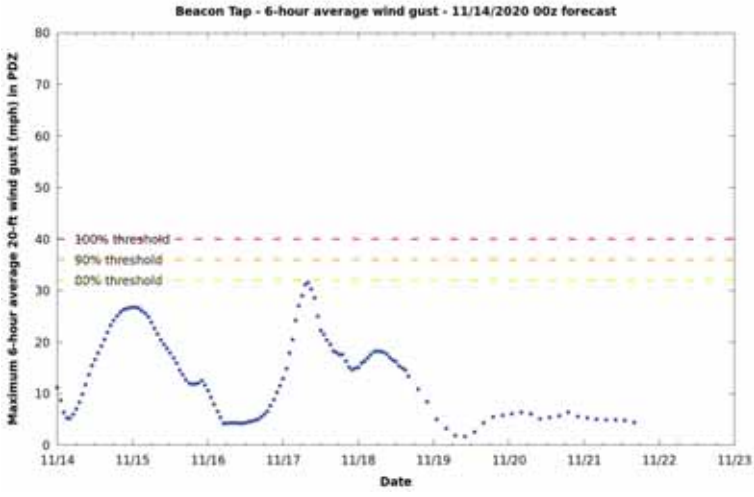
Bky 5100 to NVE



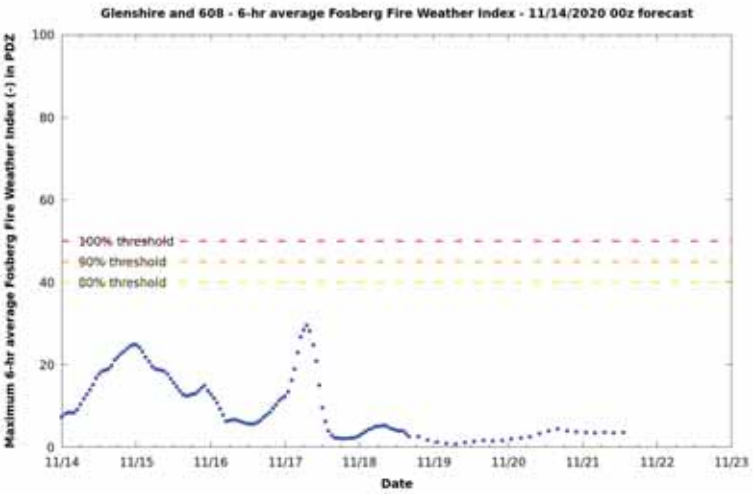


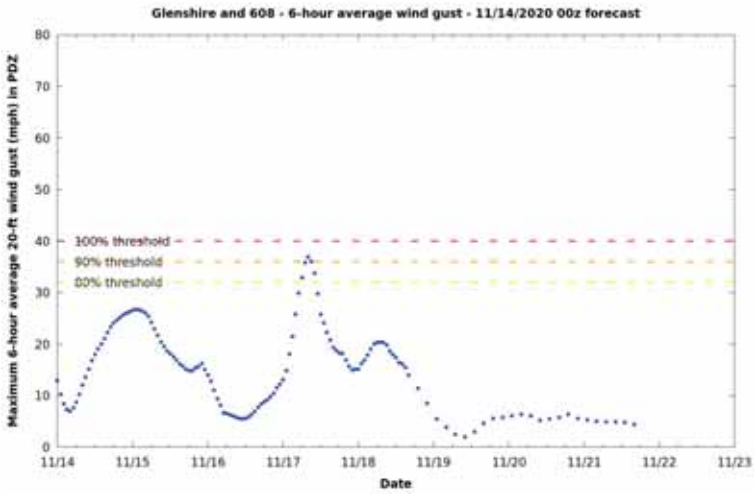
Beacon Tap



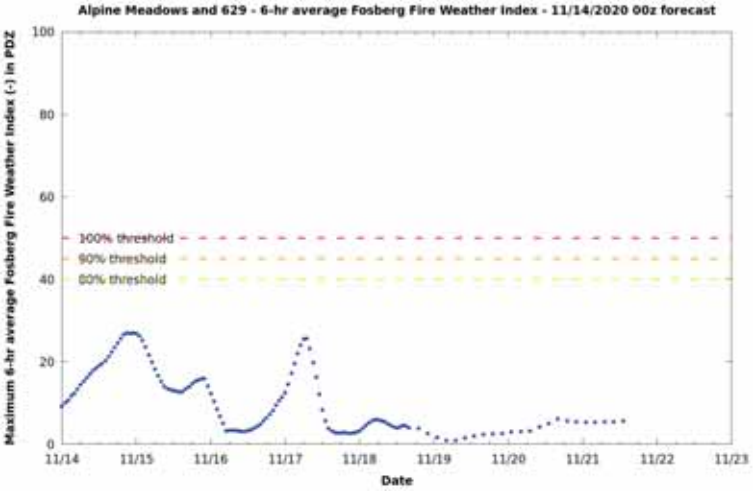


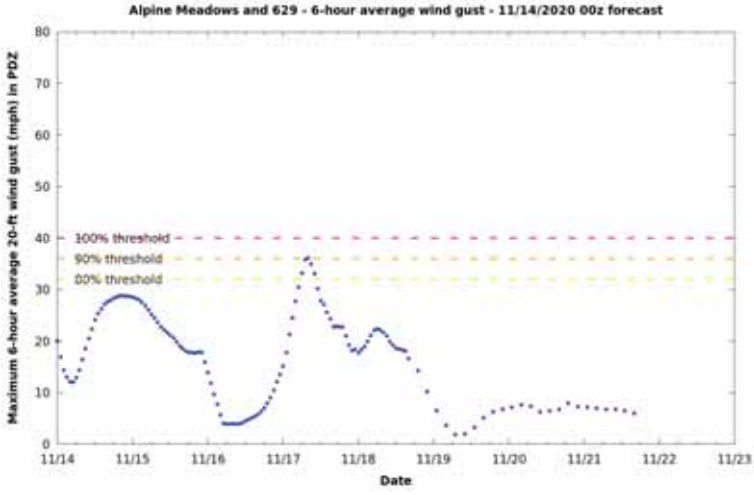
Glenshire and 608



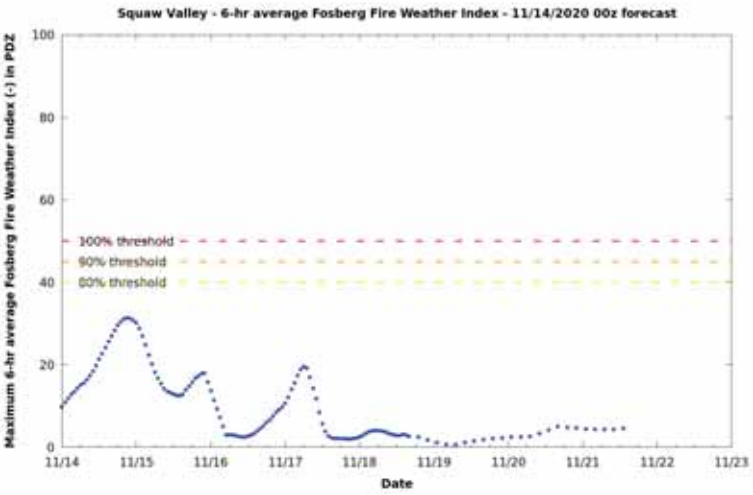


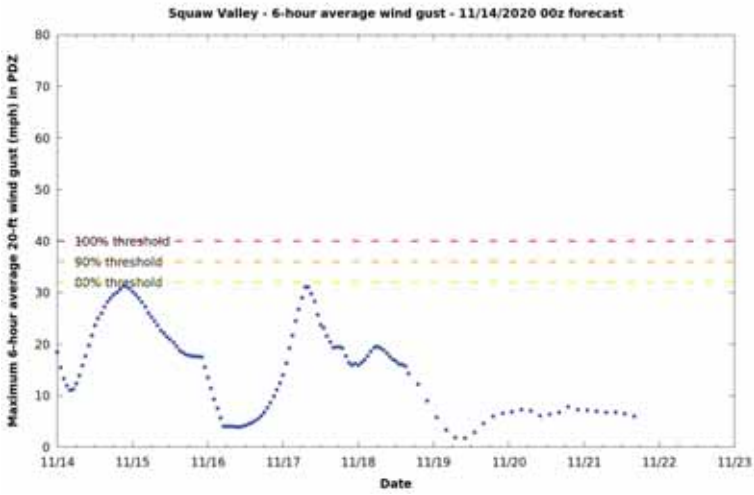
Alpine Meadows and 629



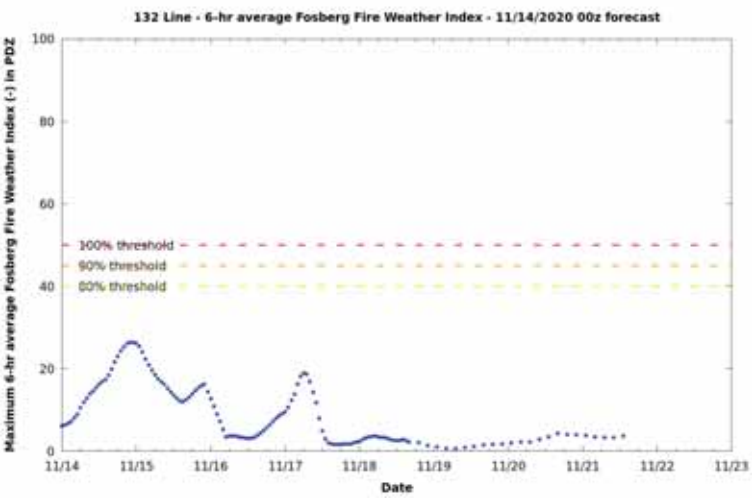


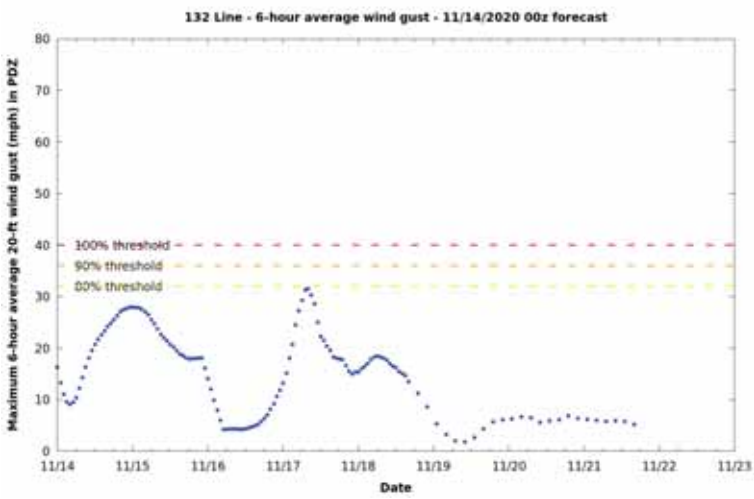
Squaw Valley



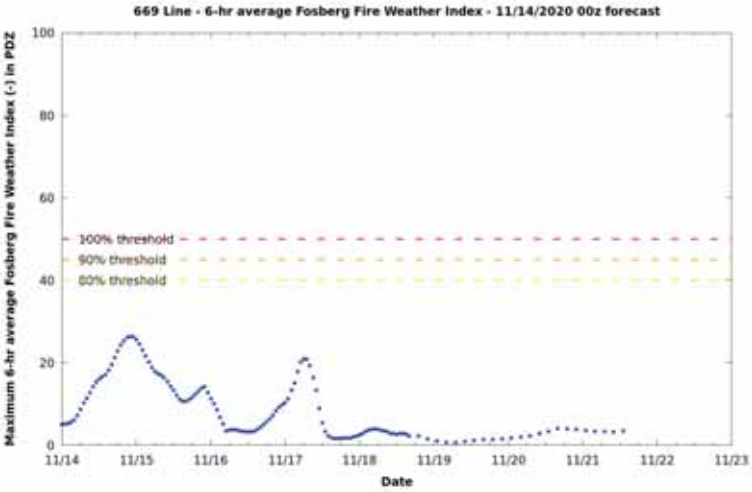


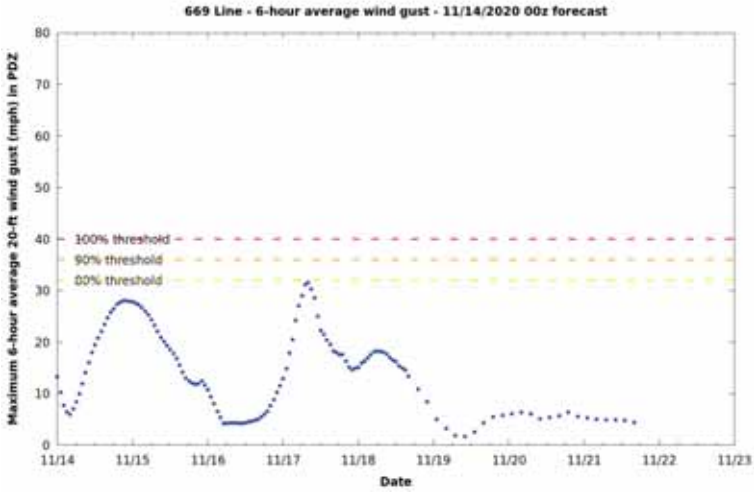
132 Line



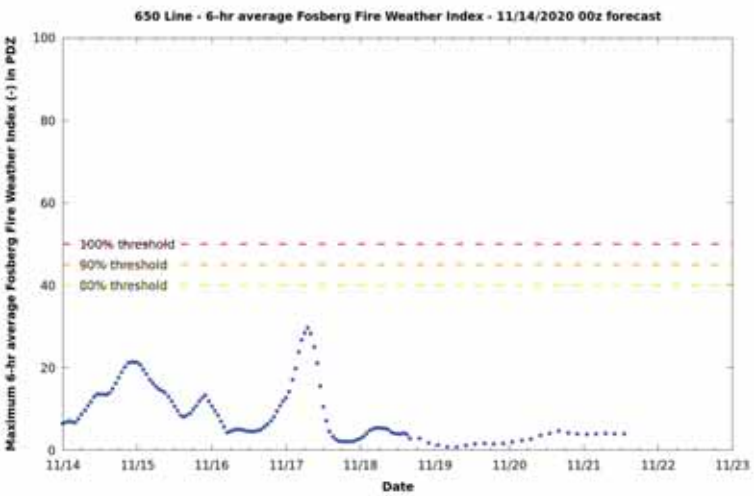


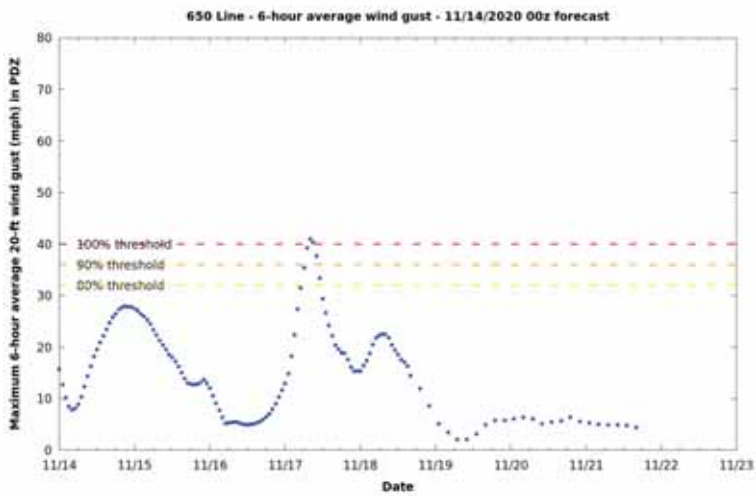
669 Line



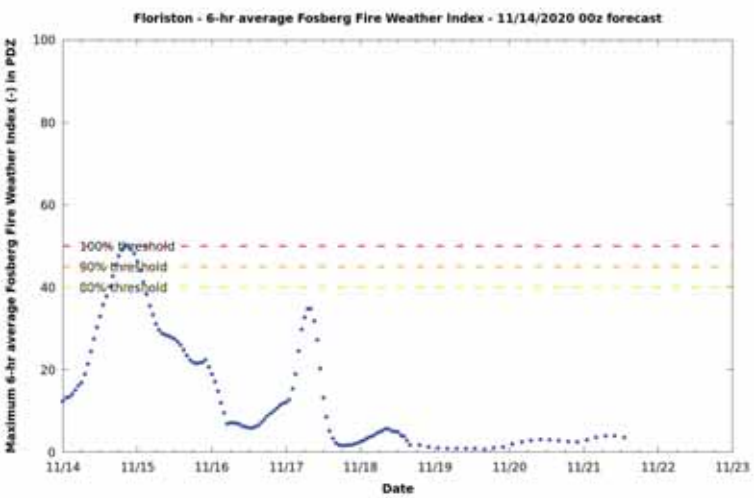


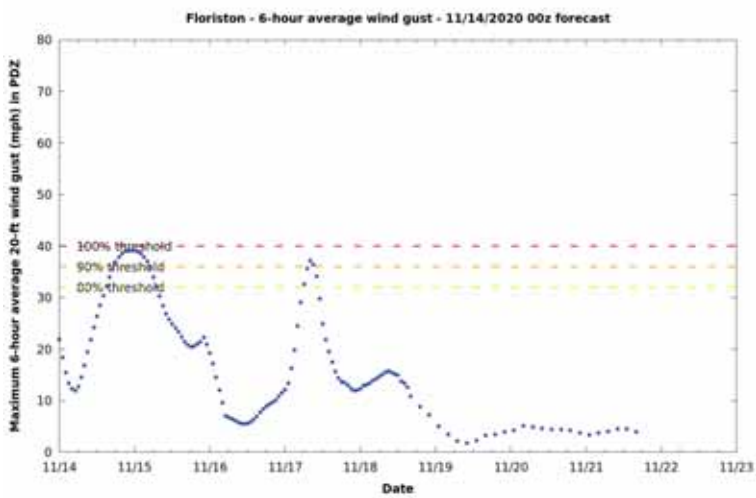
650 Line



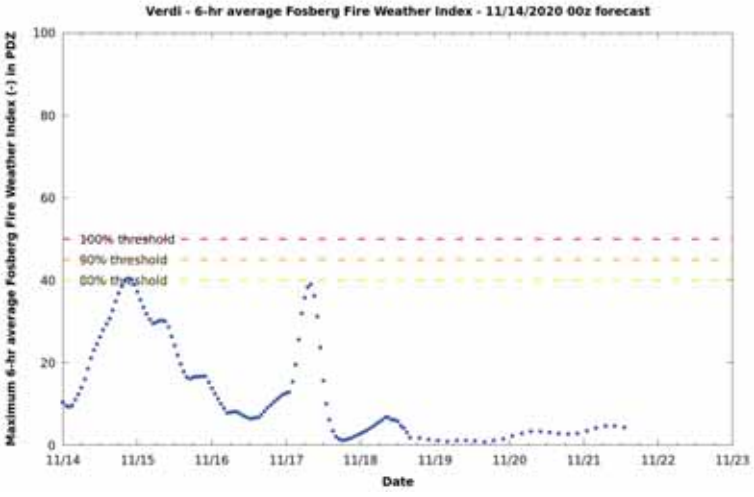


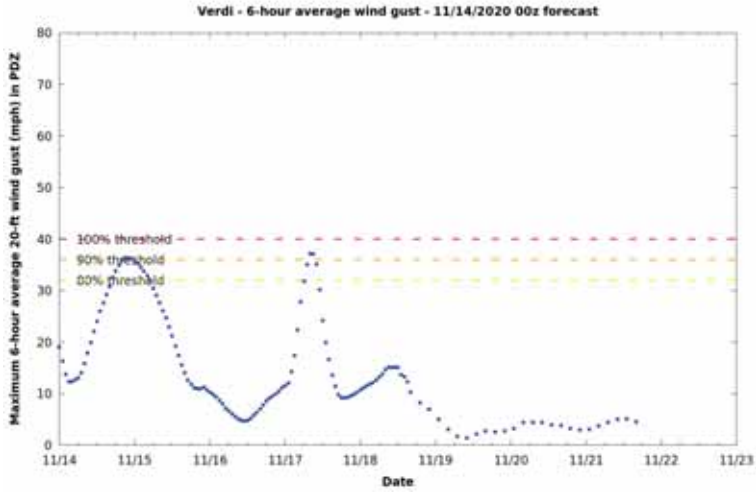
Floriston



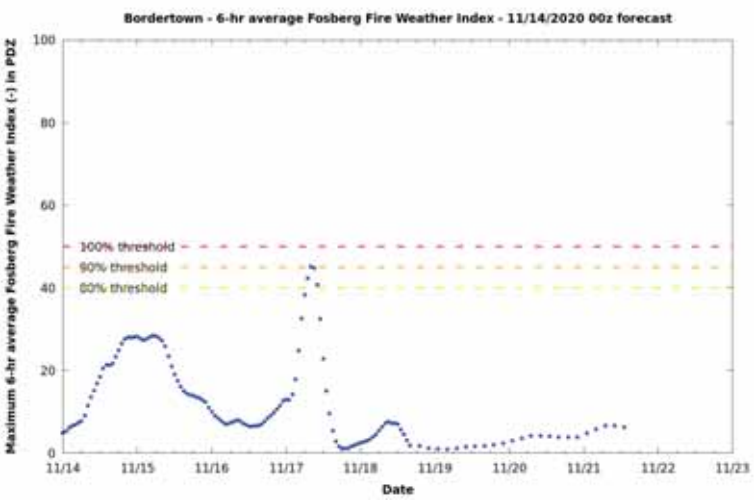


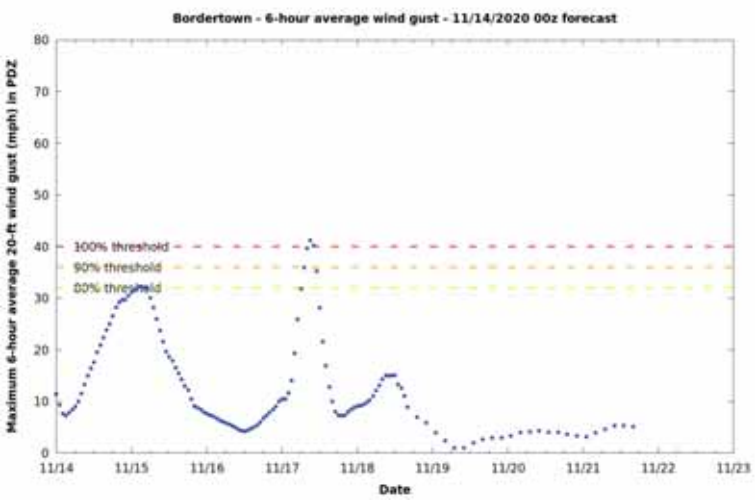
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/14/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/14/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/14/20 - 11/20/20

Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

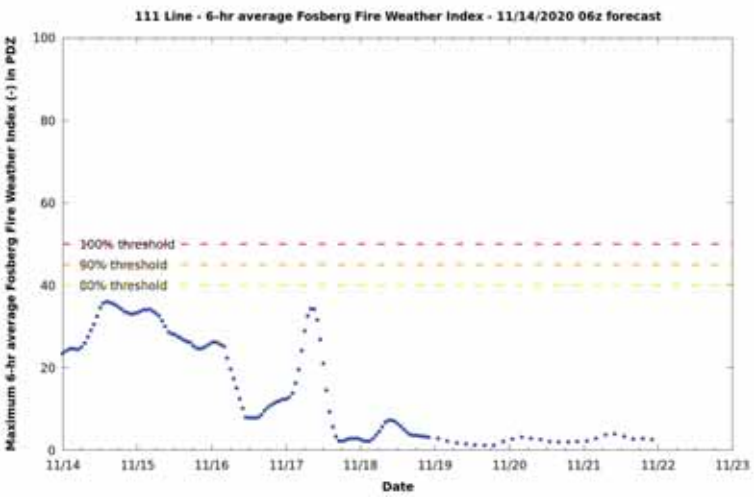
Liberty Utilities Energy Release Component Forecast for 11/14/20 - 11/20/20

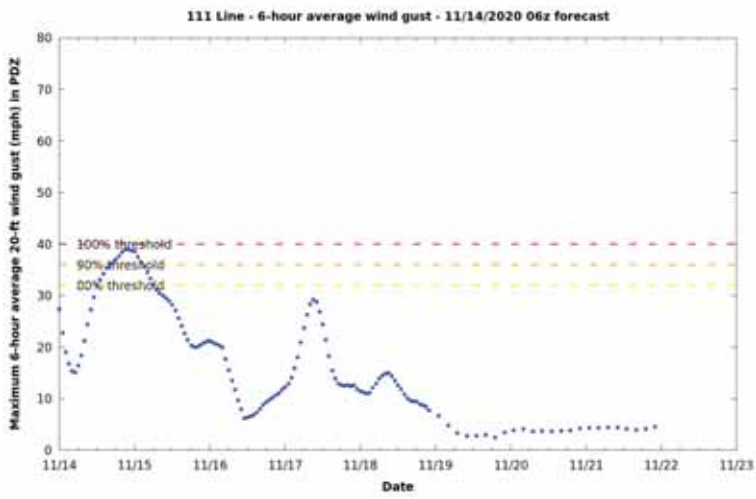
Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	57.0	57.0	55.0	51.0	56.0	58.0	55.0
Sierra Brooks	58.0	61.0	58.0	55.0	61.0	62.0	62.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	57.0	57.0	51.0	43.0	48.0	42.0	35.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	56.0	56.0	53.0	50.0	56.0	57.0	57.0

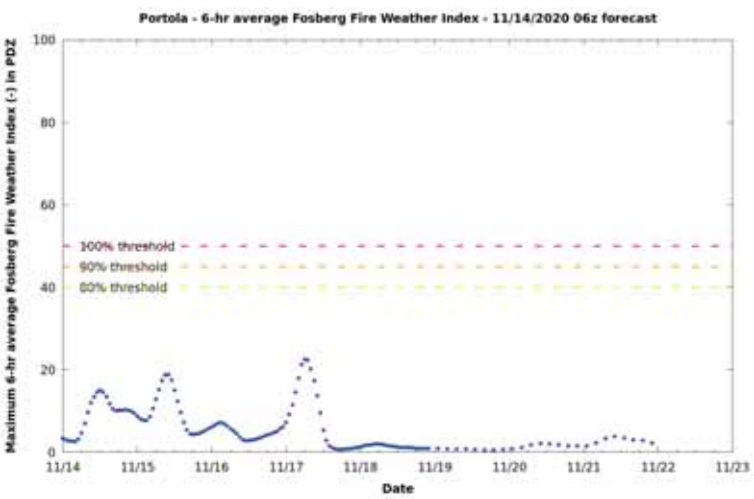
Liberty Utilities Fire Weather Summary Plots - 11/14/2020 06z forecast

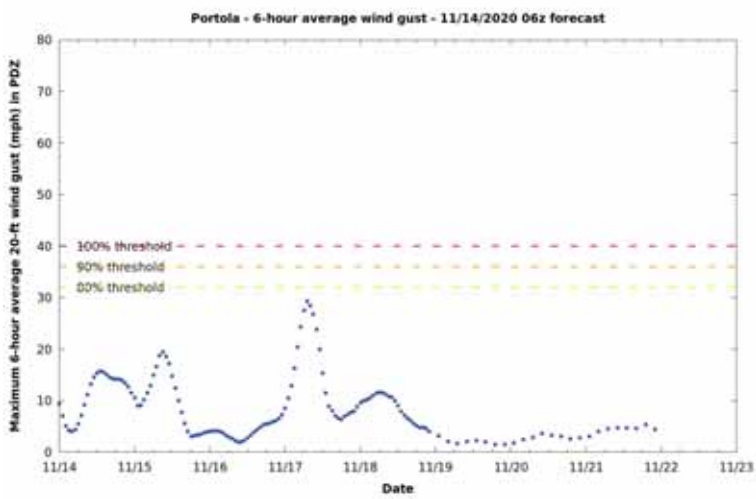
111 Line



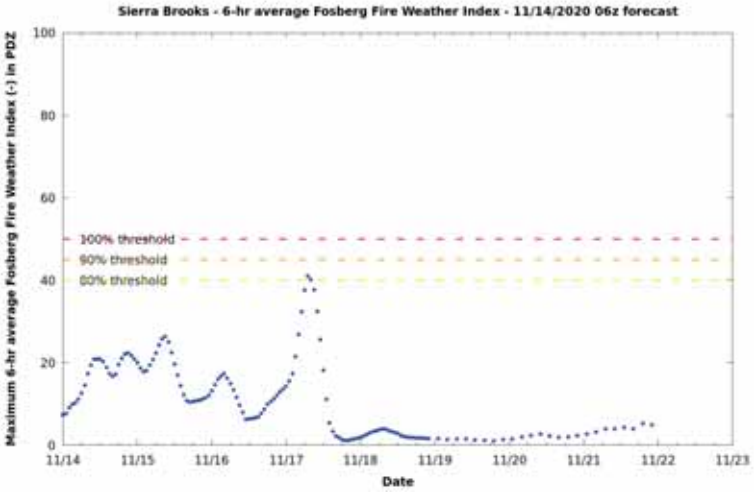


Portola



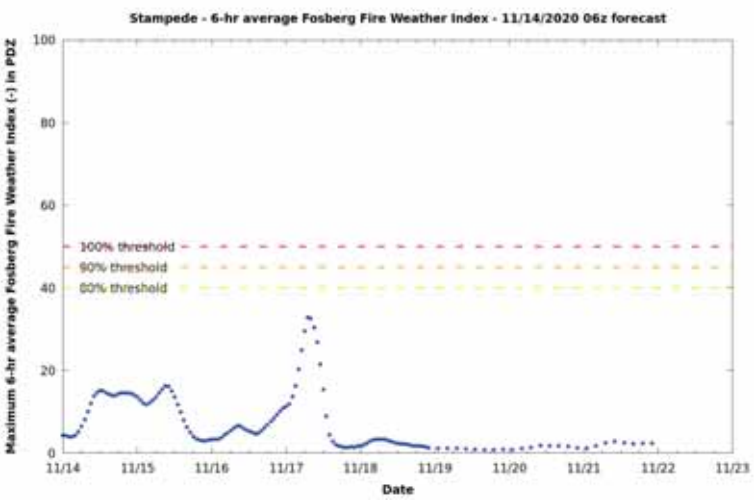


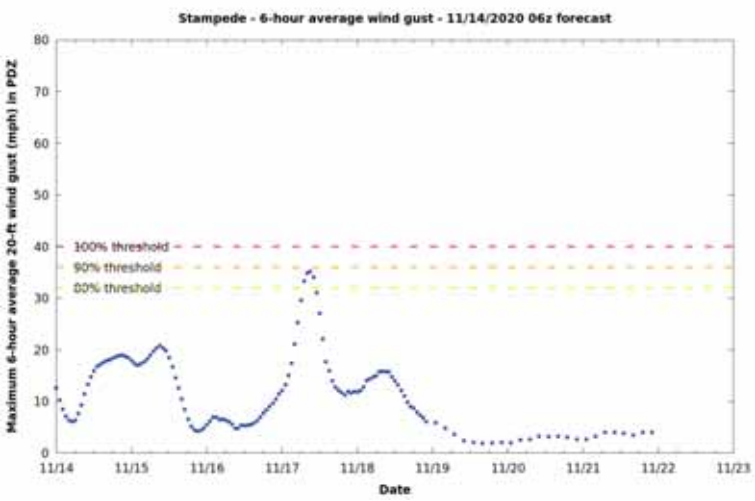
Sierra Brooks



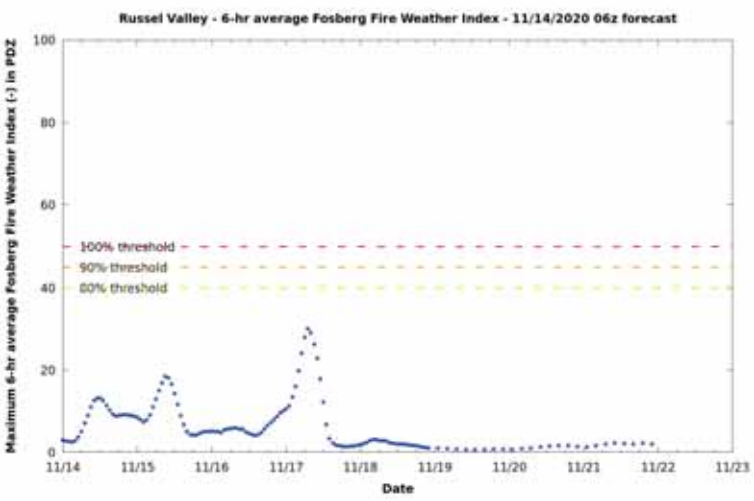


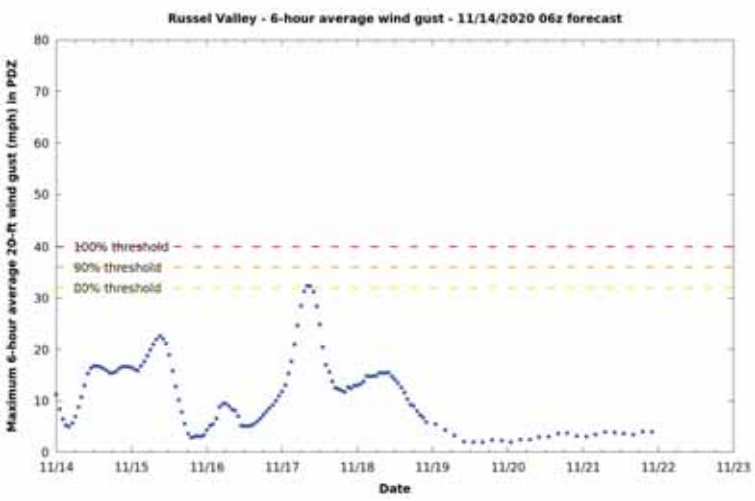
Stampede



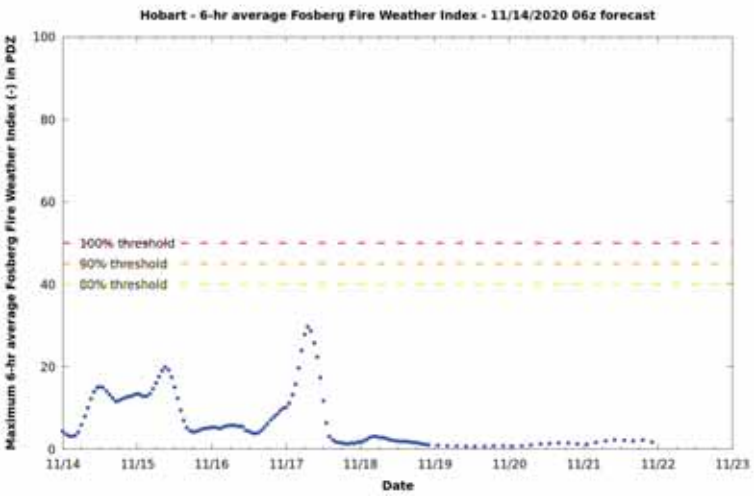


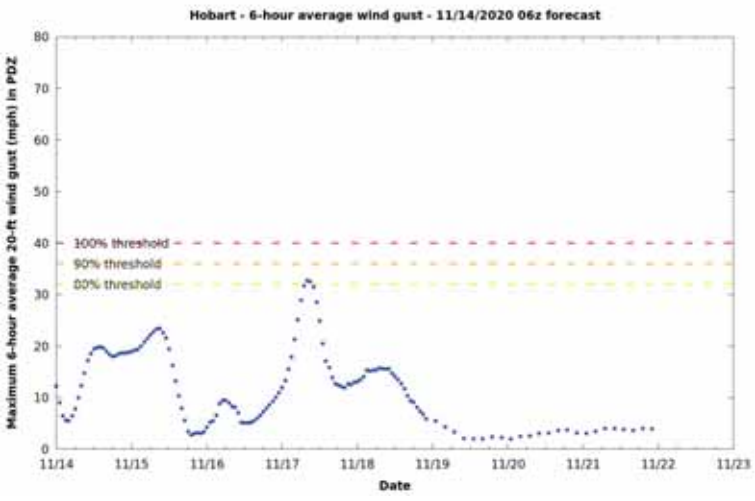
Russell Valley



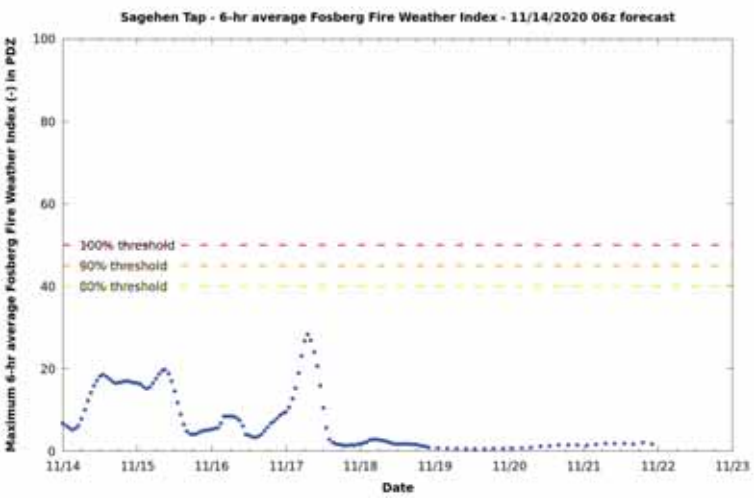


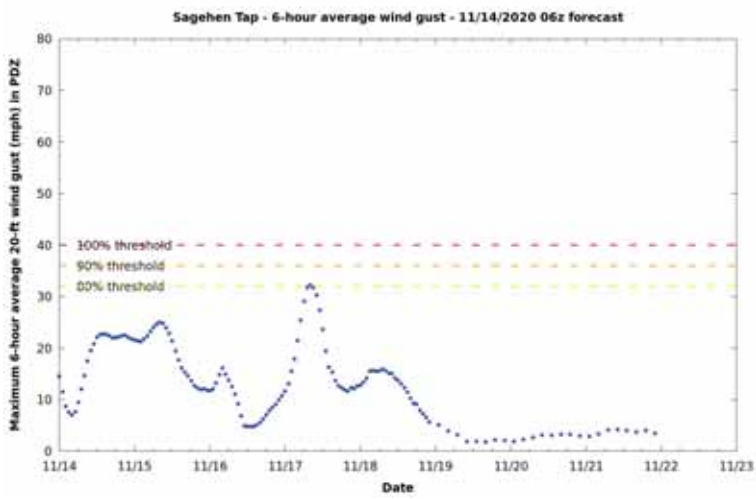
Hobart



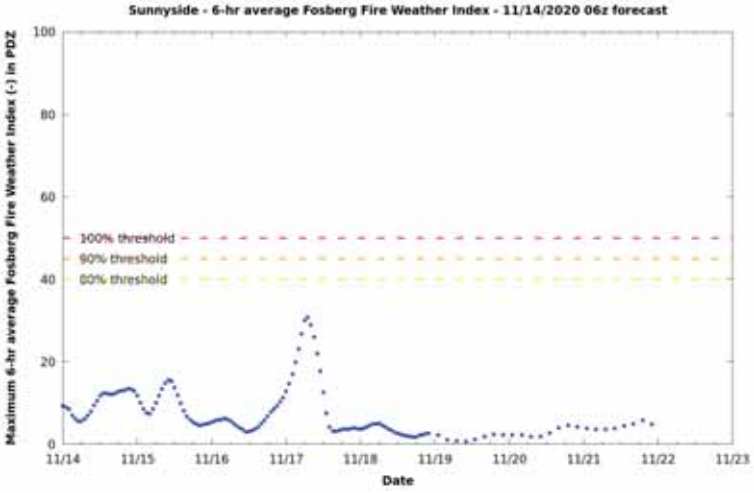


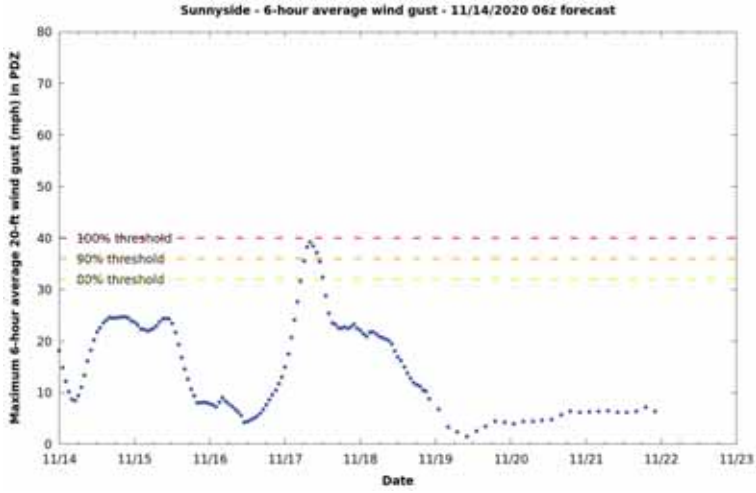
Sagehen tap



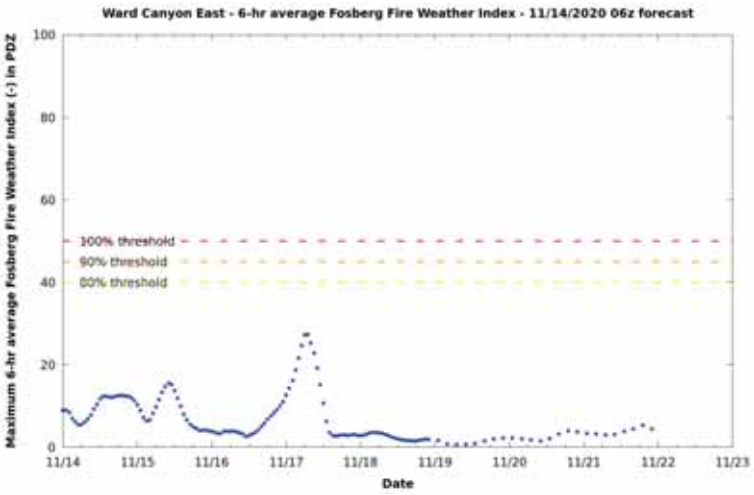


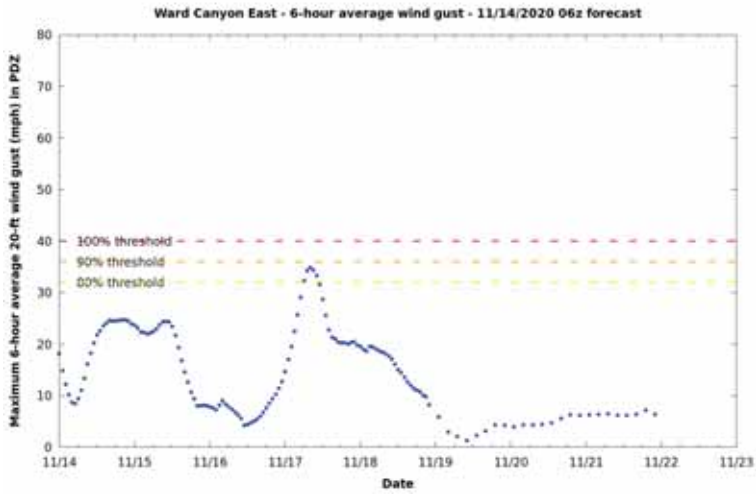
Sunnyside



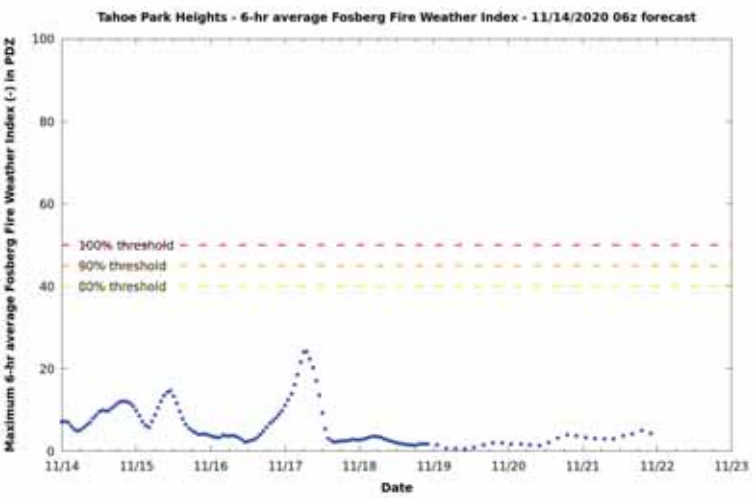


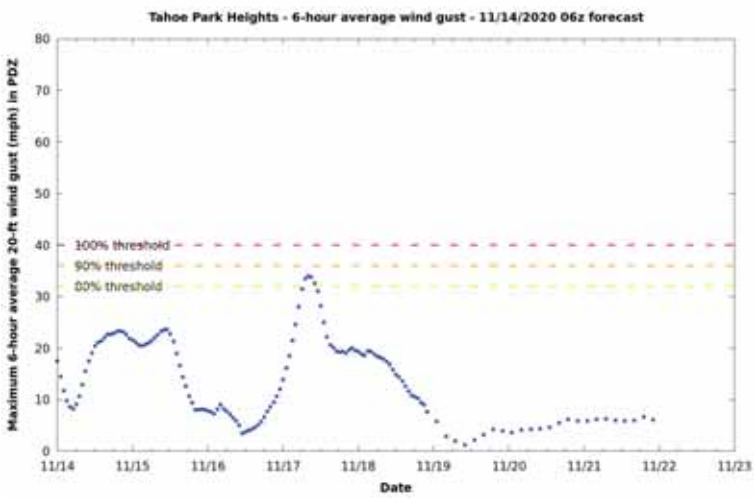
Ward Canyon East



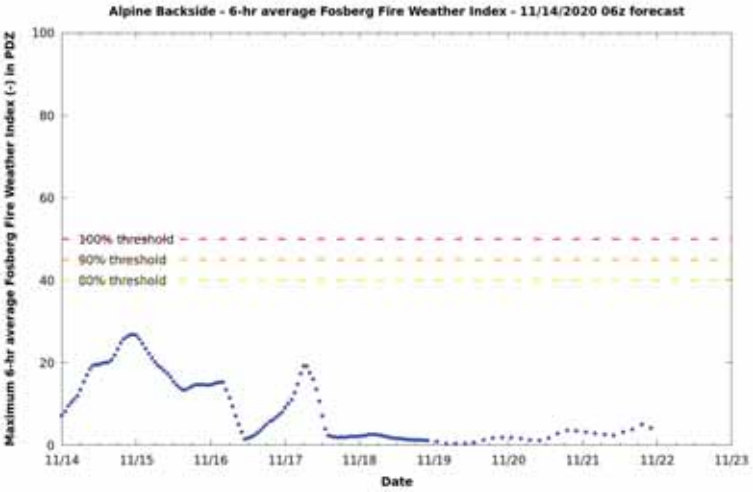


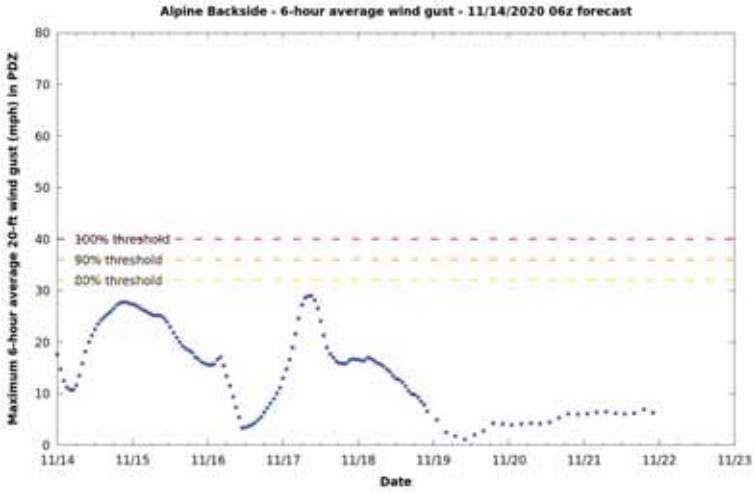
Tahoe Park Heights



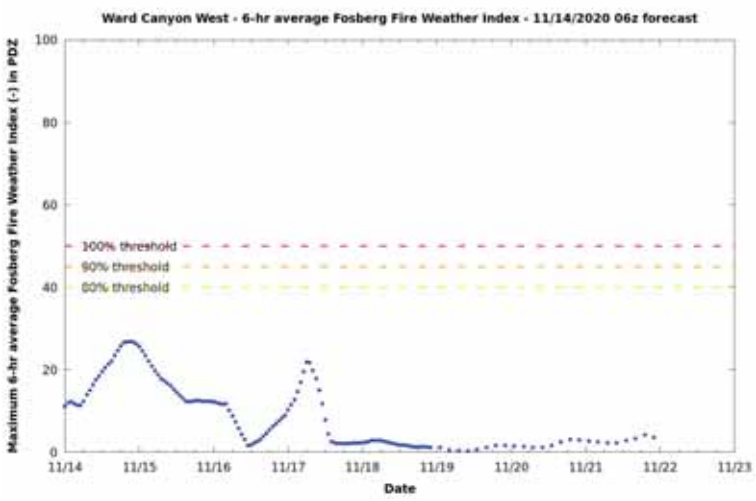


Alpine Backside



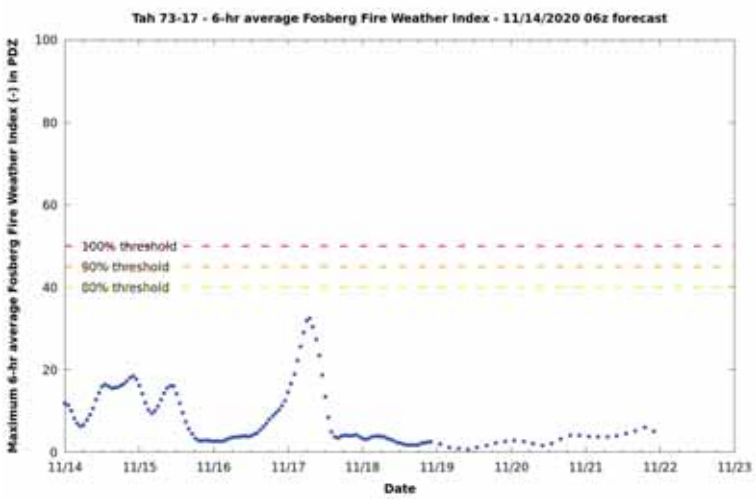


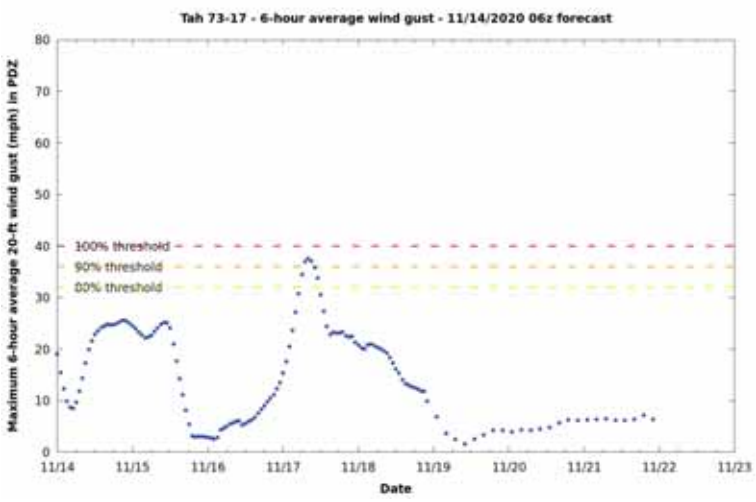
Ward Canyon West



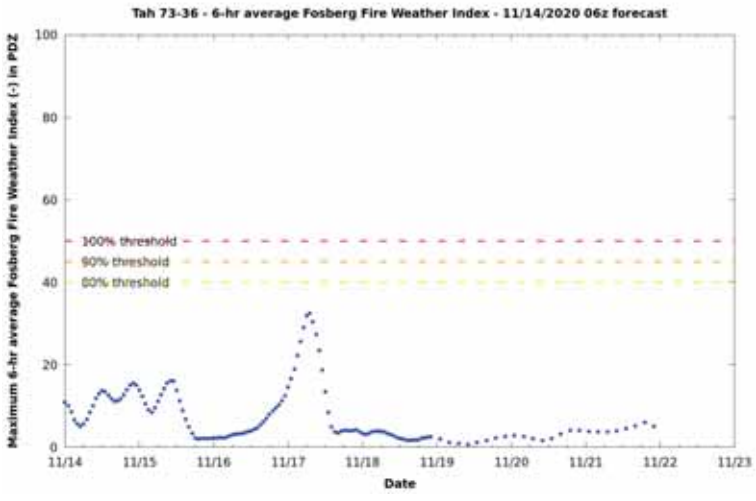


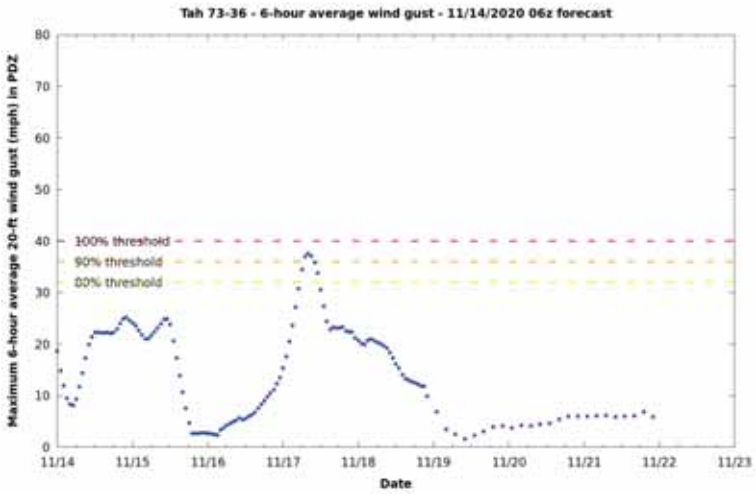
Tah 73-17



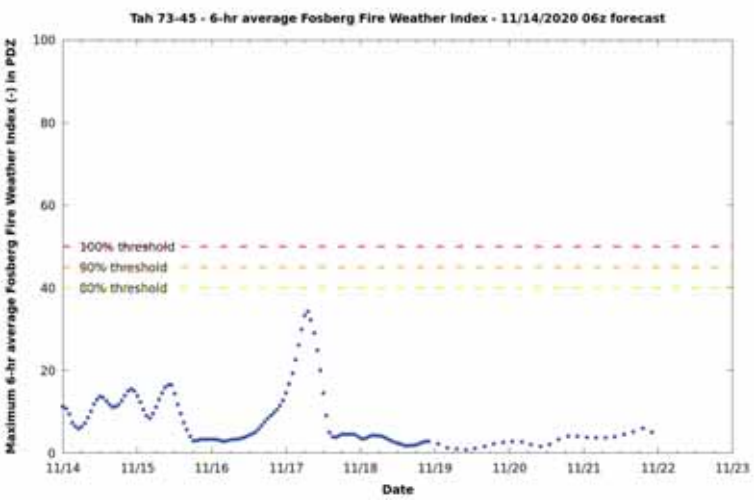


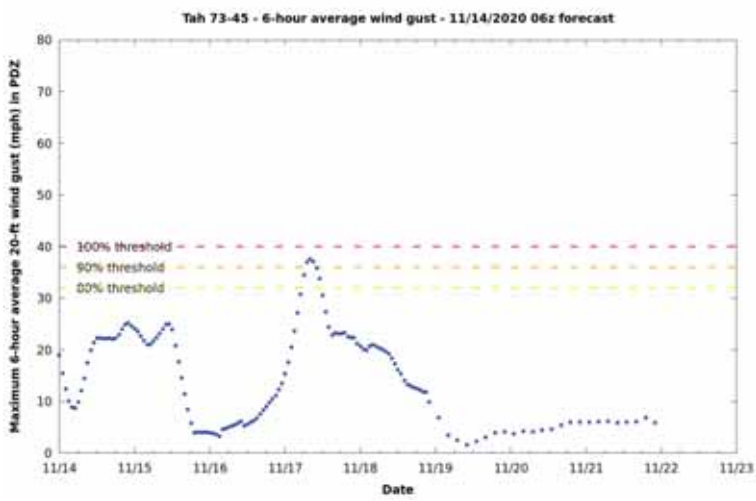
Tah 73-36



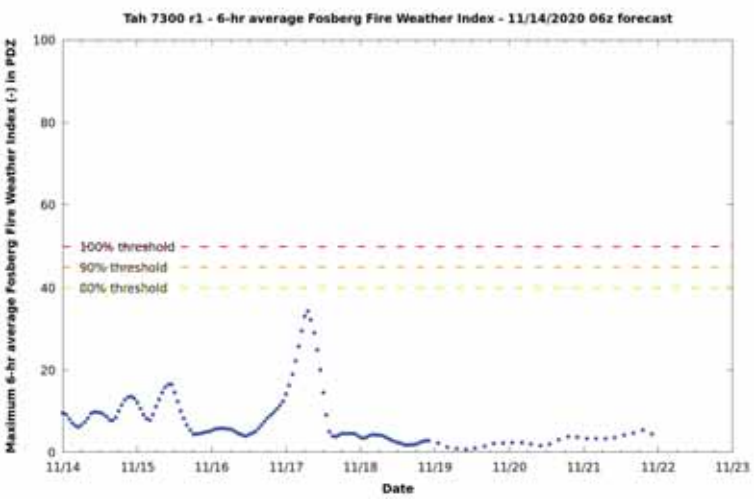


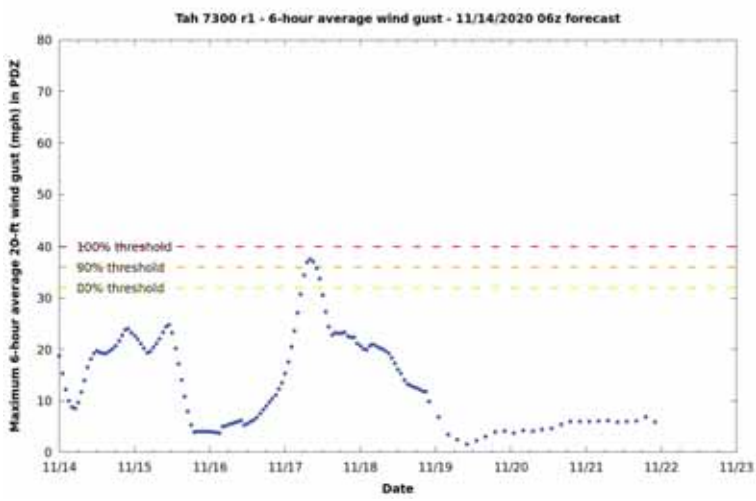
Tah 73-45



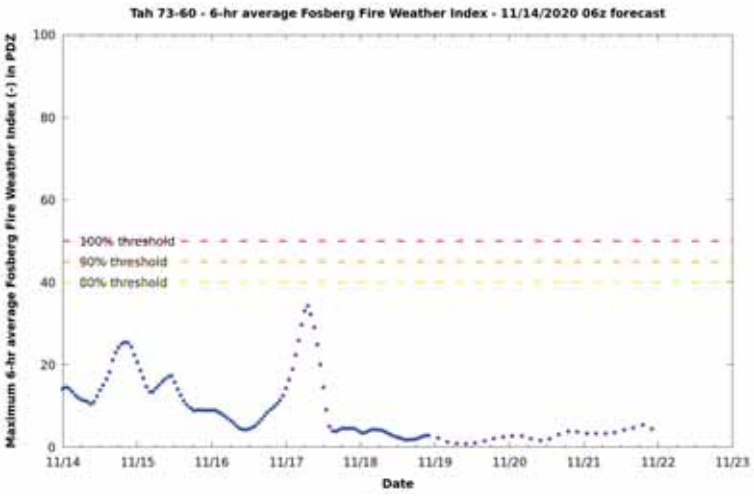


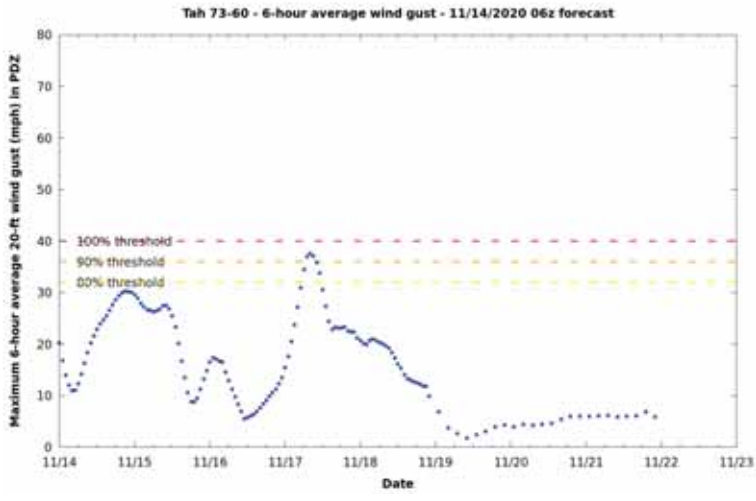
Tah 7300 r1



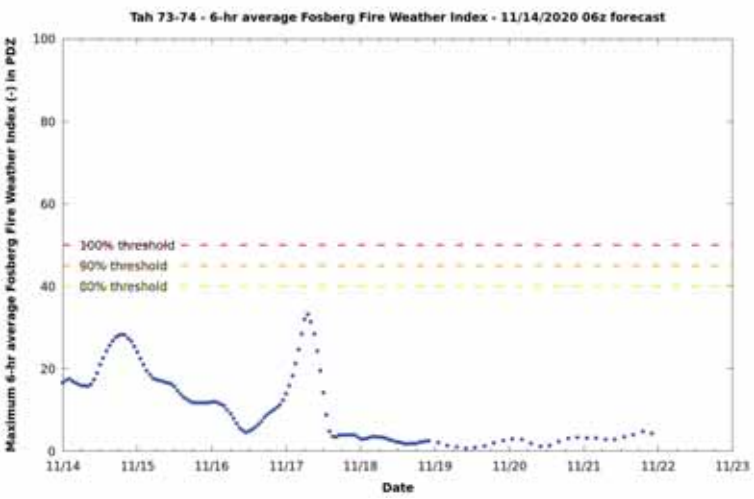


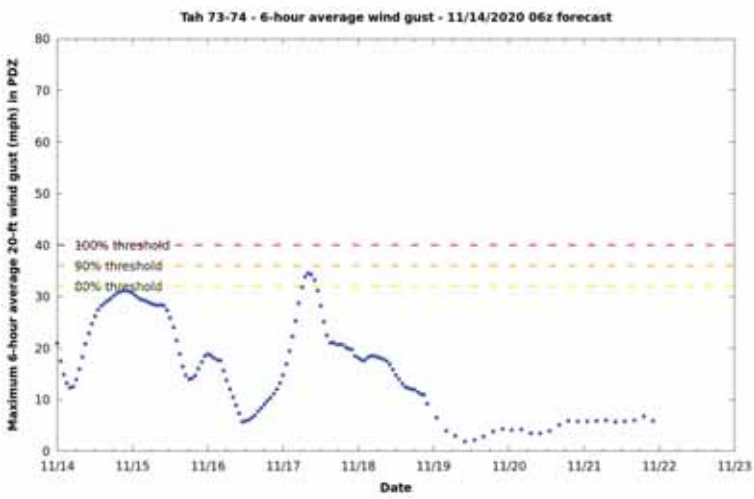
Tah 73-60



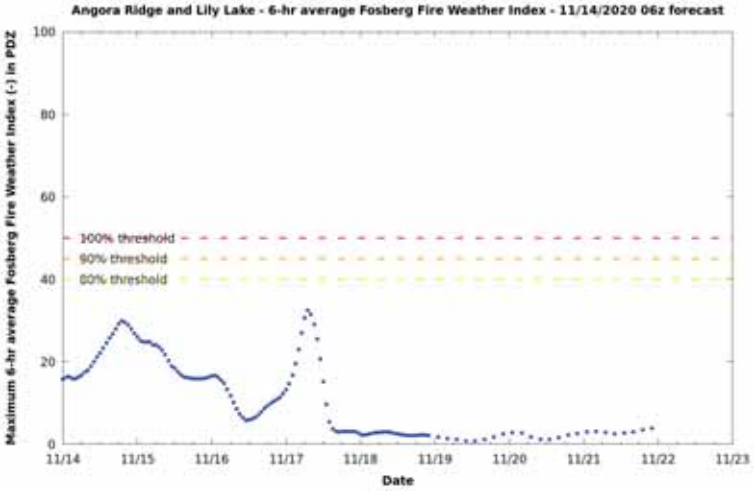


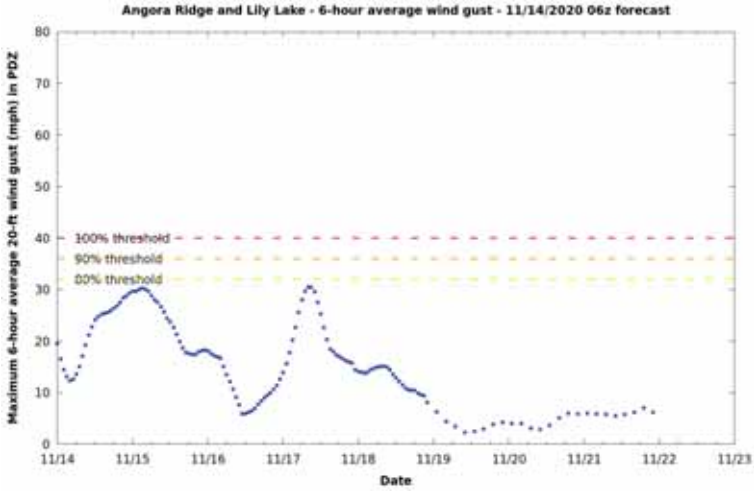
Tah 73-74



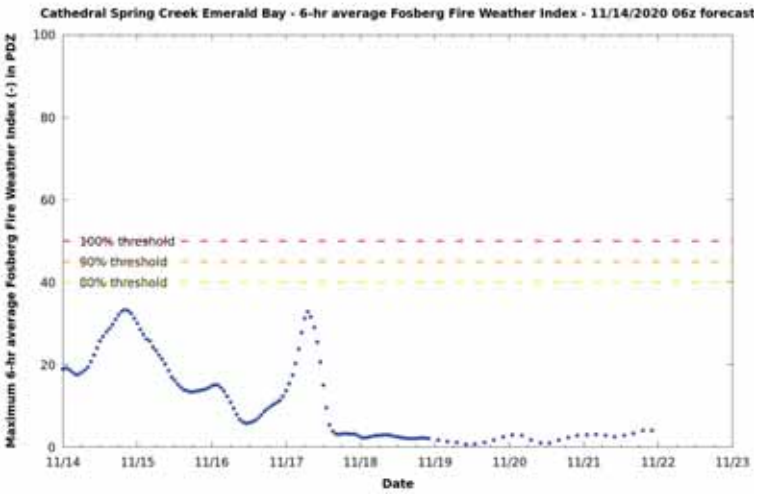


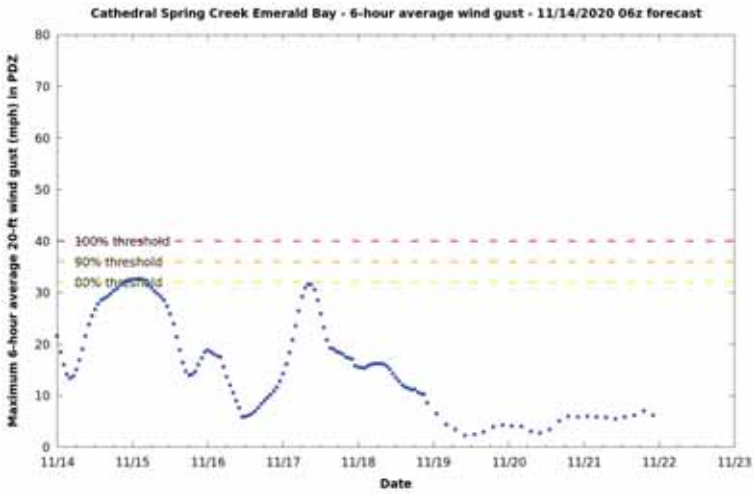
Angora Ridge and Lily Lake



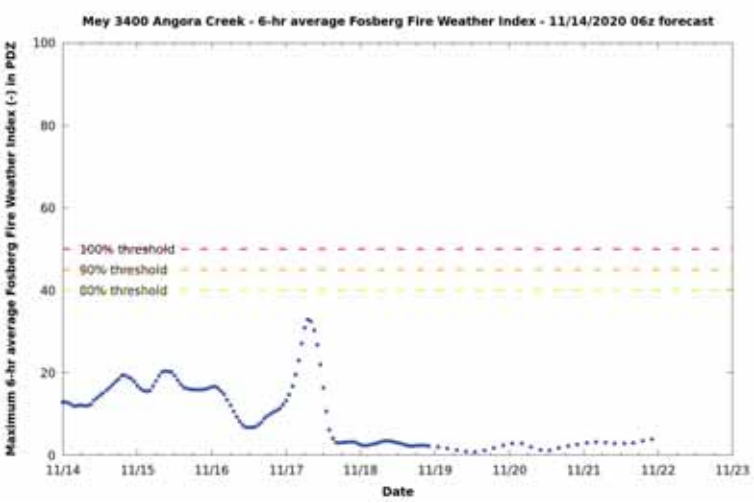


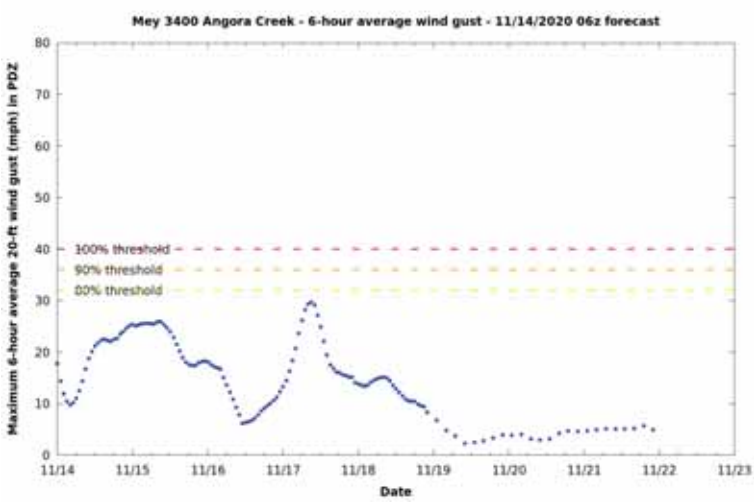
Cathedral Spring Creek Emerald Bay



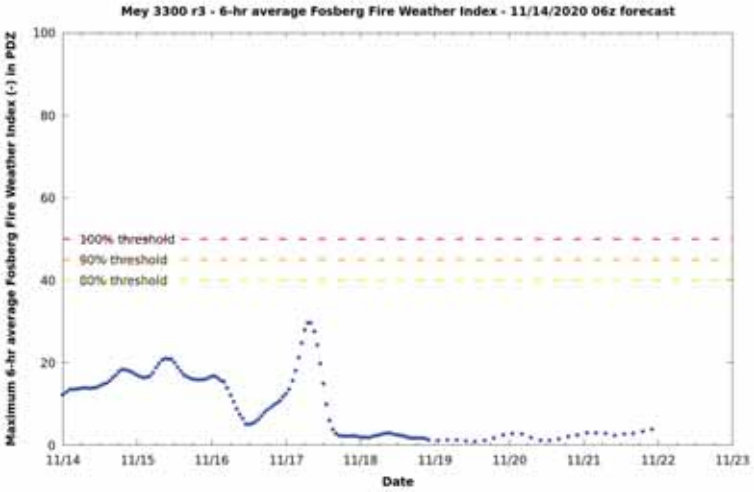


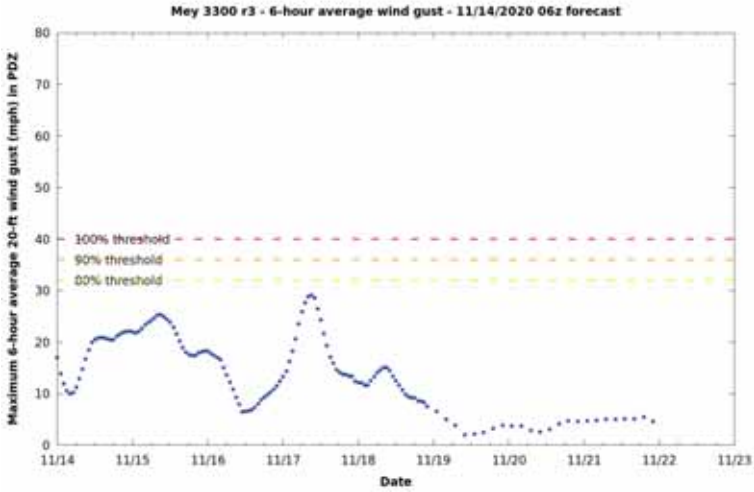
Mey 3400 Angora Creek



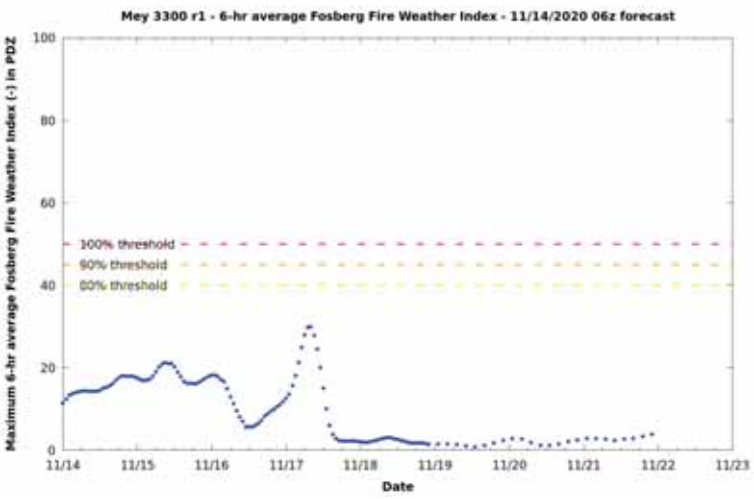


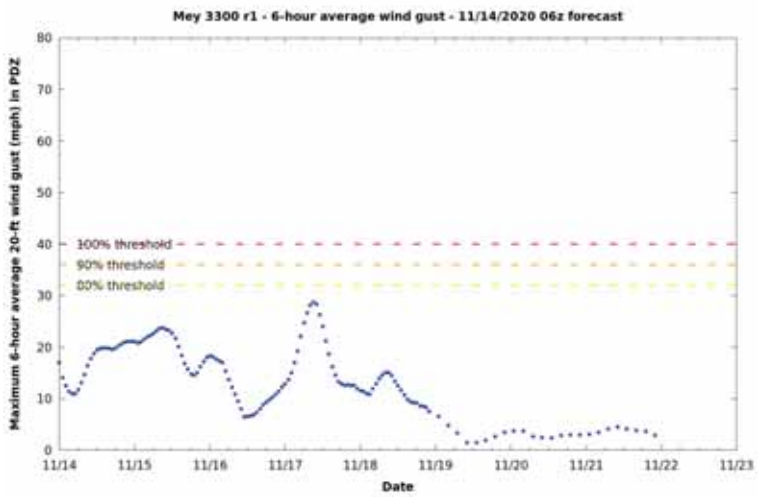
Mey 3300 r3



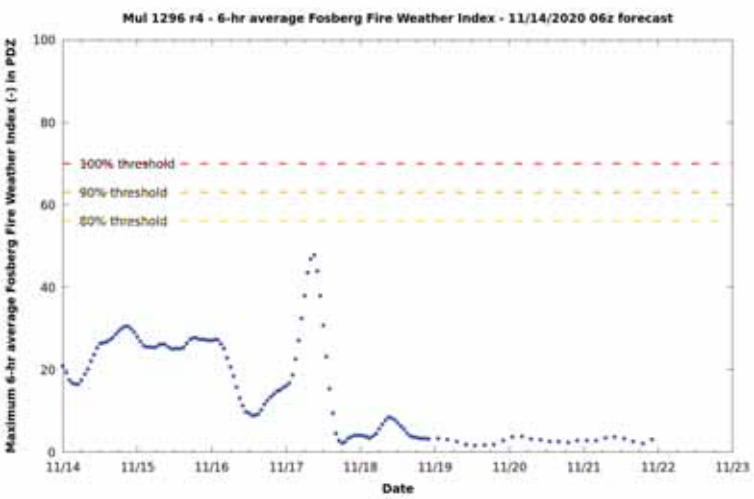


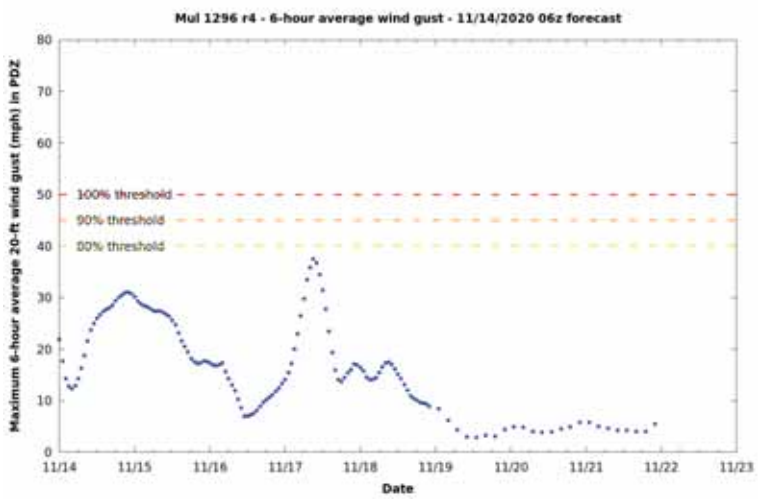
Mey 3300 r1



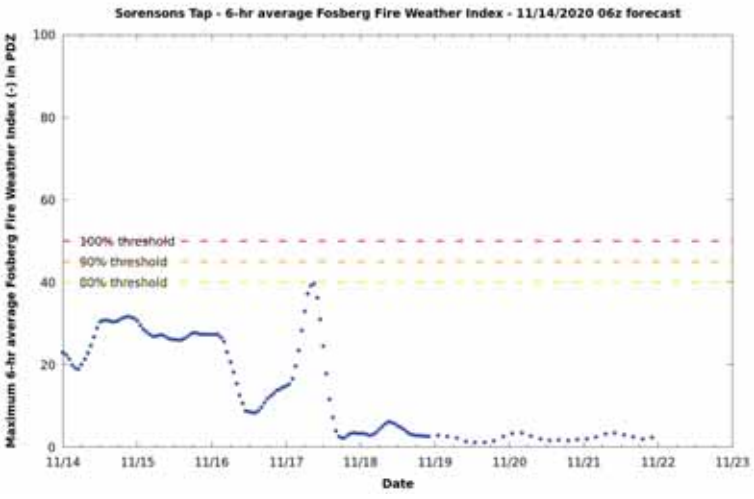


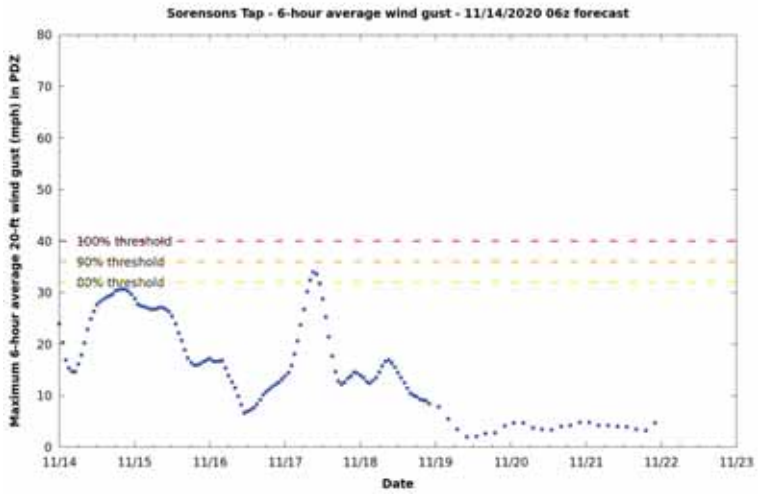
Mul 1296 r4



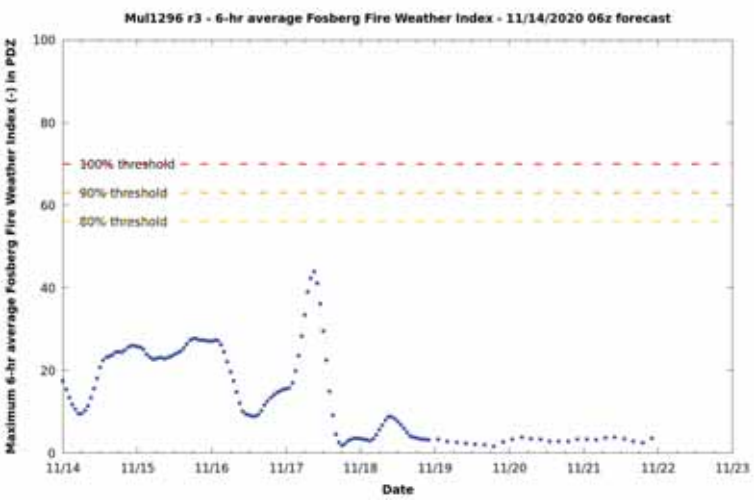


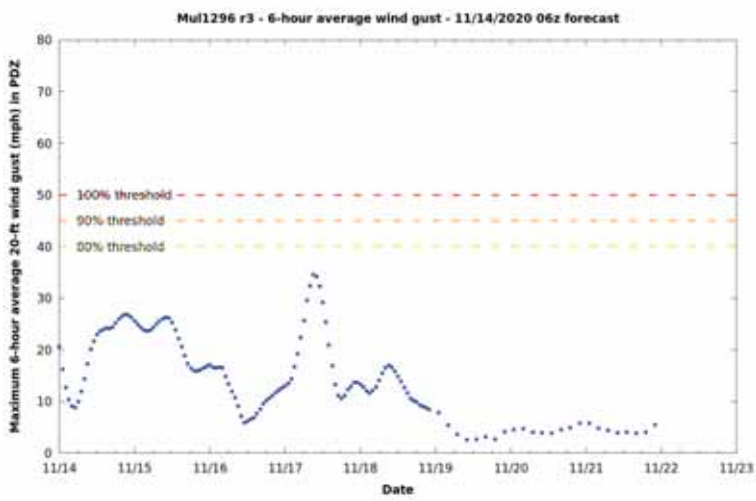
Sorensons Tap



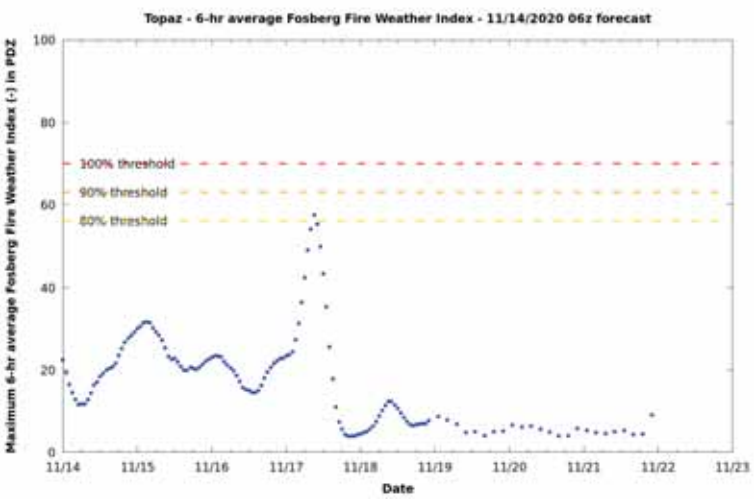


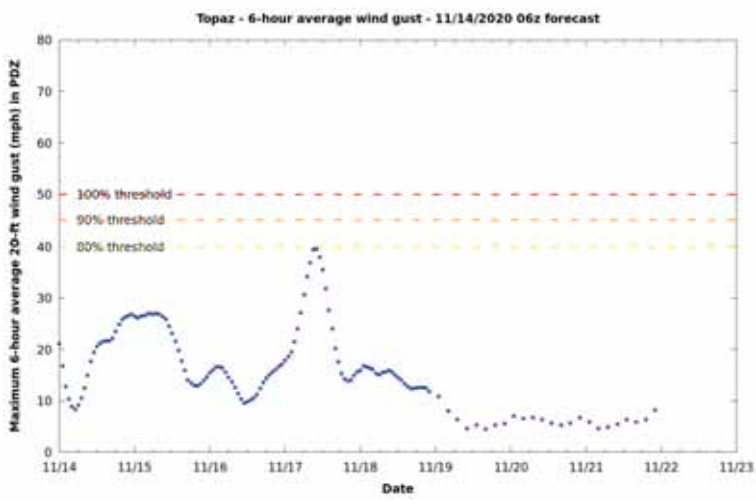
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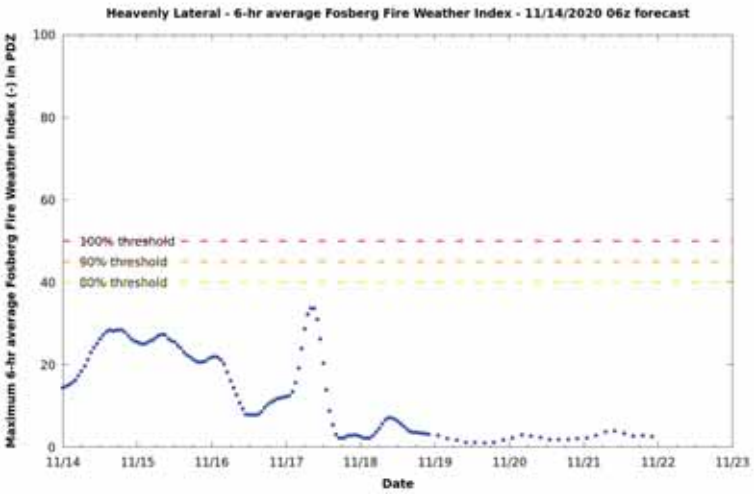


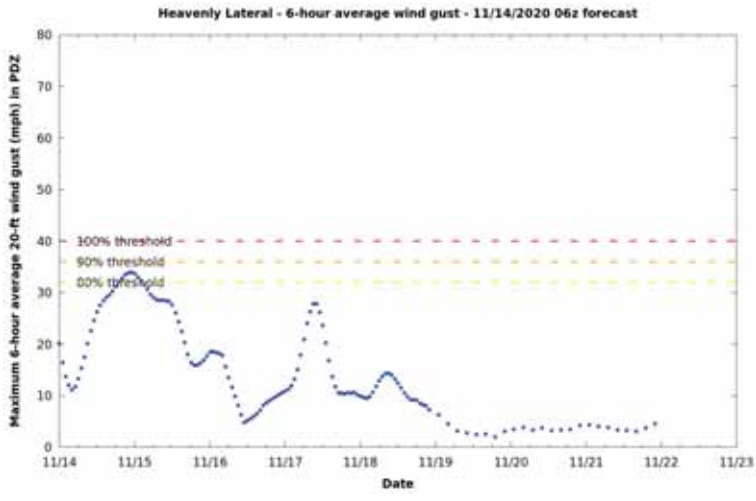
Topaz



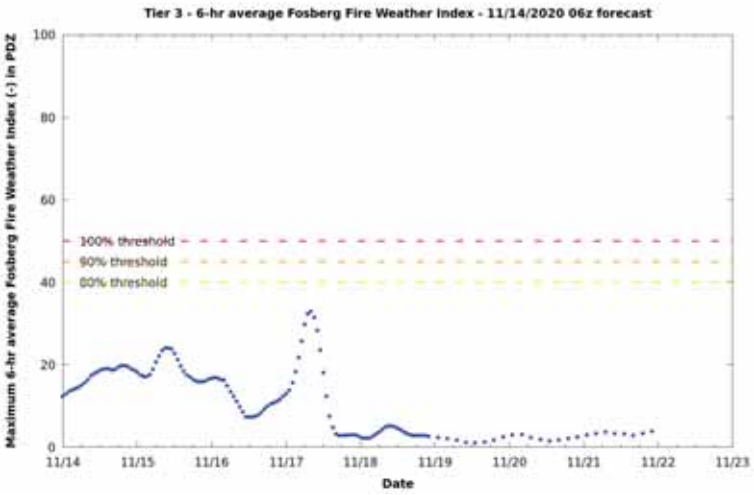


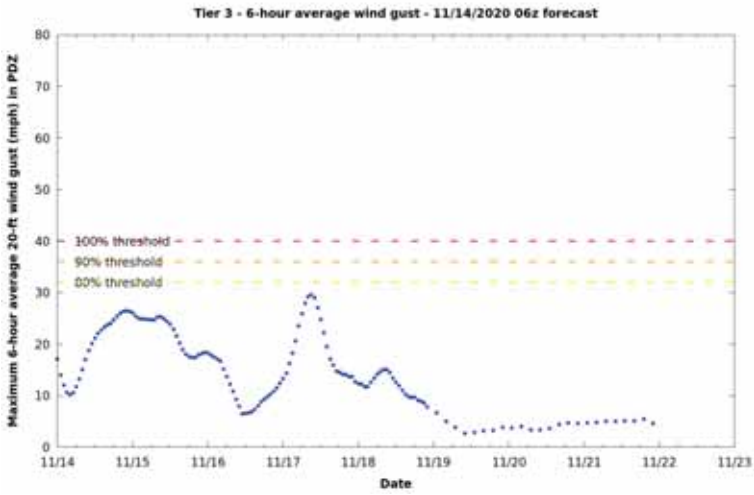
Heavenly Lateral



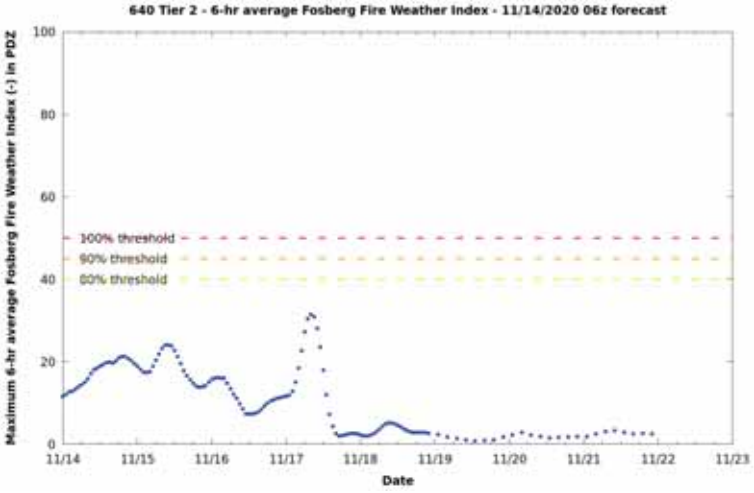


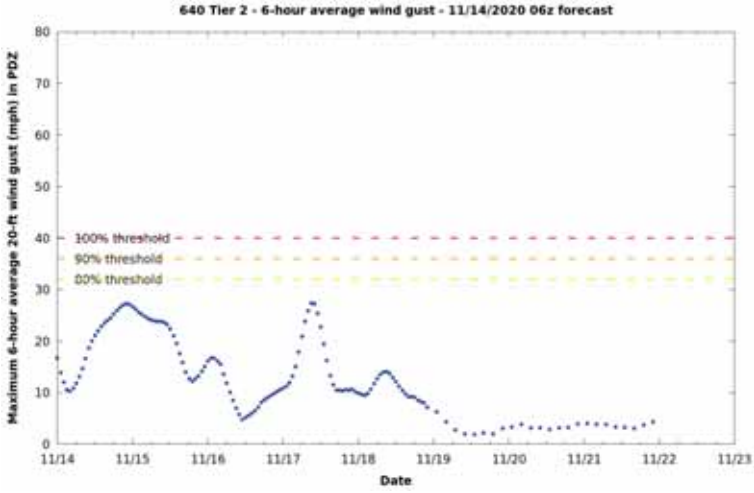
Tier 3



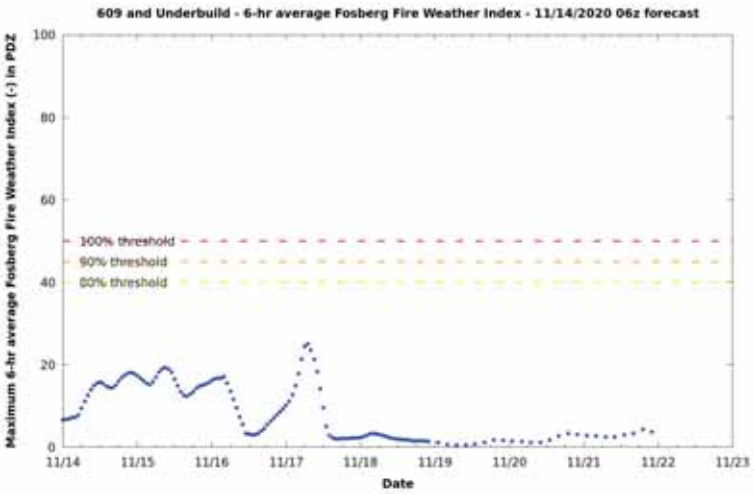


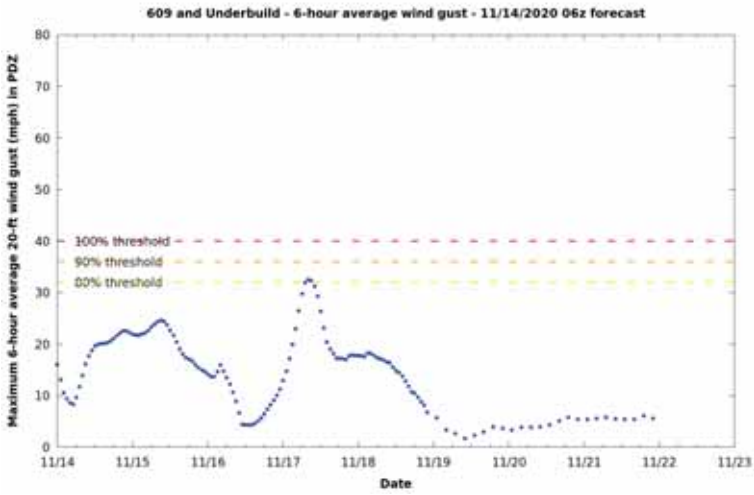
640 Tier 2



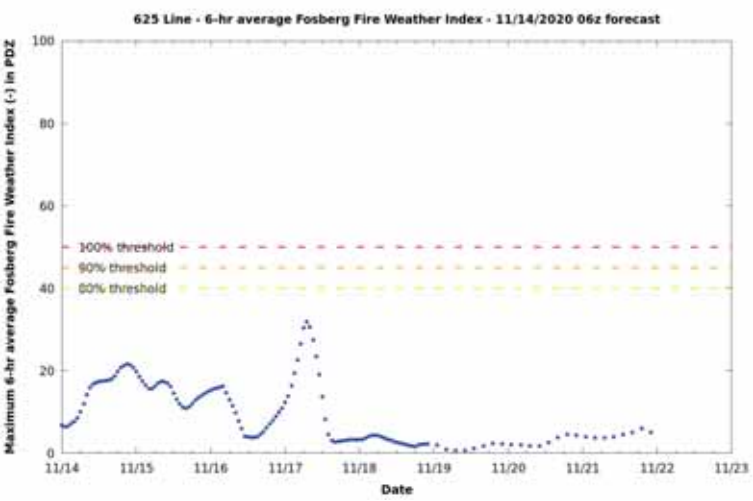


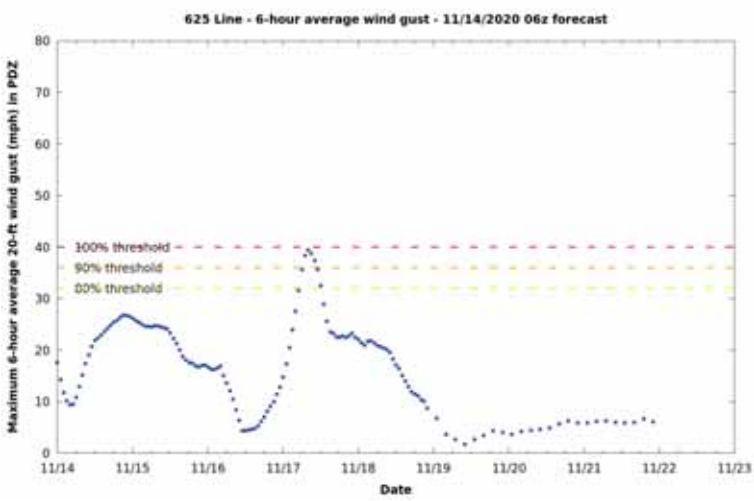
609 and Underbuild



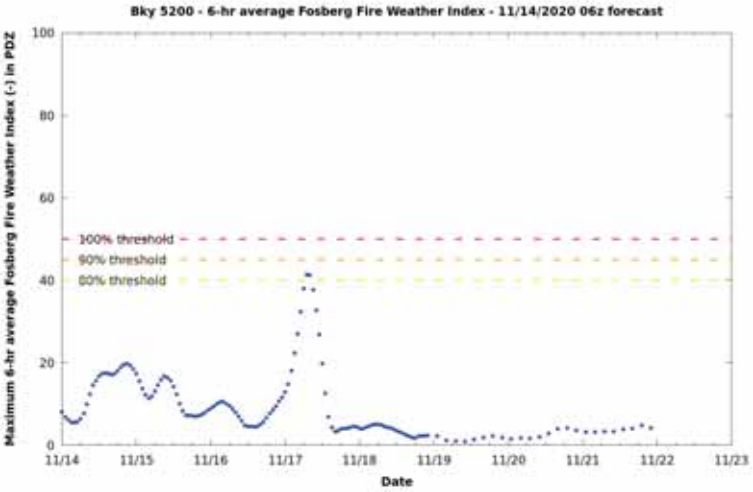


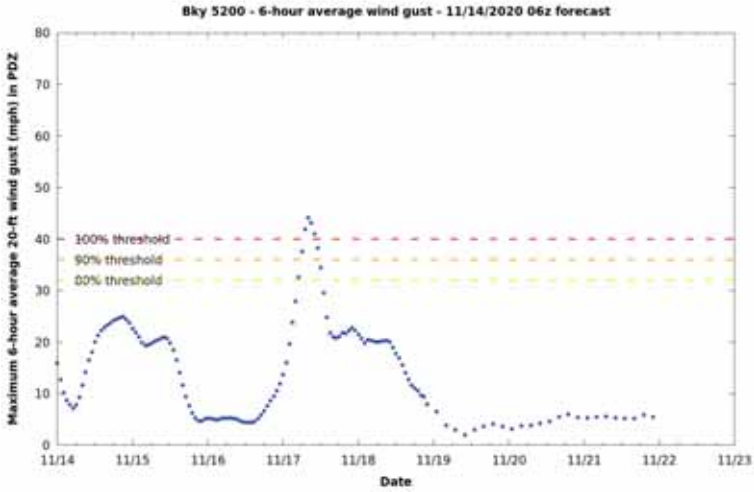
625 Line



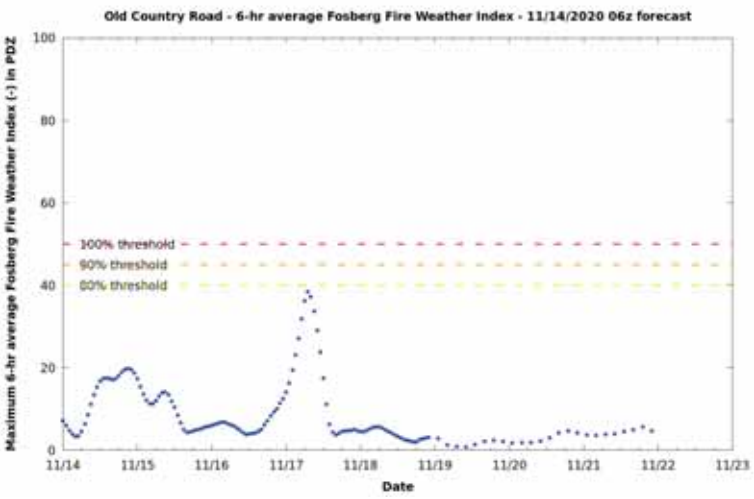


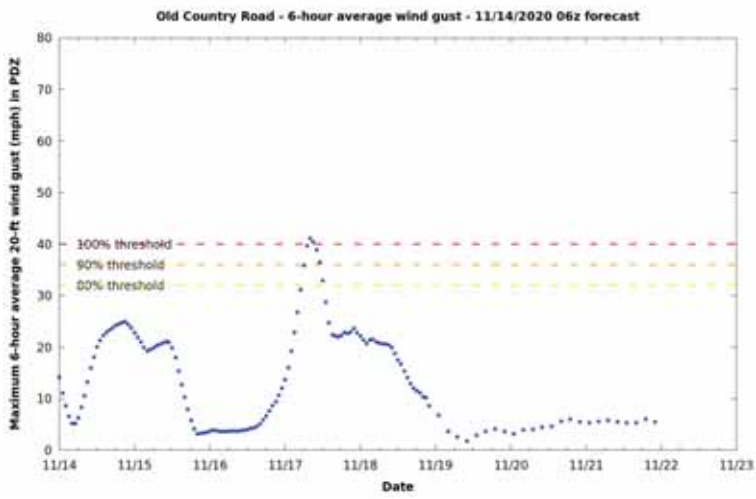
Bky 5200



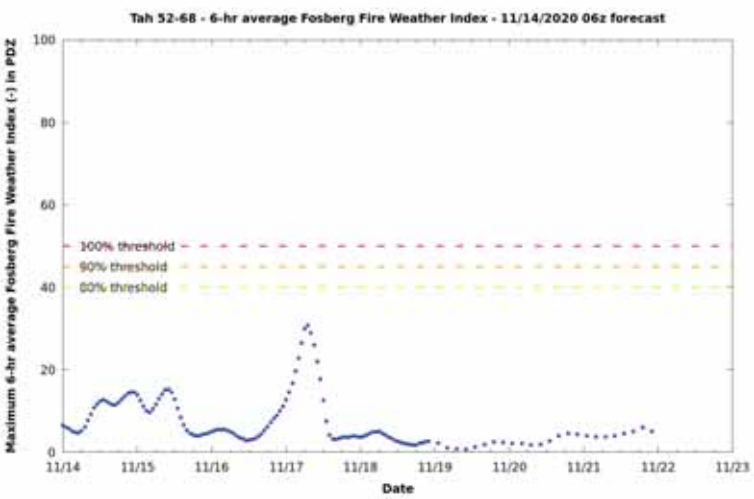


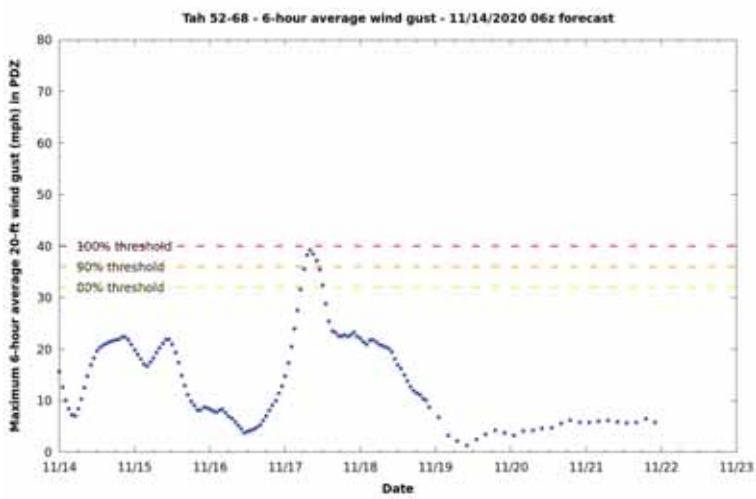
Old Country Road



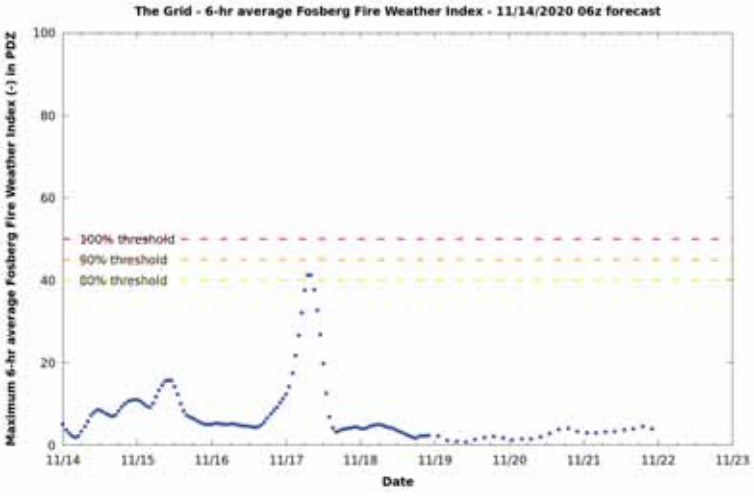


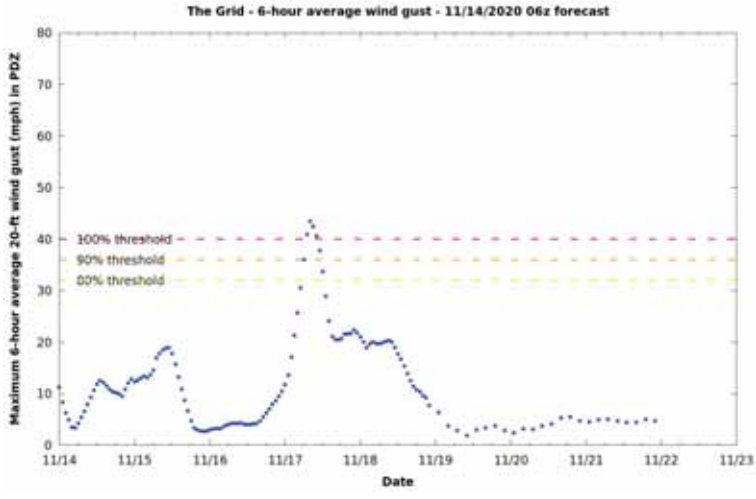
Tah 52-68



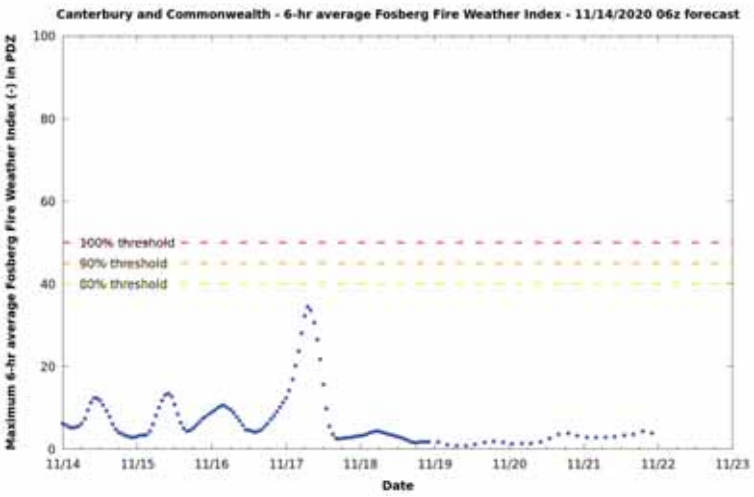


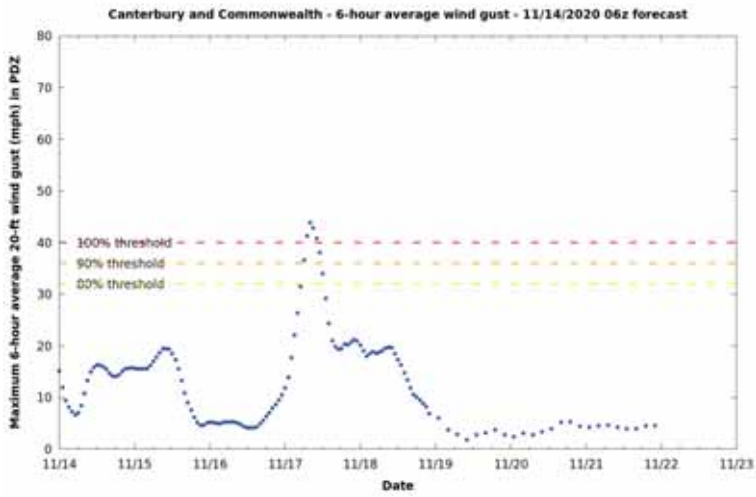
The Grid



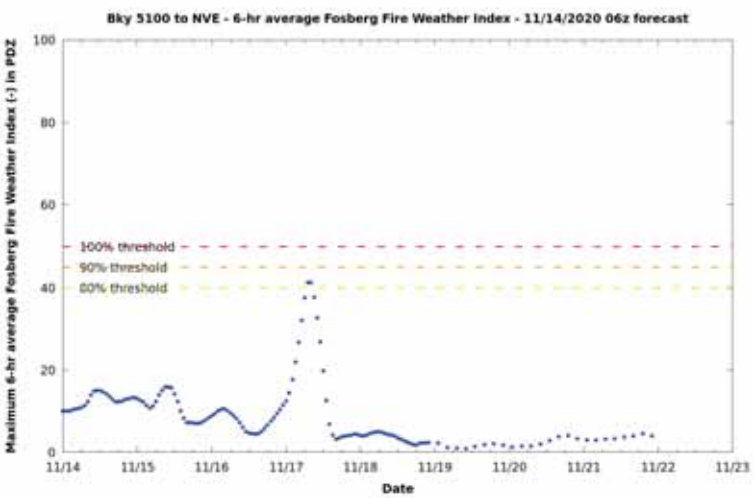


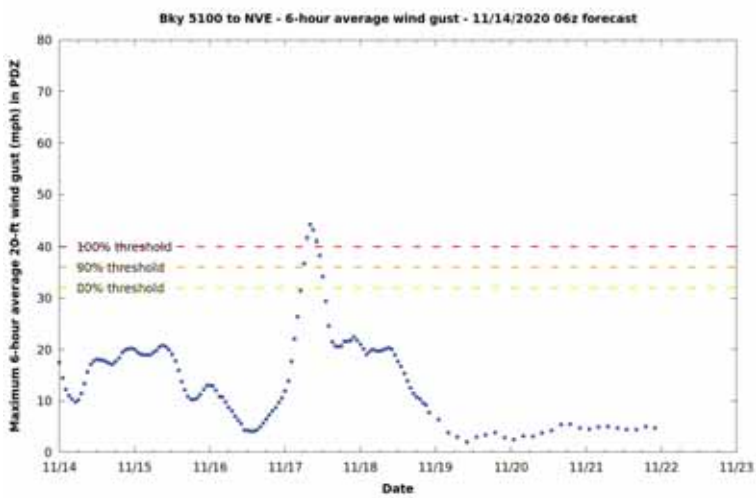
Canterbuy and Commonwealth



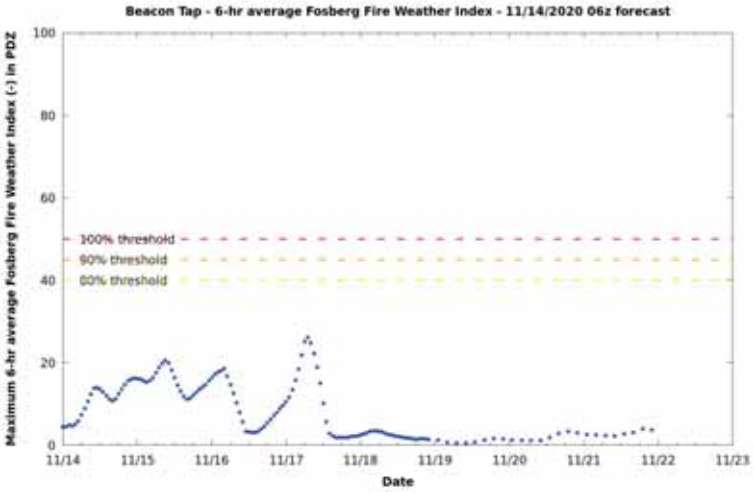


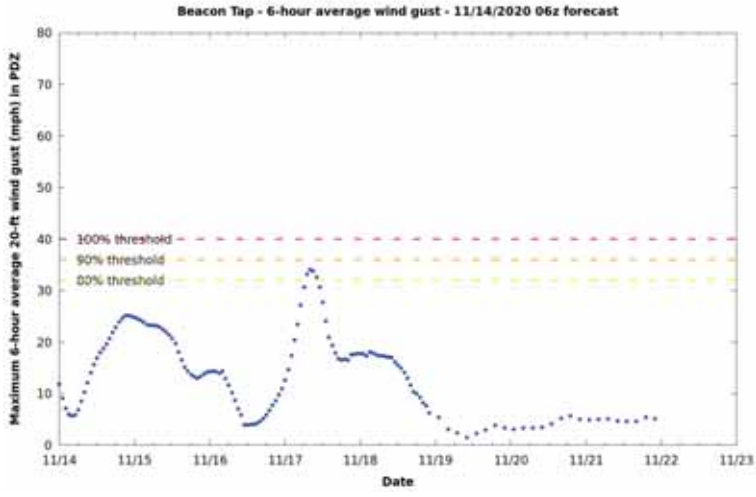
Bky 5100 to NVE



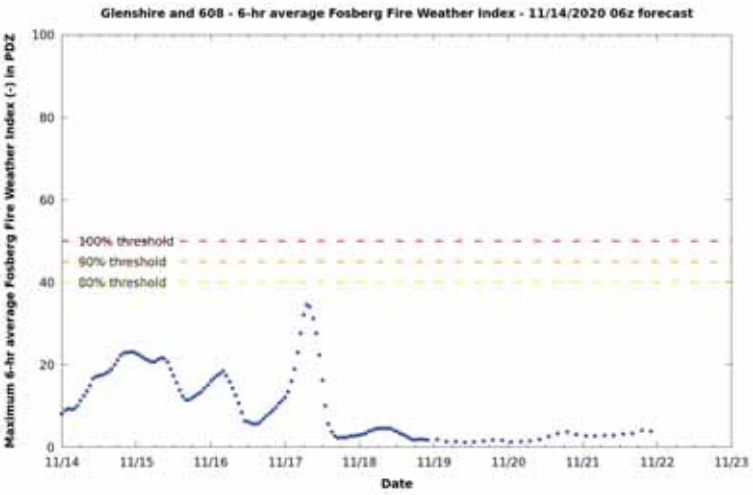


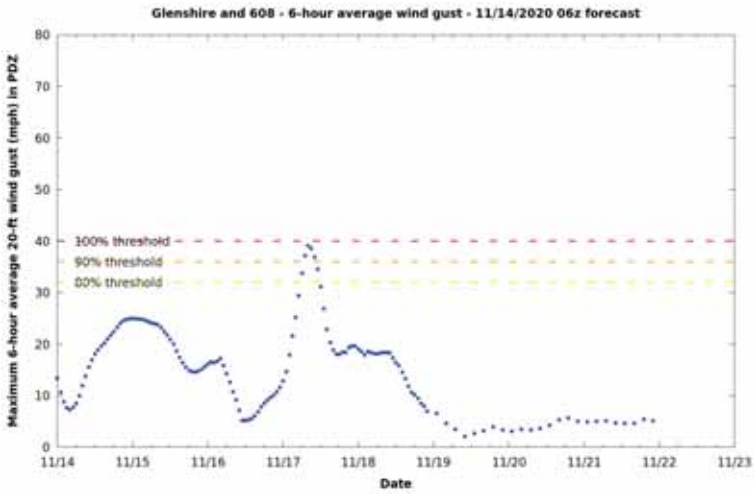
Beacon Tap



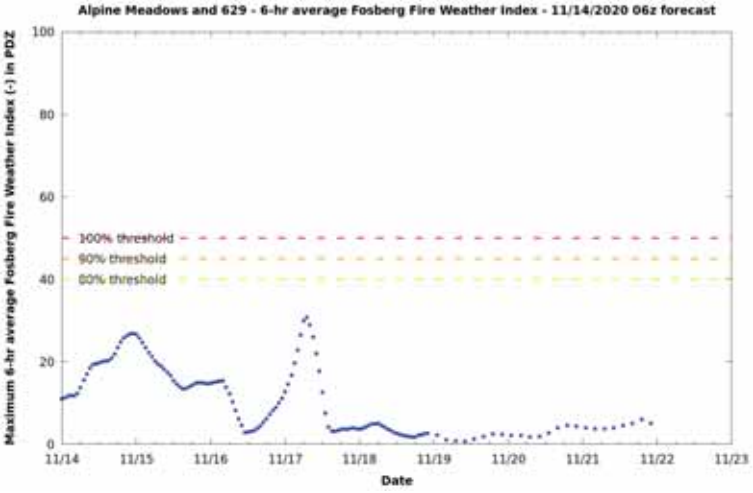


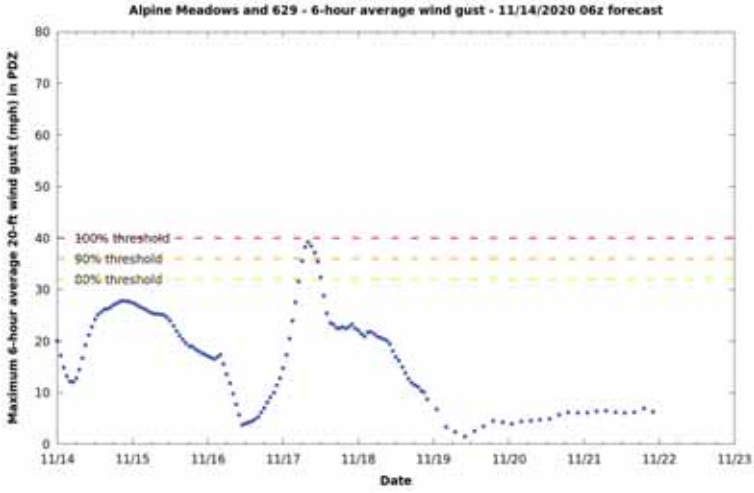
Glenshire and 608



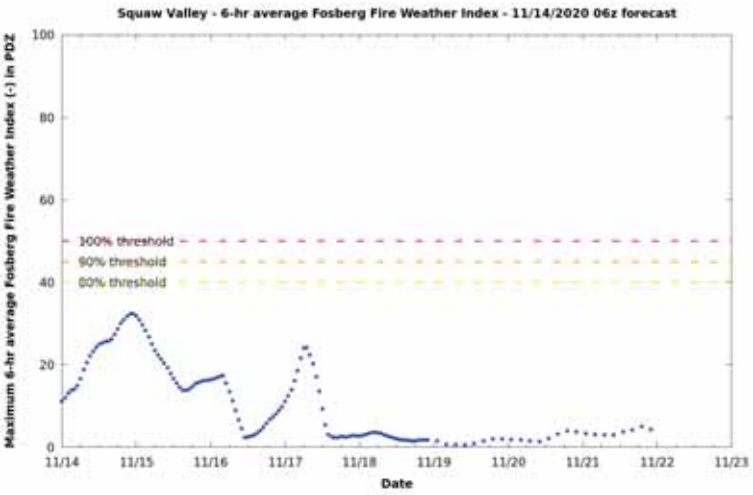


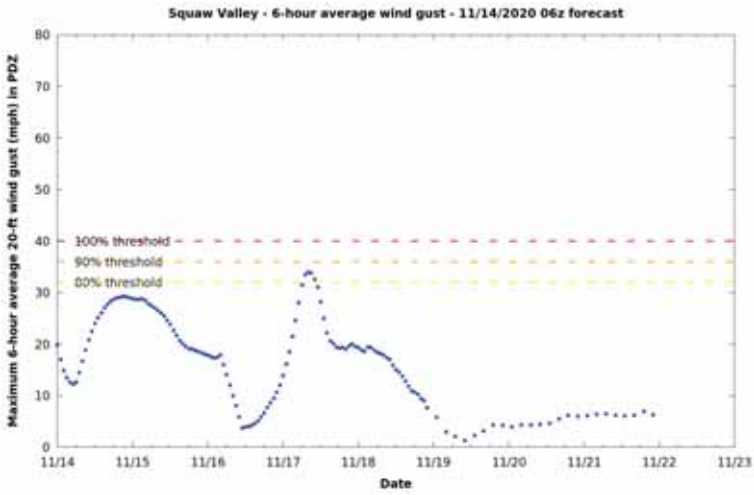
Alpine Meadows and 629



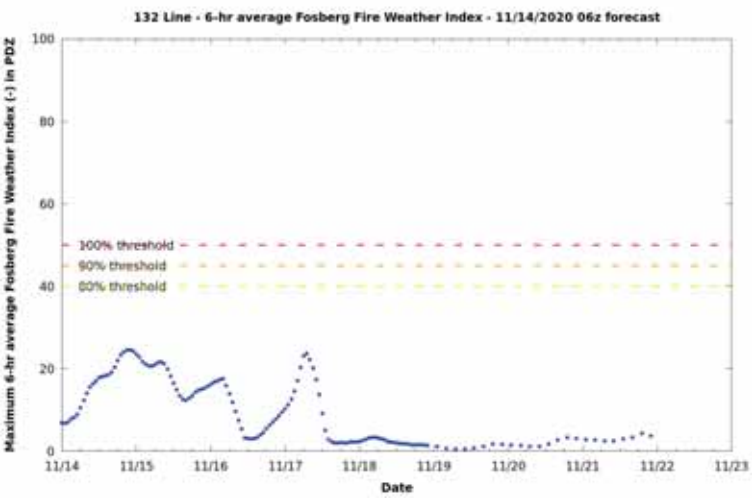


Squaw Valley



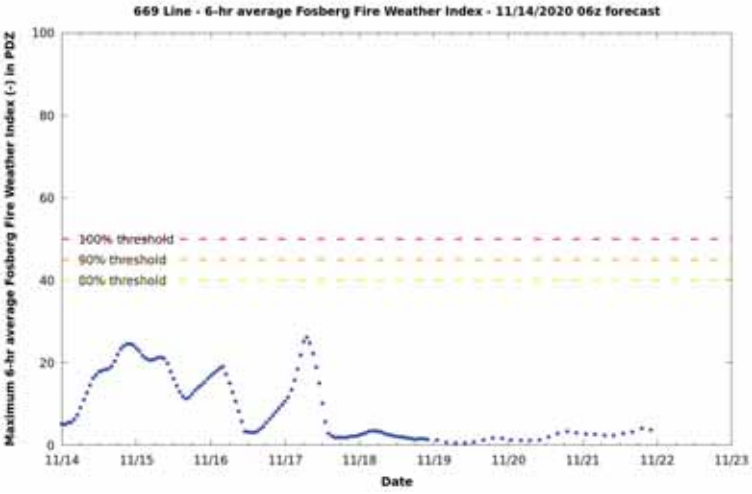


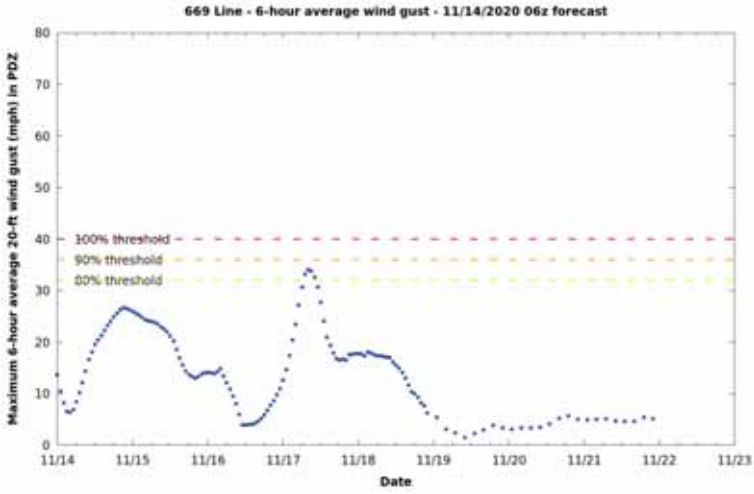
132 Line



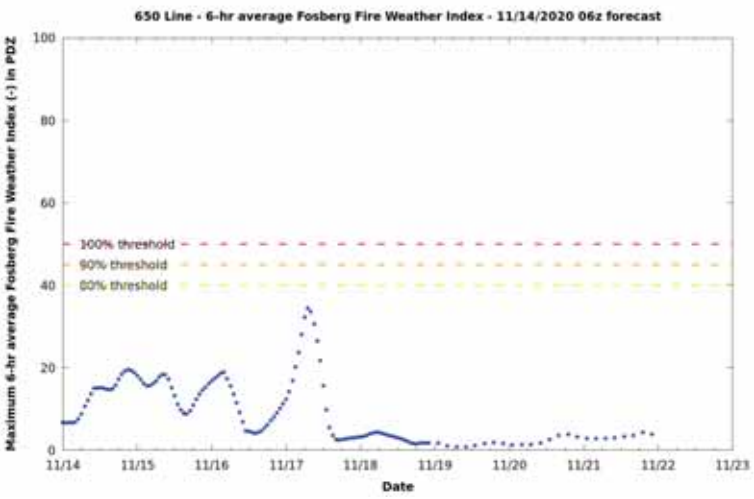


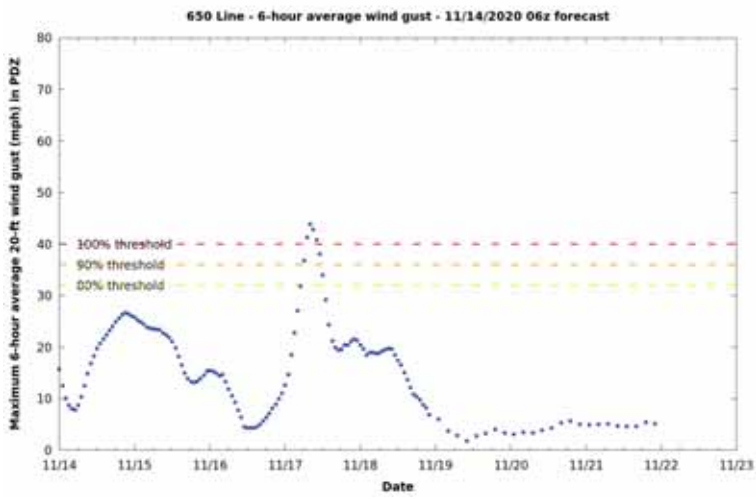
669 Line



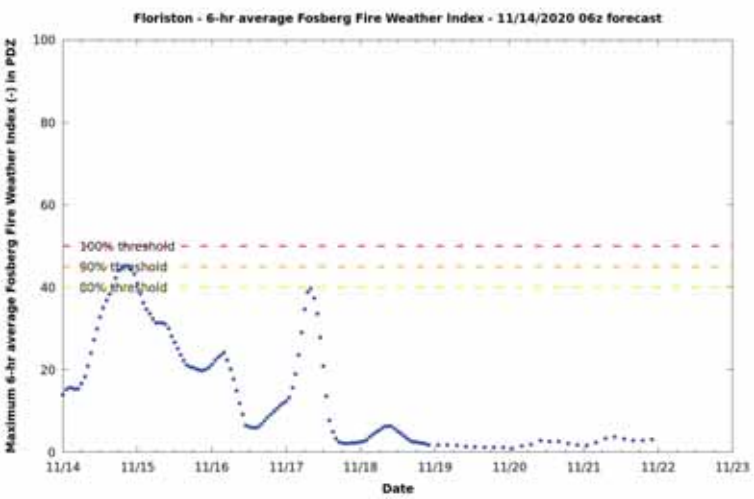


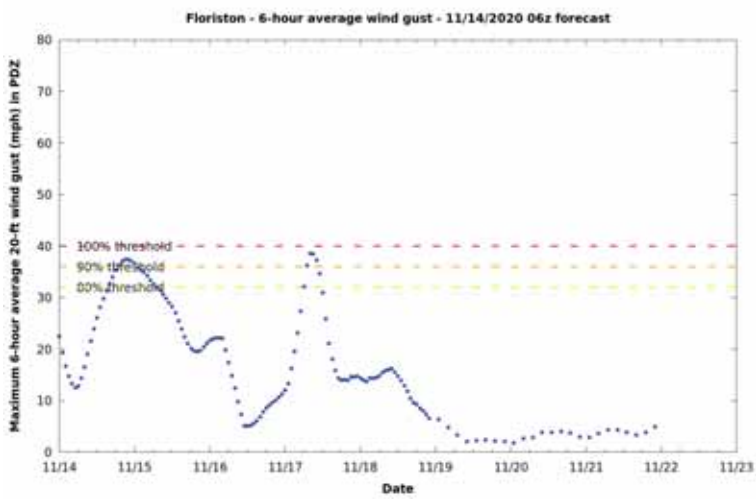
650 Line



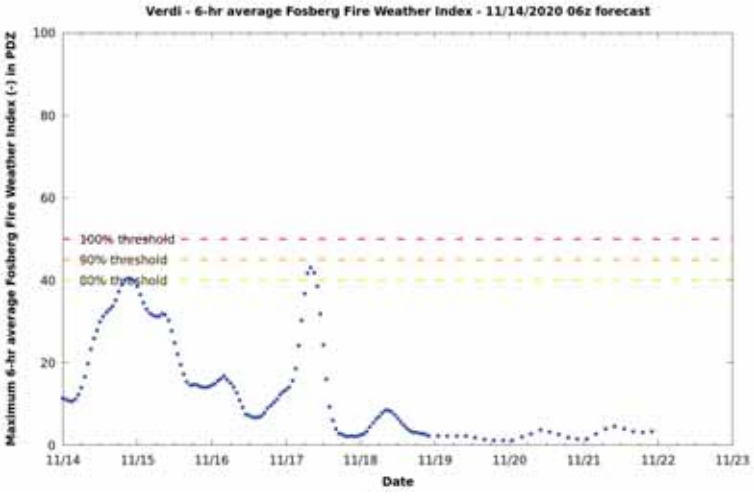


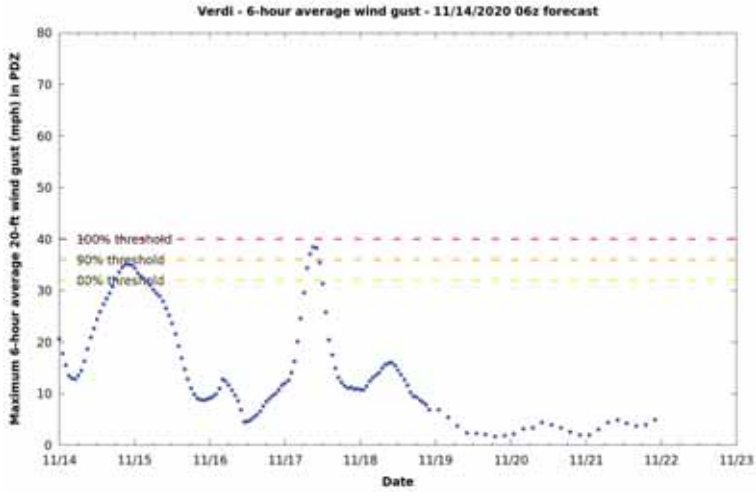
Floriston



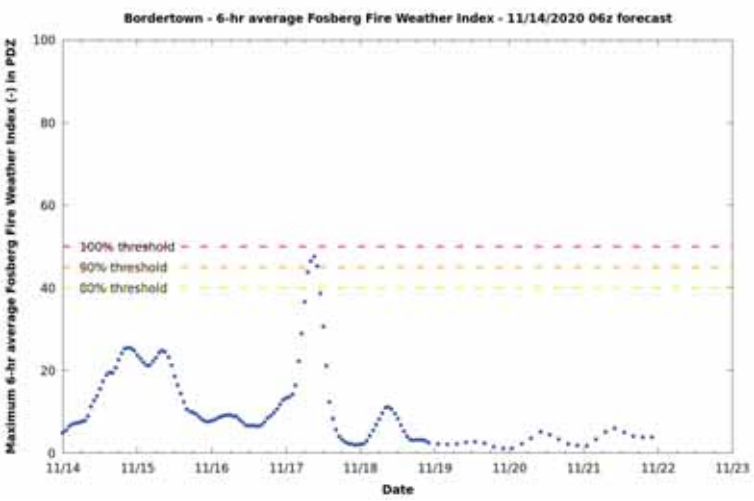


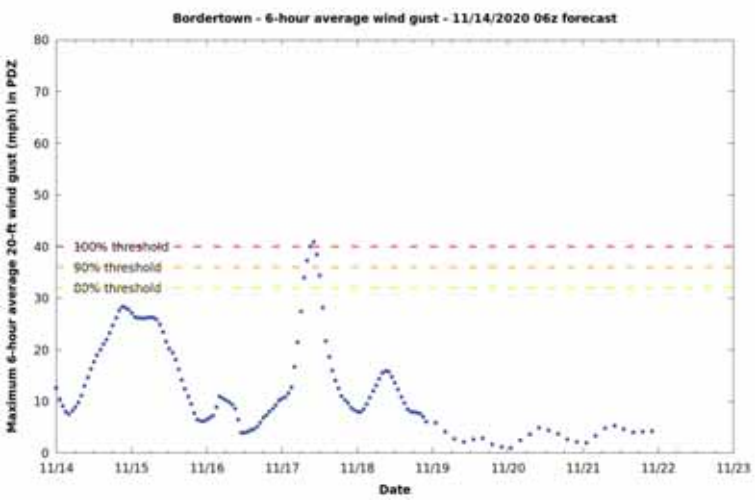
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/14/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
00% threshold
Date
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23


Bordertown - 6-hour average wind gust - 11/14/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
00% threshold
Date
11/14
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23

Liberty Utilities Fire Potential Index Forecast for 11/14/20 - 11/20/20

Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

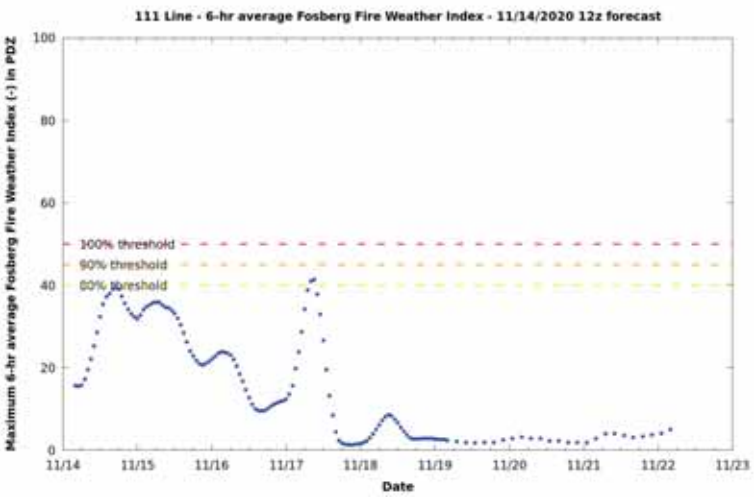
Liberty Utilities Energy Release Component Forecast for 11/14/20 - 11/20/20

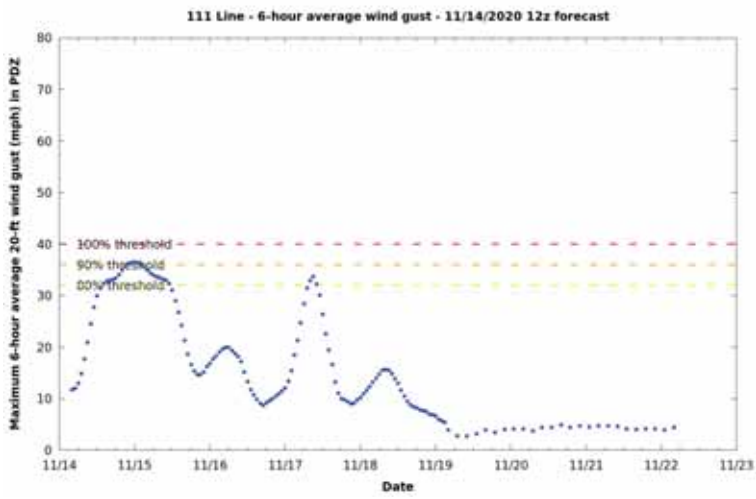
Zone	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	57.0	56.0	56.0	49.0	40.0	38.0	40.0
Sierra Brooks	61.0	61.0	63.0	58.0	48.0	48.0	49.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	61.0	57.0	59.0	51.0	39.0	35.0	37.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	53.0	53.0	57.0	53.0	42.0	43.0	45.0

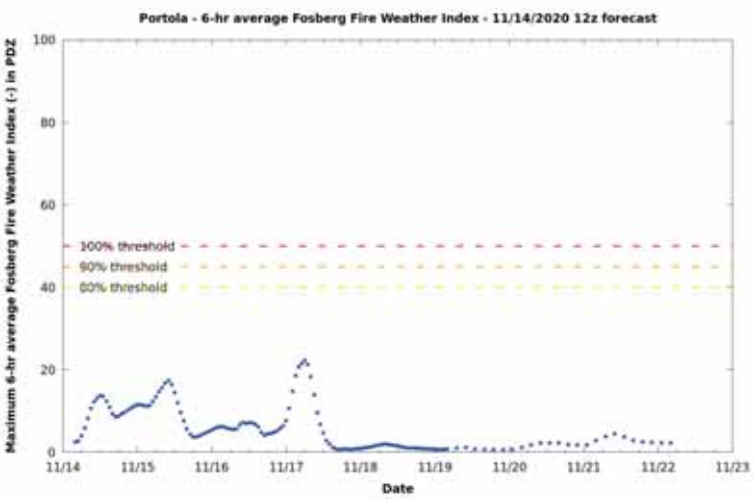
Liberty Utilities Fire Weather Summary Plots - 11/14/2020 12z forecast

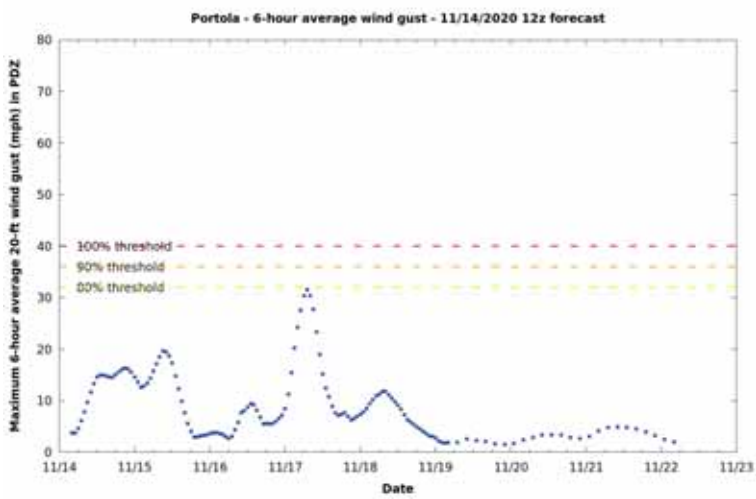
111 Line



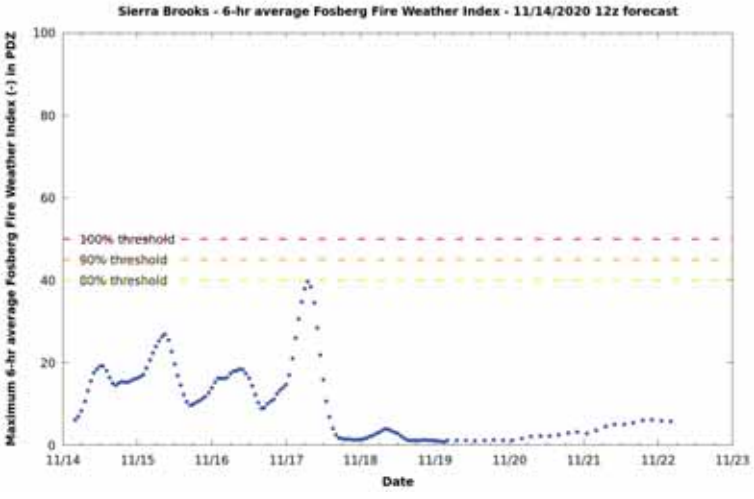


Portola



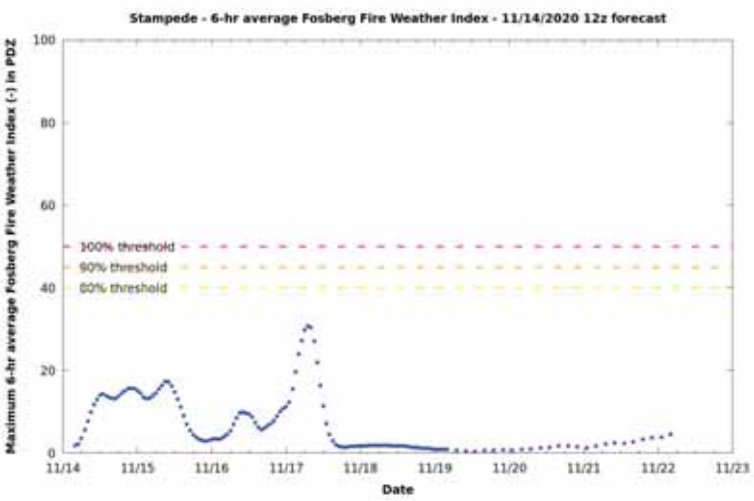


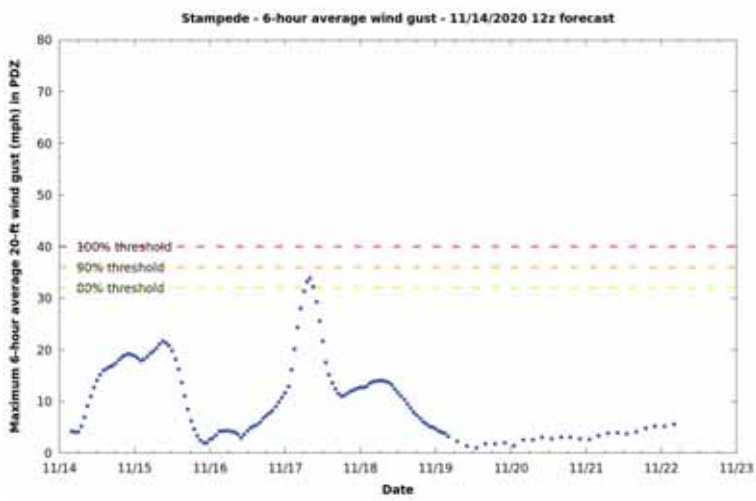
Sierra Brooks



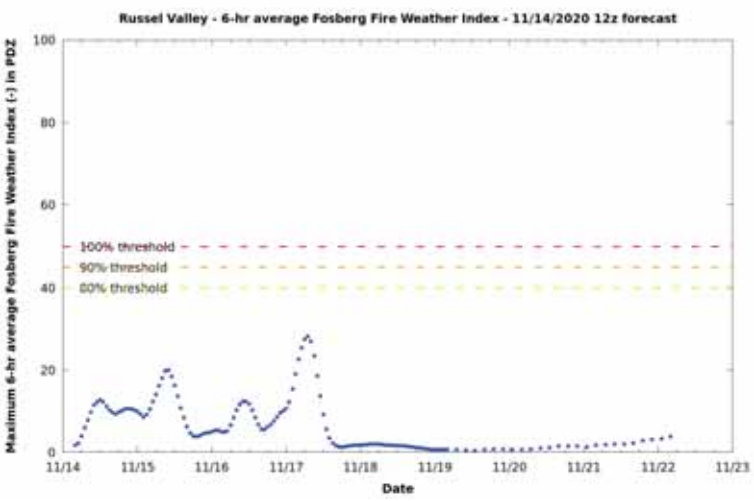


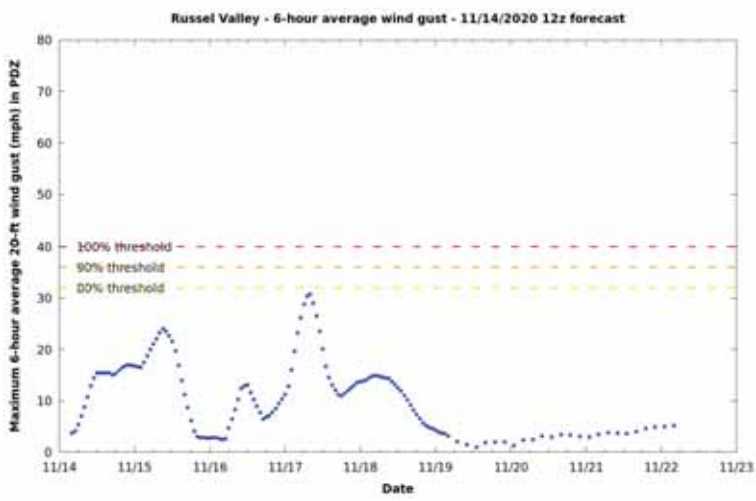
Stampede



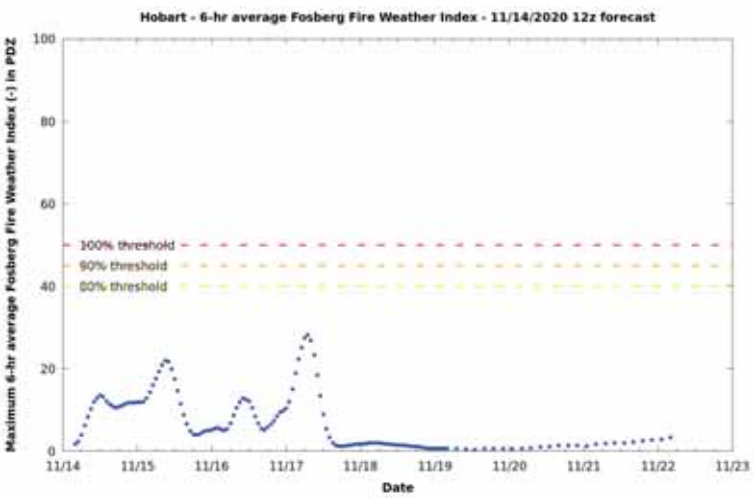


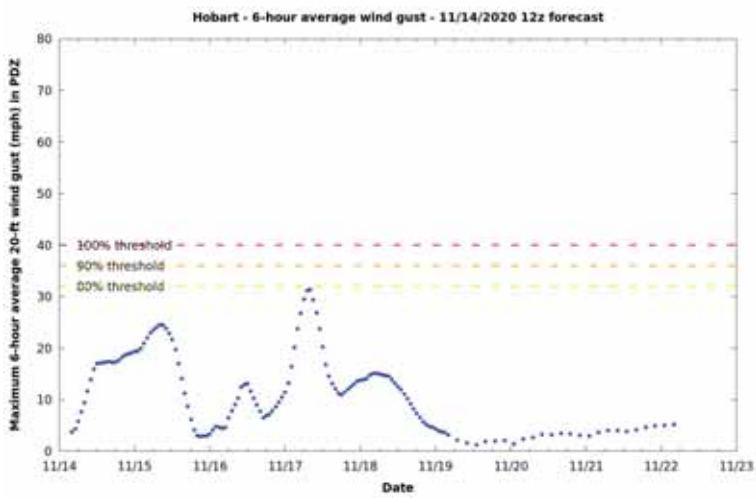
Russell Valley



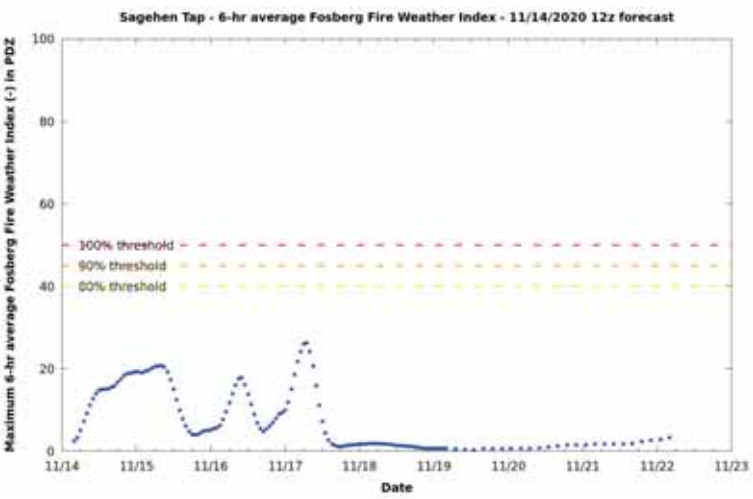


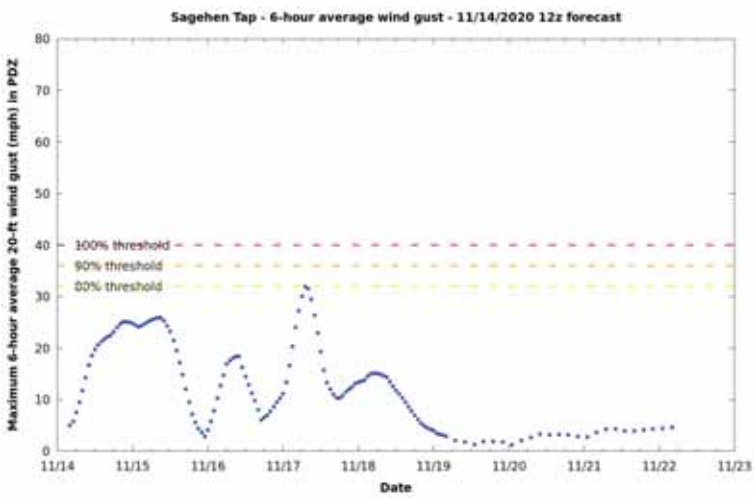
Hobart



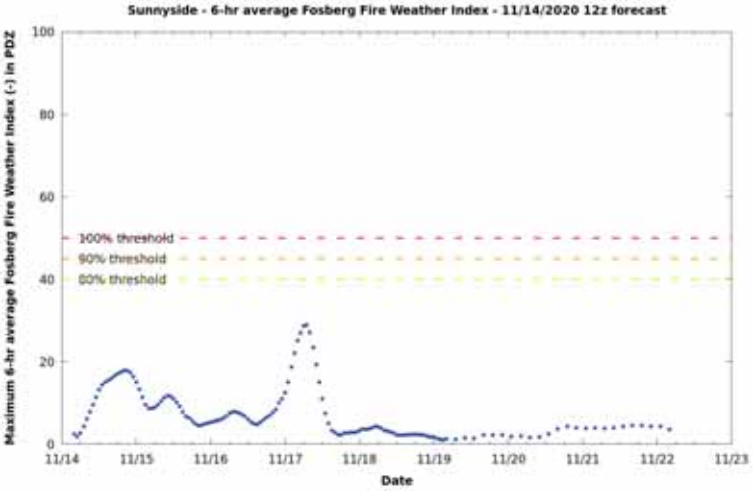


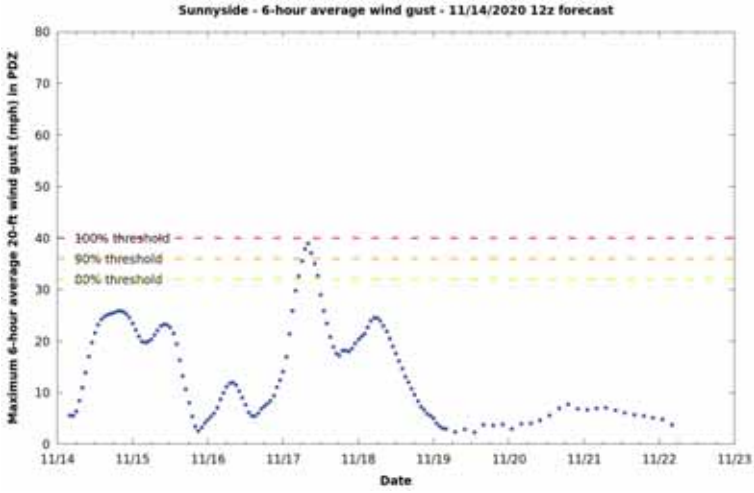
Sagehen tap



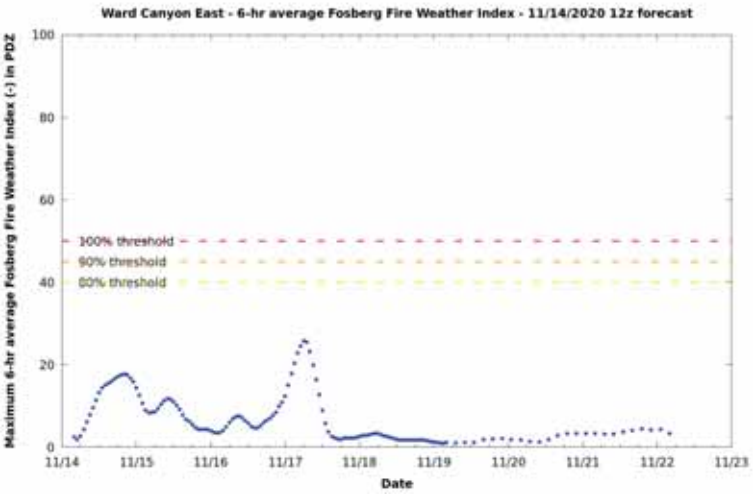


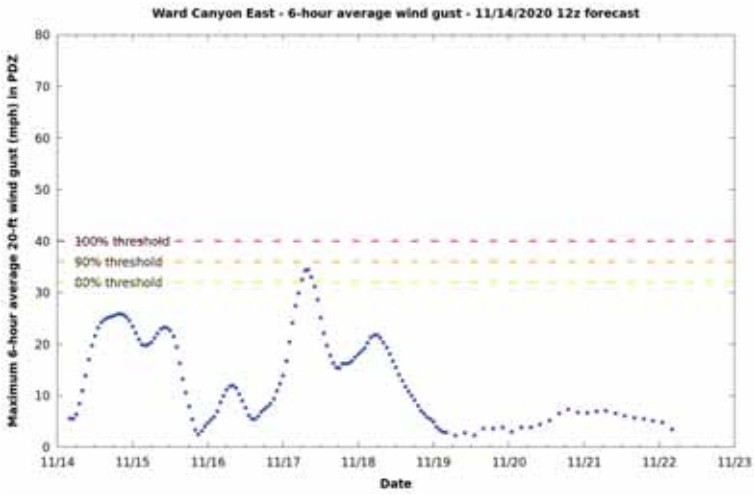
Sunnyside



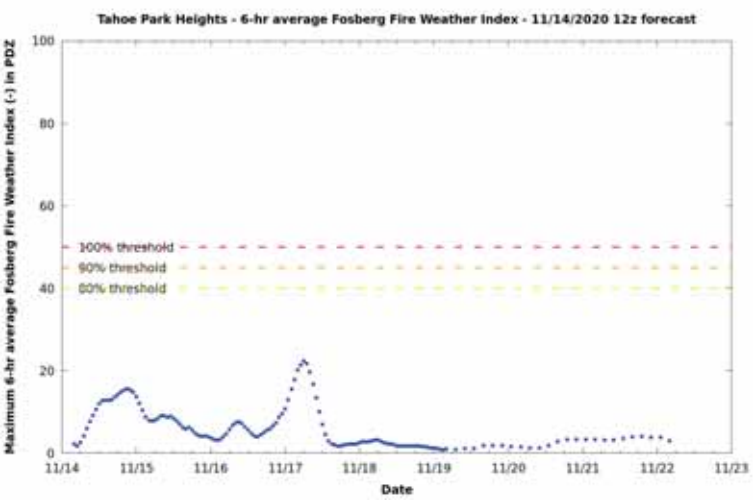


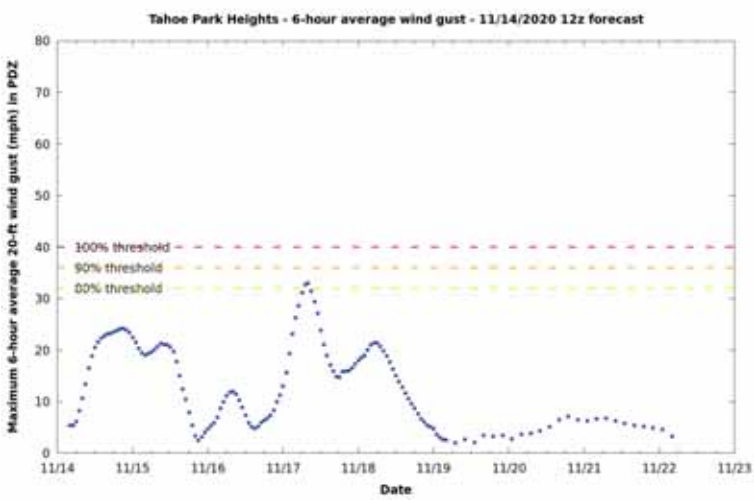
Ward Canyon East



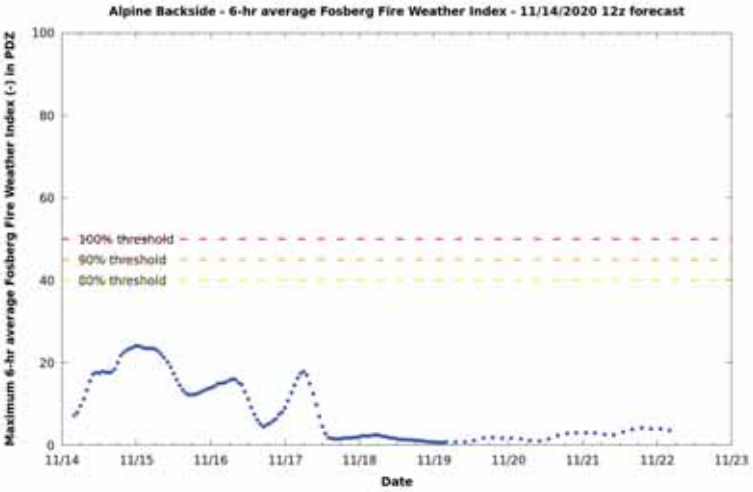


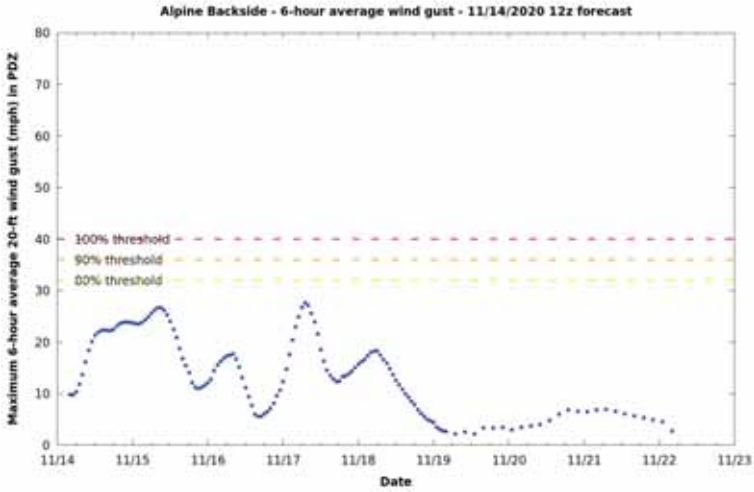
Tahoe Park Heights



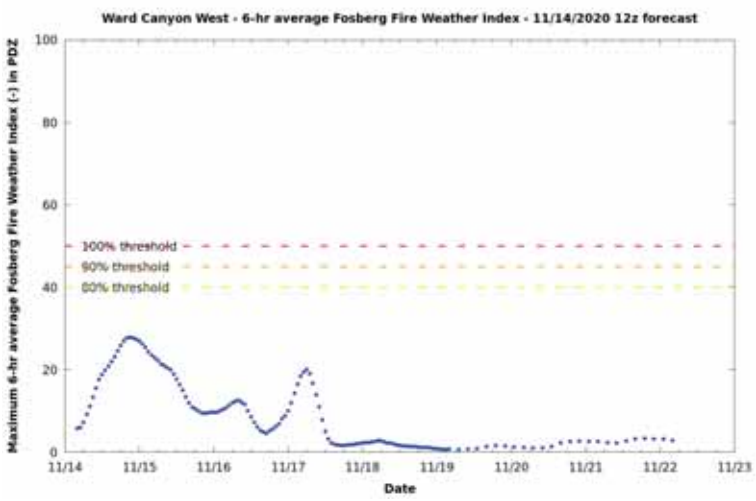


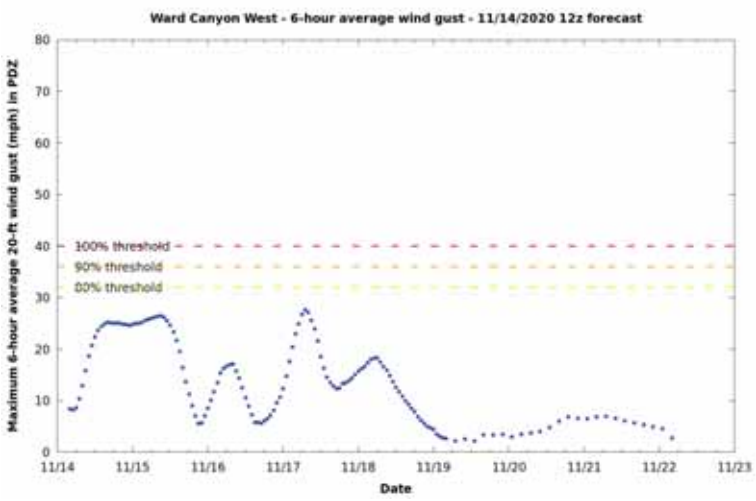
Alpine Backside



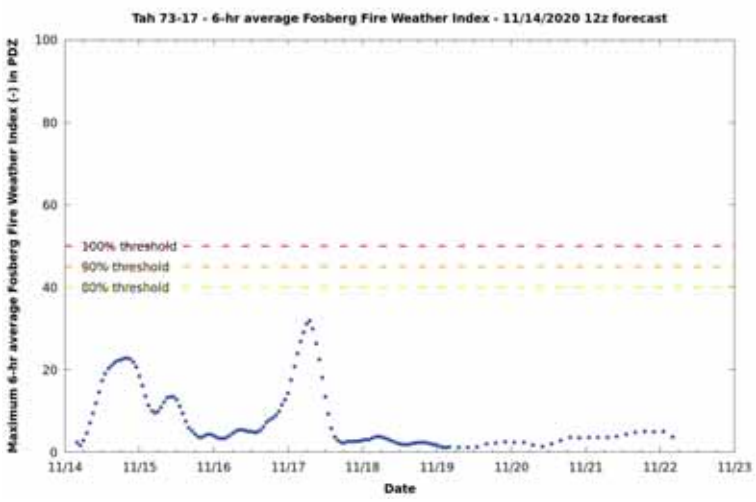


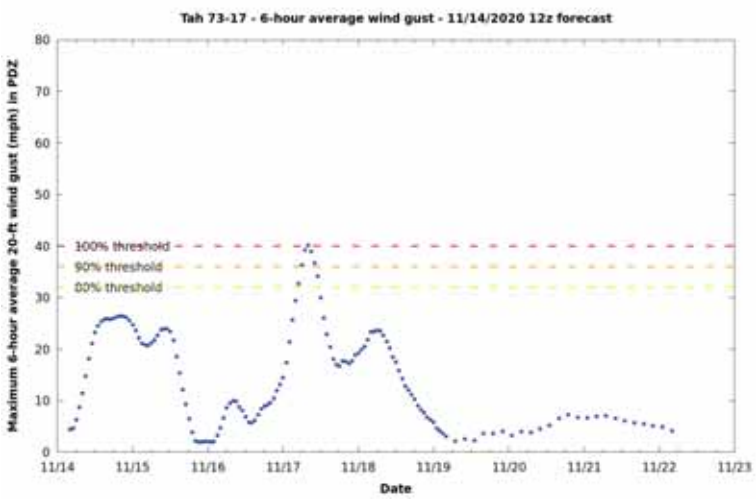
Ward Canyon West



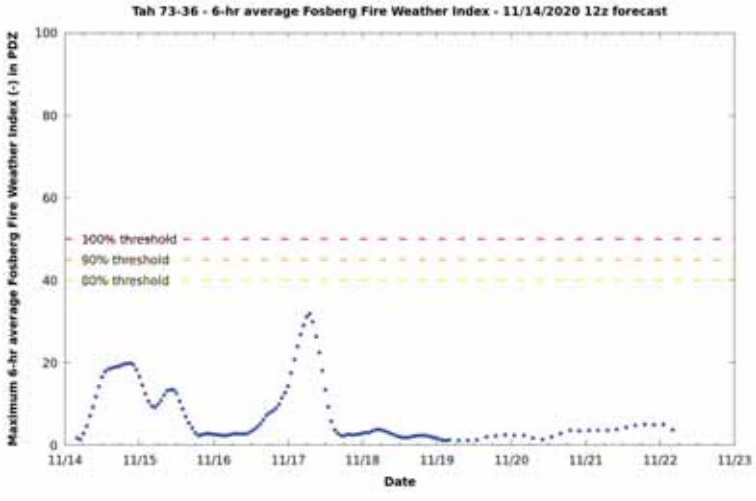


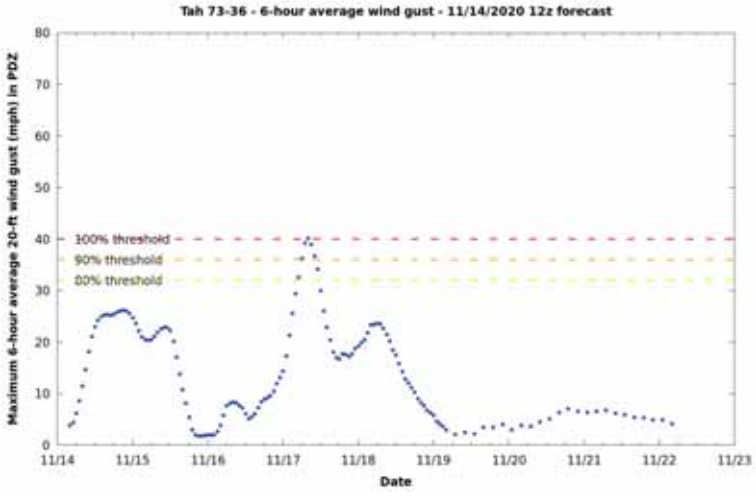
Tah 73-17



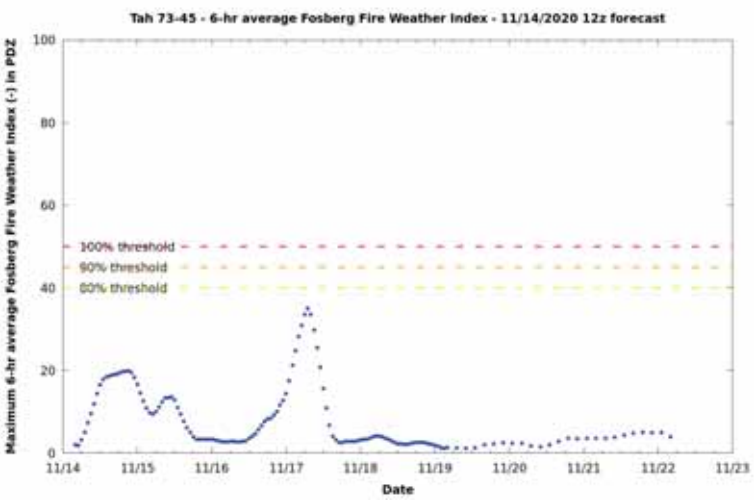


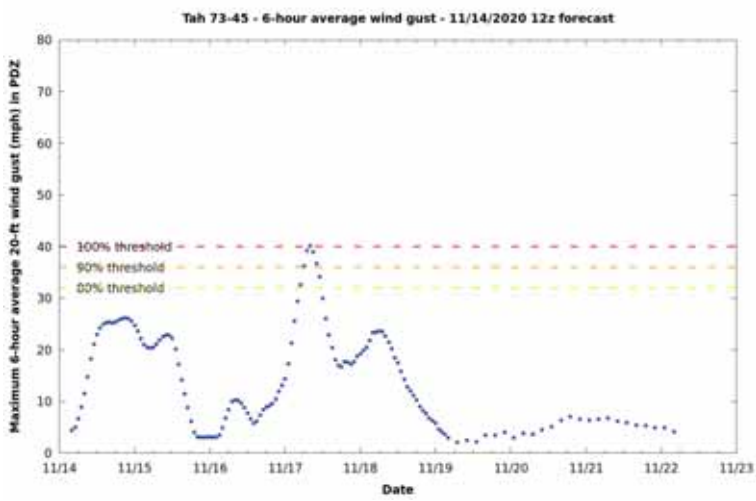
Tah 73-36



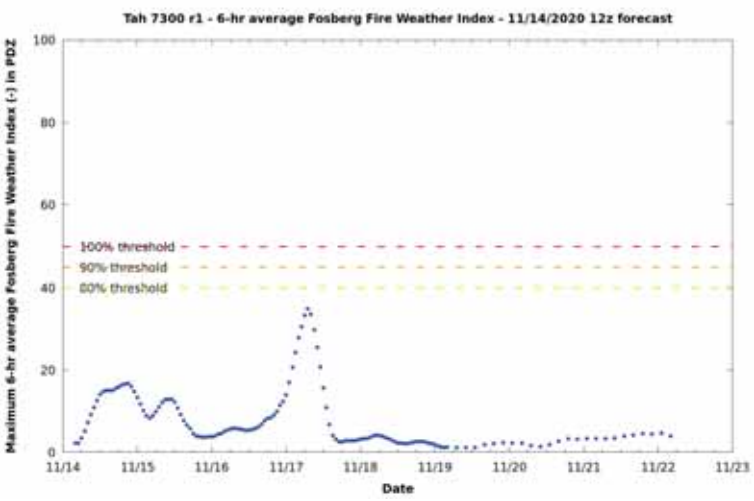


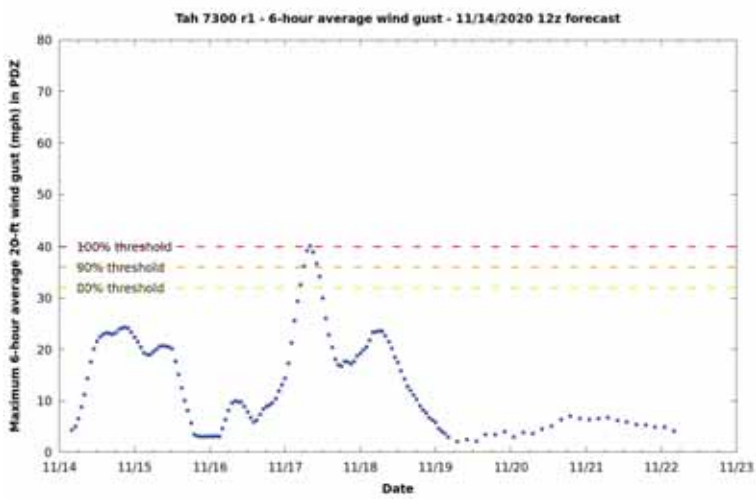
Tah 73-45



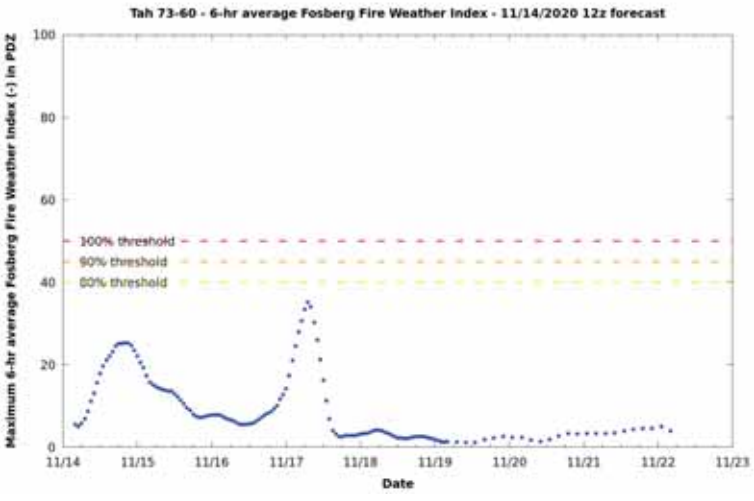


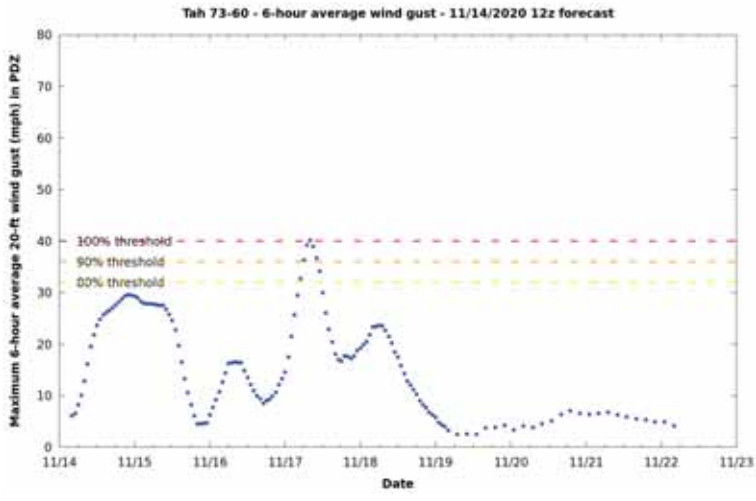
Tah 7300 r1



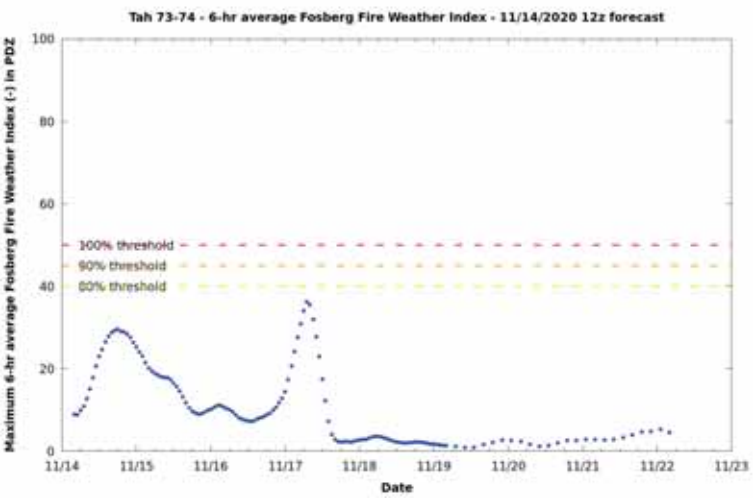


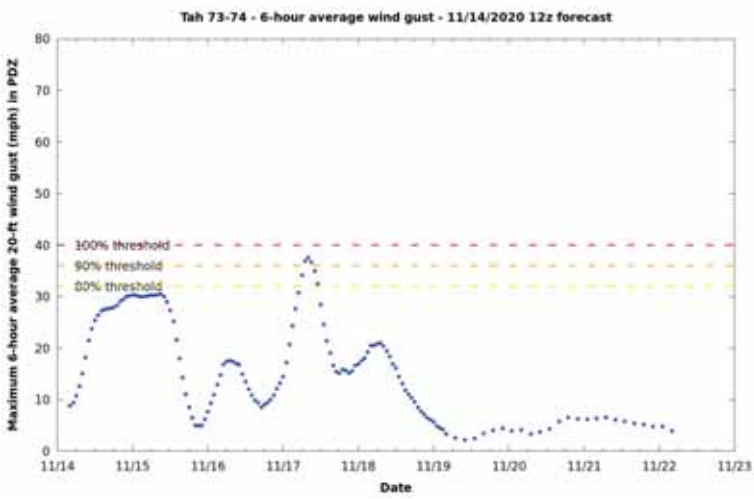
Tah 73-60



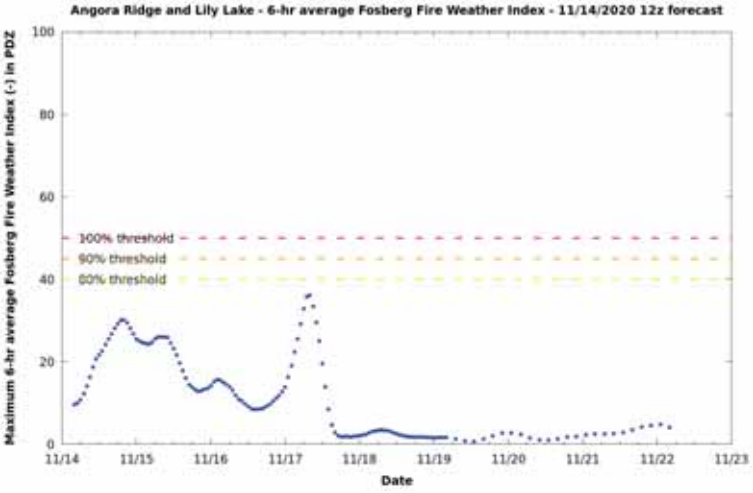


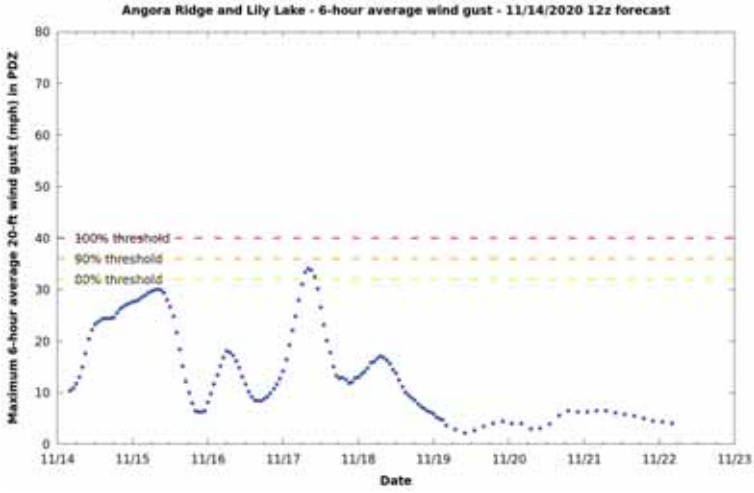
Tah 73-74



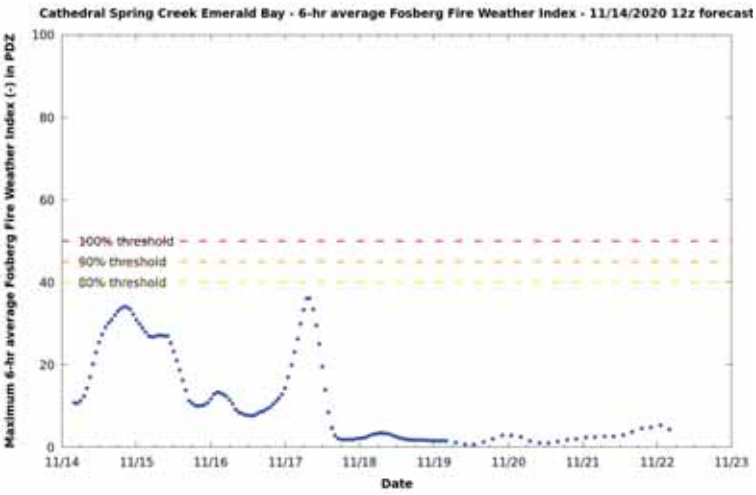


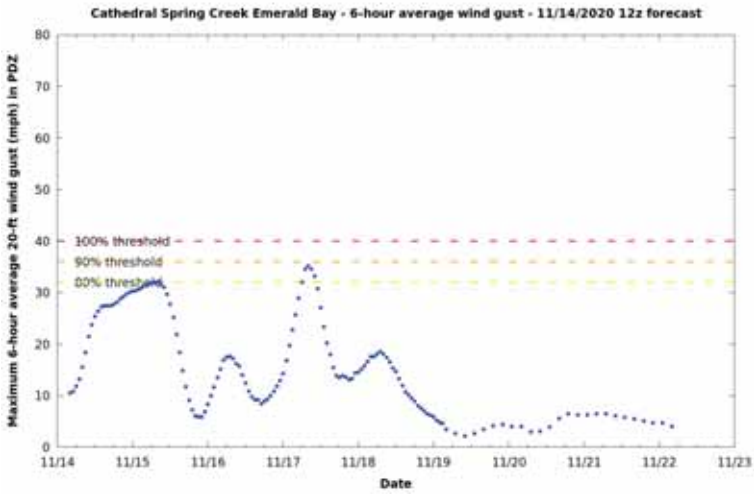
Angora Ridge and Lily Lake



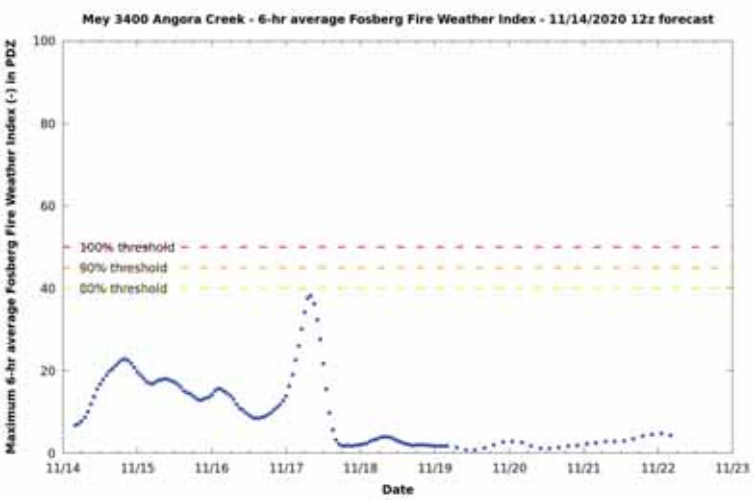


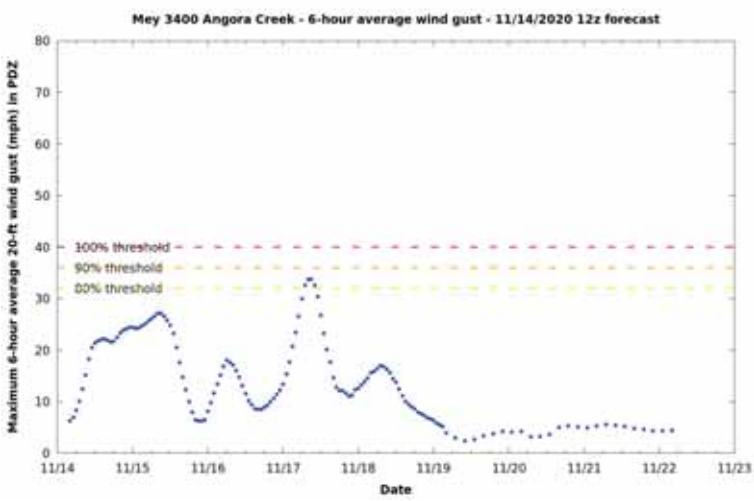
Cathedral Spring Creek Emerald Bay



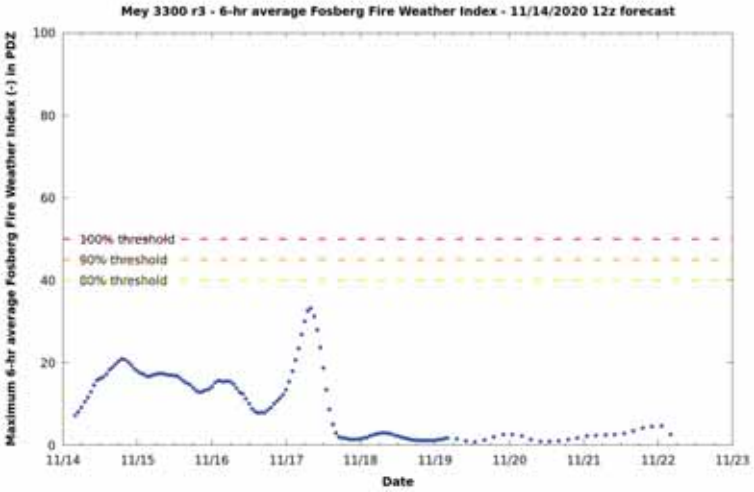


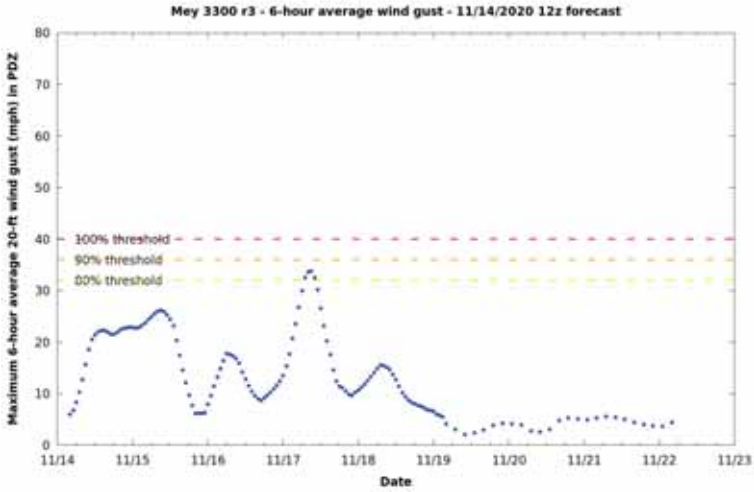
Mey 3400 Angora Creek



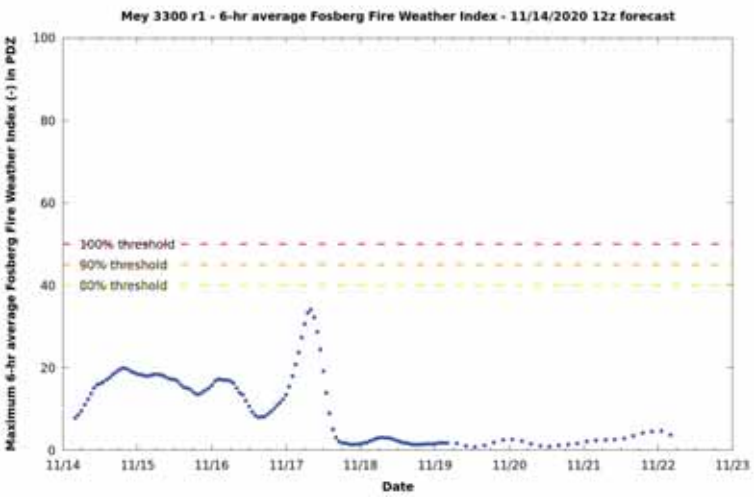


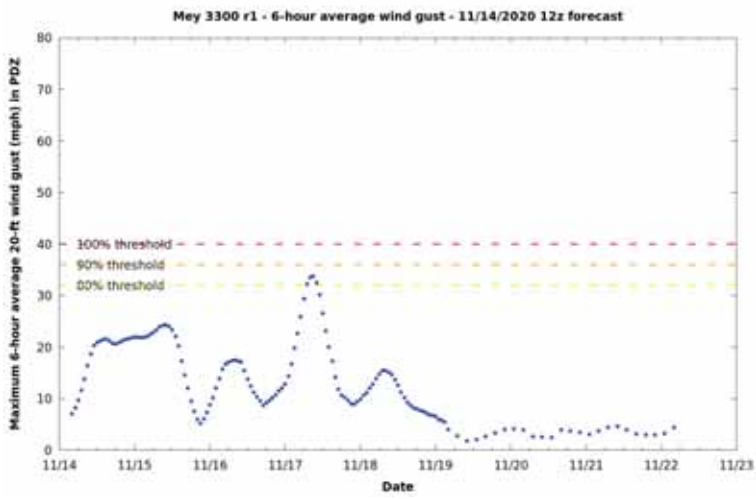
Mey 3300 r3



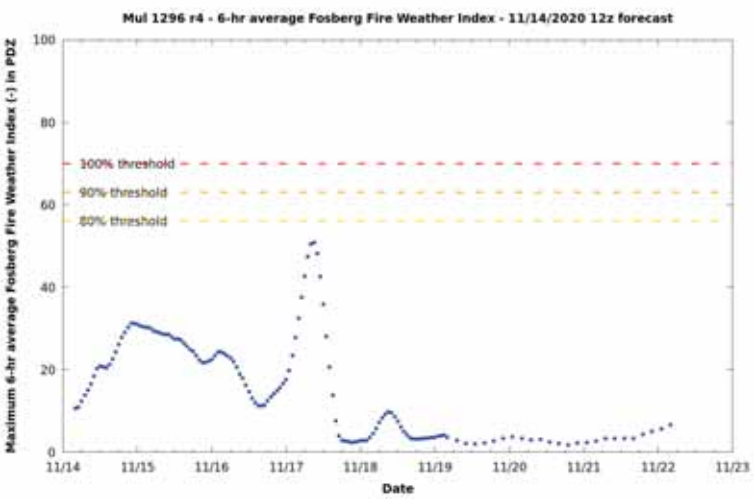


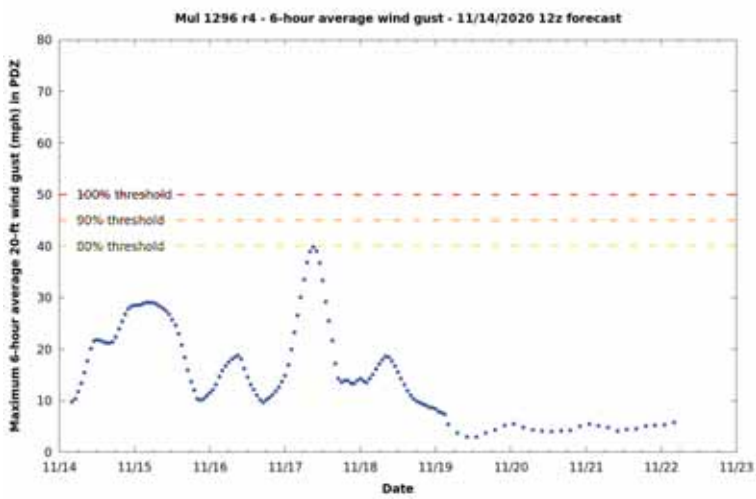
Mey 3300 r1



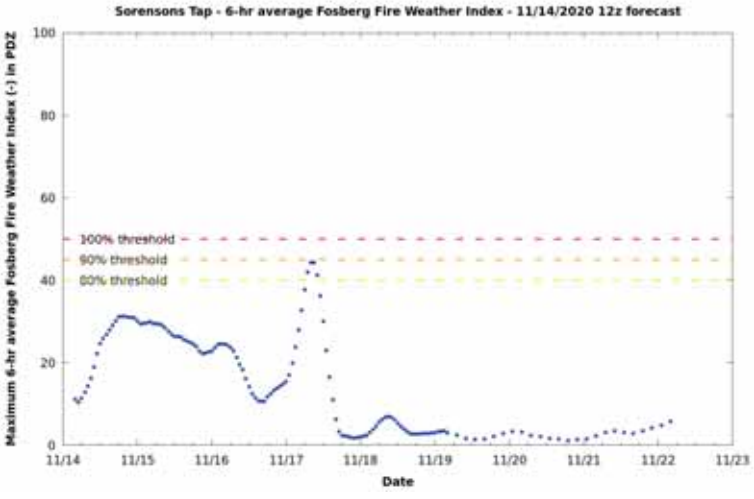


Mul 1296 r4



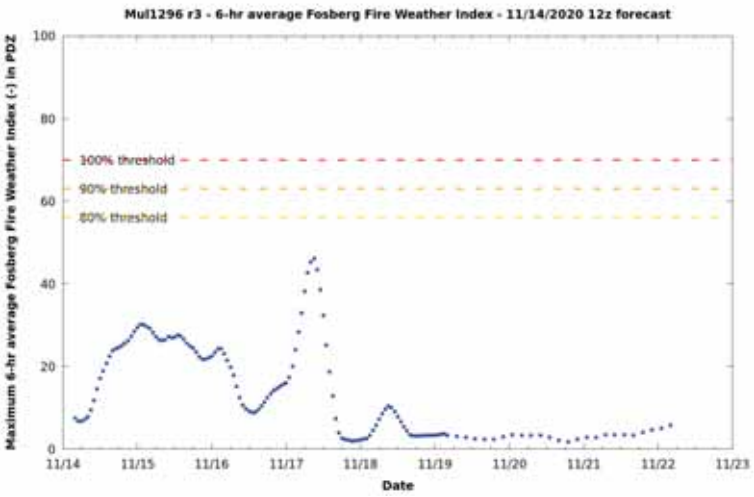


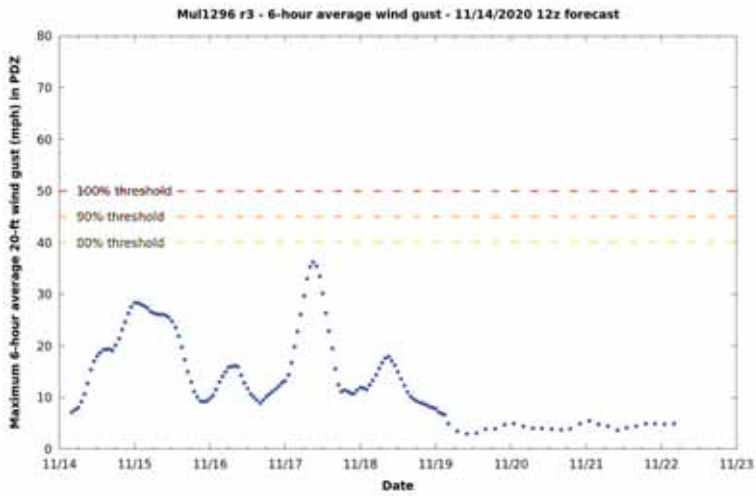
Sorensons Tap



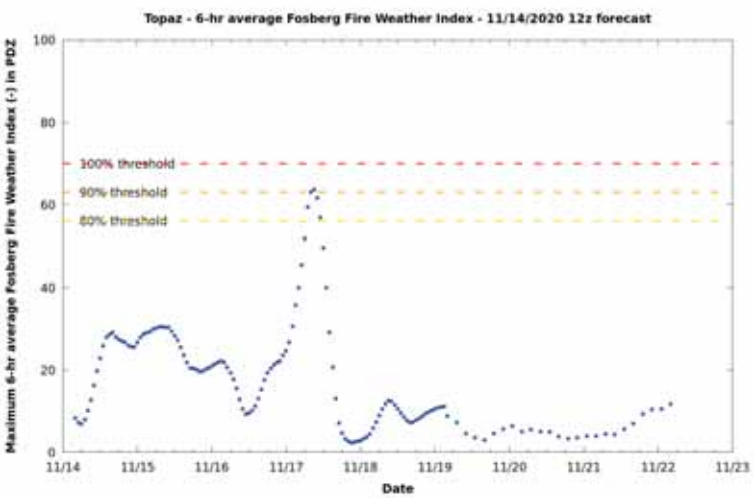


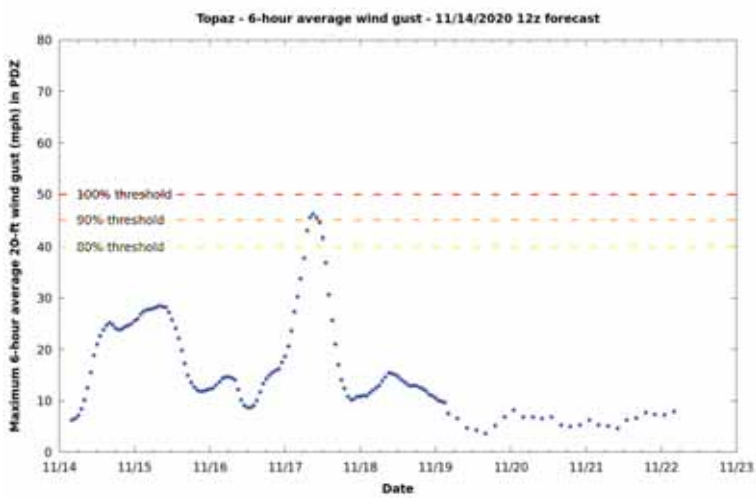
Mul 1296 r3



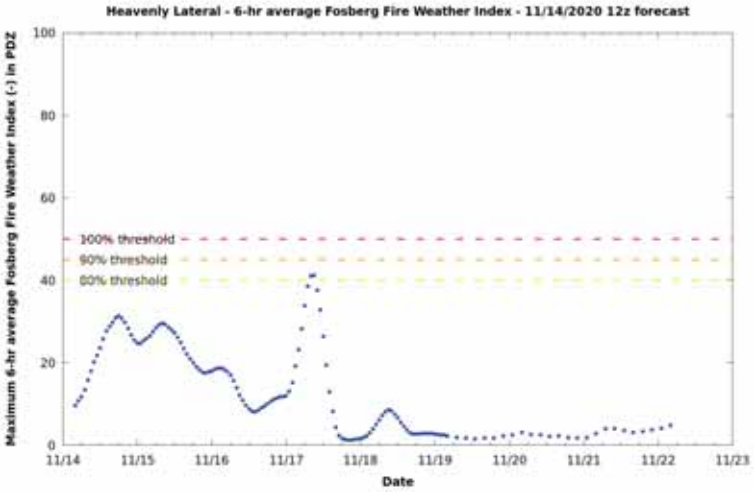


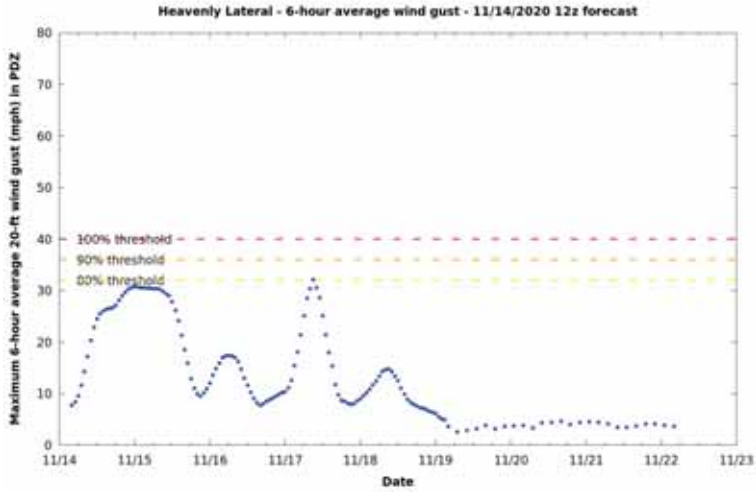
Topaz



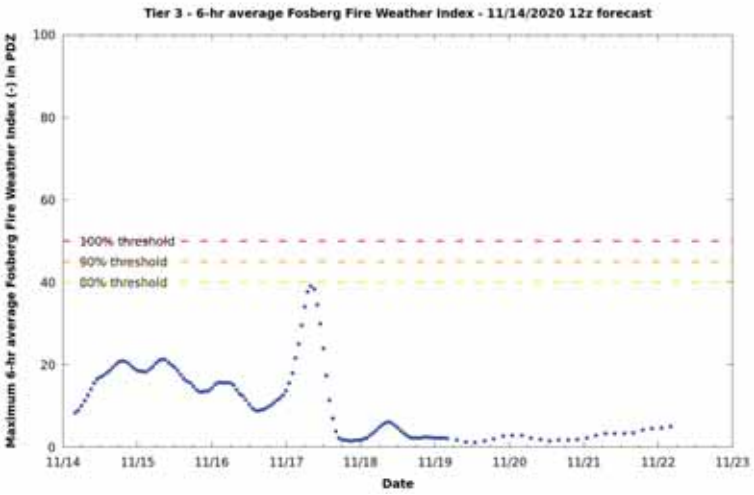


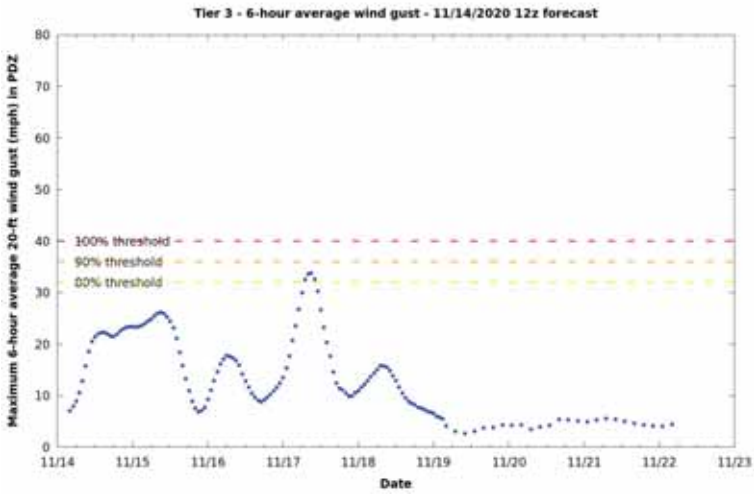
Heavenly Lateral



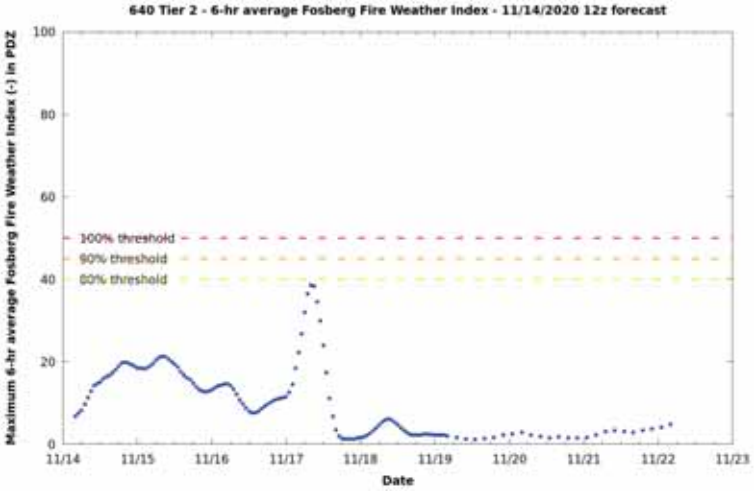


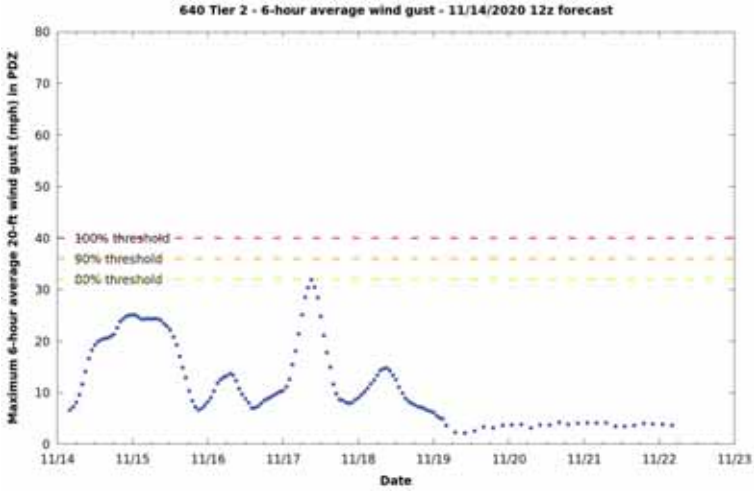
Tier 3



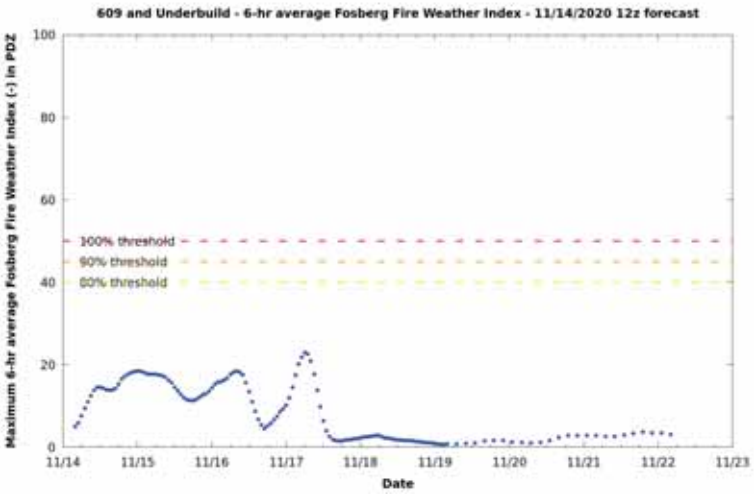


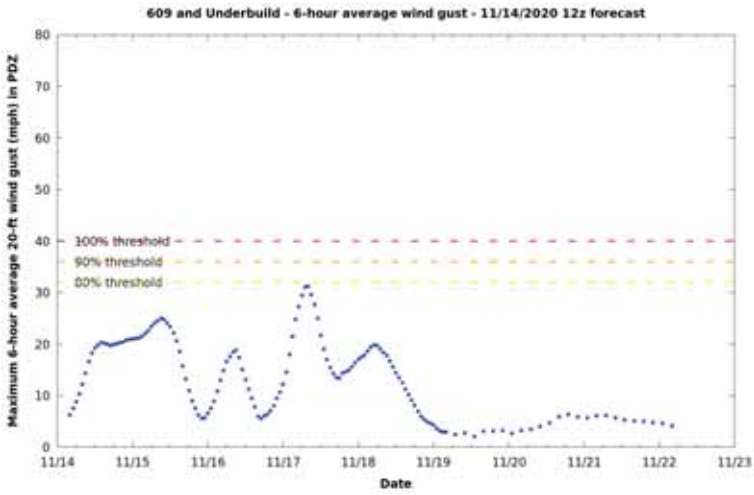
640 Tier 2



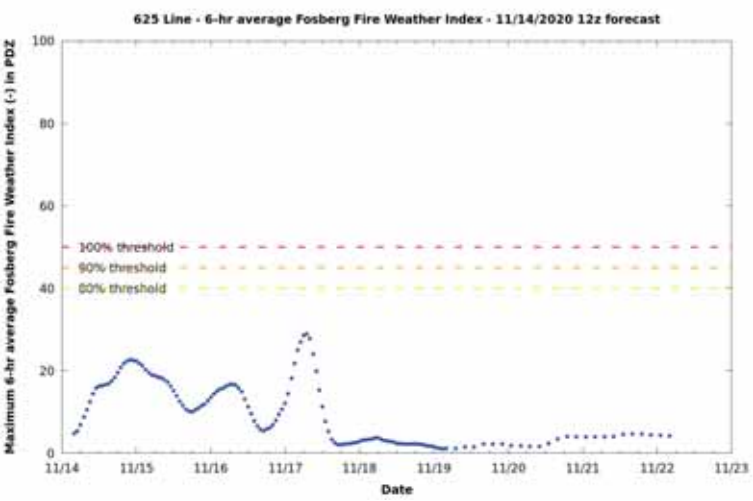


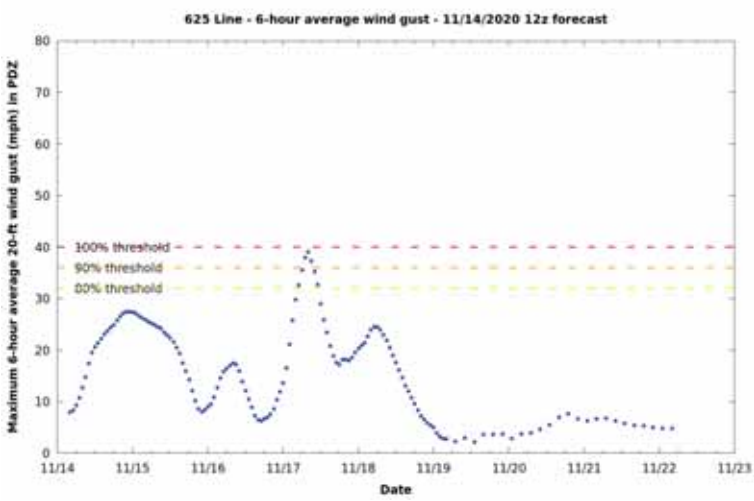
609 and Underbuild



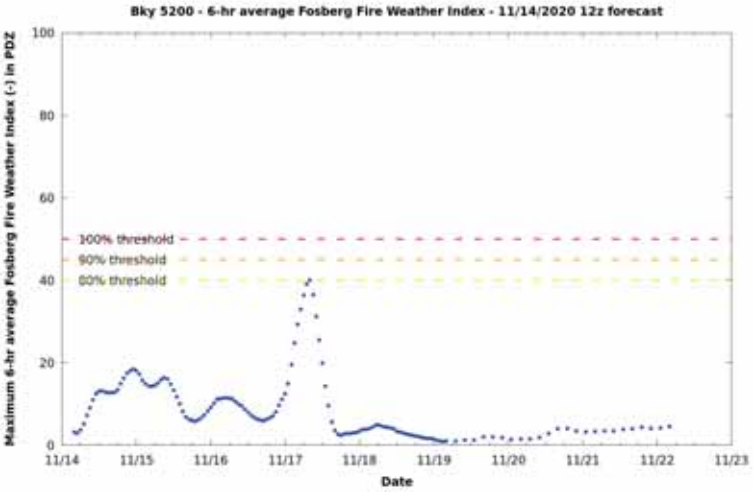


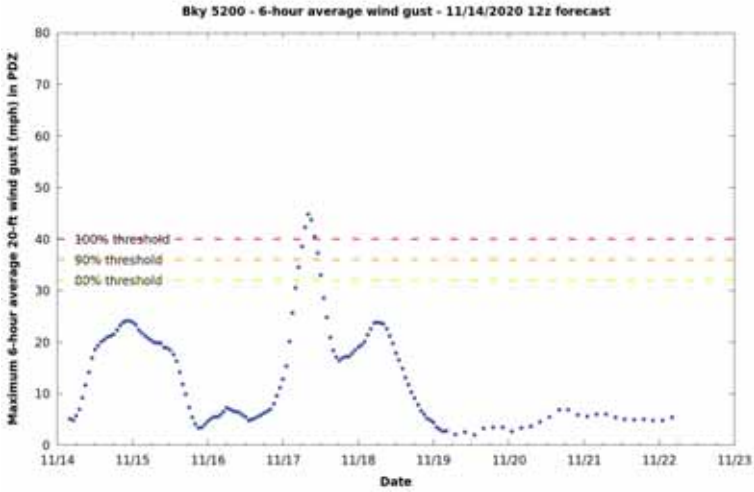
625 Line



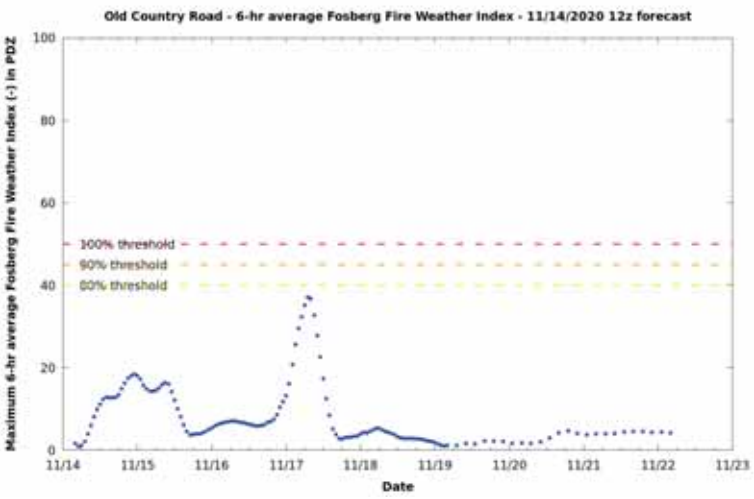


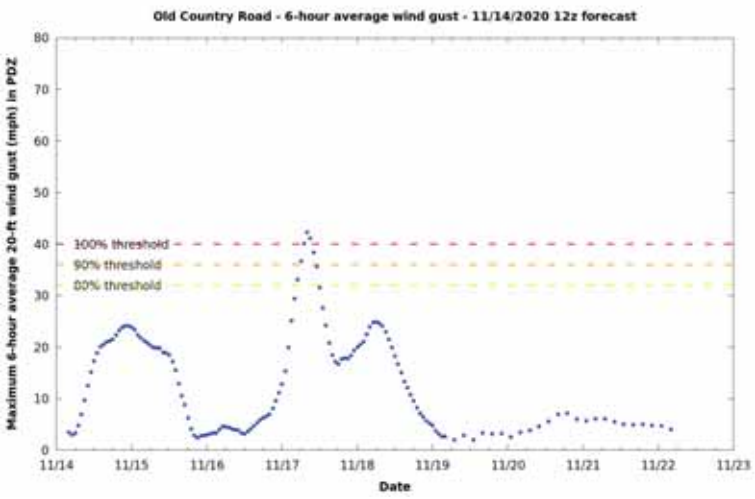
Bky 5200



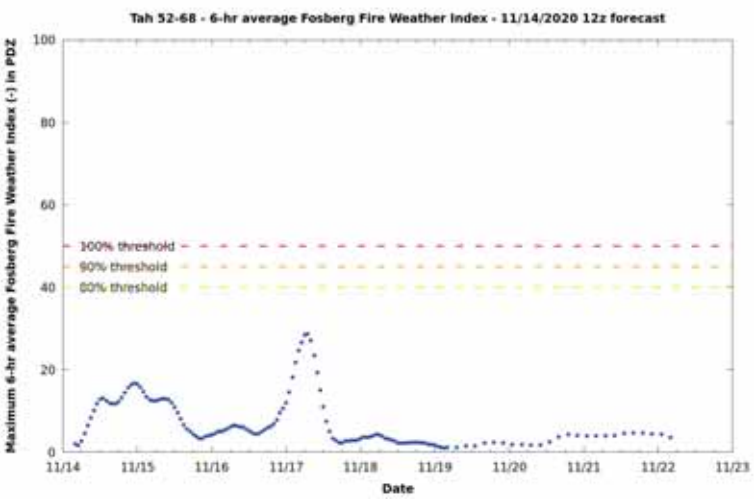


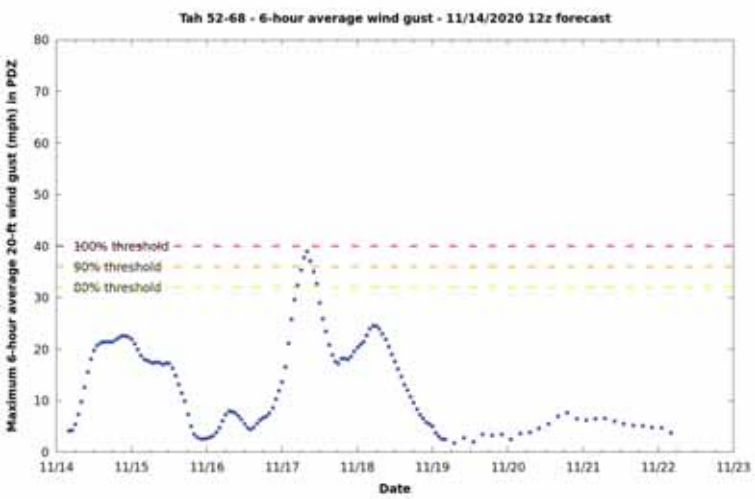
Old Country Road



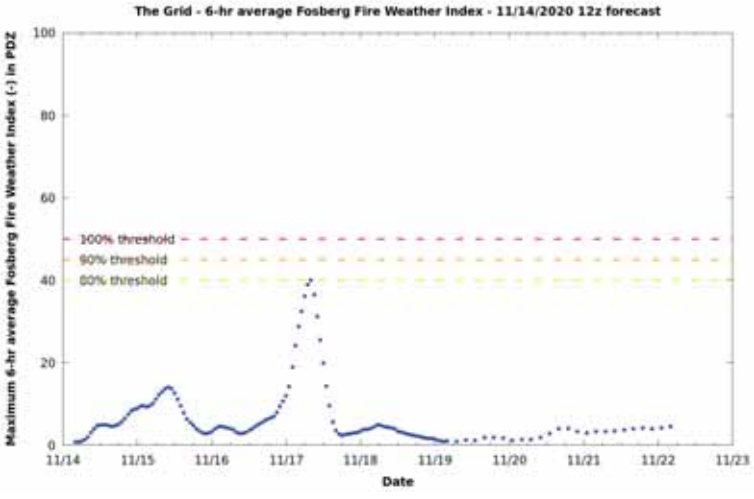


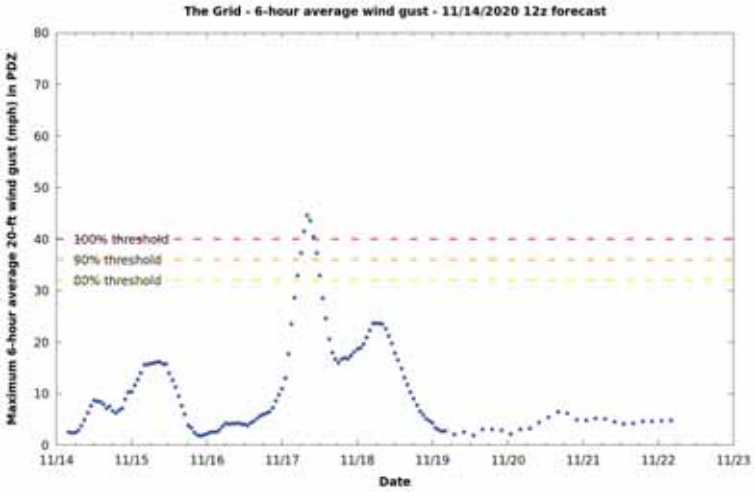
Tah 52-68



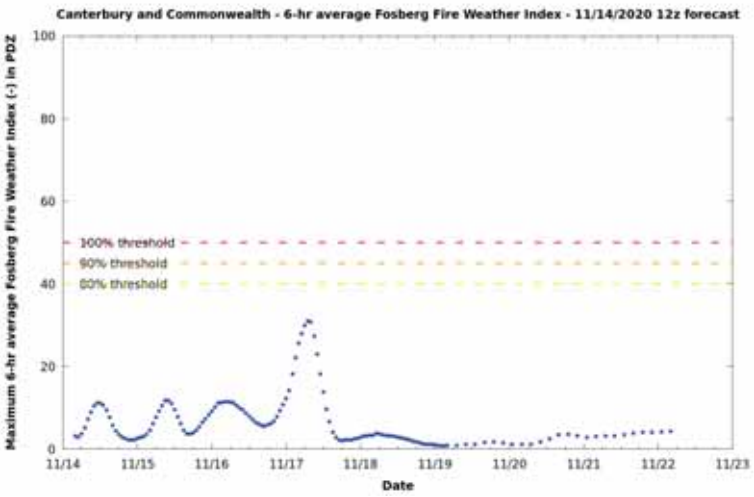


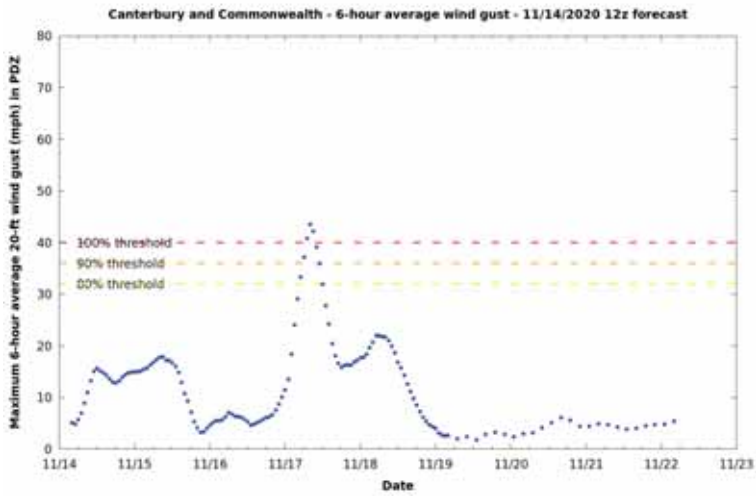
The Grid



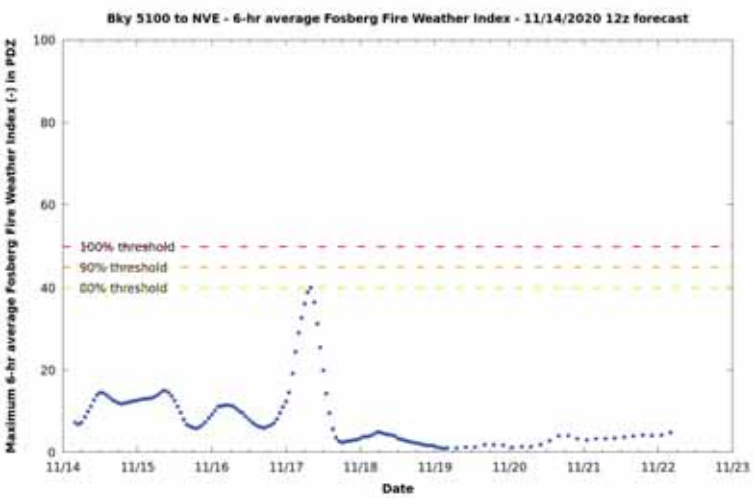


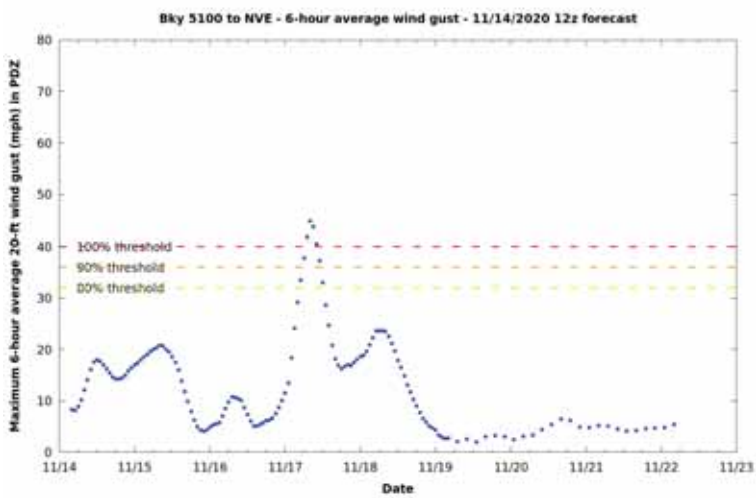
Canterbuy and Commonwealth



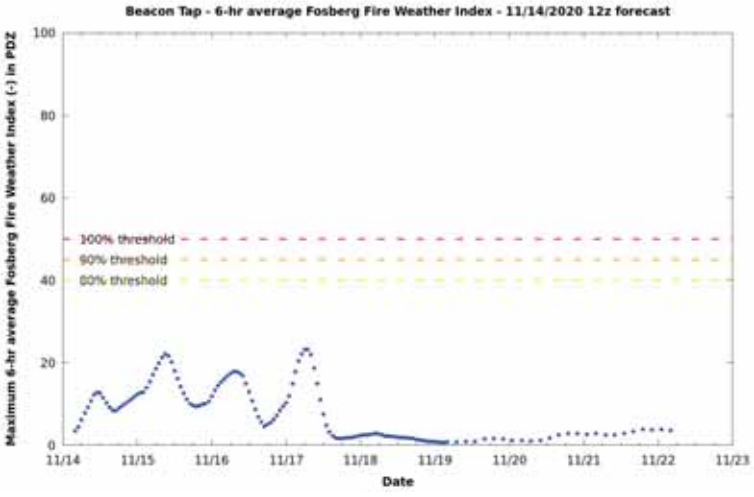


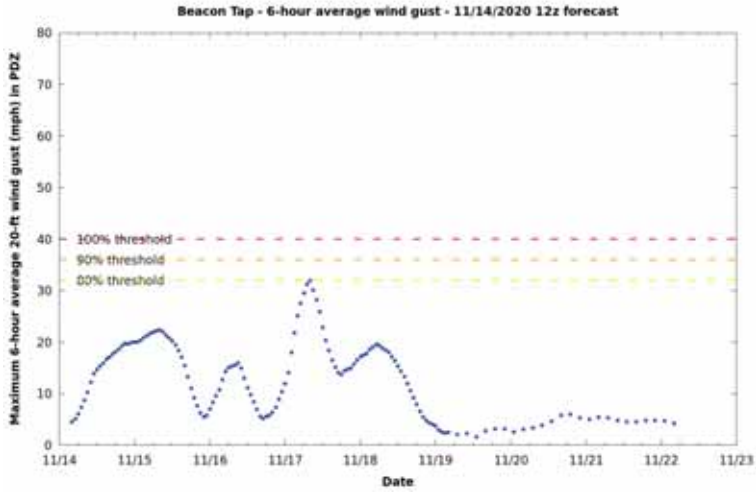
Bky 5100 to NVE



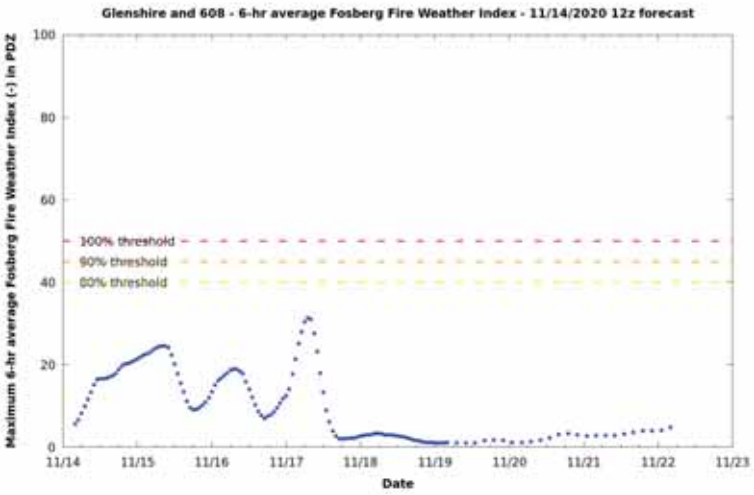


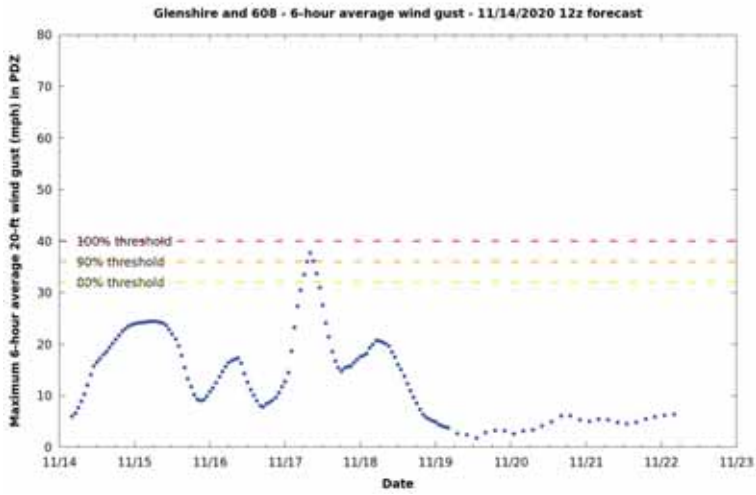
Beacon Tap



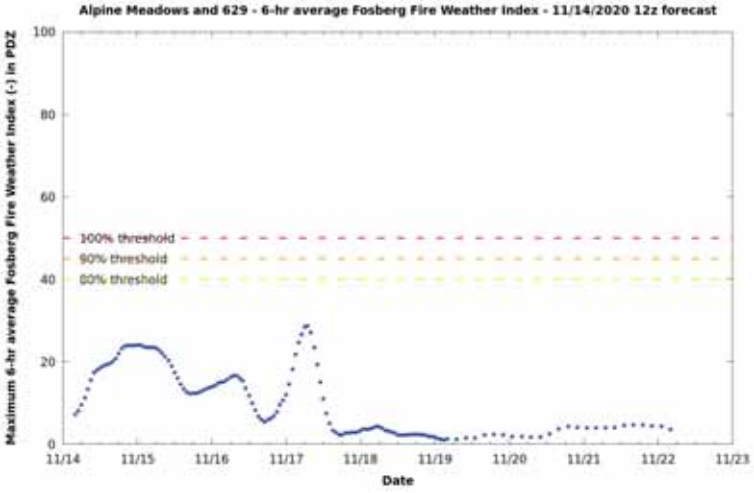


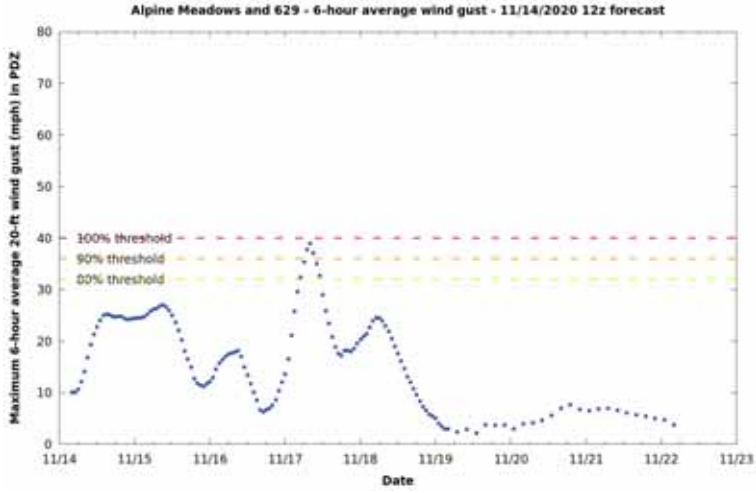
Glenshire and 608



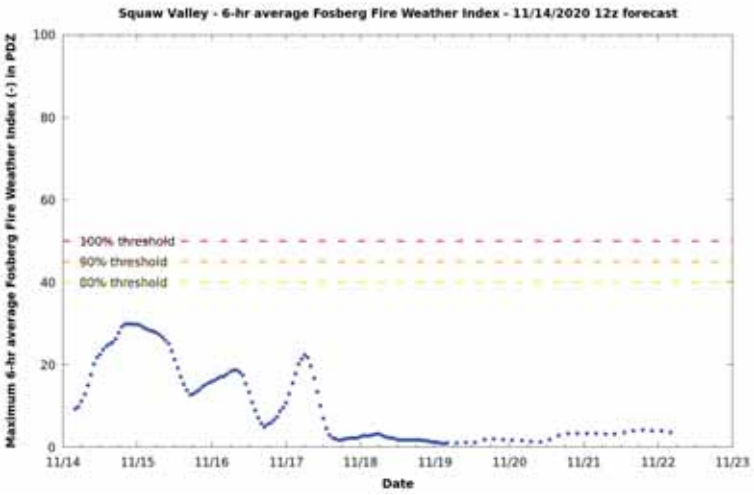


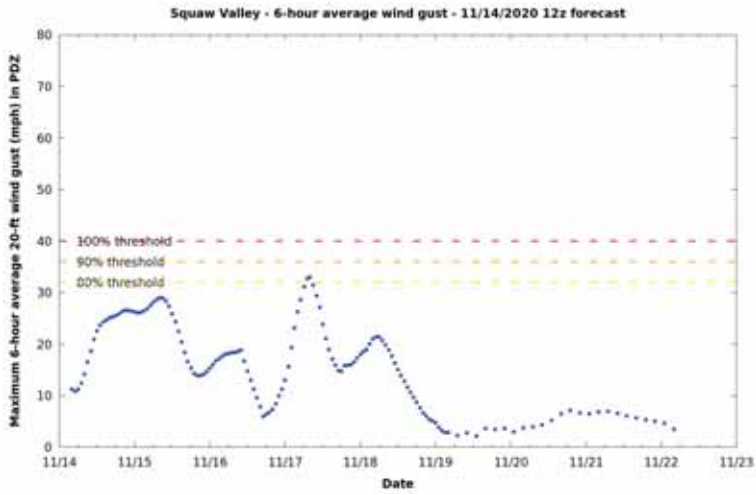
Alpine Meadows and 629



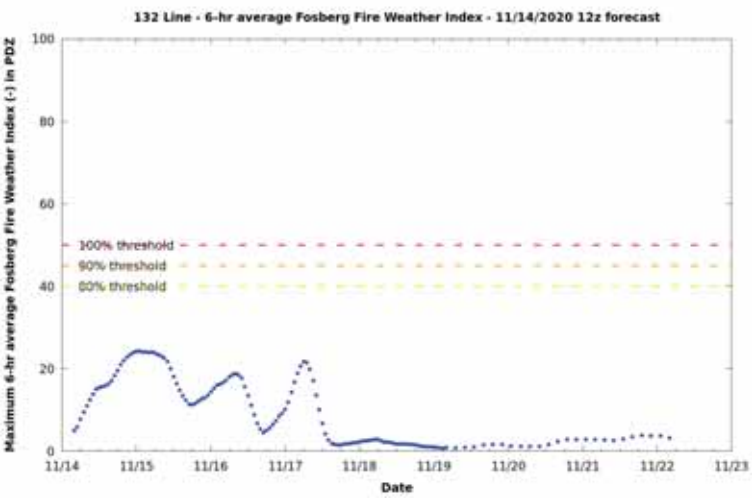


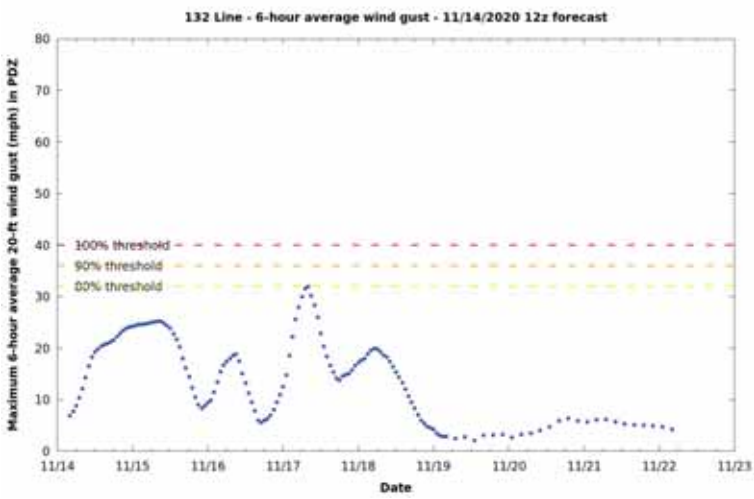
Squaw Valley



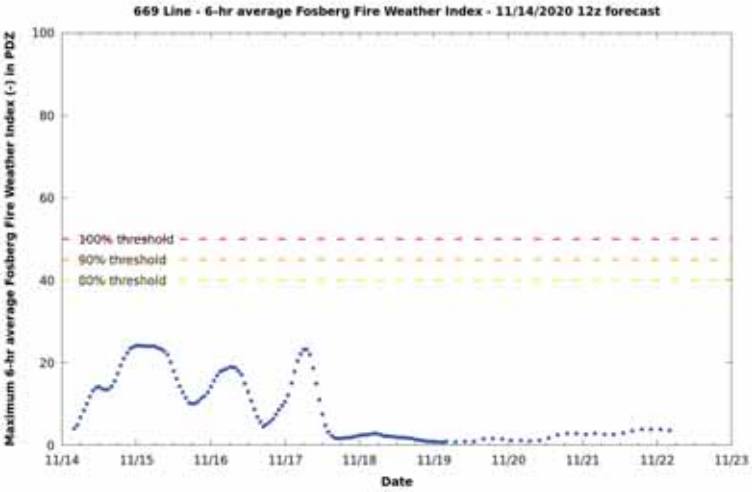


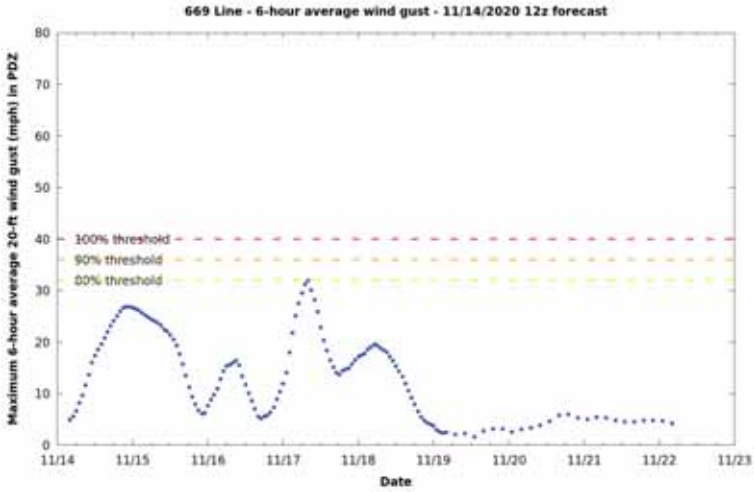
132 Line



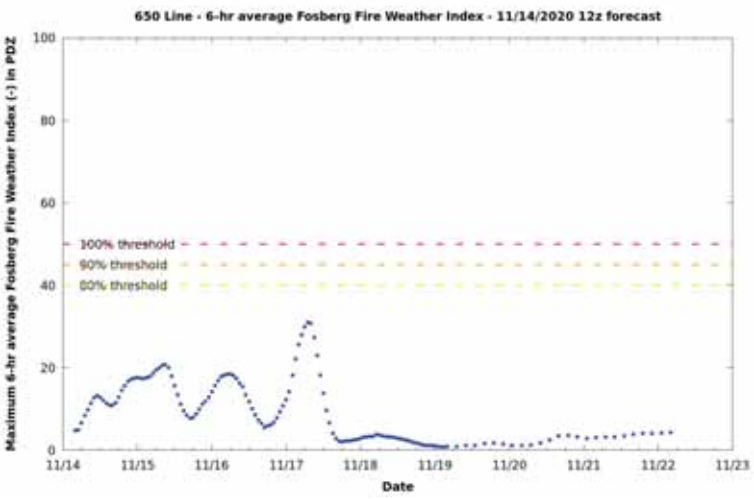


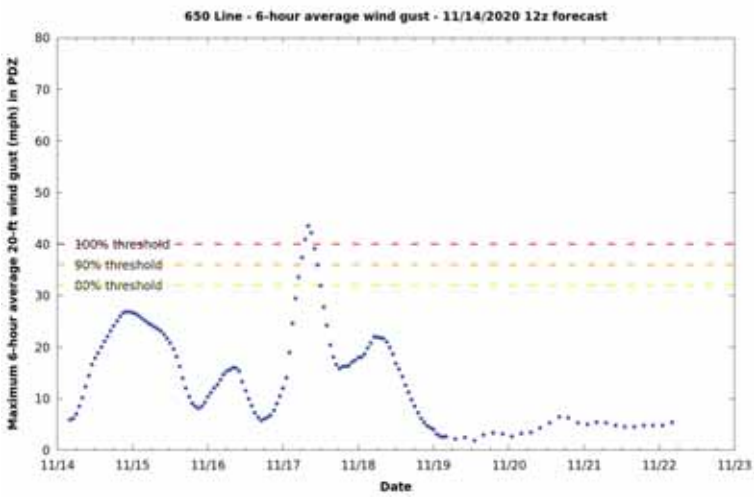
669 Line



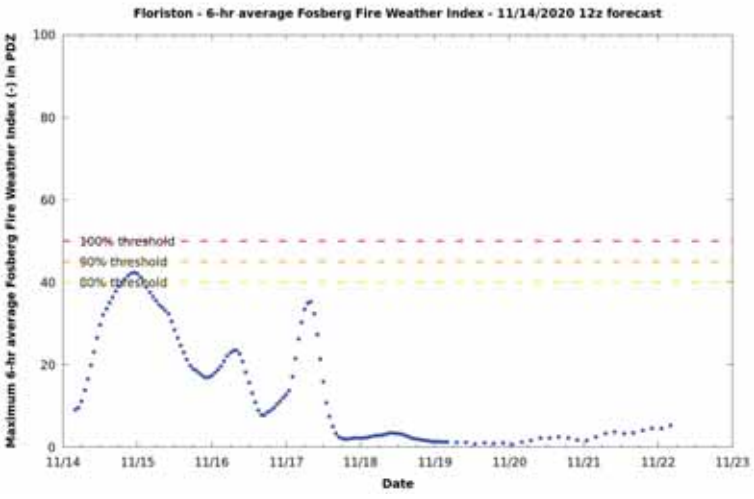


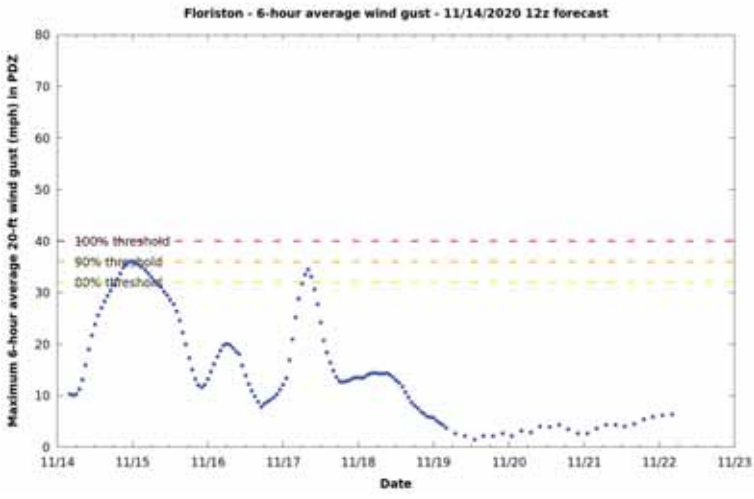
650 Line



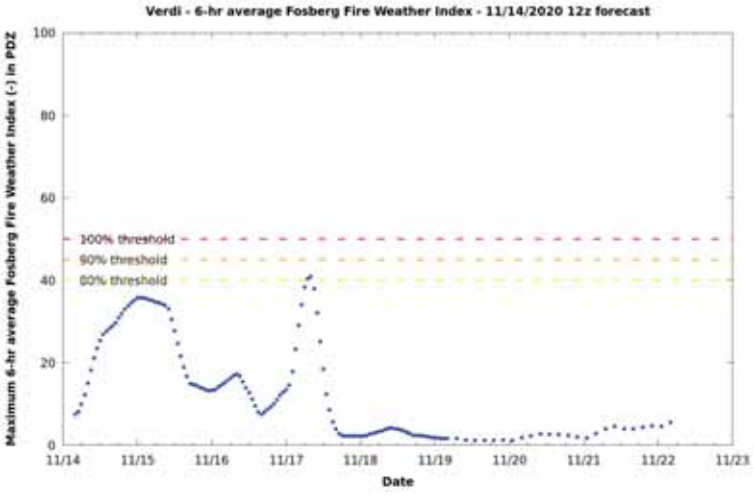


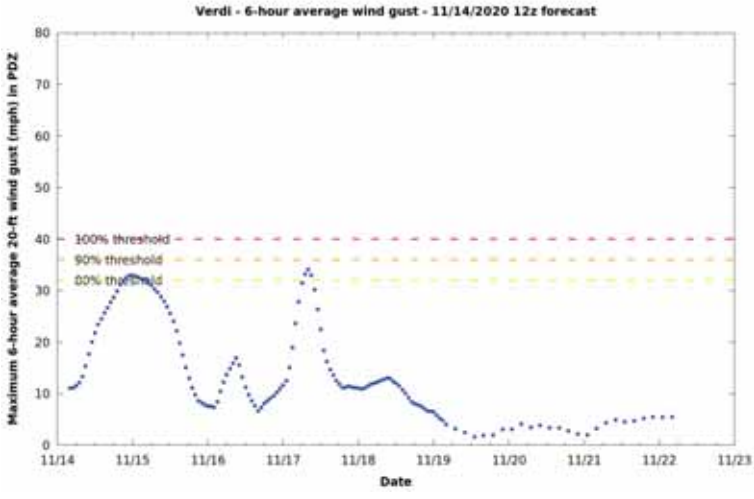
Floriston



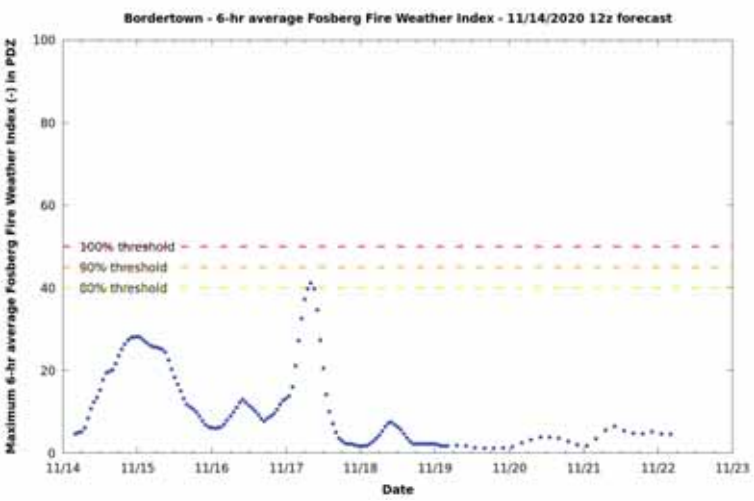


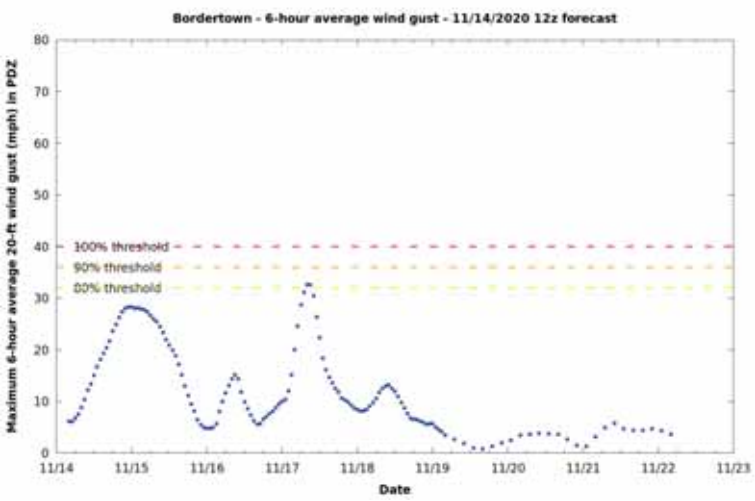
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/14/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/14/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/15/20 - 11/21/20

Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

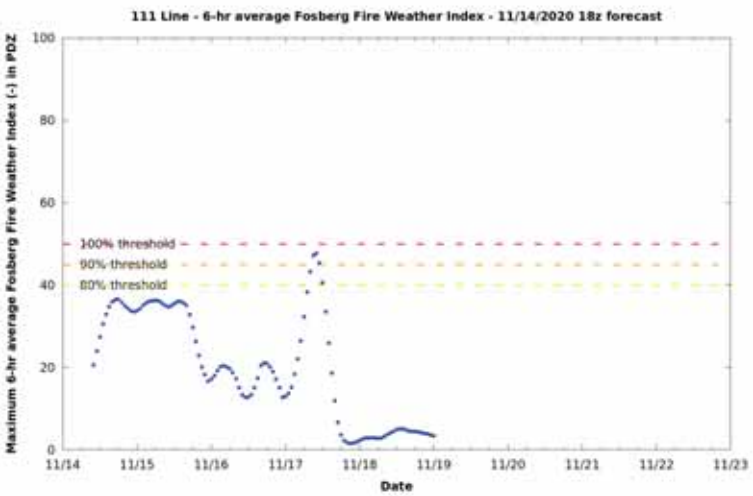
Liberty Utilities Energy Release Component Forecast for 11/15/20 - 11/21/20

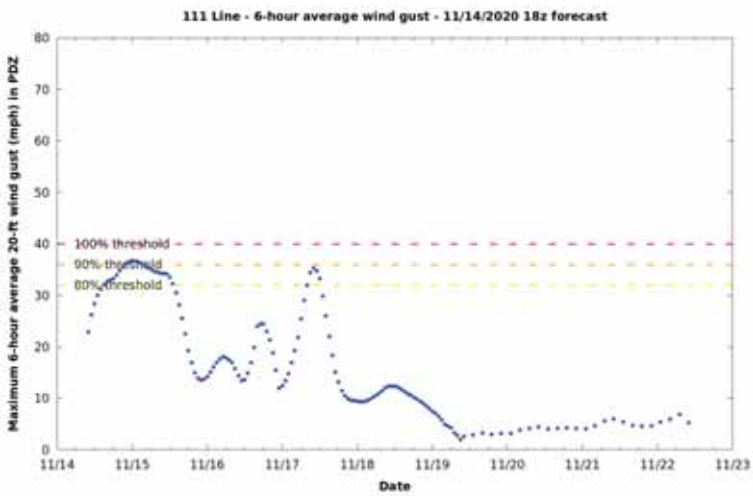
Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	57.0	56.0	56.0	49.0	40.0	38.0	40.0
Sierra Brooks	61.0	61.0	63.0	58.0	48.0	48.0	49.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

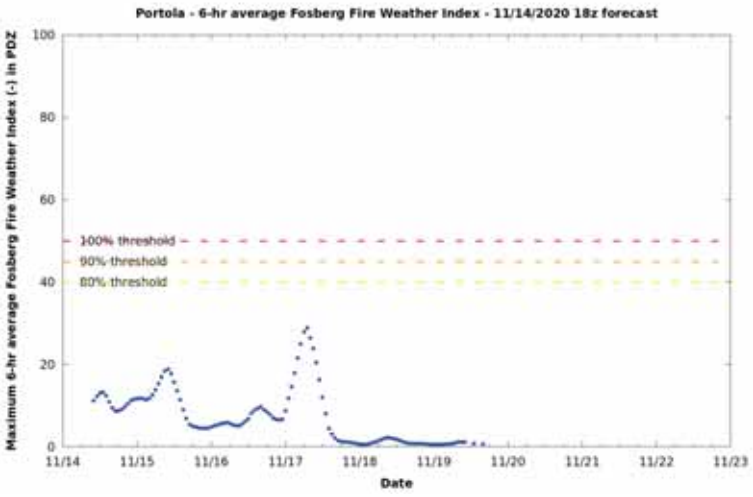
Liberty Utilities Fire Weather Summary Plots - 11/14/2020 18z forecast

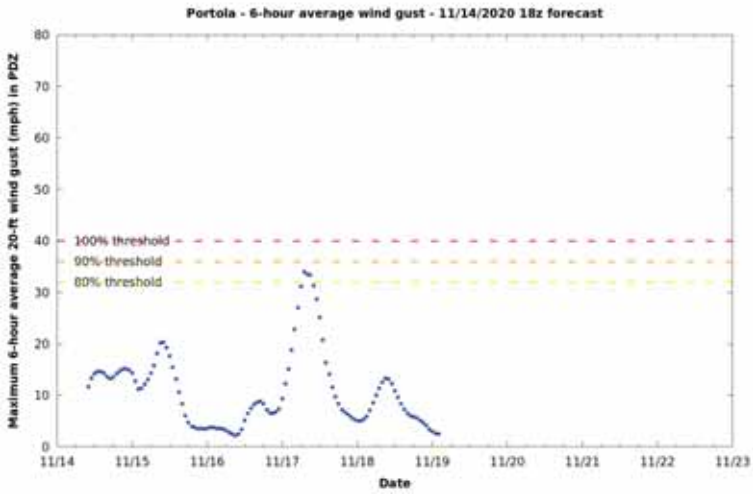
111 Line



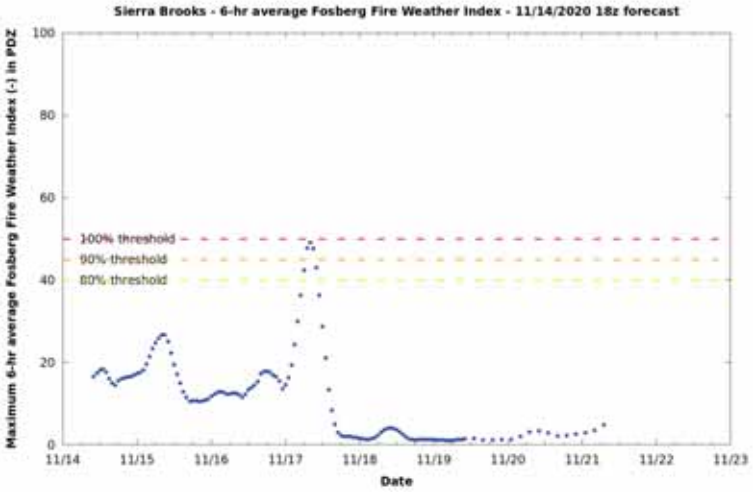


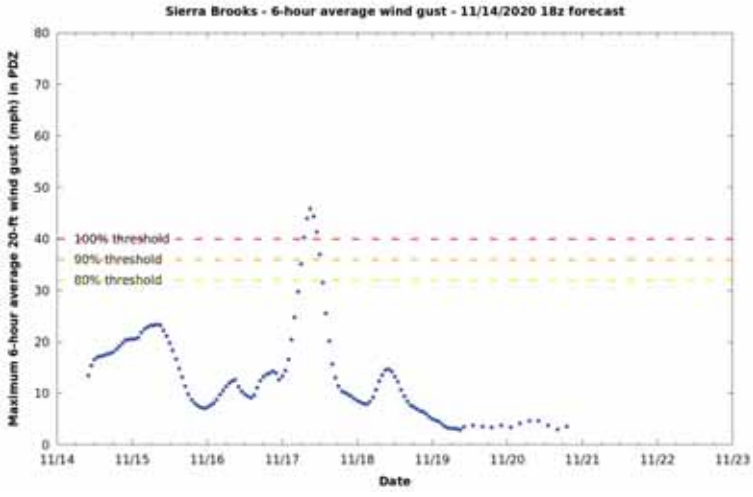
Portola



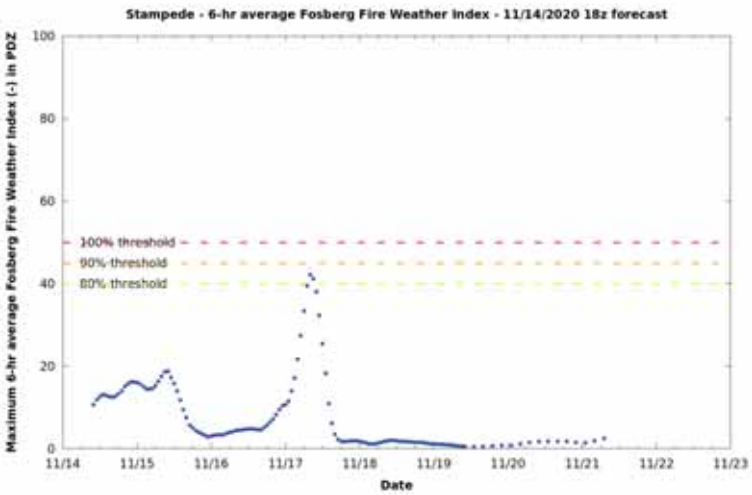


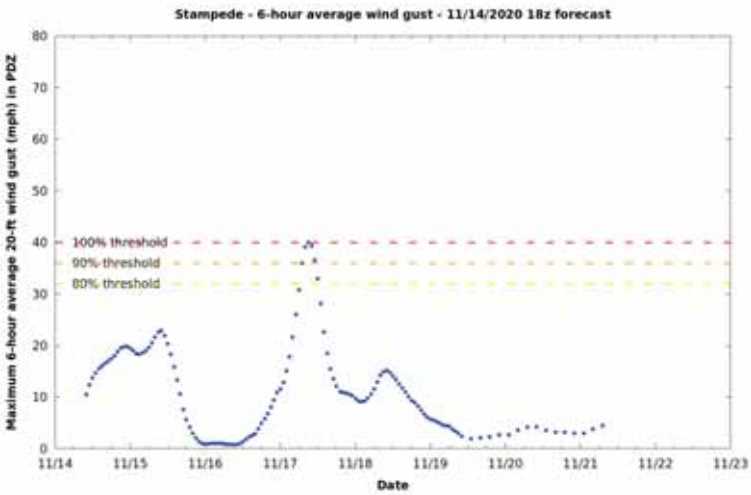
Sierra Brooks



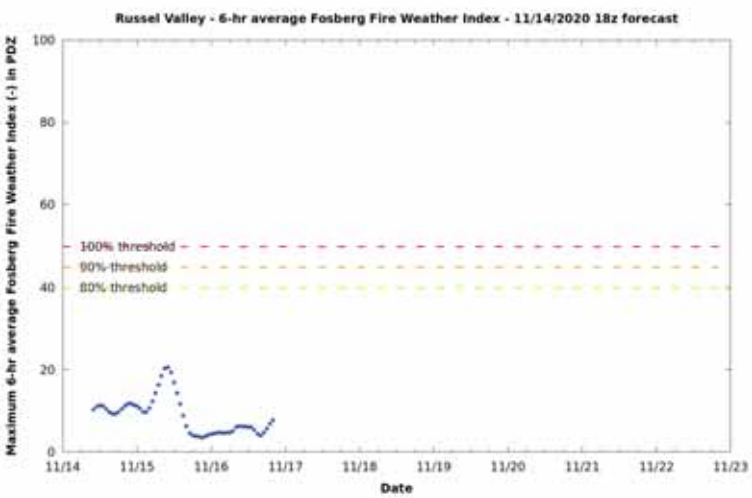


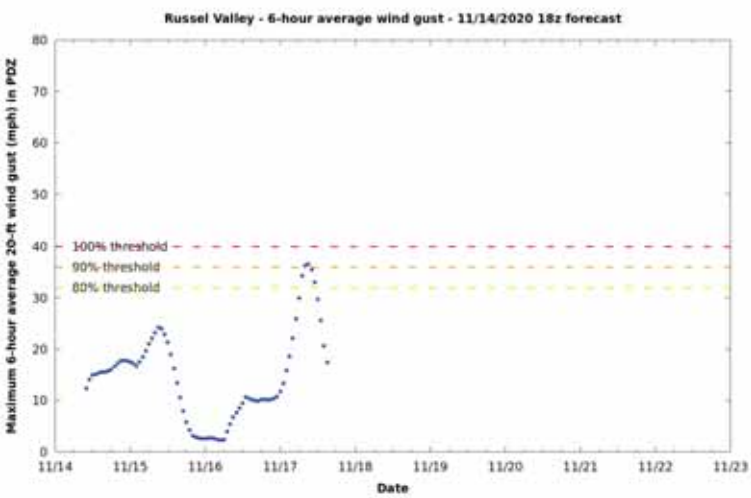
Stampede





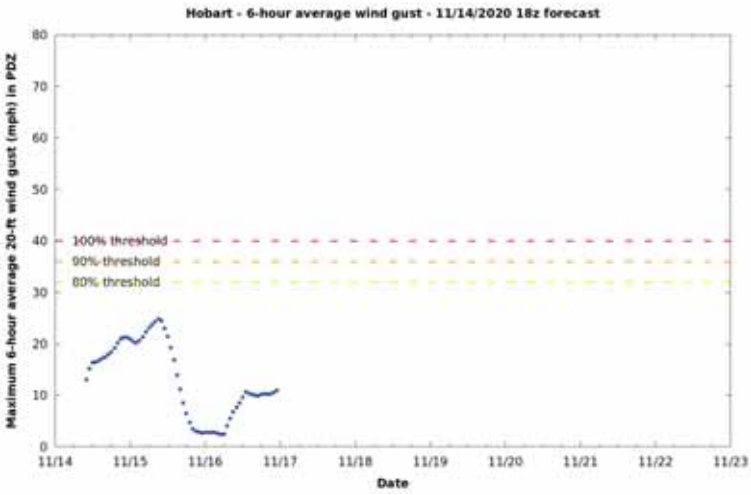
Russell Valley



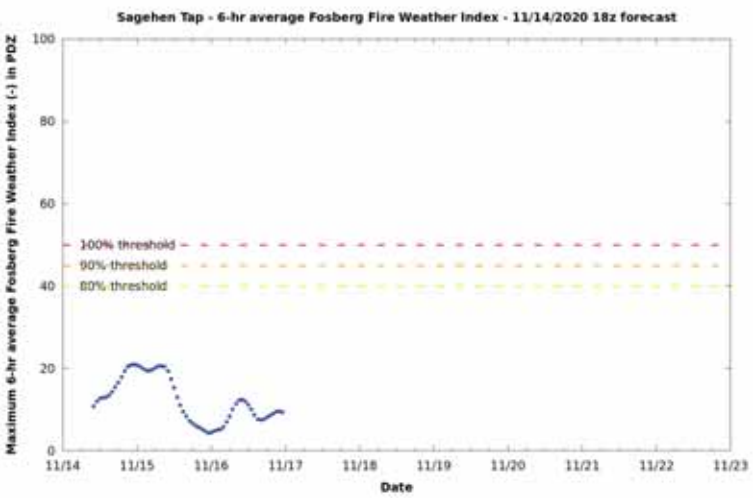


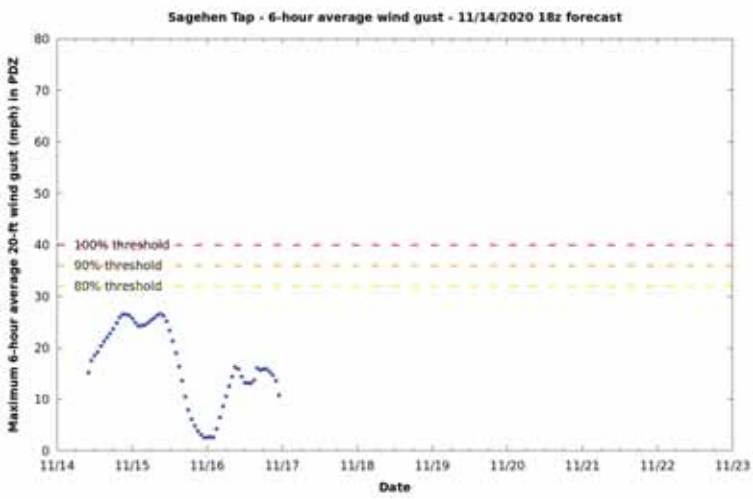
Hobart



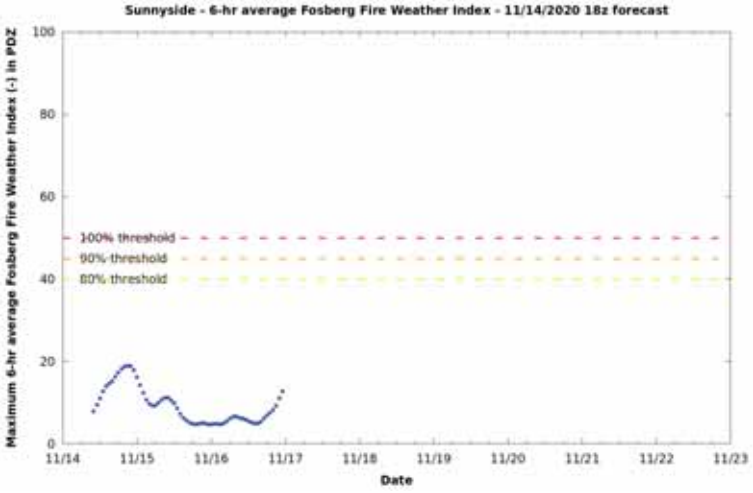


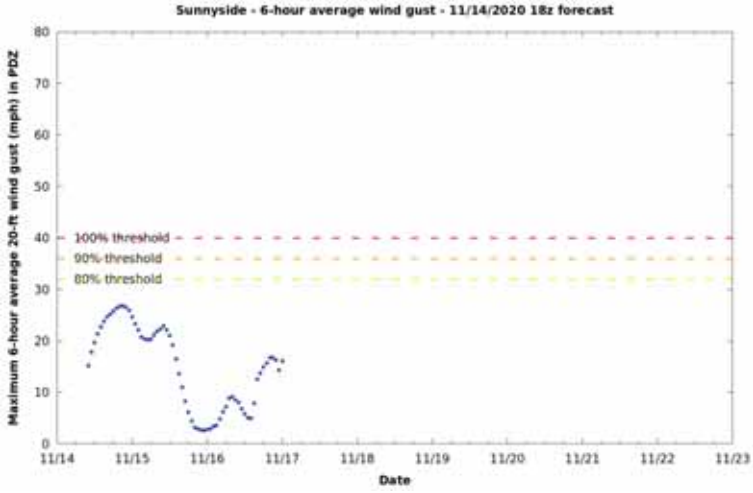
Sagehen tap



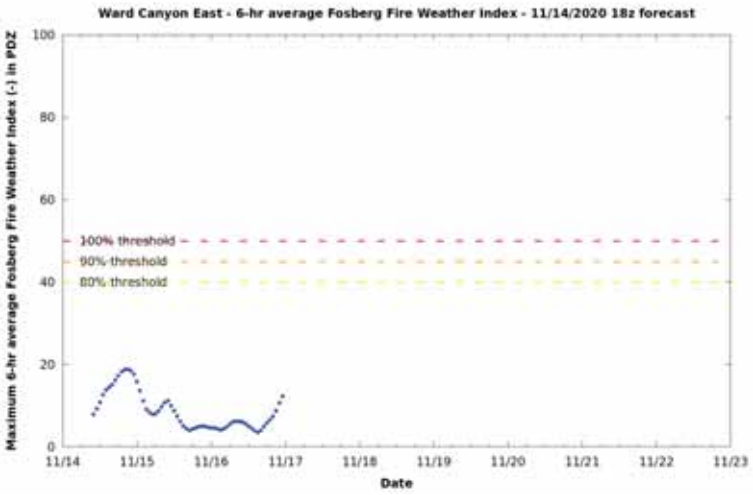


Sunnyside



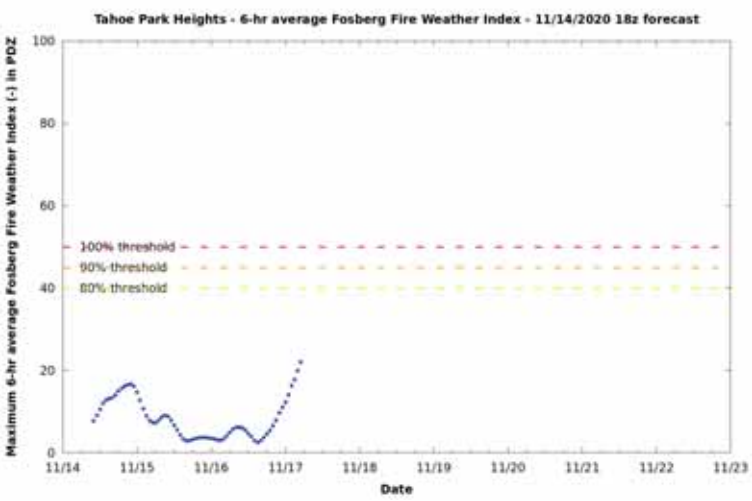


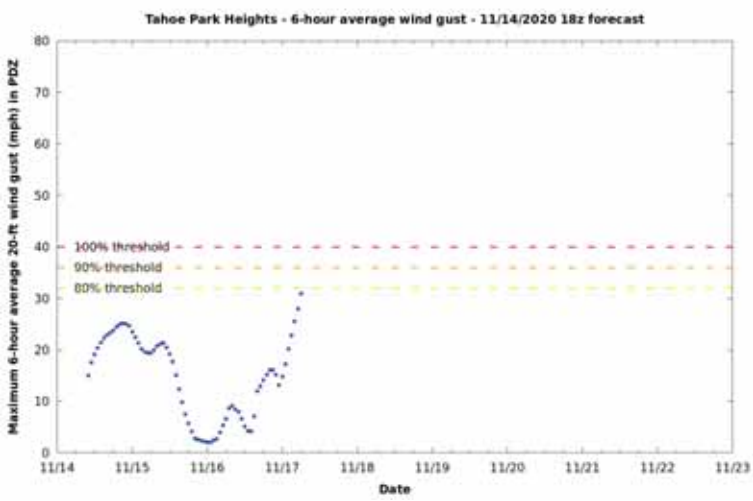
Ward Canyon East



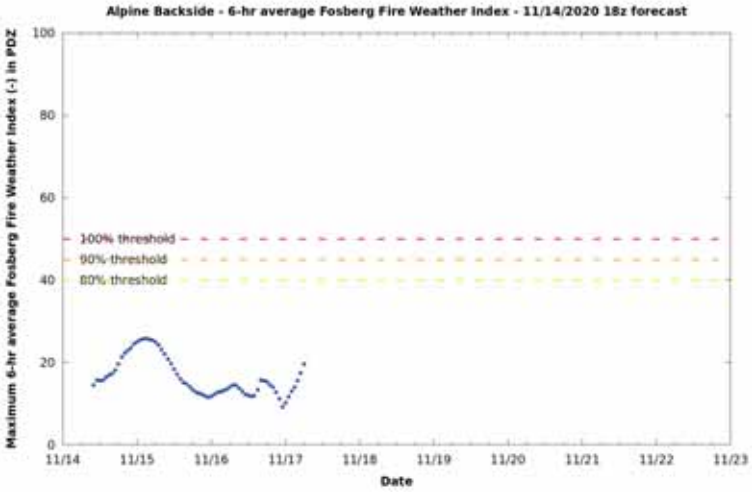


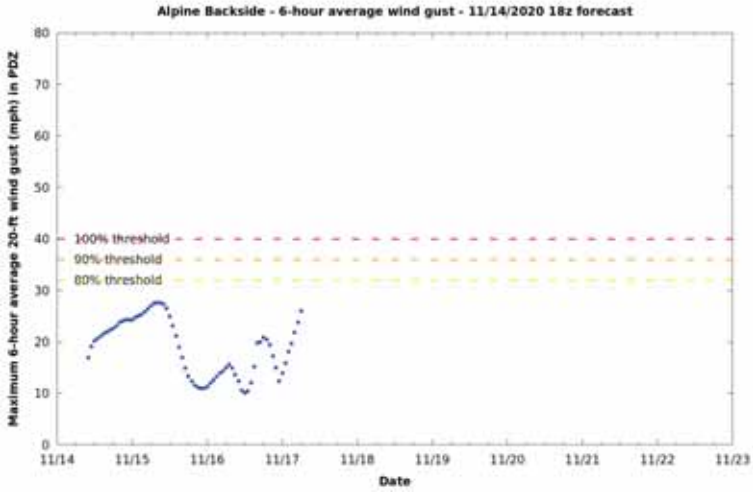
Tahoe Park Heights



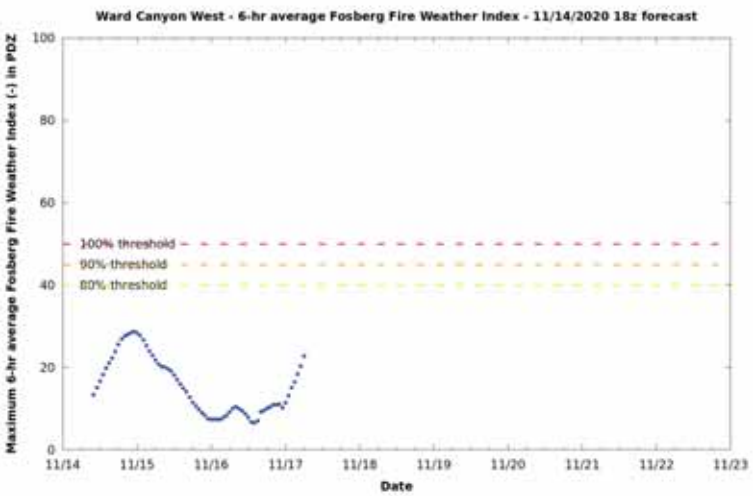


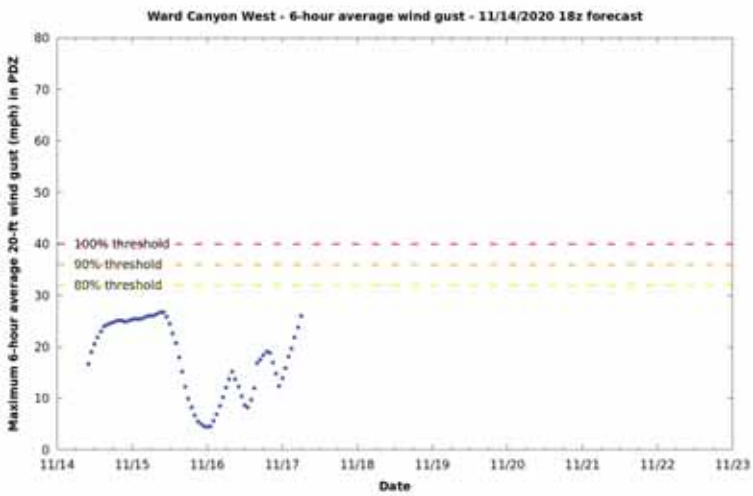
Alpine Backside



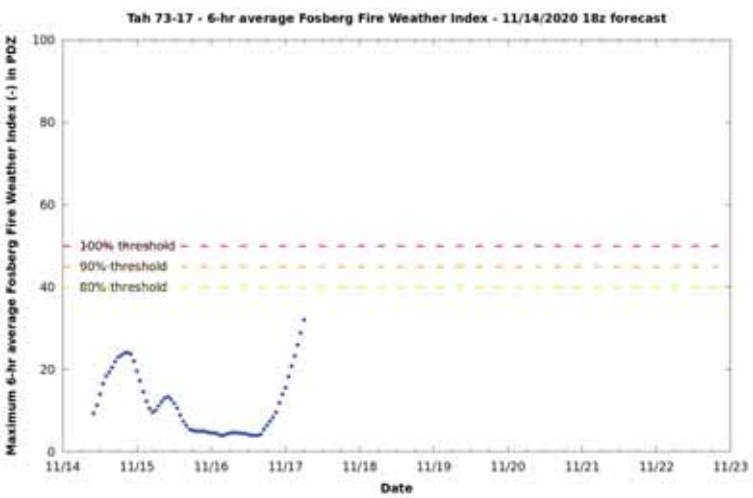


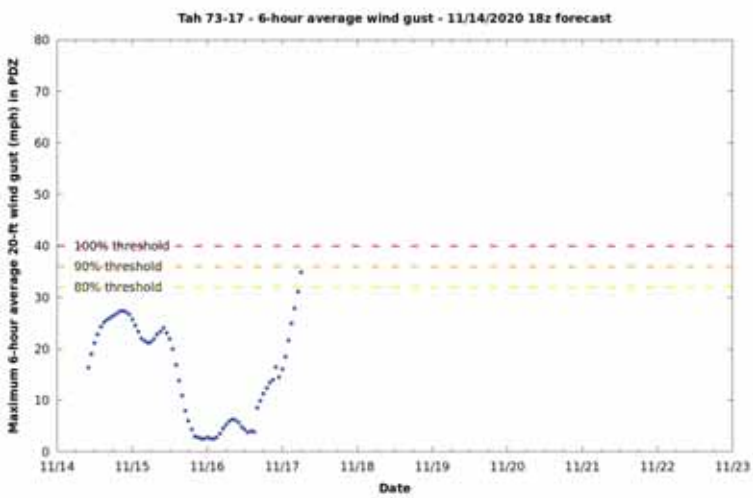
Ward Canyon West



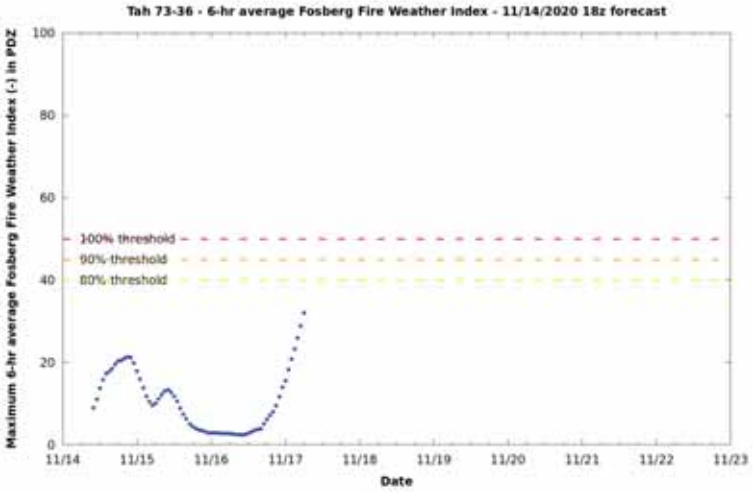


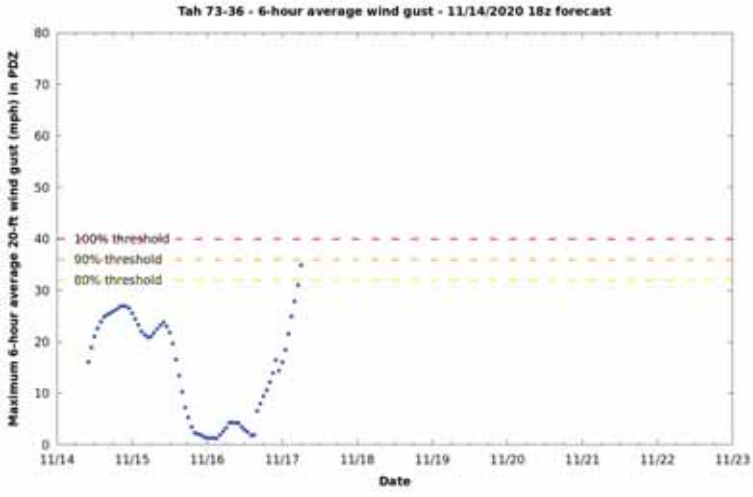
Tah 73-17



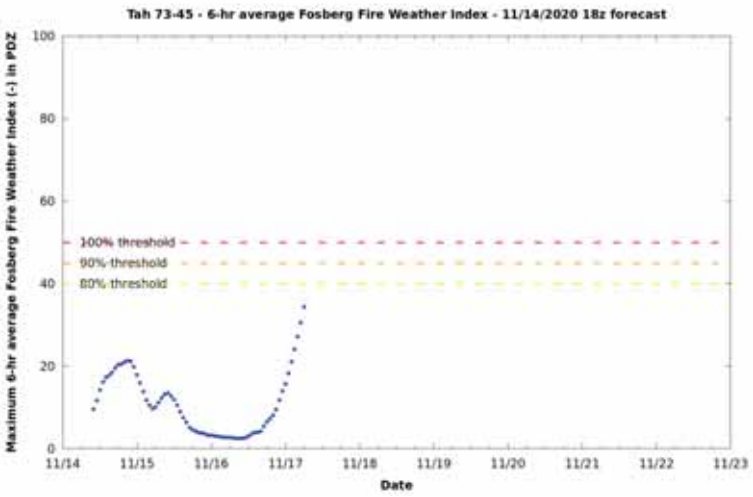


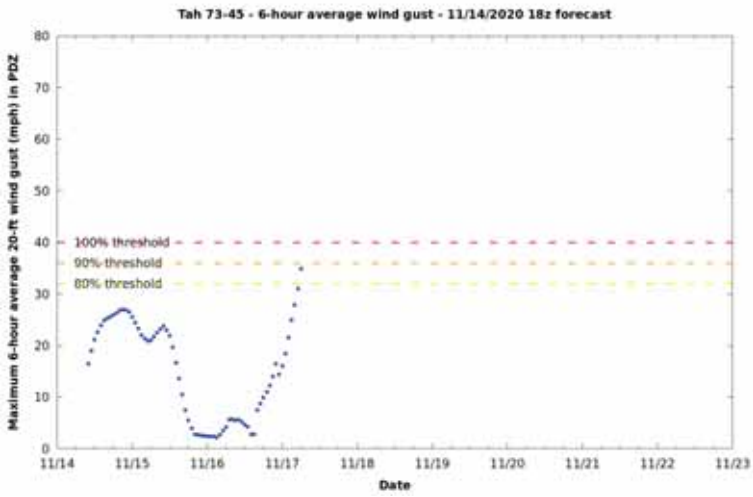
Tah 73-36



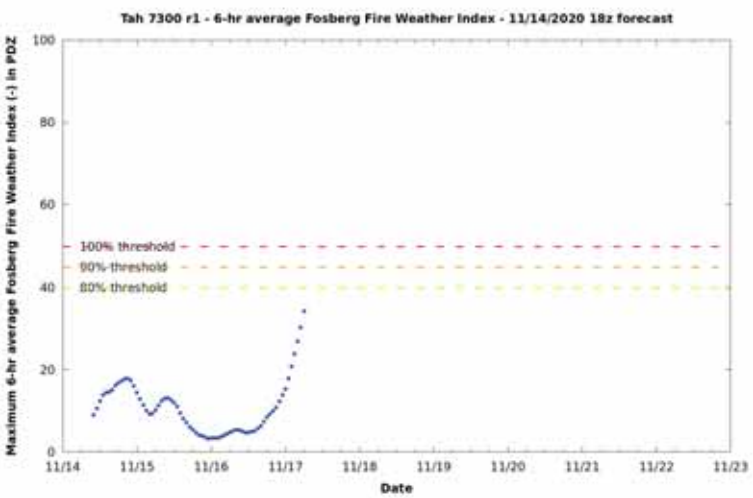


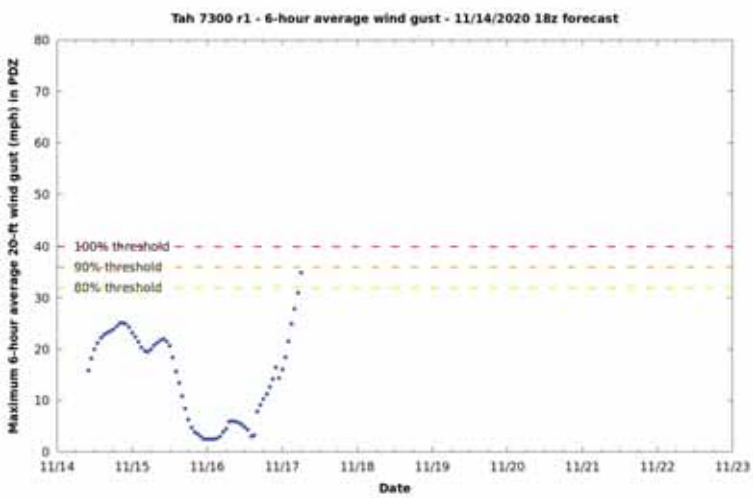
Tah 73-45



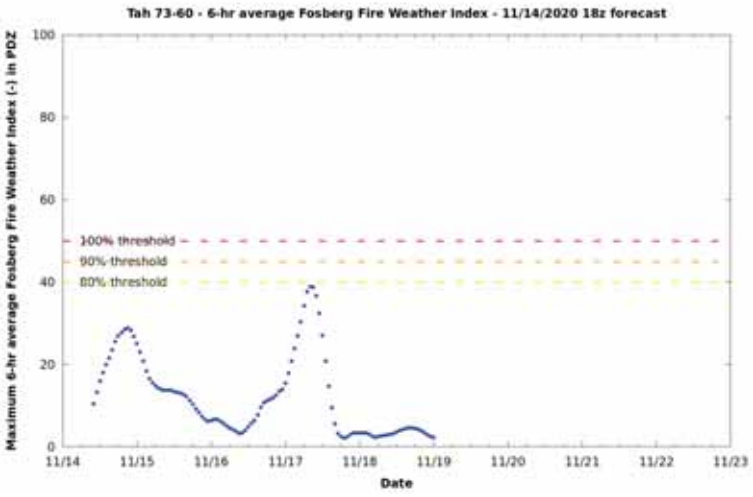


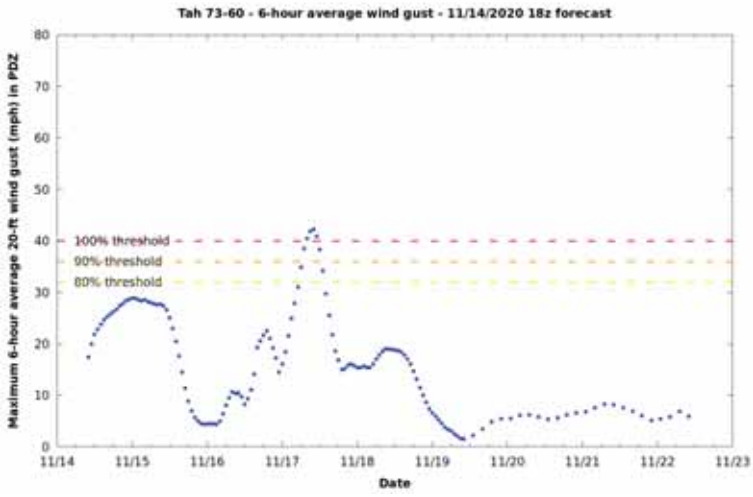
Tah 7300 r1



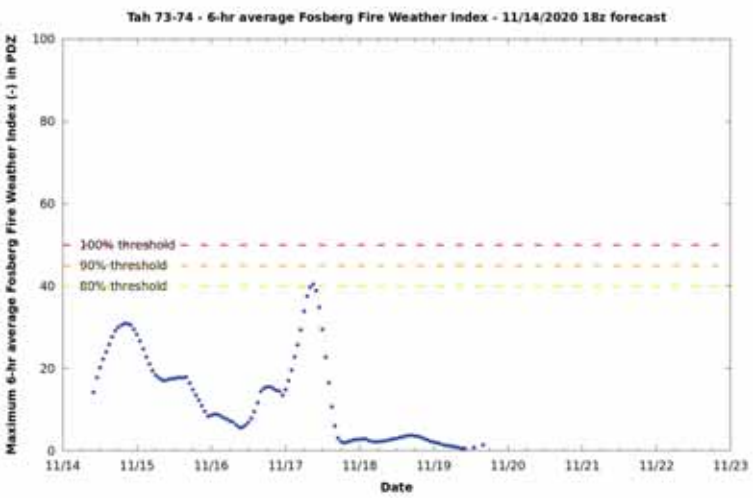


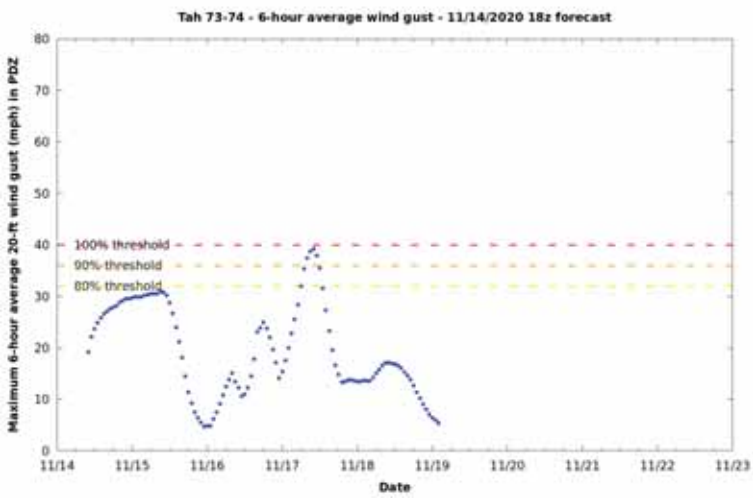
Tah 73-60



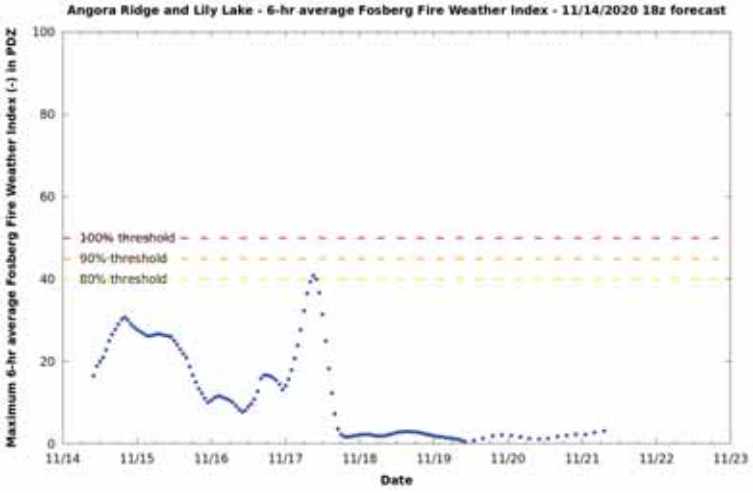


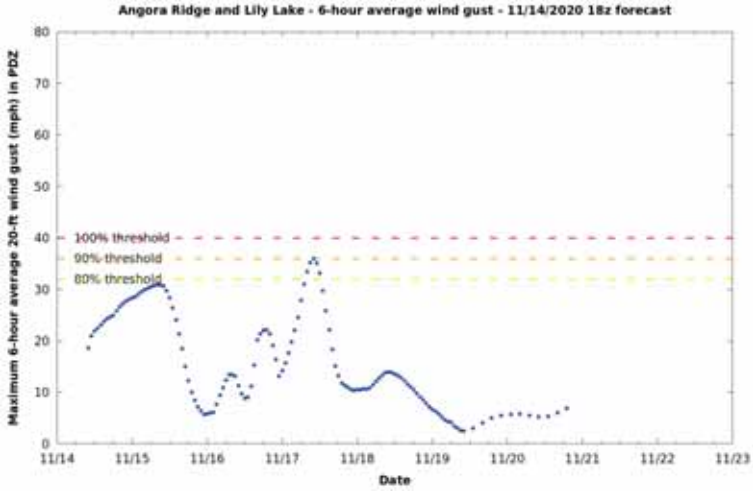
Tah 73-74



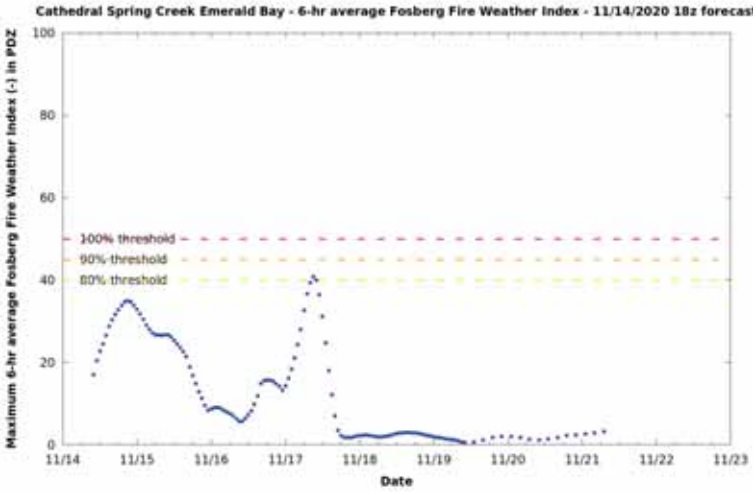


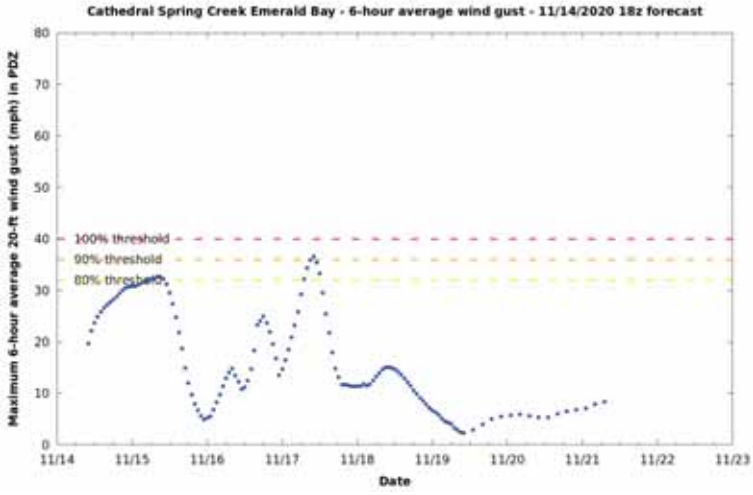
Angora Ridge and Lily Lake



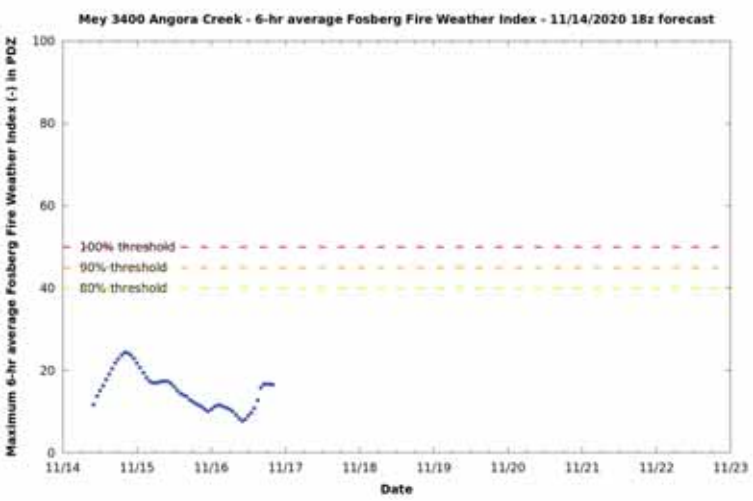


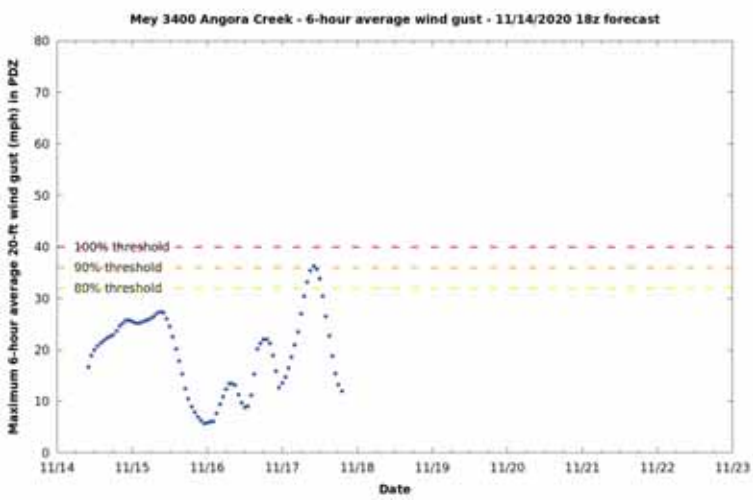
Cathedral Spring Creek Emerald Bay



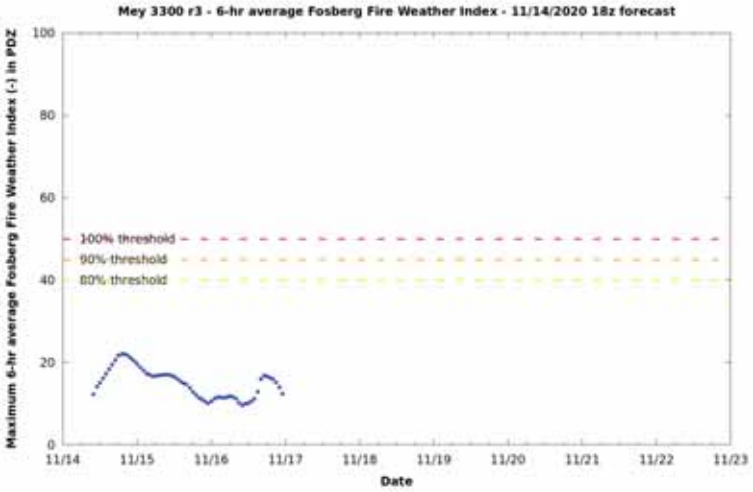


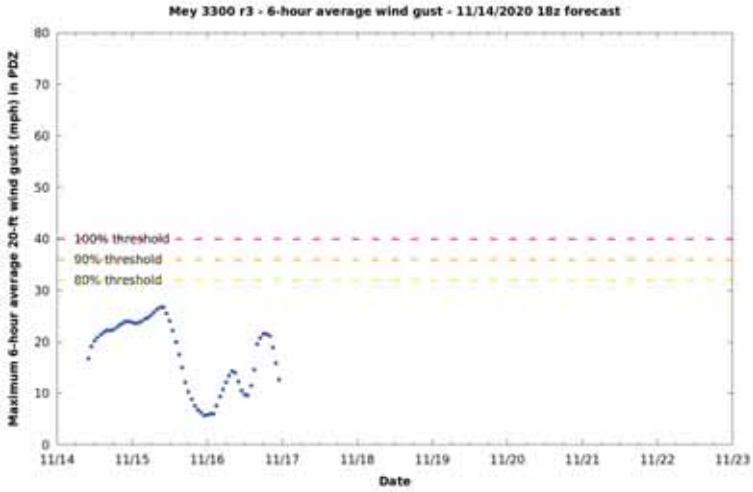
Mey 3400 Angora Creek



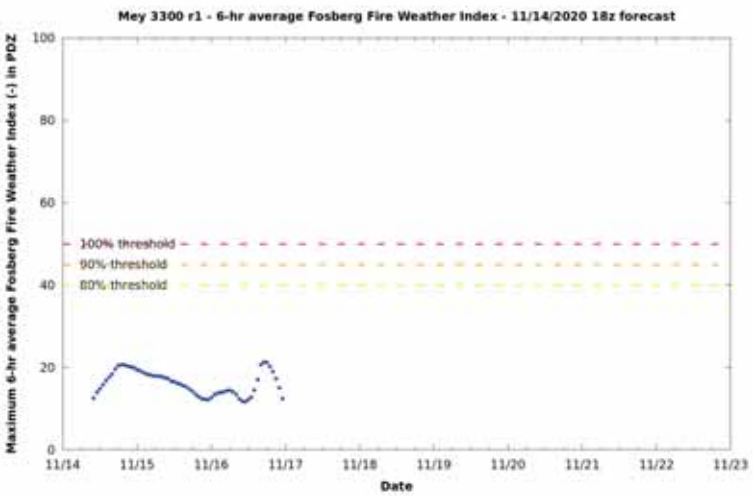


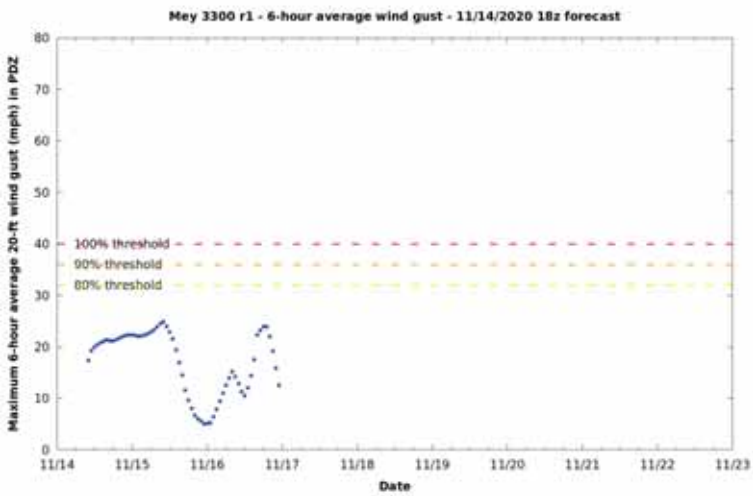
Mey 3300 r3



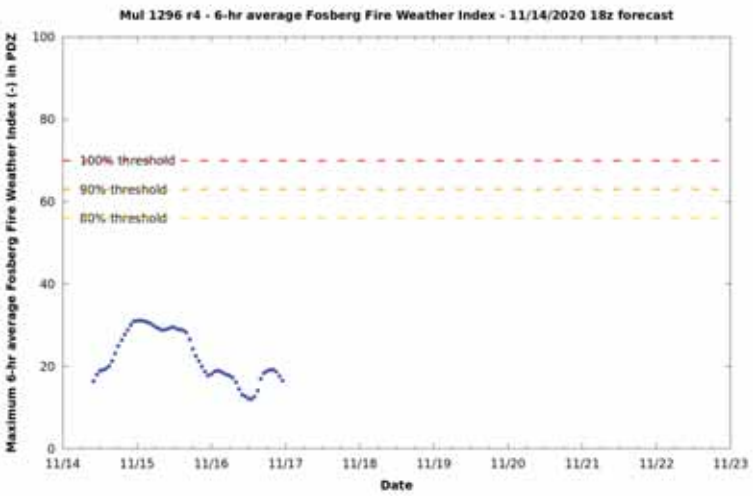


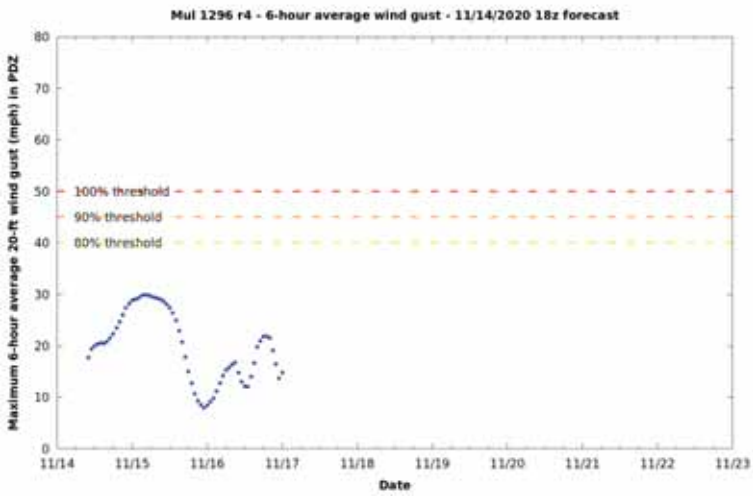
Mey 3300 r1



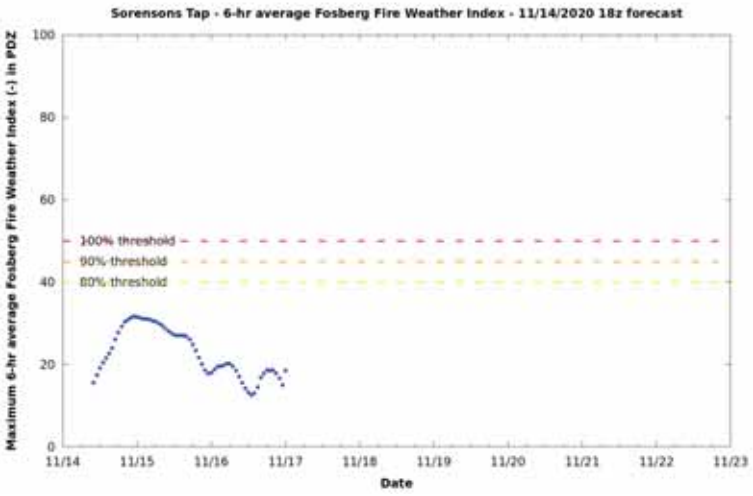


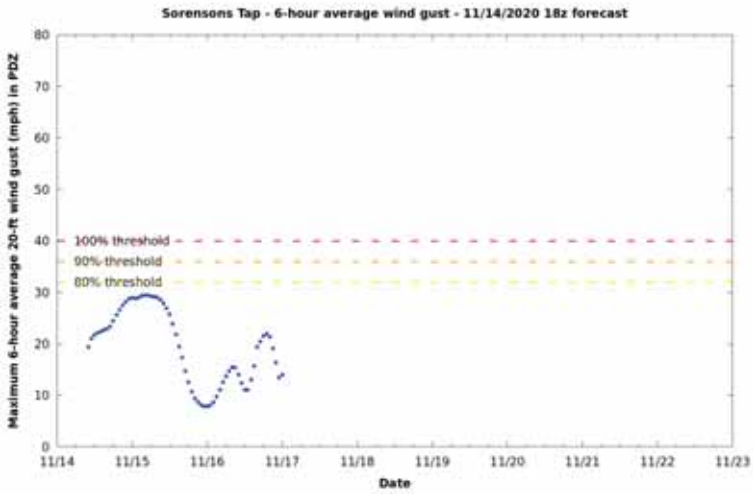
Mul 1296 r4



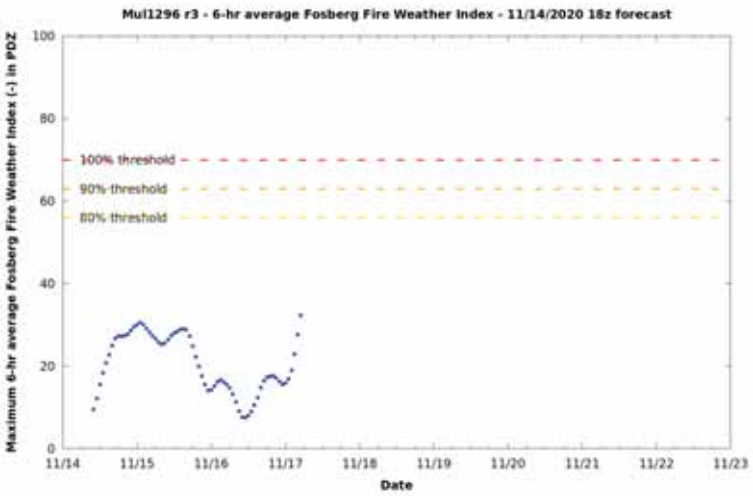


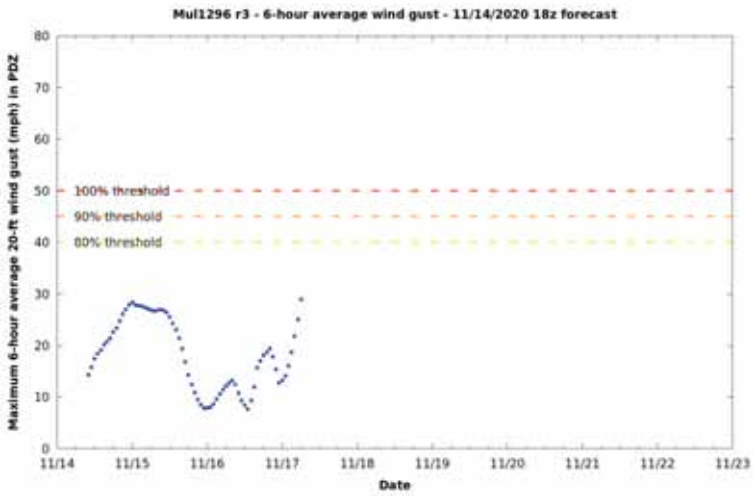
Sorensons Tap



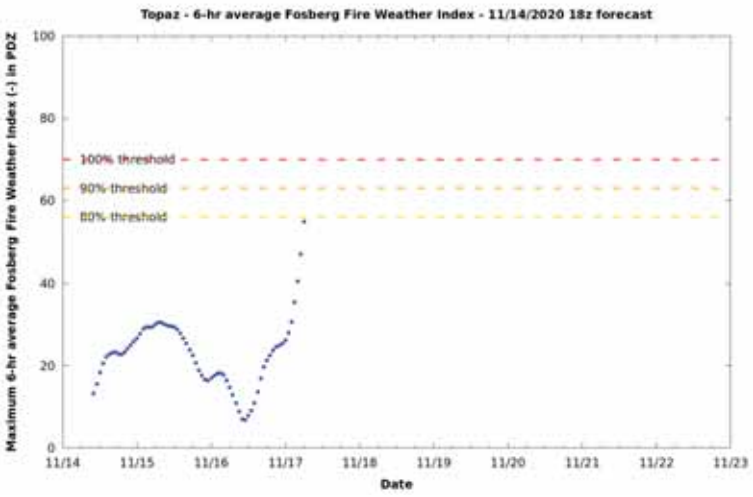


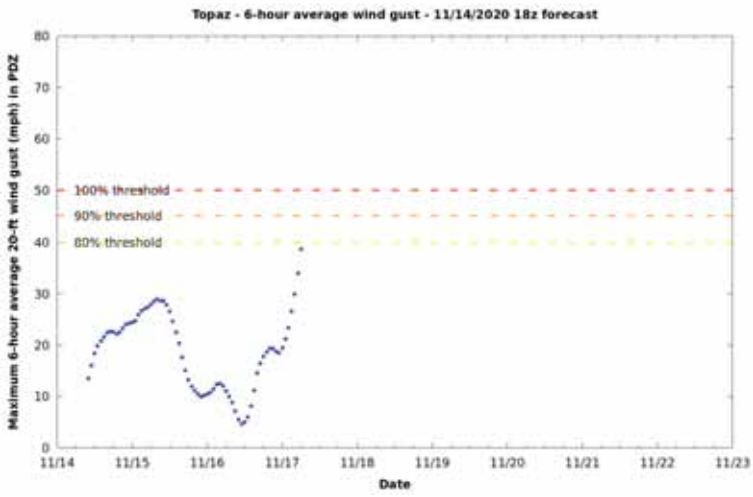
Mul 1296 r3



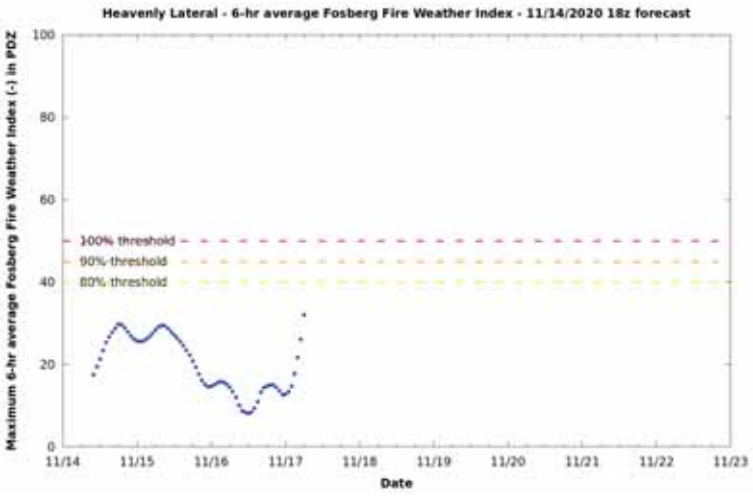


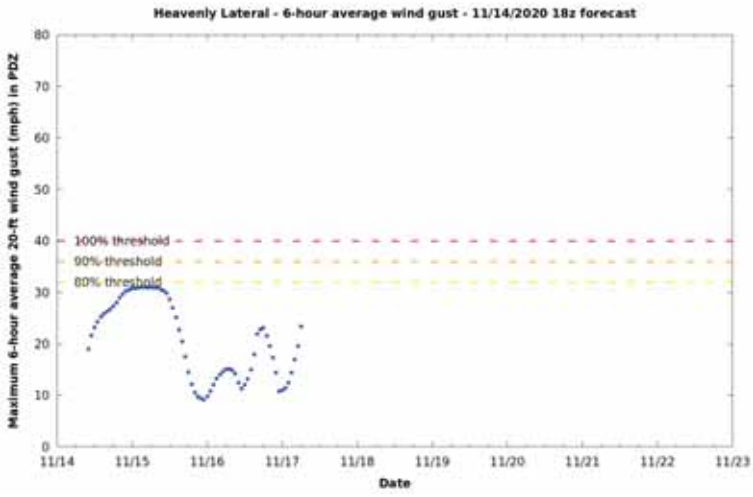
Topaz





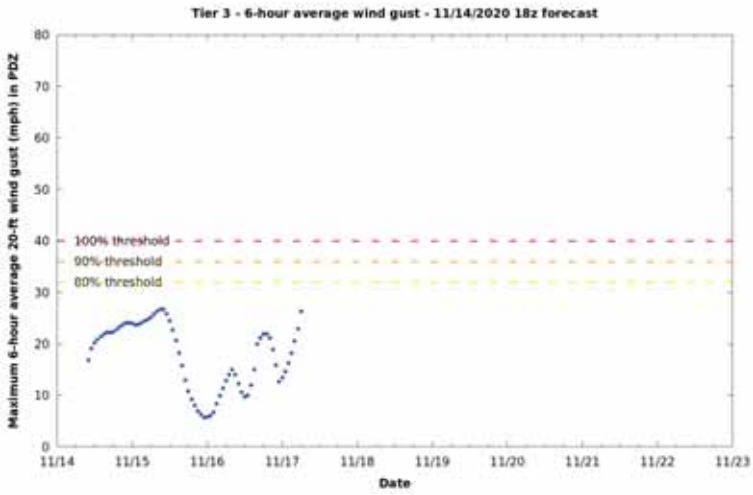
Heavenly Lateral



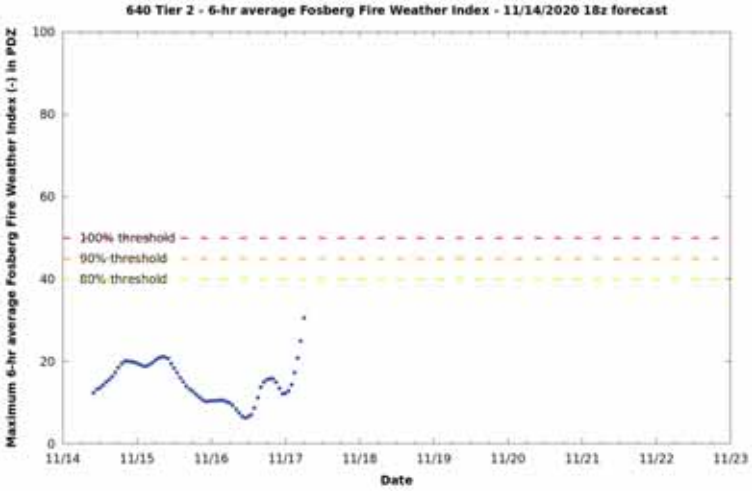


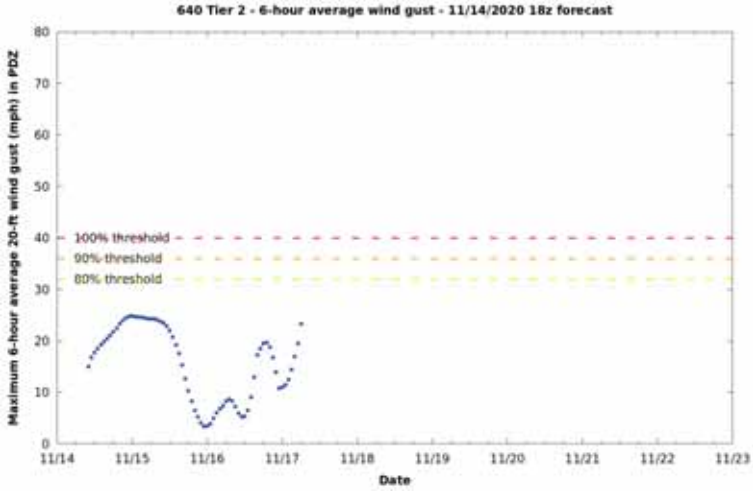
Tier 3



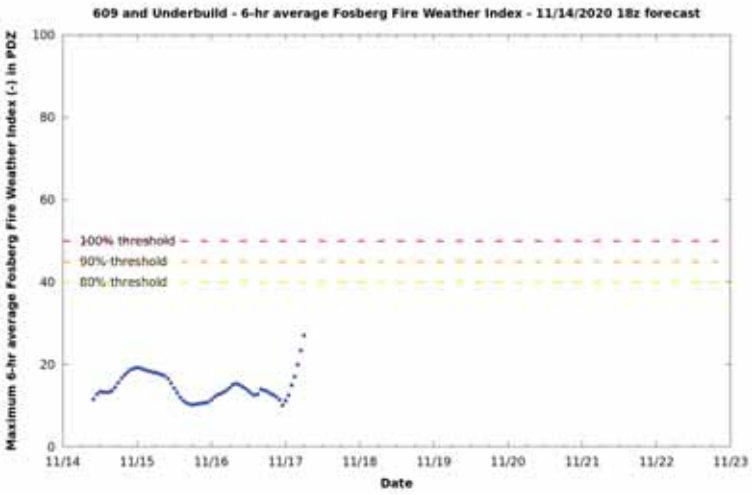


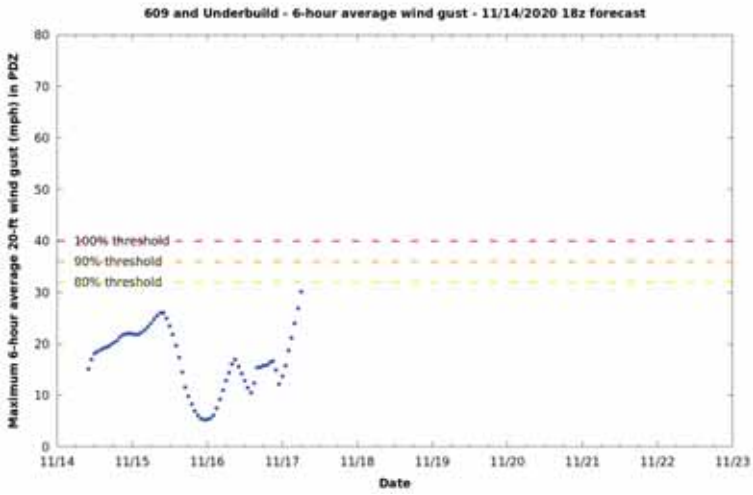
640 Tier 2



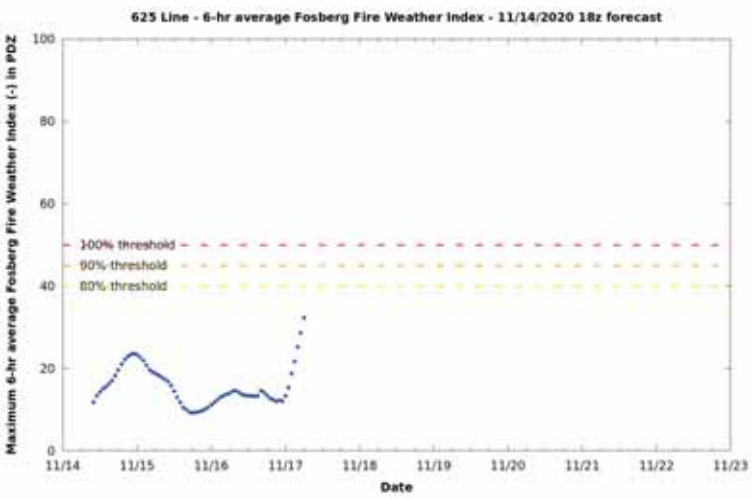


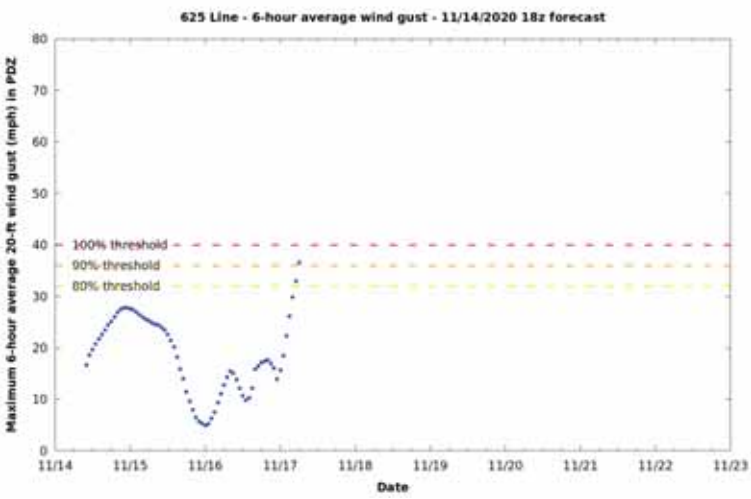
609 and Underbuild



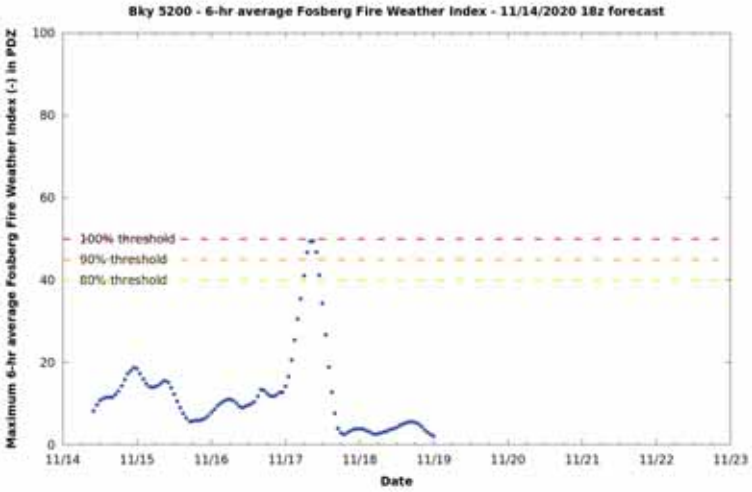


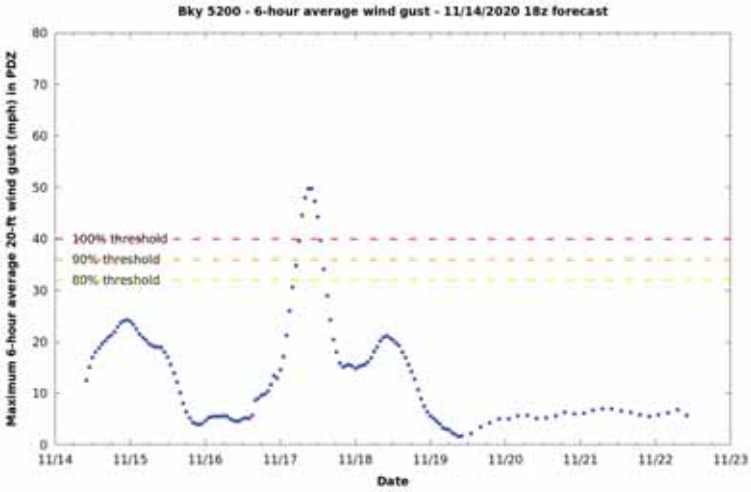
625 Line



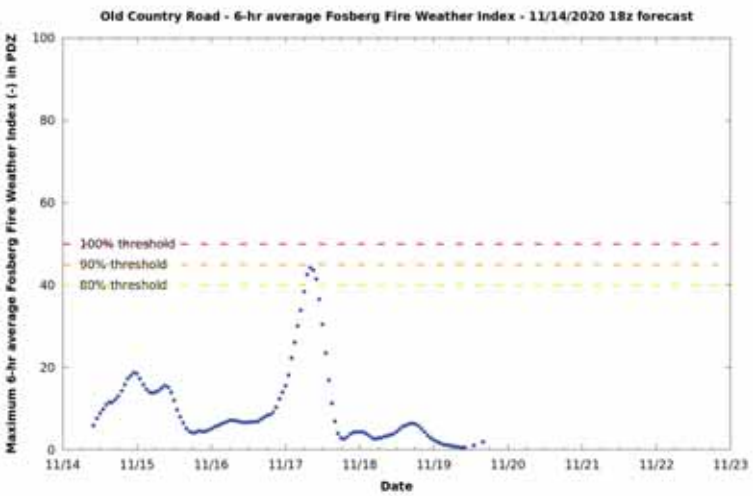


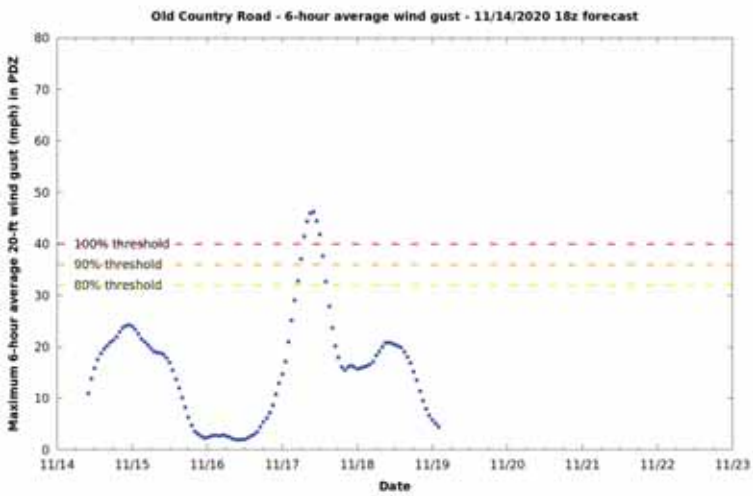
Bky 5200



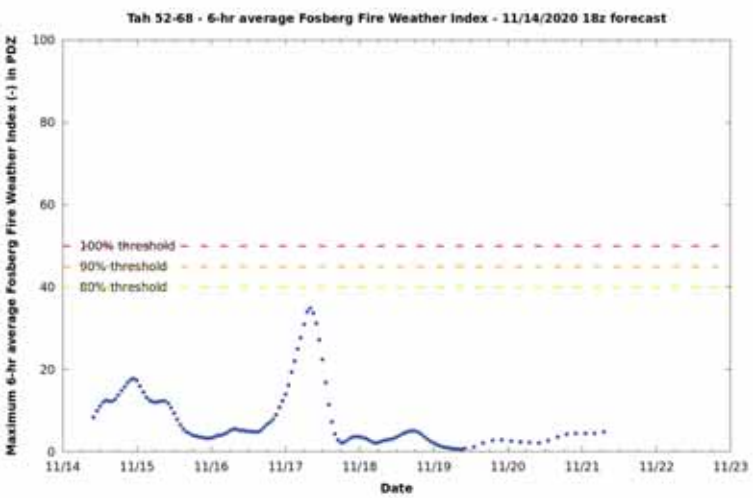


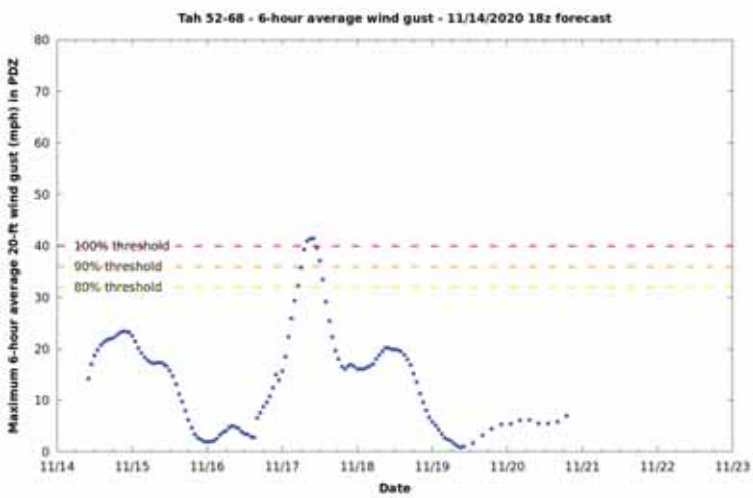
Old Country Road



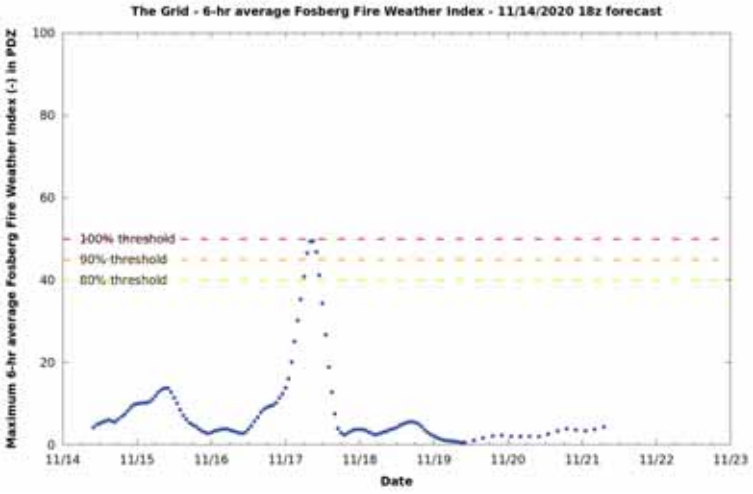


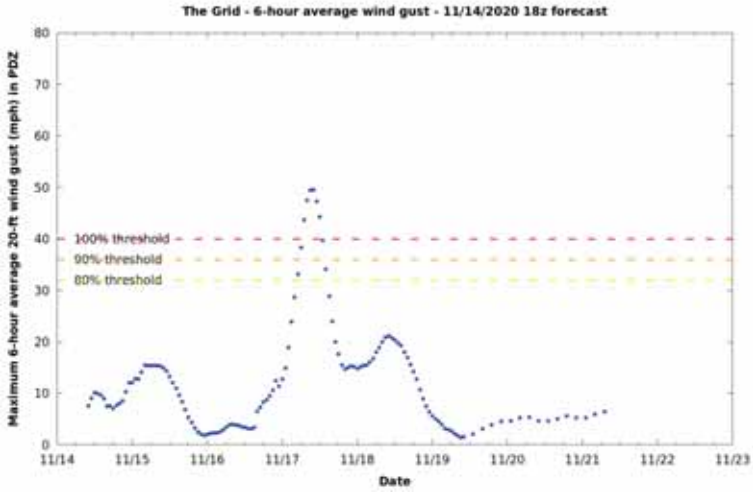
Tah 52-68





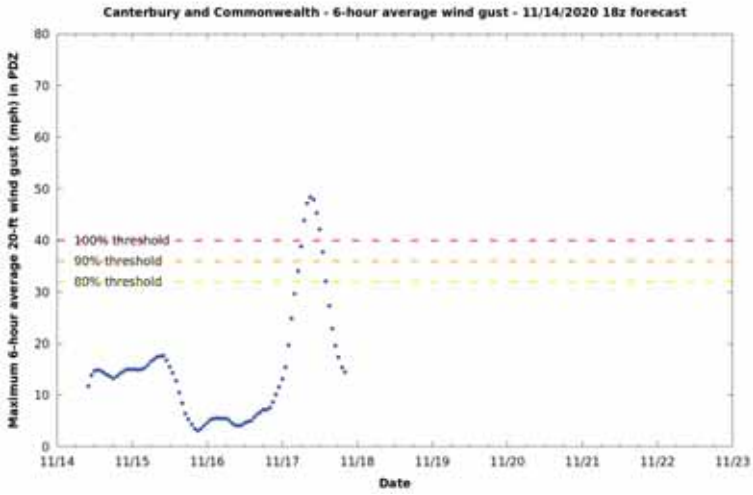
The Grid



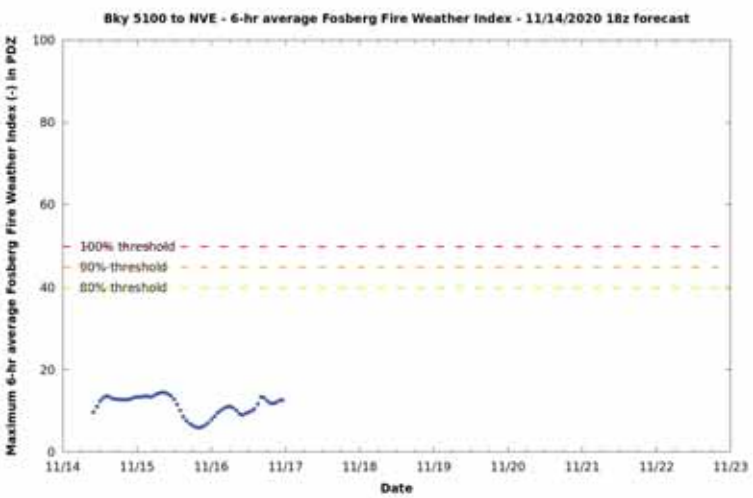


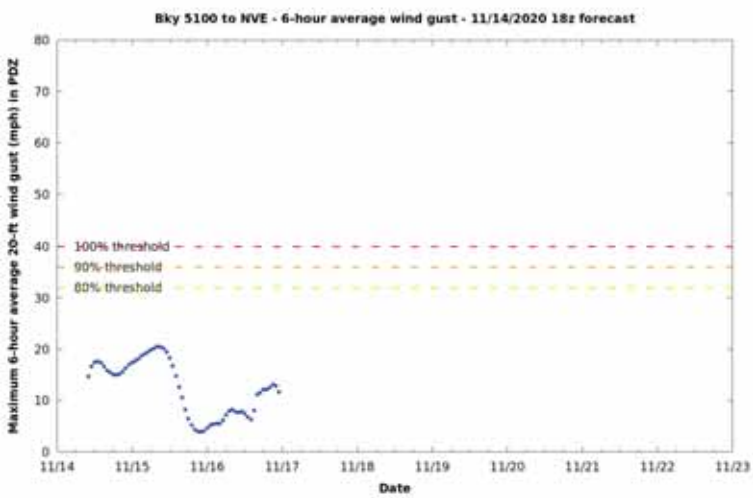
Canterbuy and Commonwealth



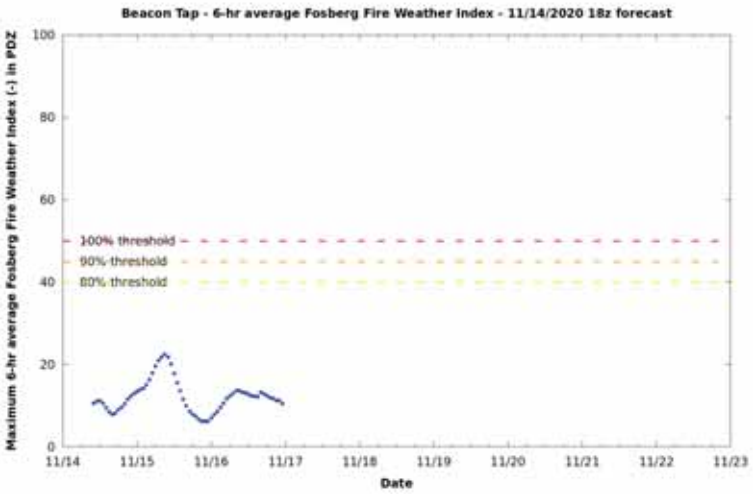


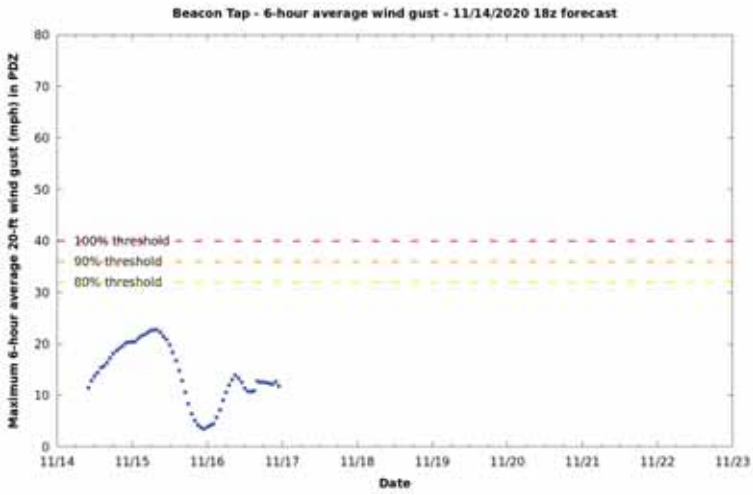
Bky 5100 to NVE



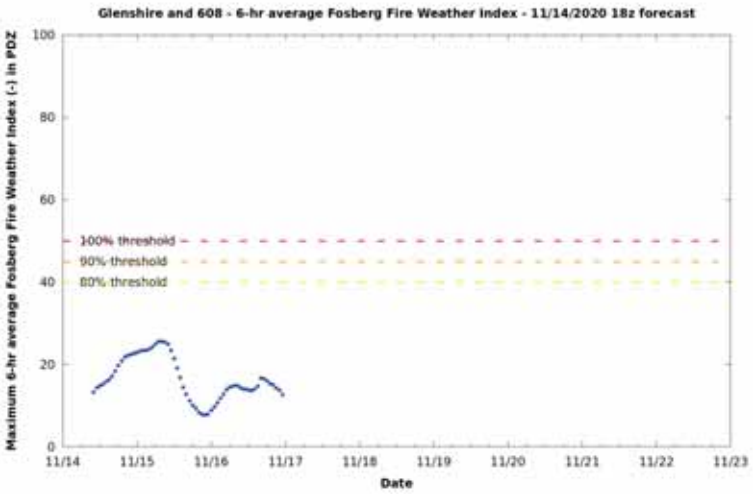


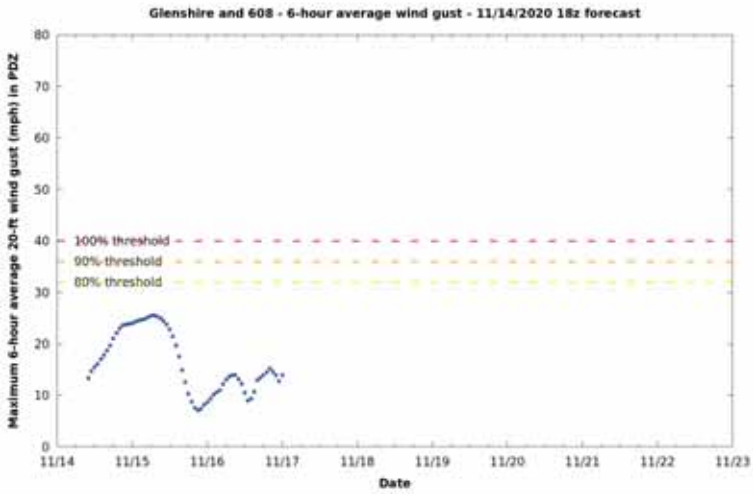
Beacon Tap



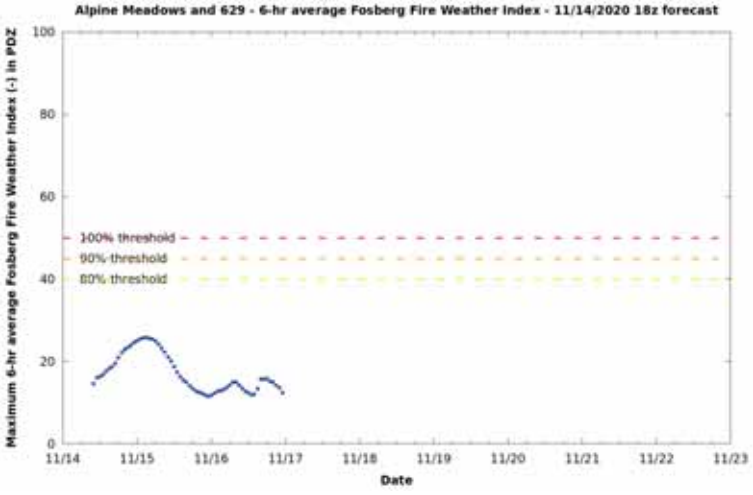


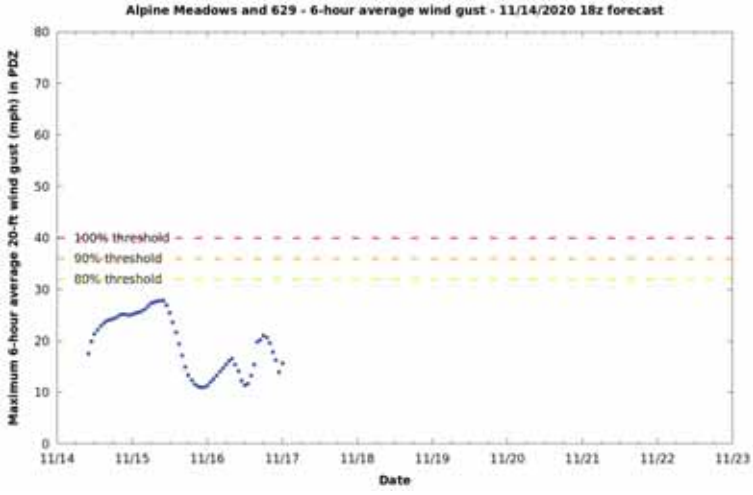
Glenshire and 608



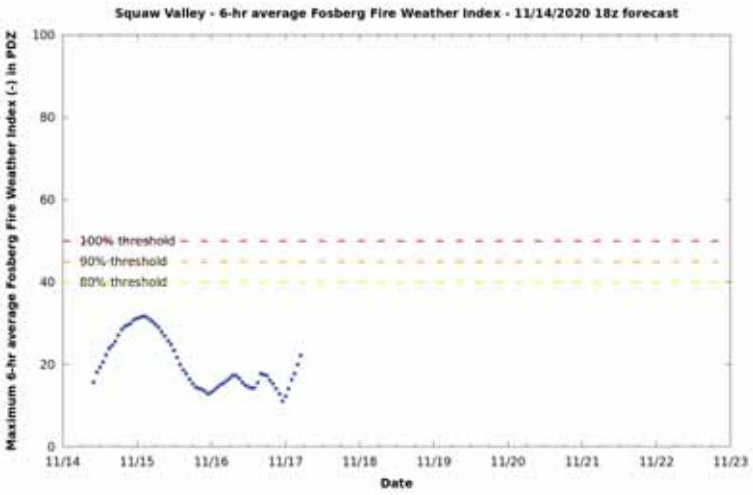


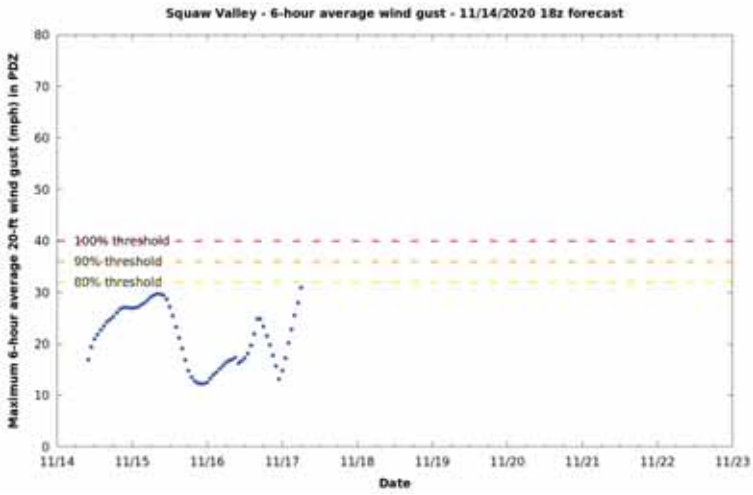
Alpine Meadows and 629



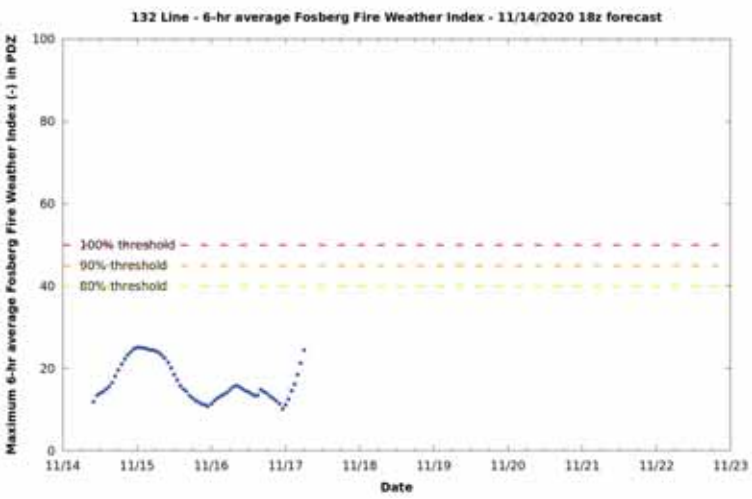


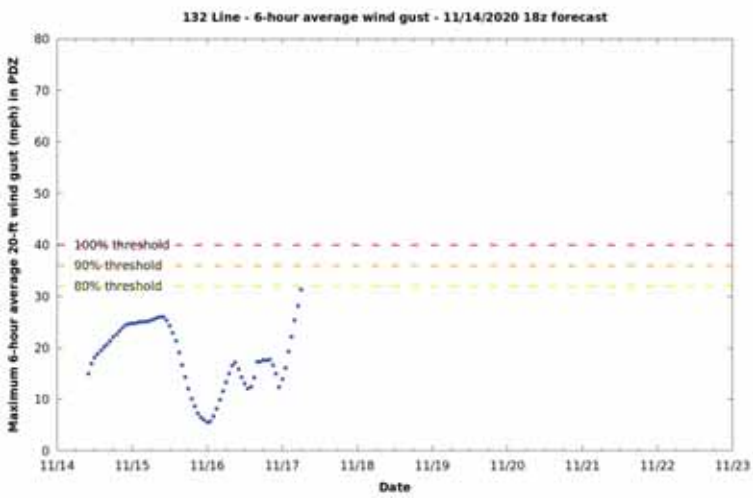
Squaw Valley



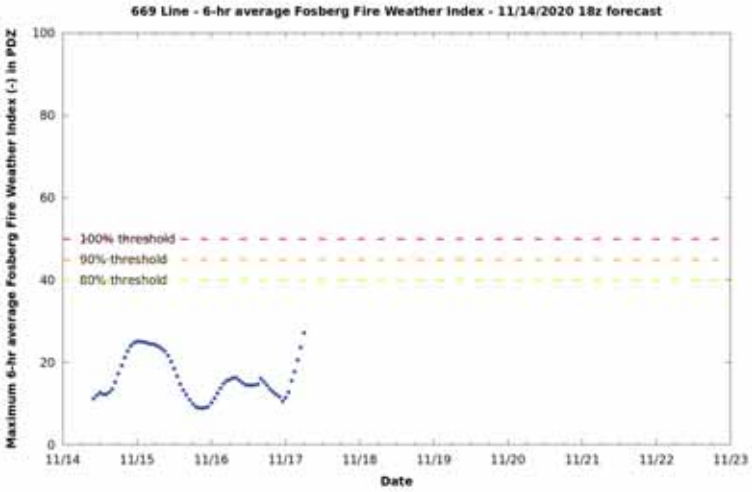


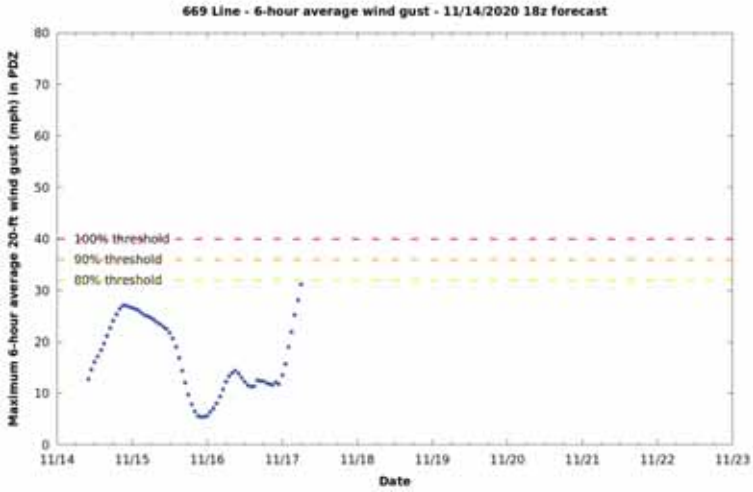
132 Line



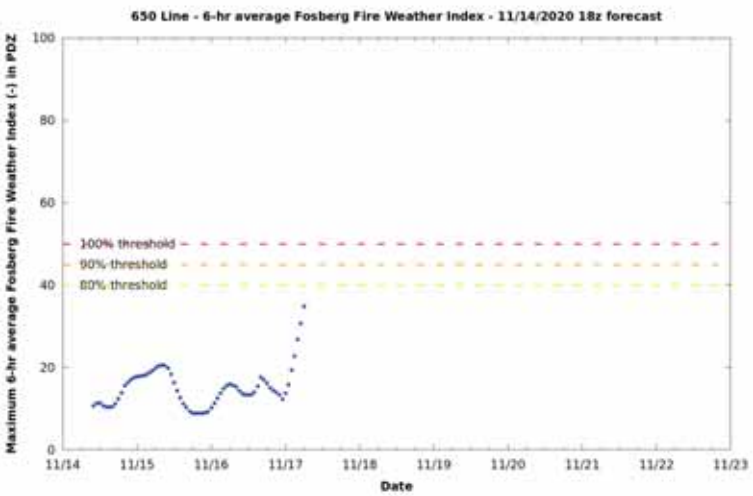


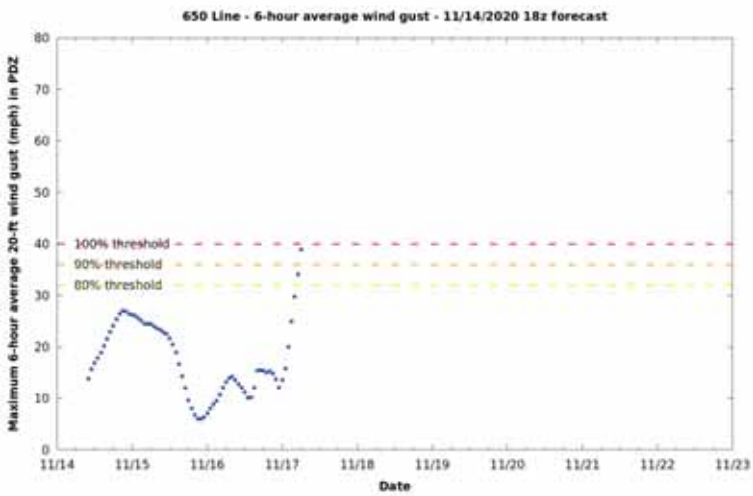
669 Line



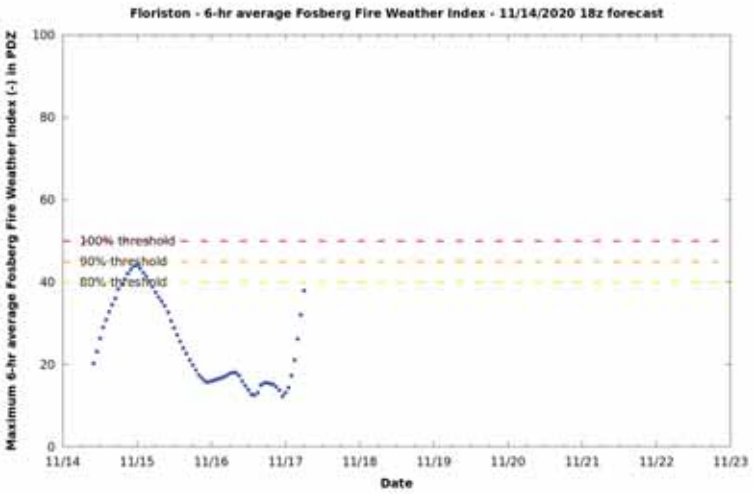


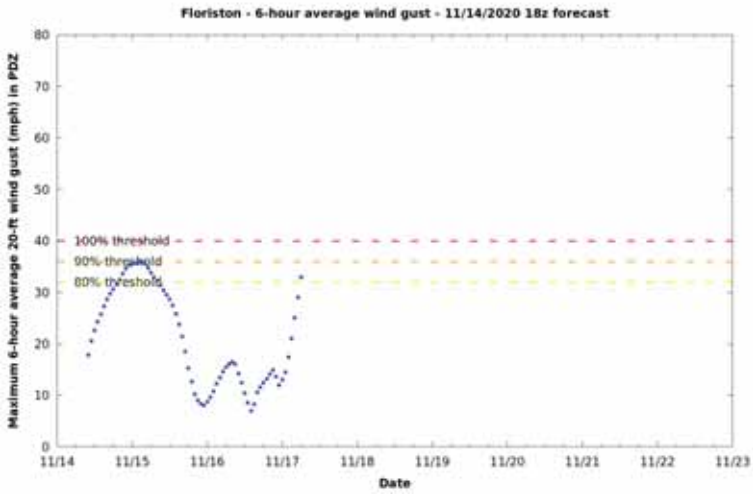
650 Line



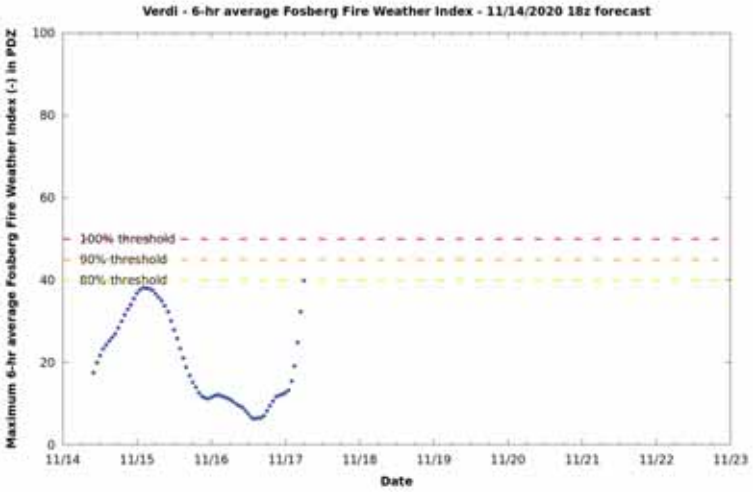


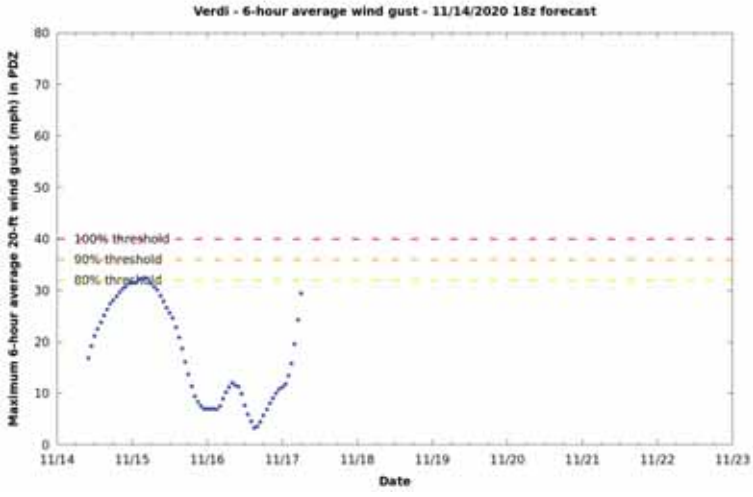
Floriston



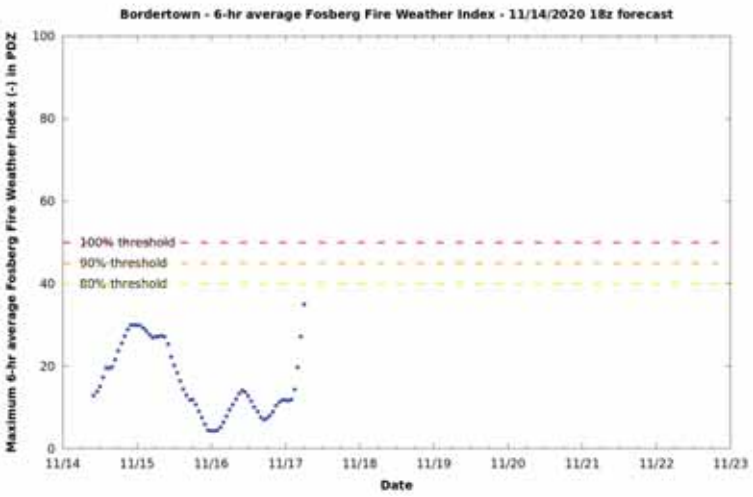


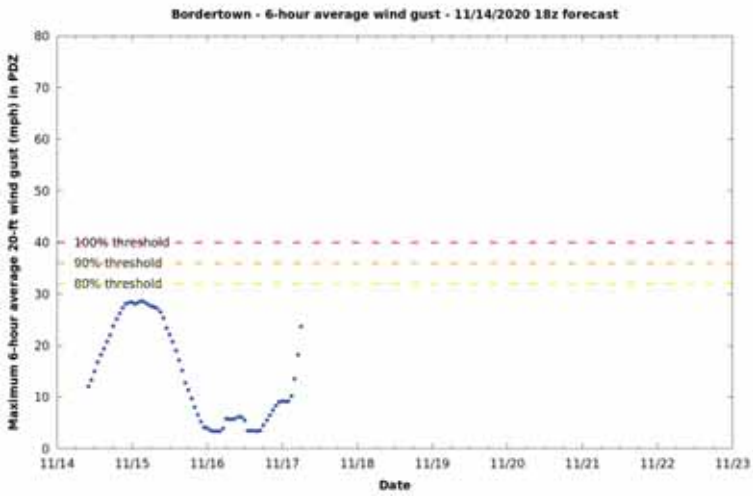
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/14/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/14/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/15/20 - 11/21/20

Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

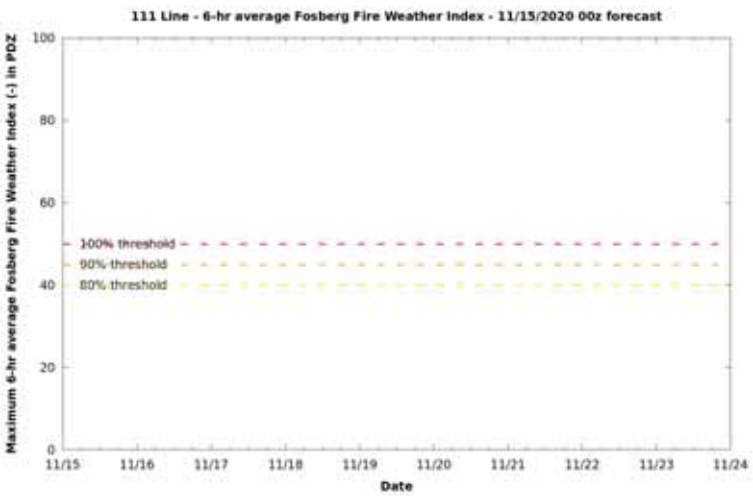
Liberty Utilities Energy Release Component Forecast for 11/15/20 - 11/21/20

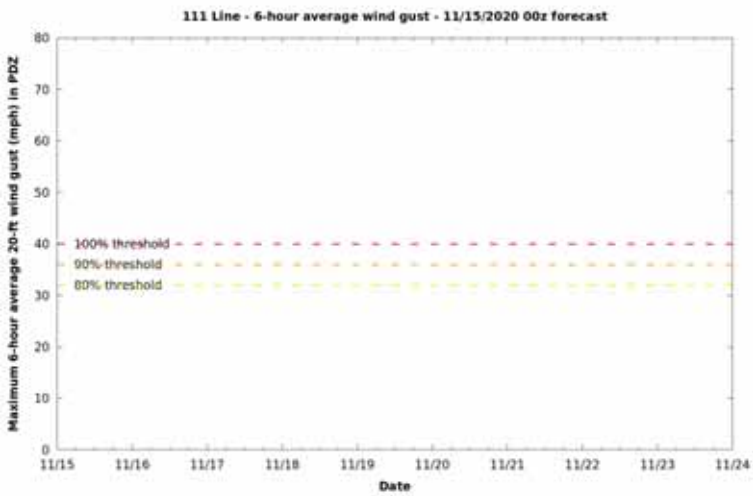
Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

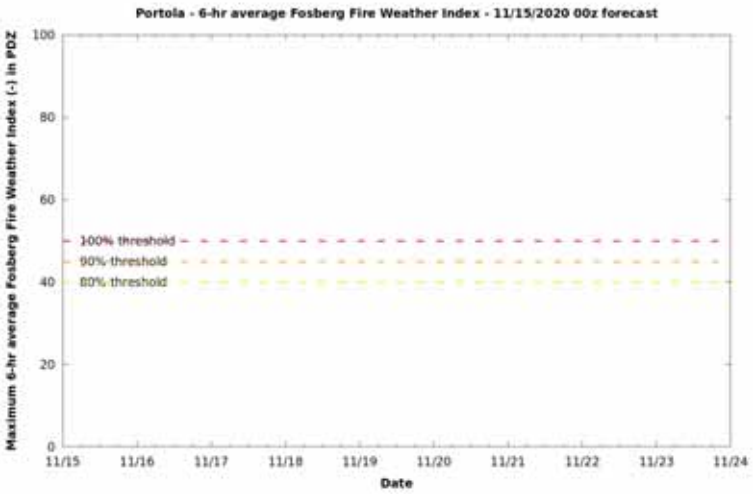
Liberty Utilities Fire Weather Summary Plots - 11/15/2020 00z forecast

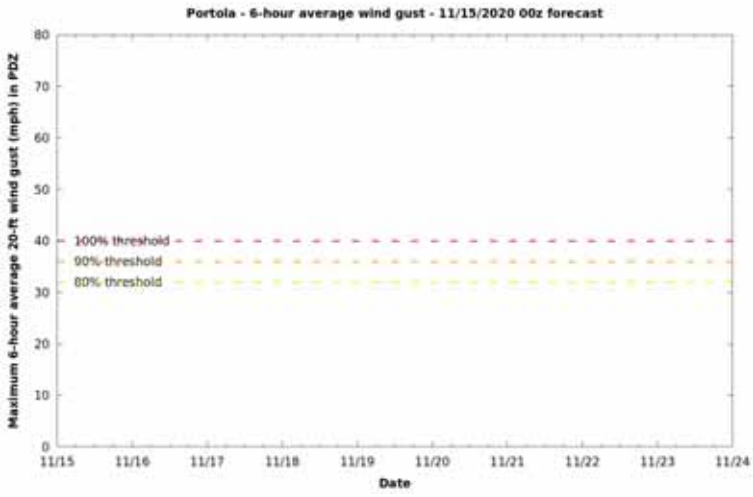
111 Line



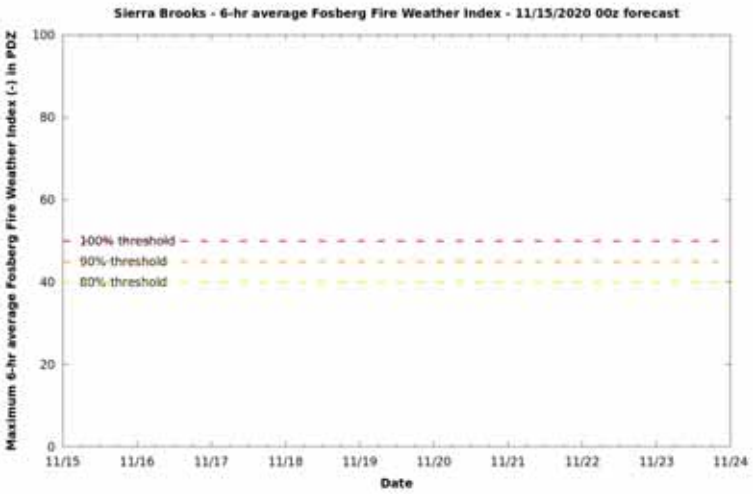


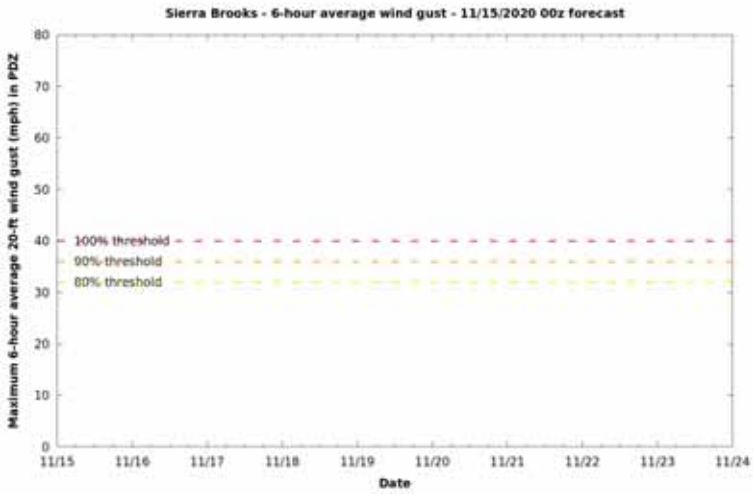
Portola



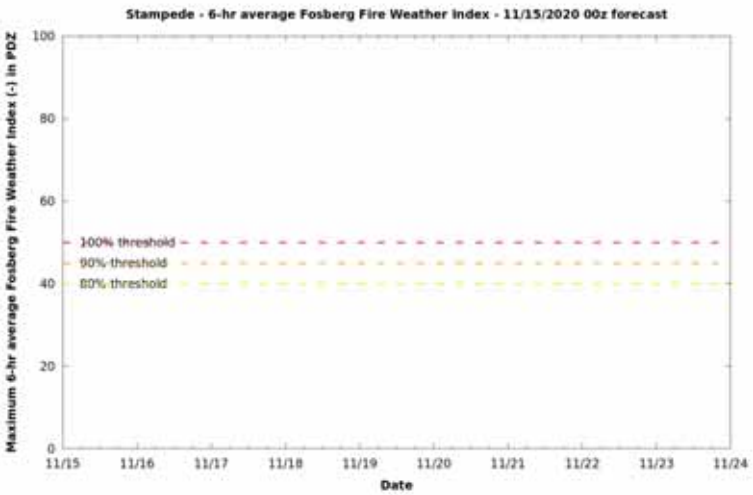


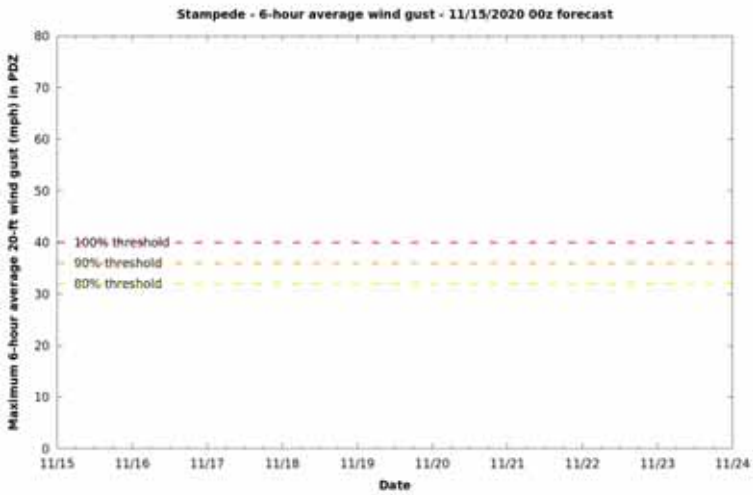
Sierra Brooks



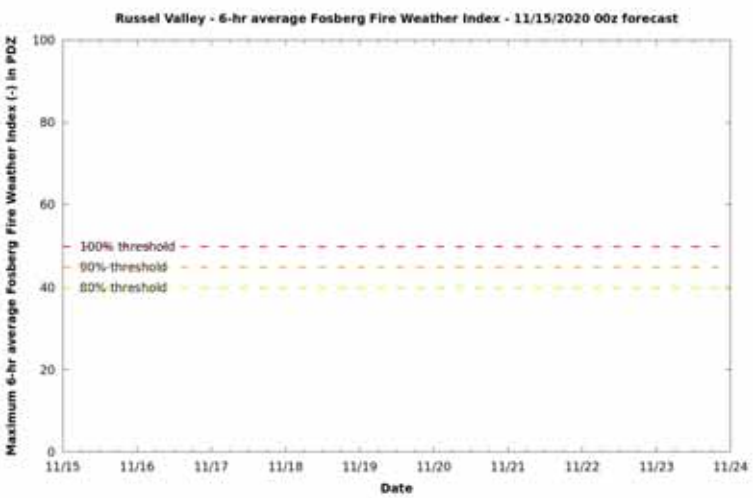


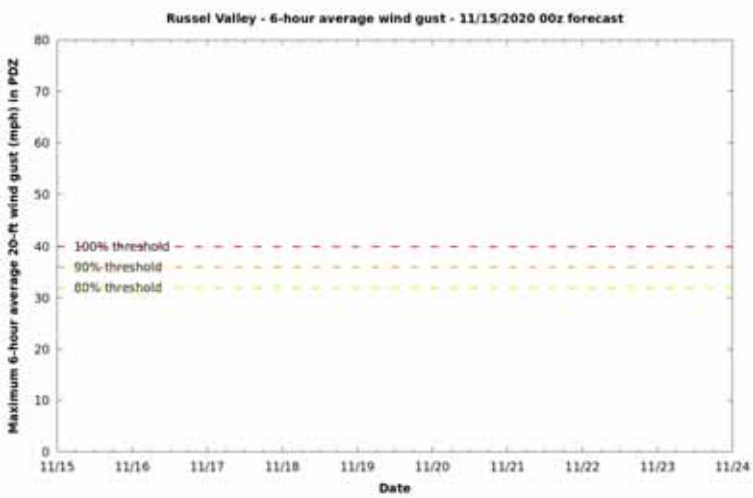
Stampede





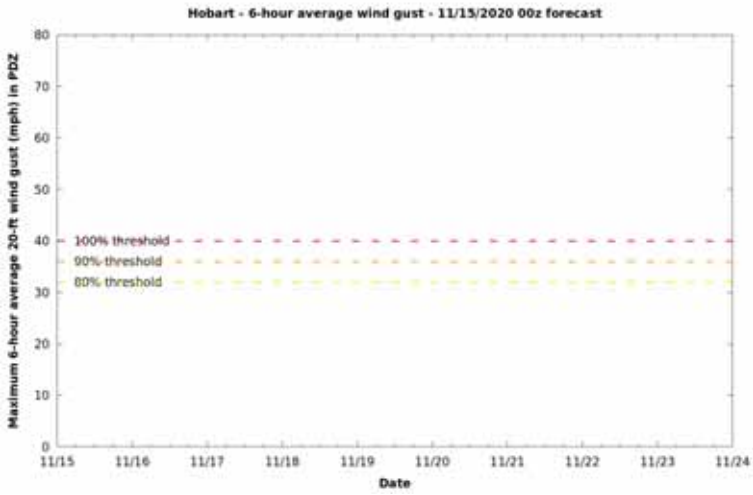
Russell Valley



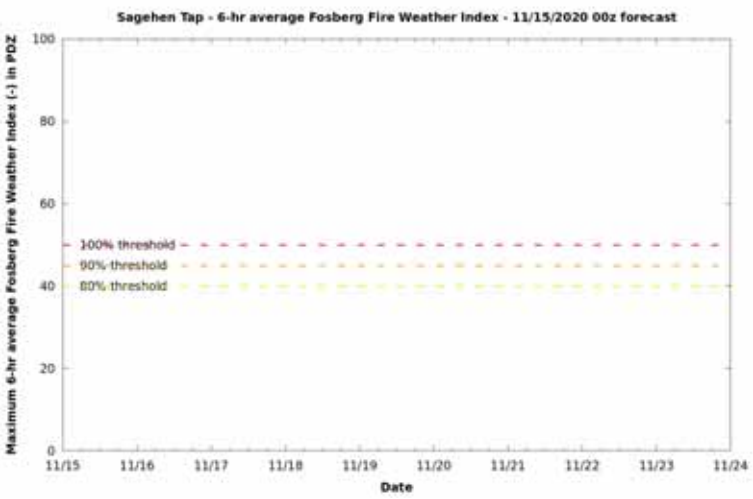


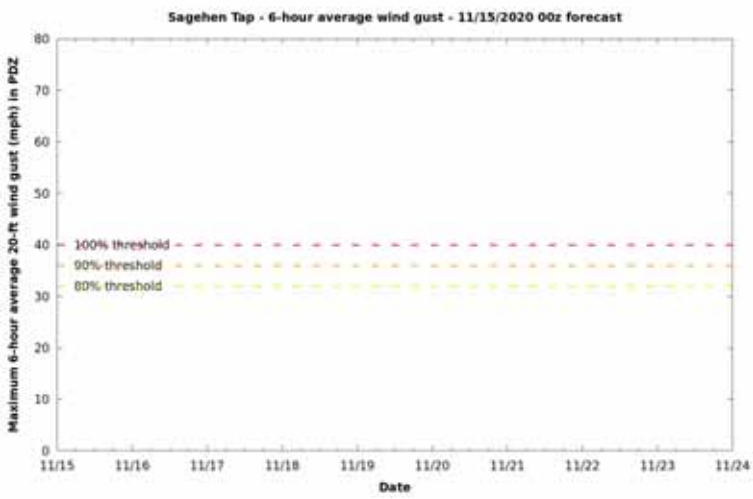
Hobart



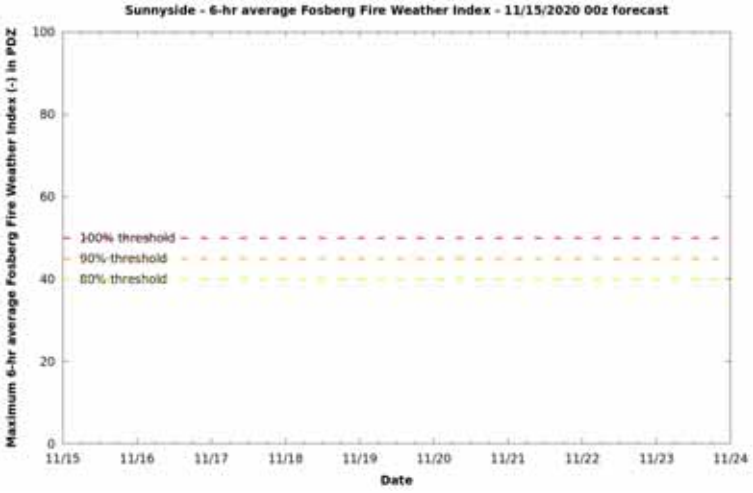


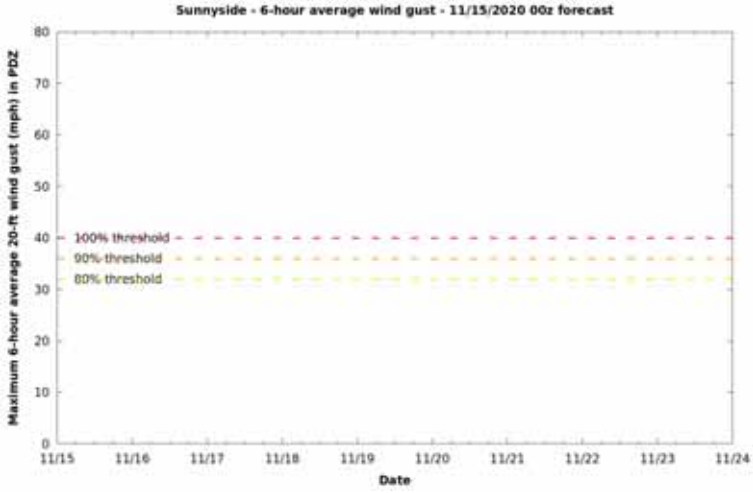
Sagehen tap



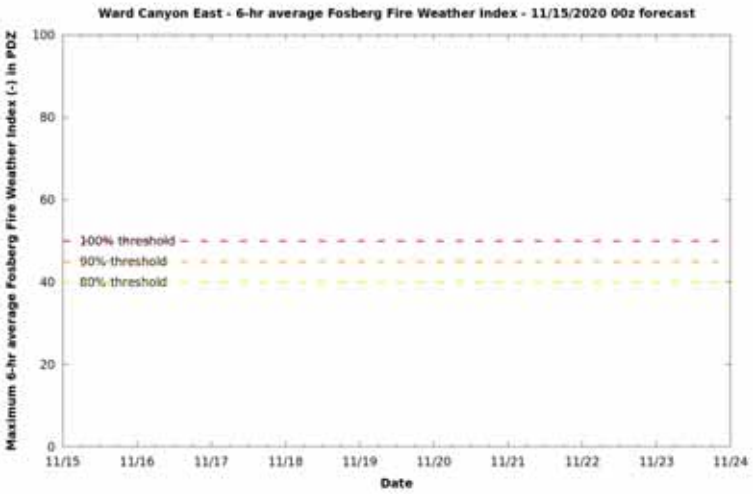


Sunnyside



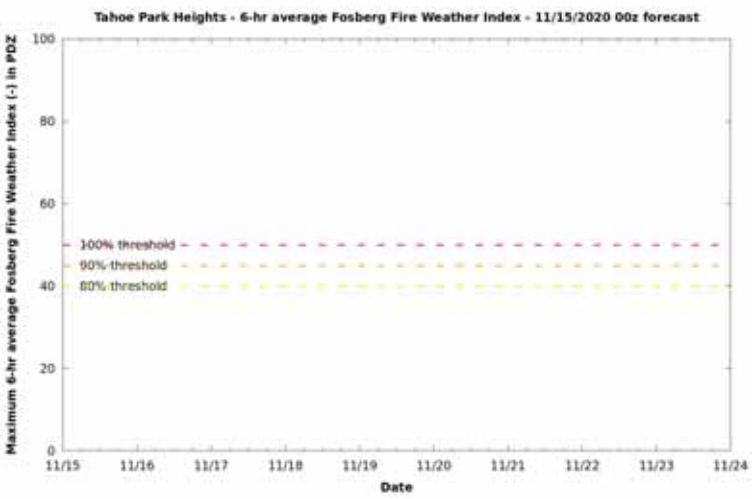


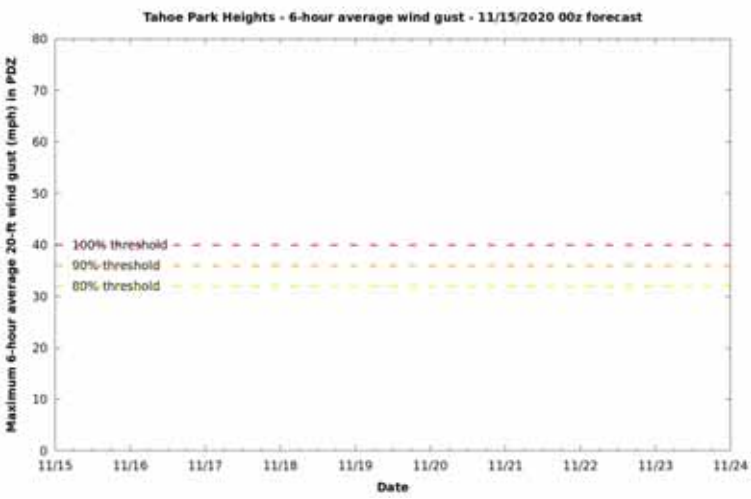
Ward Canyon East



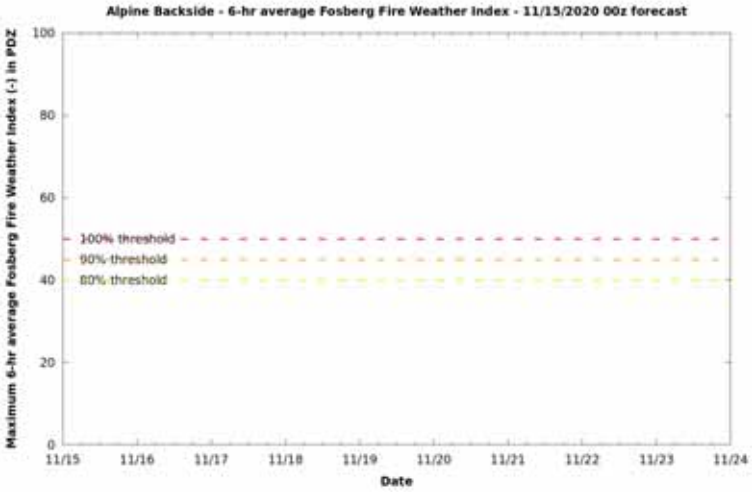


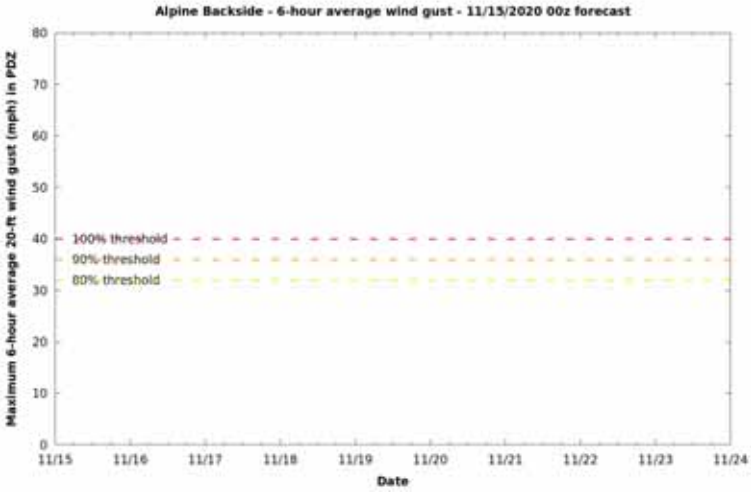
Tahoe Park Heights



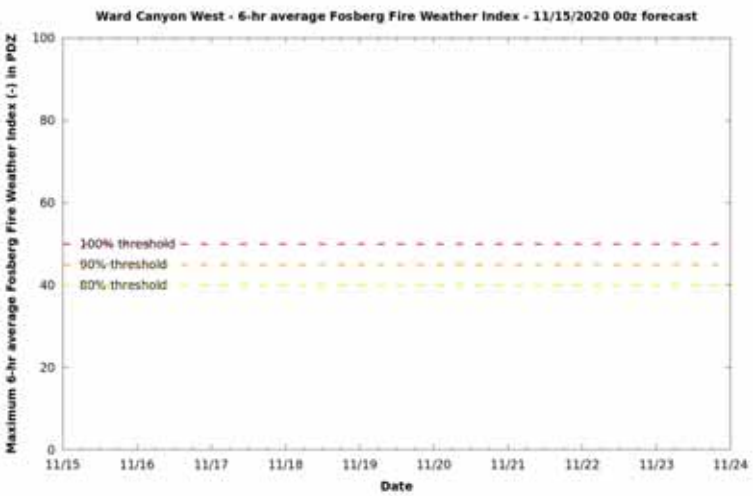


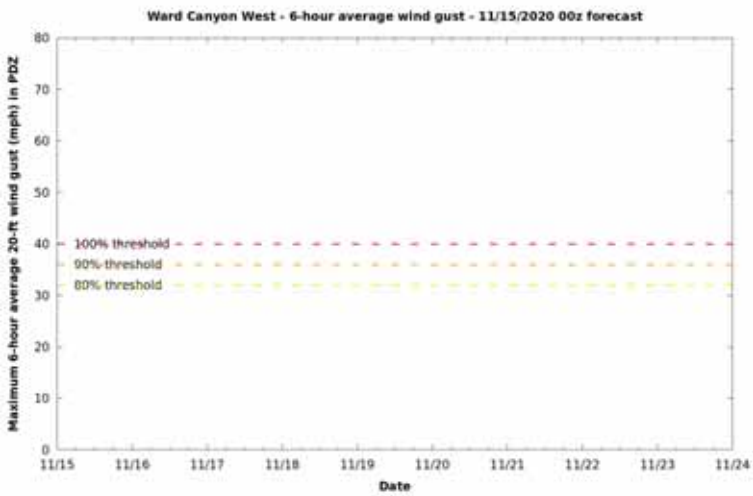
Alpine Backside



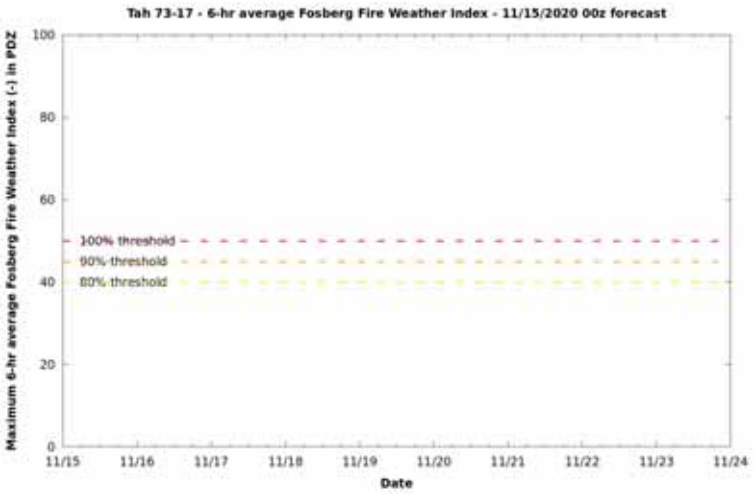


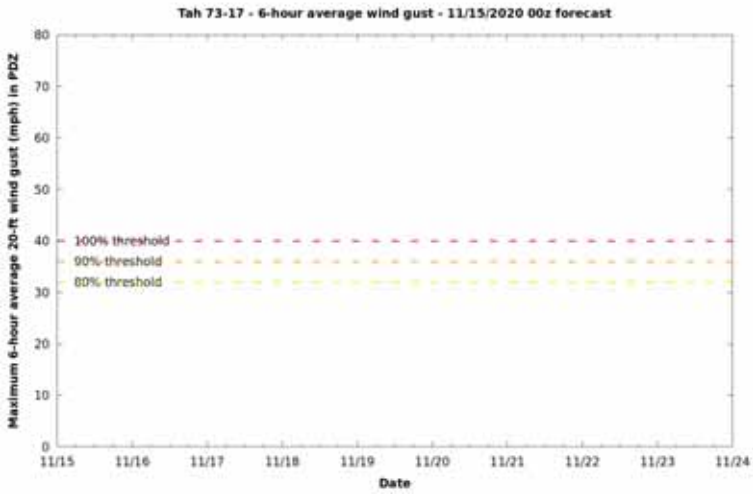
Ward Canyon West



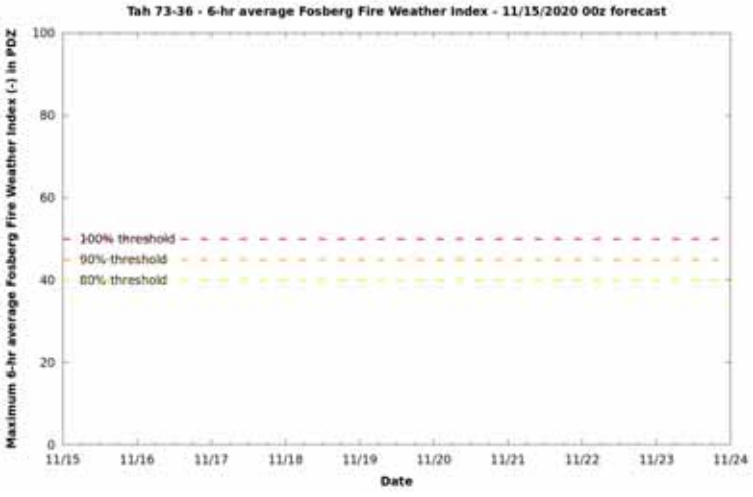


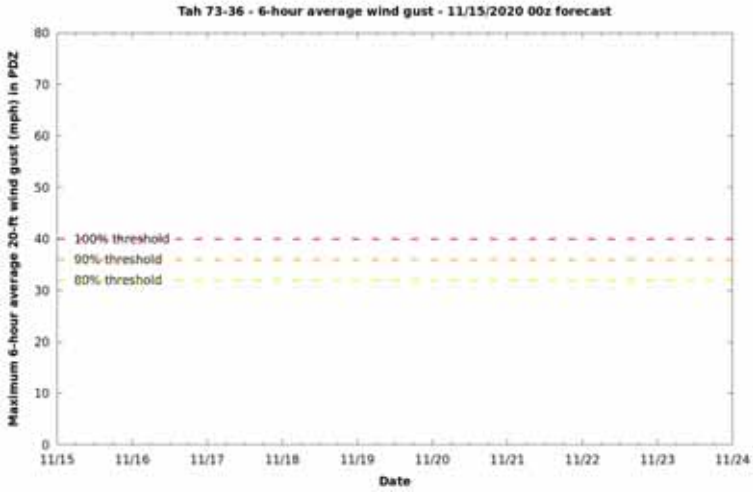
Tah 73-17



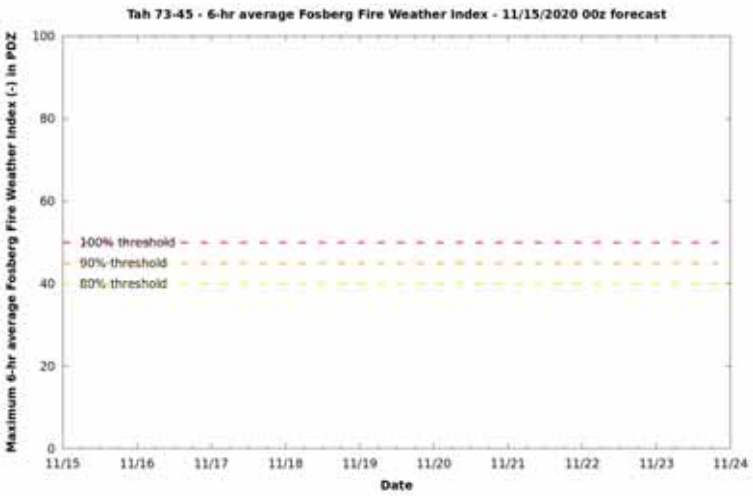


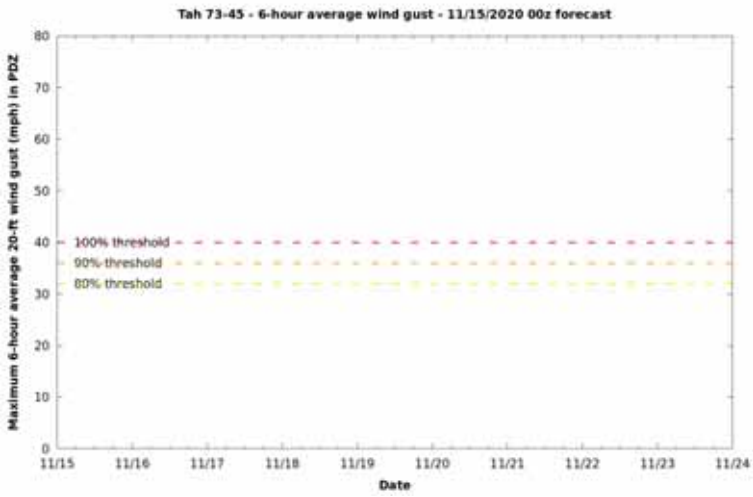
Tah 73-36



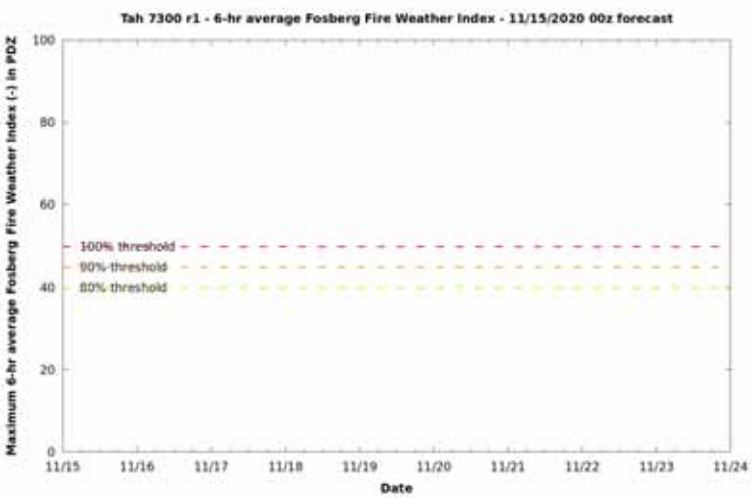


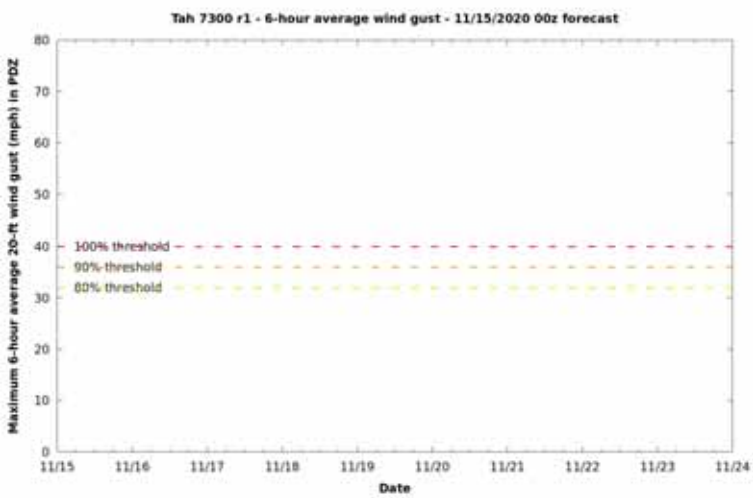
Tah 73-45



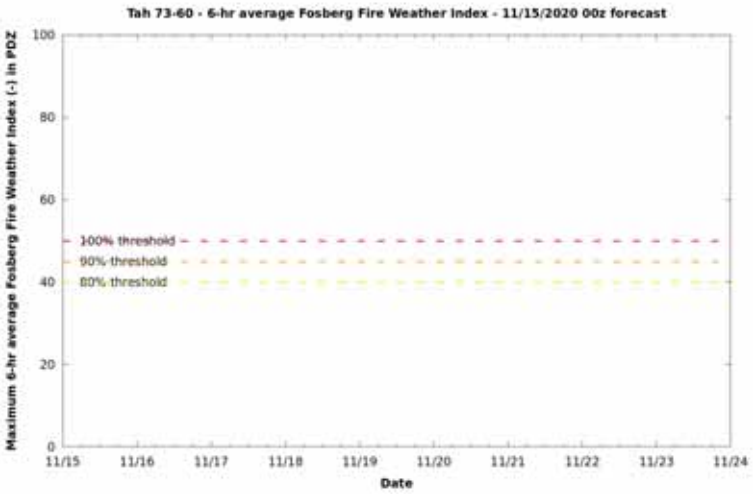


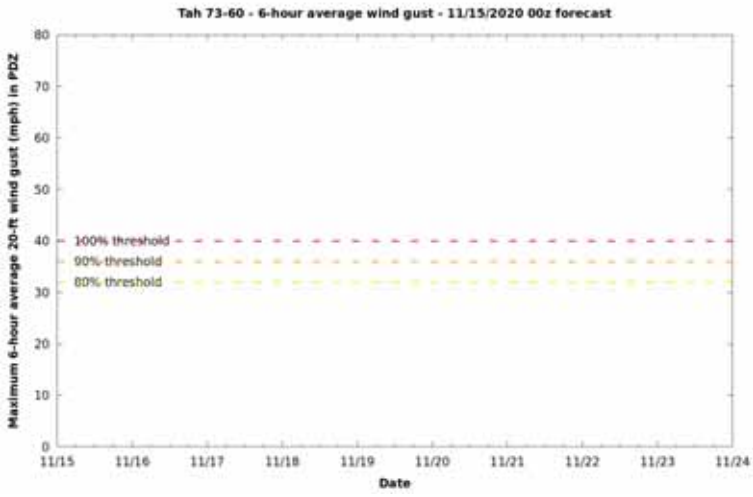
Tah 7300 r1



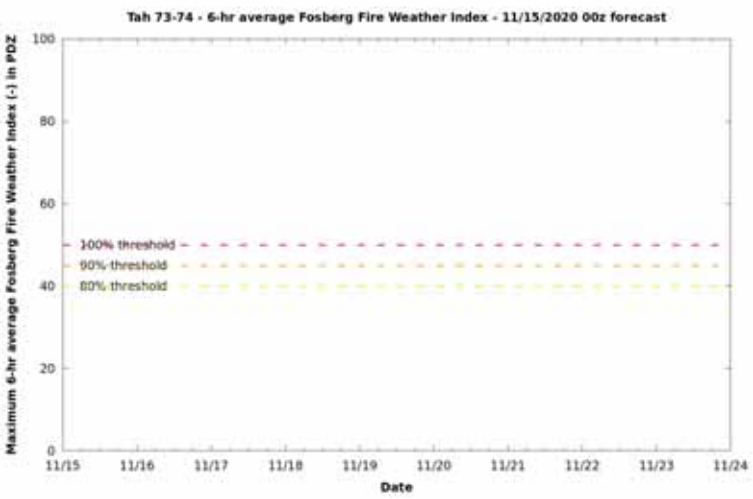


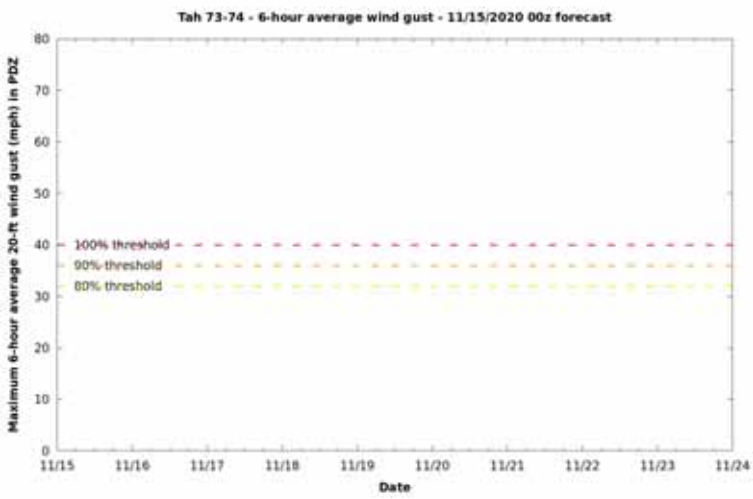
Tah 73-60



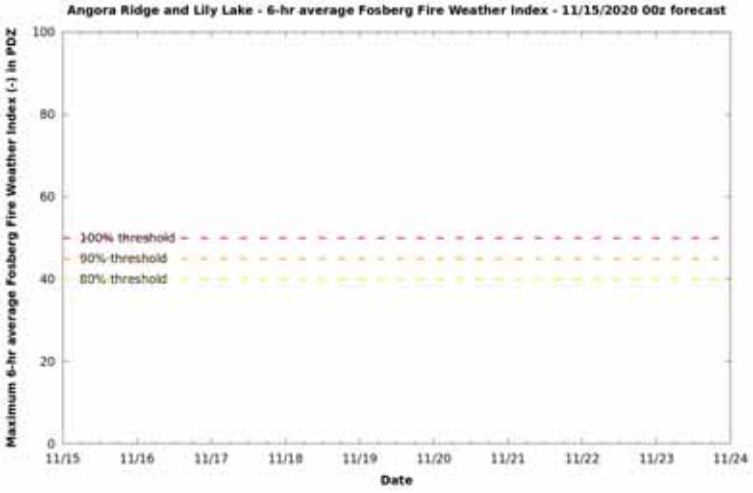


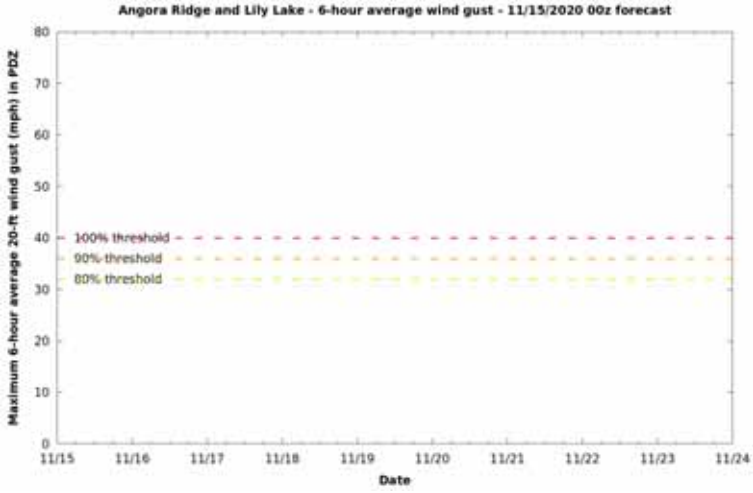
Tah 73-74



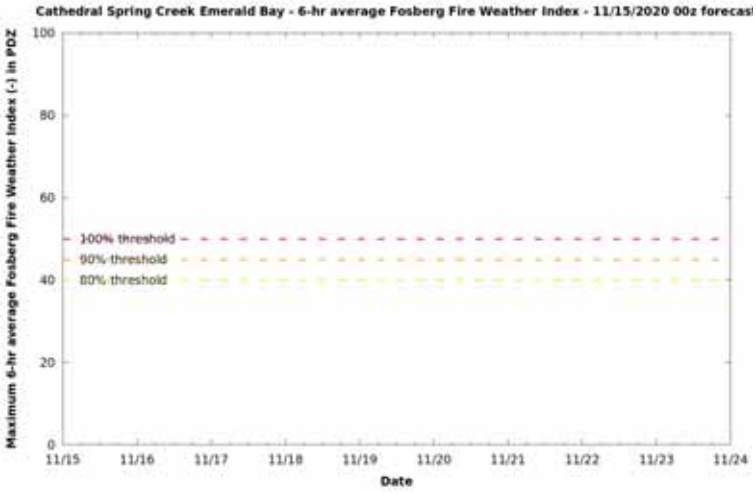


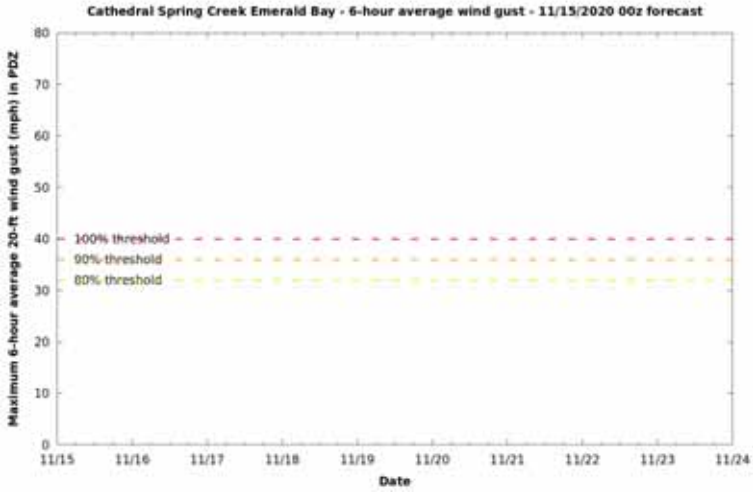
Angora Ridge and Lily Lake



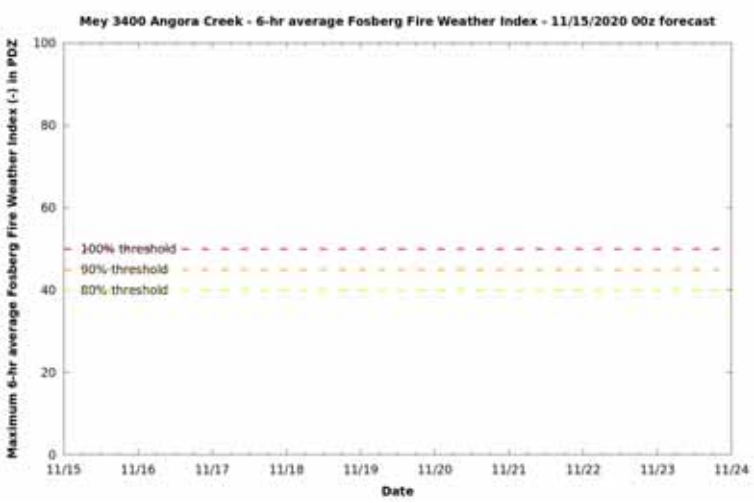


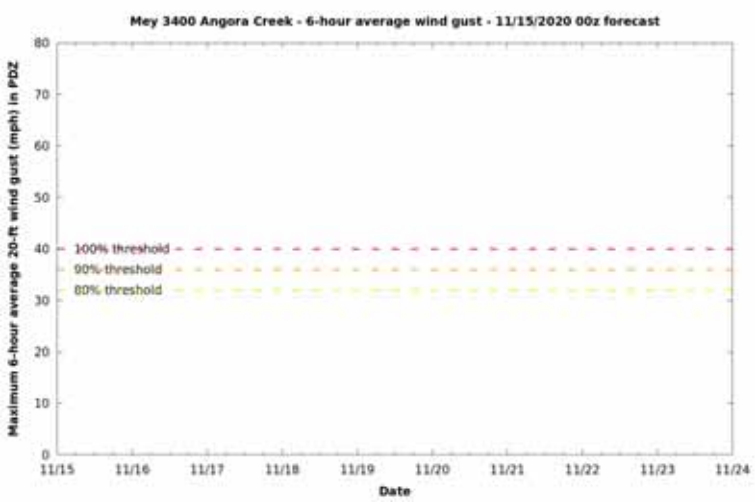
Cathedral Spring Creek Emerald Bay



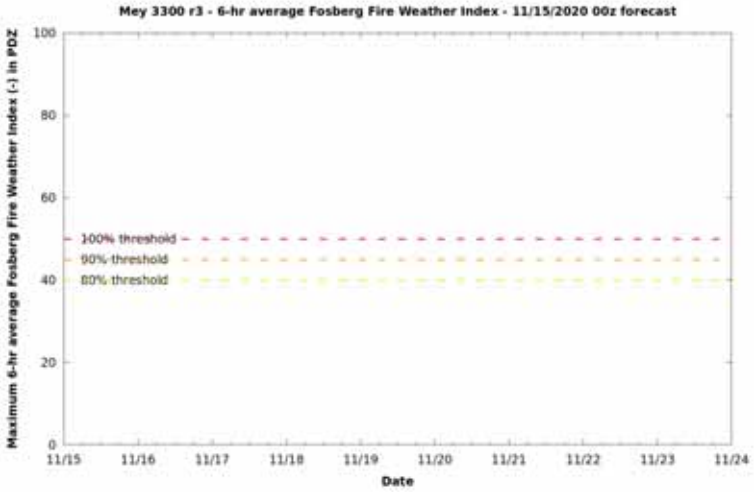


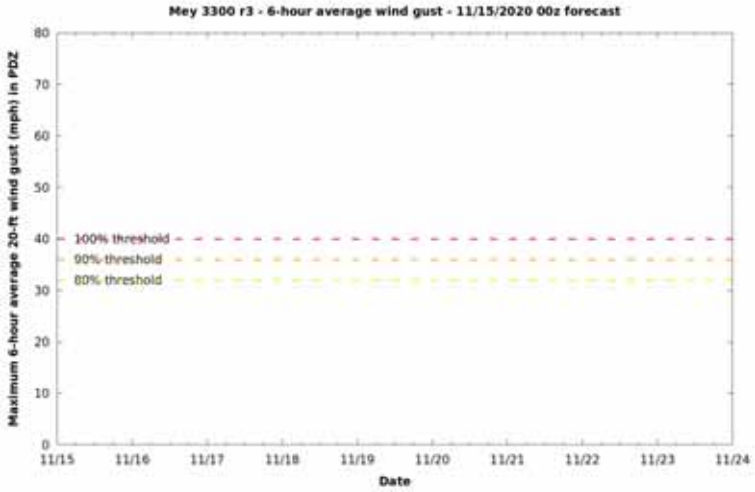
Mey 3400 Angora Creek



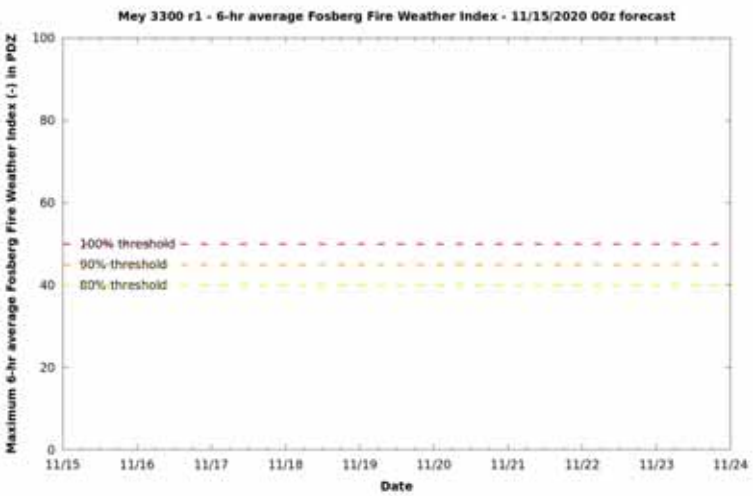


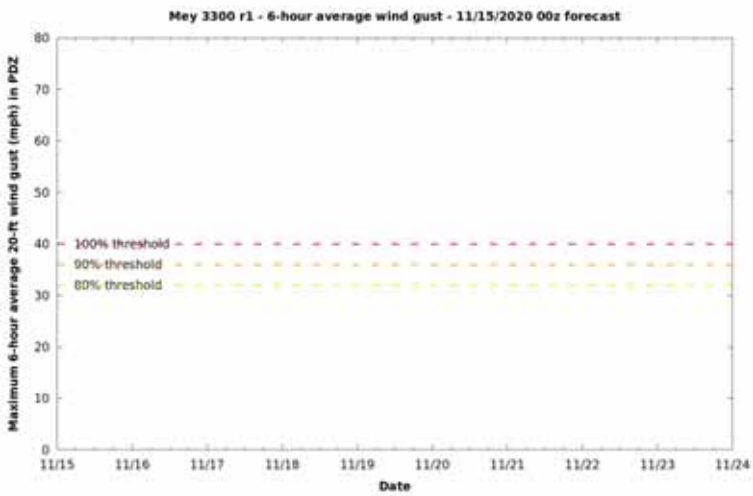
Mey 3300 r3



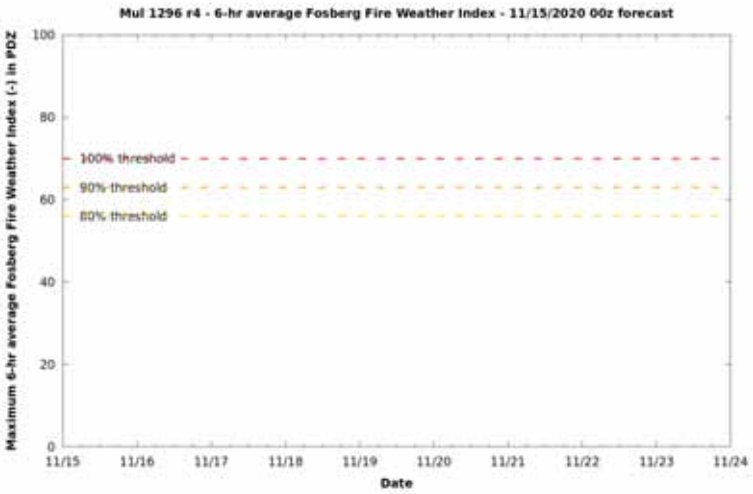


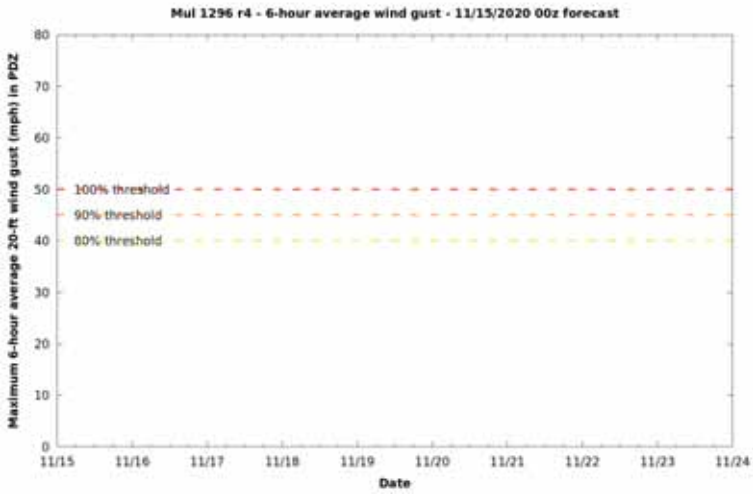
Mey 3300 r1



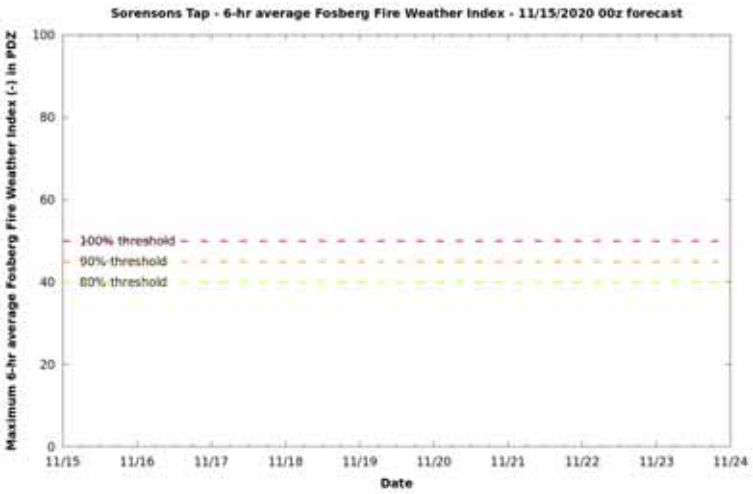


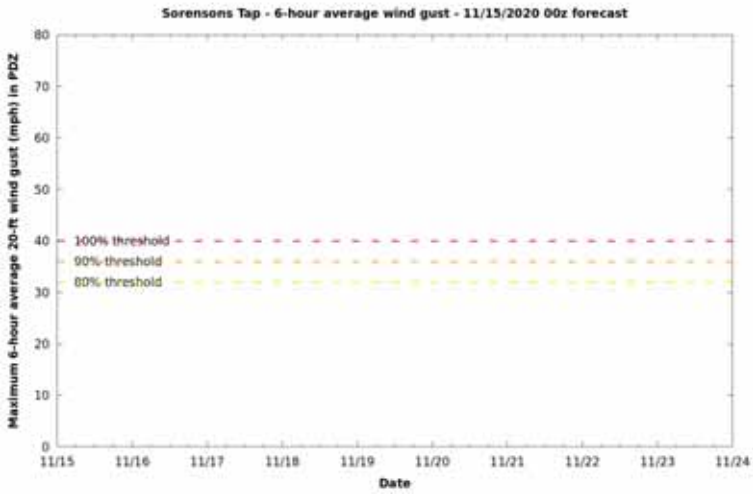
Mul 1296 r4



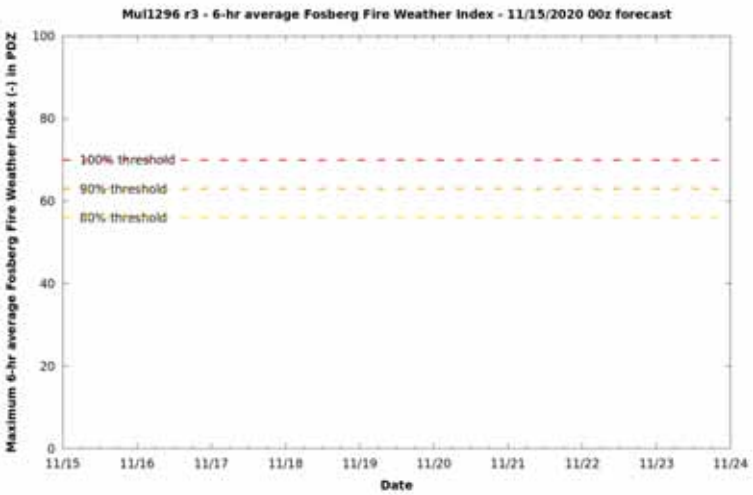


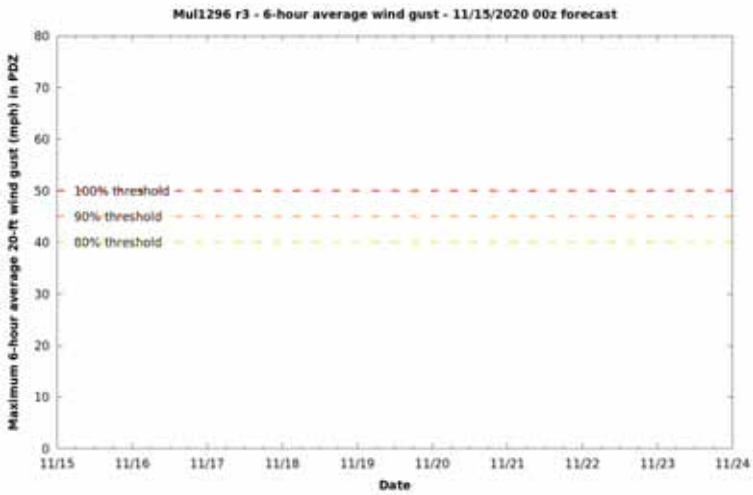
Sorensons Tap



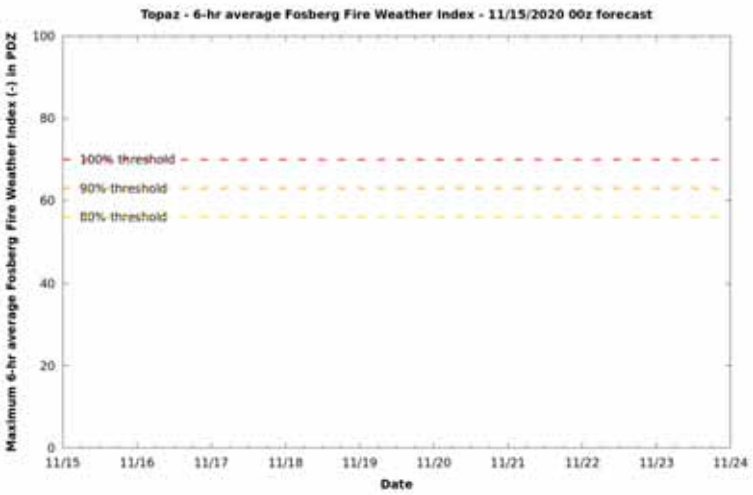


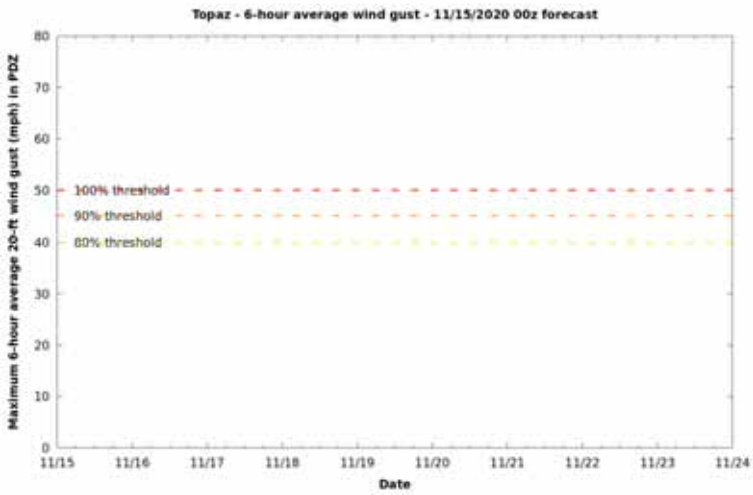
Mul 1296 r3



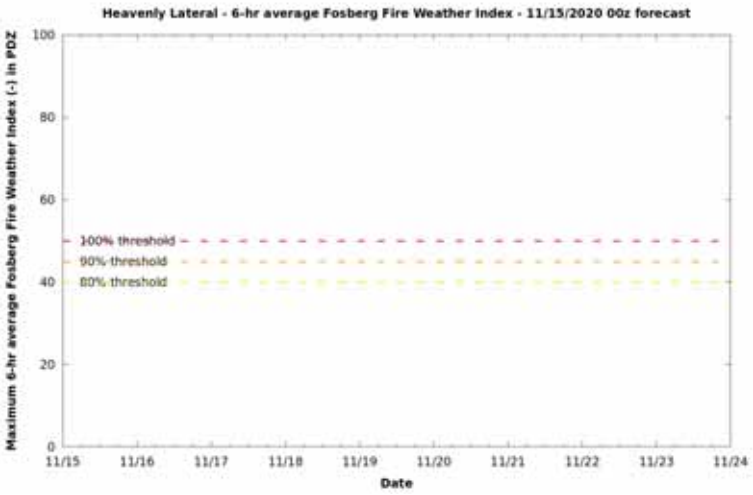


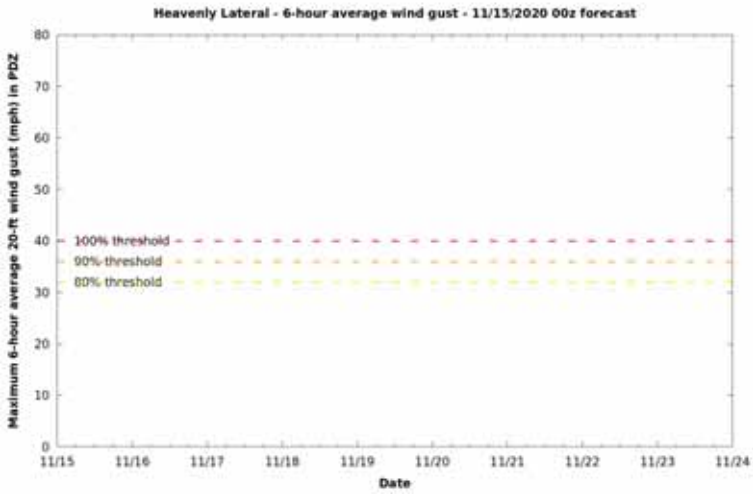
Topaz



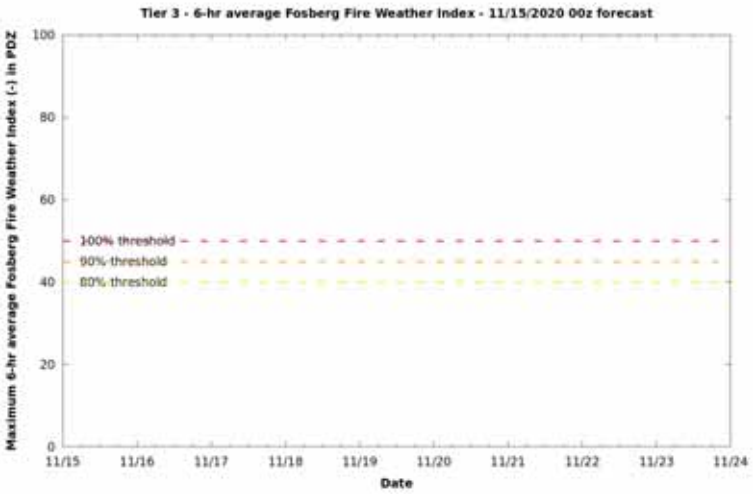


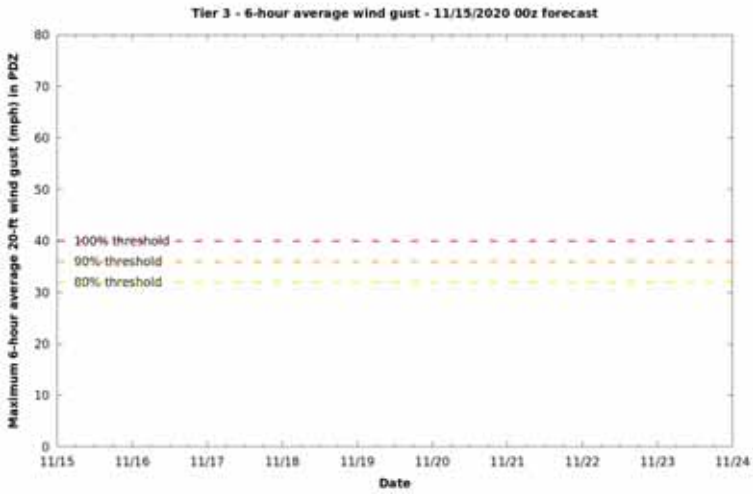
Heavenly Lateral



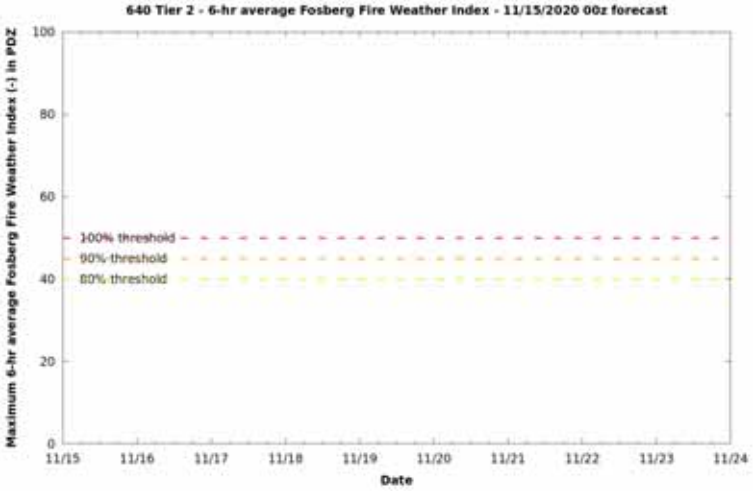


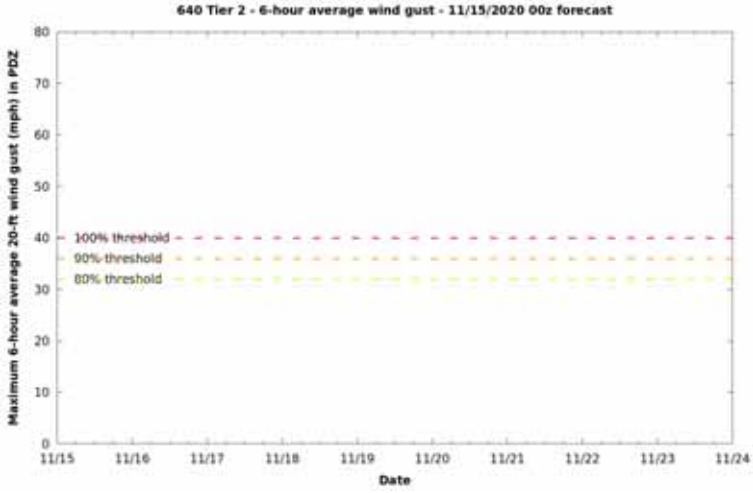
Tier 3



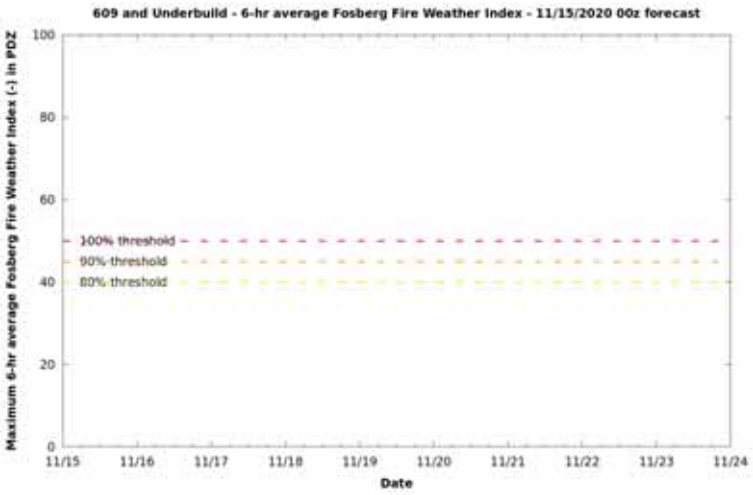


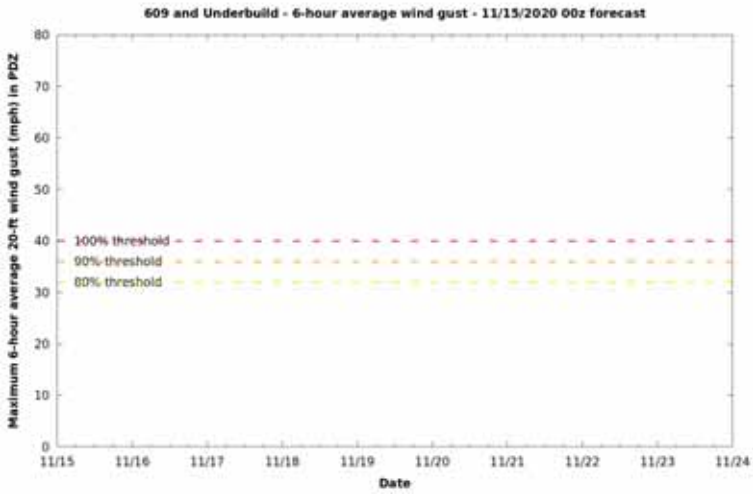
640 Tier 2



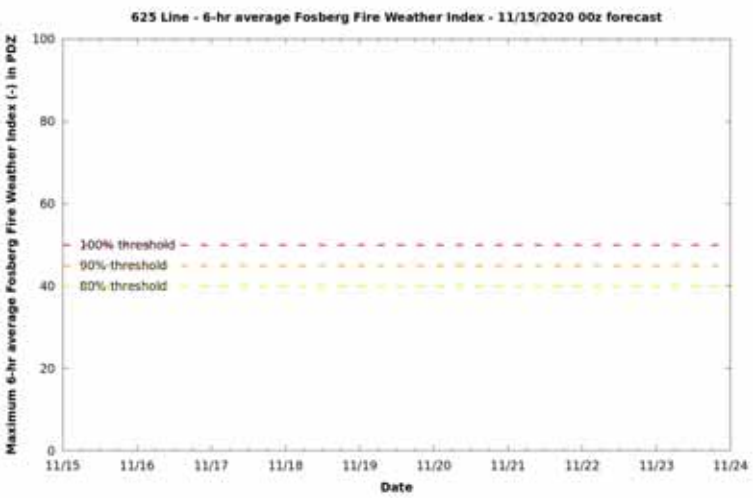


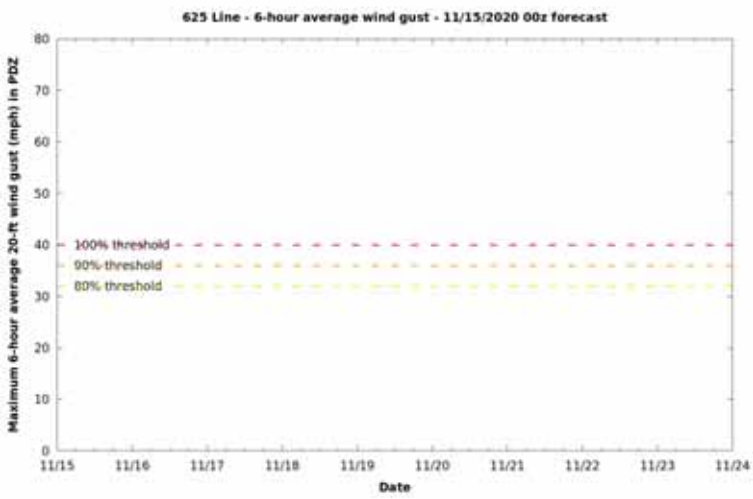
609 and Underbuild



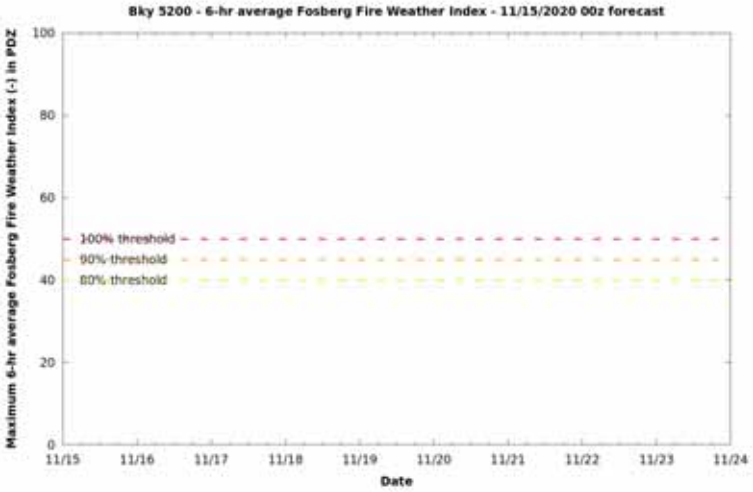


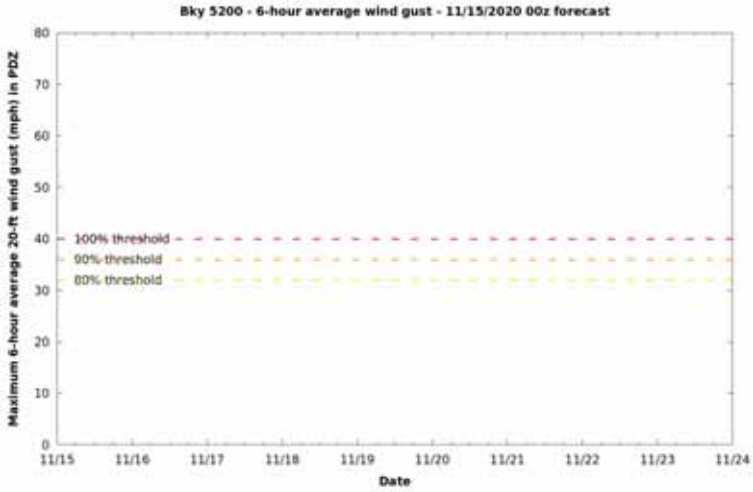
625 Line



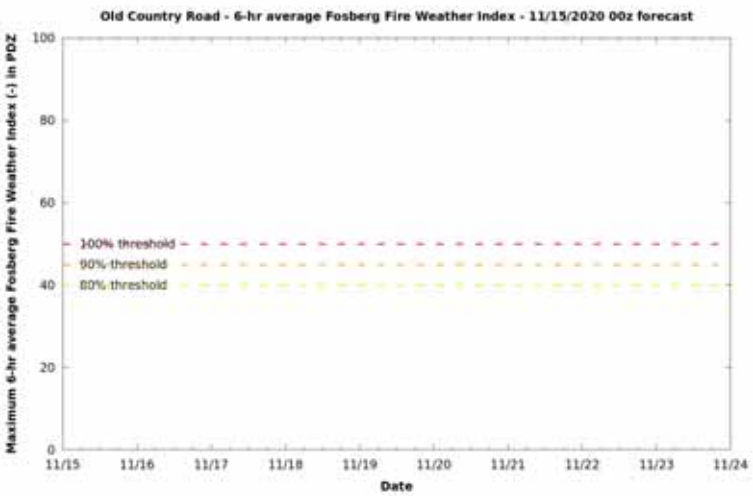


Bky 5200



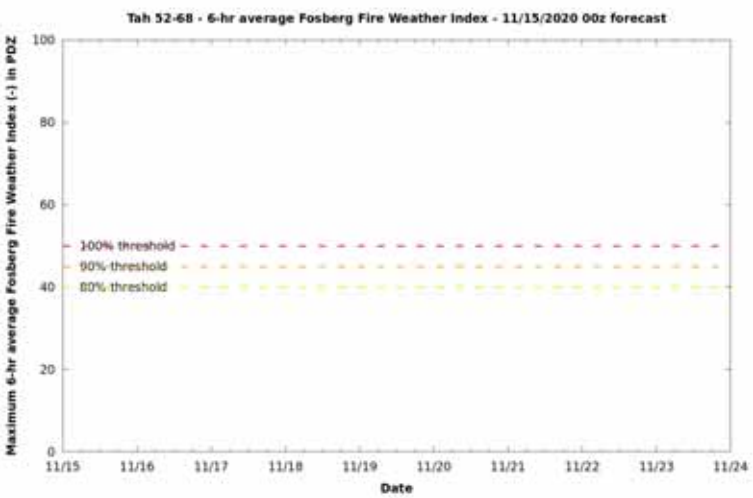


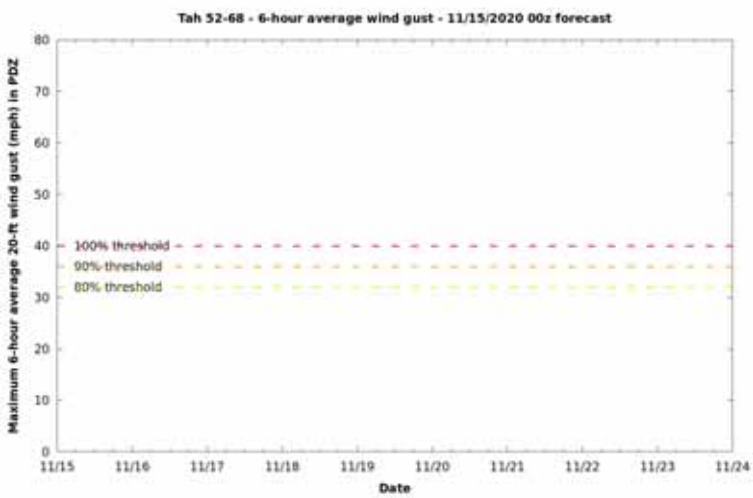
Old Country Road



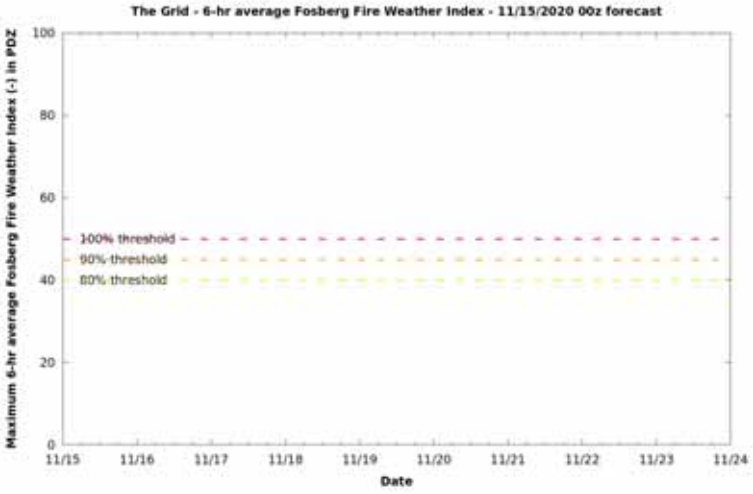


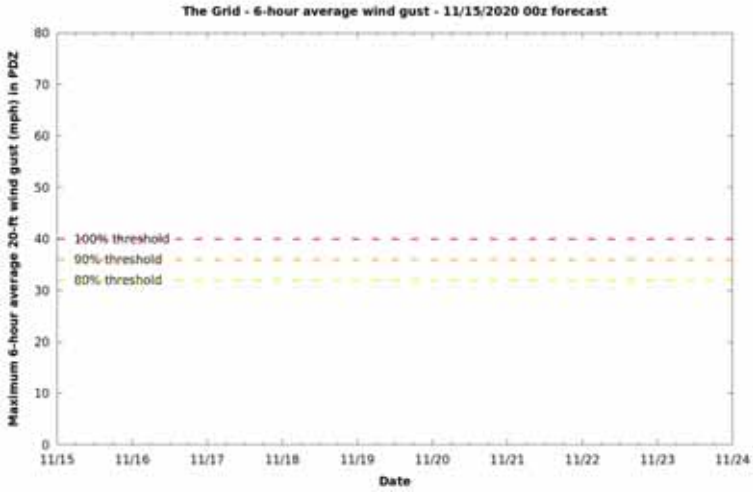
Tah 52-68



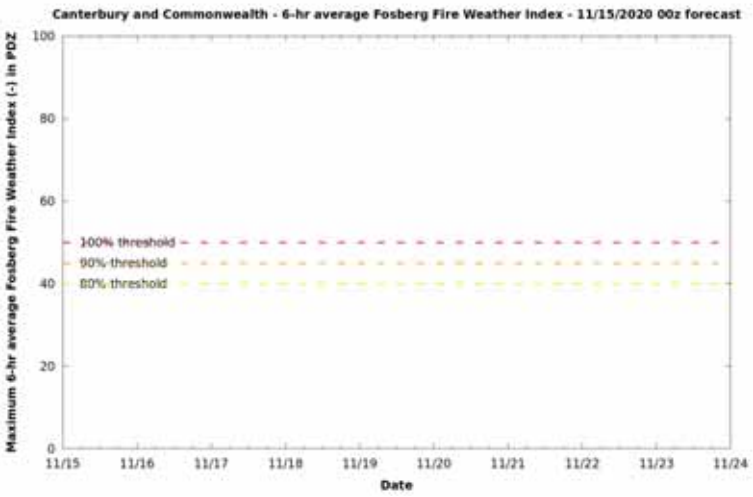


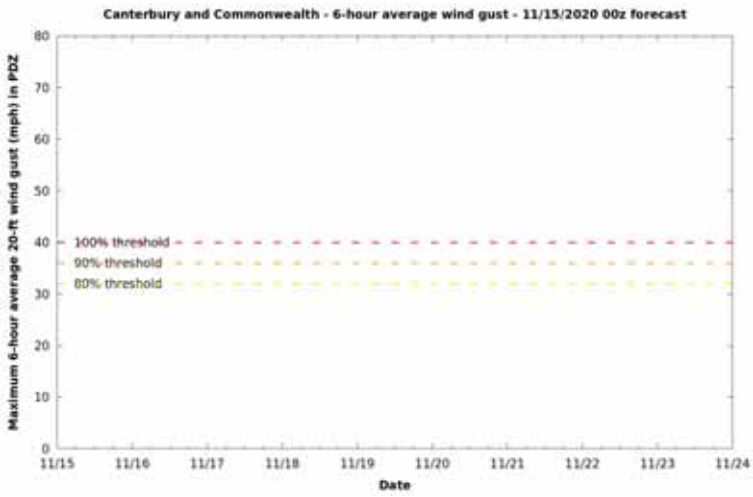
The Grid



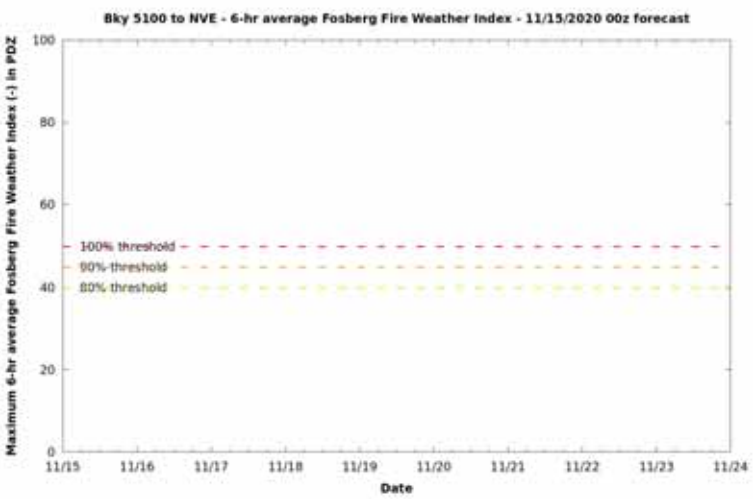


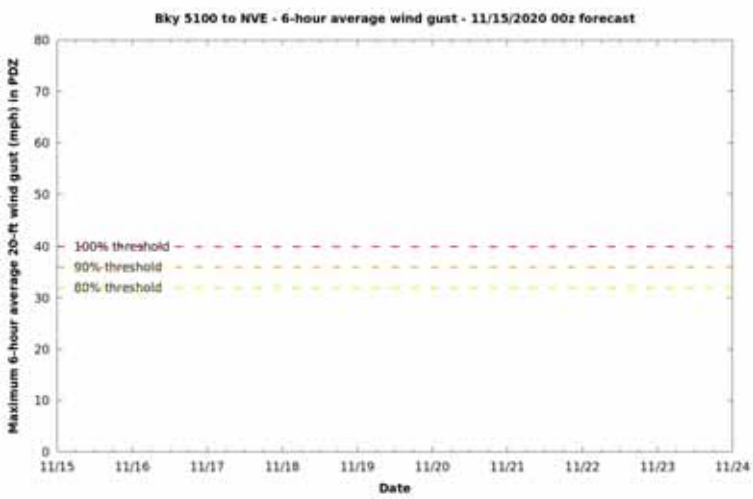
Canterbuy and Commonwealth



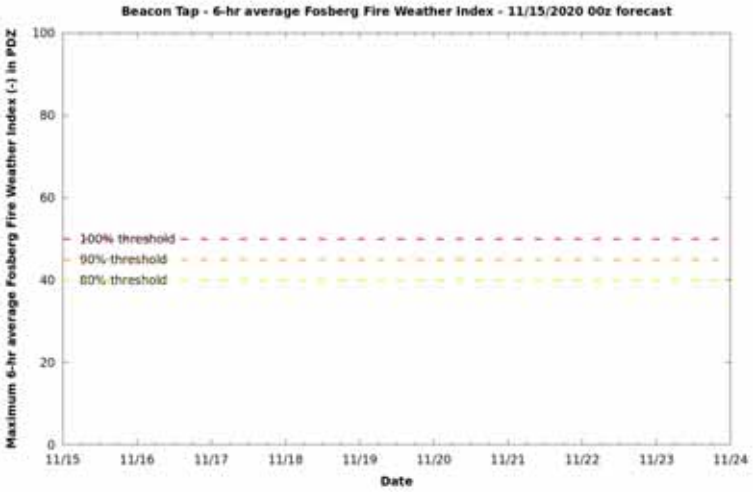


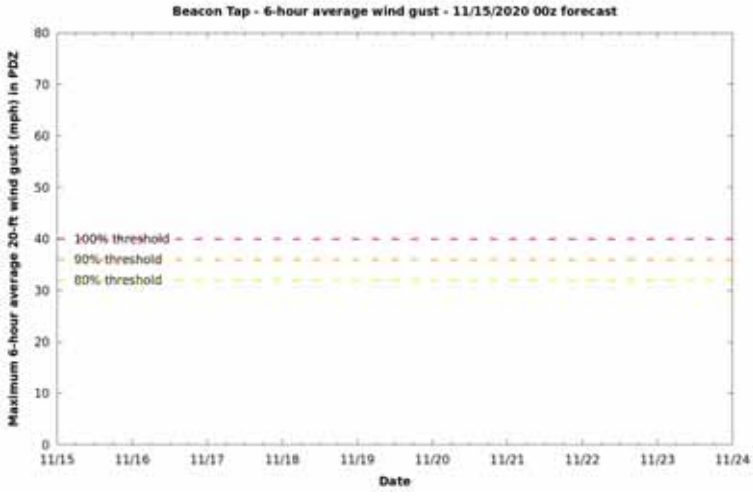
Bky 5100 to NVE



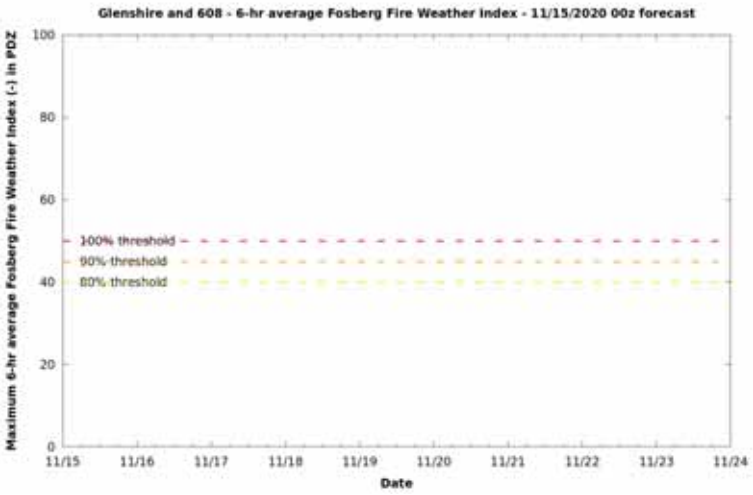


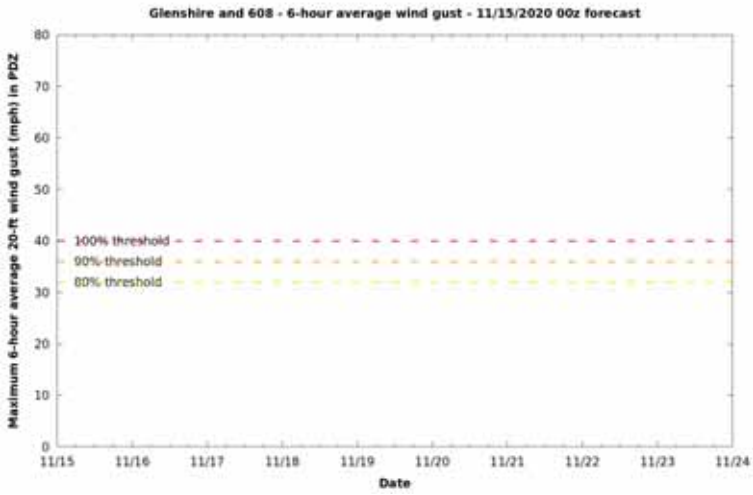
Beacon Tap



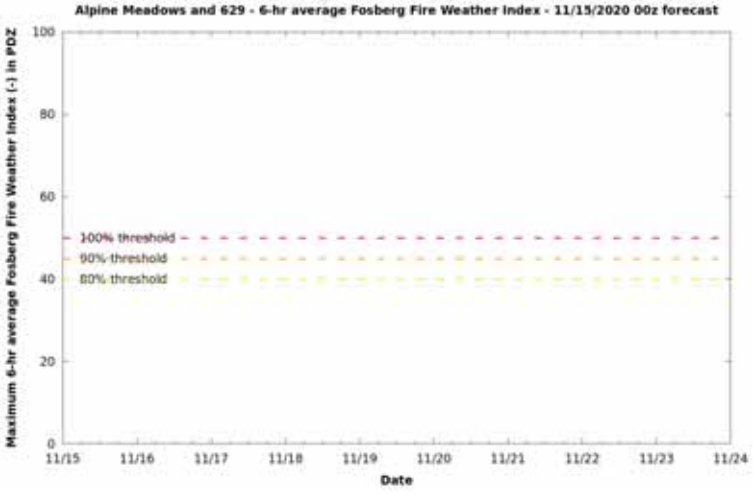


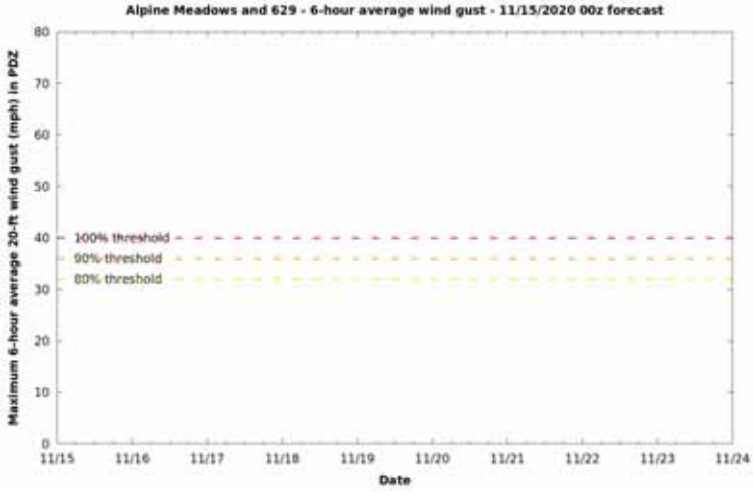
Glenshire and 608



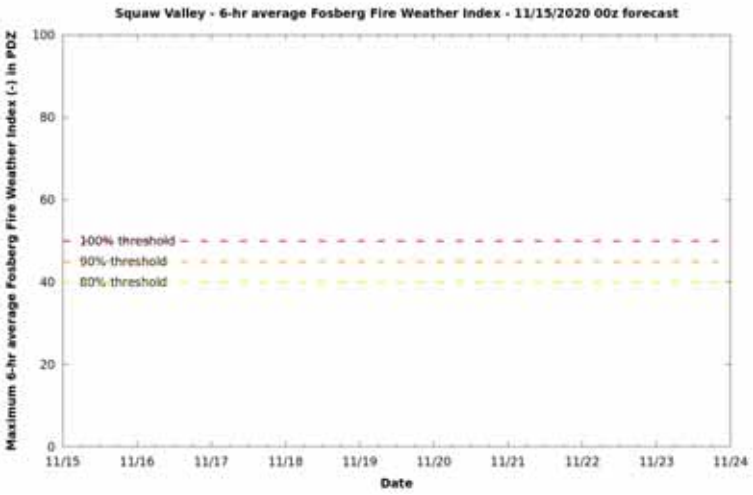


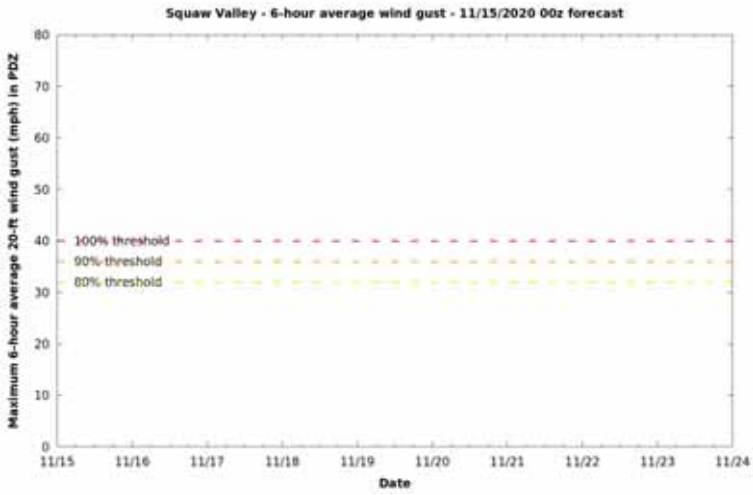
Alpine Meadows and 629



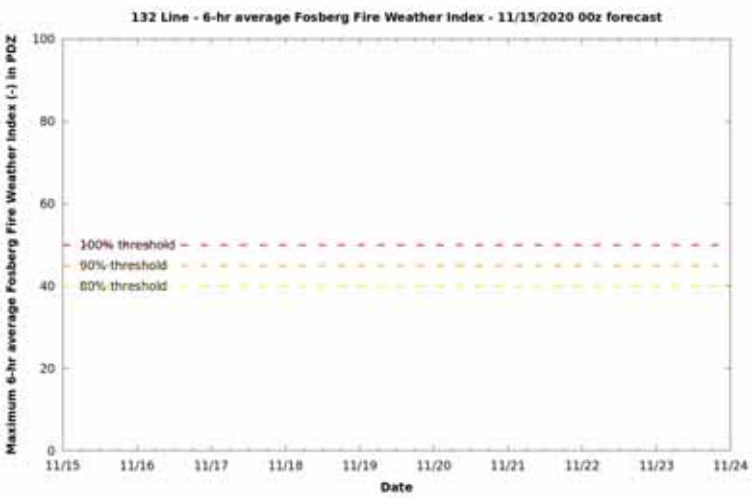


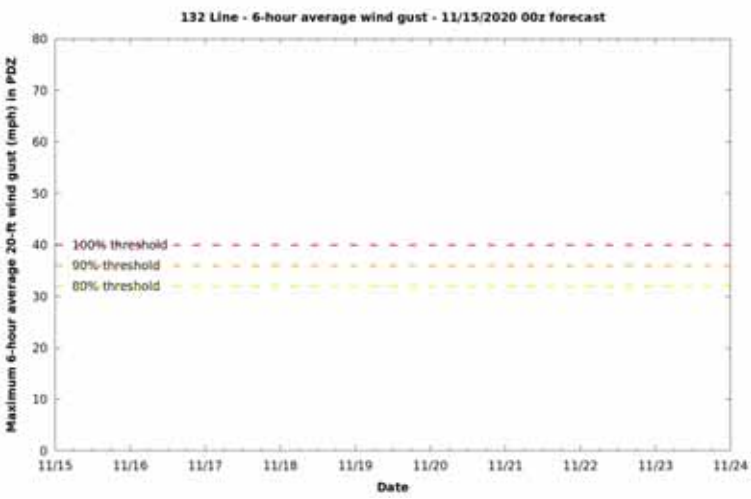
Squaw Valley



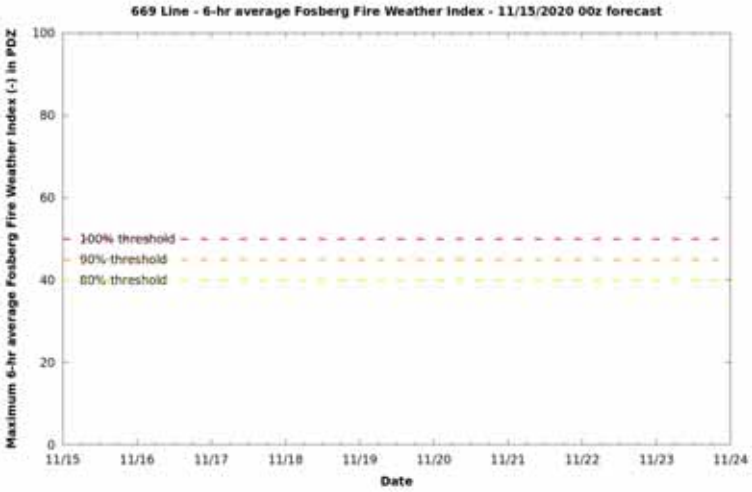


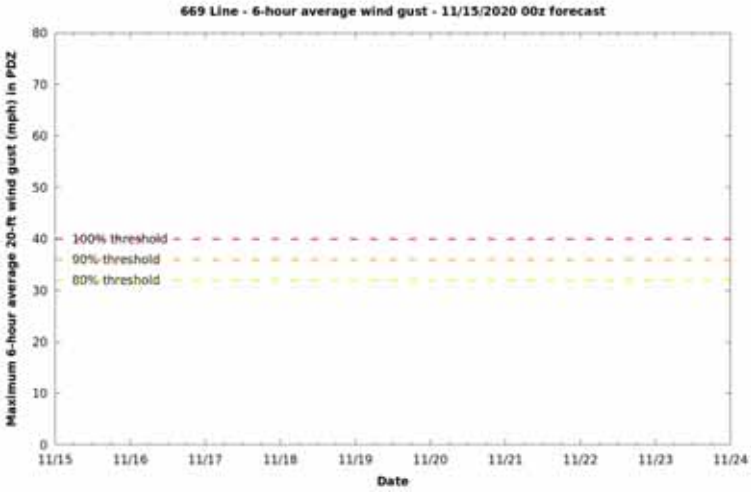
132 Line



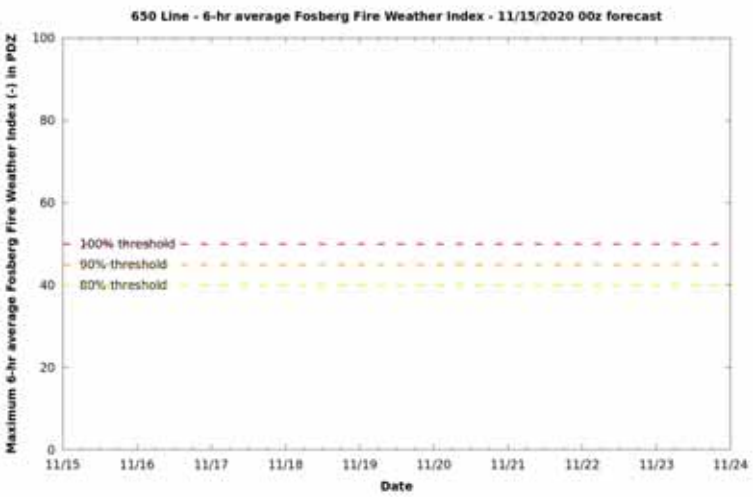


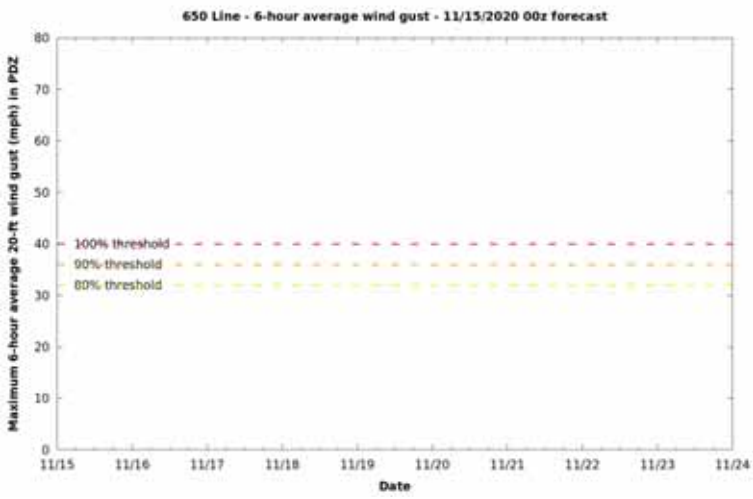
669 Line



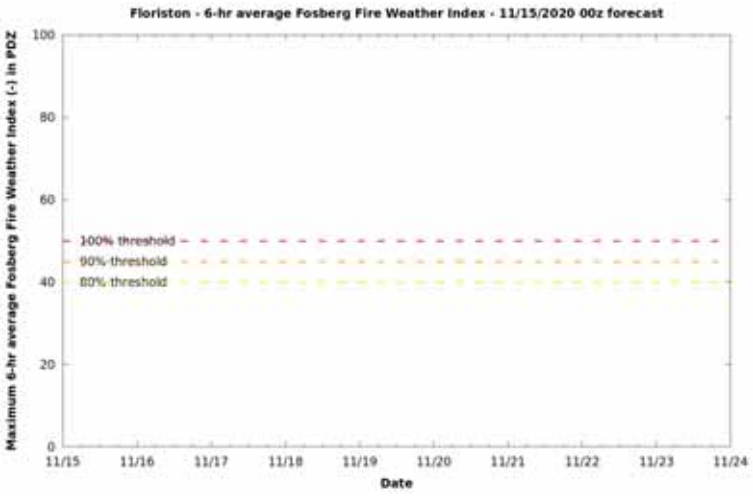


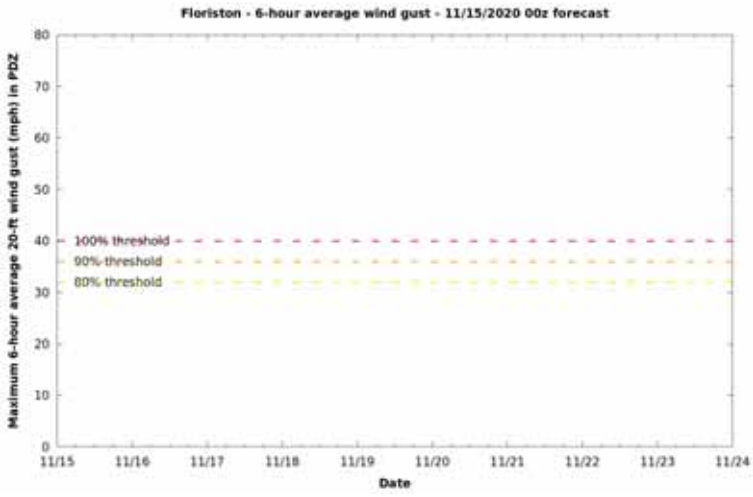
650 Line



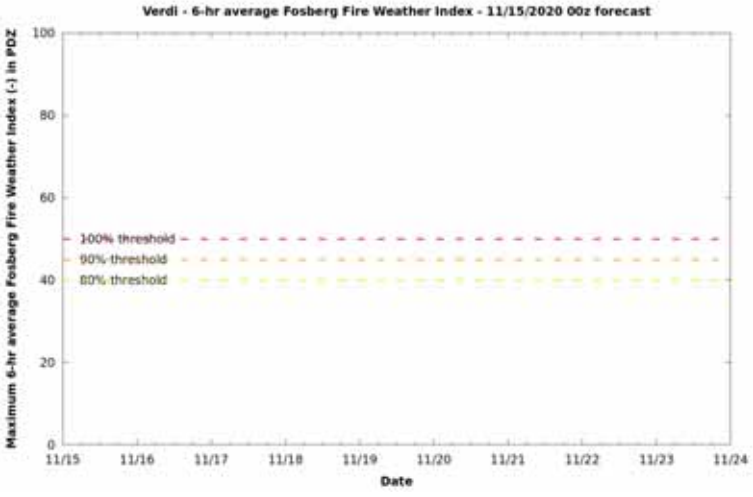


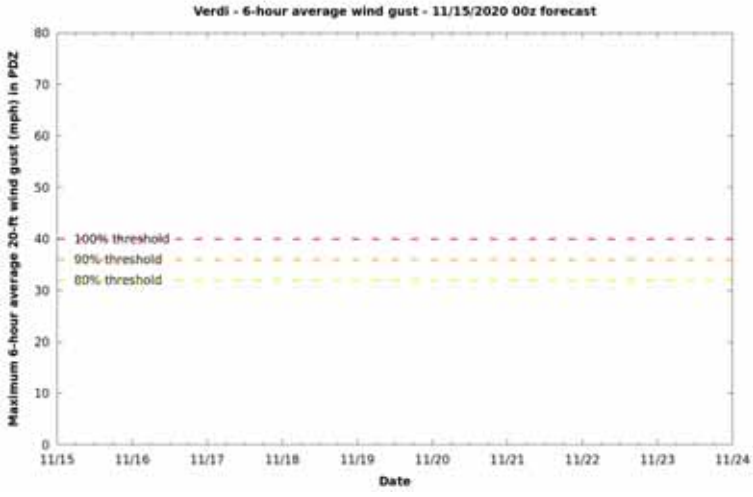
Floriston



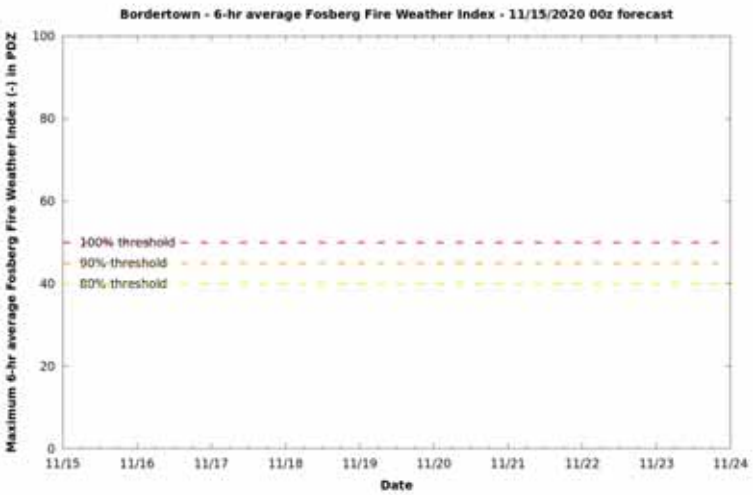


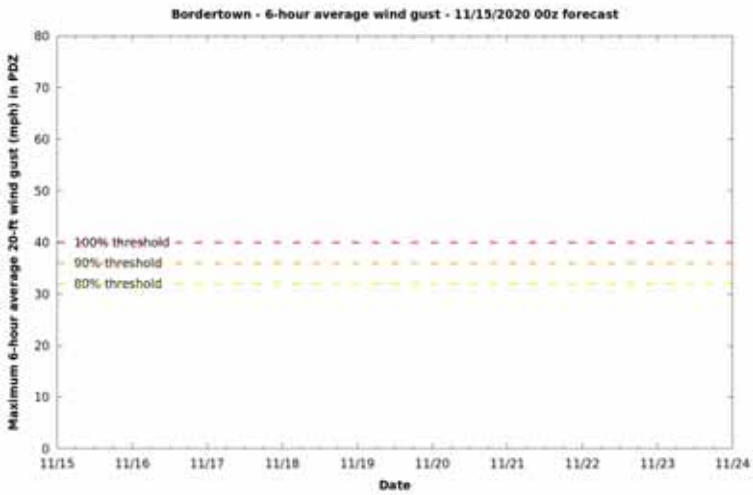
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/15/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100
80
60
40
20
0
100% threshold
90% threshold
80% threshold
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
Date


Bordertown - 6-hour average wind gust - 11/15/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
80
70
60
50
40
30
20
10
0
100% threshold
90% threshold
80% threshold
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
Date

Liberty Utilities Fire Potential Index Forecast for 11/15/20 - 11/21/20

Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

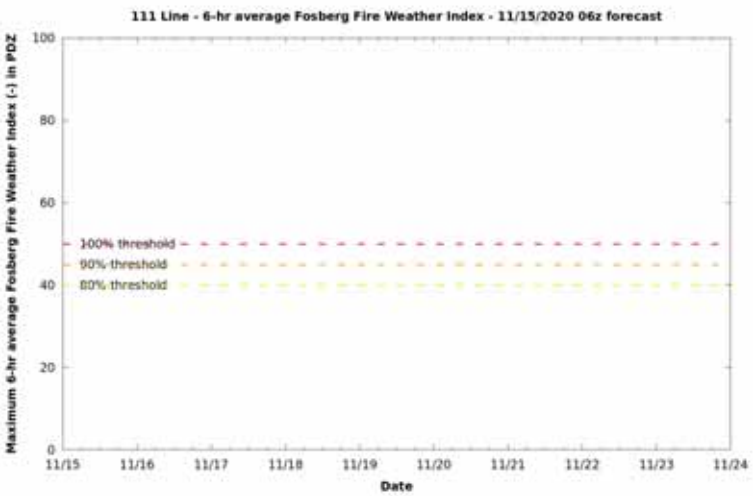
Liberty Utilities Energy Release Component Forecast for 11/15/20 - 11/21/20

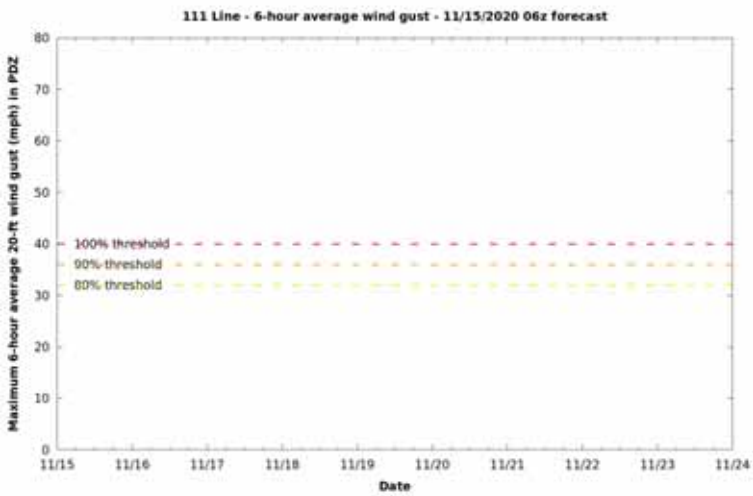
Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Brooks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Topaz	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Country Road	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 52-68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Grid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verdi	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bordertown	0.0	0.0	0.0	0.0	0.0	0.0	0.0

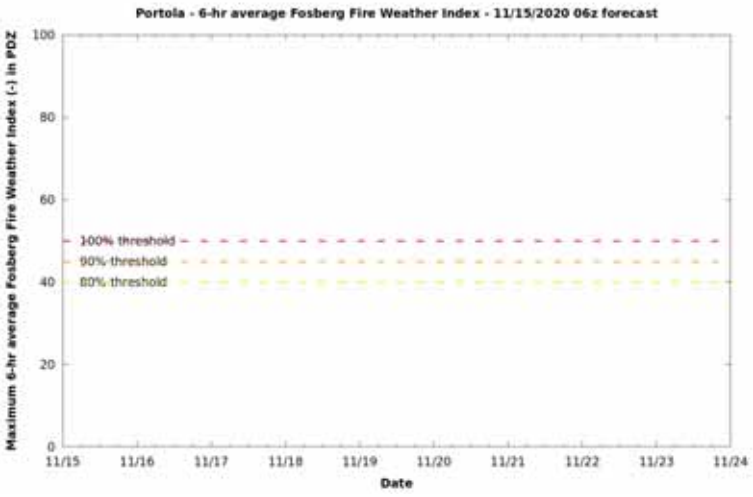
Liberty Utilities Fire Weather Summary Plots - 11/15/2020 06z forecast

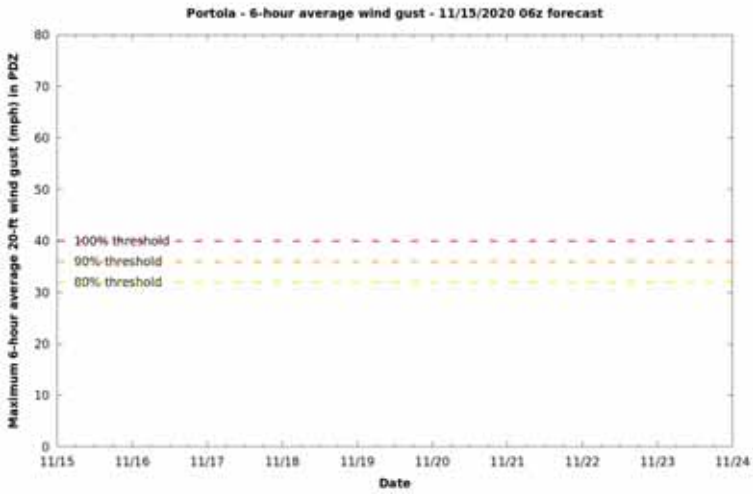
111 Line



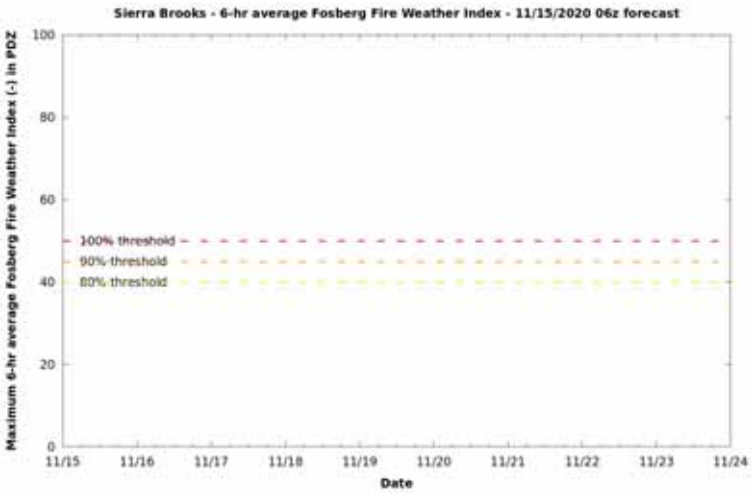


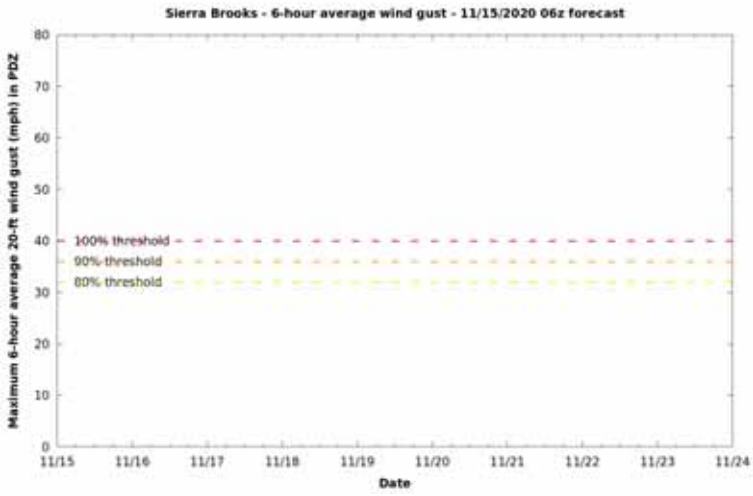
Portola



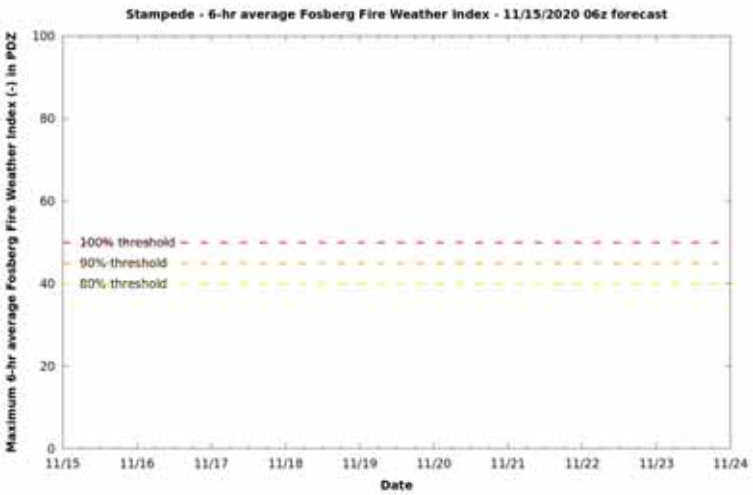


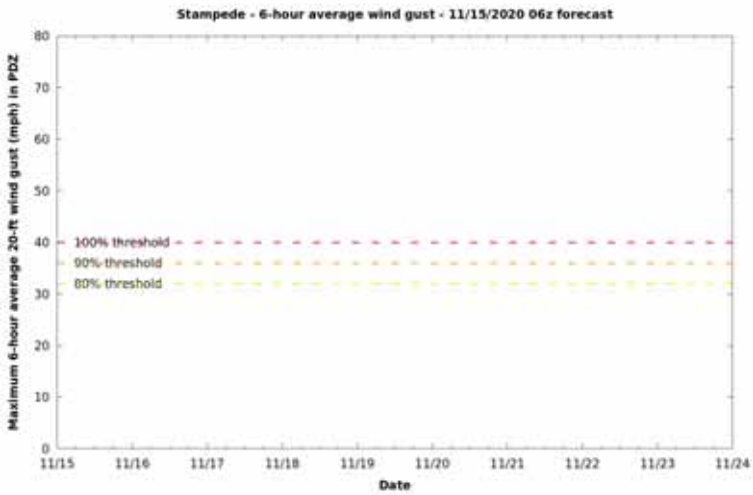
Sierra Brooks



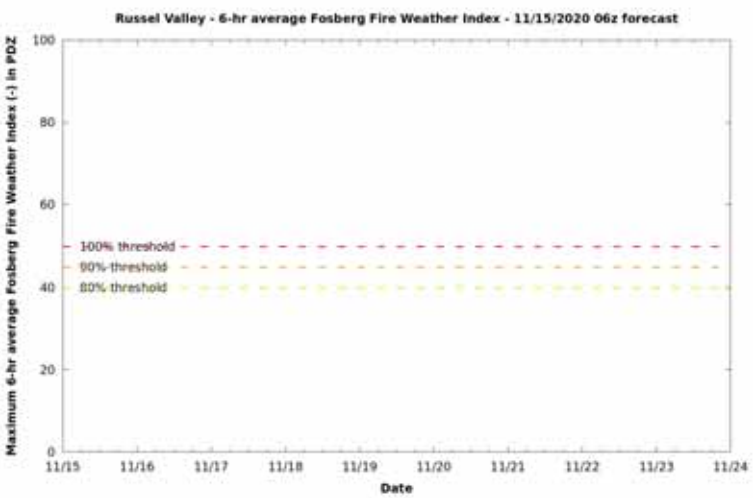


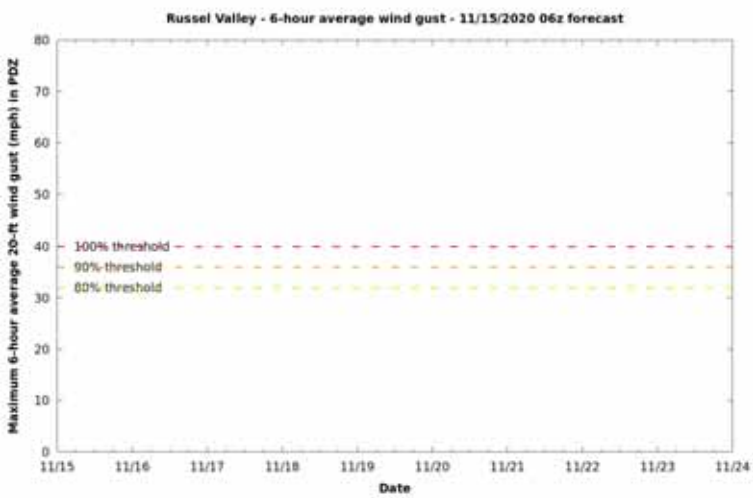
Stampede





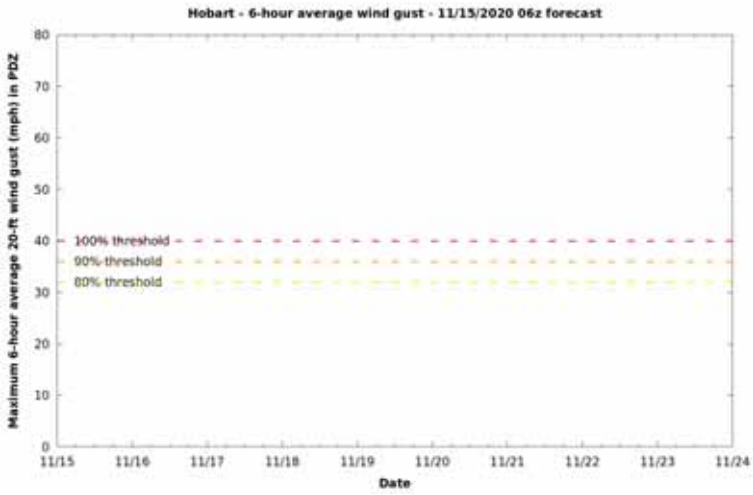
Russell Valley



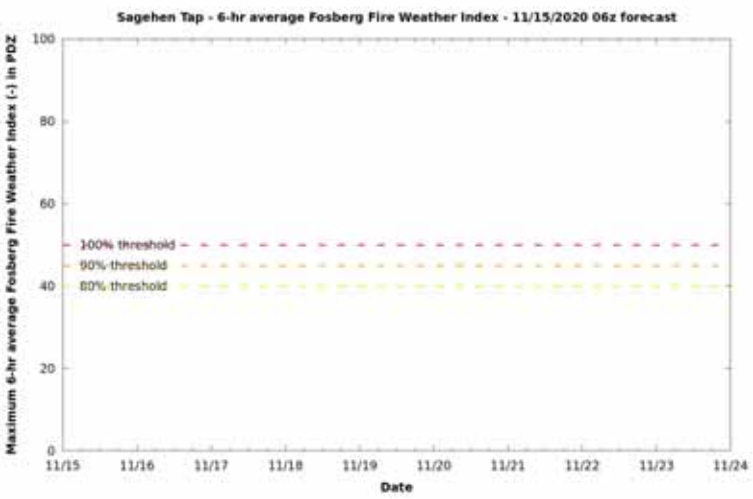


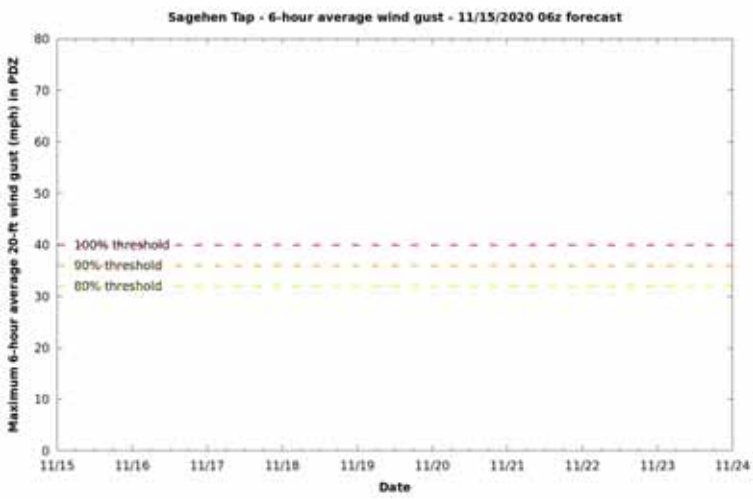
Hobart



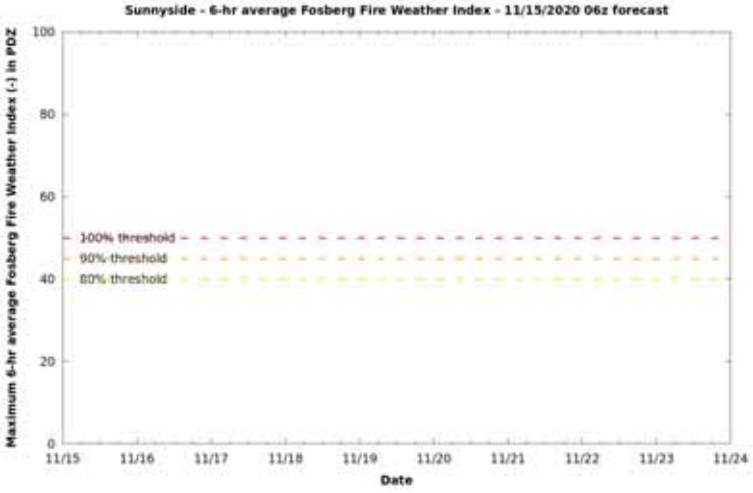


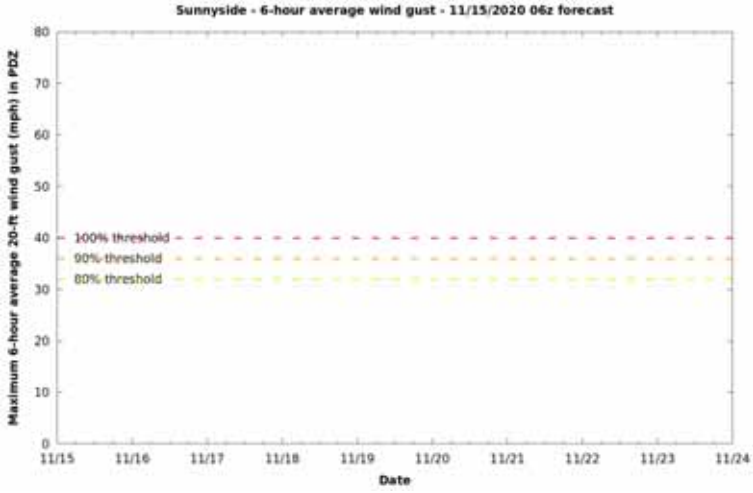
Sagehen tap



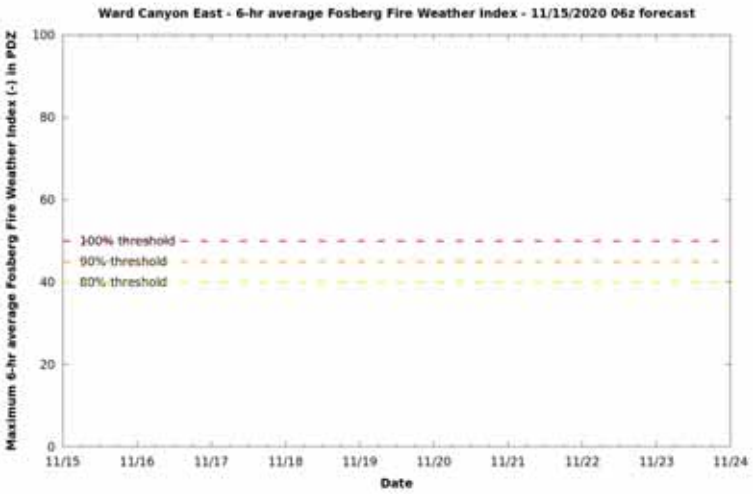


Sunnyside



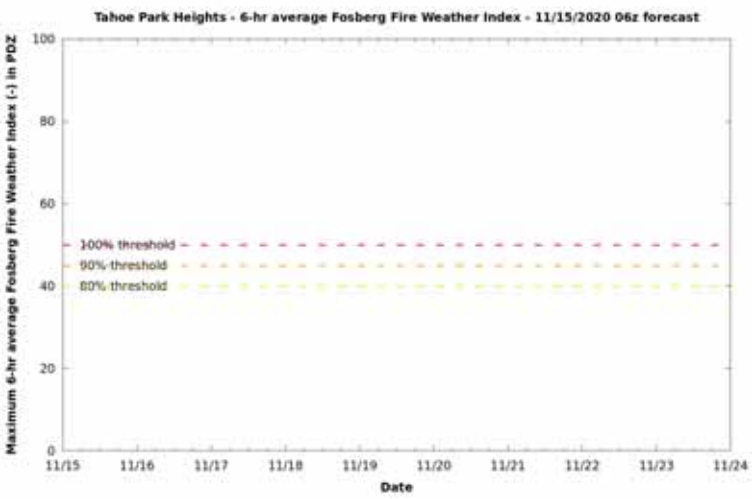


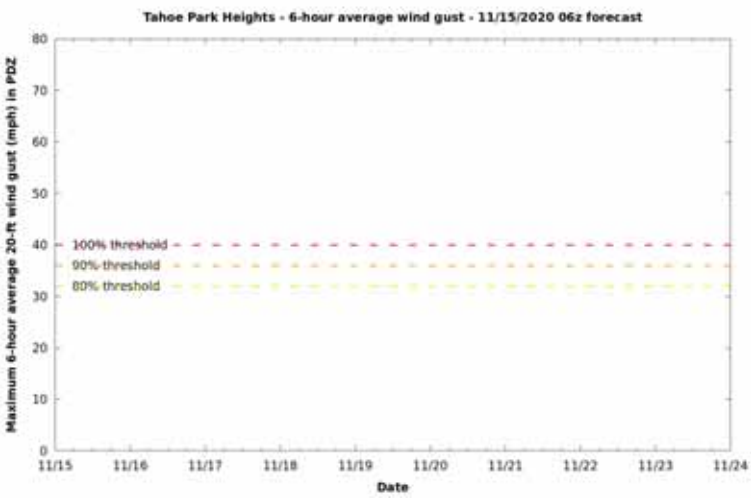
Ward Canyon East



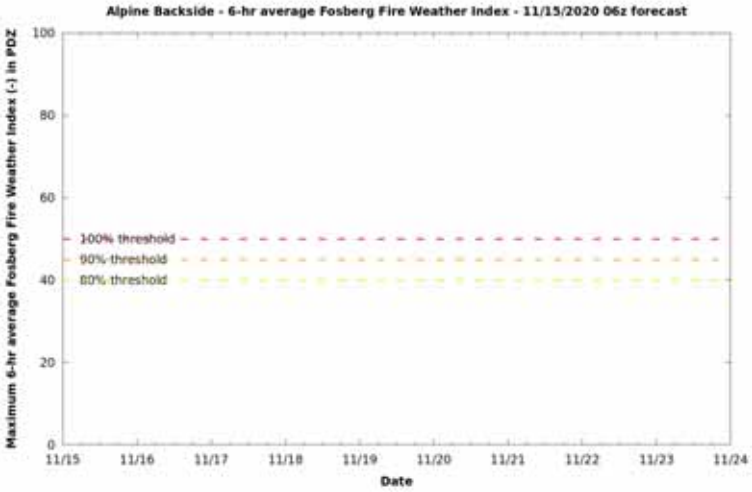


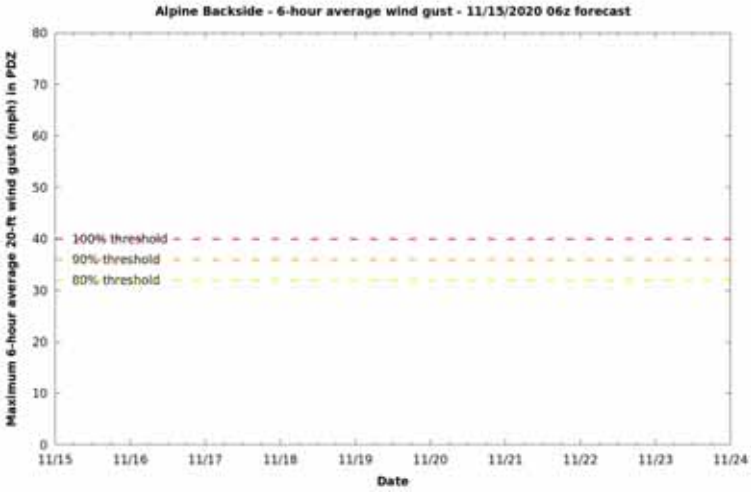
Tahoe Park Heights



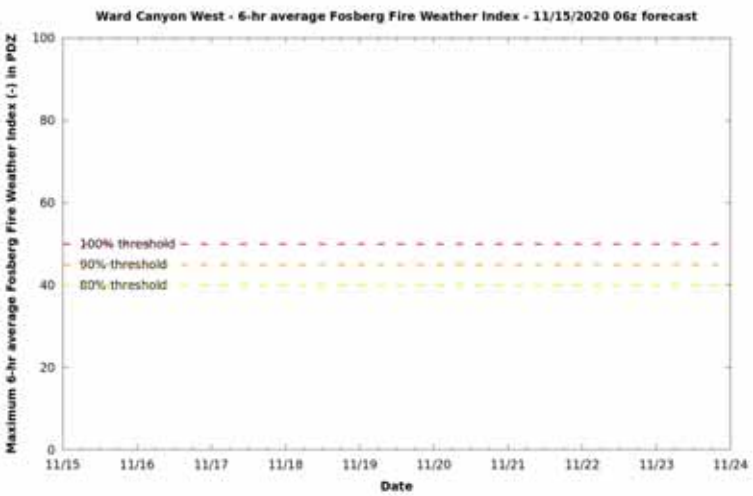


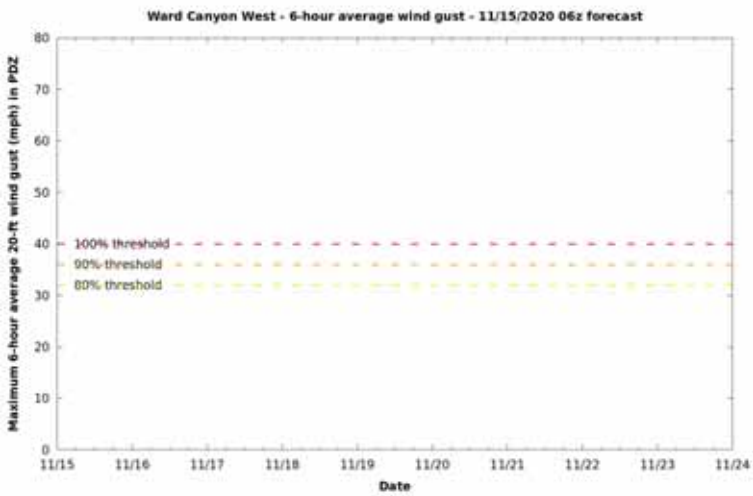
Alpine Backside



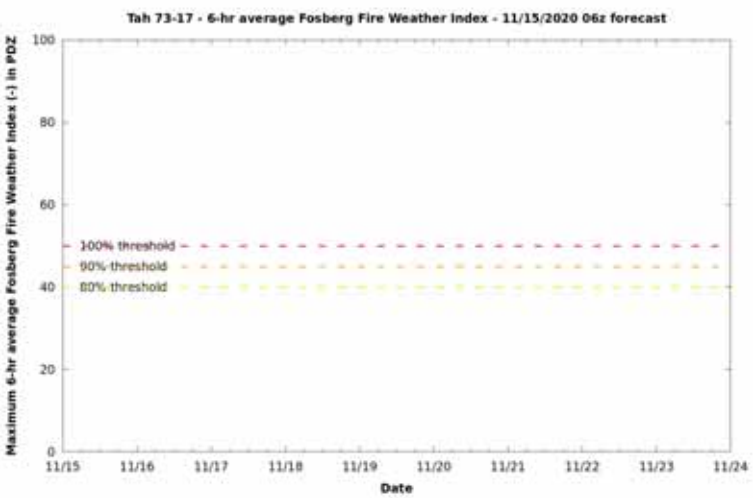


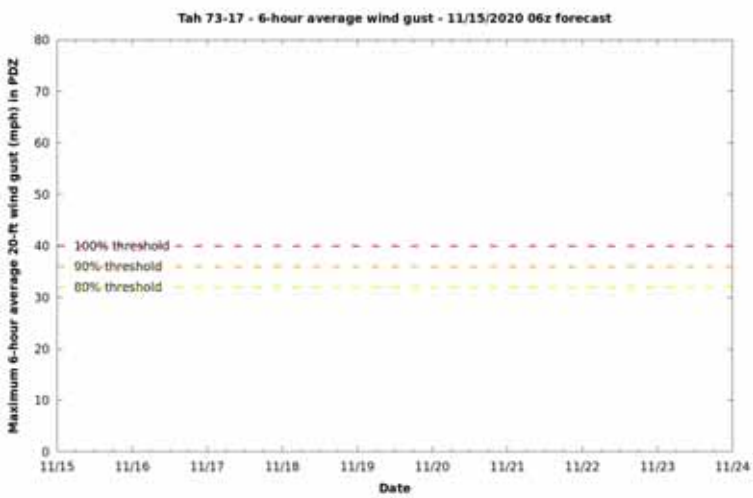
Ward Canyon West



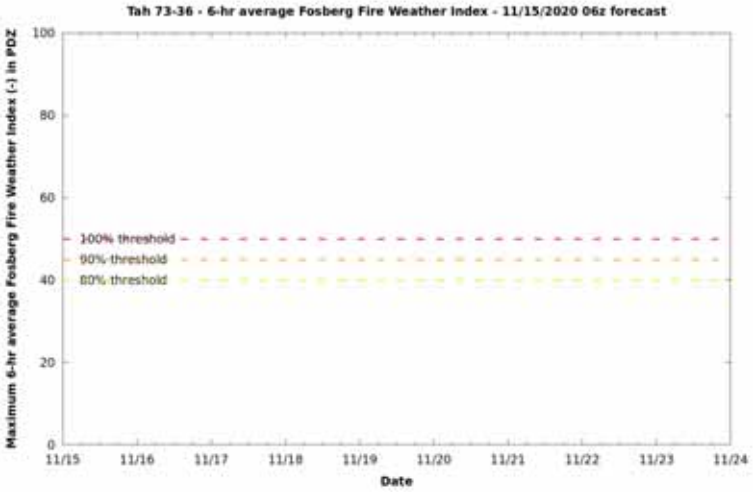


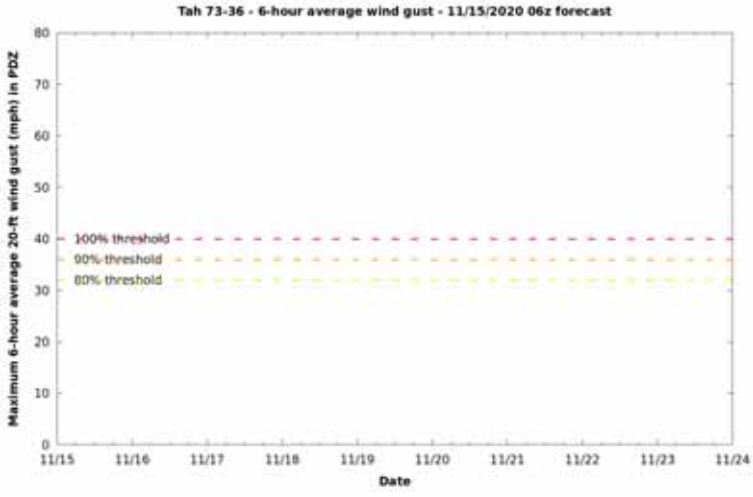
Tah 73-17



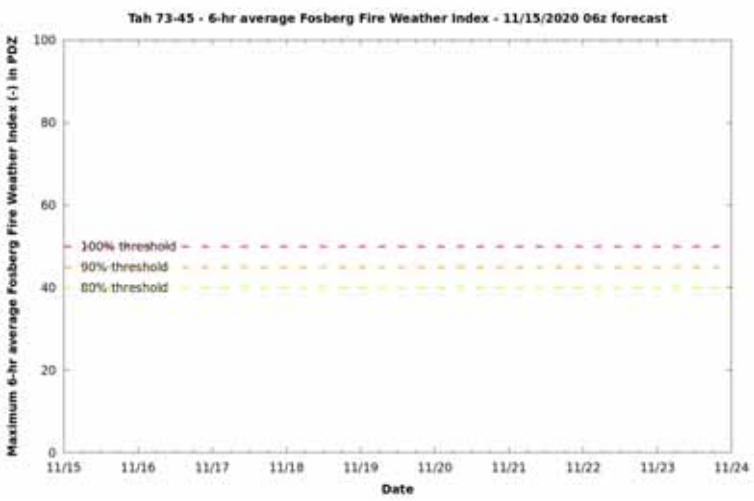


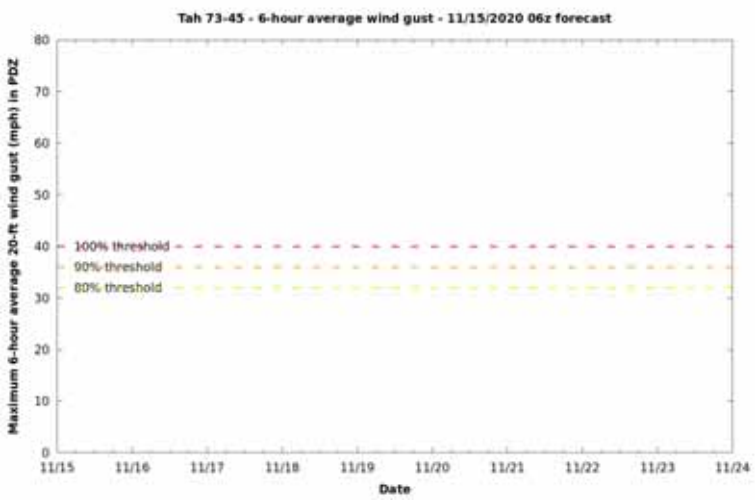
Tah 73-36



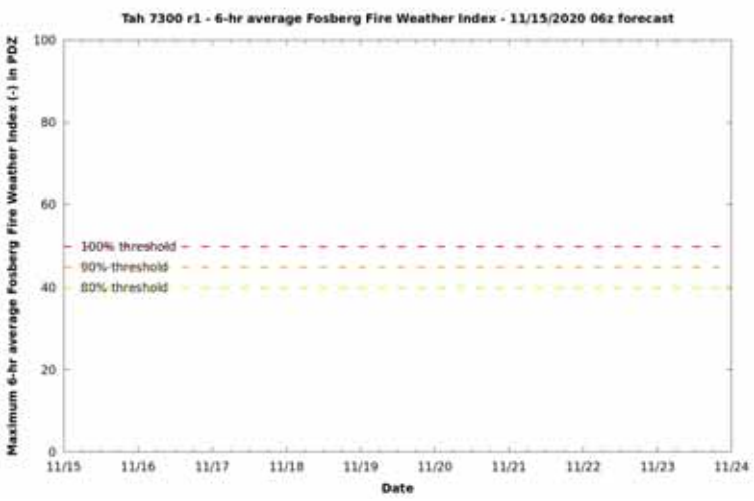


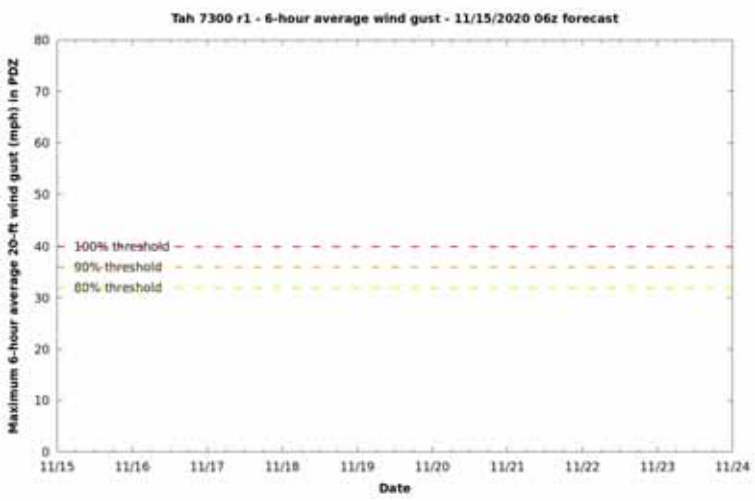
Tah 73-45



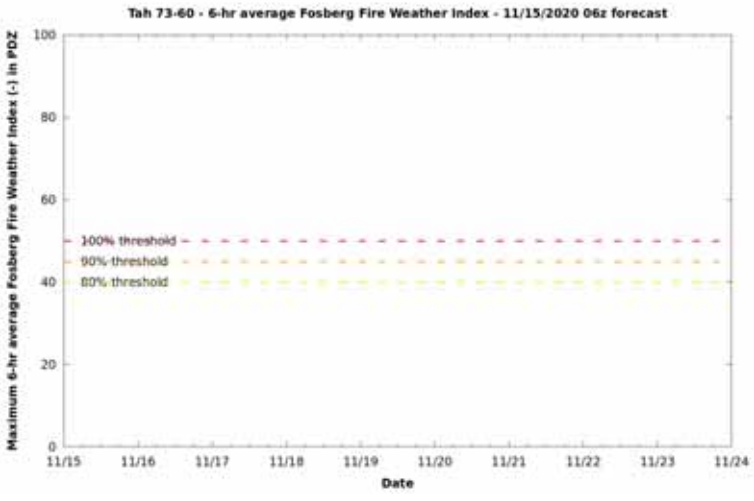


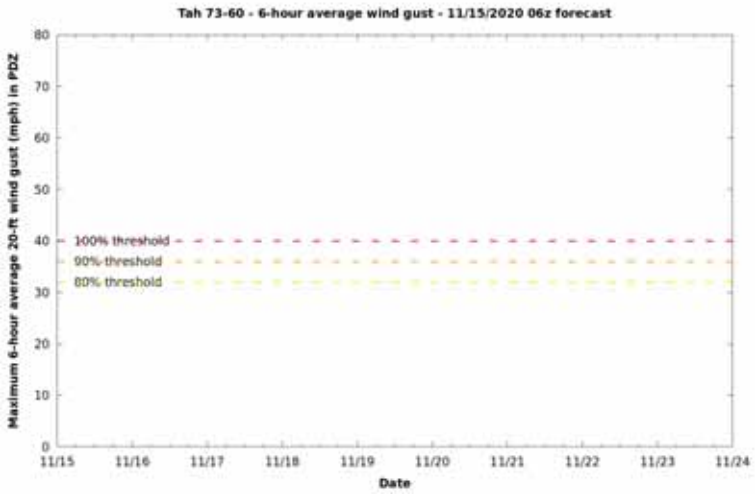
Tah 7300 r1



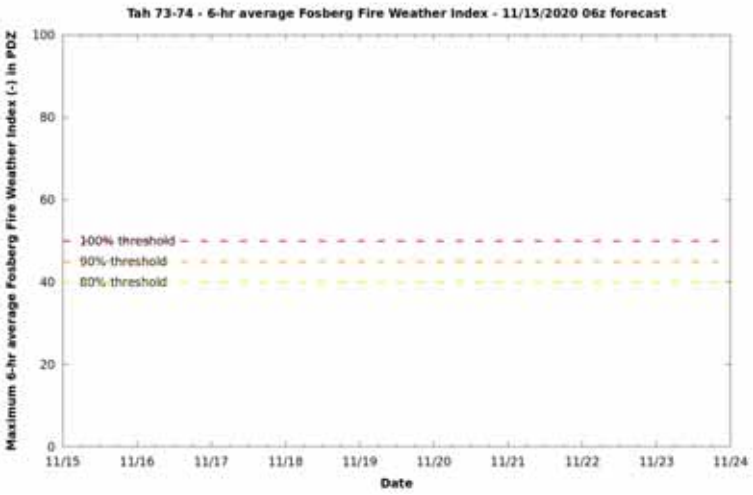


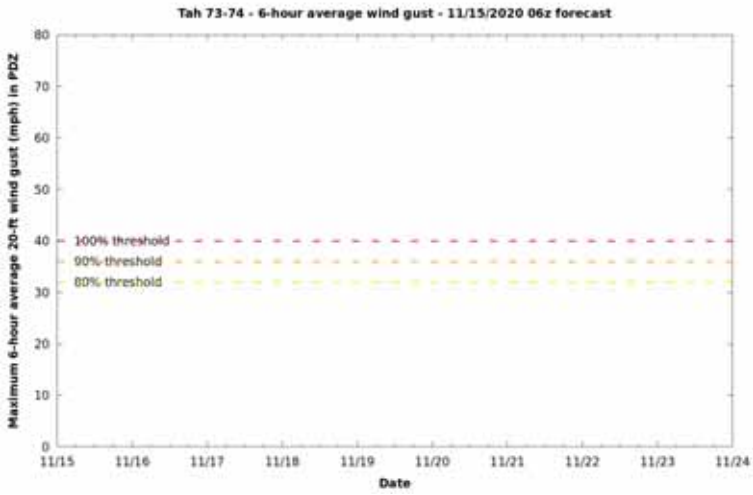
Tah 73-60



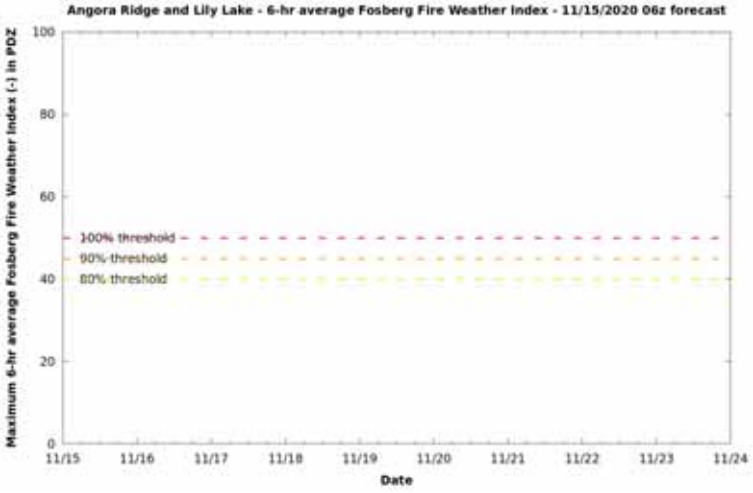


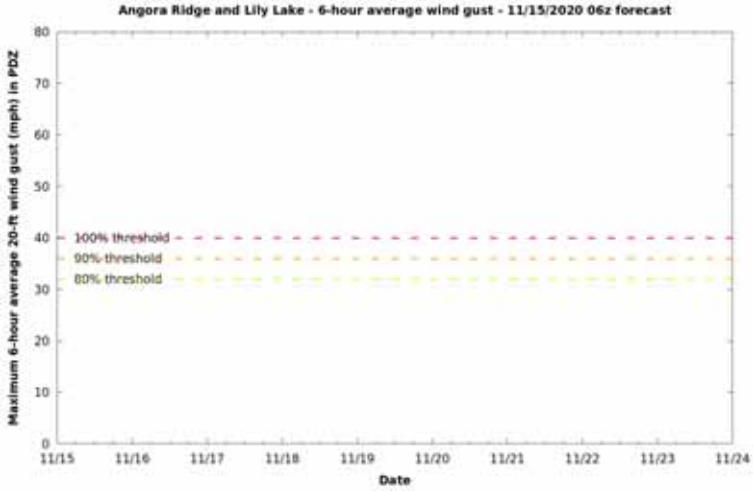
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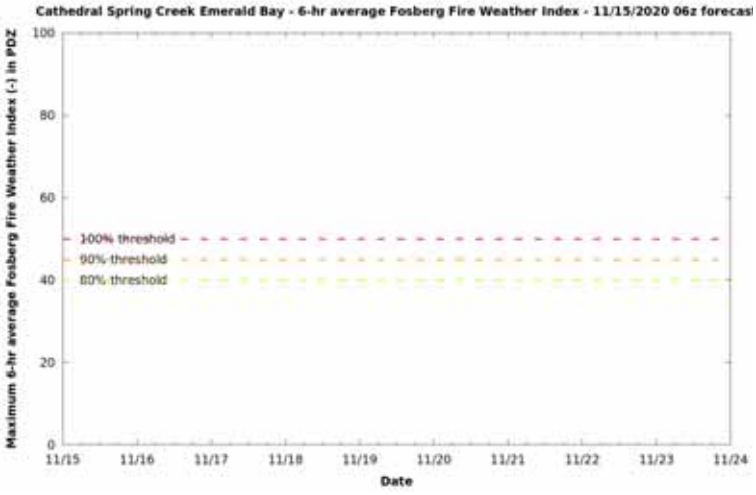


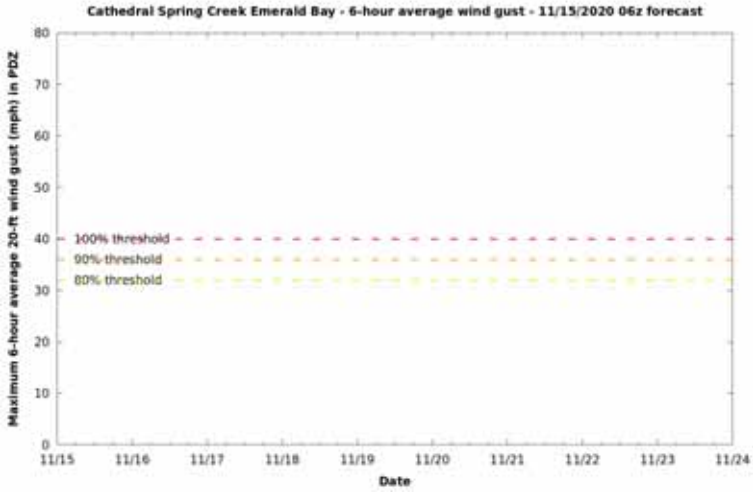
Angora Ridge and Lily Lake



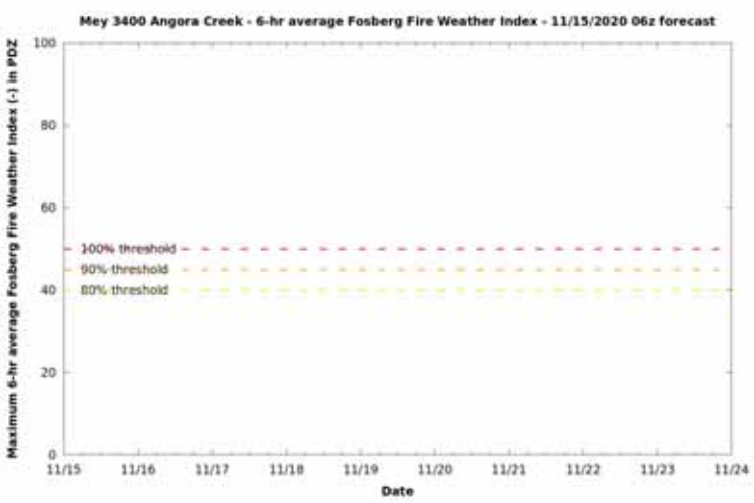


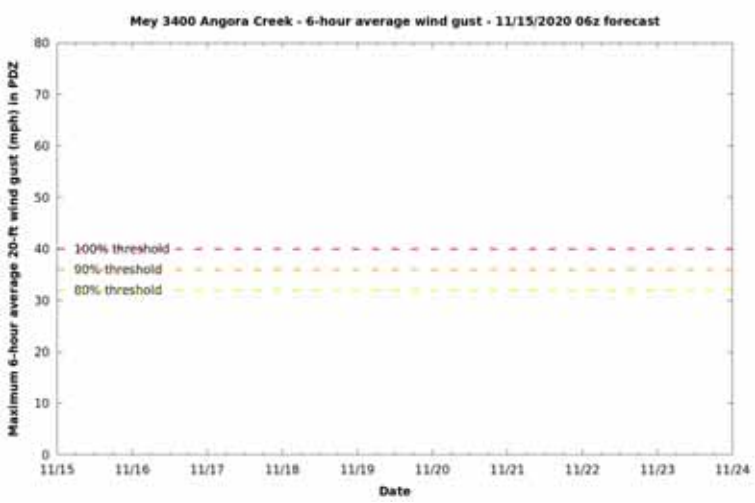
Cathedral Spring Creek Emerald Bay



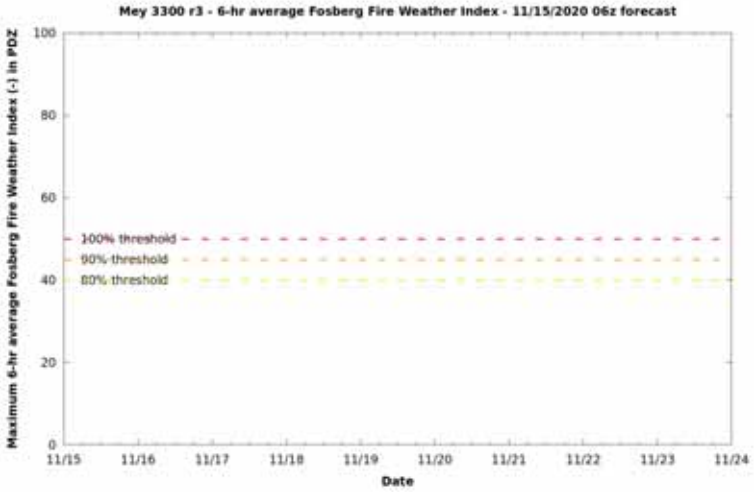


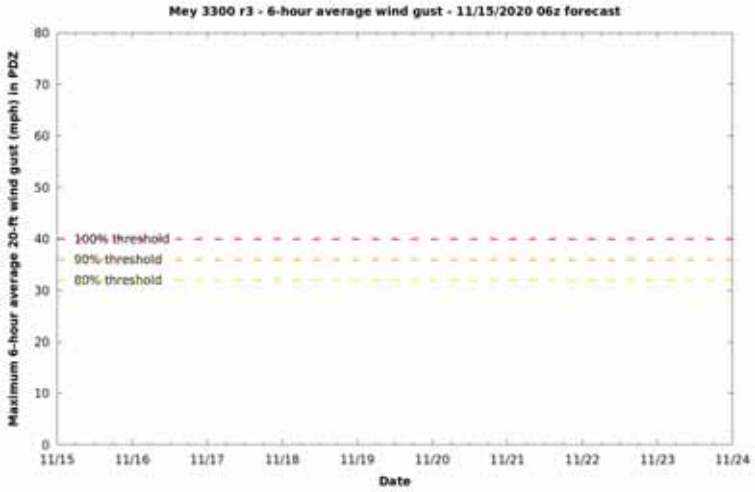
Mey 3400 Angora Creek



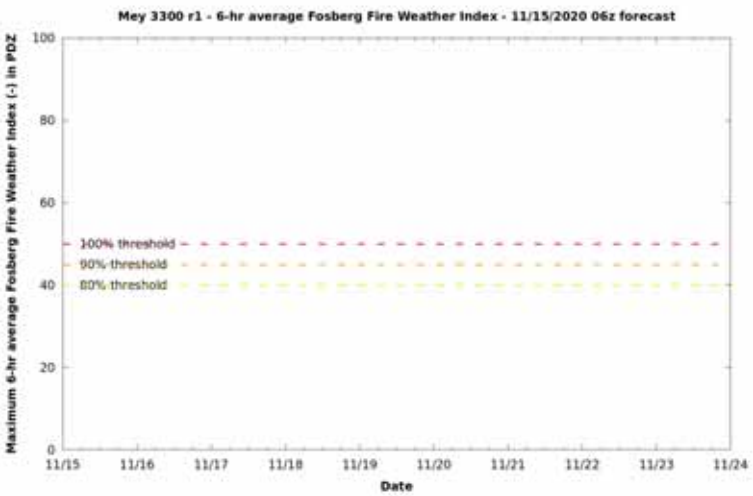


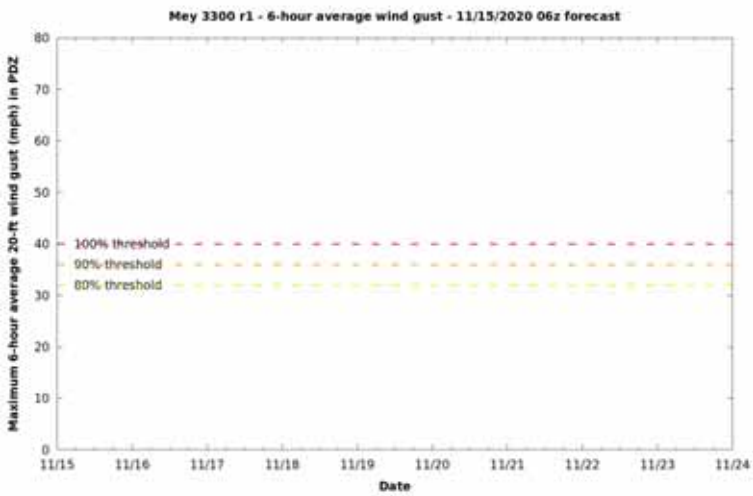
Mey 3300 r3



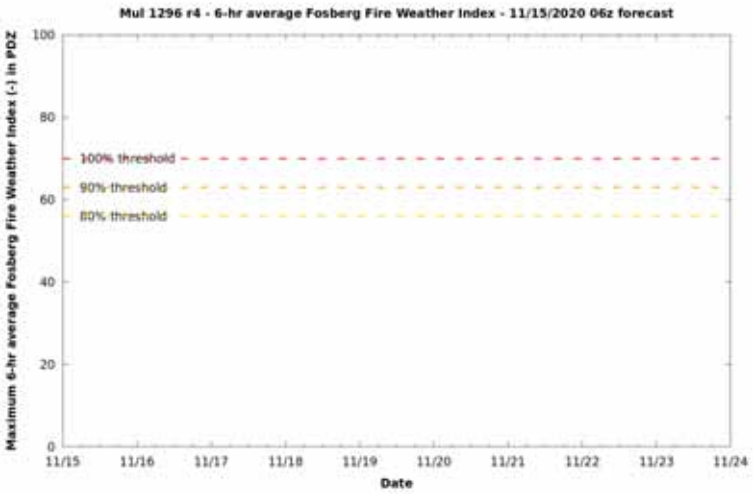


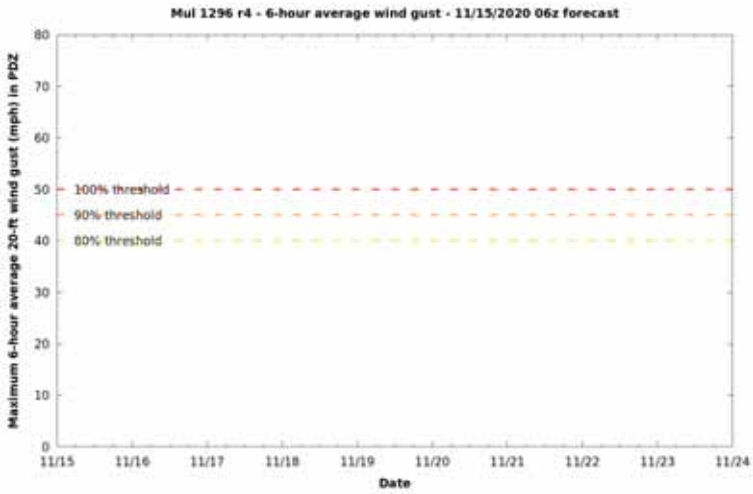
Mey 3300 r1



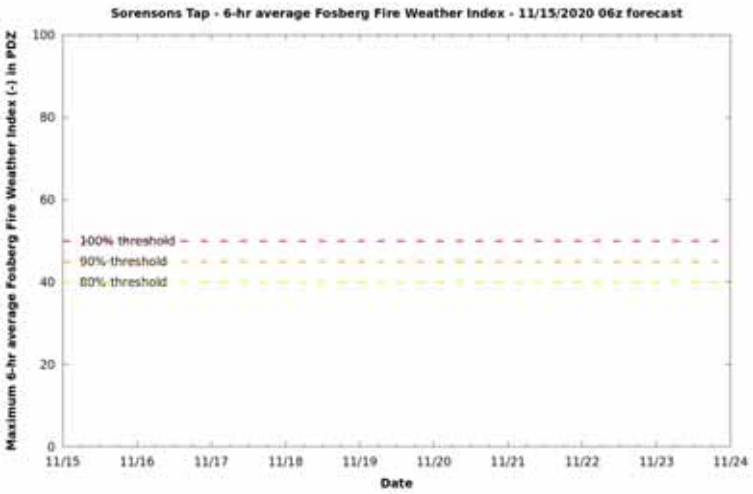


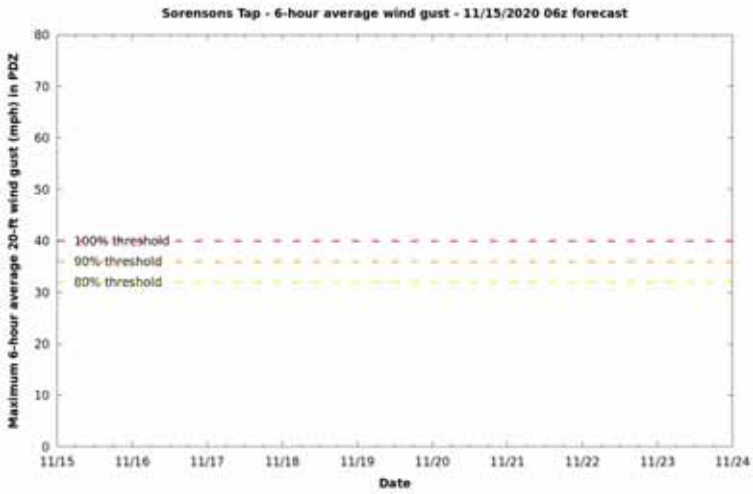
Mul 1296 r4



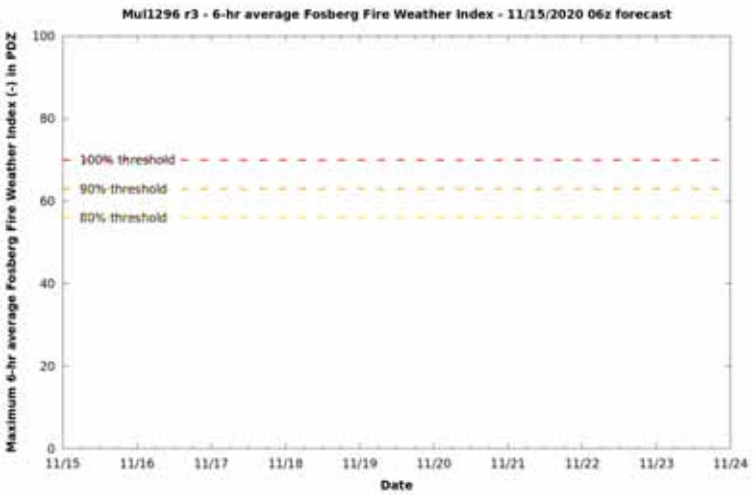


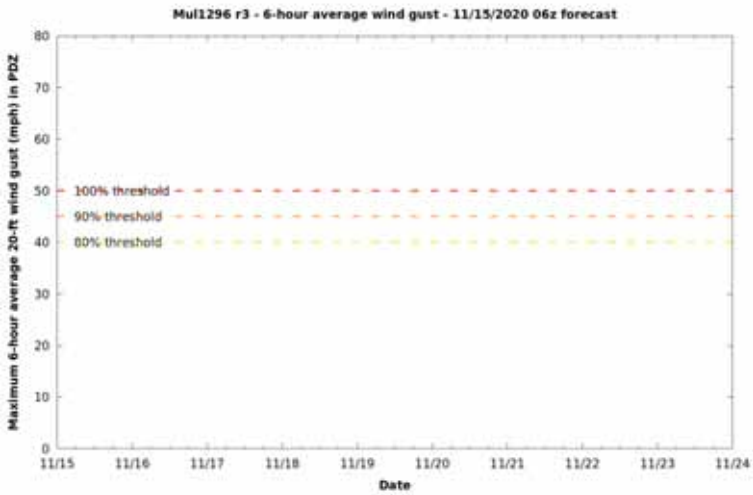
Sorensons Tap



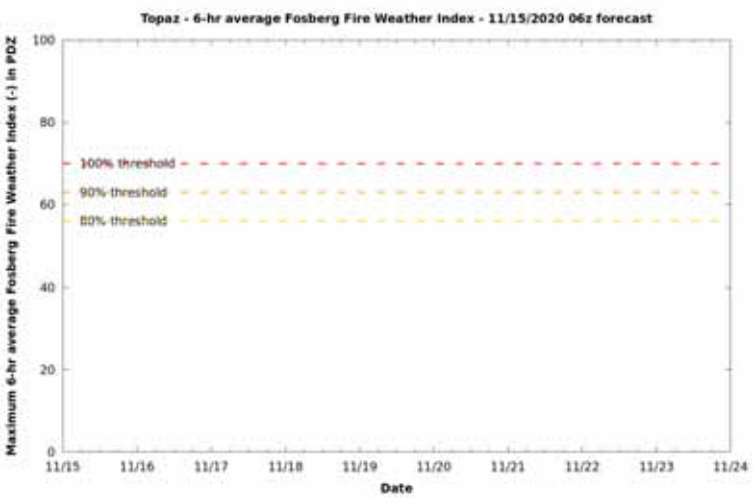


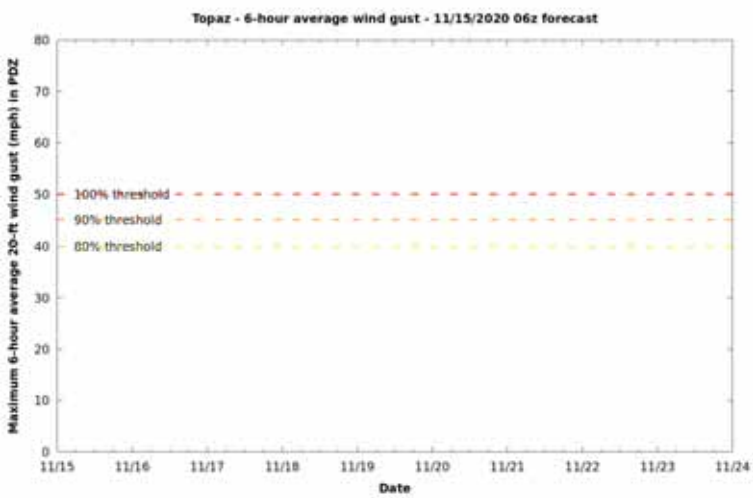
Mul 1296 r3



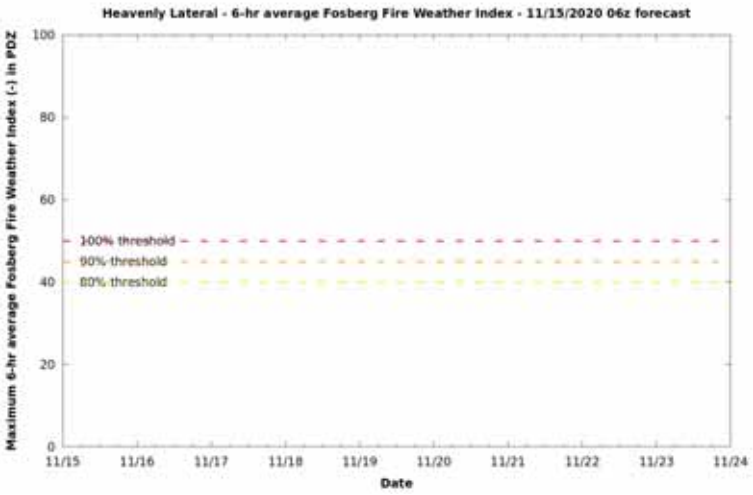


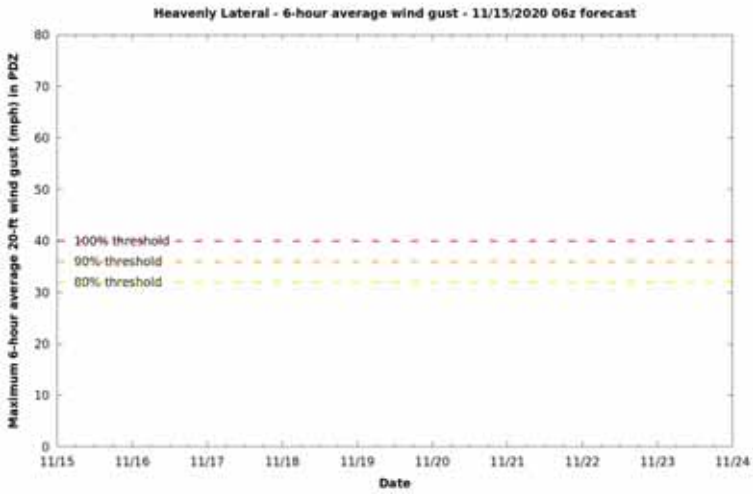
Topaz



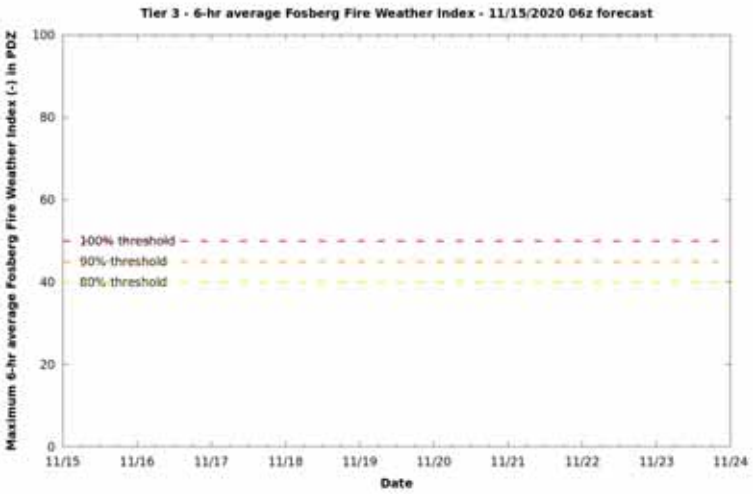


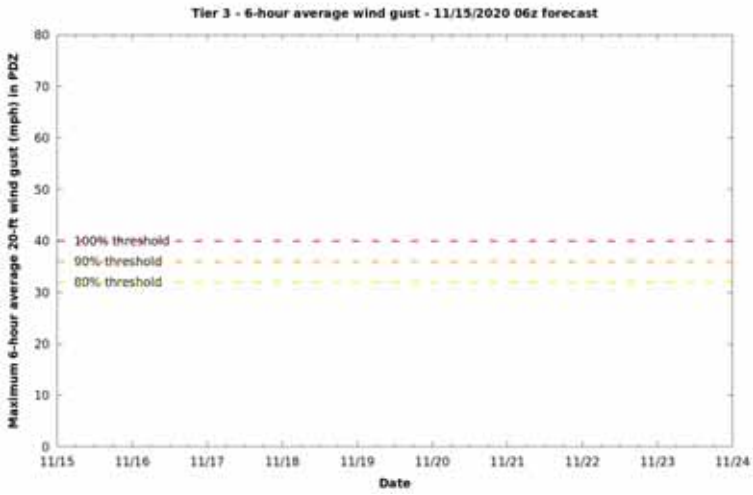
Heavenly Lateral



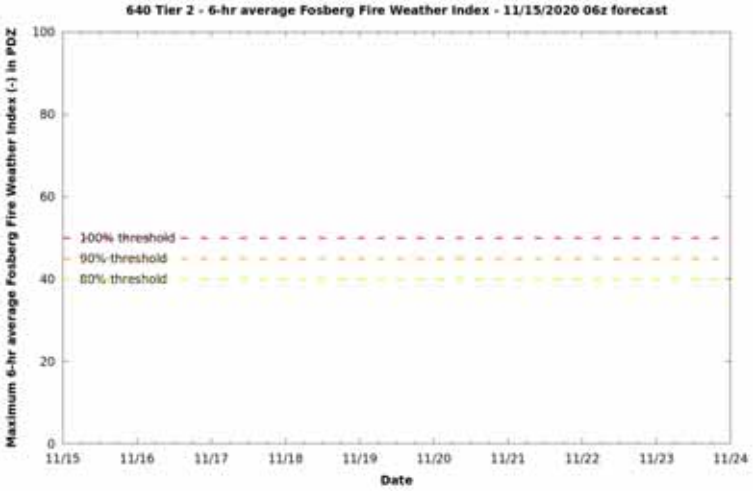


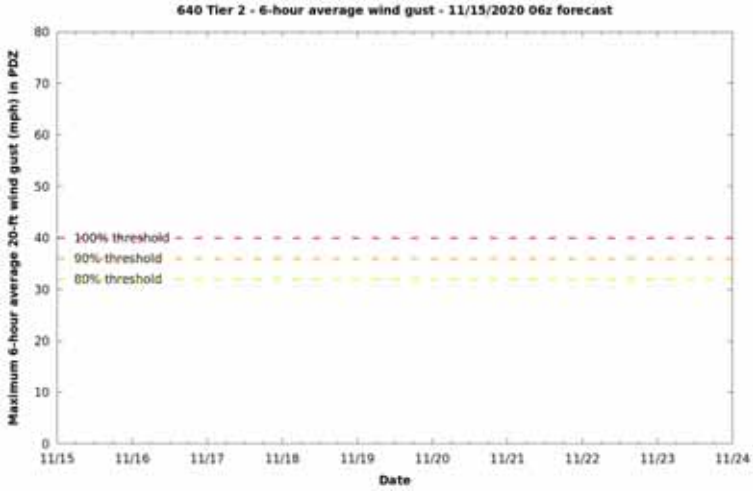
Tier 3



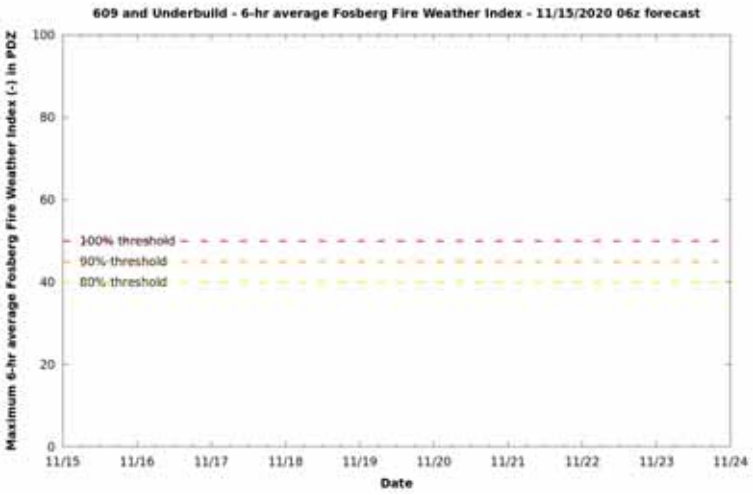


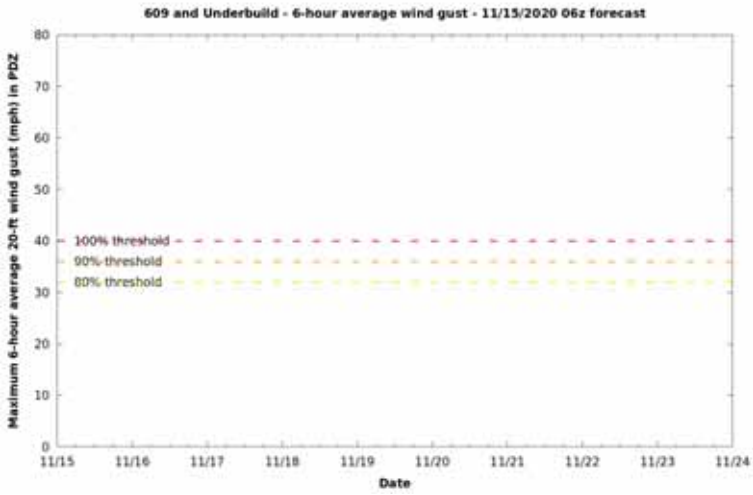
640 Tier 2



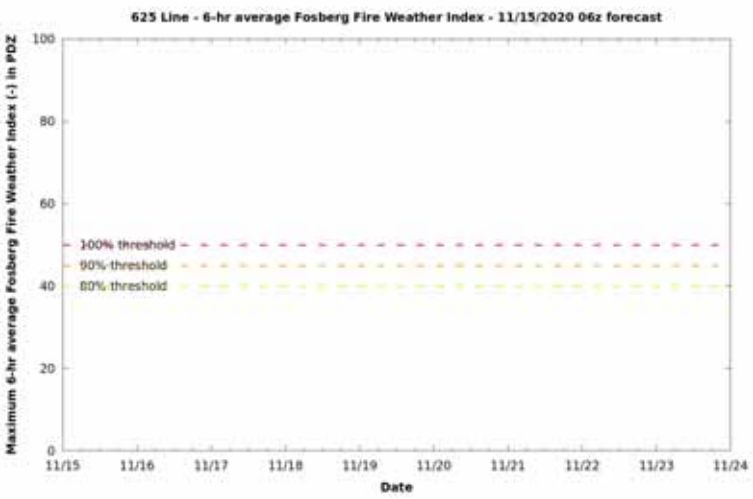


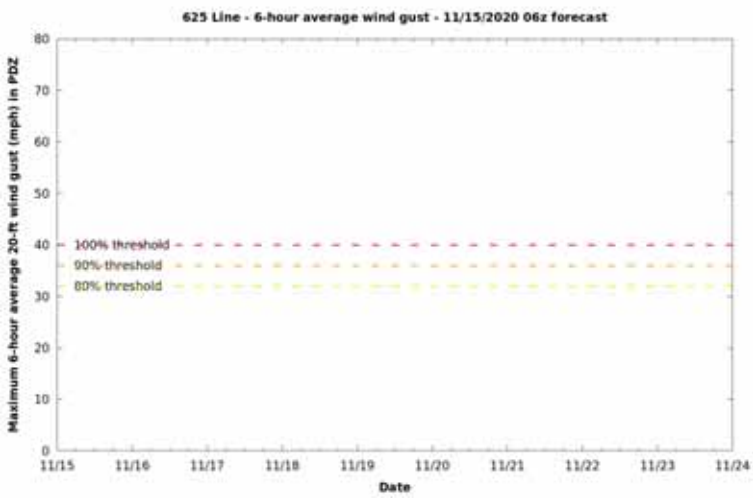
609 and Underbuild



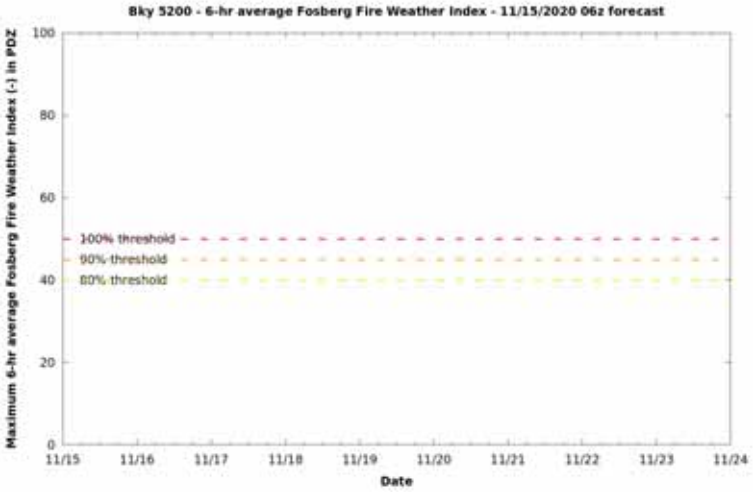


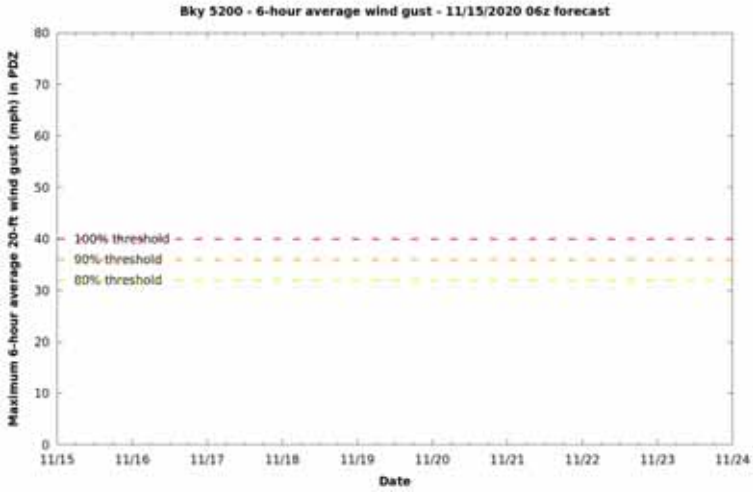
625 Line



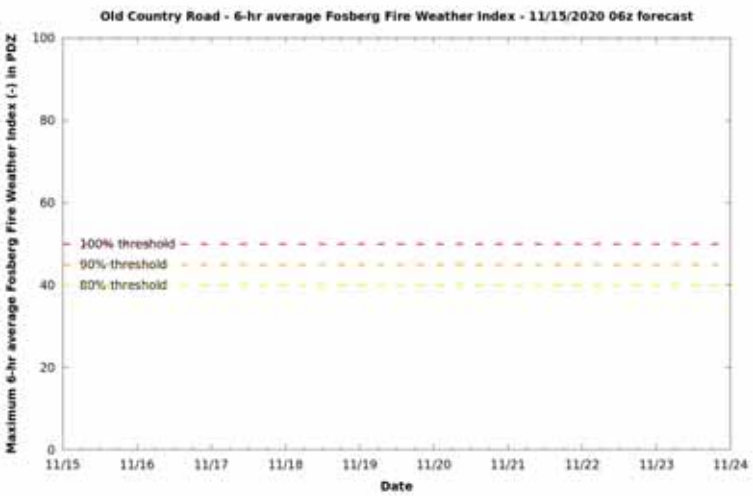


Bky 5200



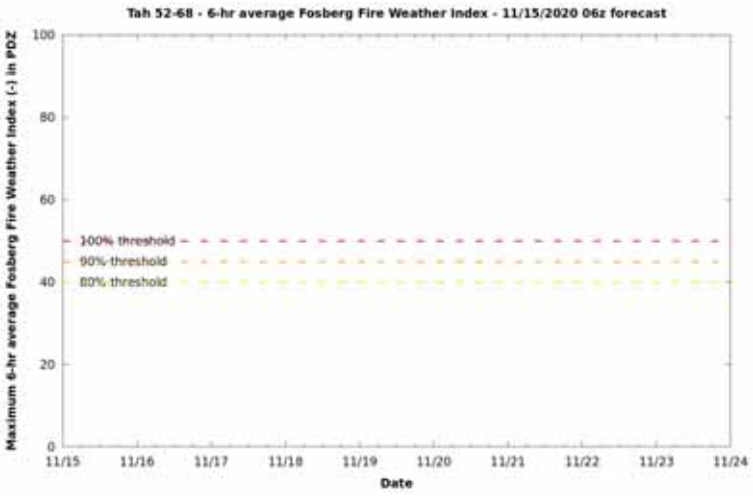


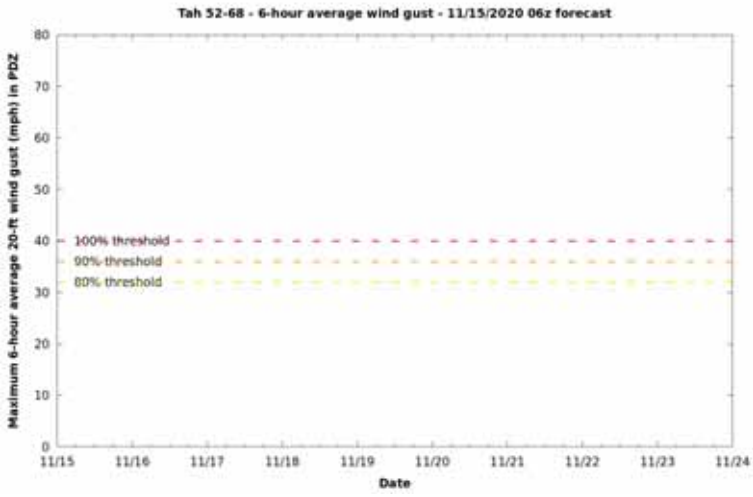
Old Country Road



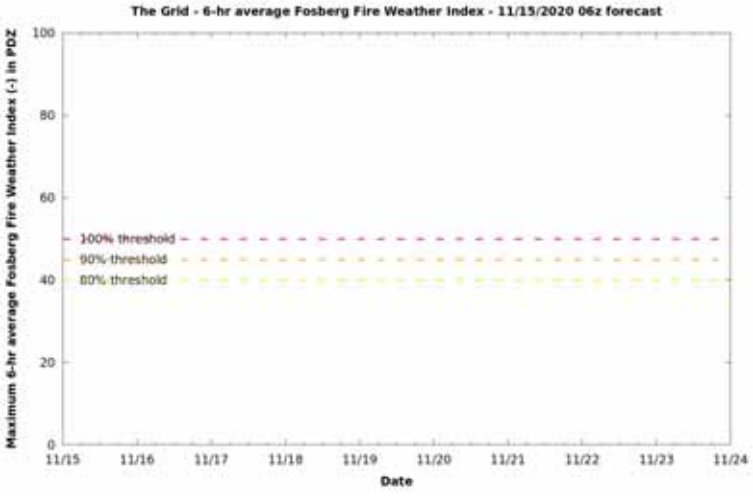


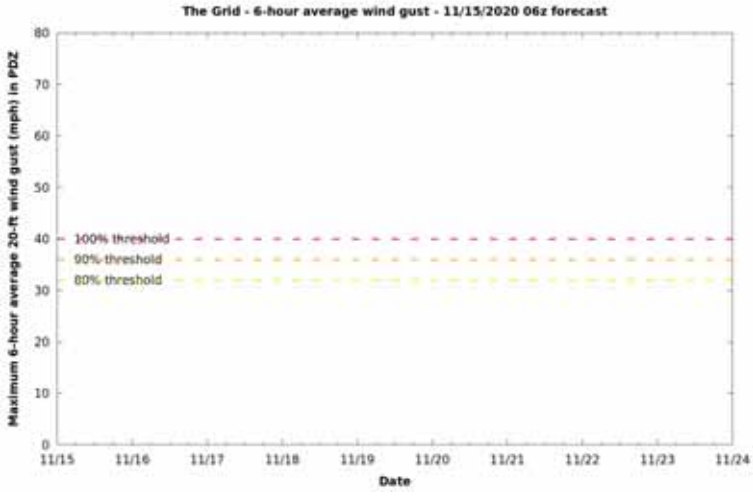
Tah 52-68





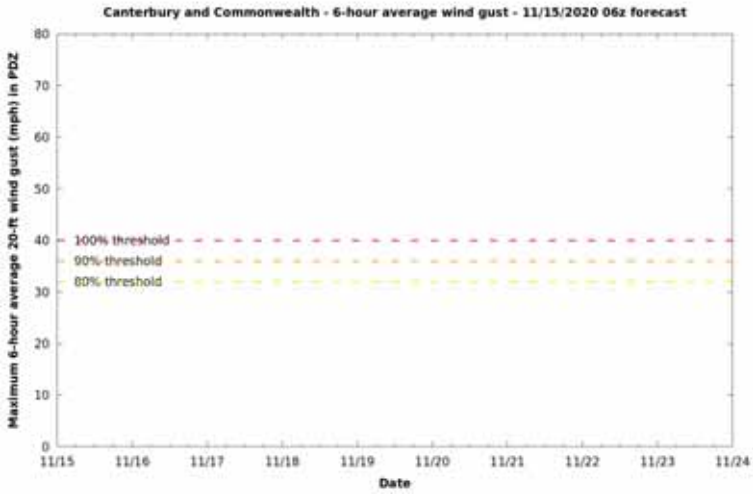
The Grid



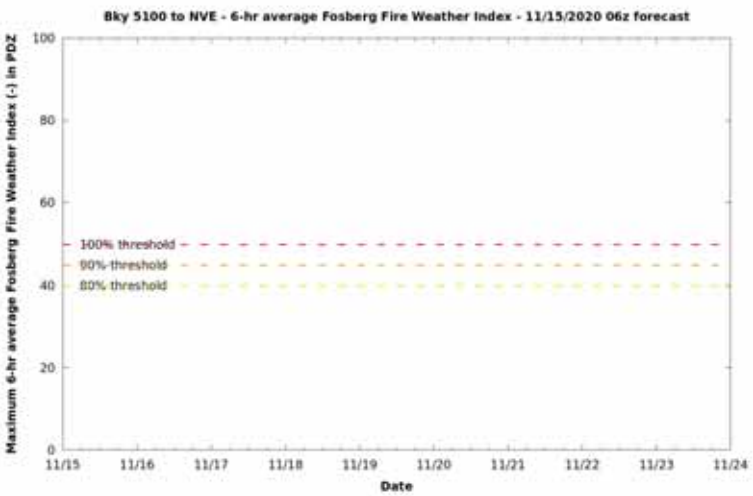


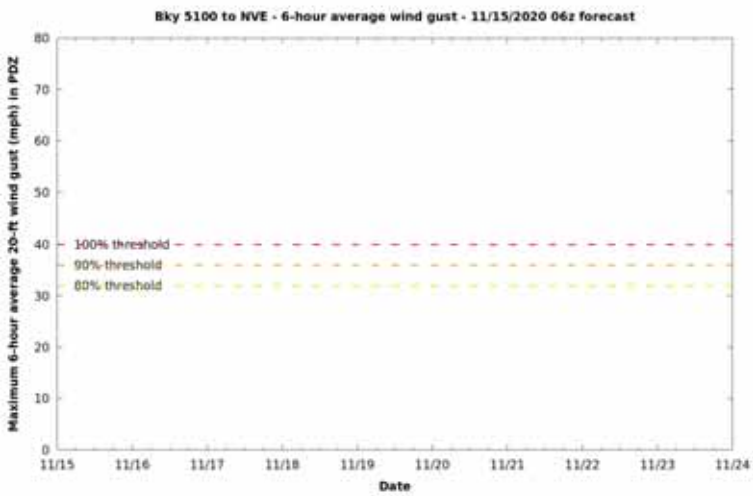
Canterbuy and Commonwealth



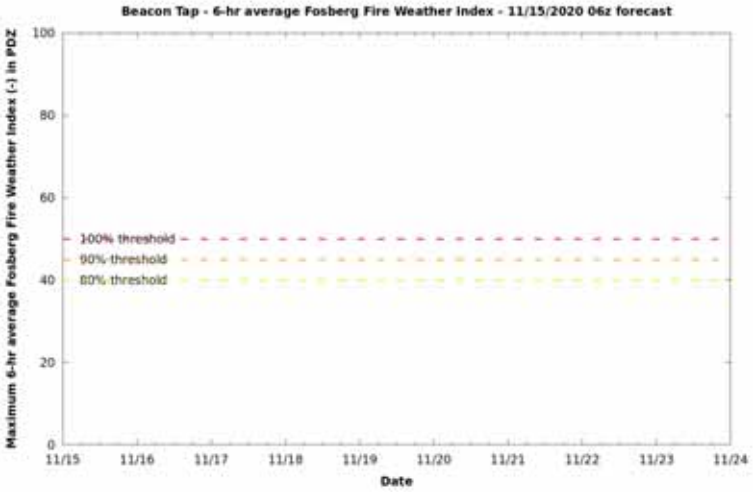


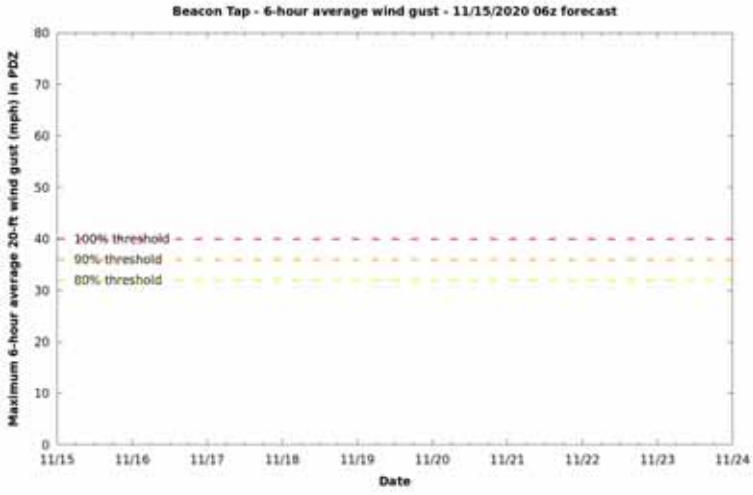
Bky 5100 to NVE



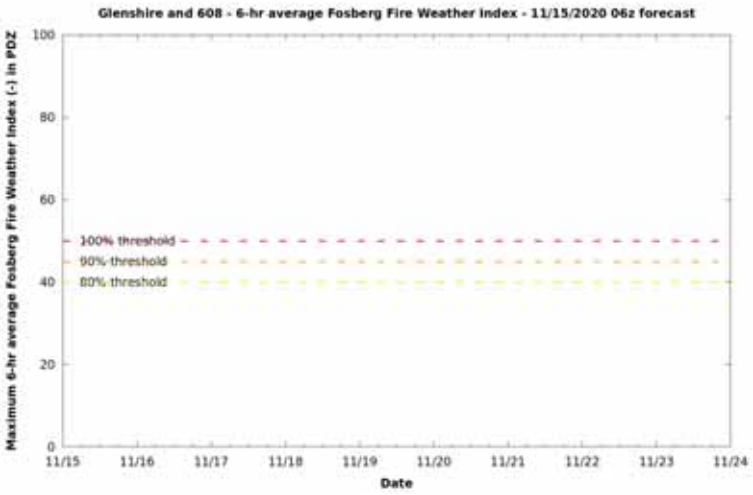


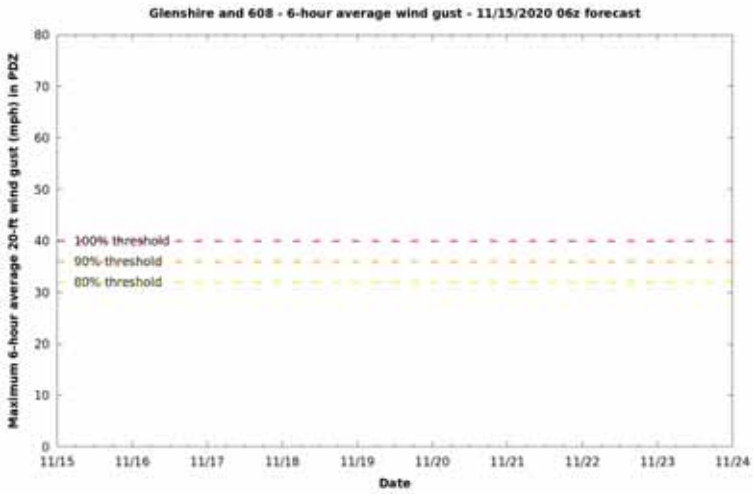
Beacon Tap



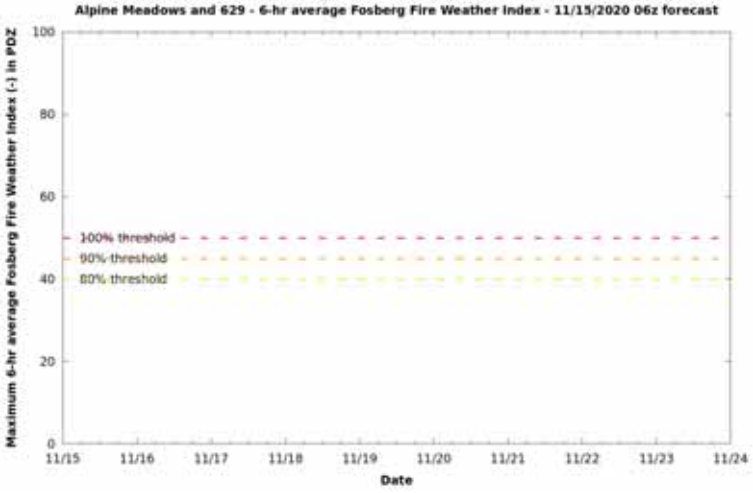


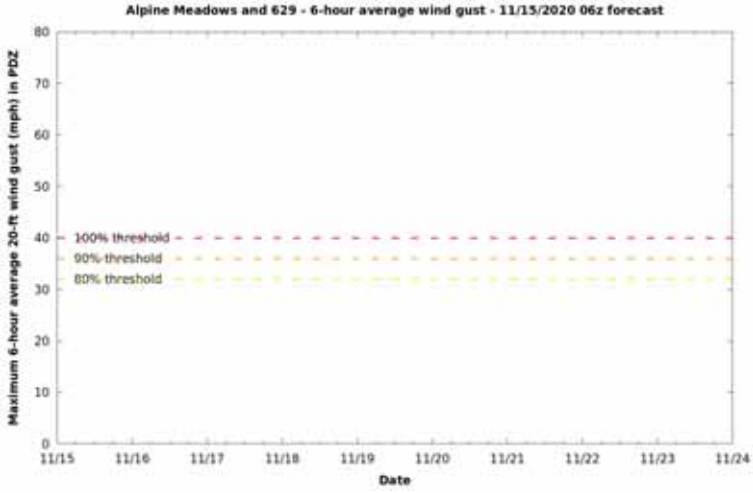
Glenshire and 608



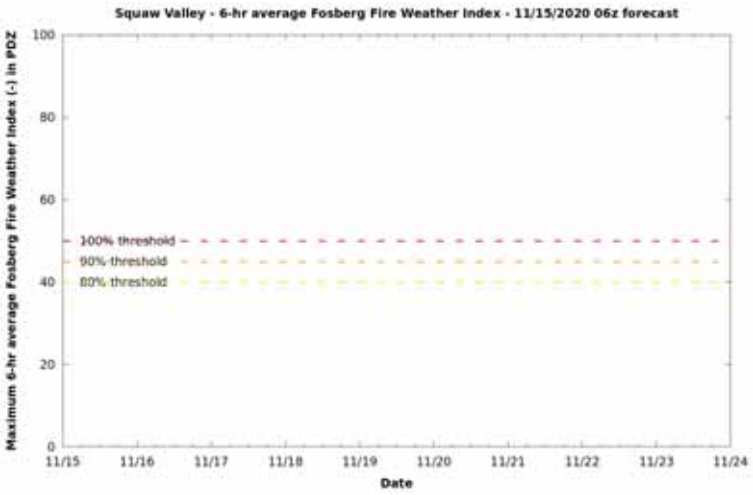


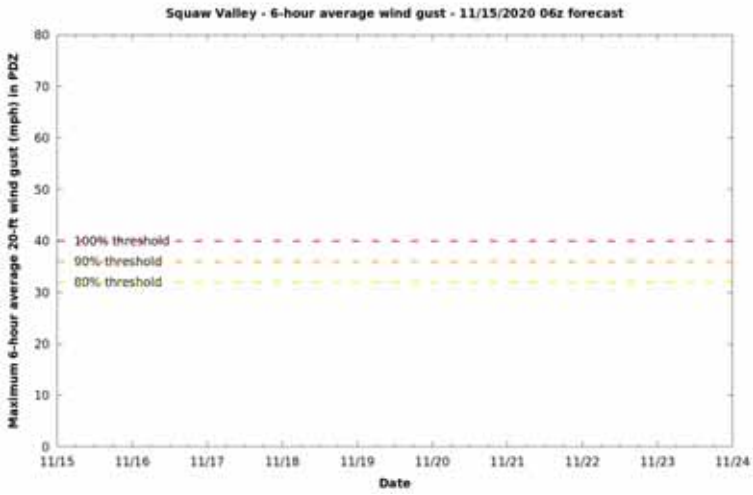
Alpine Meadows and 629



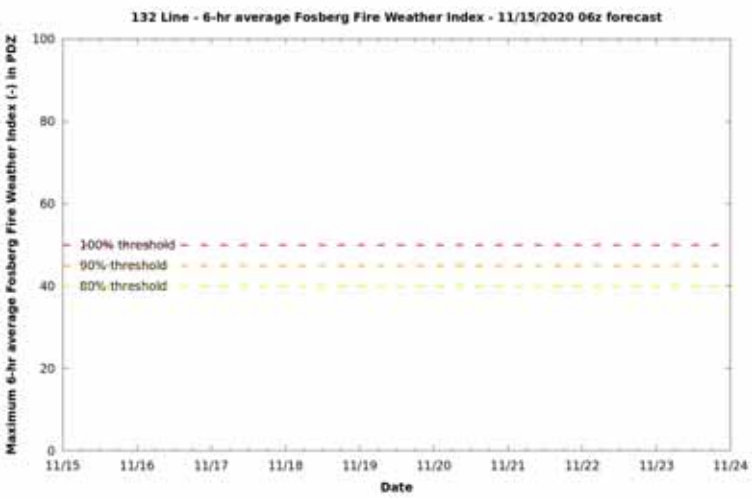


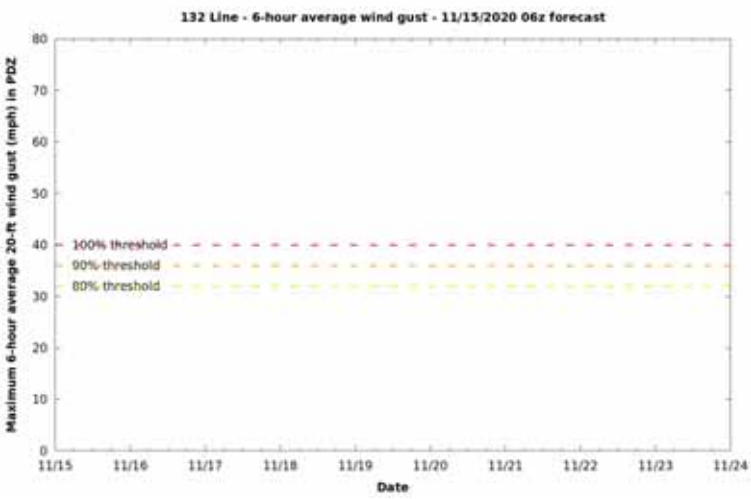
Squaw Valley



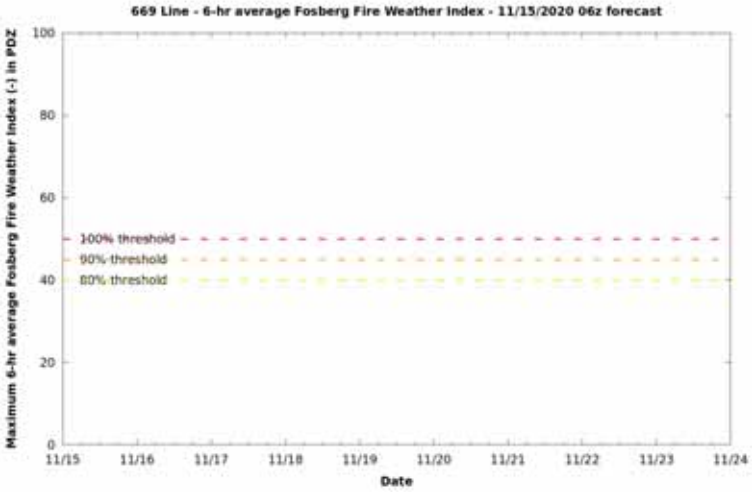


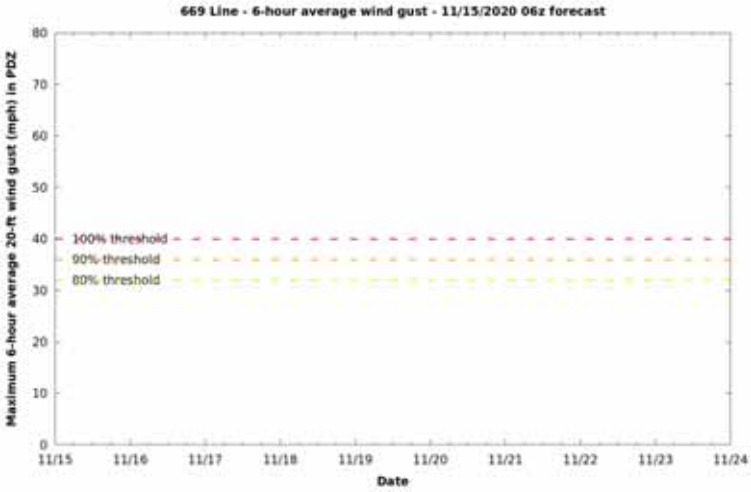
132 Line



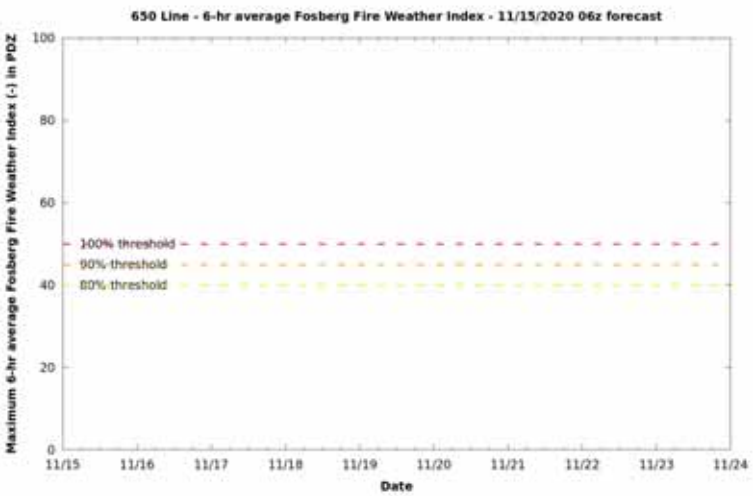


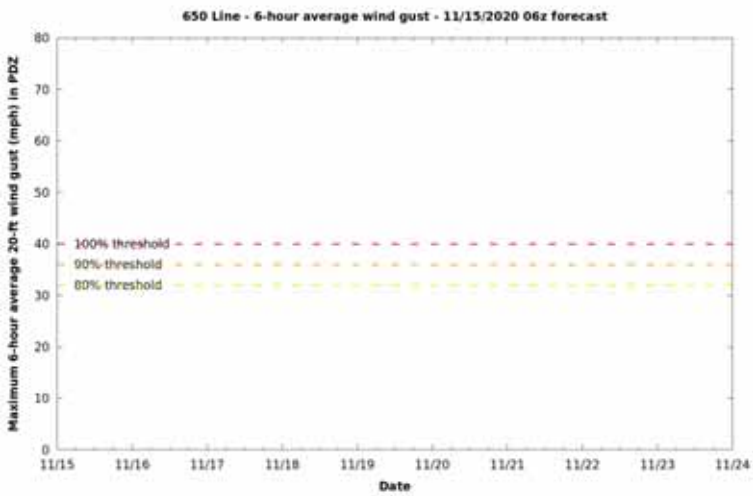
669 Line



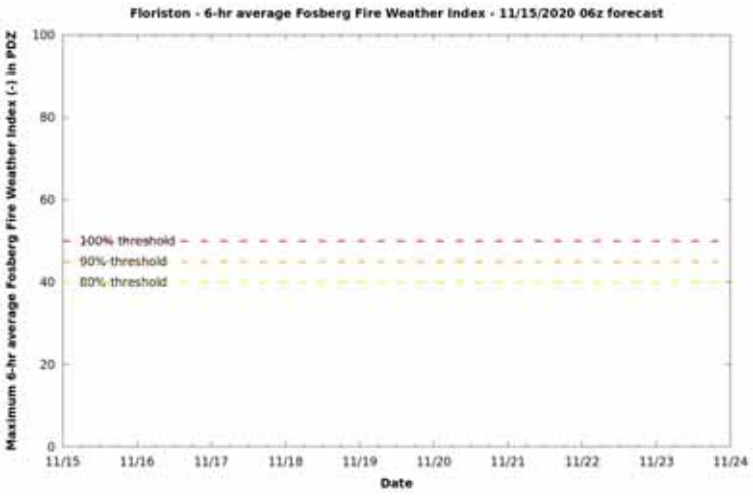


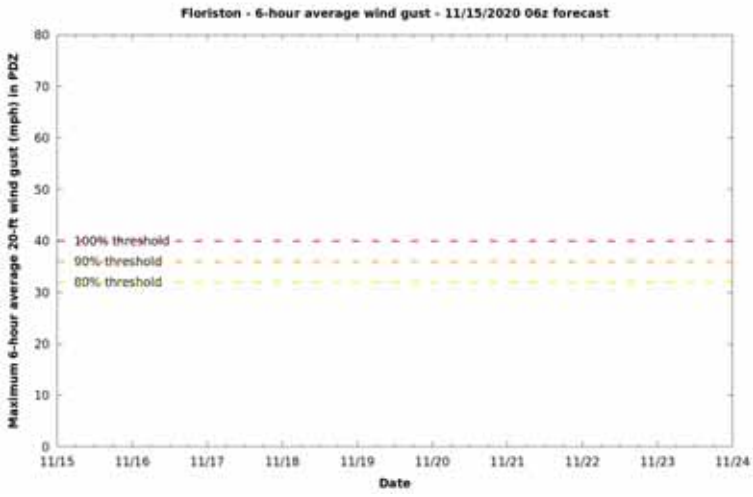
650 Line



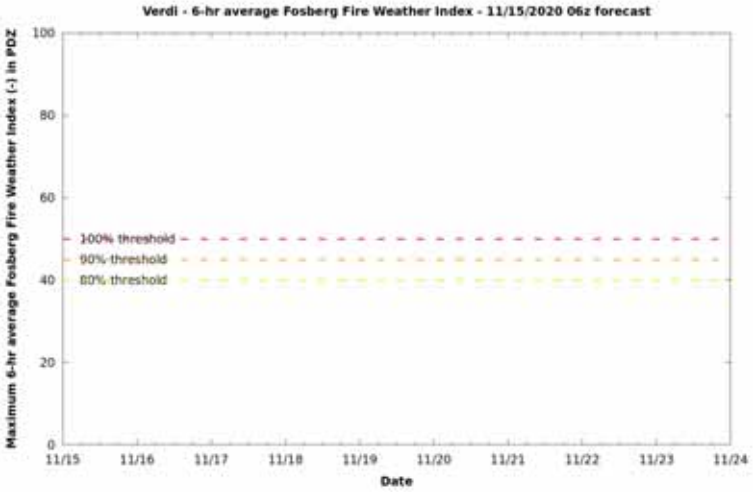


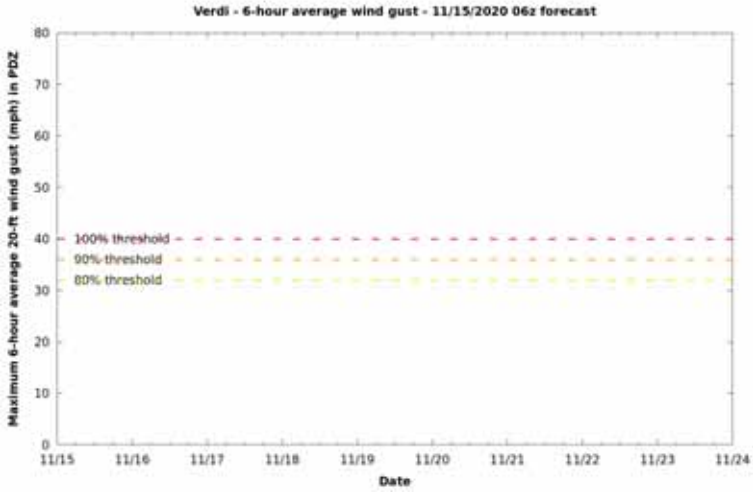
Floriston



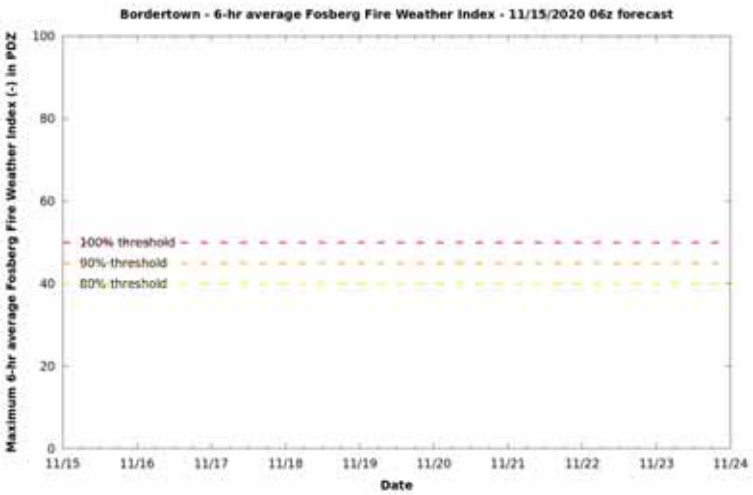


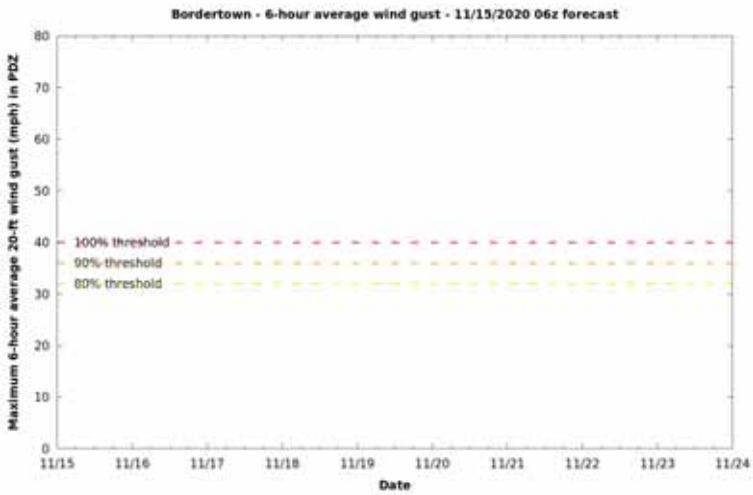
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/15/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100
80
60
40
20
0
100% threshold
90% threshold
80% threshold
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
Date


Bordertown - 6-hour average wind gust - 11/15/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
80
70
60
50
40
30
20
10
0
100% threshold
90% threshold
80% threshold
11/15
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
Date

Liberty Utilities Fire Potential Index Forecast for 11/15/20 - 11/21/20

Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

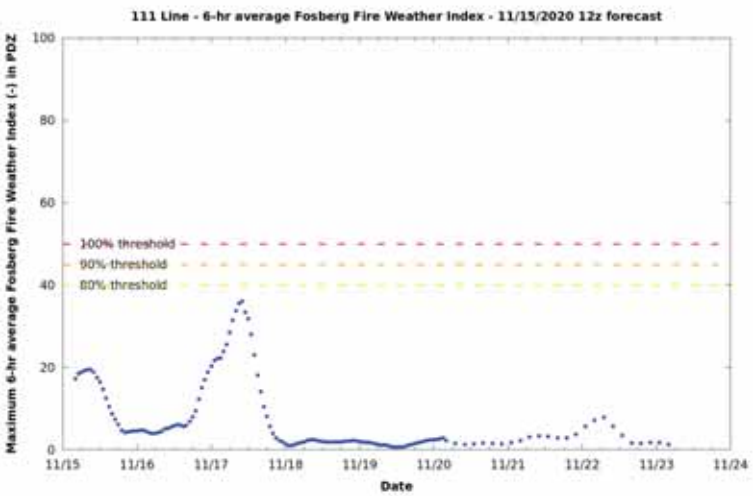
Liberty Utilities Energy Release Component Forecast for 11/15/20 - 11/21/20

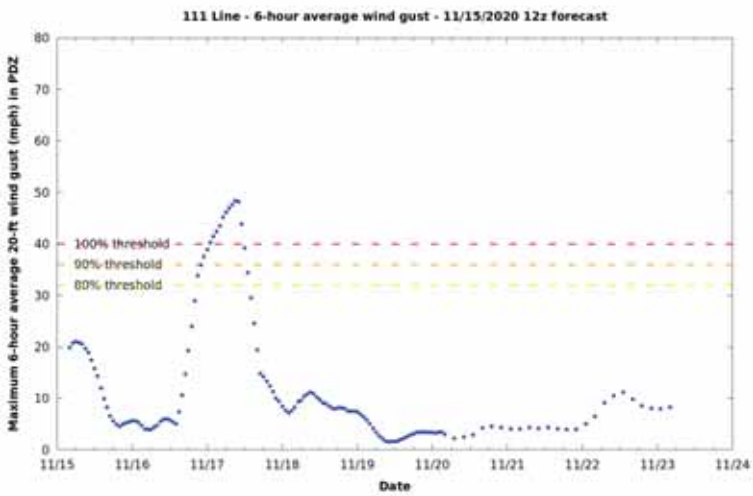
Zone	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	47.6	49.4	47.7	33.9	33.0	34.5	36.9
Sierra Brooks	50.9	56.8	54.6	40.3	42.4	45.2	49.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.3	1.4	1.2	0.7	0.7	0.6	0.6
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	23.8	27.2	24.3	15.9	17.7	19.6	20.4
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	43.0	48.3	43.8	27.6	28.9	31.5	32.5
Topaz	53.4	57.9	54.1	36.4	39.2	40.9	42.2
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	3.4	3.8	3.4	2.1	1.9	1.9	1.8
Old Country Road	29.7	32.0	26.3	16.6	14.9	14.3	13.7
Tah 52-68	20.1	21.7	17.9	11.2	10.2	9.7	9.3
The Grid	8.3	9.5	8.1	4.6	4.3	3.8	3.6
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	24.1	24.1	23.0	15.4	15.6	15.5	16.8
Verdi	51.1	51.1	47.8	31.7	34.6	36.6	41.1
Bordertown	54.6	54.6	52.1	35.8	37.8	40.5	44.7

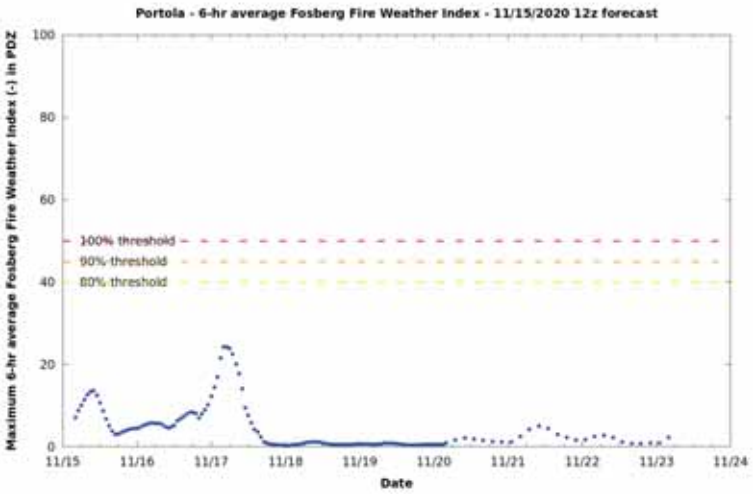
Liberty Utilities Fire Weather Summary Plots - 11/15/2020 12z forecast

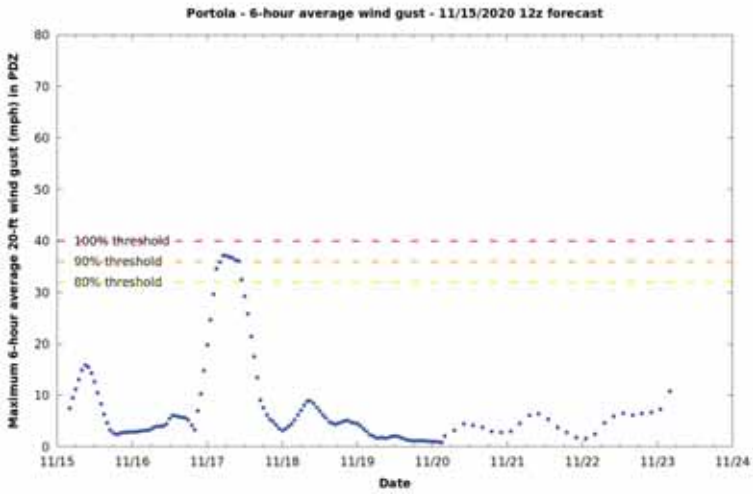
111 Line



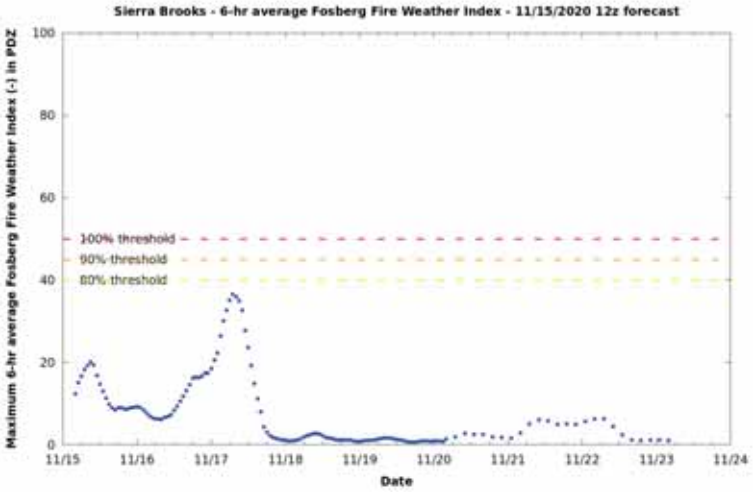


Portola



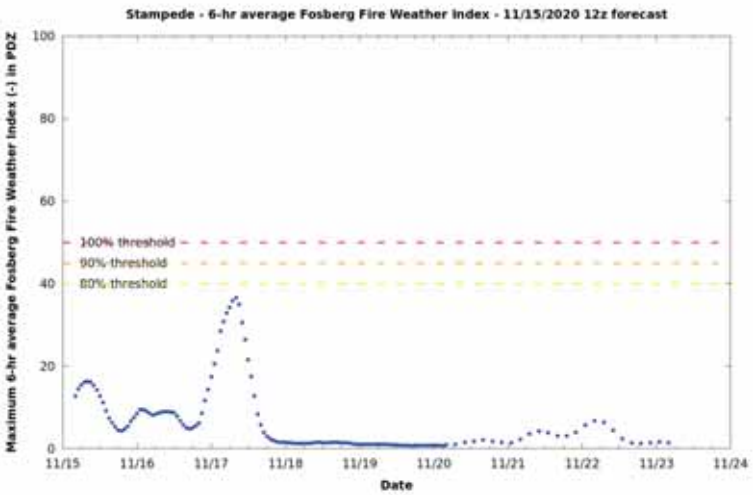


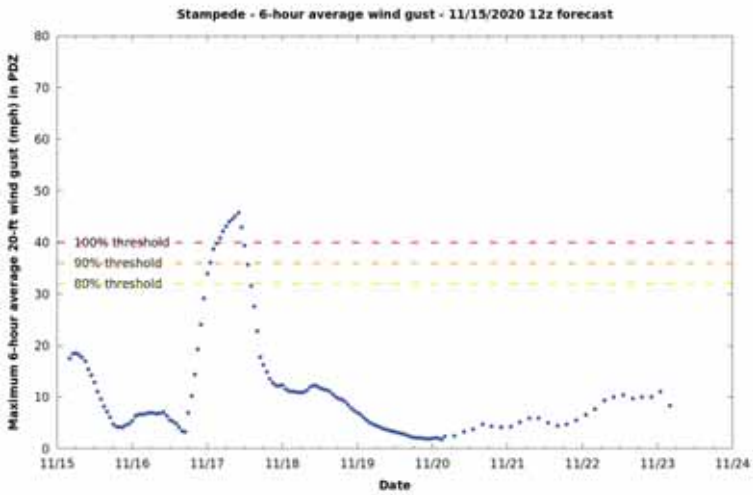
Sierra Brooks



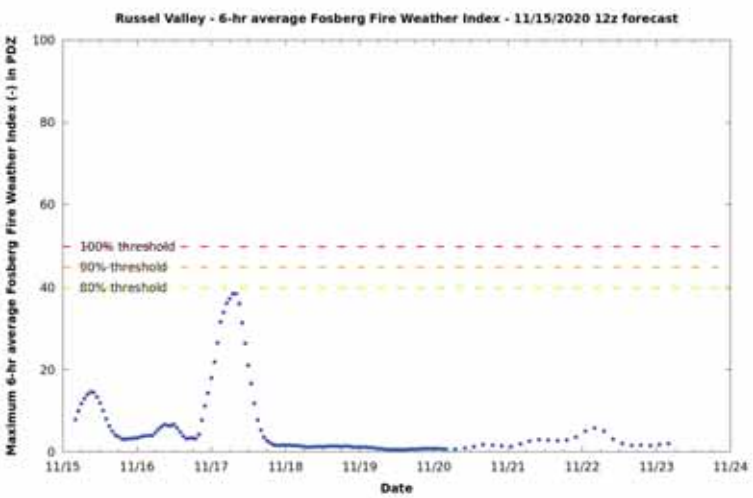


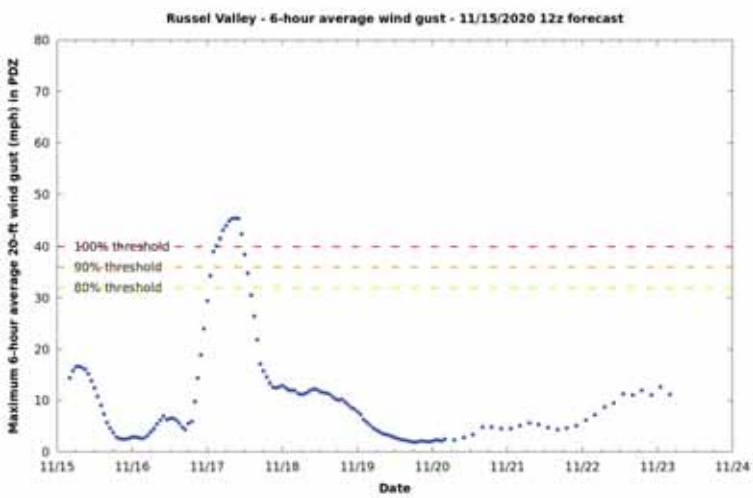
Stampede



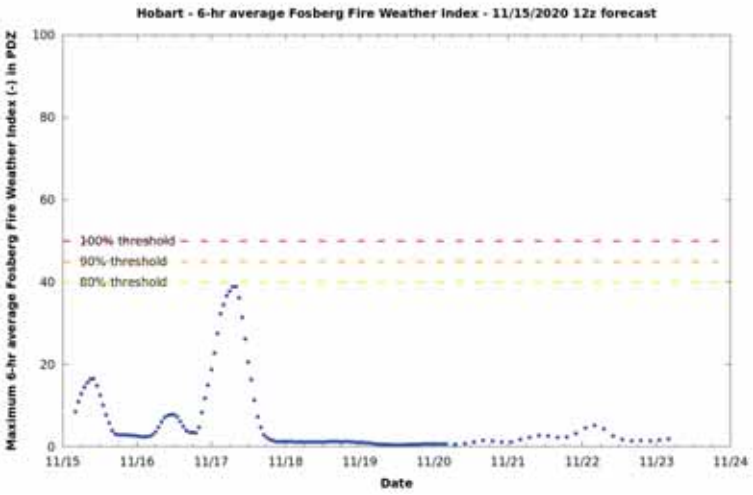


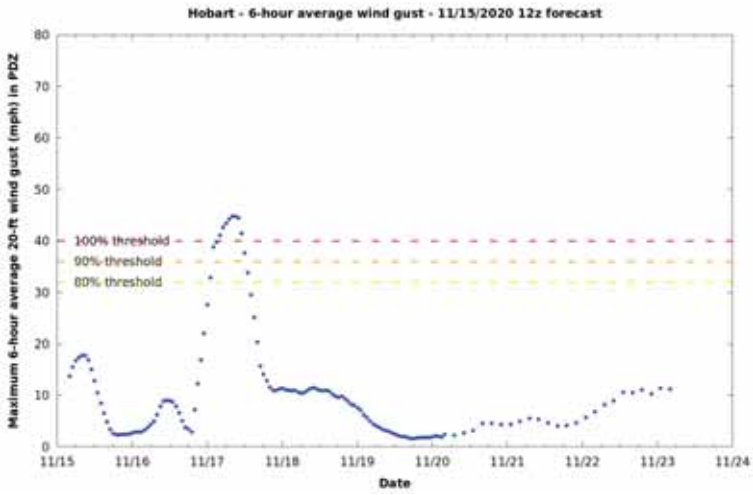
Russell Valley



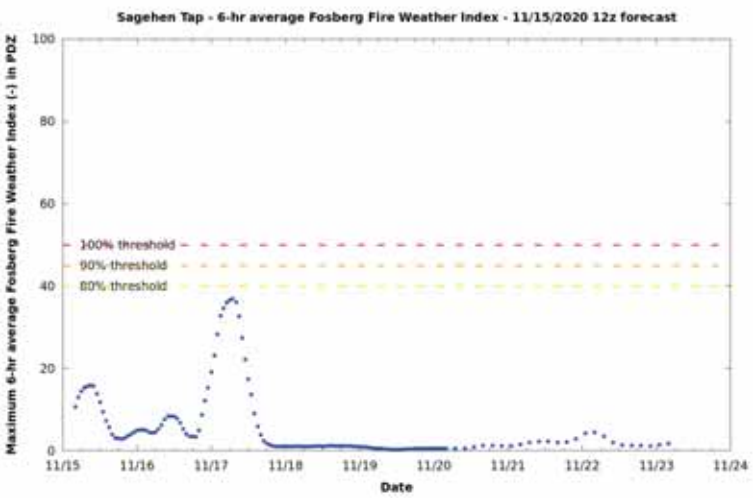


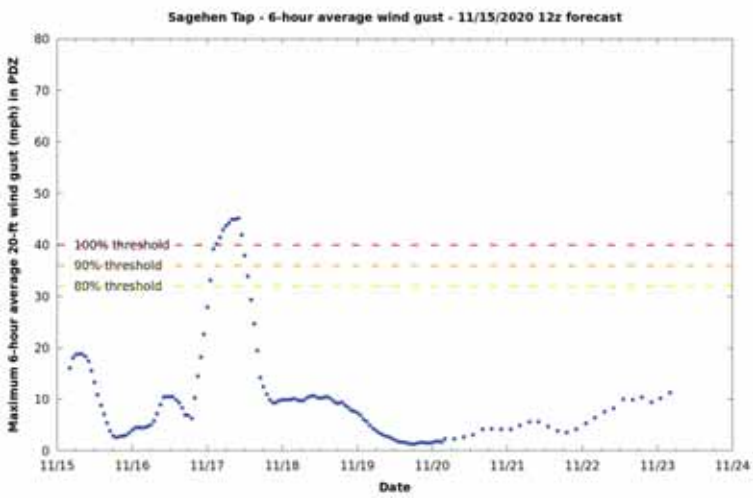
Hobart



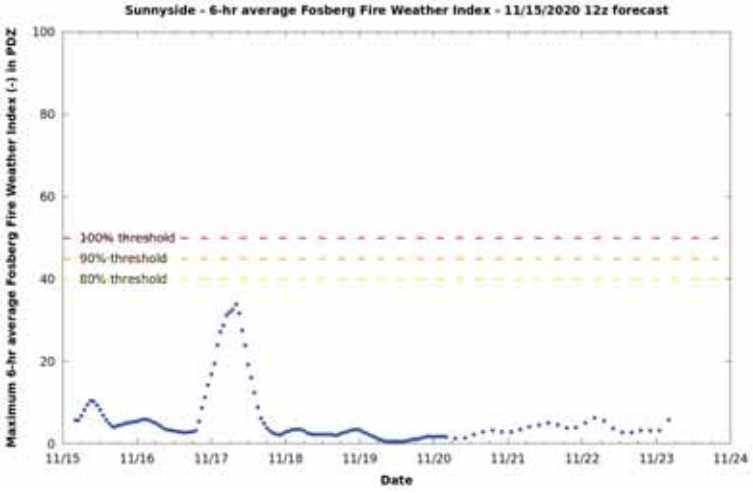


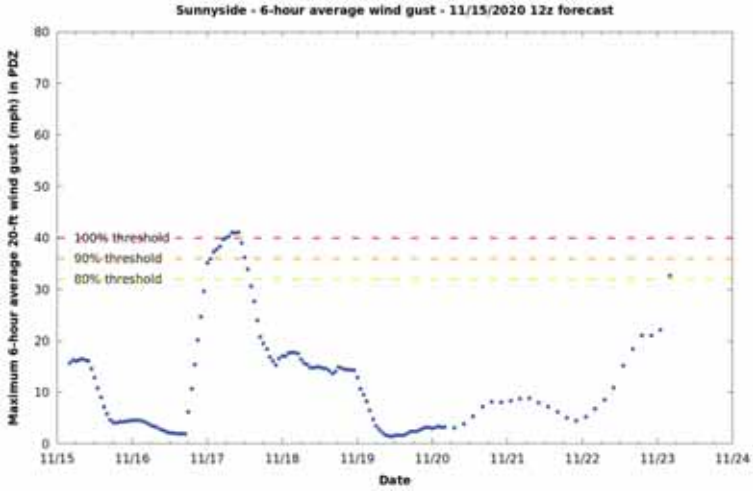
Sagehen tap



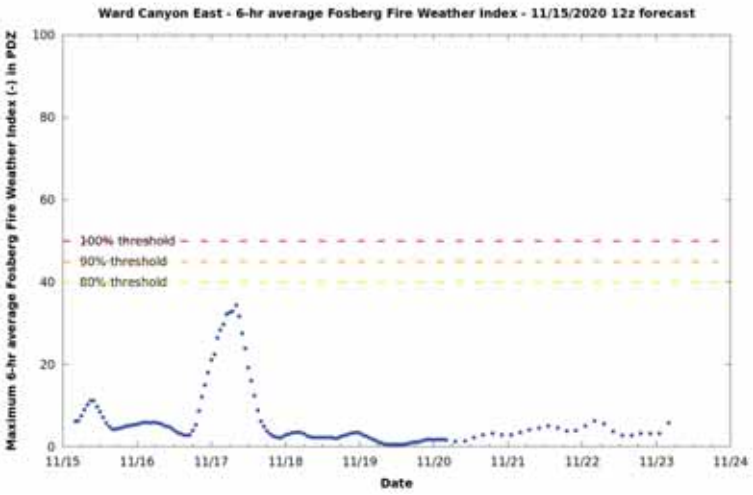


Sunnyside



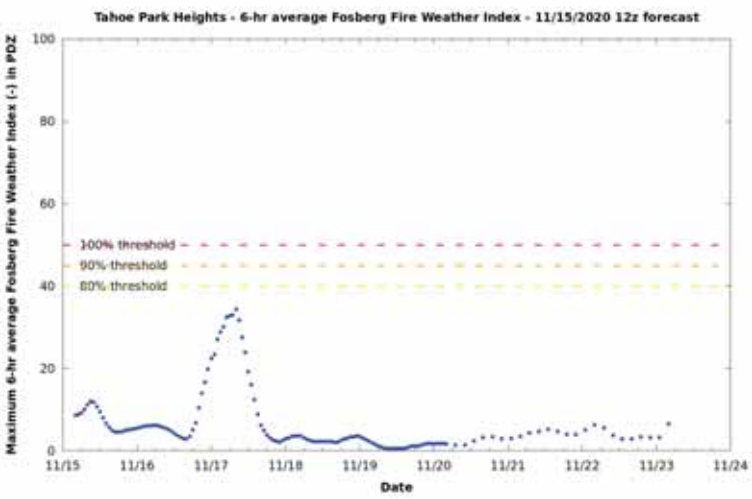


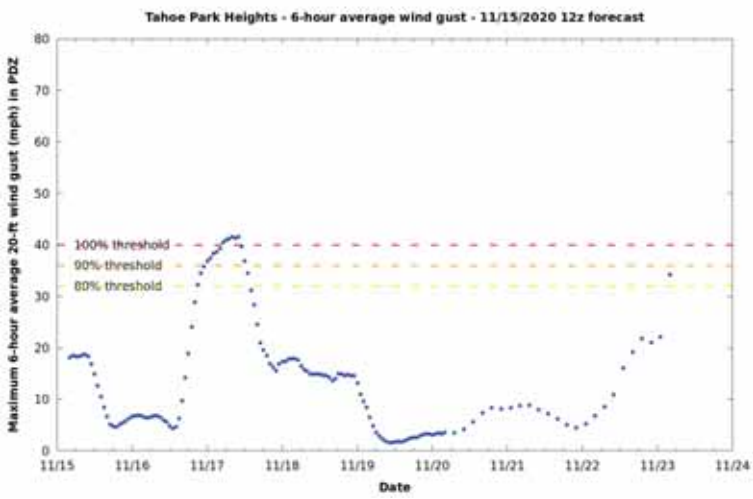
Ward Canyon East



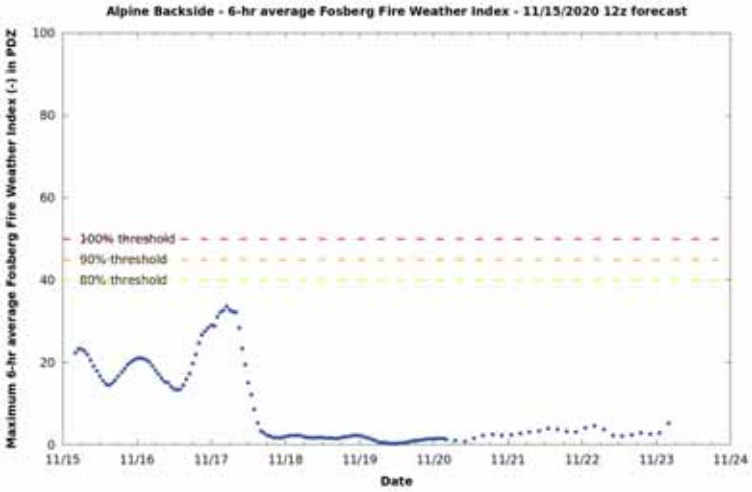


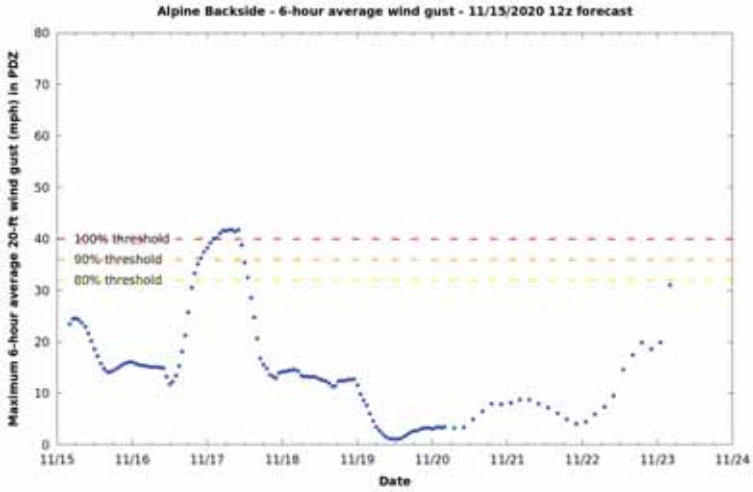
Tahoe Park Heights



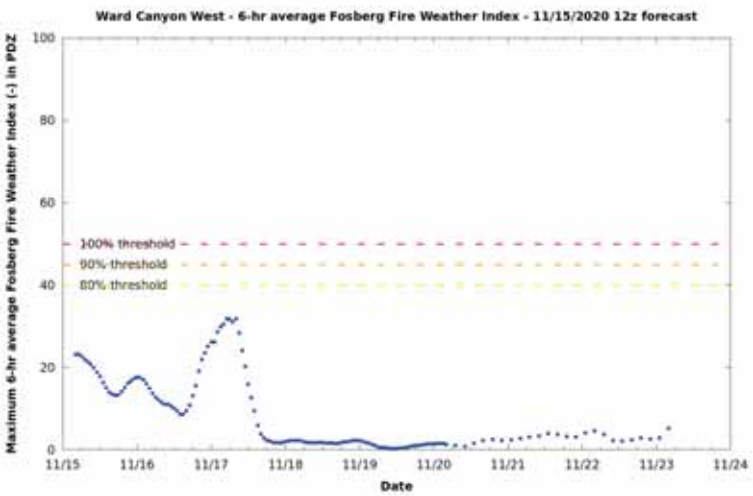


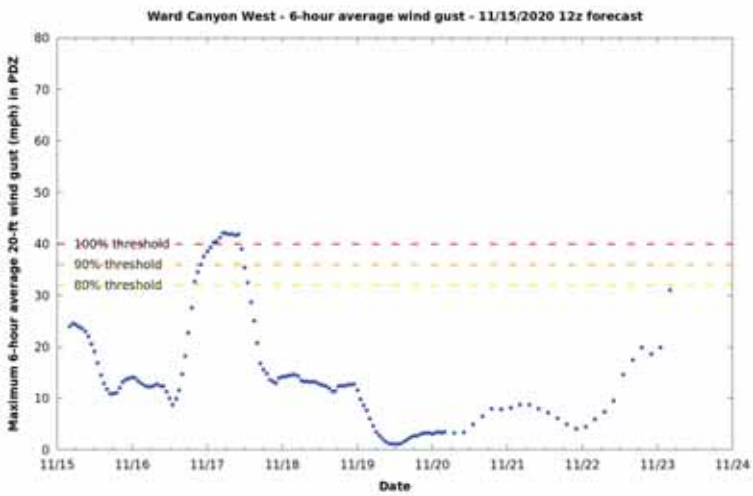
Alpine Backside



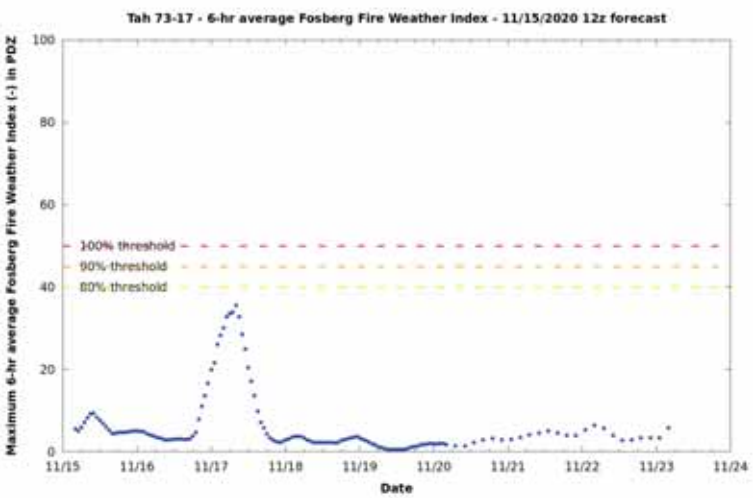


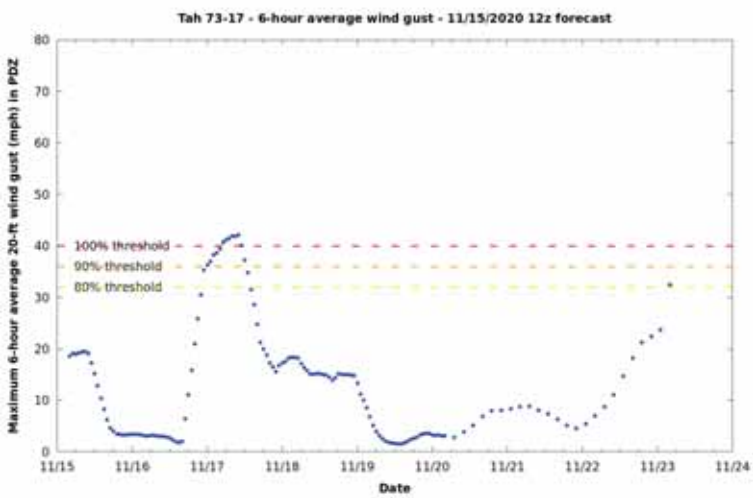
Ward Canyon West



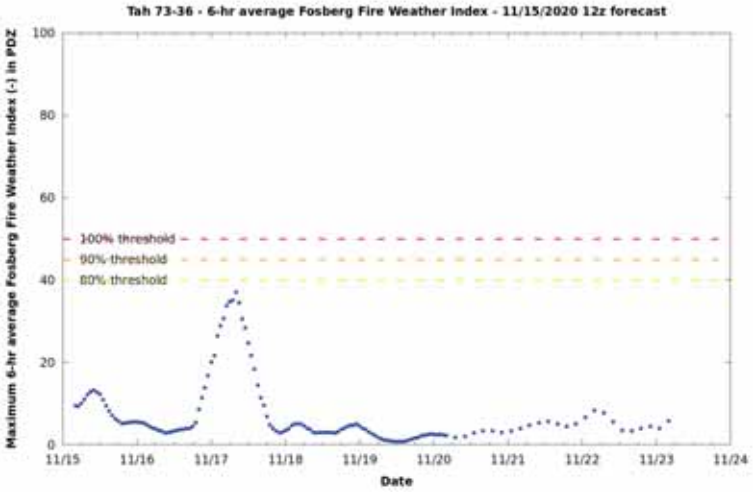


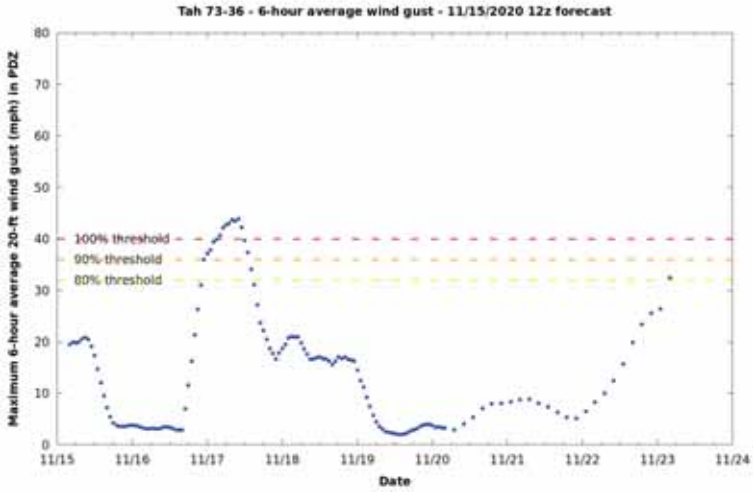
Tah 73-17



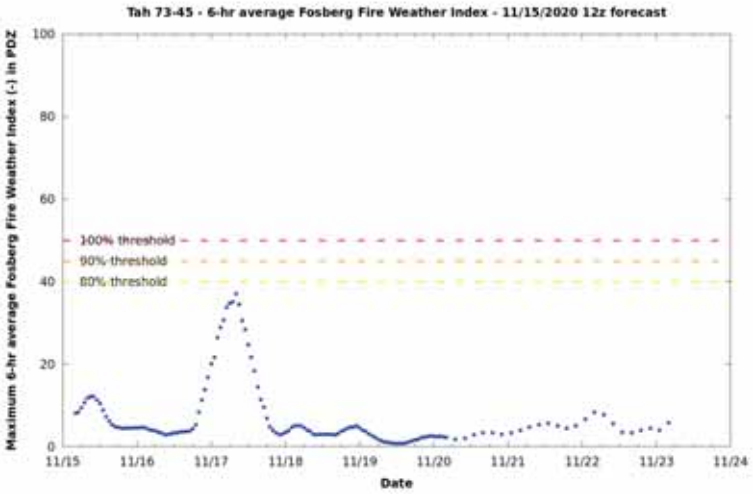


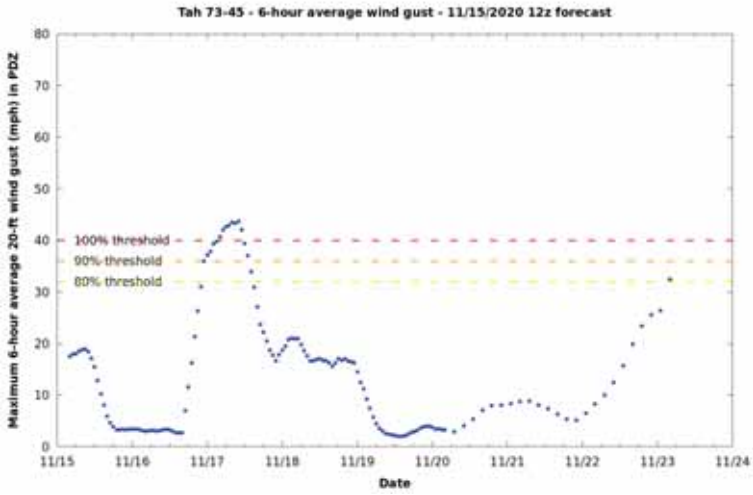
Tah 73-36



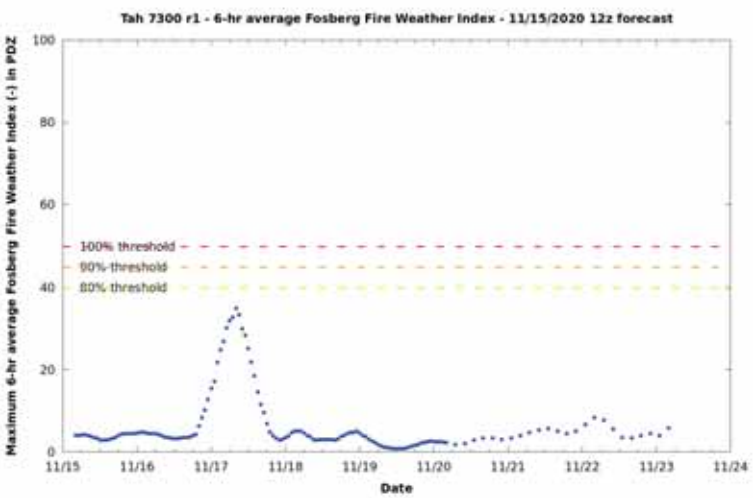


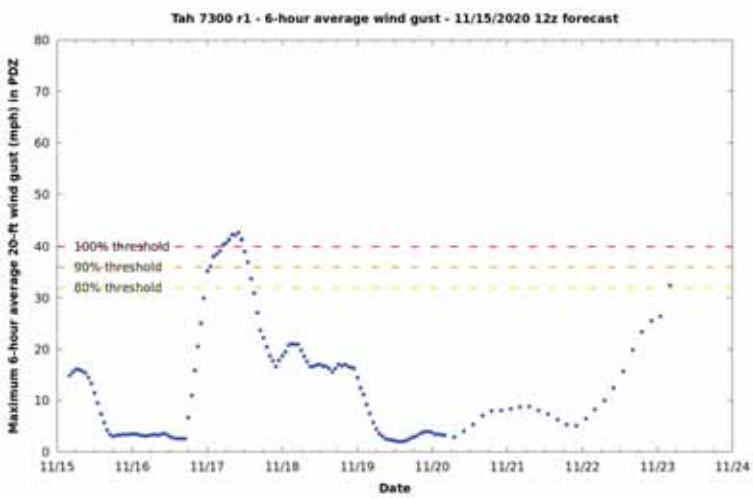
Tah 73-45



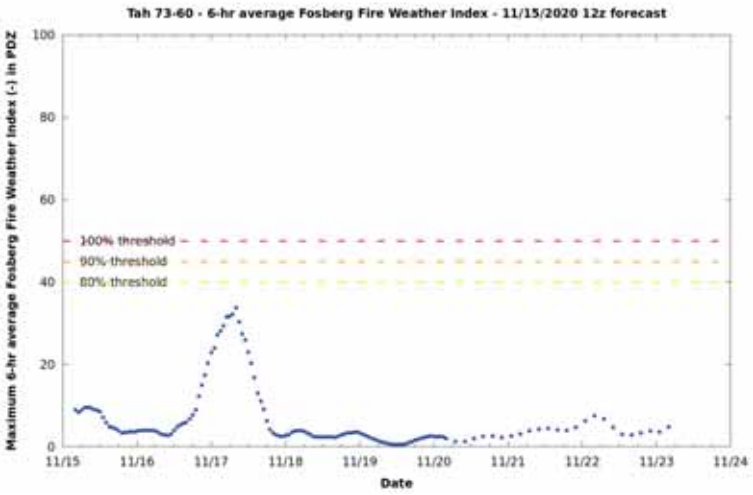


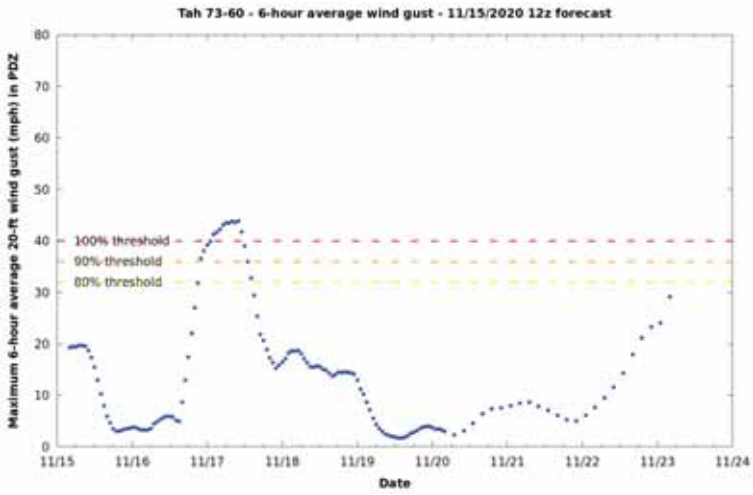
Tah 7300 r1



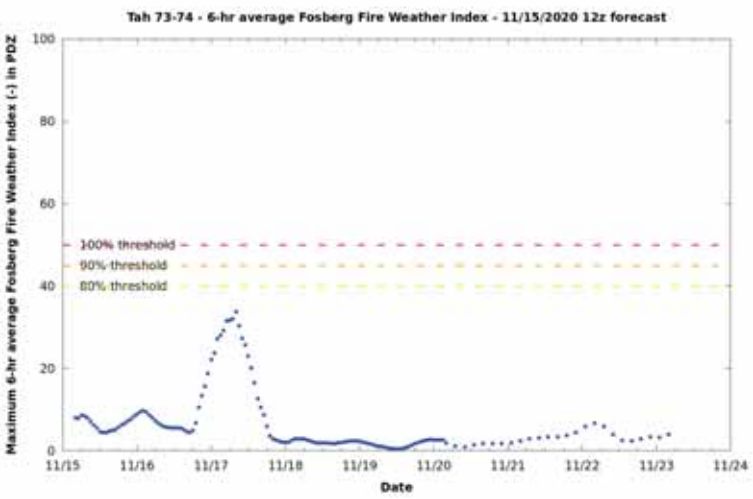


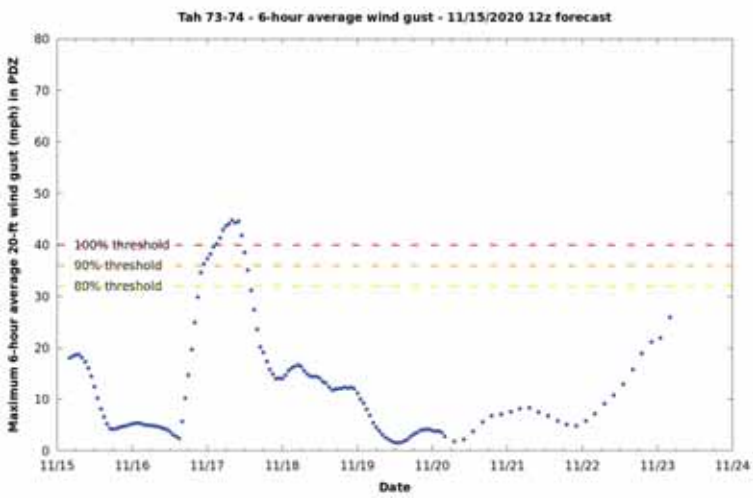
Tah 73-60



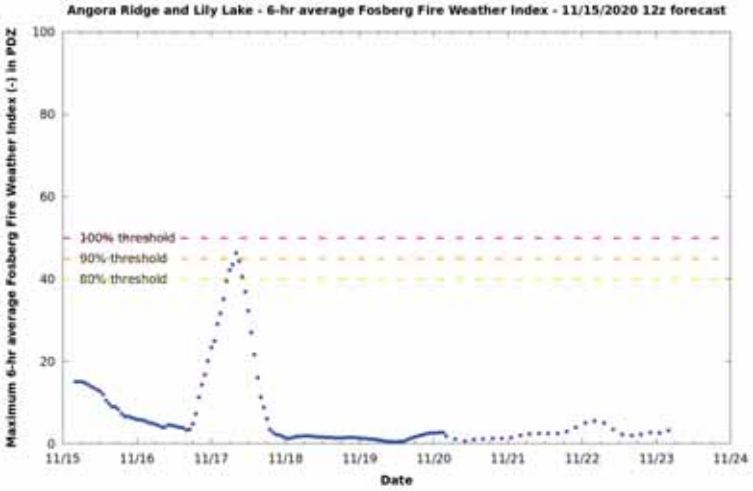


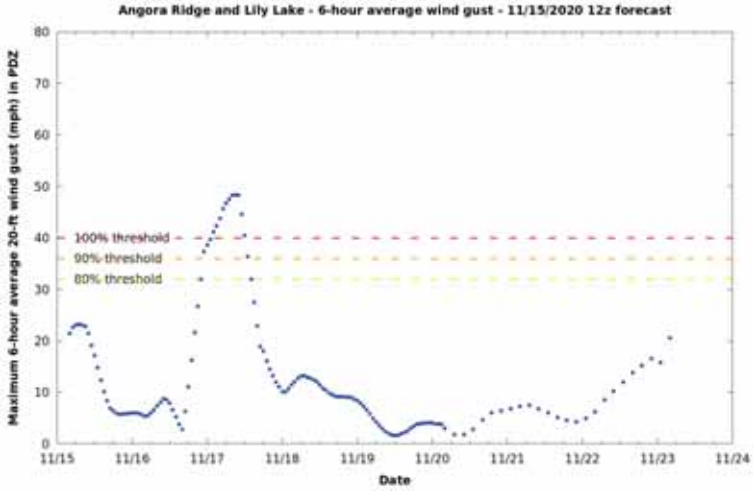
Tah 73-74



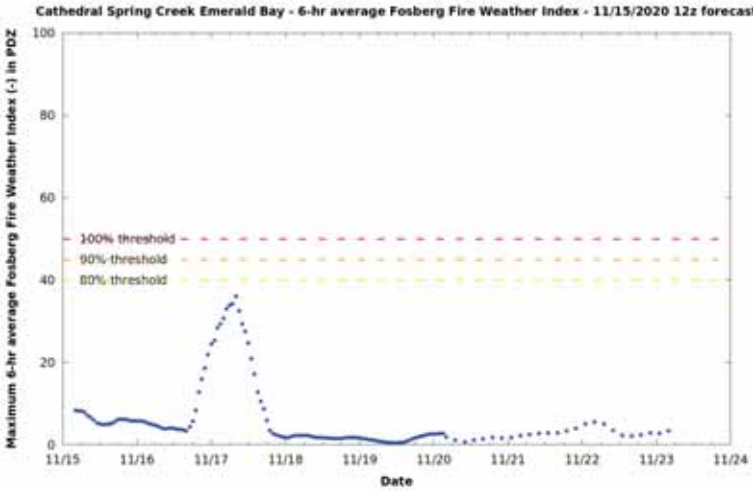


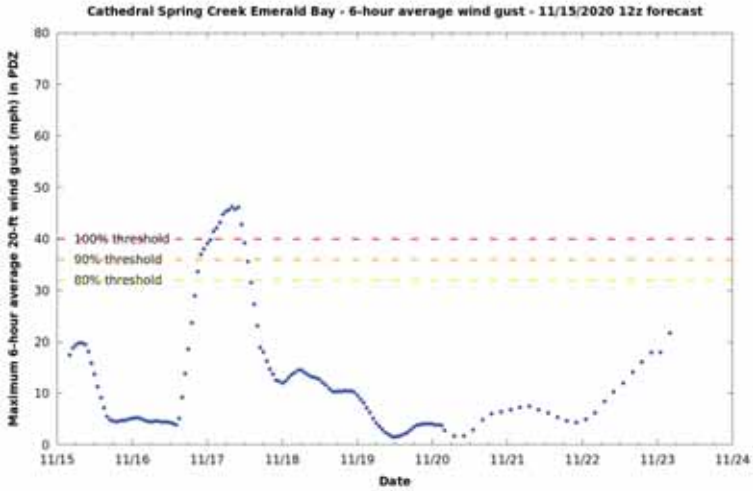
Angora Ridge and Lily Lake



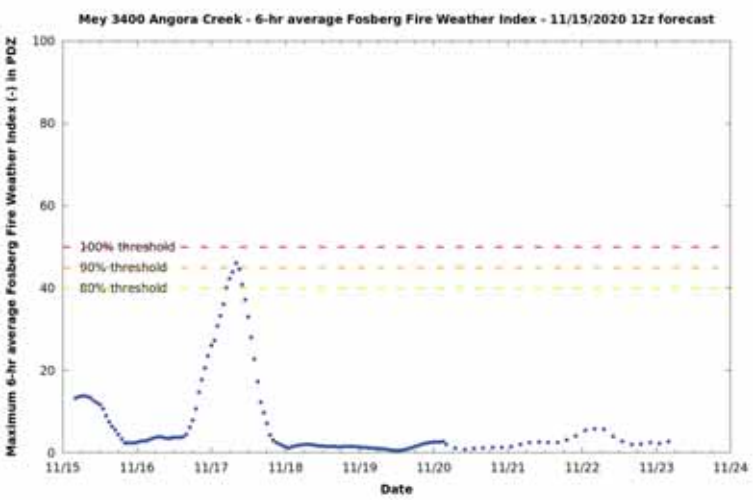


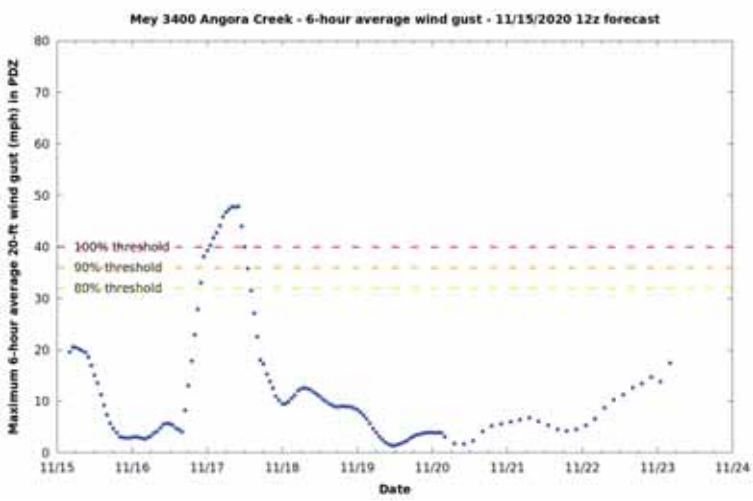
Cathedral Spring Creek Emerald Bay



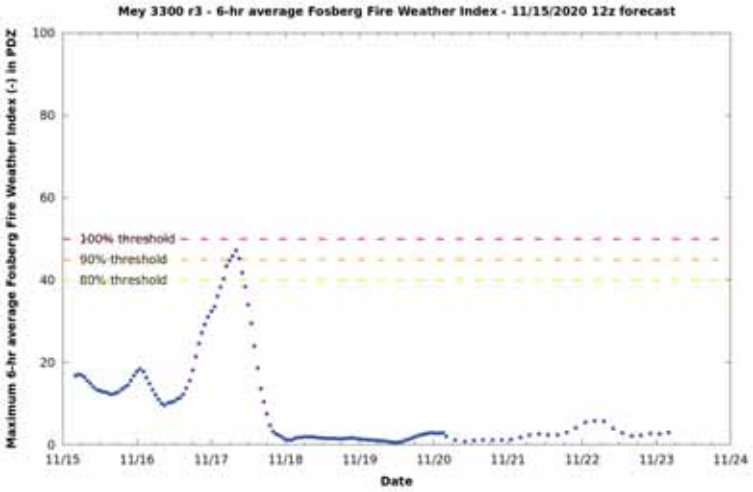


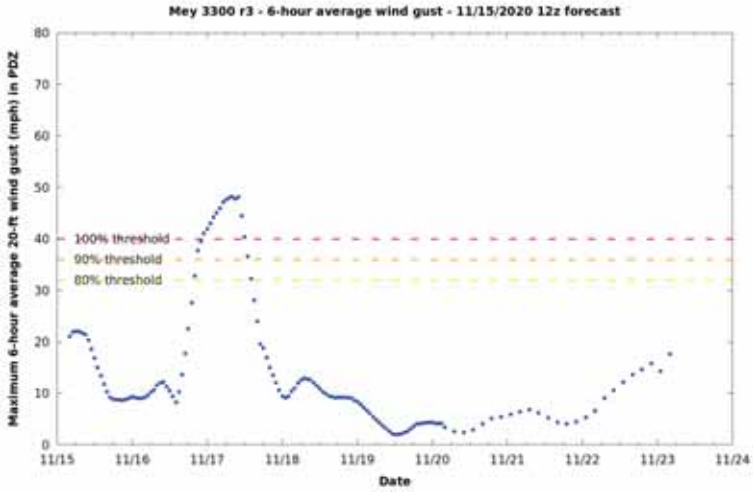
Mey 3400 Angora Creek



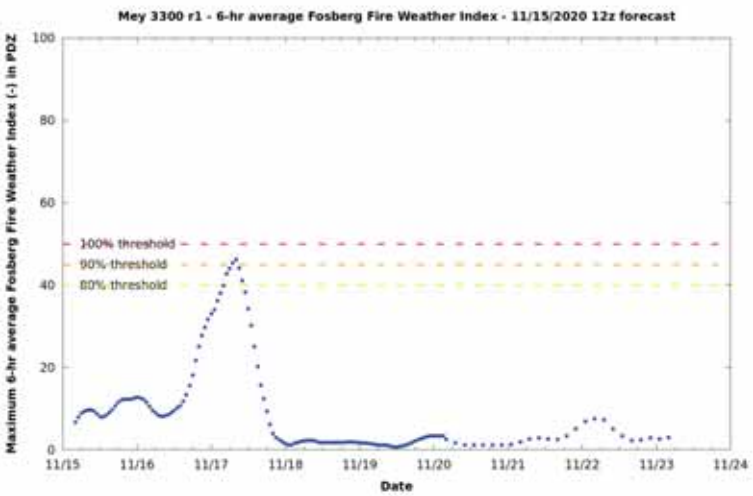


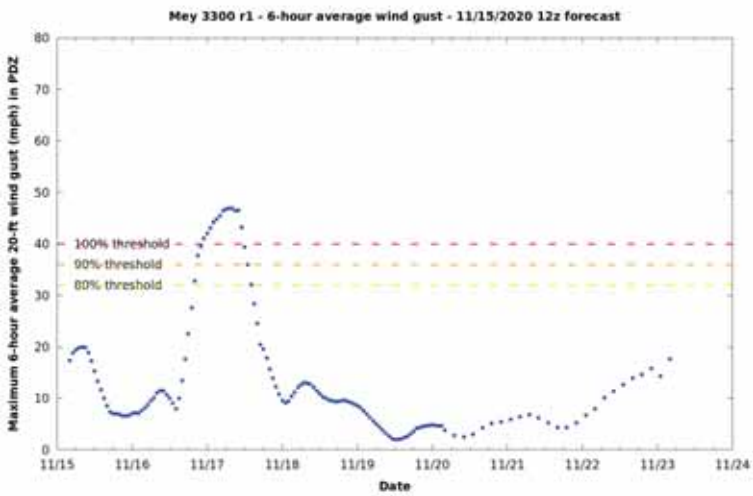
Mey 3300 r3



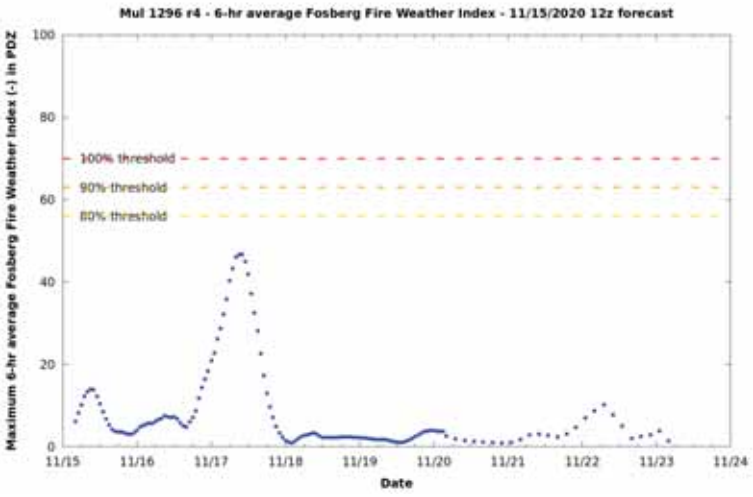


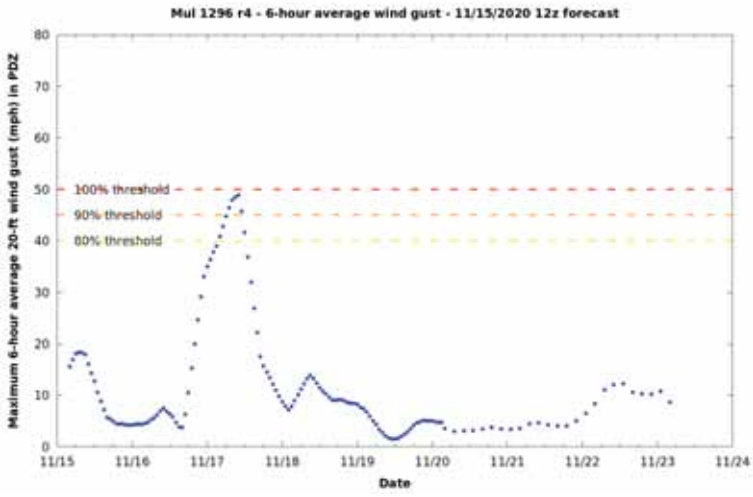
Mey 3300 r1



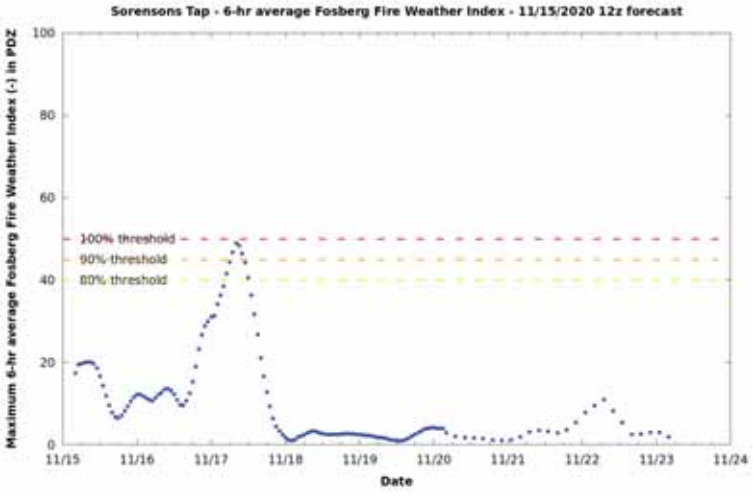


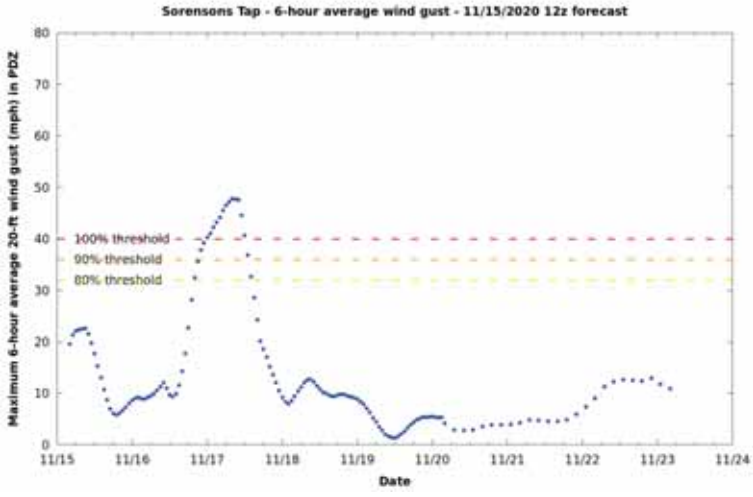
Mul 1296 r4



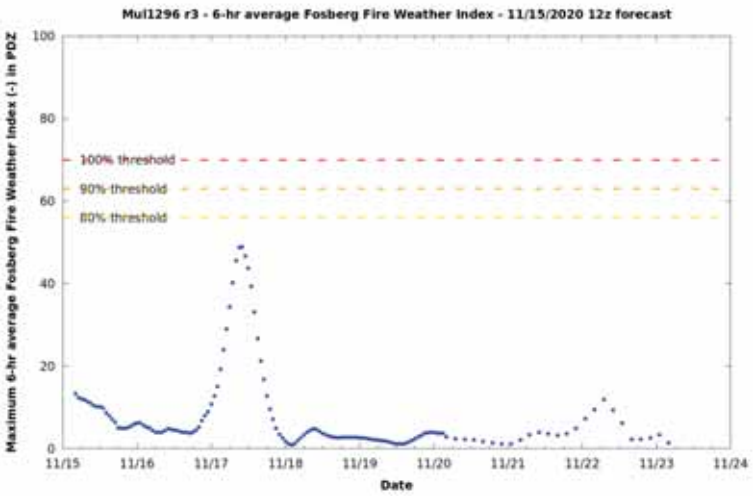


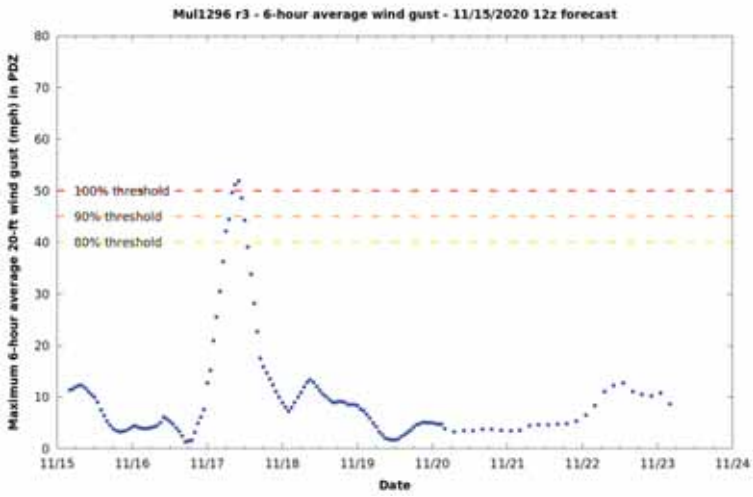
Sorensons Tap



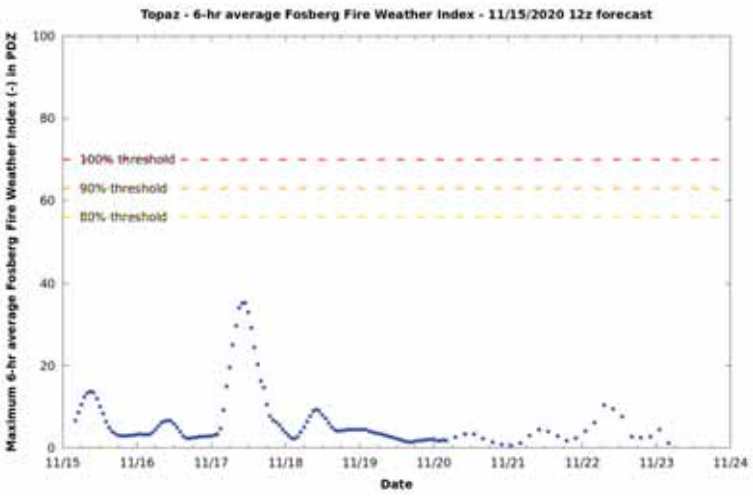


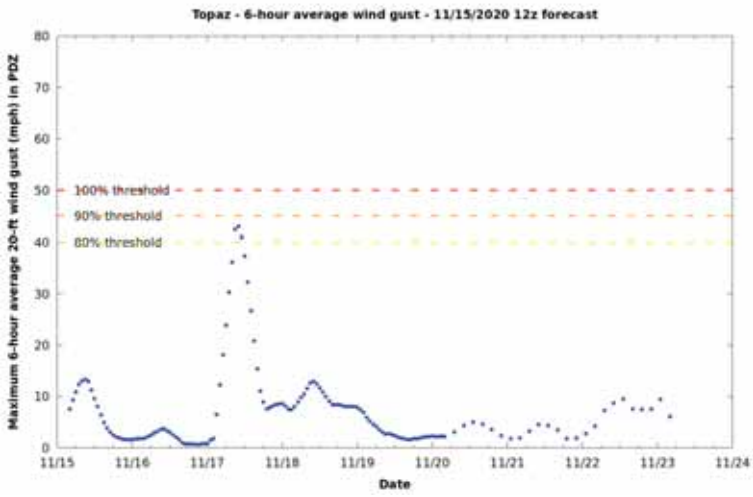
Mul 1296 r3



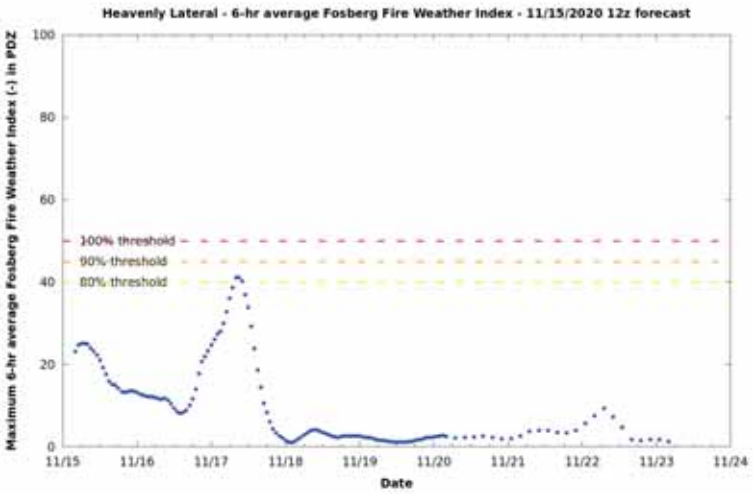


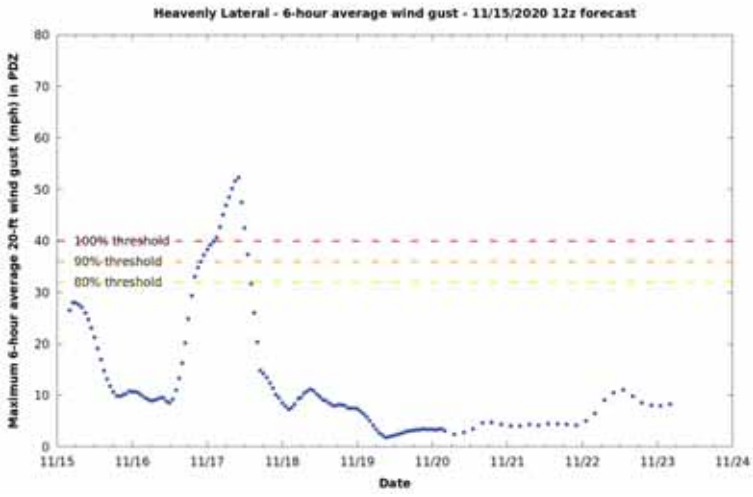
Topaz



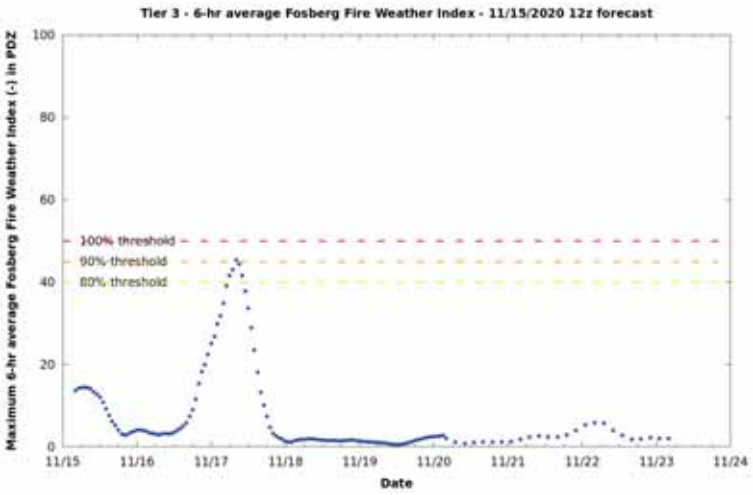


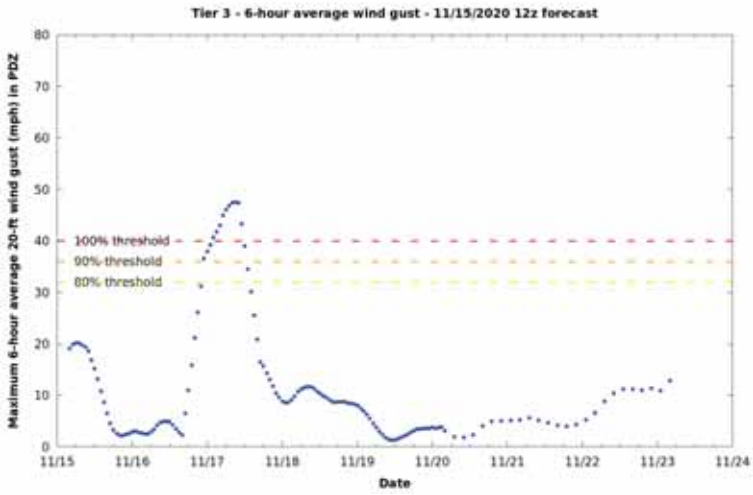
Heavenly Lateral



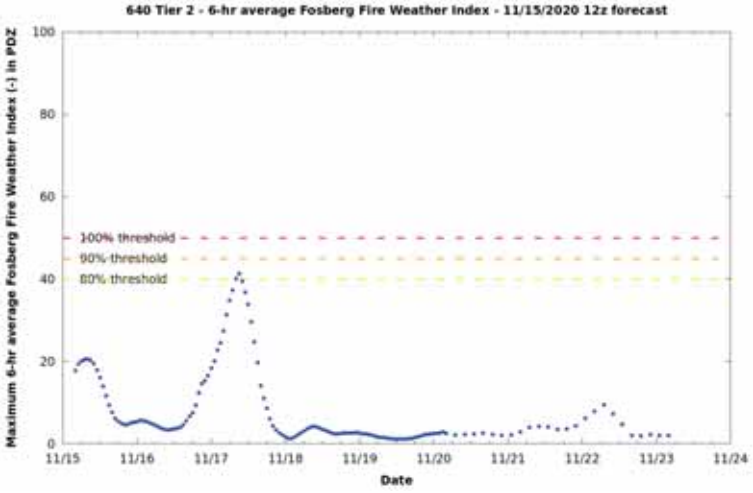


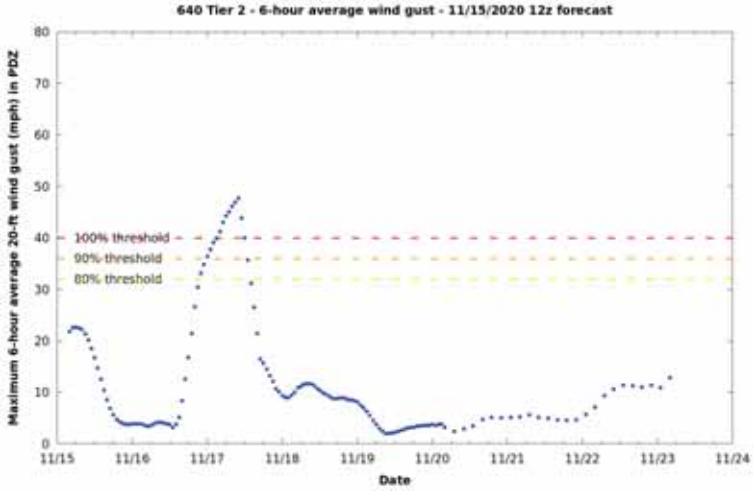
Tier 3



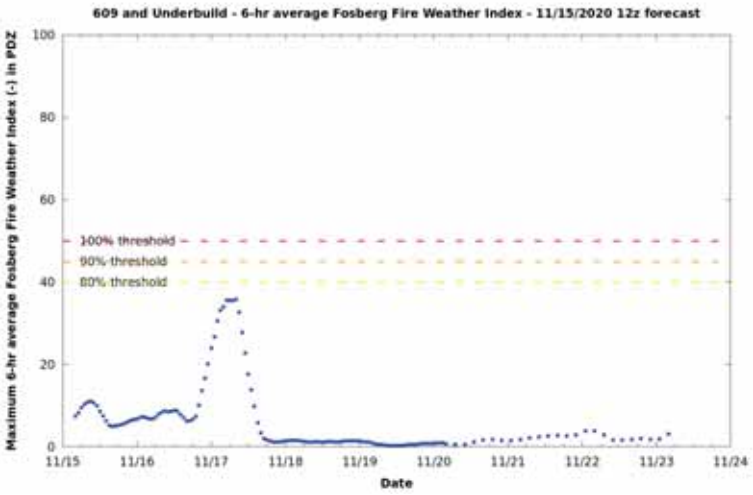


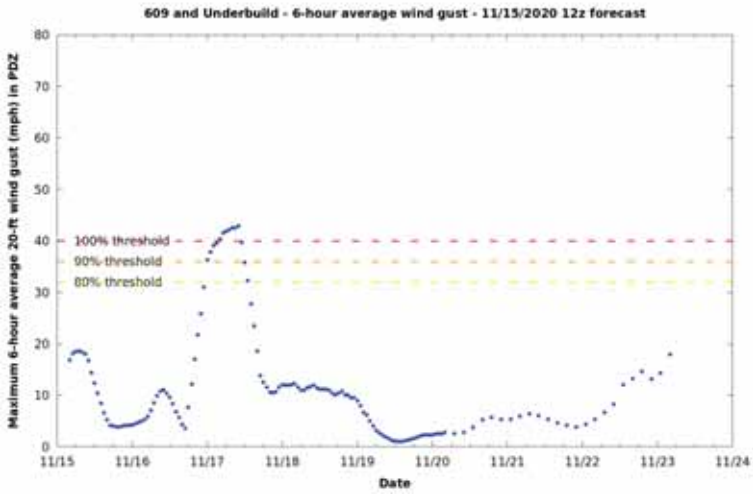
640 Tier 2



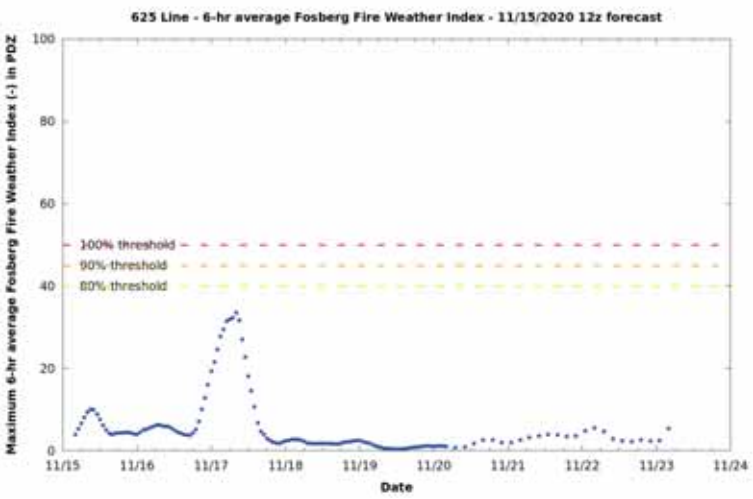


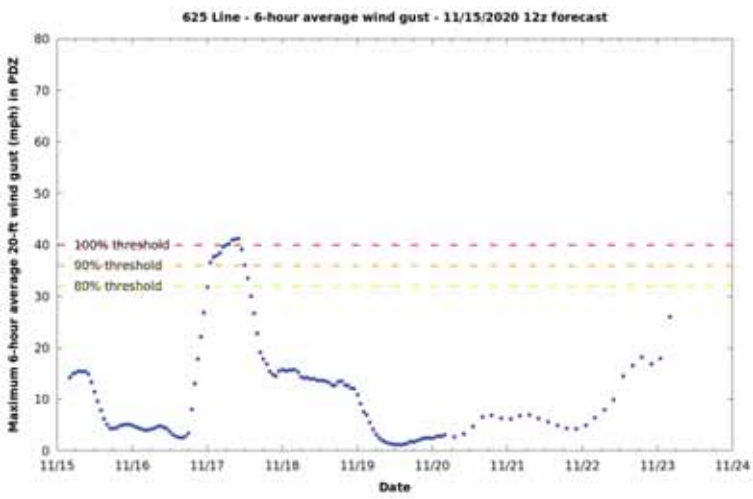
609 and Underbuild



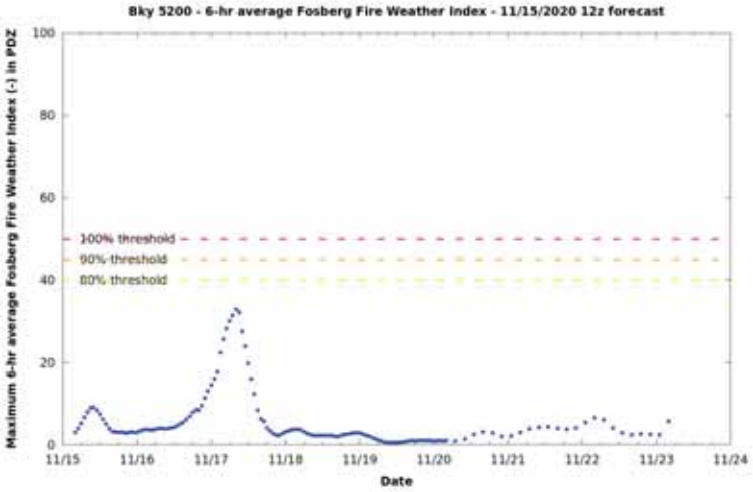


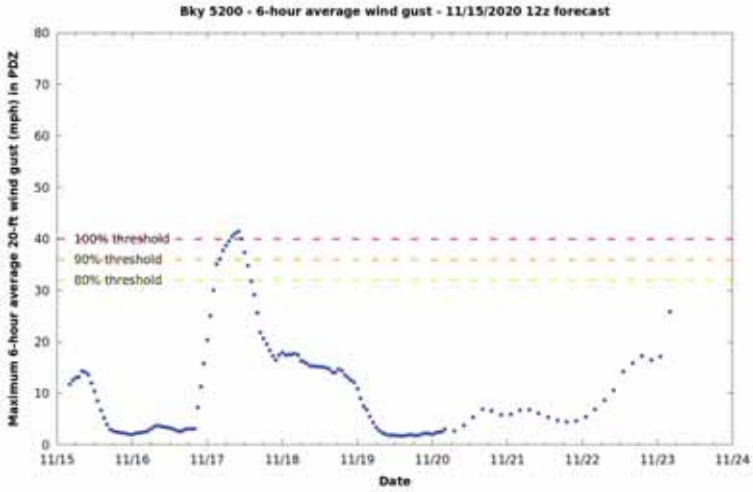
625 Line



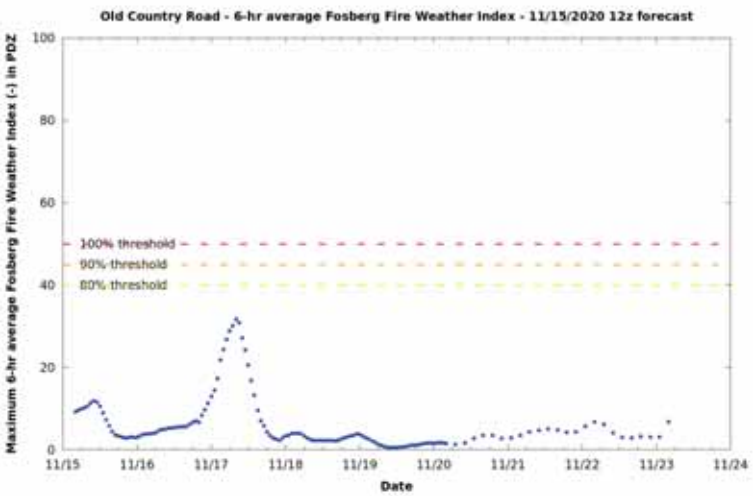


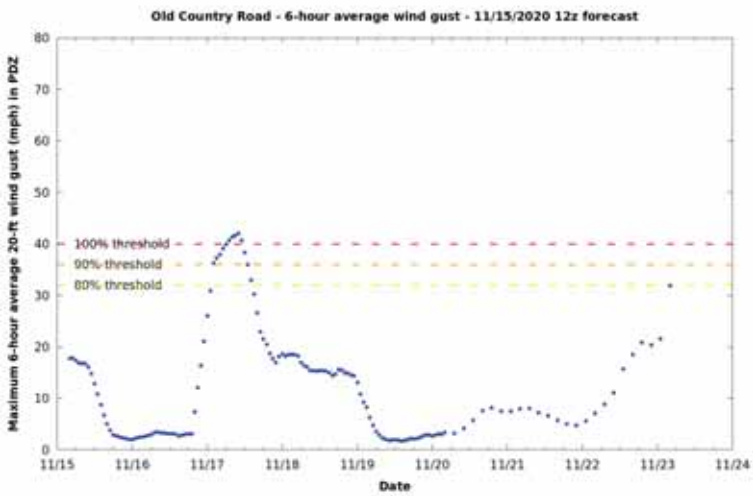
Bky 5200



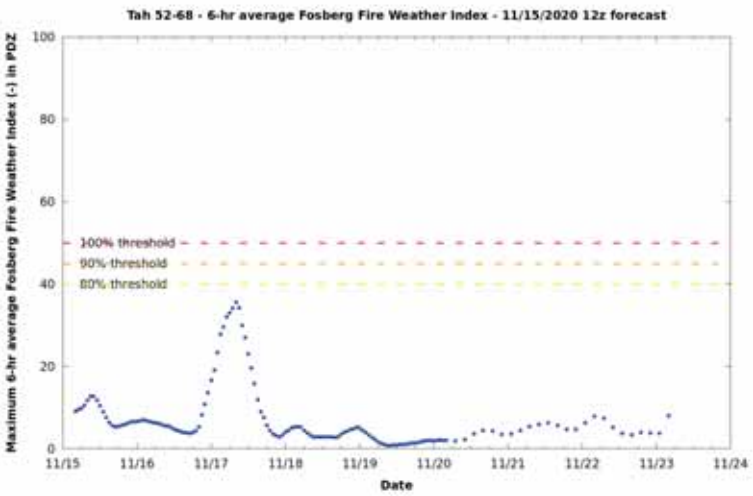


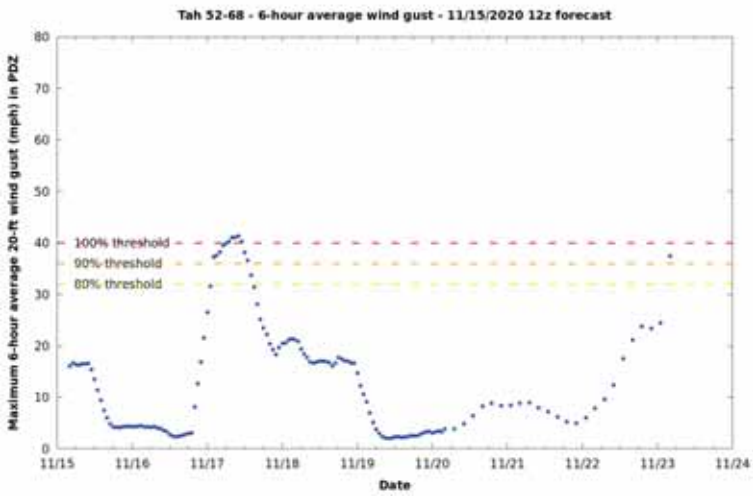
Old Country Road



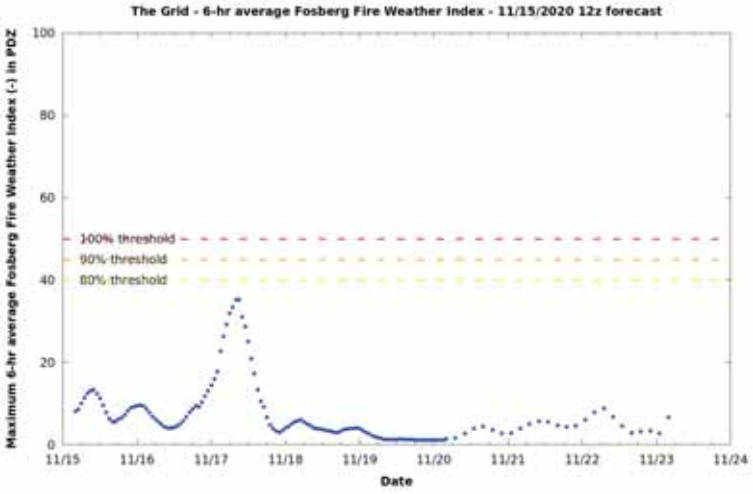


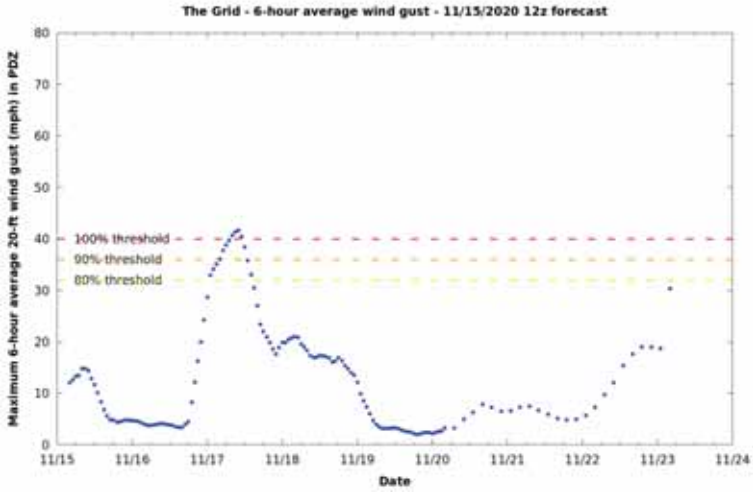
Tah 52-68



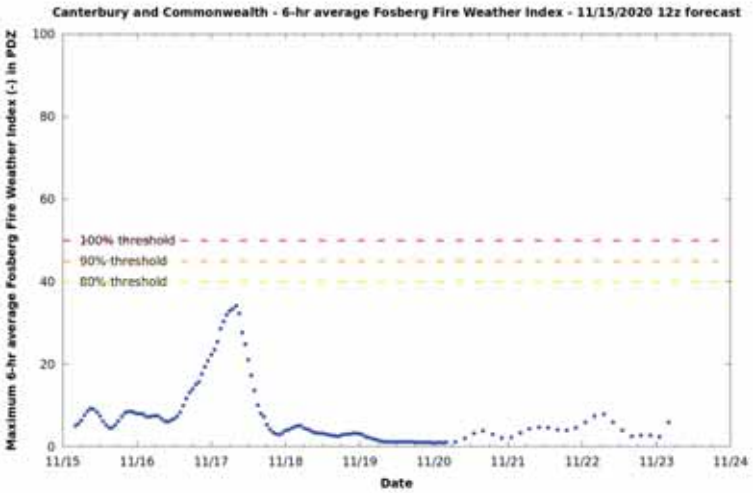


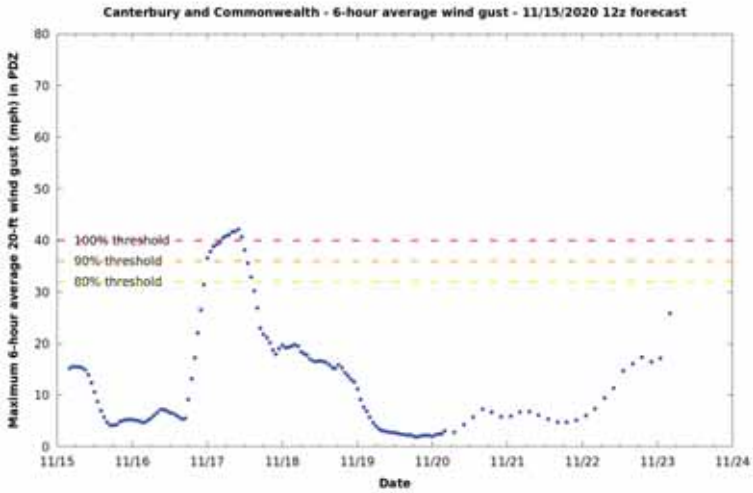
The Grid



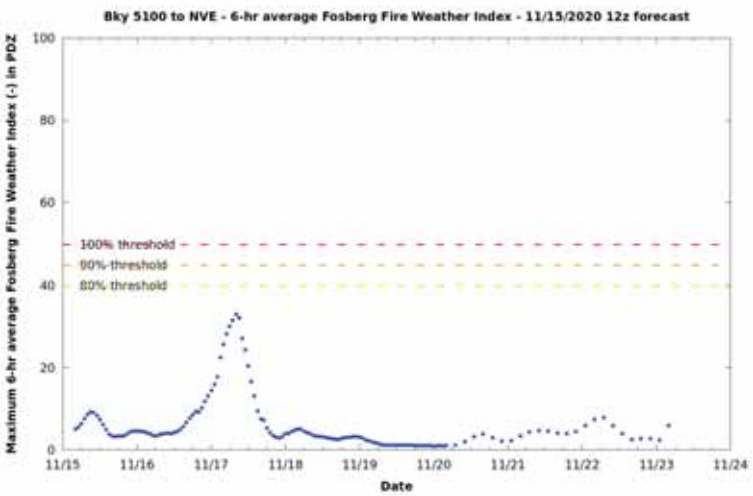


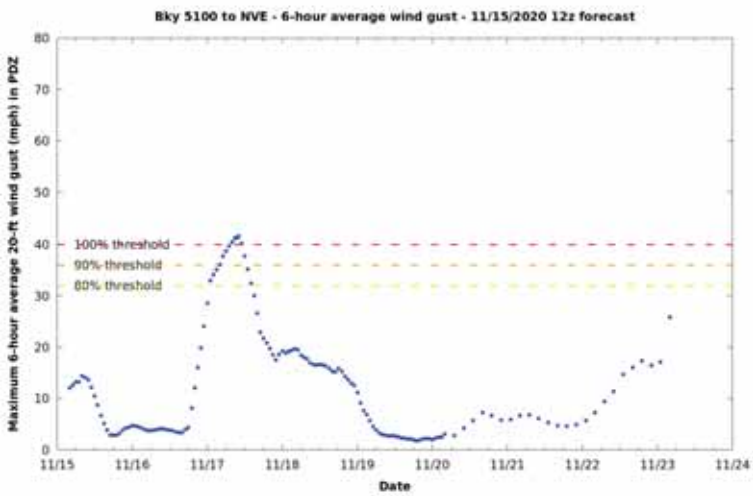
Canterbuy and Commonwealth



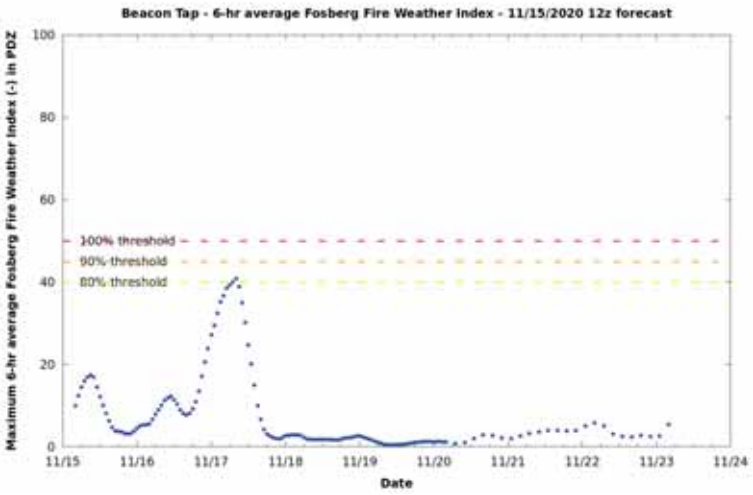


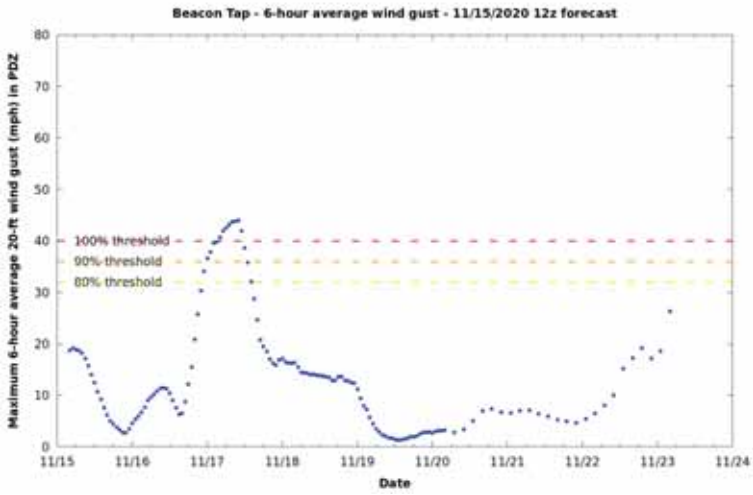
Bky 5100 to NVE



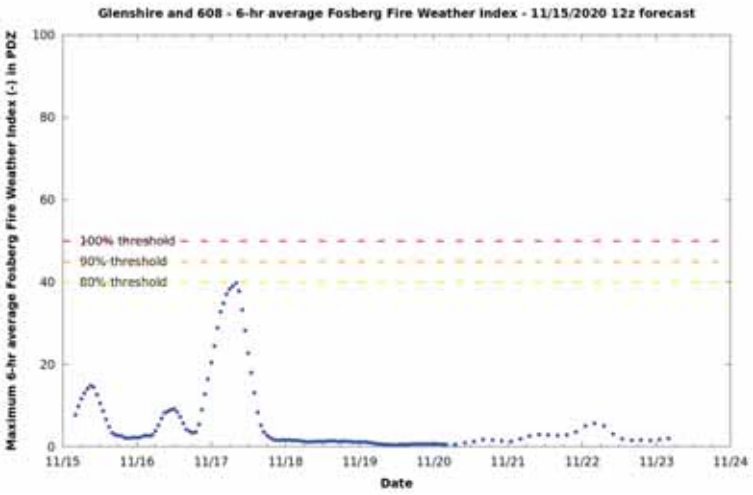


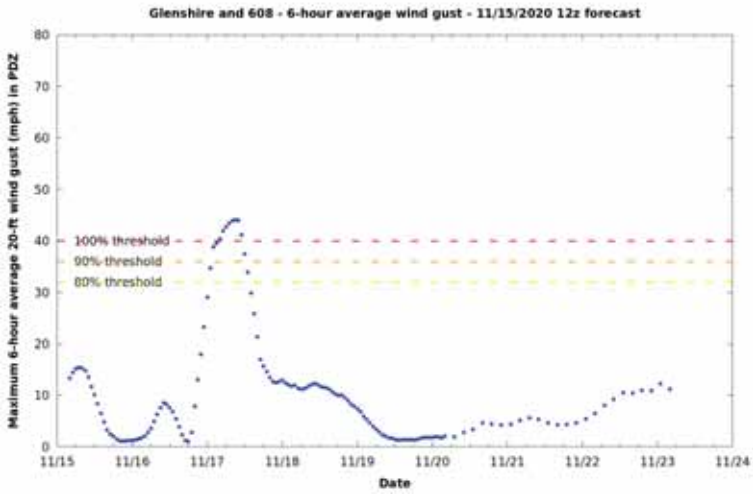
Beacon Tap



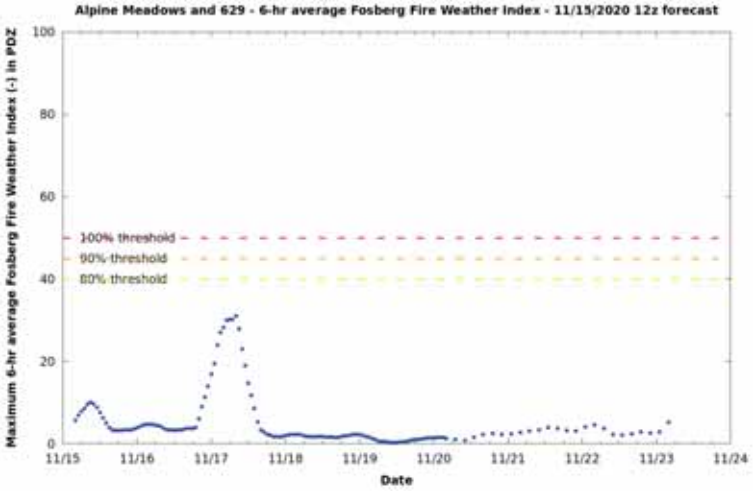


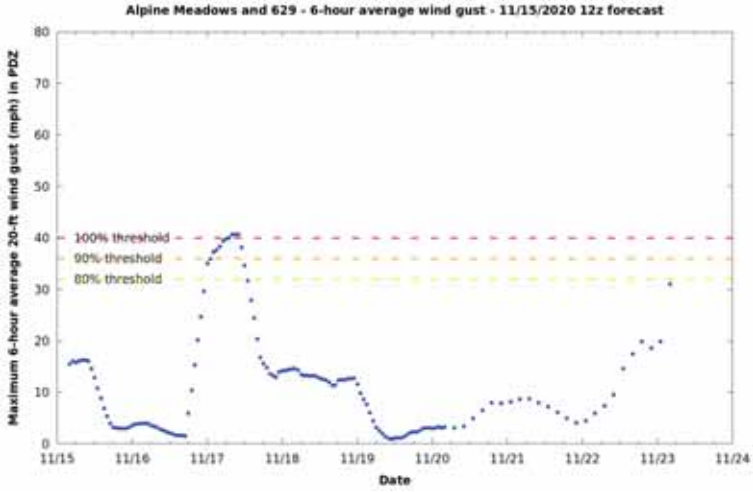
Glenshire and 608



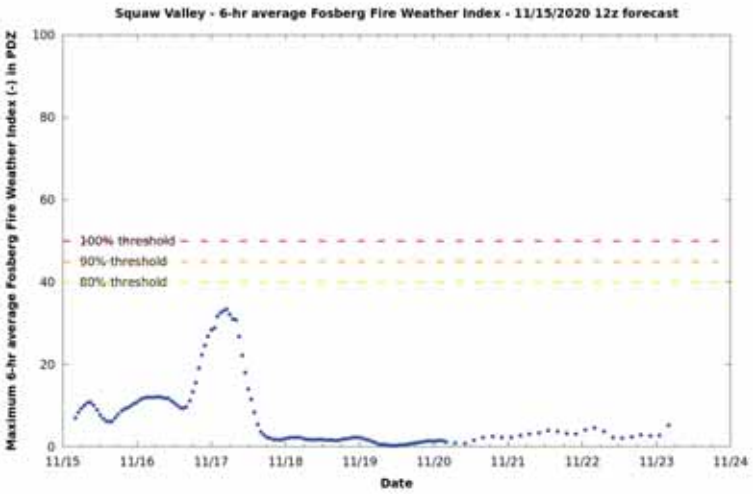


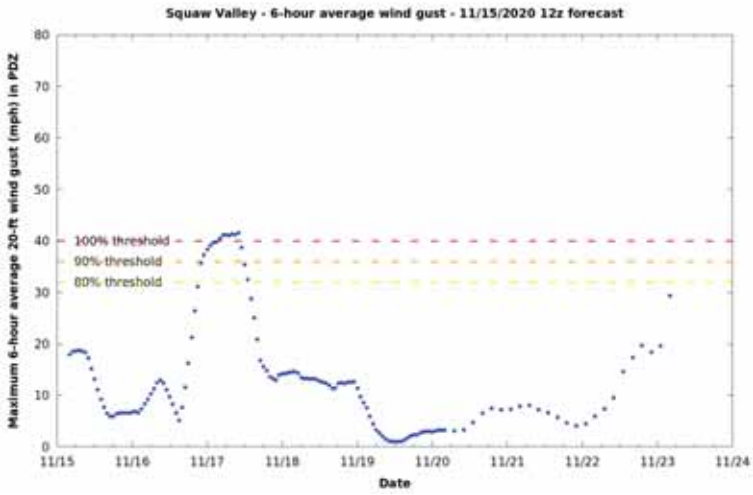
Alpine Meadows and 629



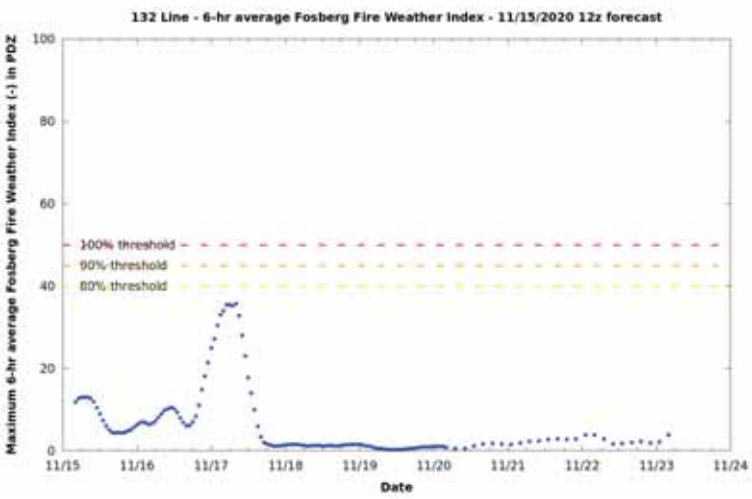


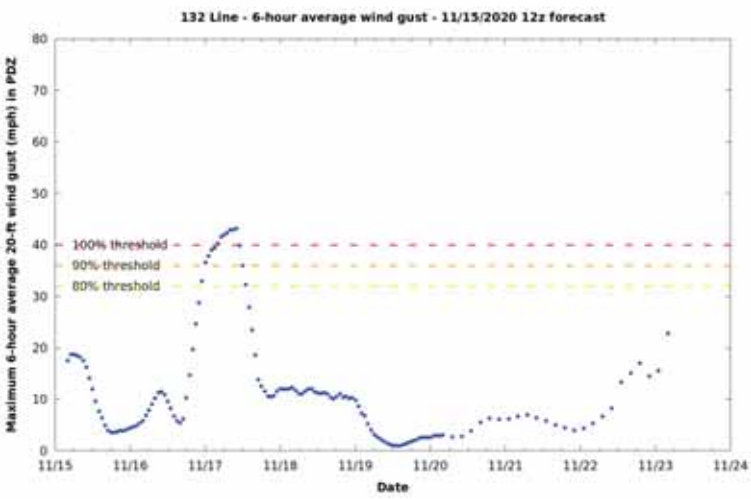
Squaw Valley



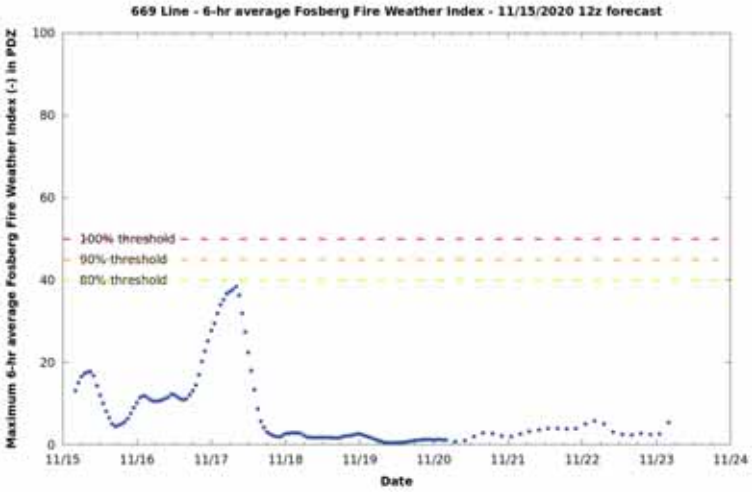


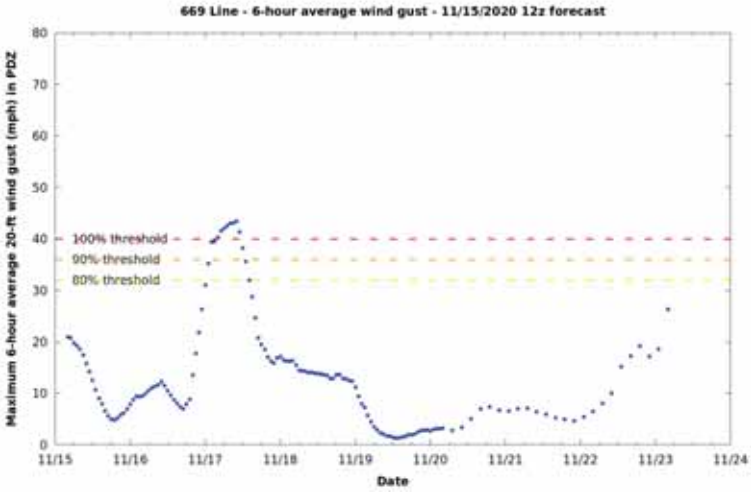
132 Line



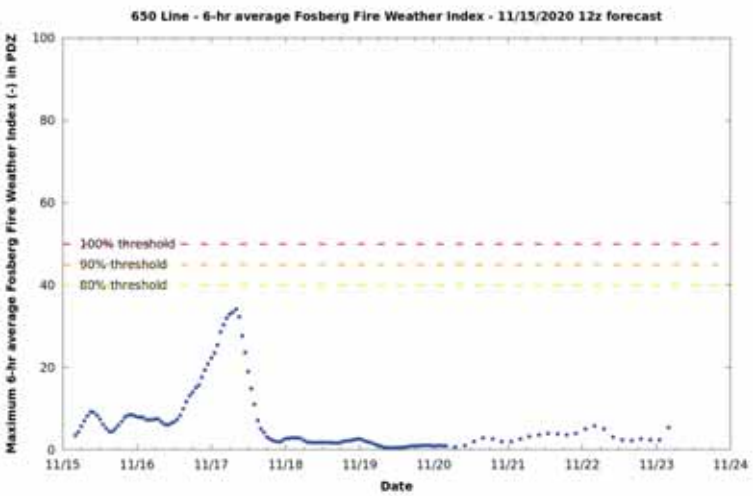


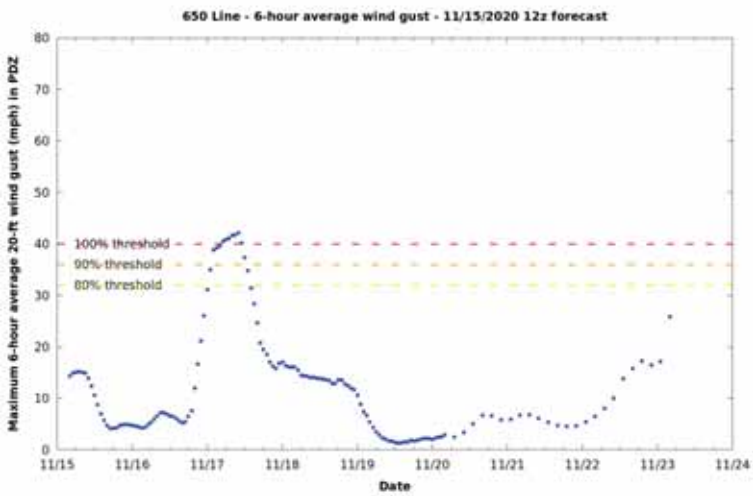
669 Line



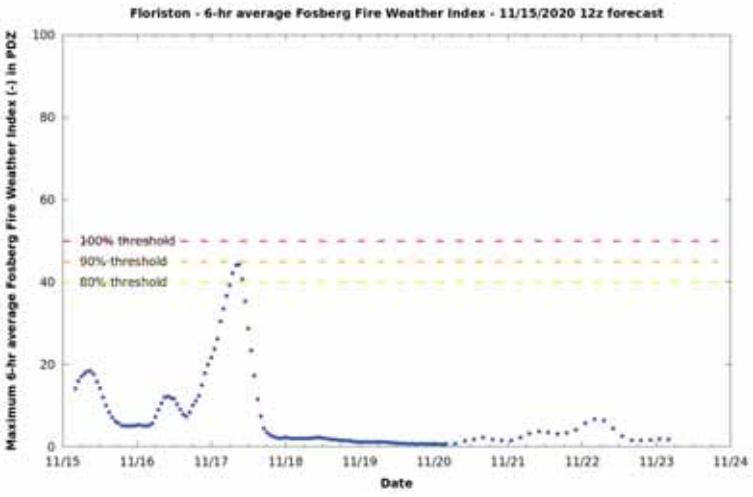


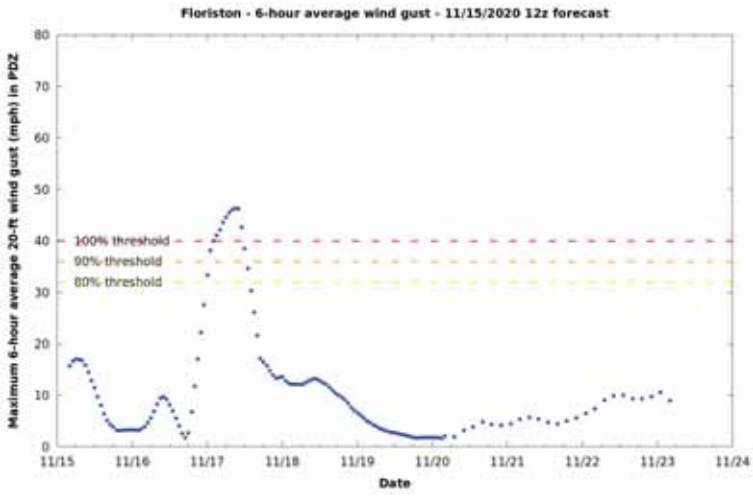
650 Line



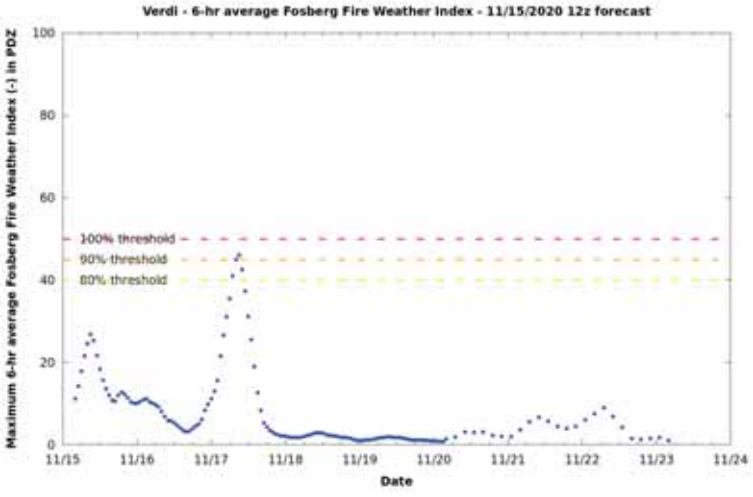


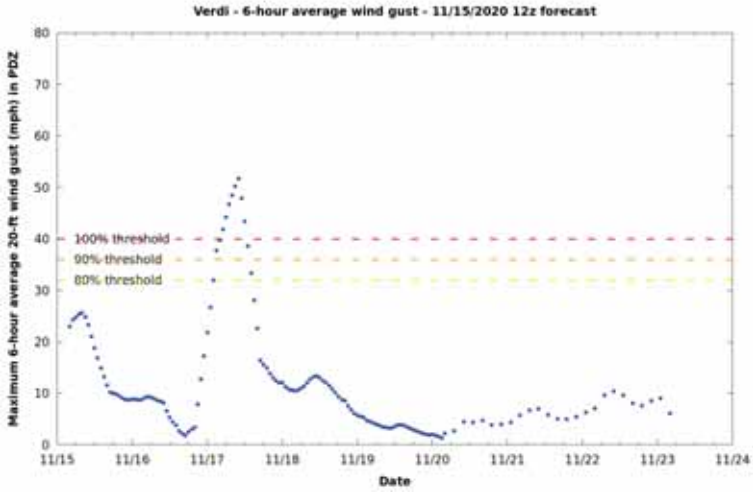
Floriston



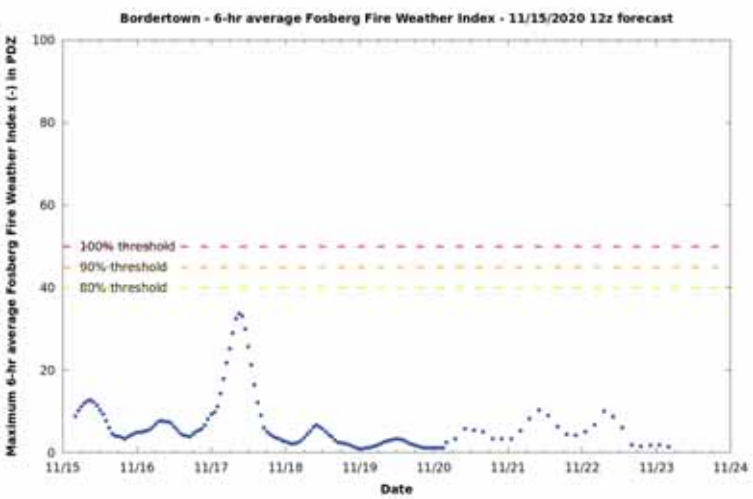


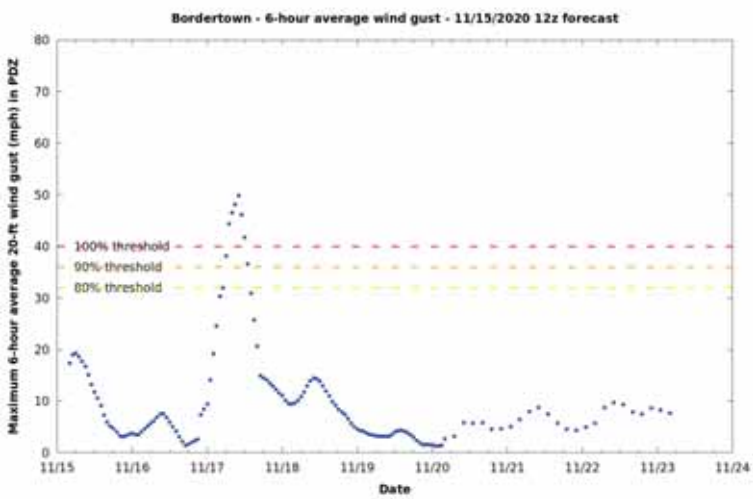
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/15/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/15/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/16/20 - 11/22/20

Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

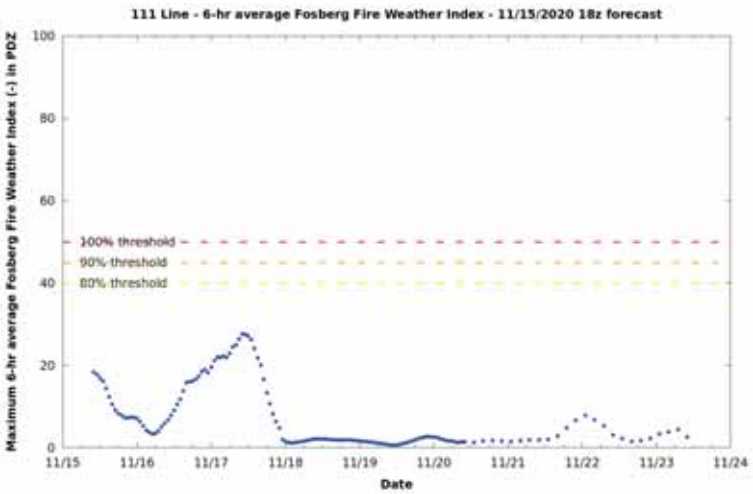
Liberty Utilities Energy Release Component Forecast for 11/16/20 - 11/22/20

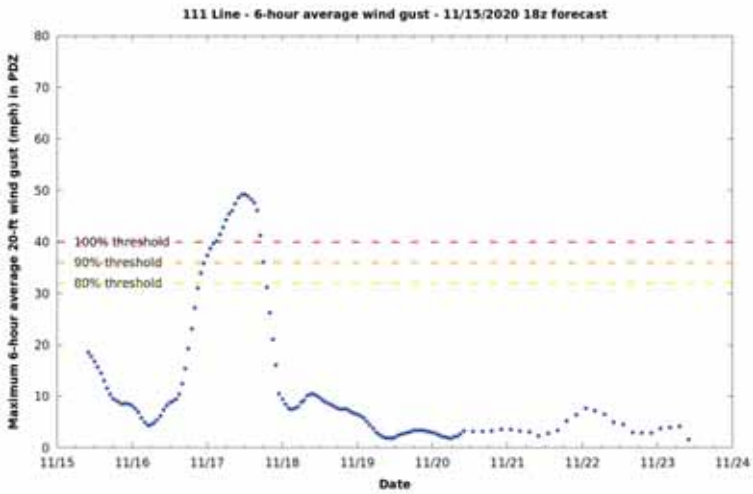
Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	47.6	49.4	47.7	33.9	33.0	34.5	36.9
Sierra Brooks	50.9	56.8	54.6	40.3	42.4	45.2	49.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.3	1.4	1.2	0.7	0.7	0.6	0.6
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	23.8	27.2	24.3	15.9	17.7	19.6	20.4
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	43.0	48.3	43.8	27.6	28.9	31.5	32.5
Topaz	53.4	57.9	54.1	36.4	39.2	40.9	42.2
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	3.4	3.8	3.4	2.1	1.9	1.9	1.8
Old Country Road	29.7	32.0	26.3	16.6	14.9	14.3	13.7
Tah 52-68	20.1	21.7	17.9	11.2	10.2	9.7	9.3
The Grid	8.3	9.5	8.1	4.6	4.3	3.8	3.6
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	24.1	24.1	23.0	15.4	15.6	15.5	16.8
Verdi	51.1	51.1	47.8	31.7	34.6	36.6	41.1
Bordertown	54.6	54.6	52.1	35.8	37.8	40.5	44.7

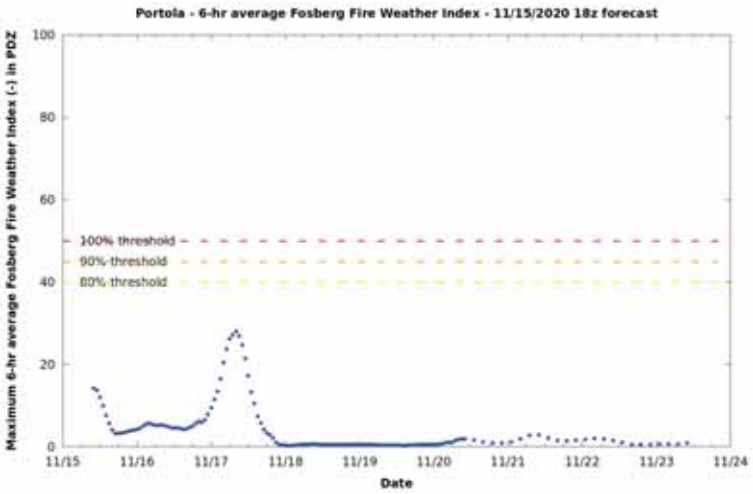
Liberty Utilities Fire Weather Summary Plots - 11/15/2020 18z forecast

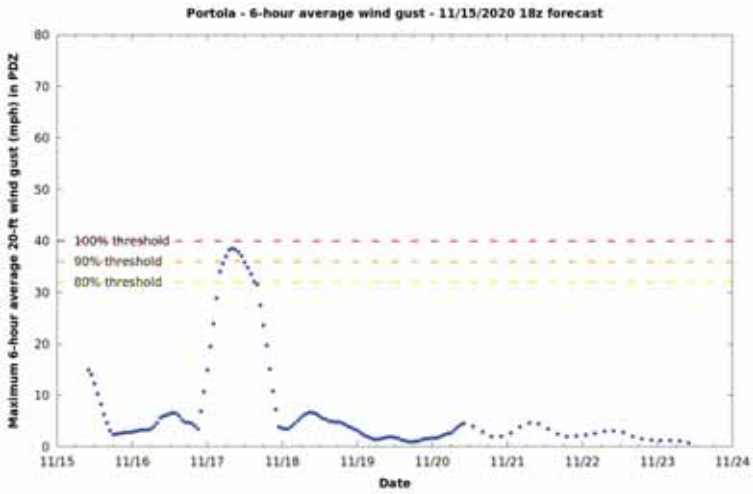
111 Line



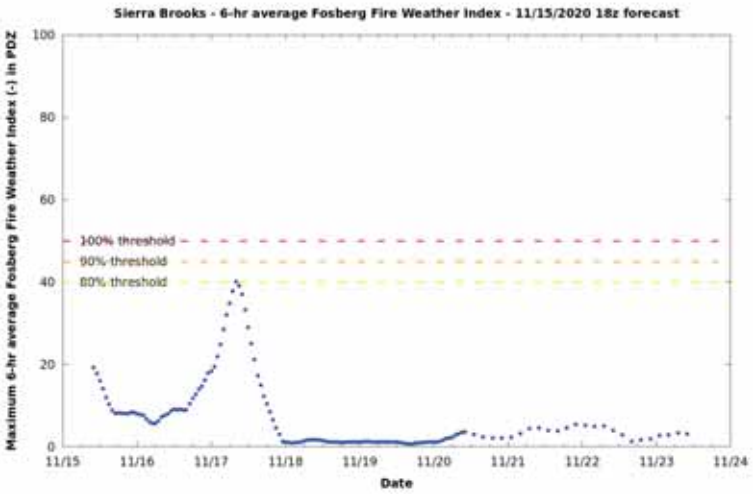


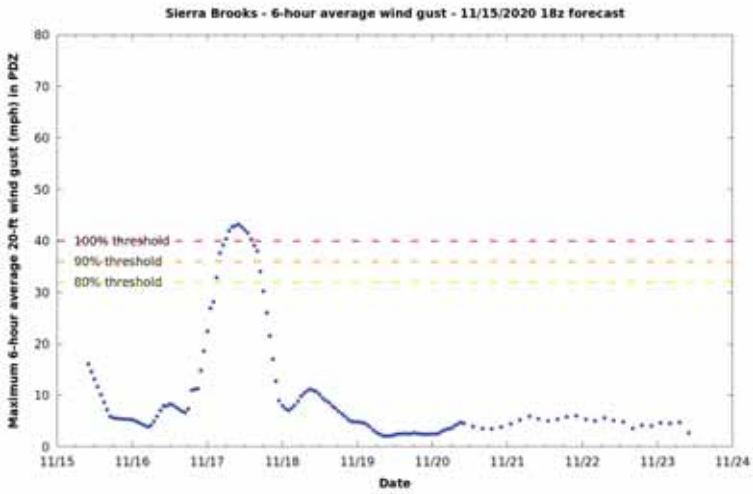
Portola



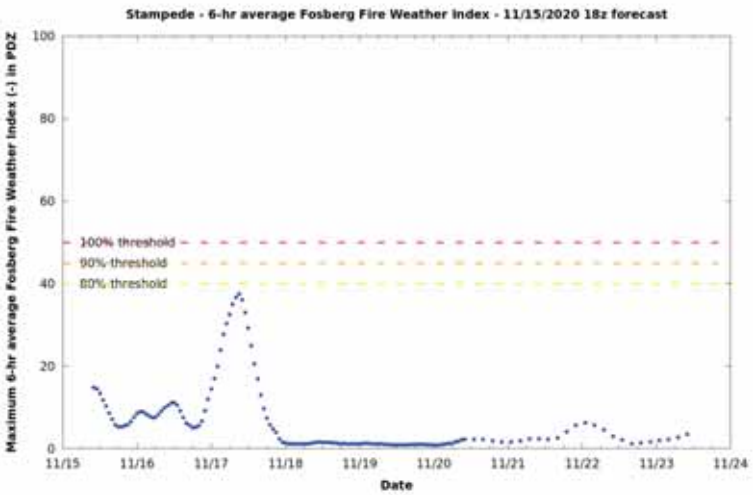


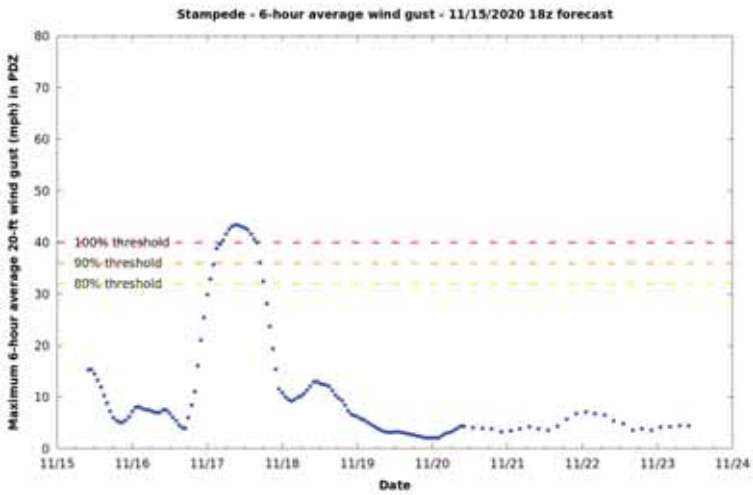
Sierra Brooks



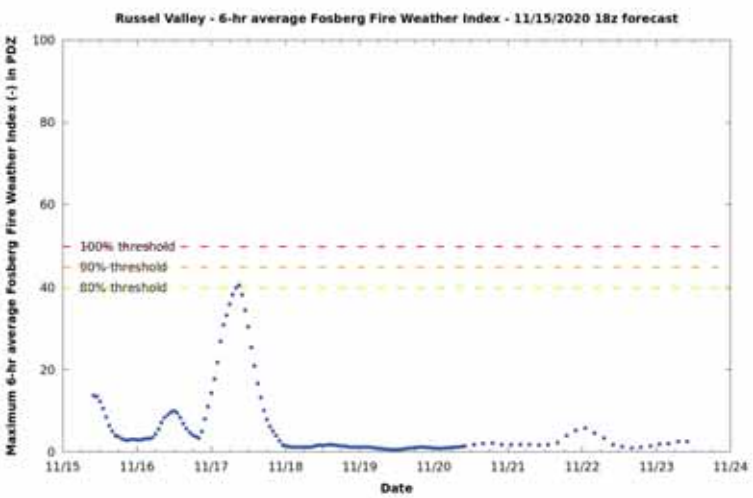


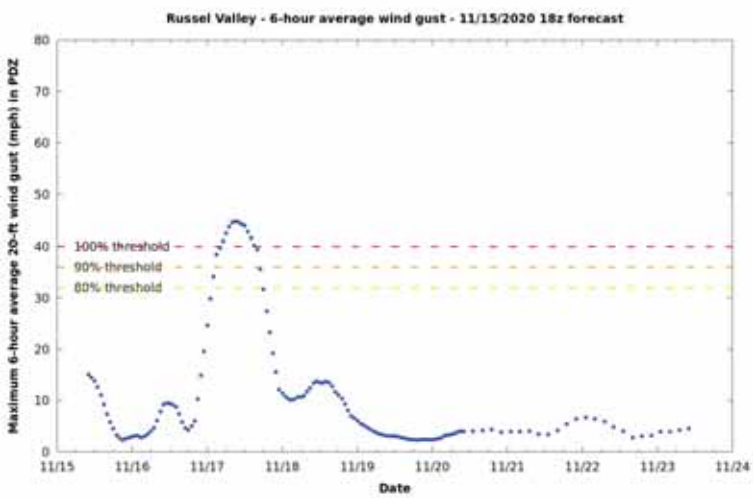
Stampede



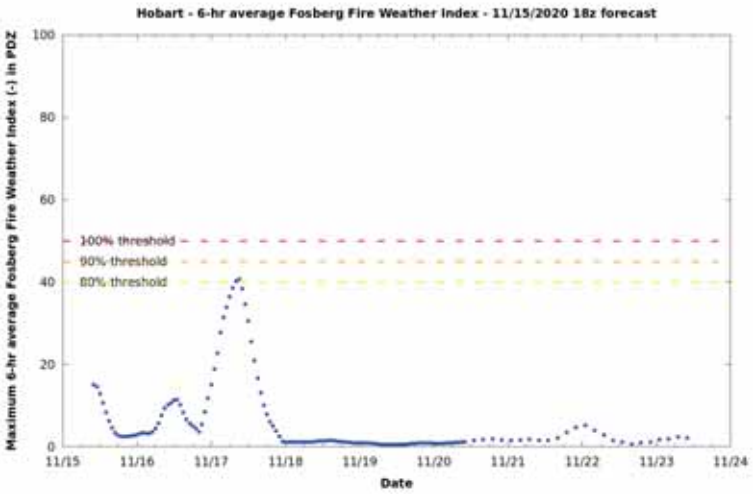


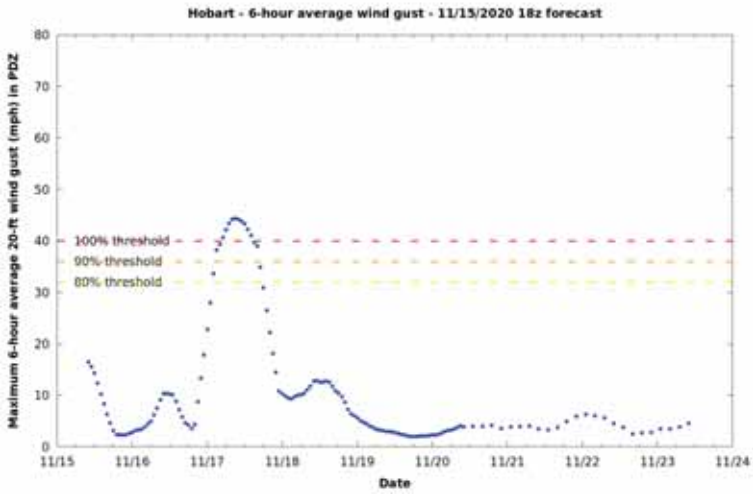
Russell Valley



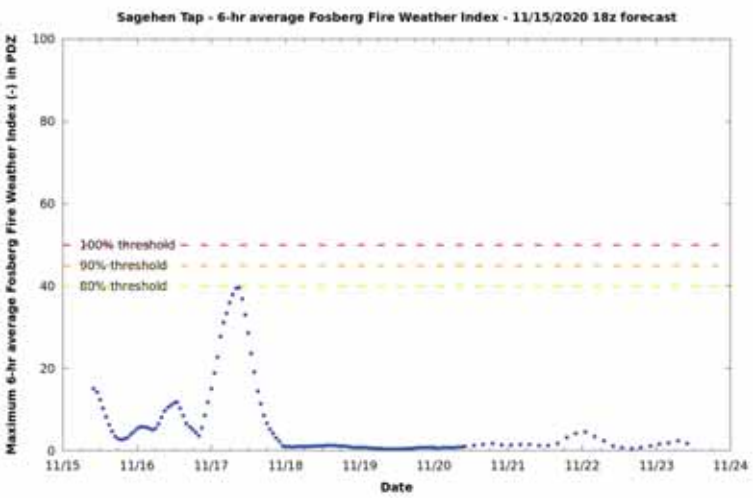


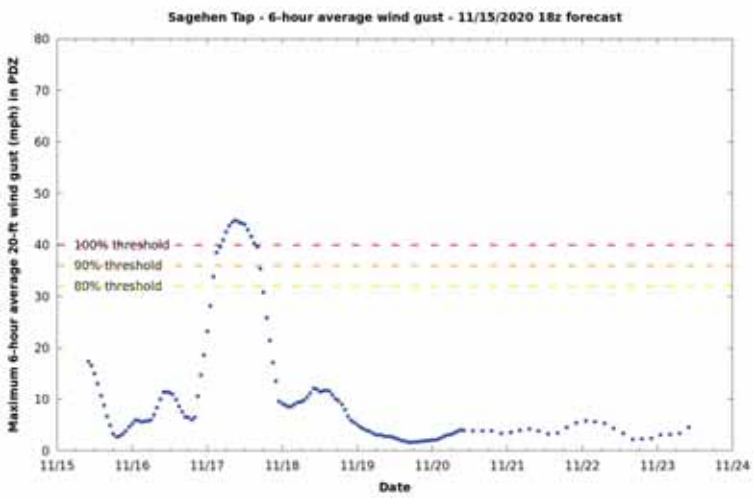
Hobart



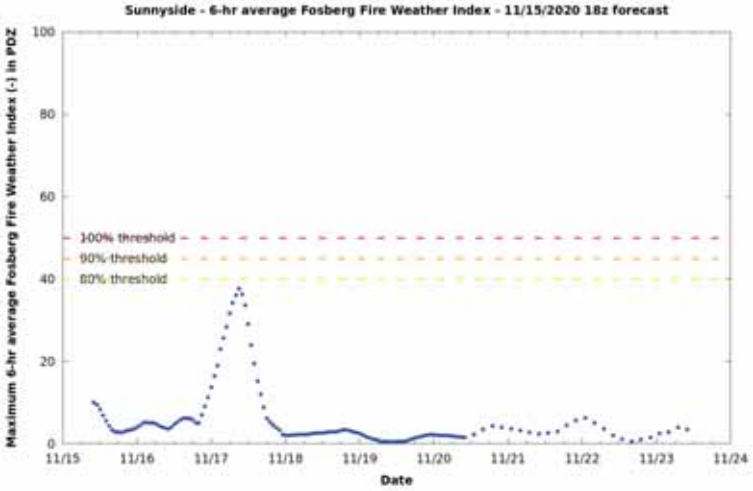


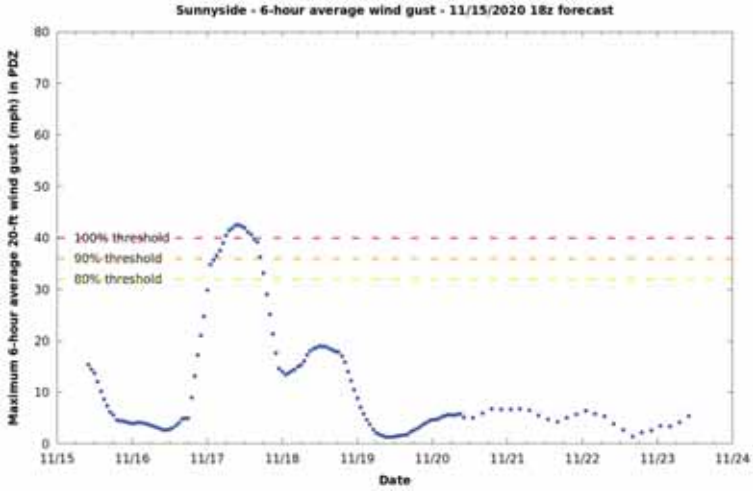
Sagehen tap



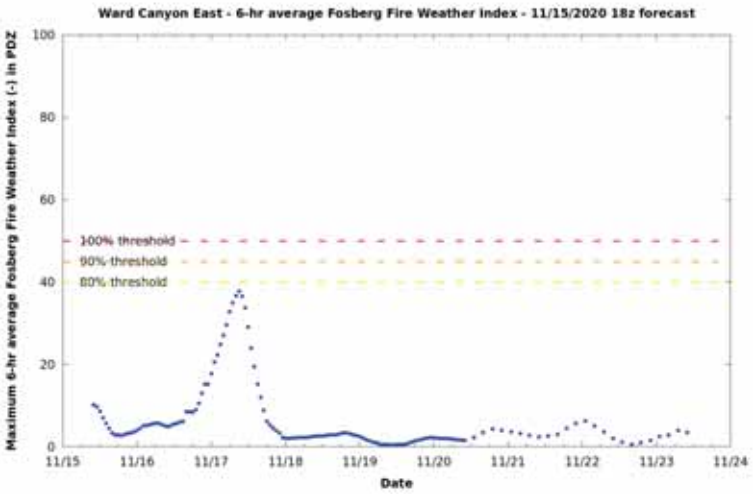


Sunnyside



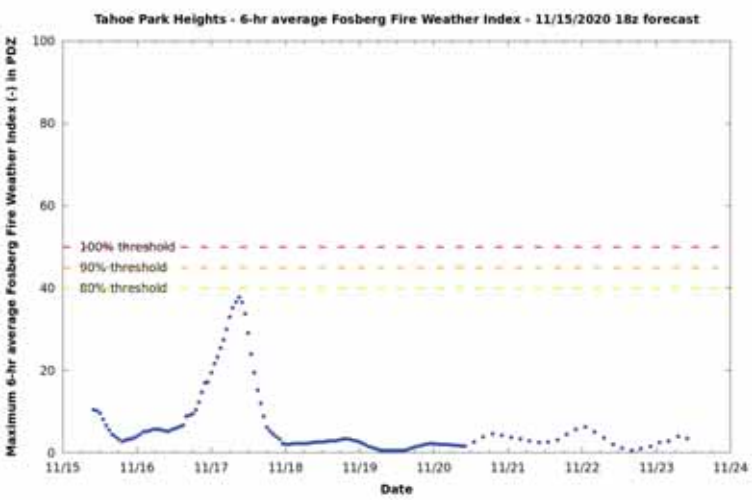


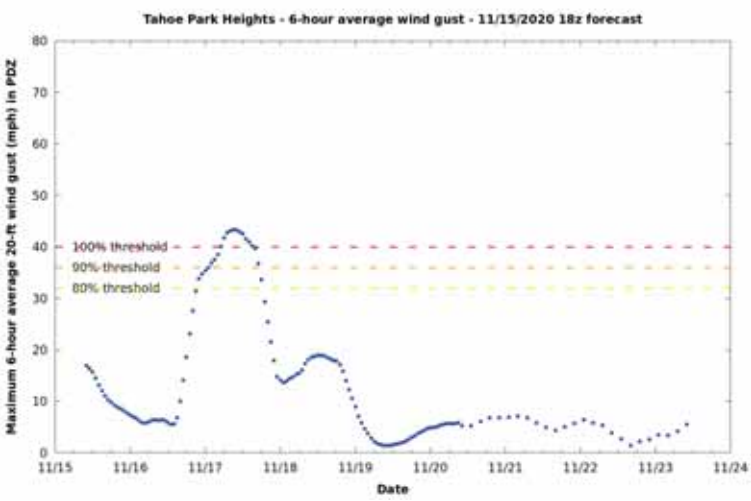
Ward Canyon East



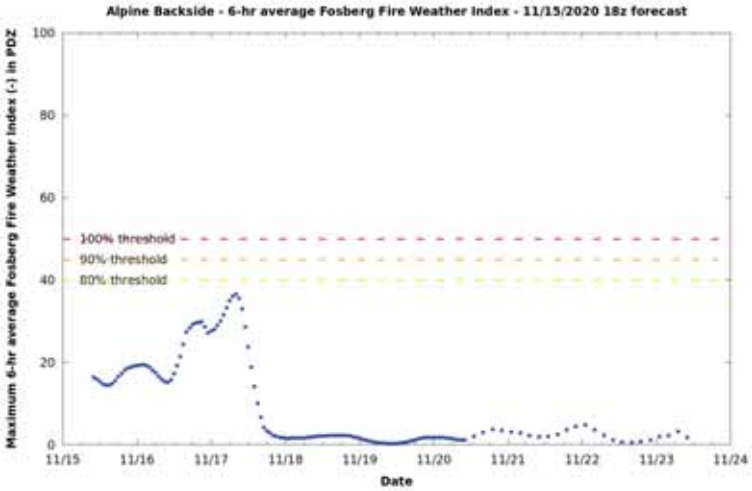


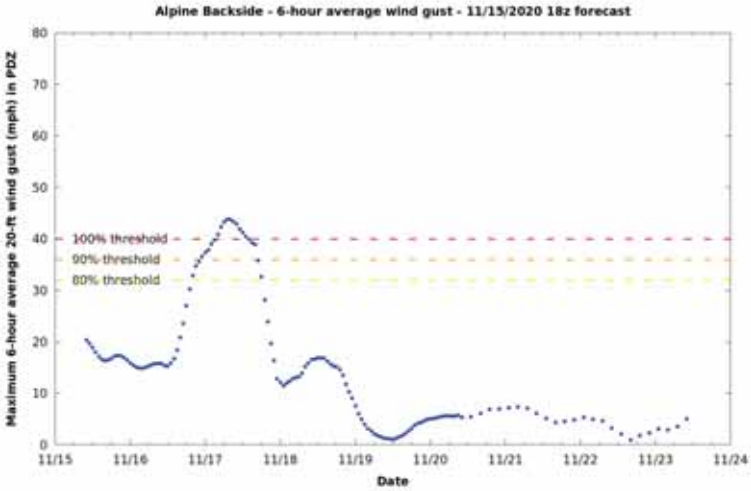
Tahoe Park Heights



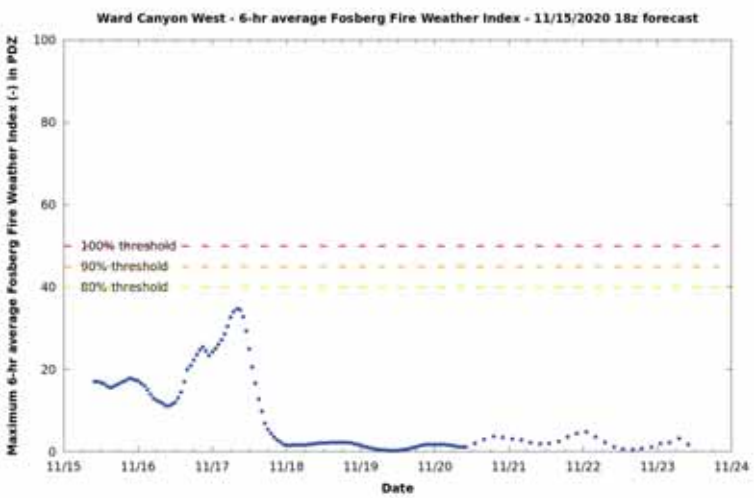


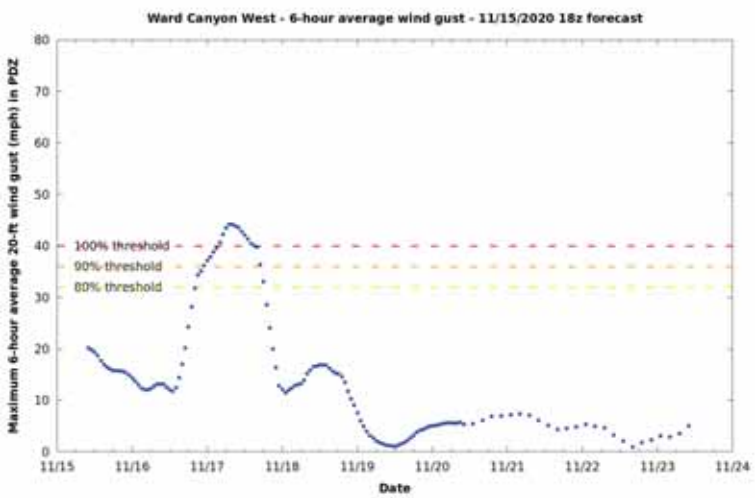
Alpine Backside



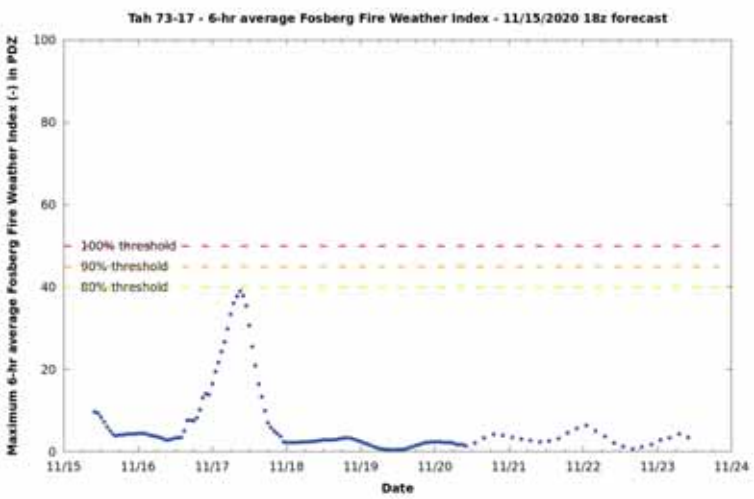


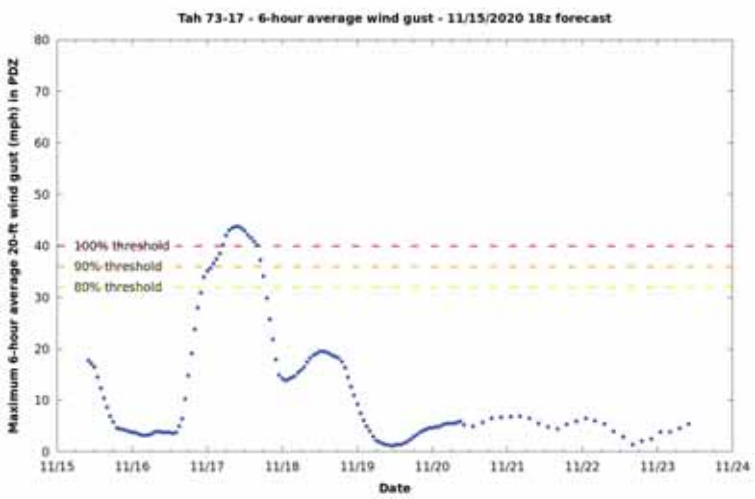
Ward Canyon West



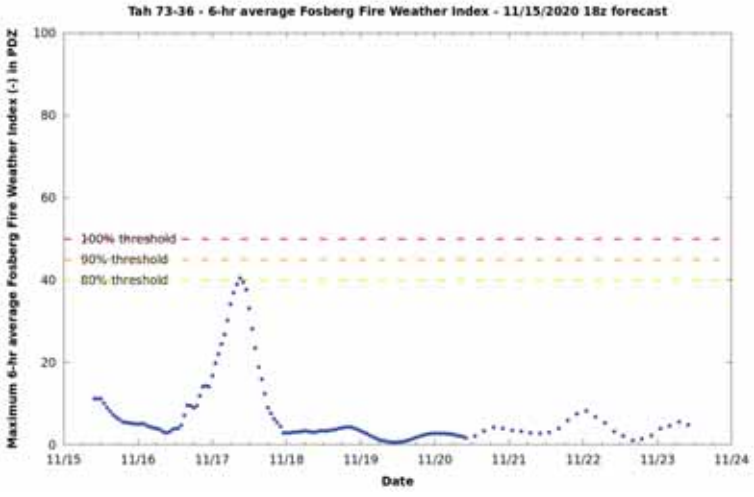


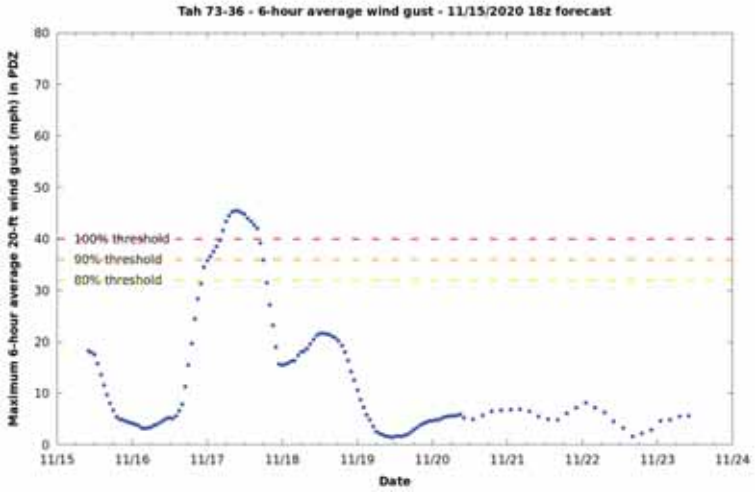
Tah 73-17



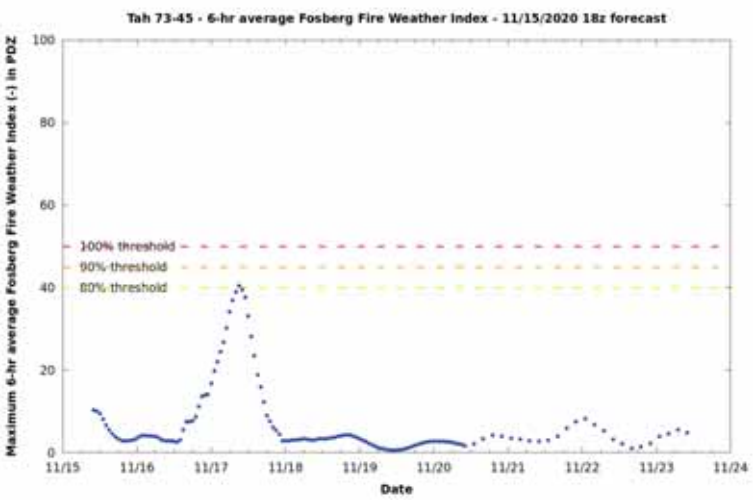


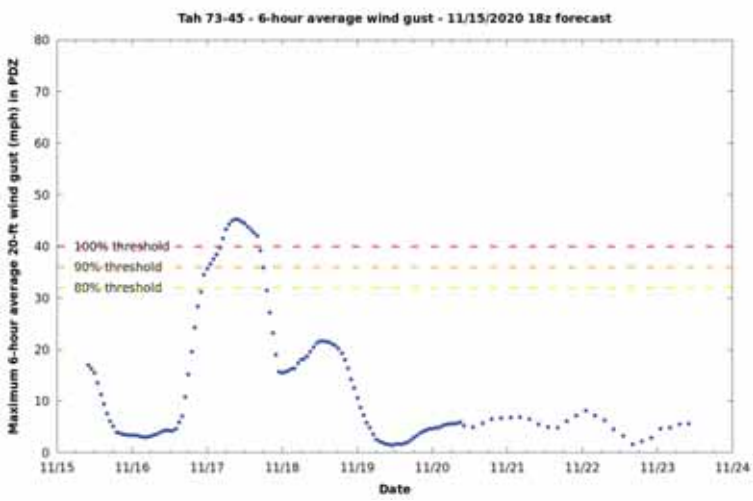
Tah 73-36



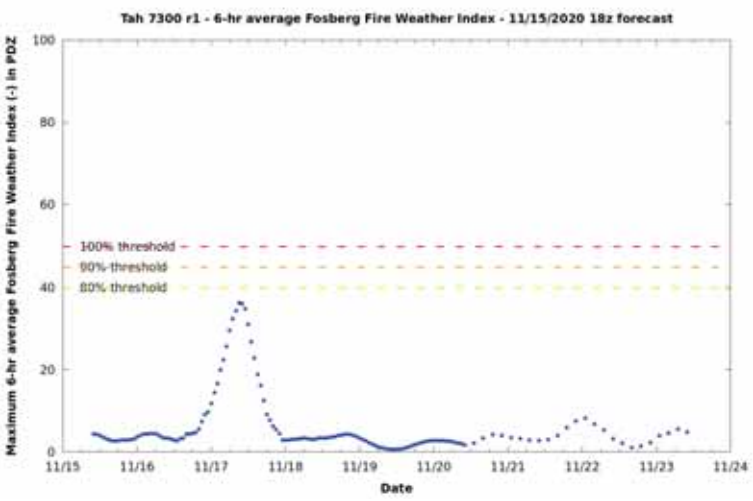


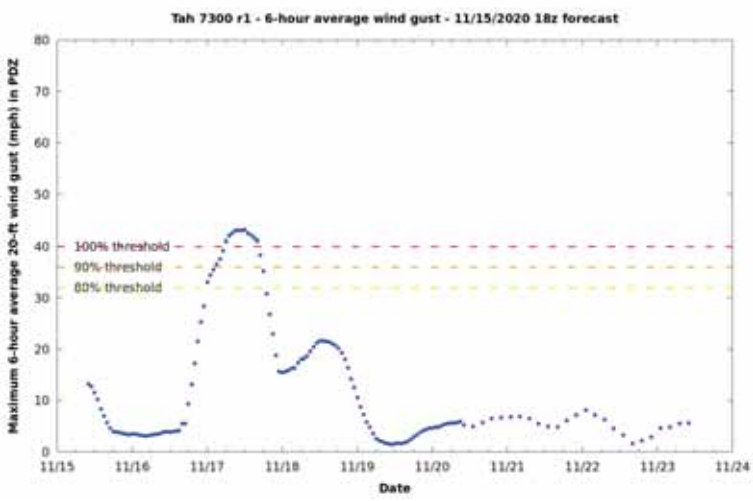
Tah 73-45



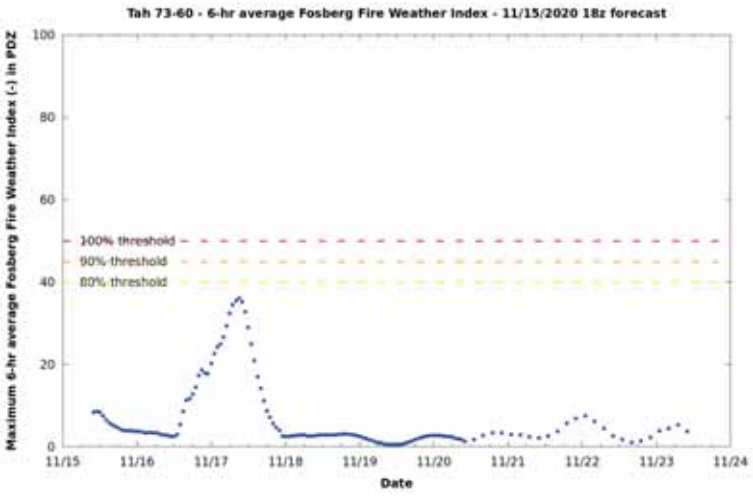


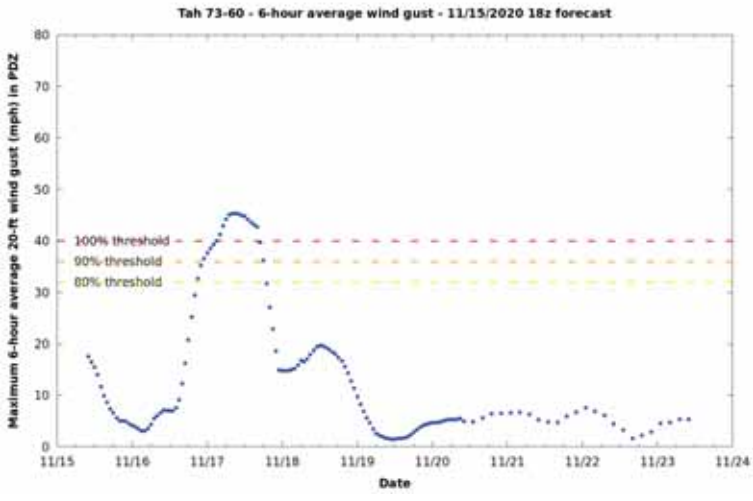
Tah 7300 r1



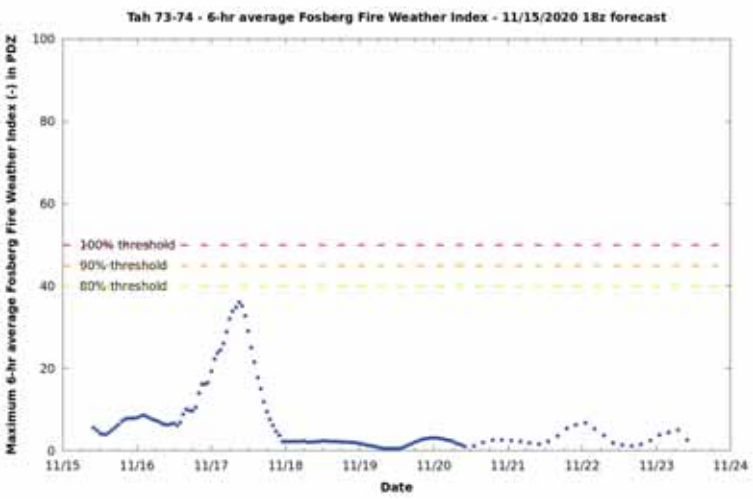


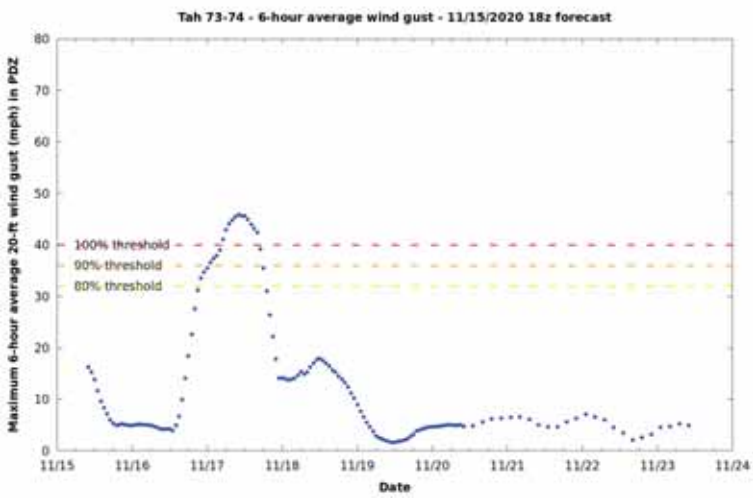
Tah 73-60



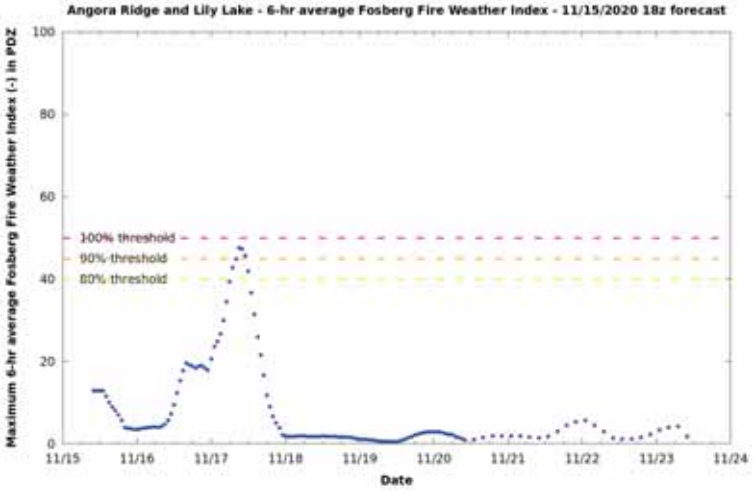


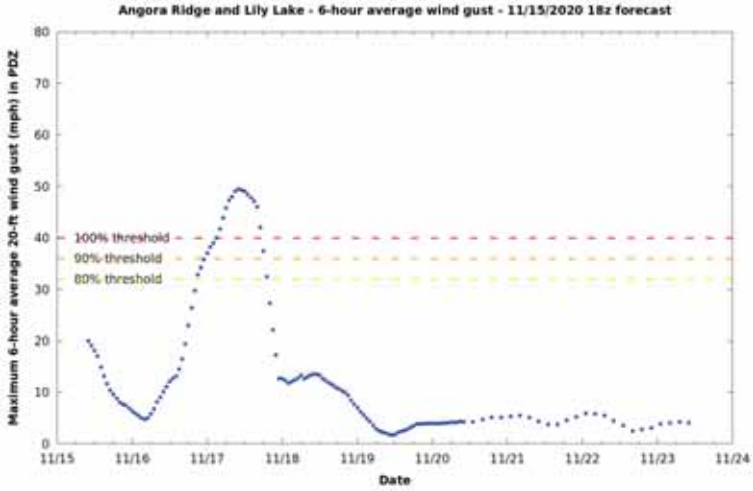
Tah 73-74



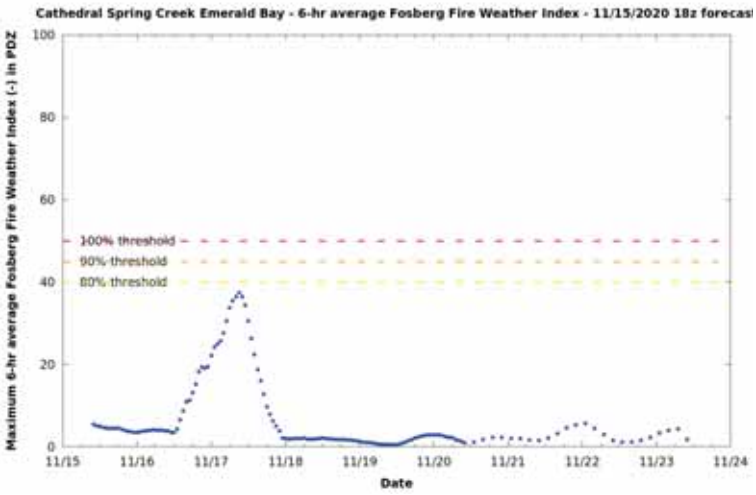


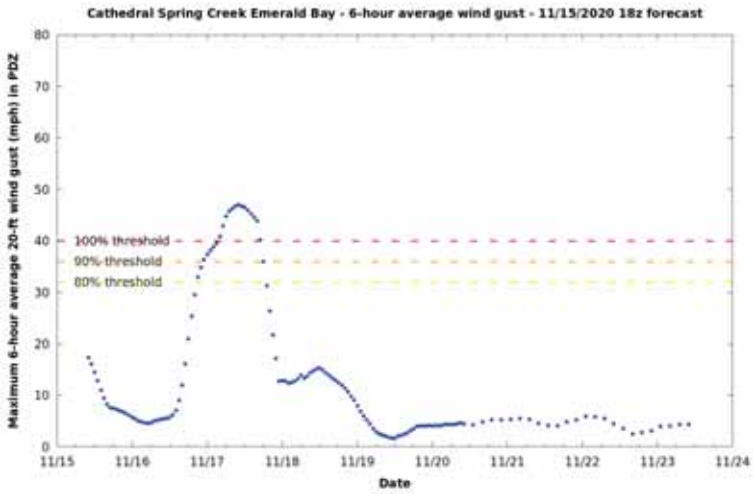
Angora Ridge and Lily Lake



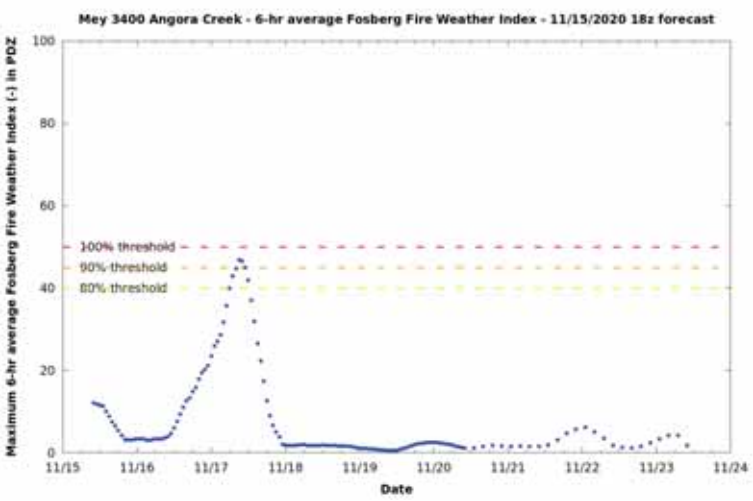


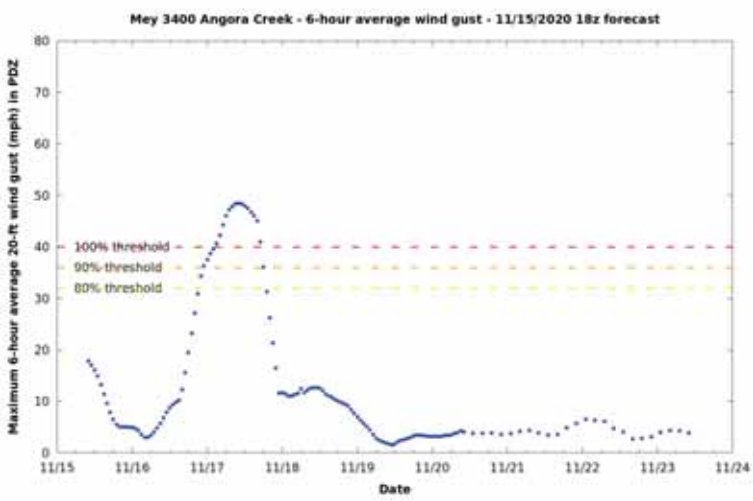
Cathedral Spring Creek Emerald Bay



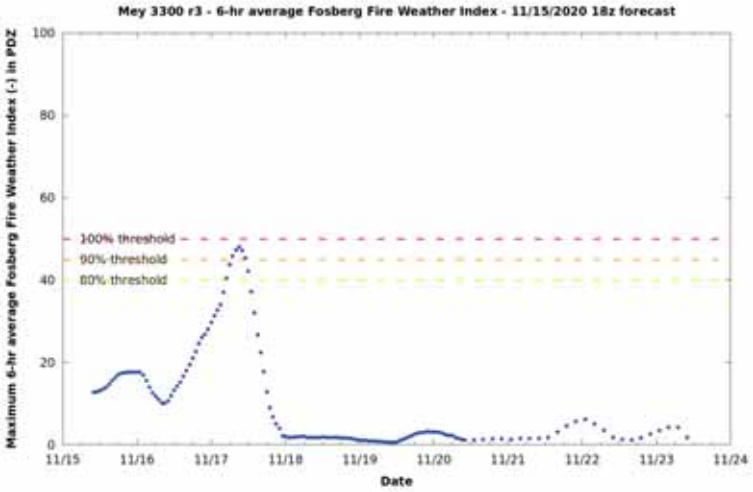


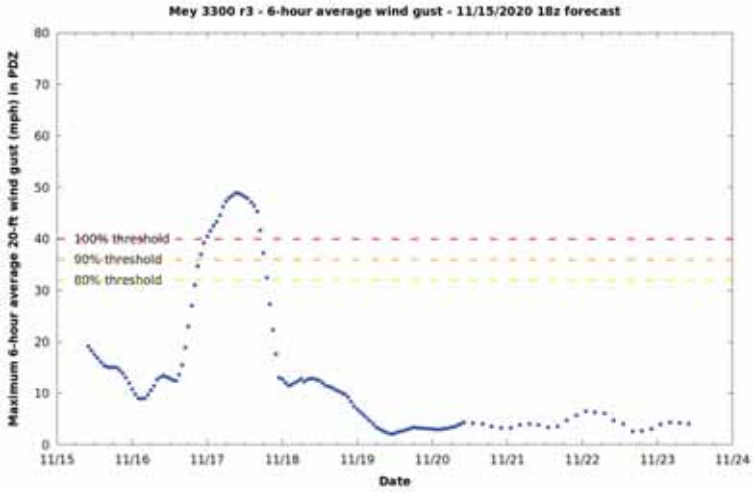
Mey 3400 Angora Creek



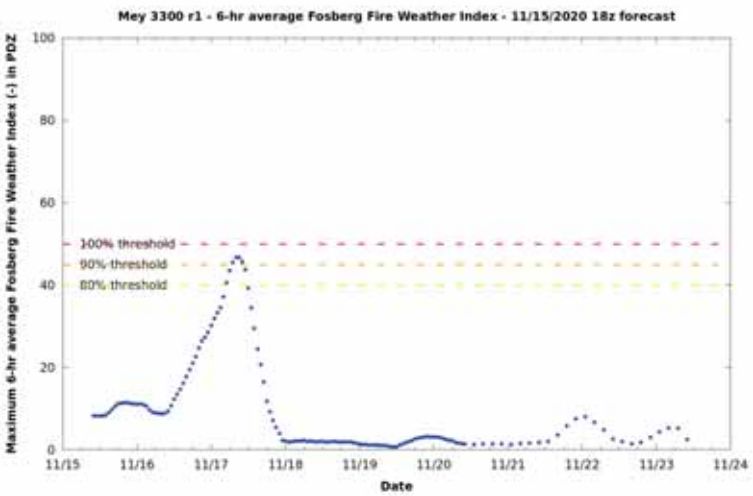


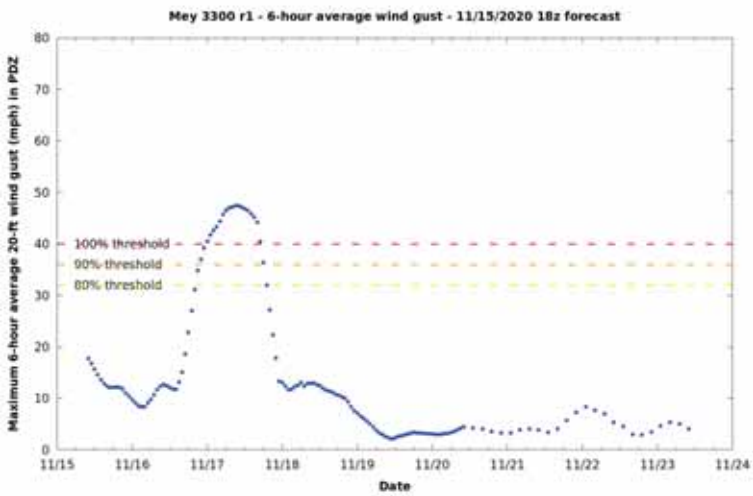
Mey 3300 r3



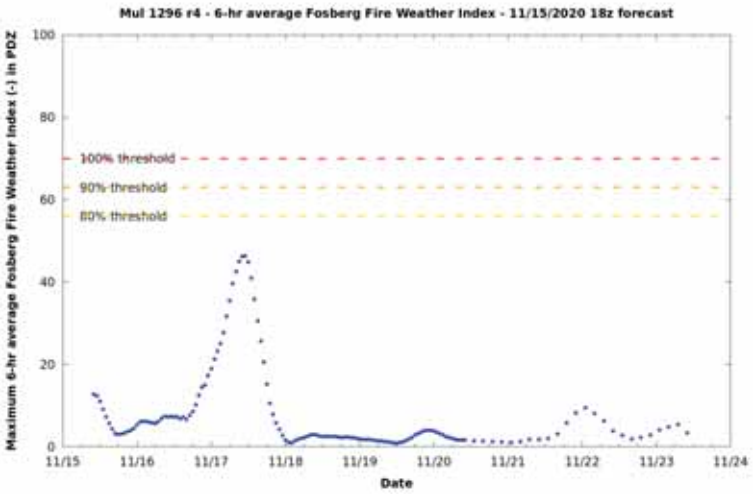


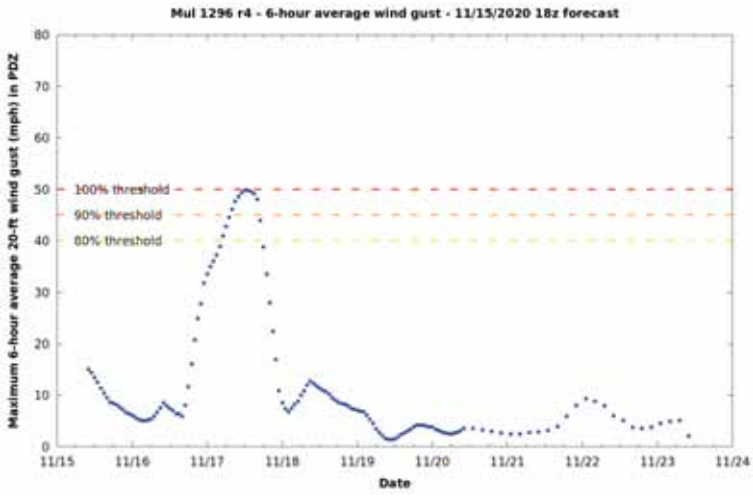
Mey 3300 r1



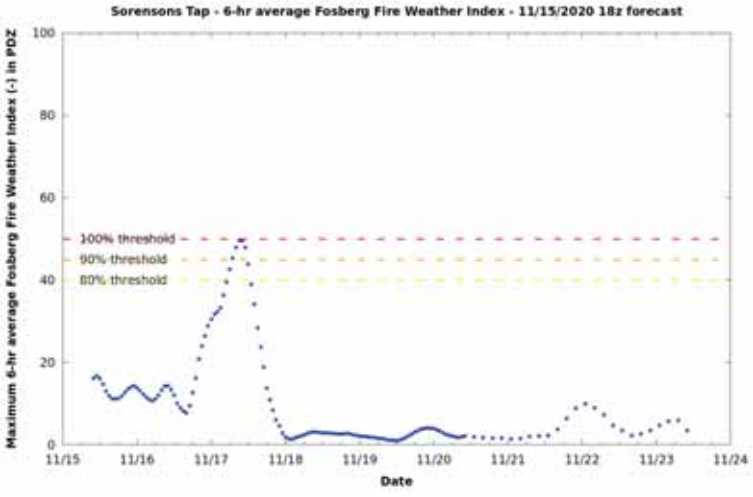


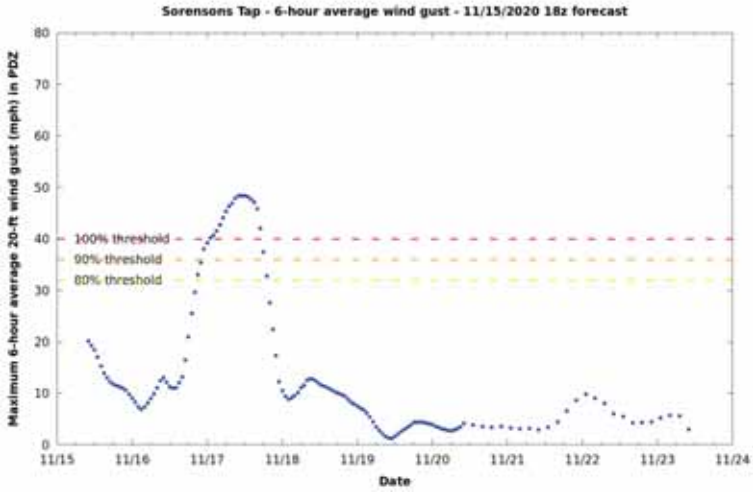
Mul 1296 r4



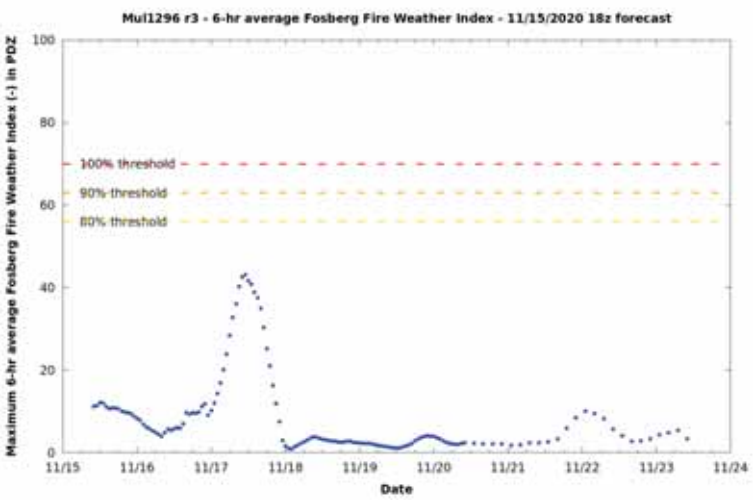


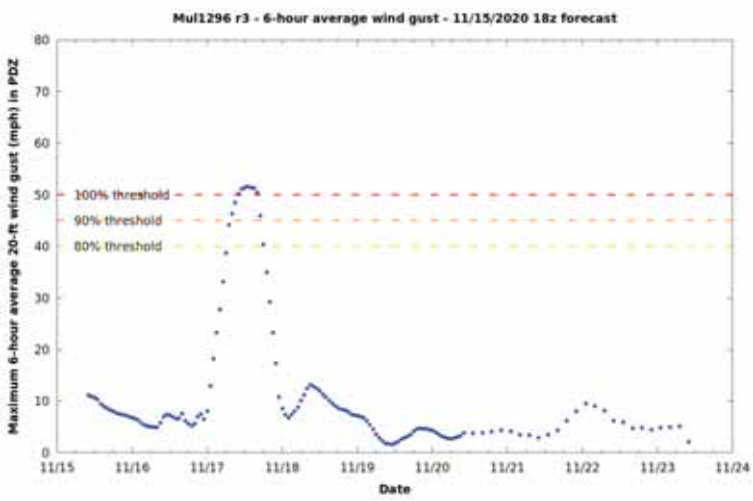
Sorensons Tap



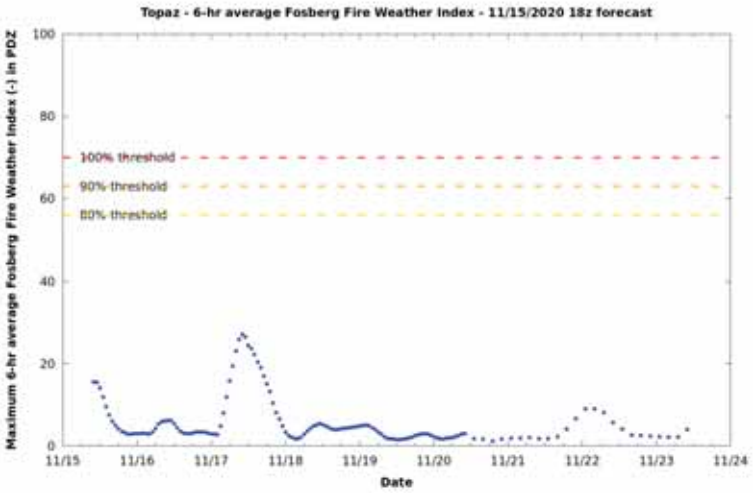


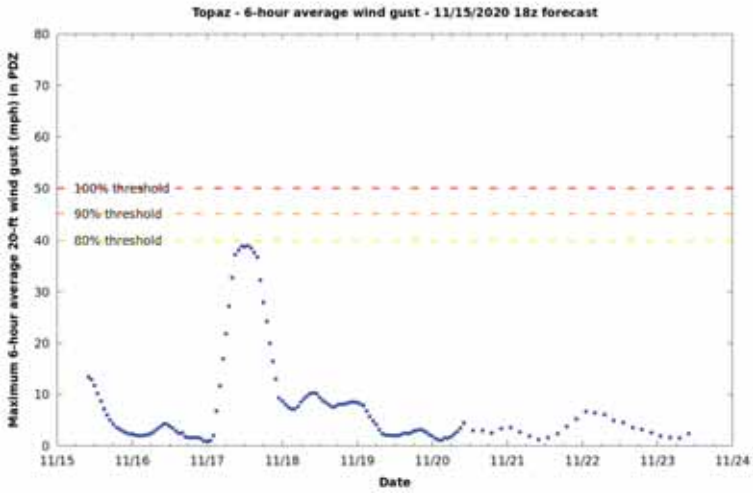
Mul 1296 r3



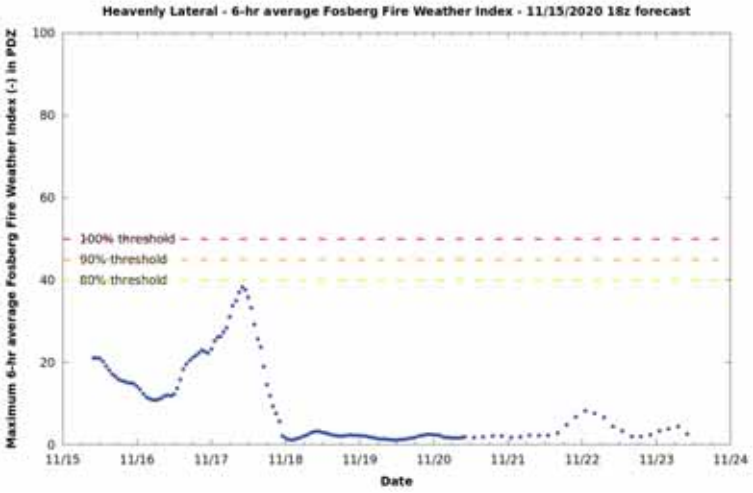


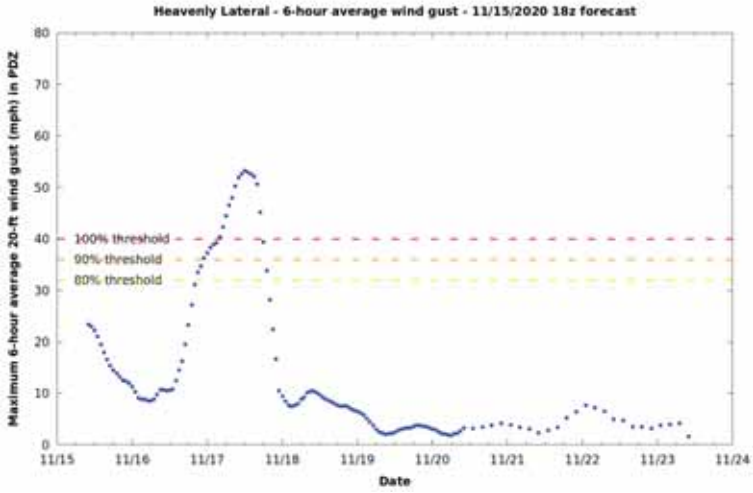
Topaz



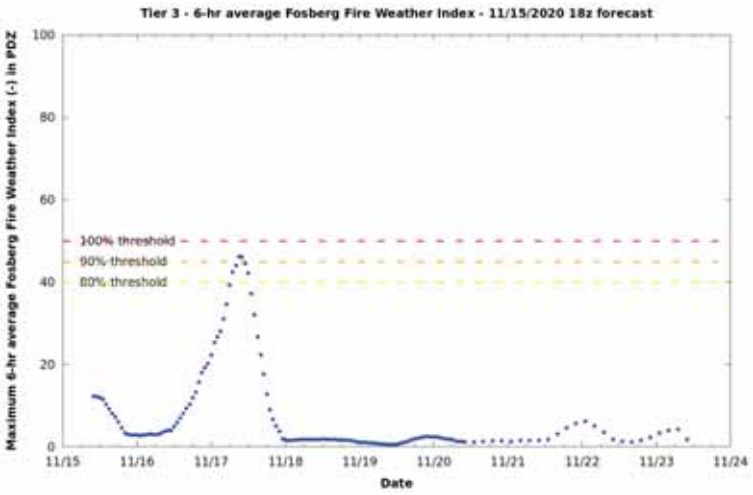


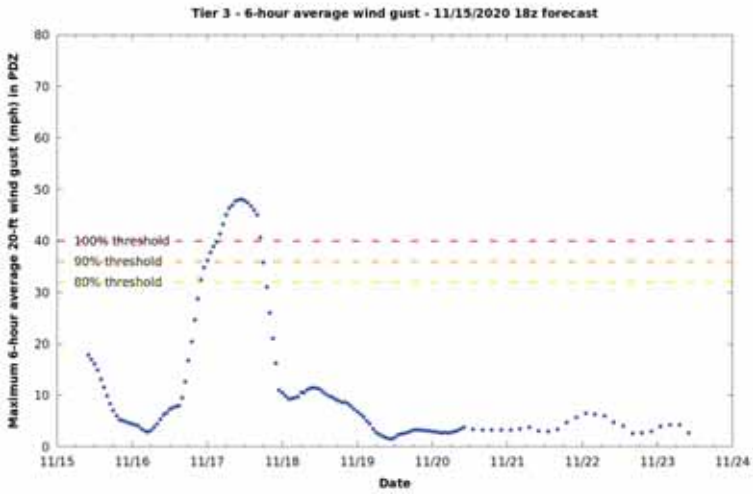
Heavenly Lateral



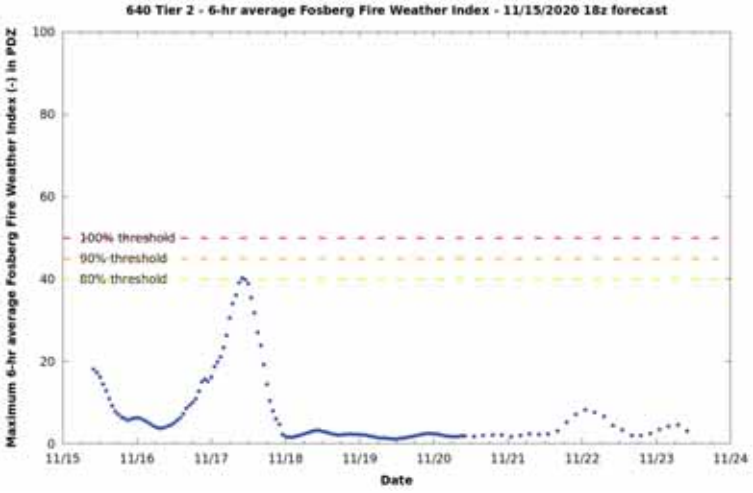


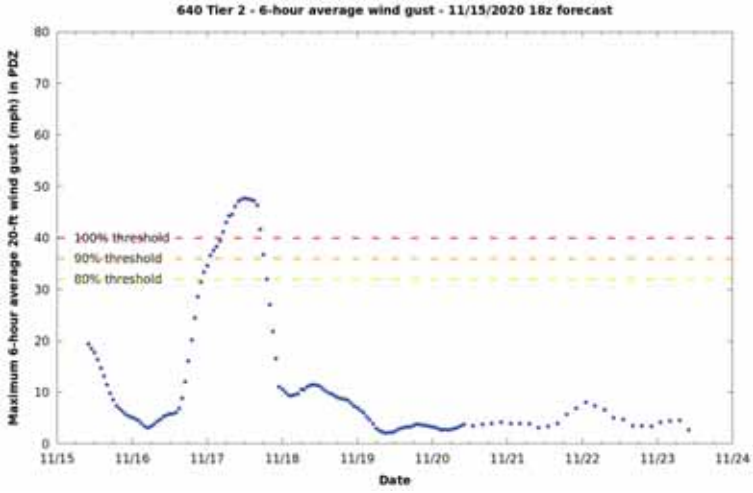
Tier 3



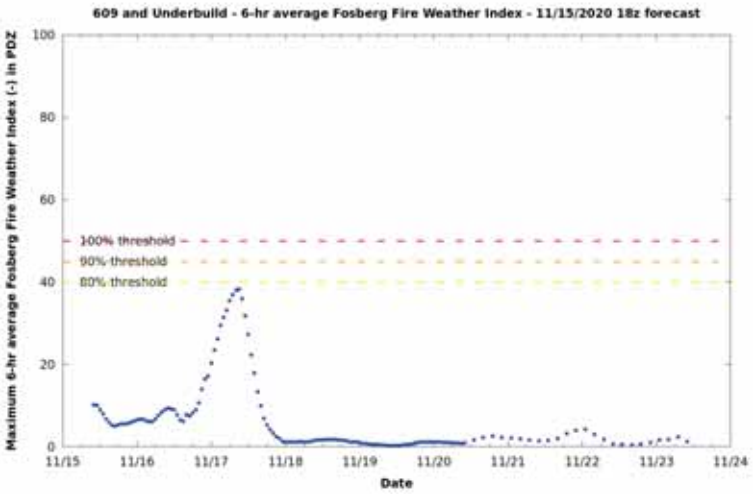


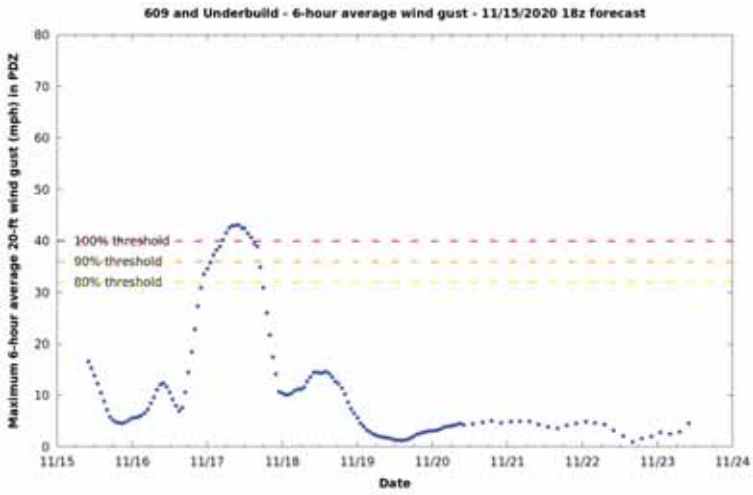
640 Tier 2



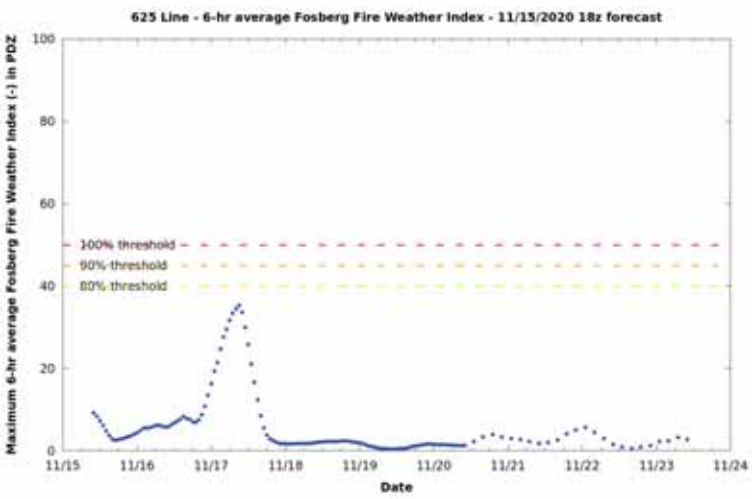


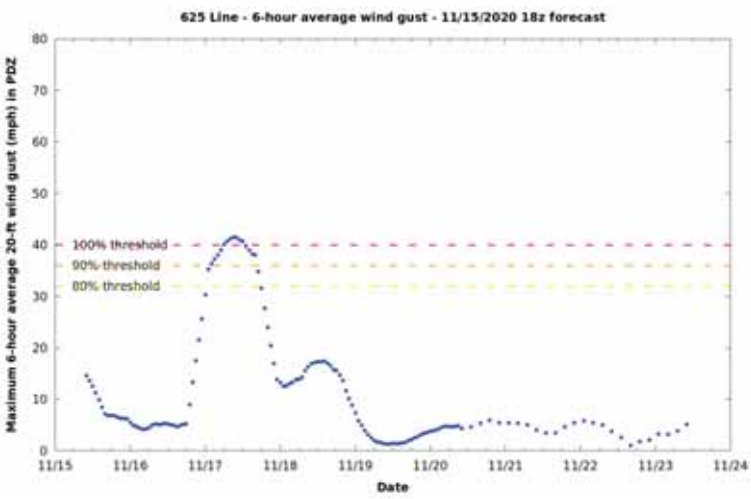
609 and Underbuild



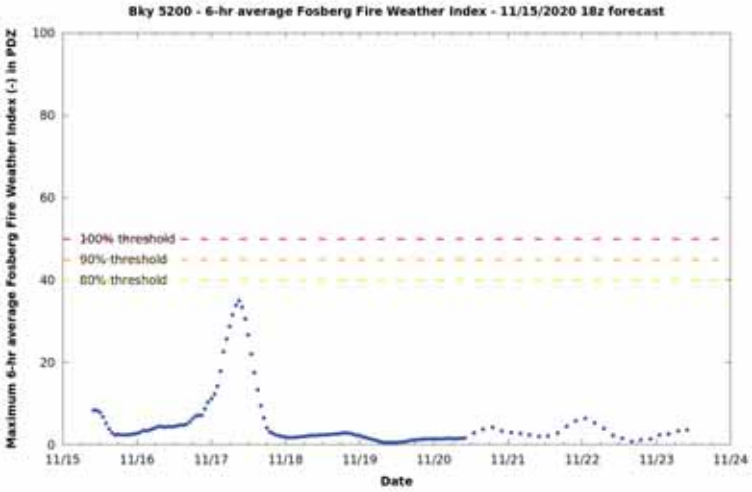


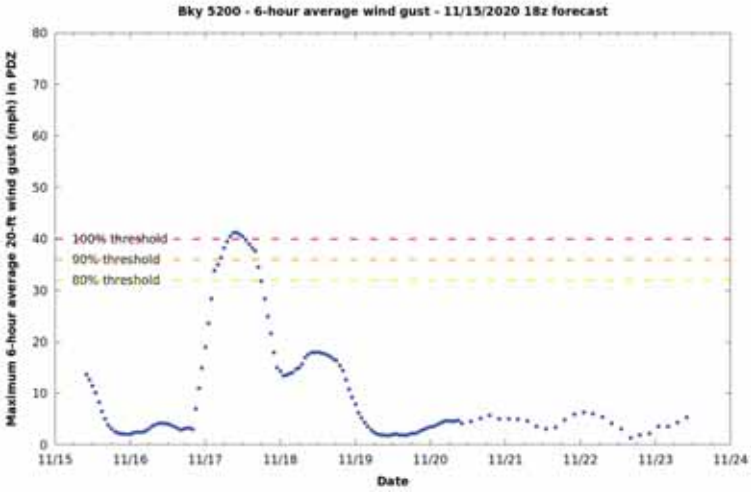
625 Line



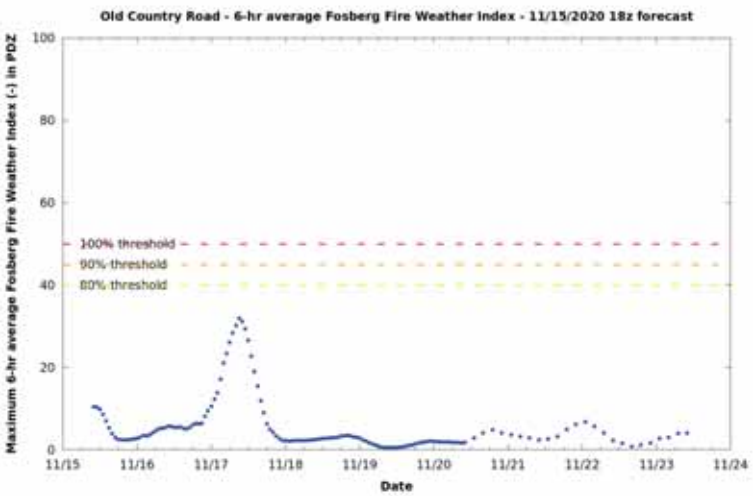


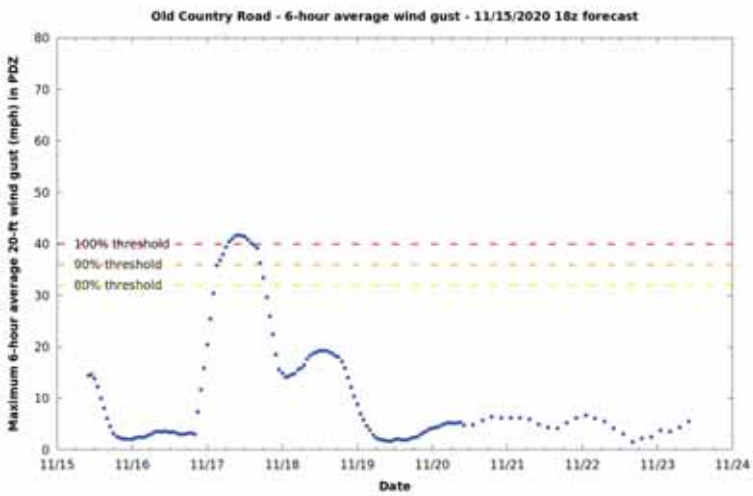
Bky 5200



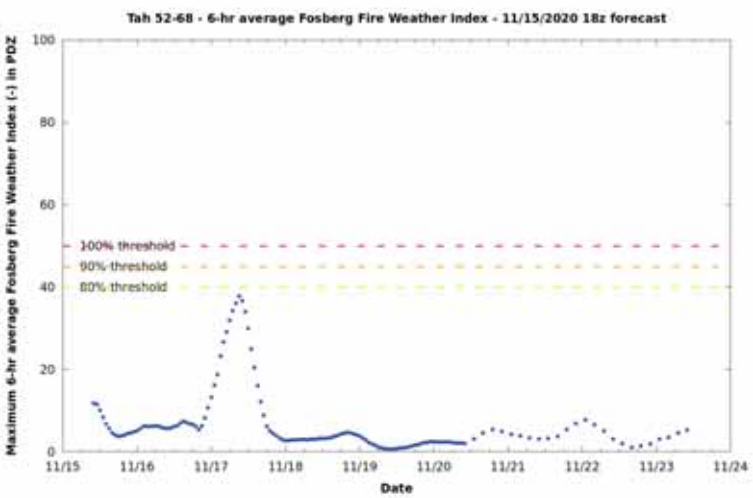


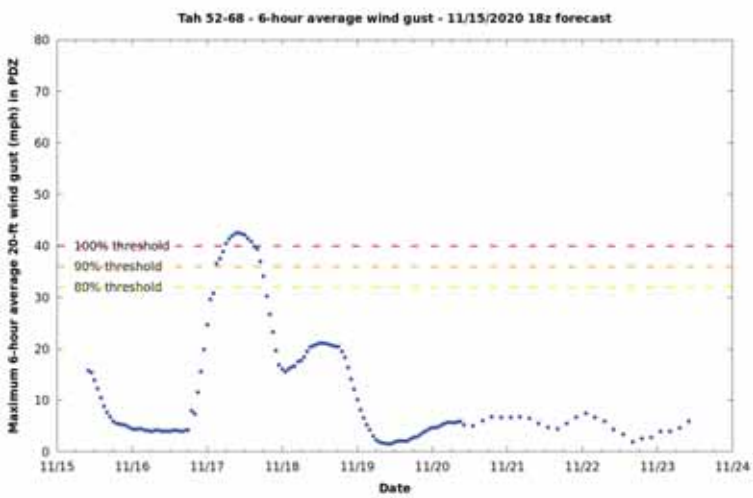
Old Country Road



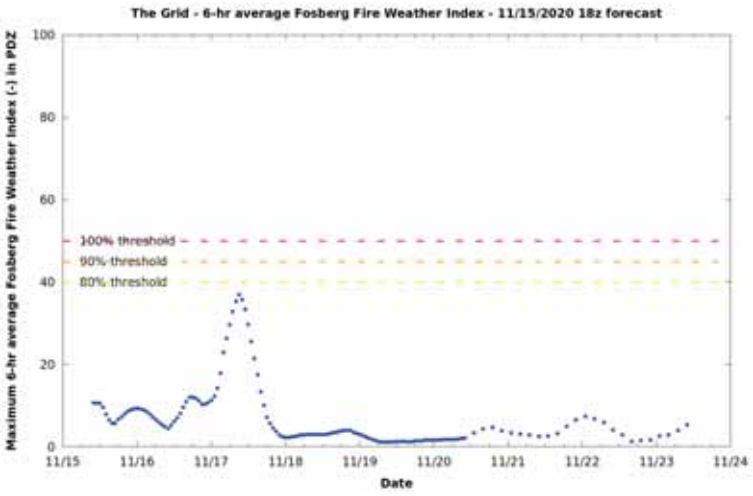


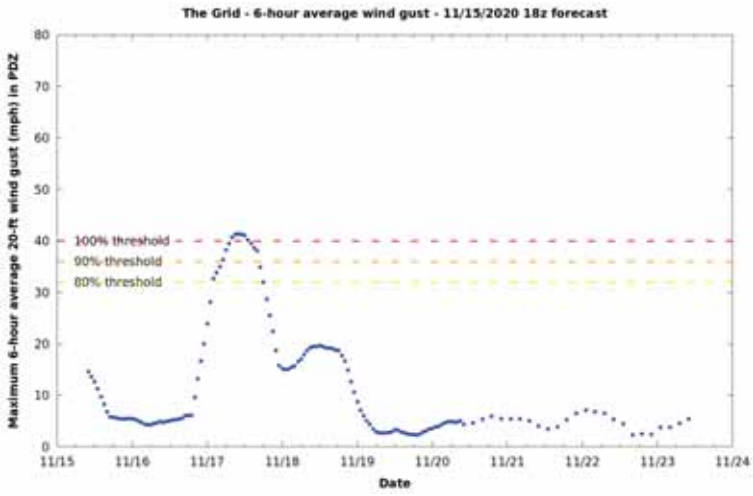
Tah 52-68



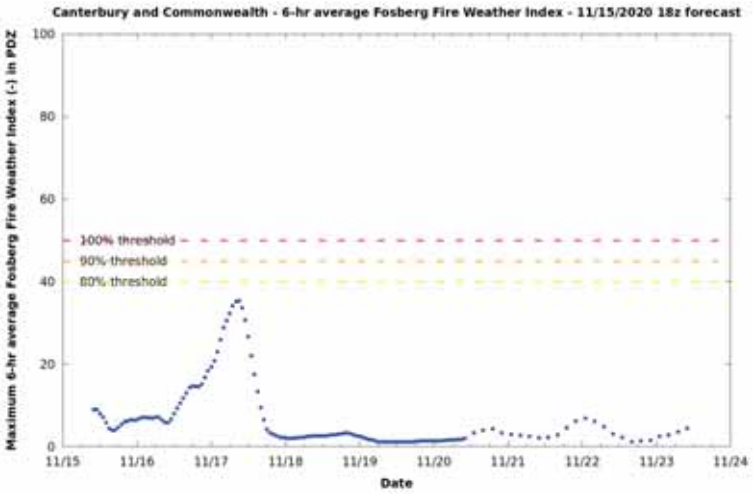


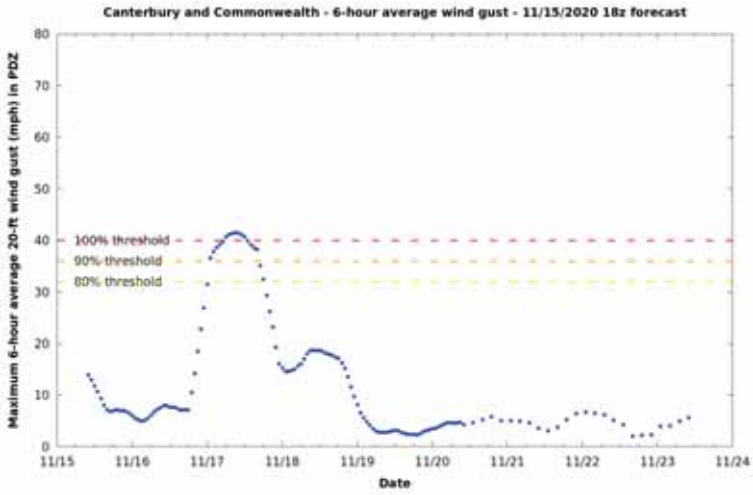
The Grid



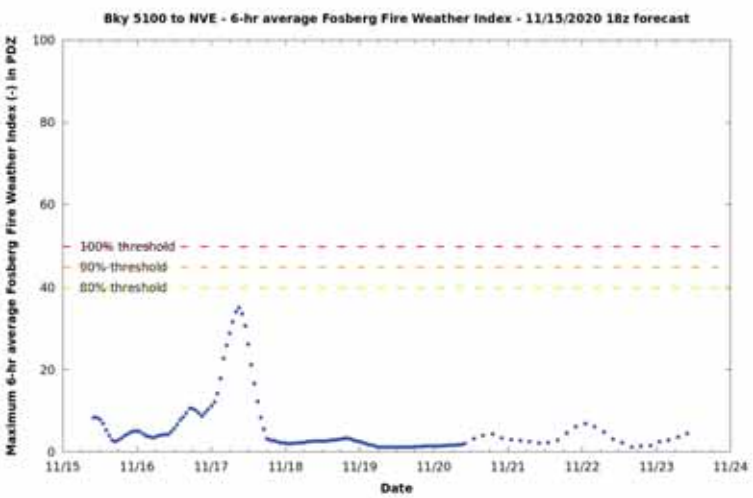


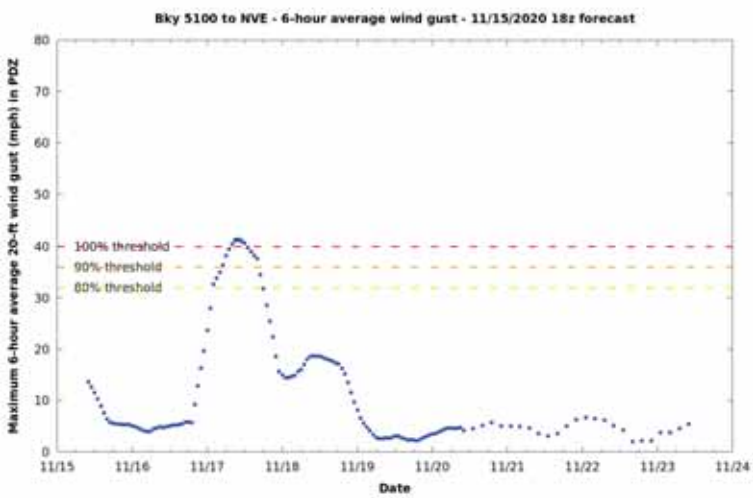
Canterbuy and Commonwealth



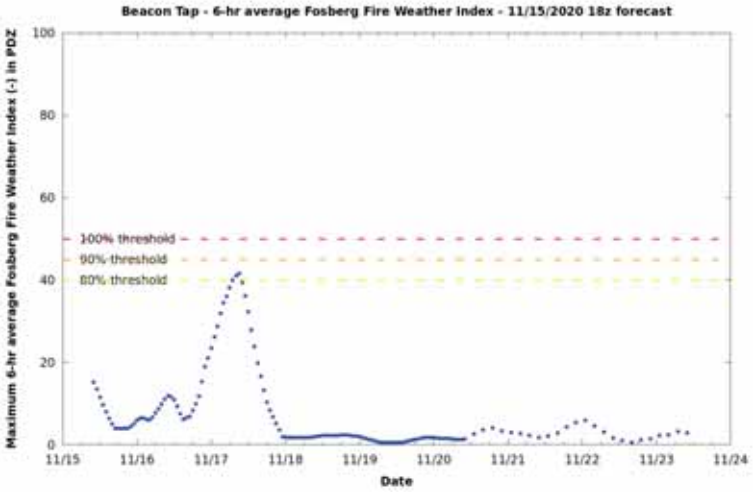


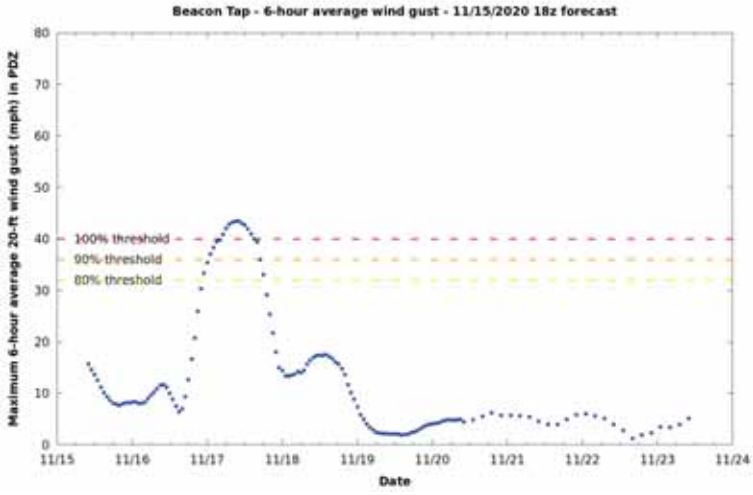
Bky 5100 to NVE



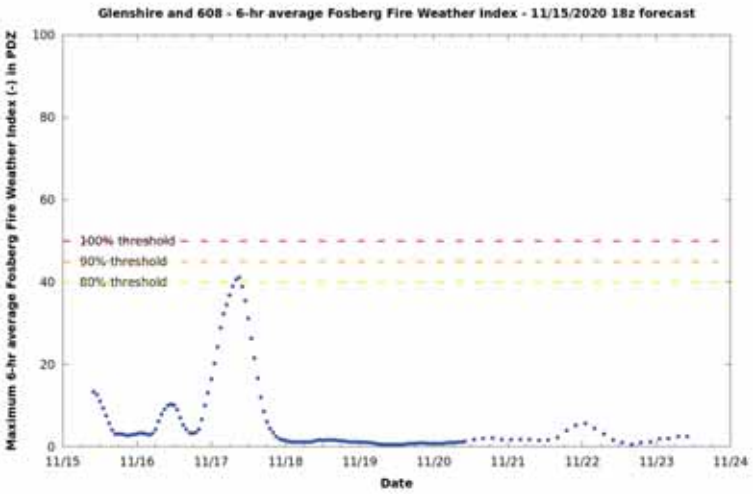


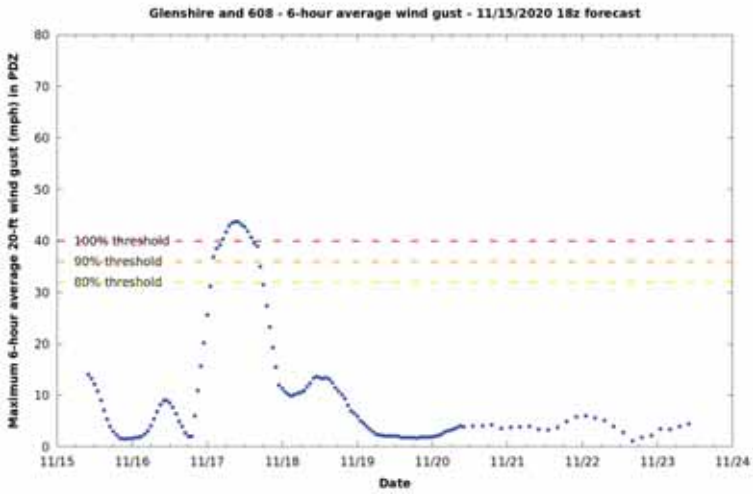
Beacon Tap



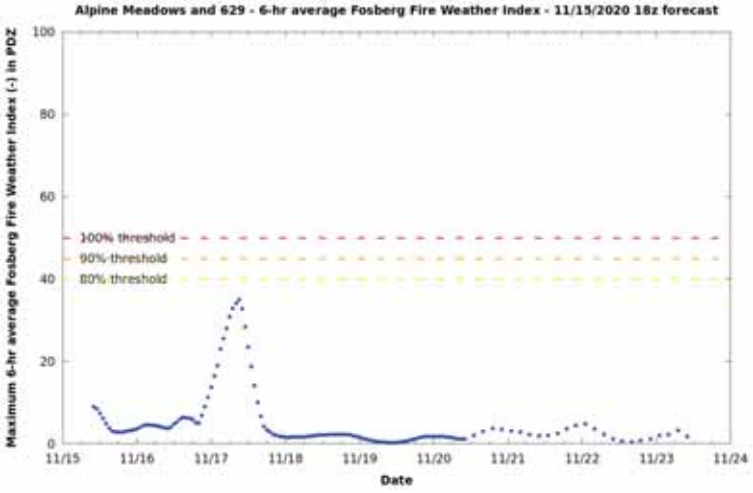


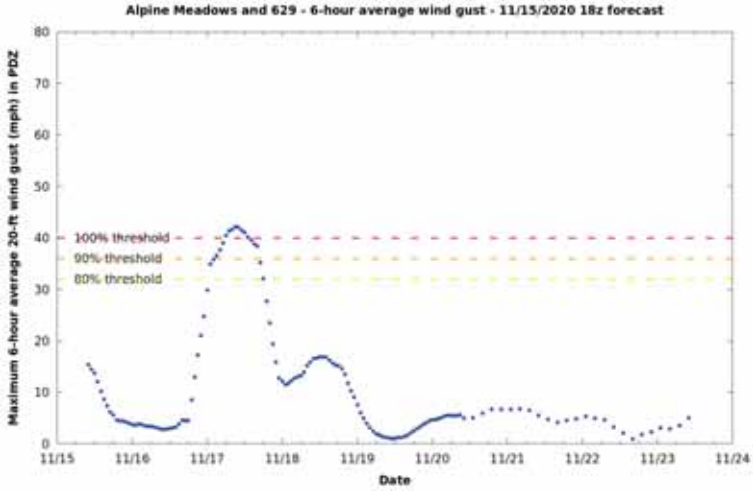
Glenshire and 608



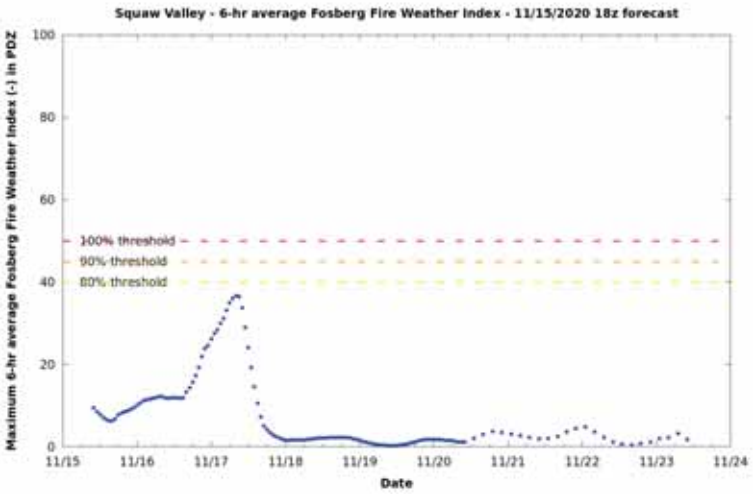


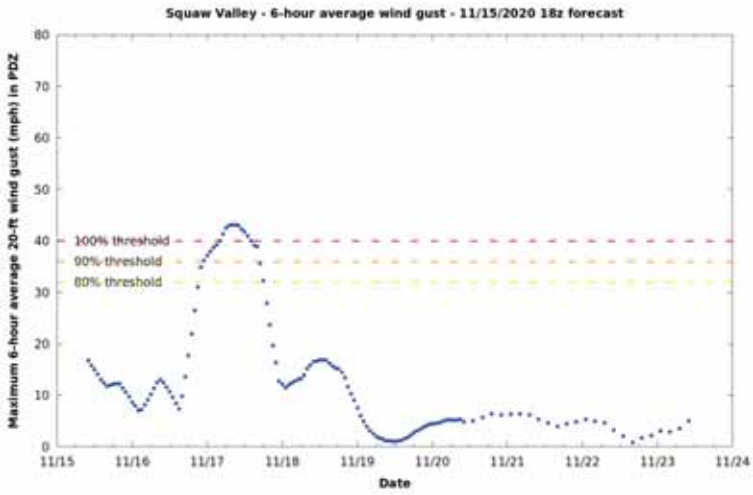
Alpine Meadows and 629



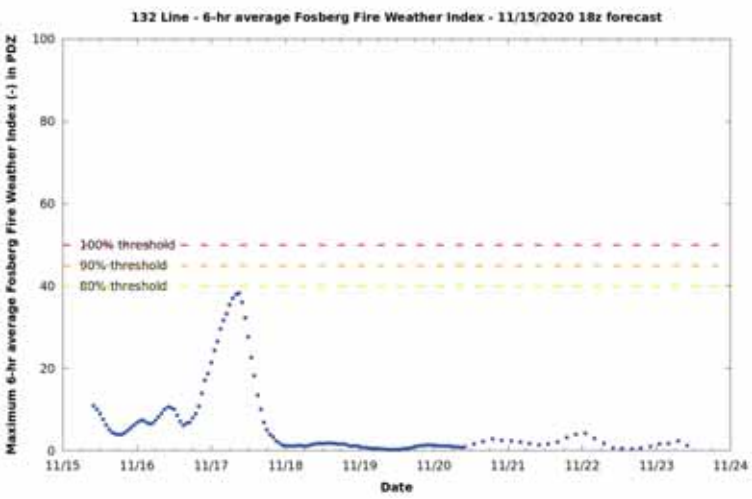


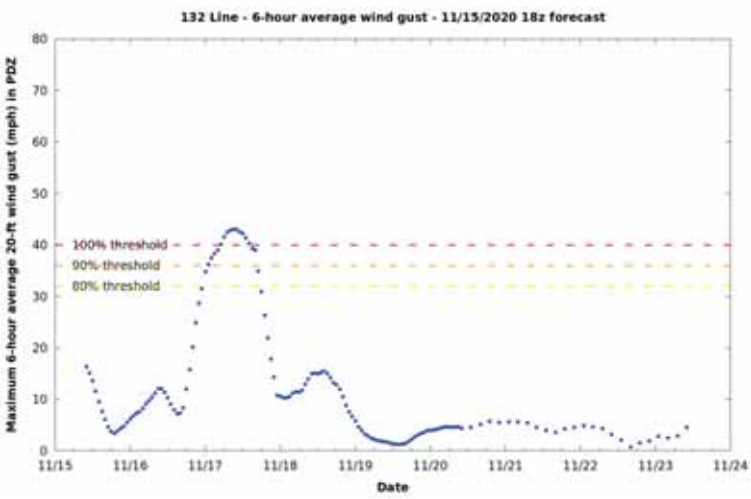
Squaw Valley



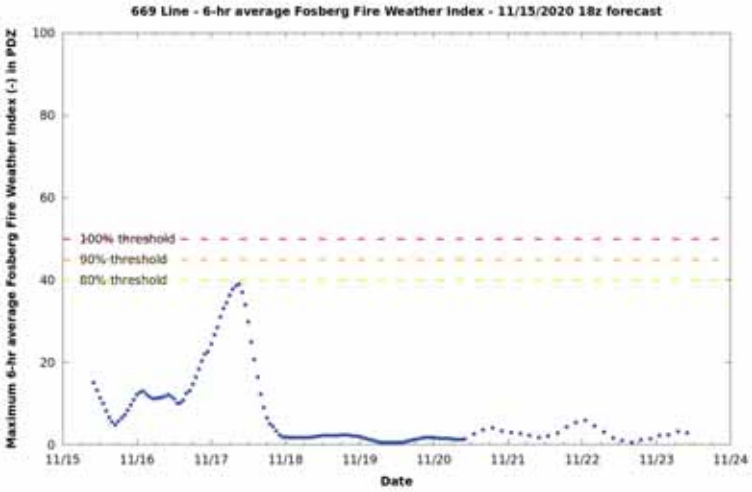


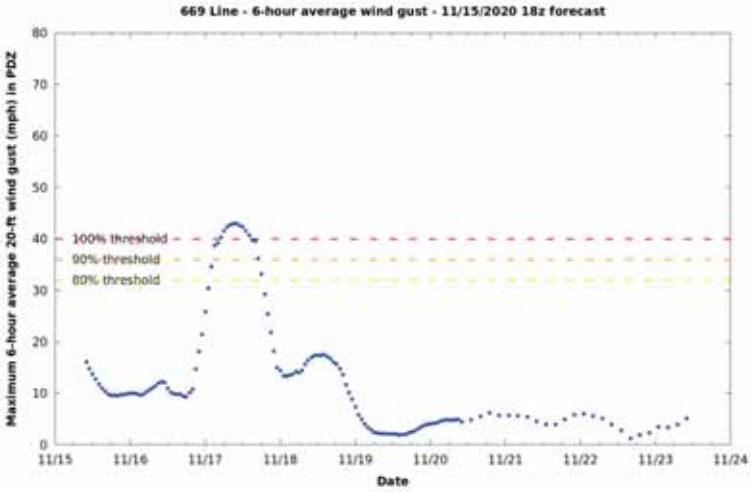
132 Line



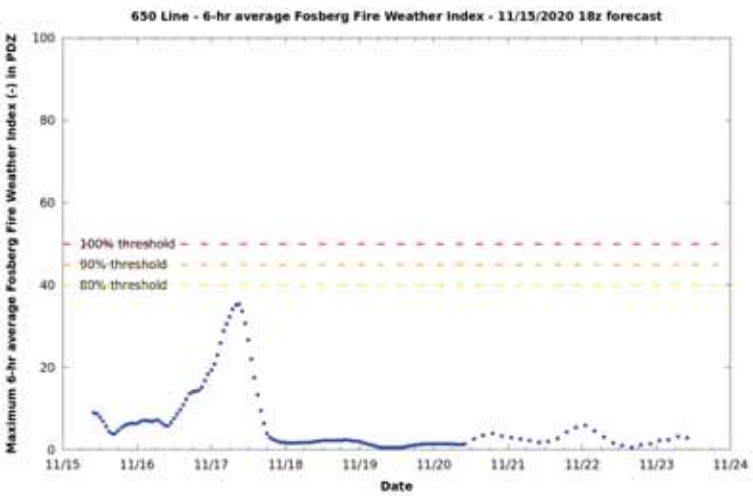


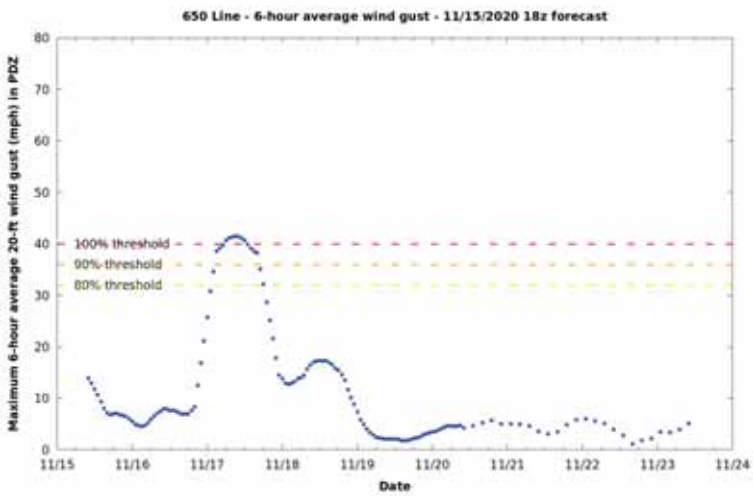
669 Line



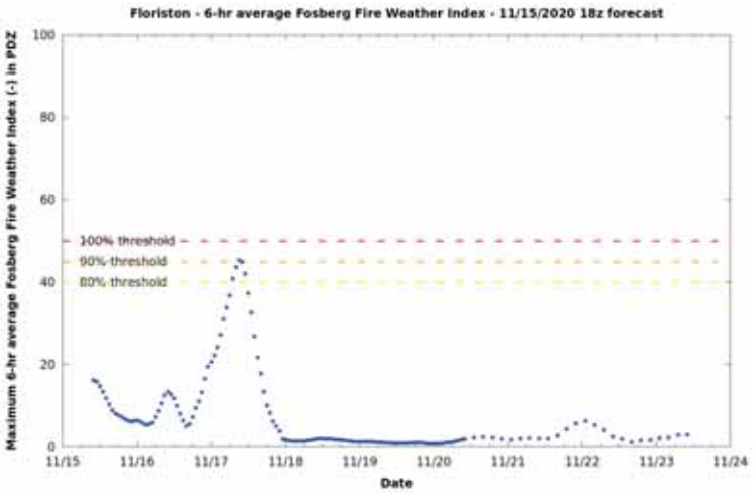


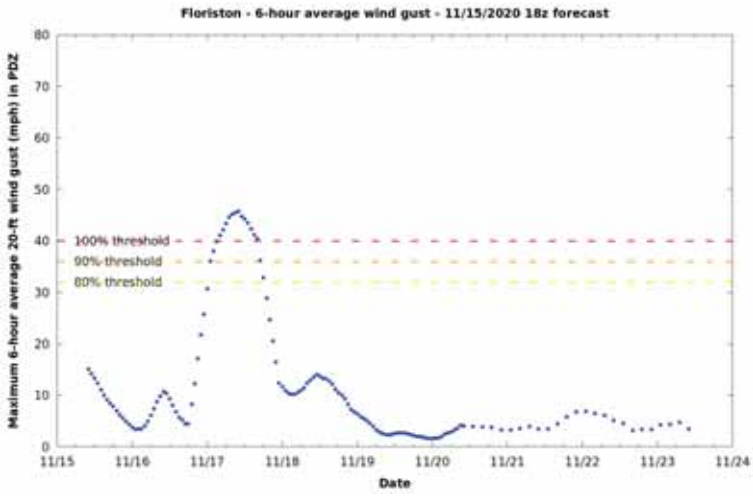
650 Line



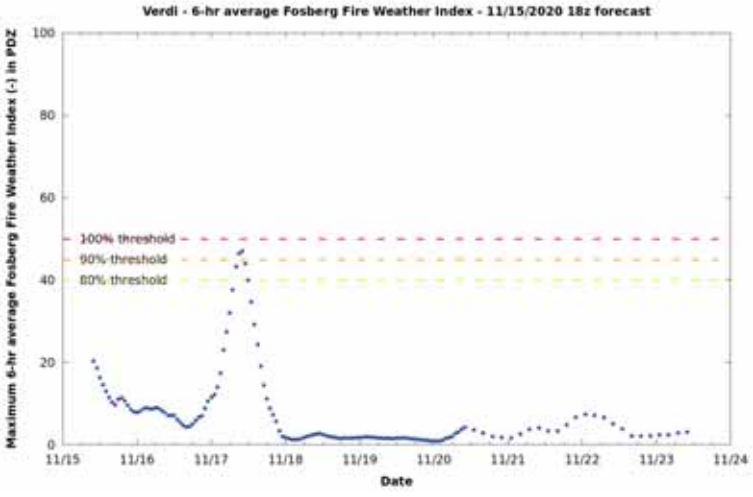


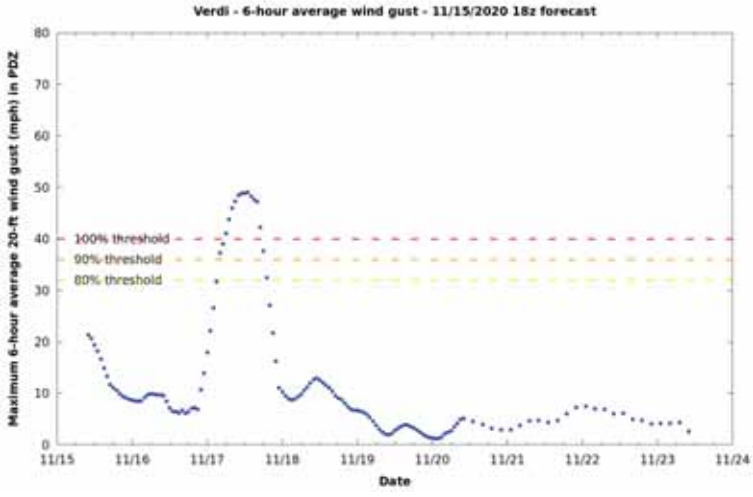
Floriston



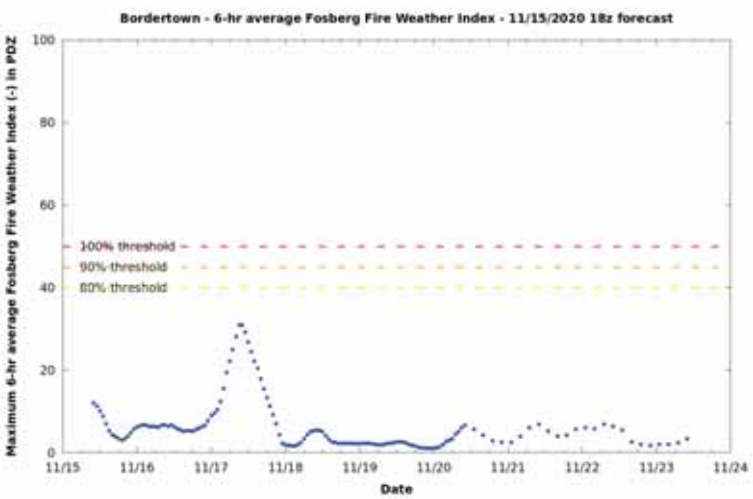


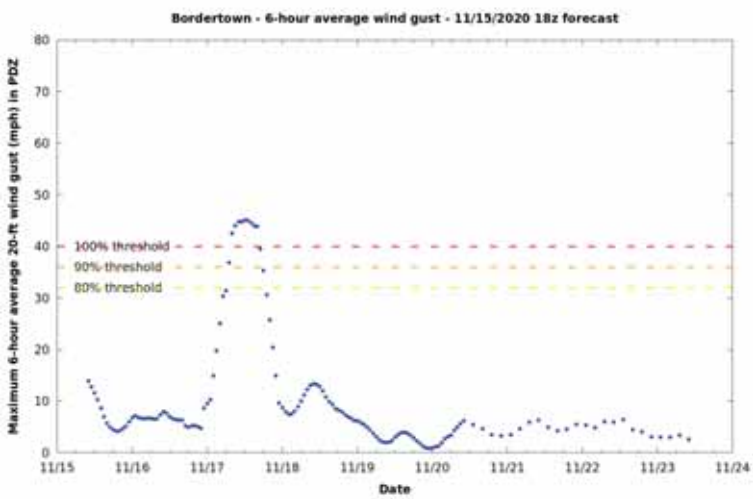
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/15/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/15/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/16/20 - 11/22/20

Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

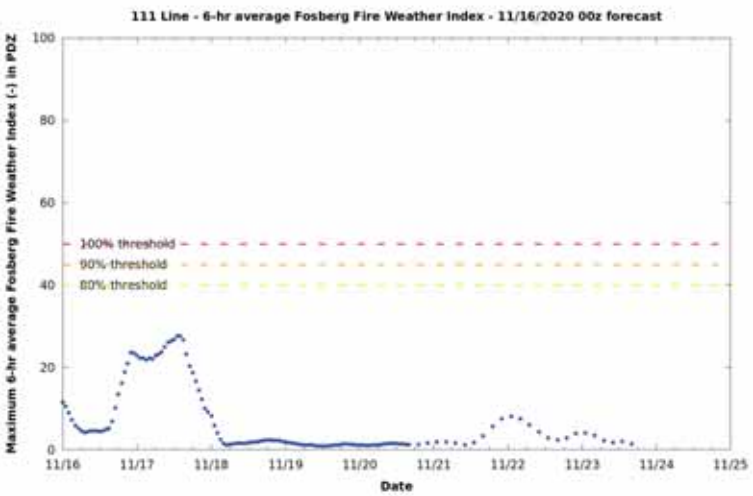
Liberty Utilities Energy Release Component Forecast for 11/16/20 - 11/22/20

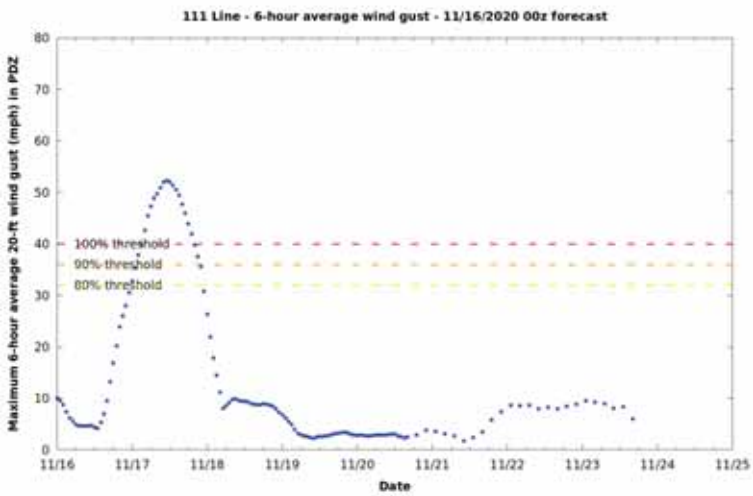
Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	47.6	49.4	47.7	33.9	33.0	34.5	36.9
Sierra Brooks	50.9	56.8	54.6	40.3	42.4	45.2	49.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.3	1.4	1.2	0.7	0.7	0.6	0.6
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	23.8	27.2	24.3	15.9	17.7	19.6	20.4
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	43.0	48.3	43.8	27.6	28.9	31.5	32.5
Topaz	53.4	57.9	54.1	36.4	39.2	40.9	42.2
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	3.4	3.8	3.4	2.1	1.9	1.9	1.8
Old Country Road	29.7	32.0	26.3	16.6	14.9	14.3	13.7
Tah 52-68	20.1	21.7	17.9	11.2	10.2	9.7	9.3
The Grid	8.3	9.5	8.1	4.6	4.3	3.8	3.6
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	24.1	24.1	23.0	15.4	15.6	15.5	16.8
Verdi	51.1	51.1	47.8	31.7	34.6	36.6	41.1
Bordertown	54.6	54.6	52.1	35.8	37.8	40.5	44.7

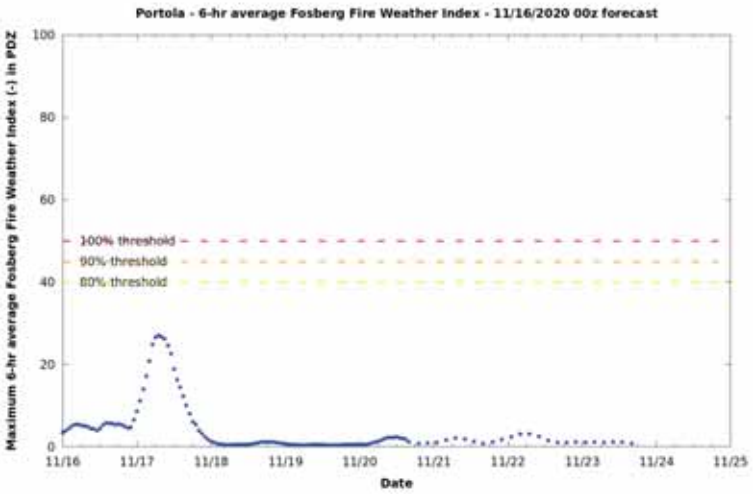
Liberty Utilities Fire Weather Summary Plots - 11/16/2020 00z forecast

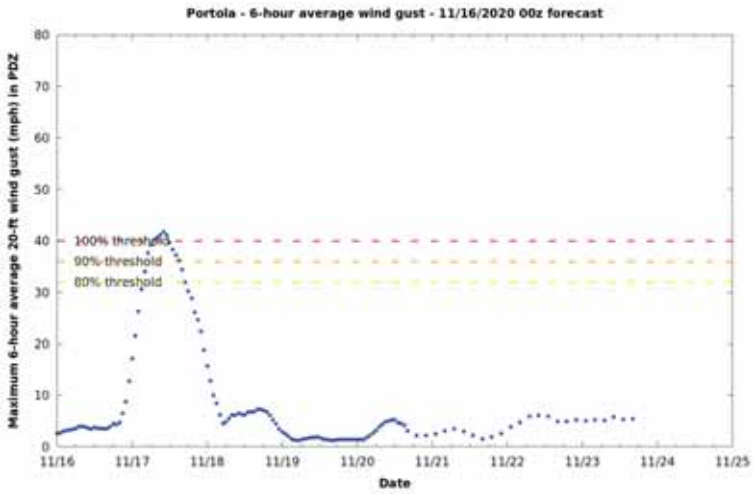
111 Line



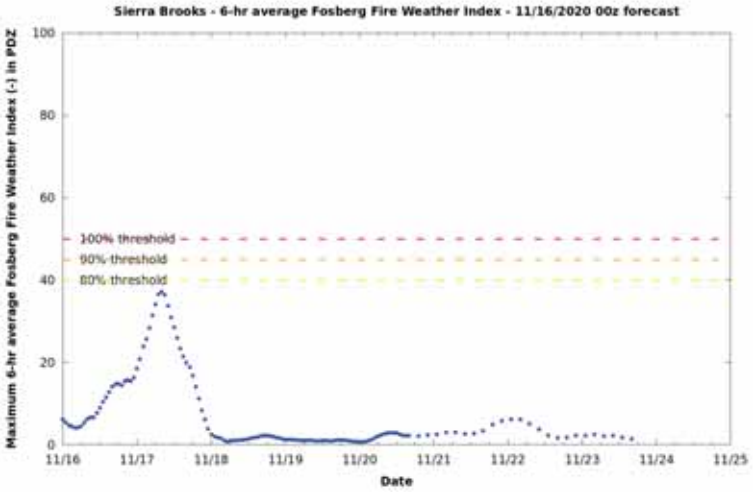


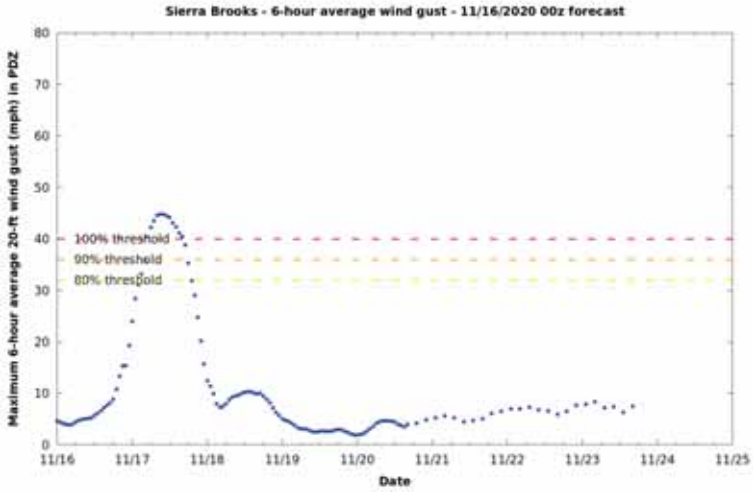
Portola



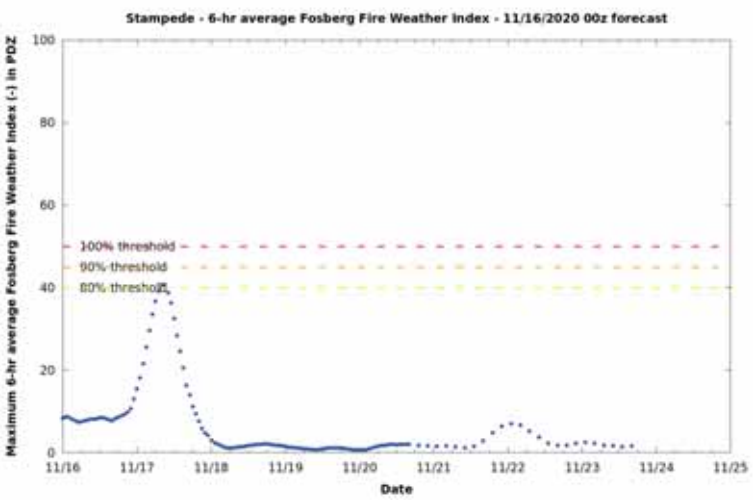


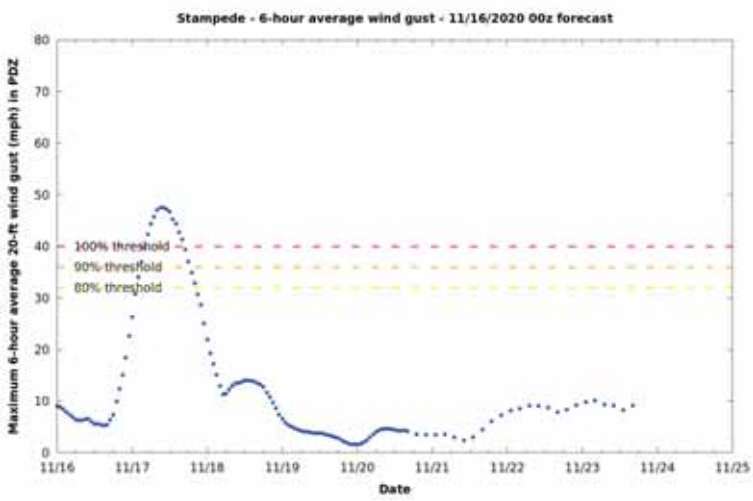
Sierra Brooks



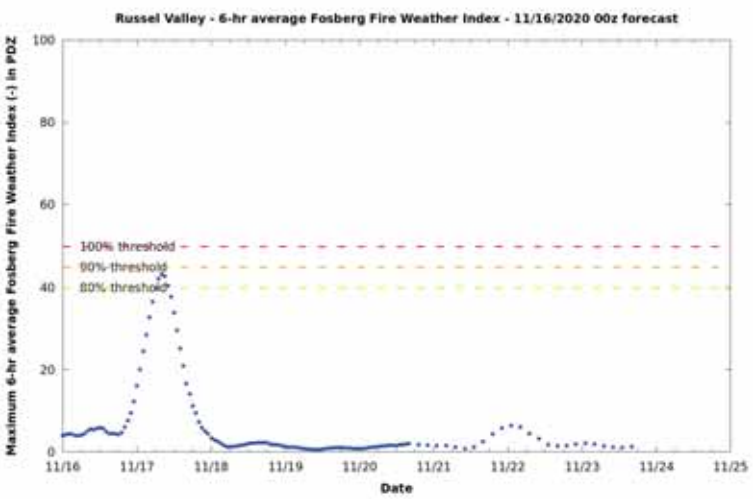


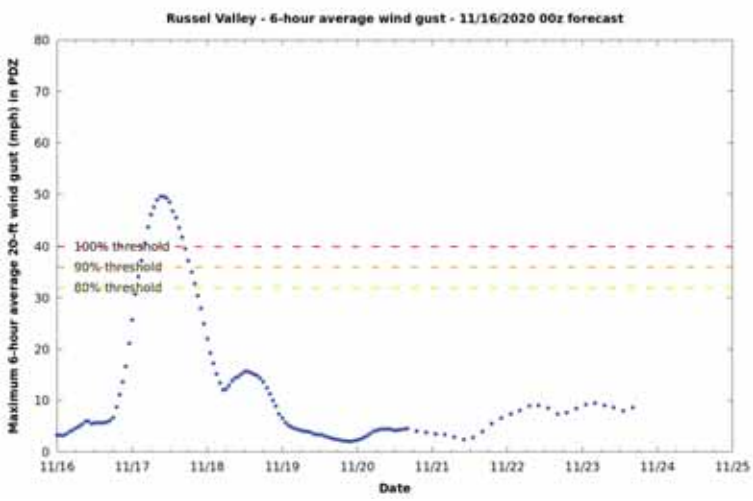
Stampede



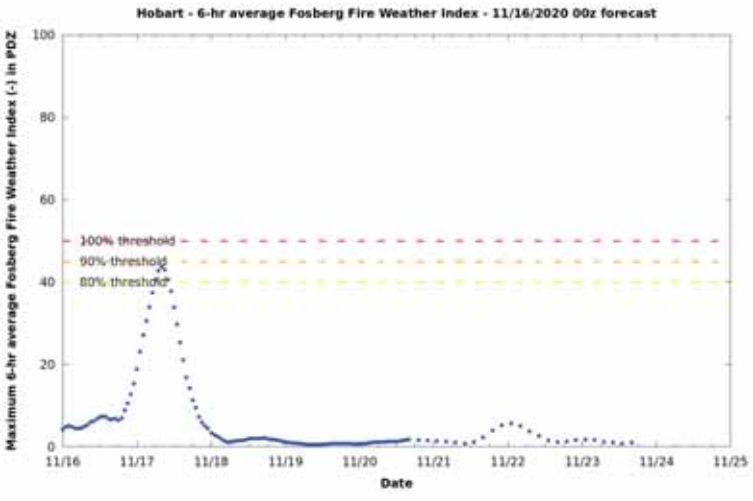


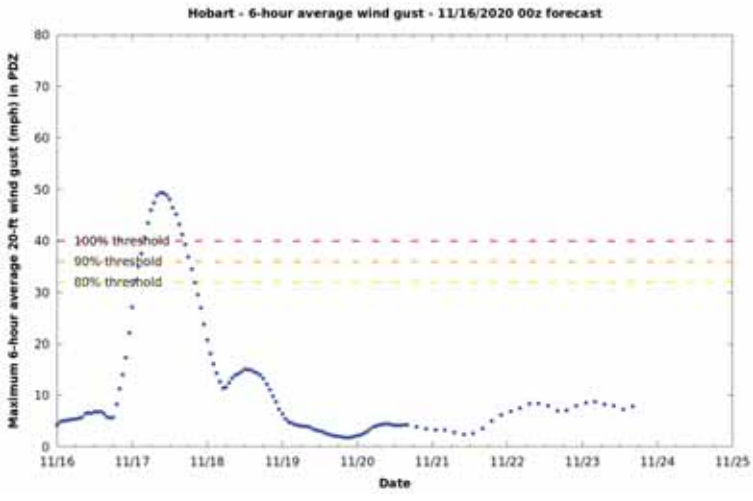
Russell Valley



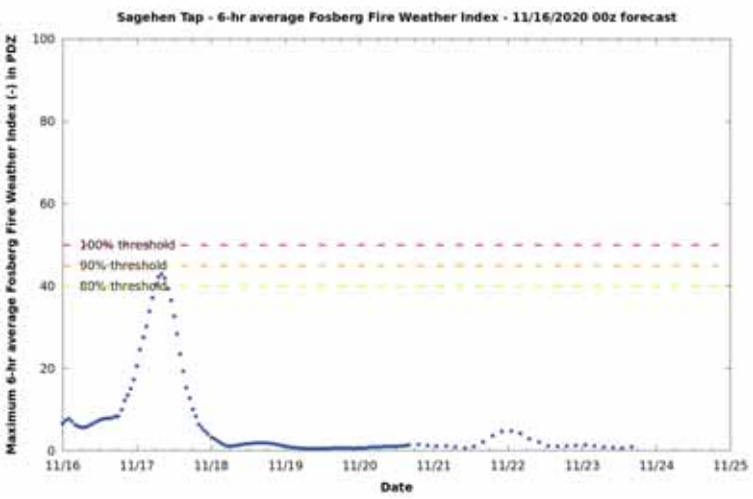


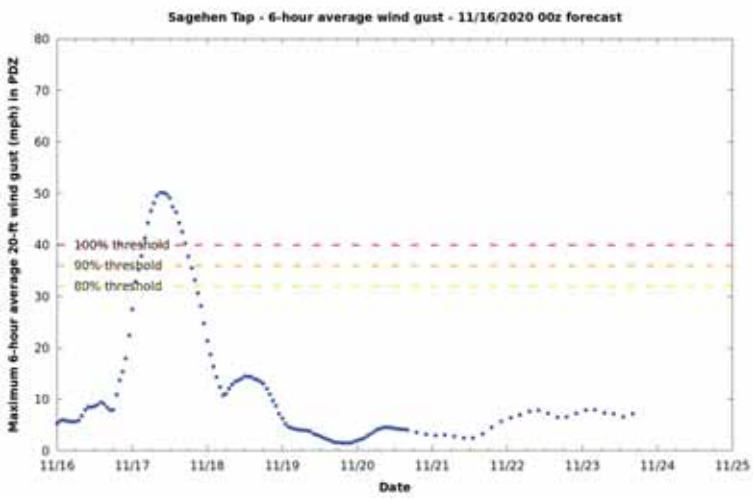
Hobart



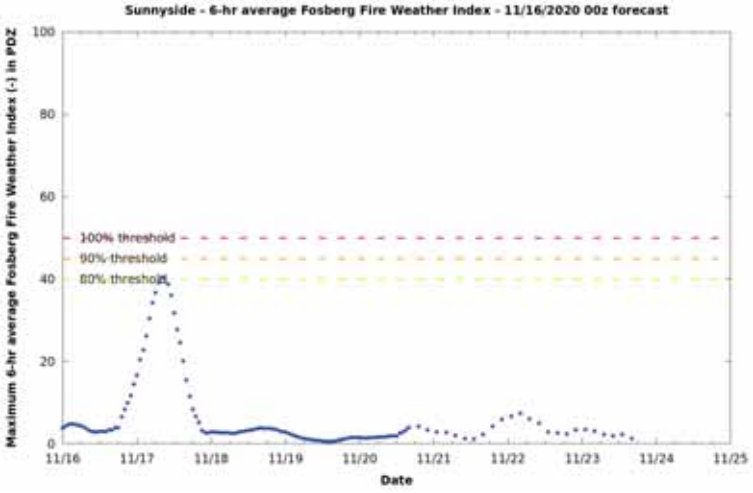


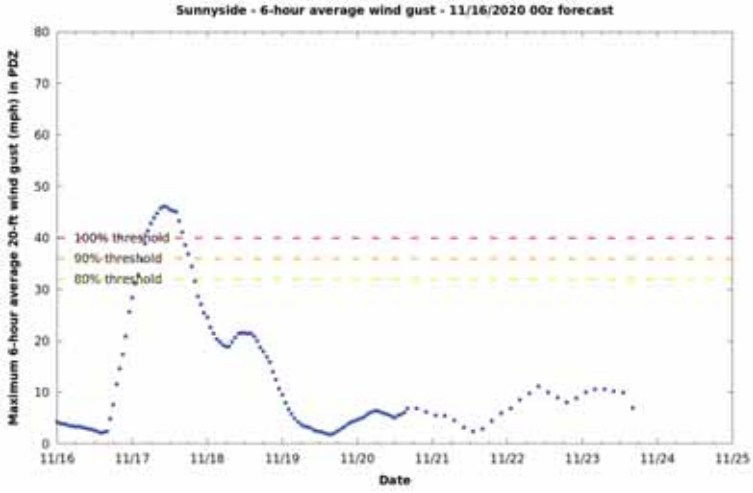
Sagehen tap



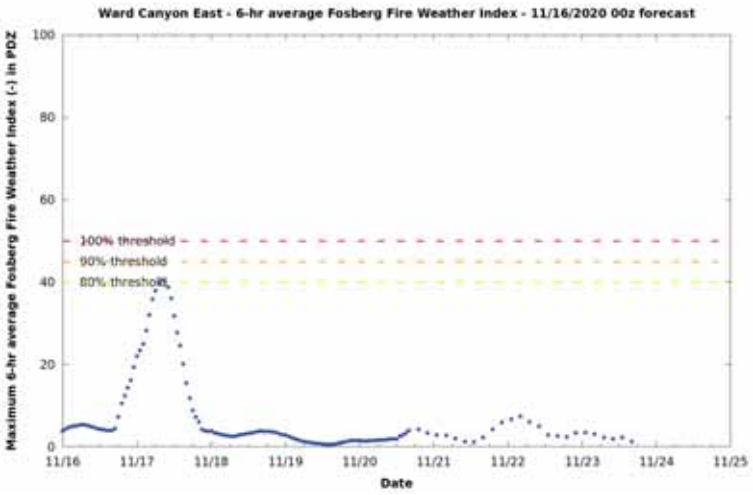


Sunnyside



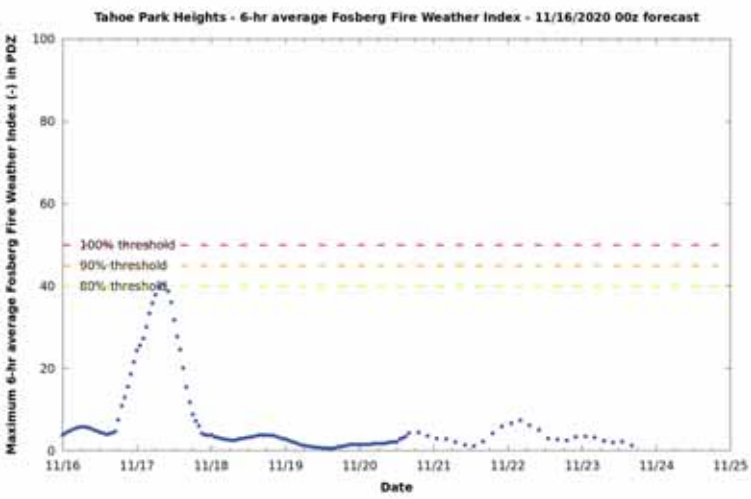


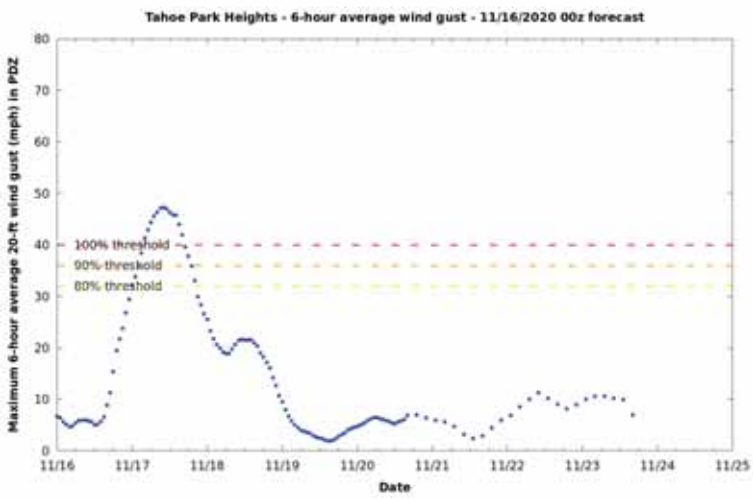
Ward Canyon East



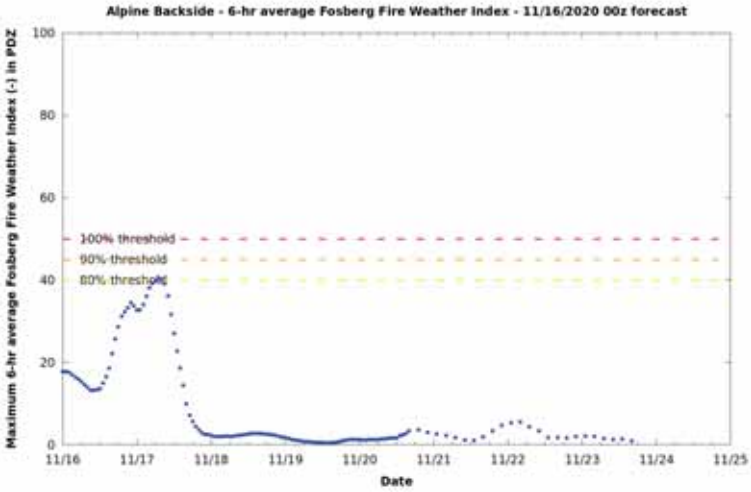


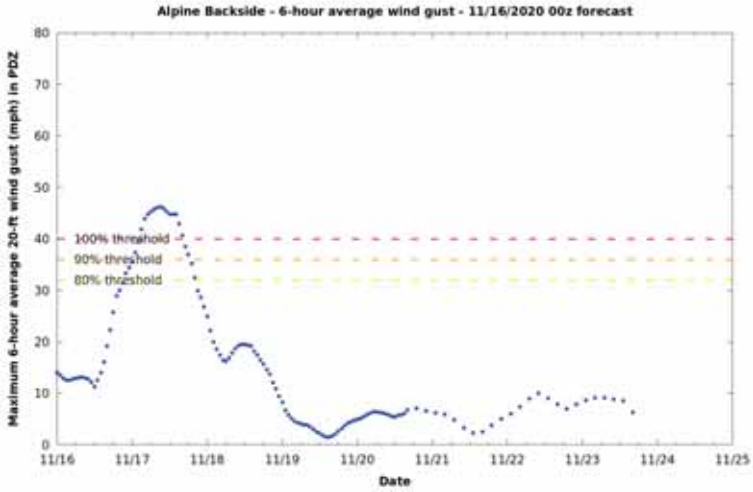
Tahoe Park Heights



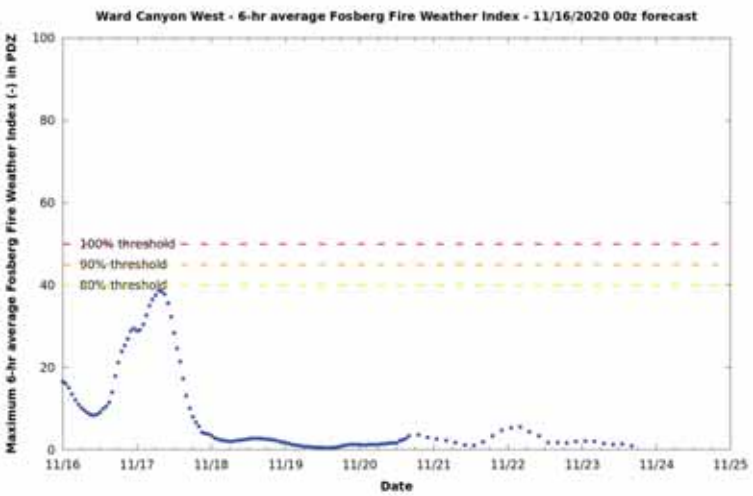


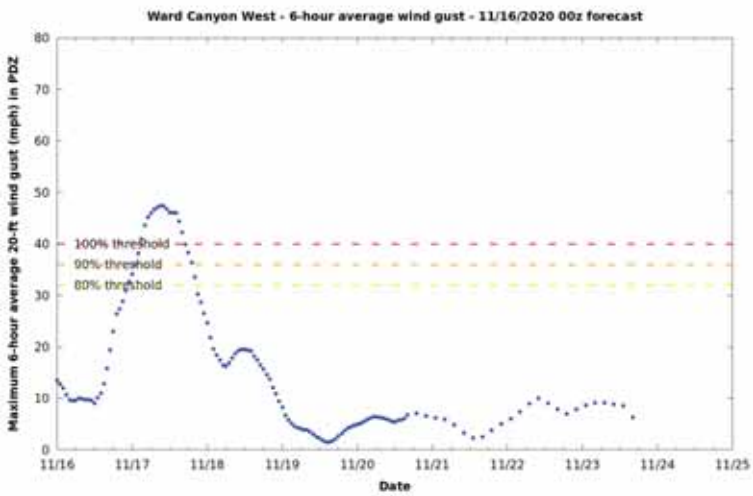
Alpine Backside



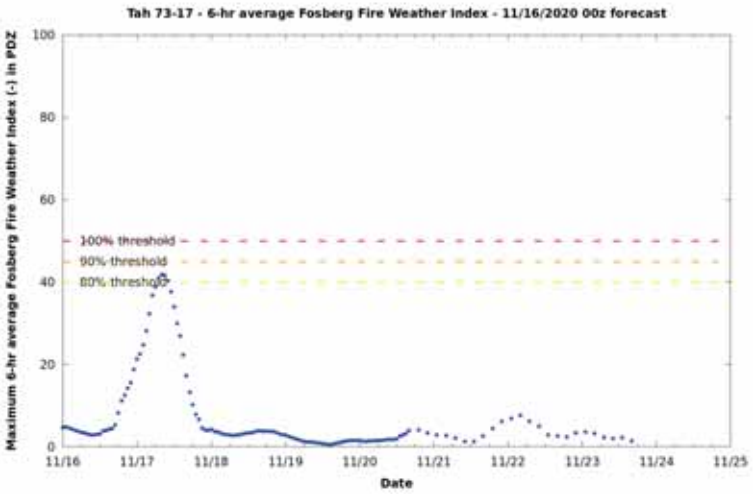


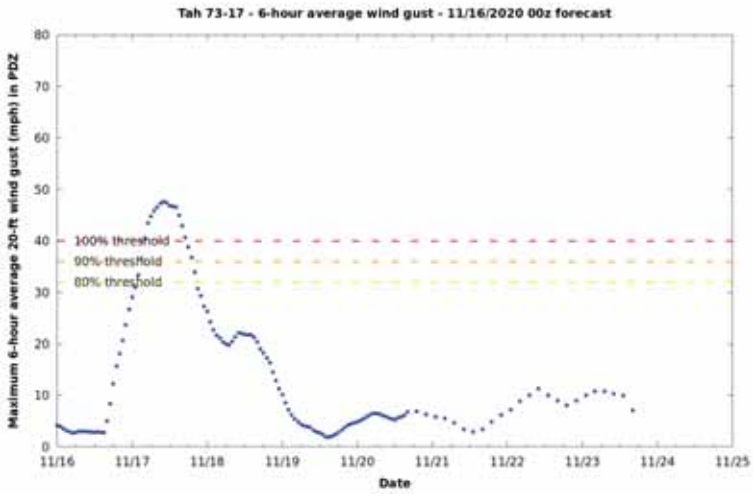
Ward Canyon West



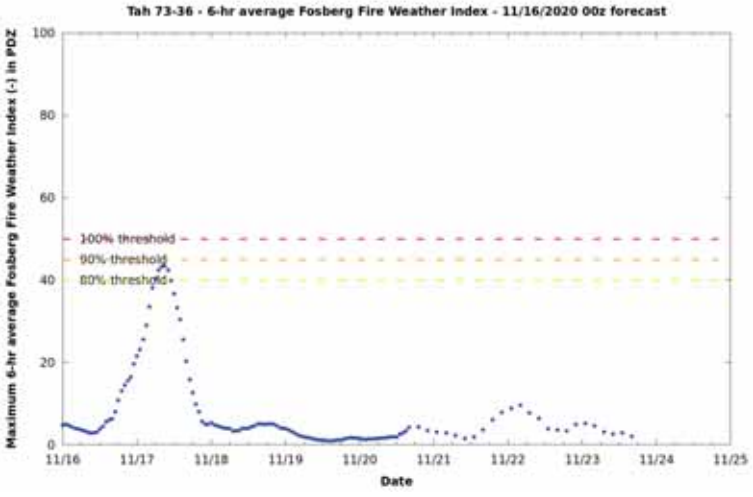


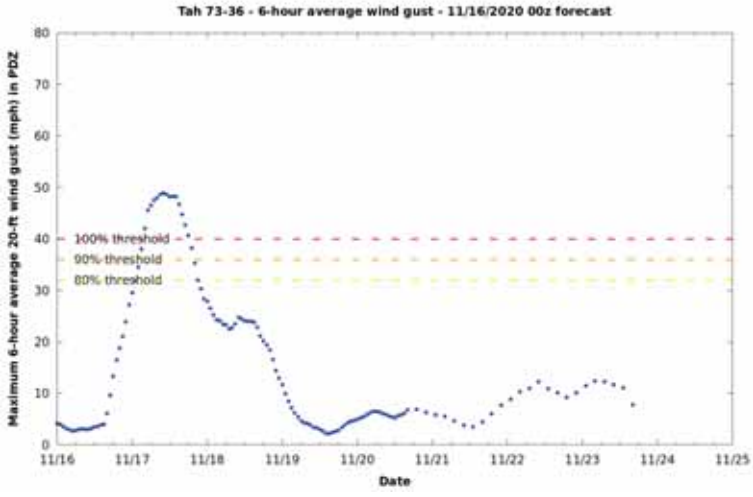
Tah 73-17



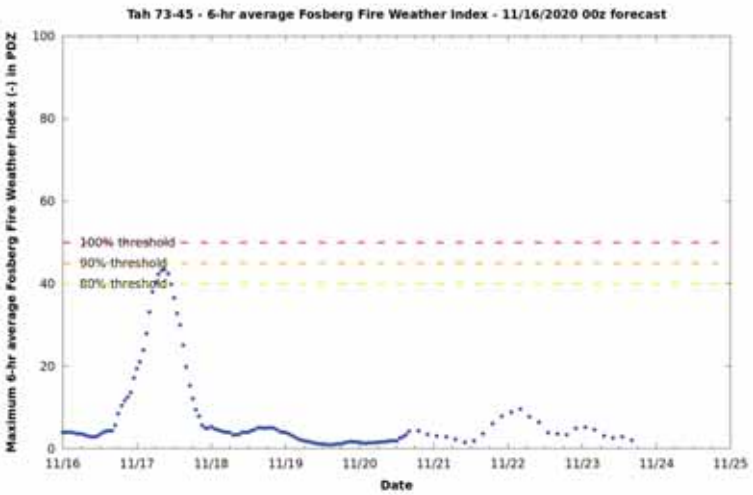


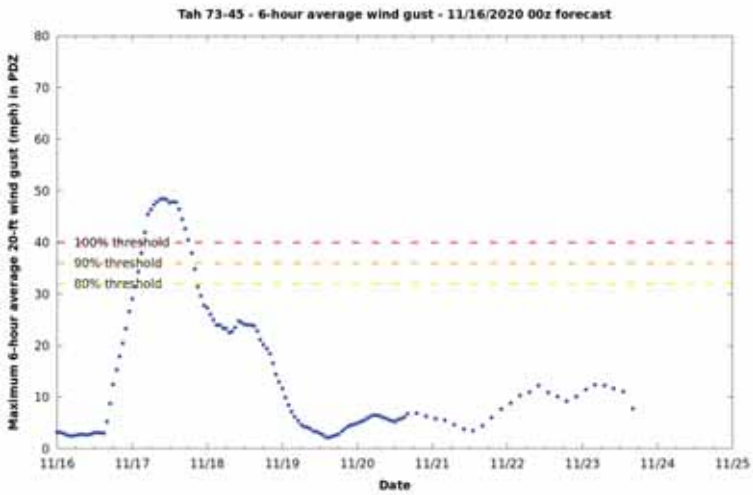
Tah 73-36



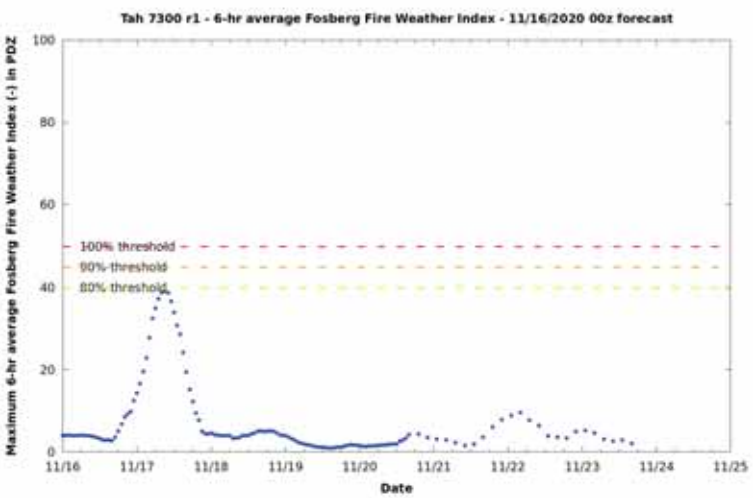


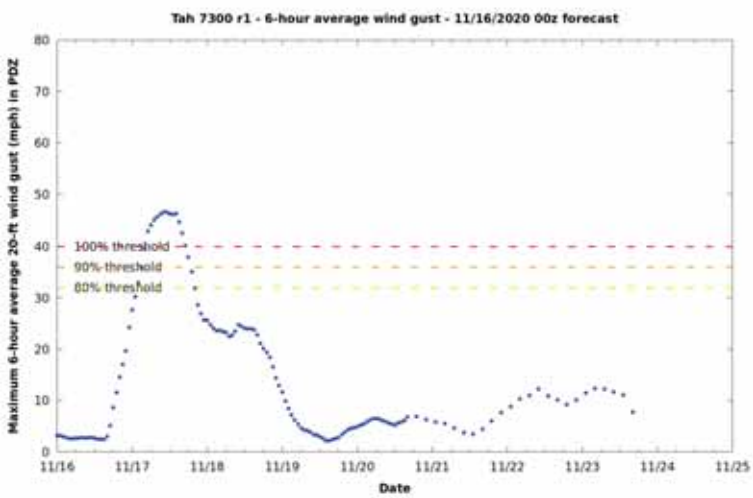
Tah 73-45



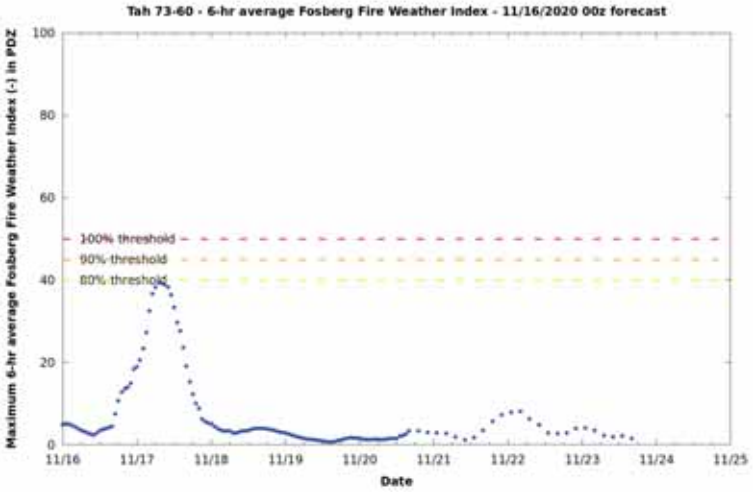


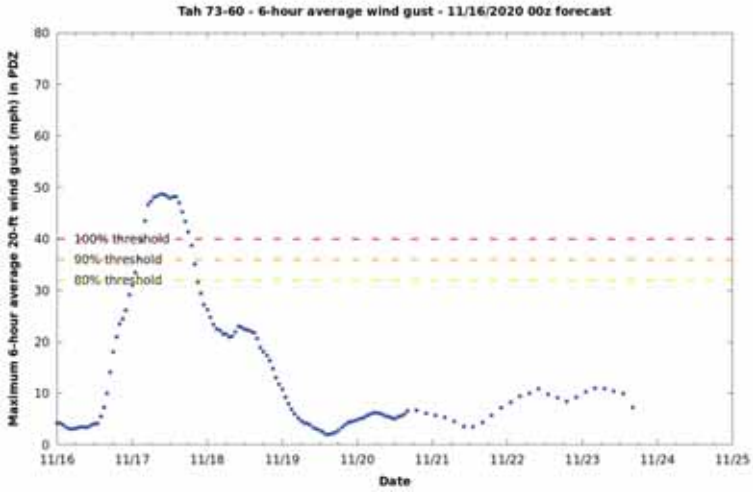
Tah 7300 r1



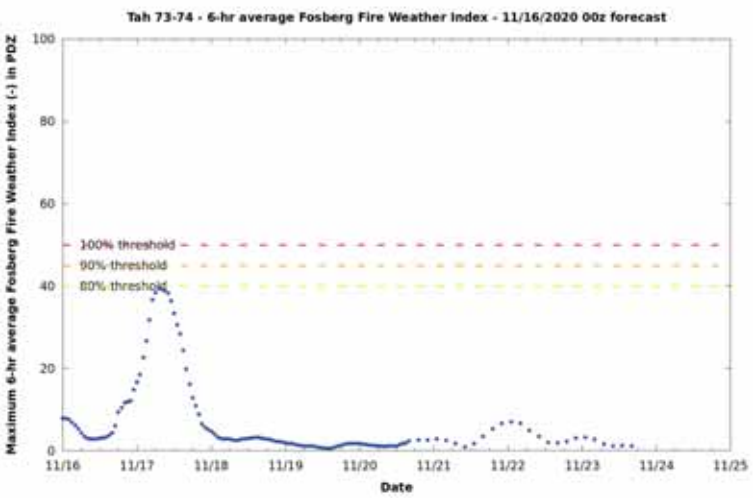


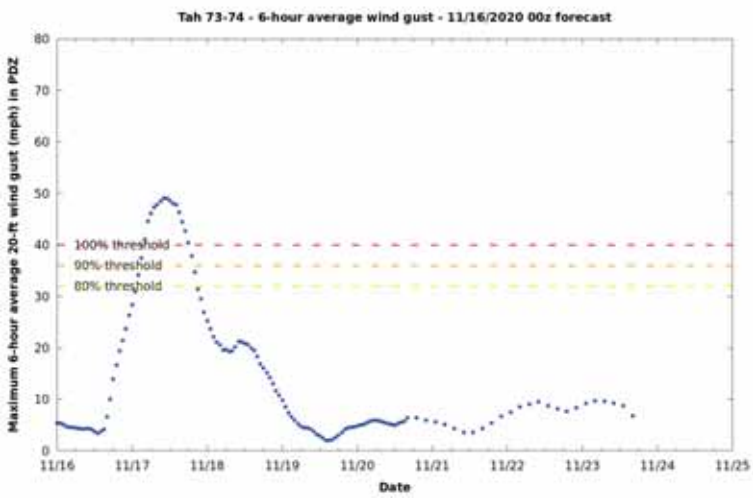
Tah 73-60



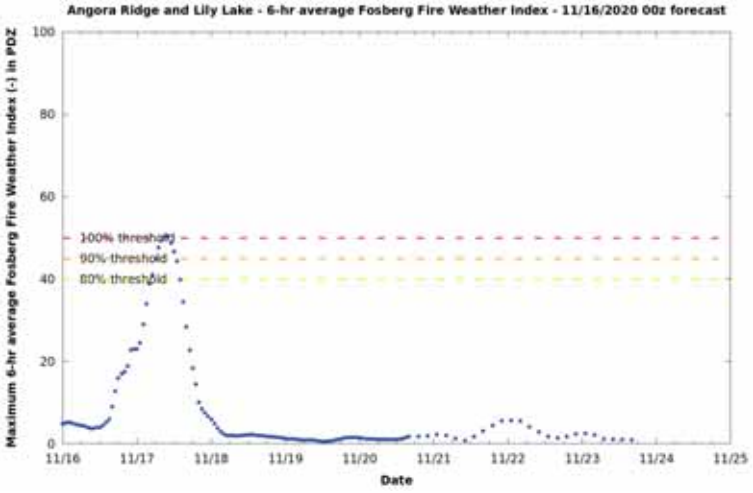


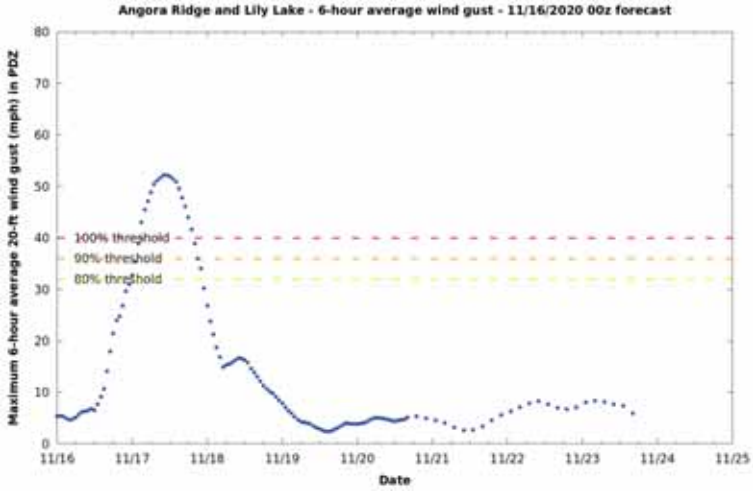
Tah 73-74



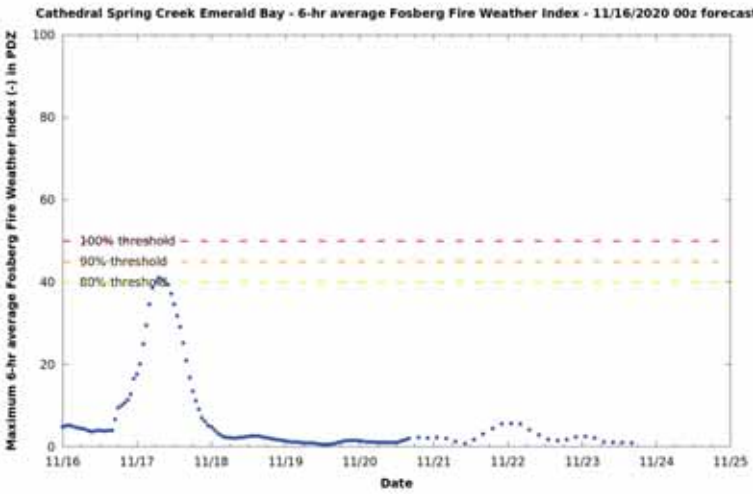


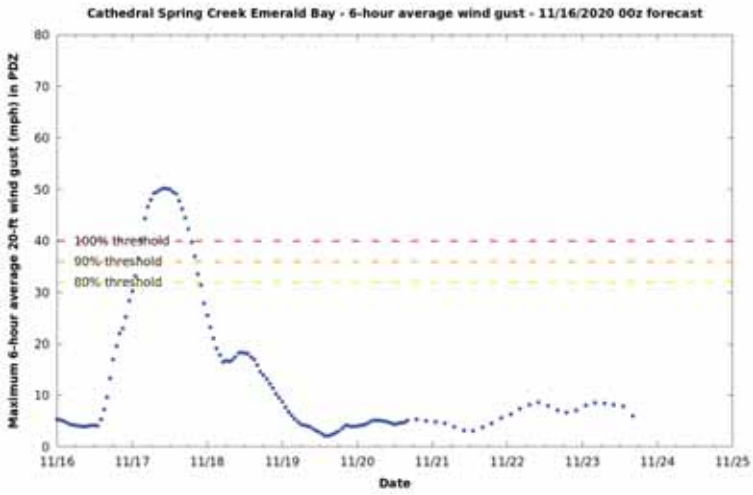
Angora Ridge and Lily Lake



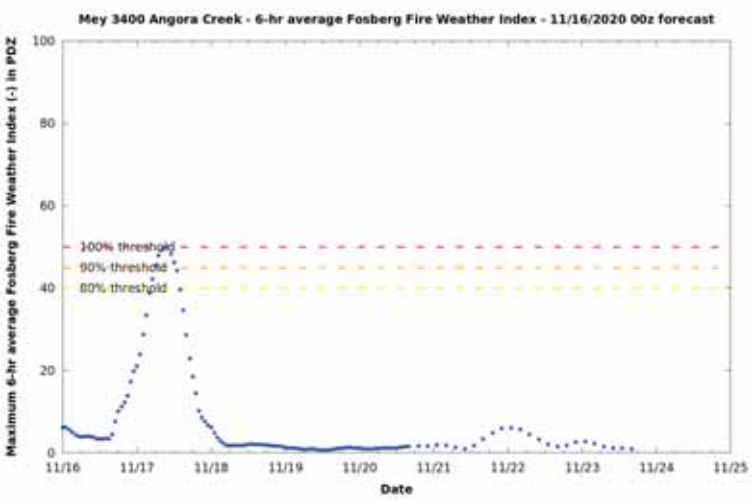


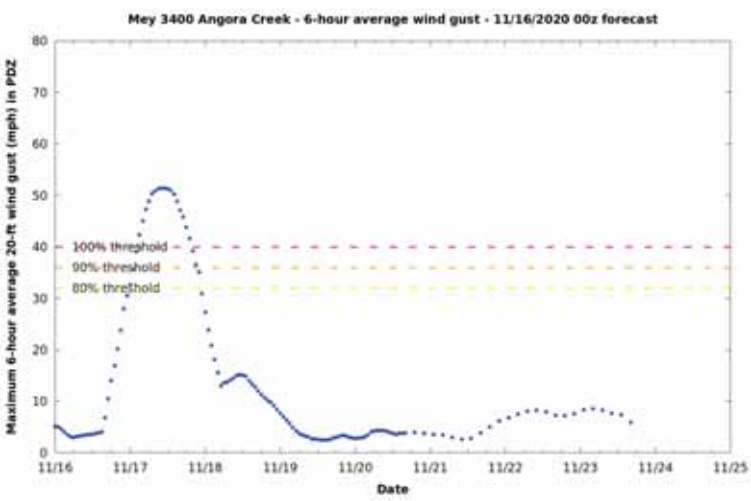
Cathedral Spring Creek Emerald Bay



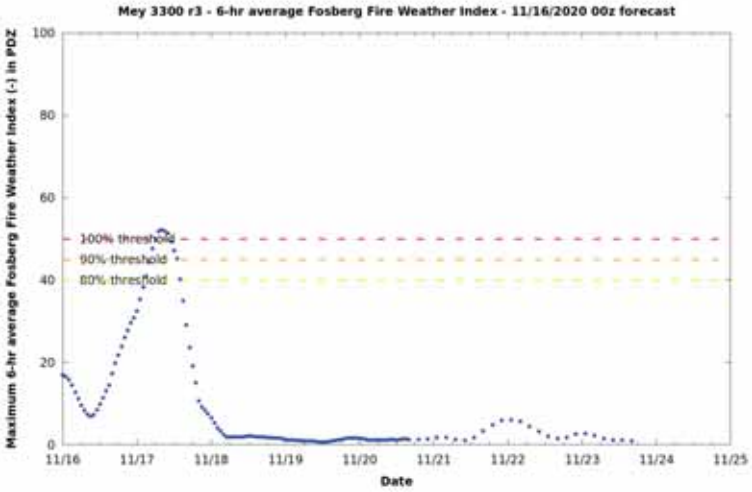


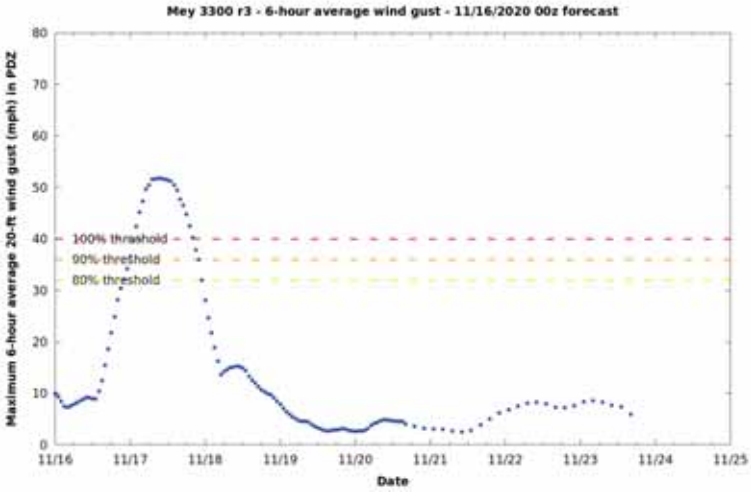
Mey 3400 Angora Creek



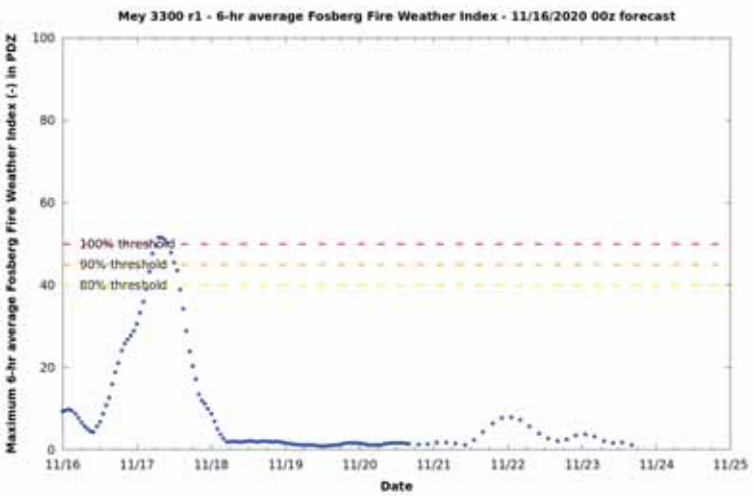


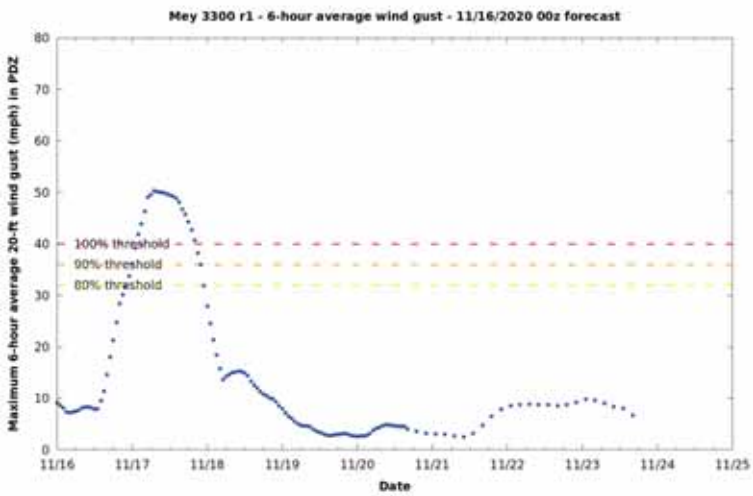
Mey 3300 r3



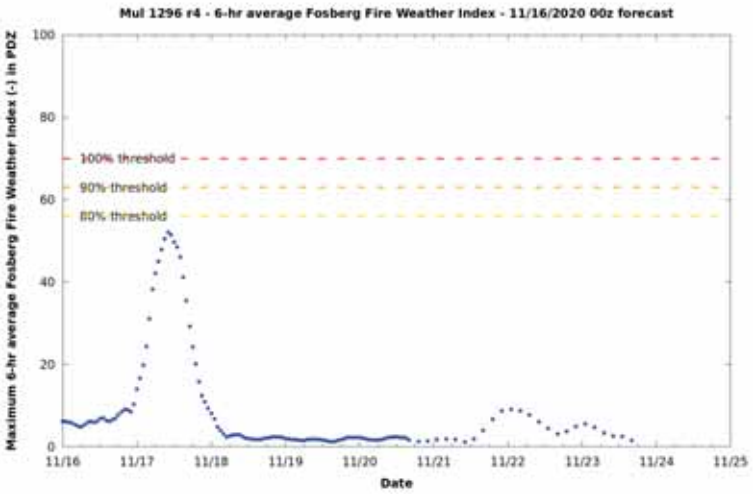


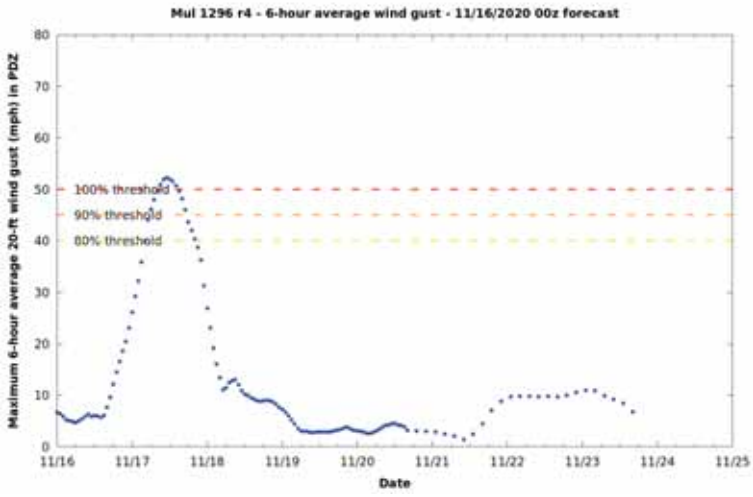
Mey 3300 r1



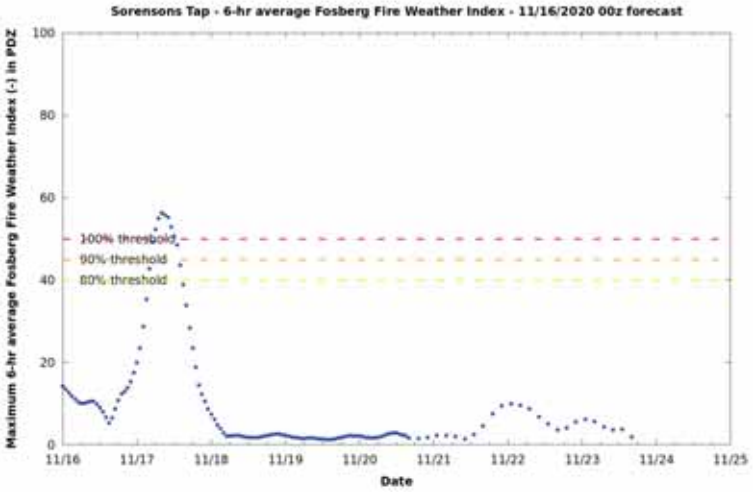


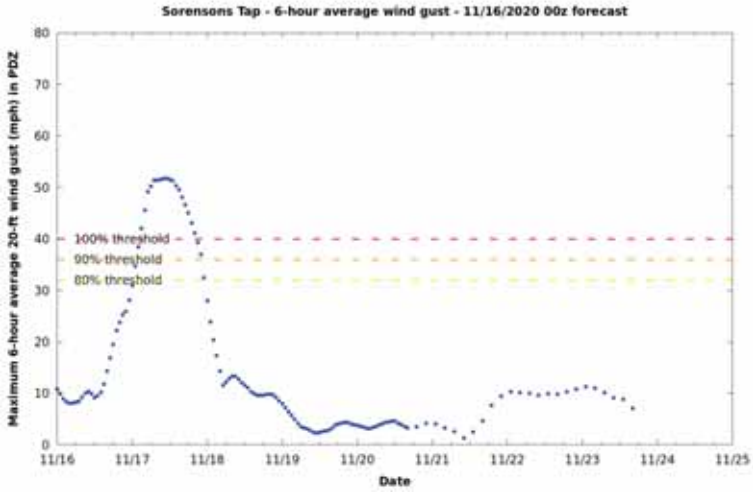
Mul 1296 r4



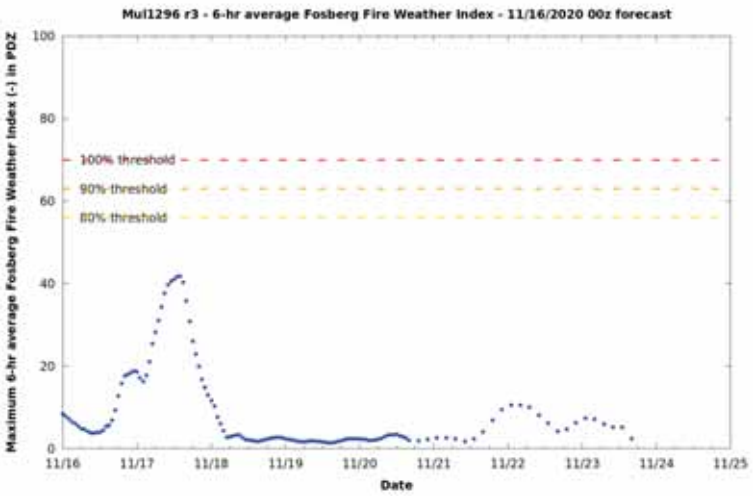


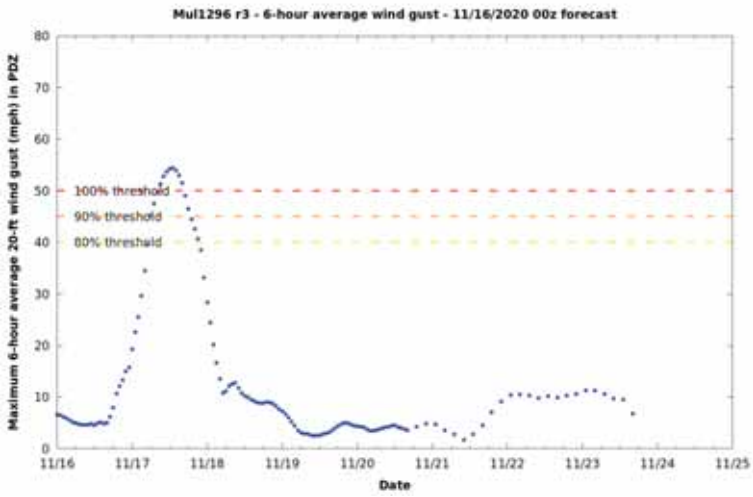
Sorensons Tap



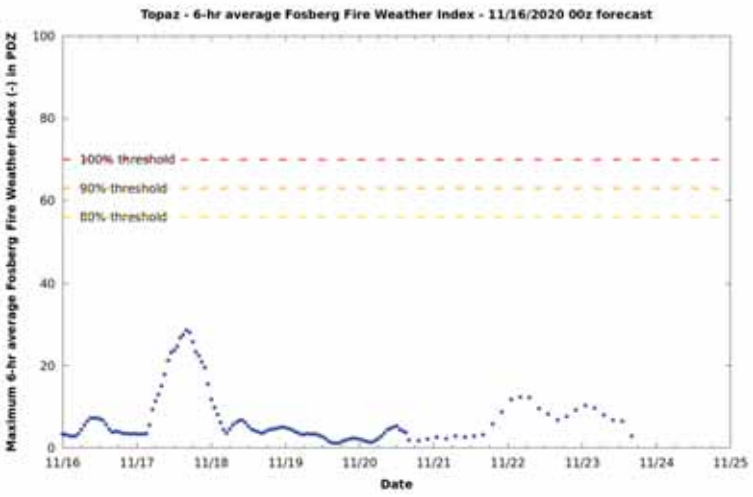


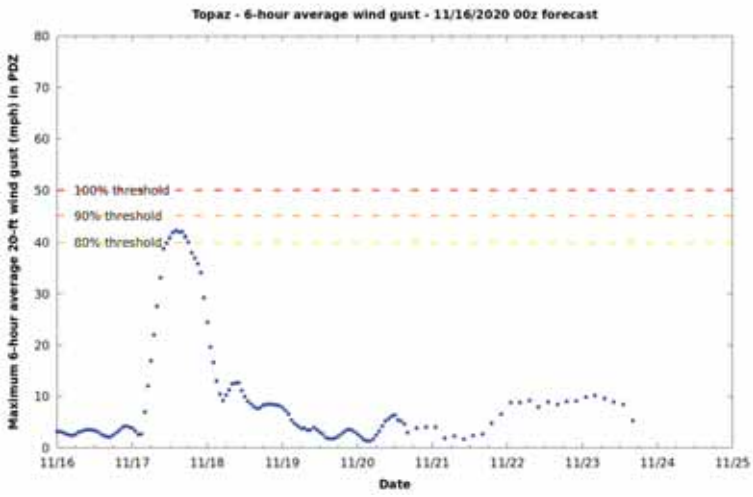
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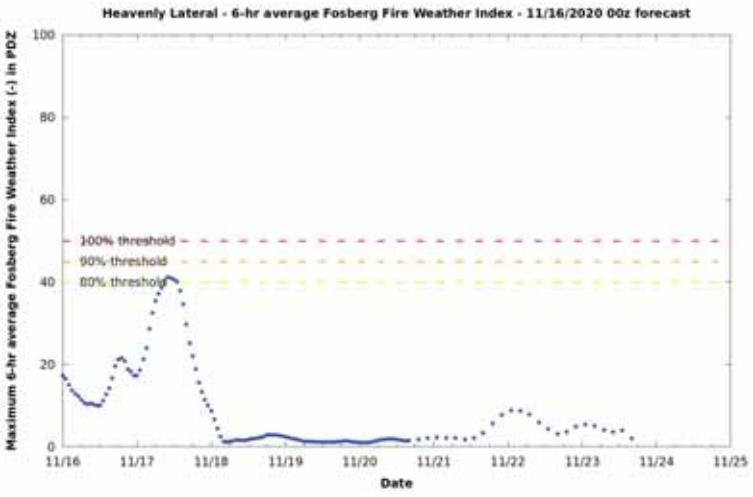


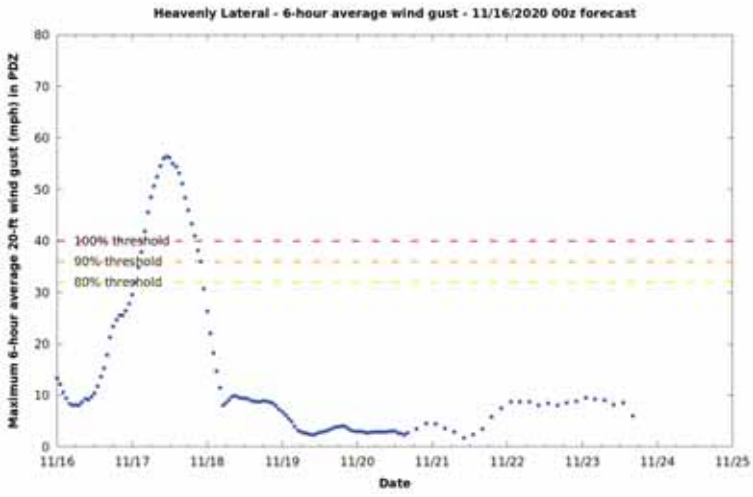
Topaz



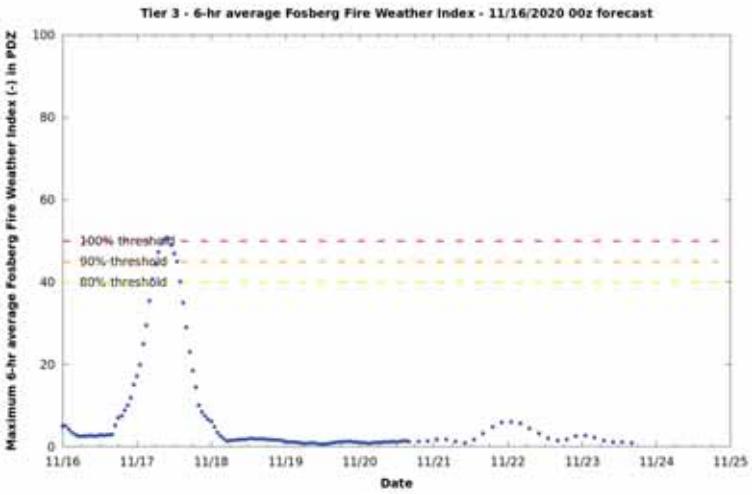


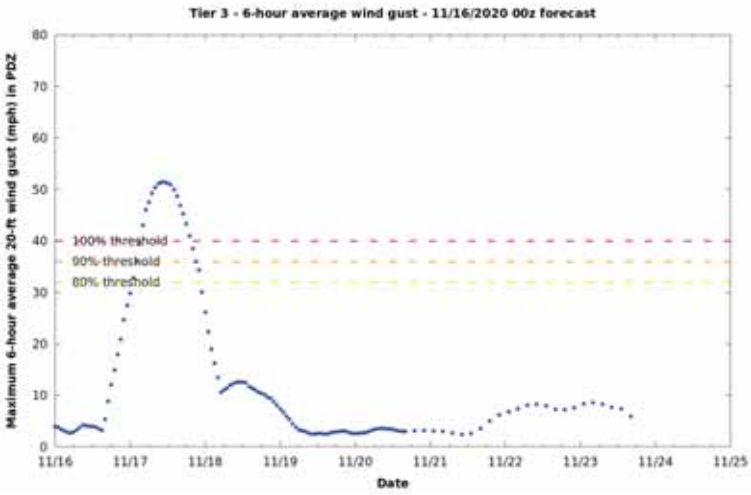
Heavenly Lateral



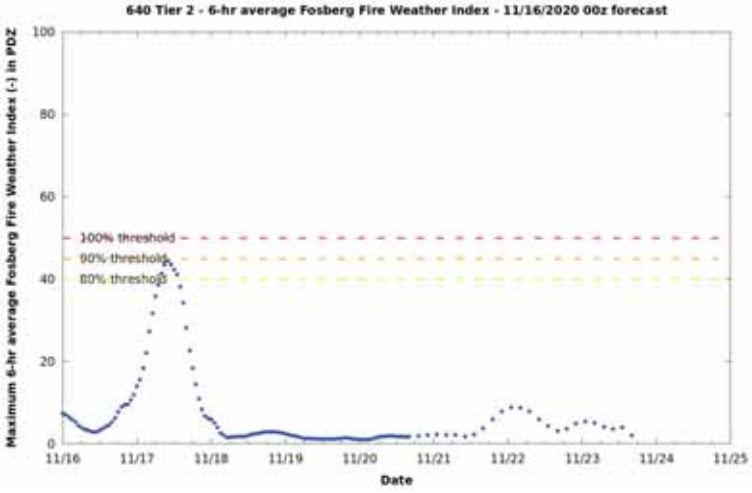


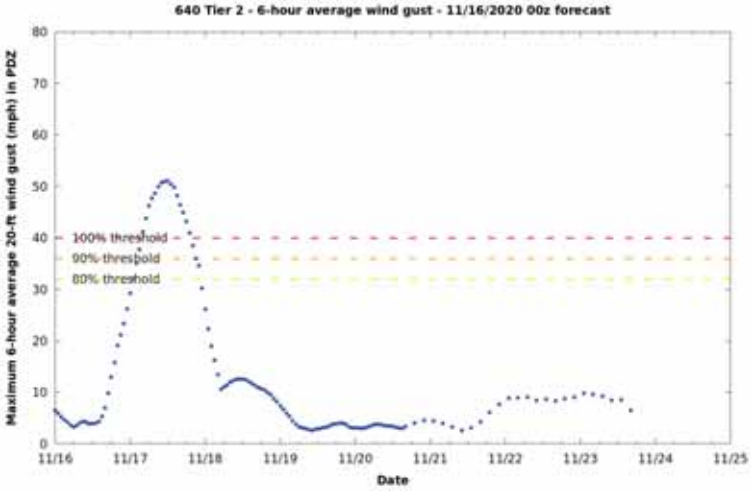
Tier 3



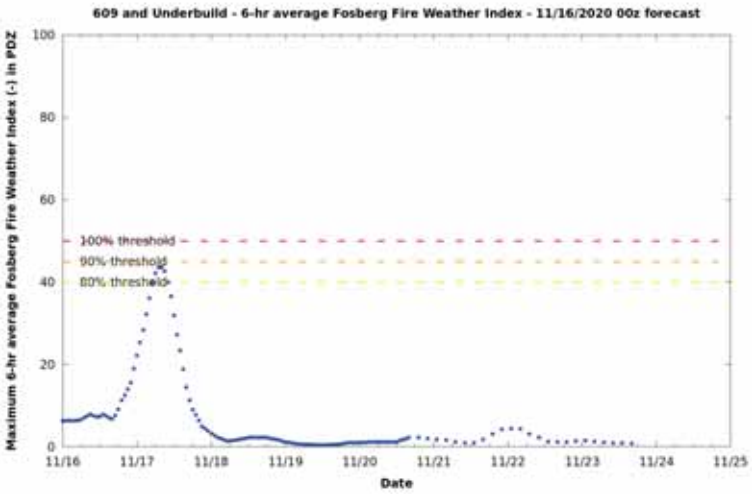


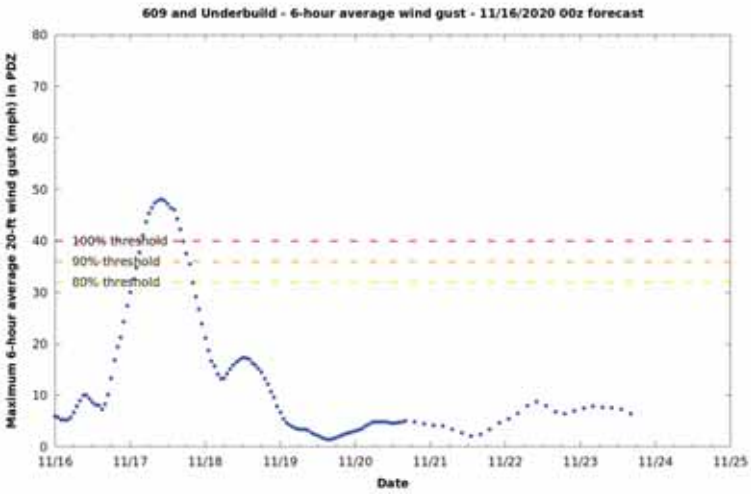
640 Tier 2



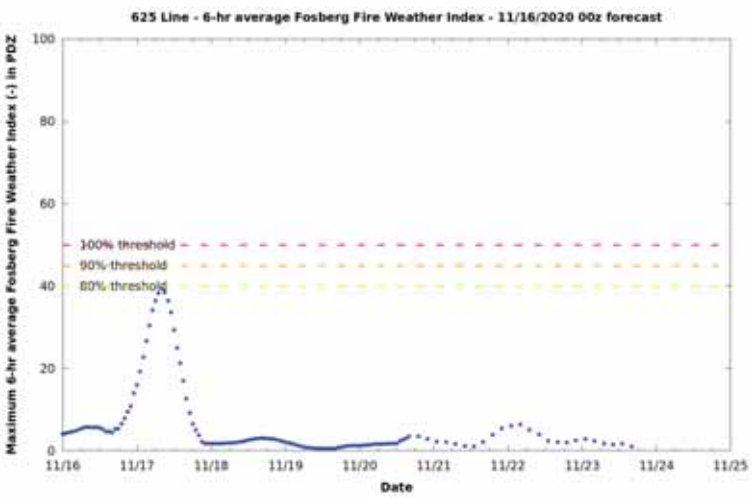


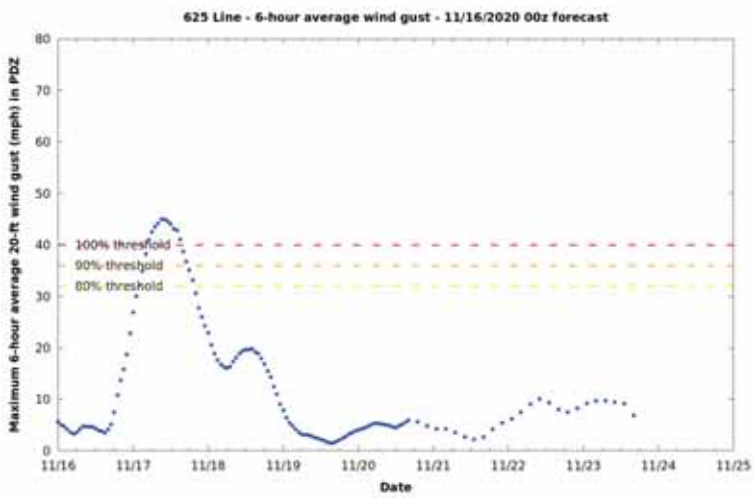
609 and Underbuild



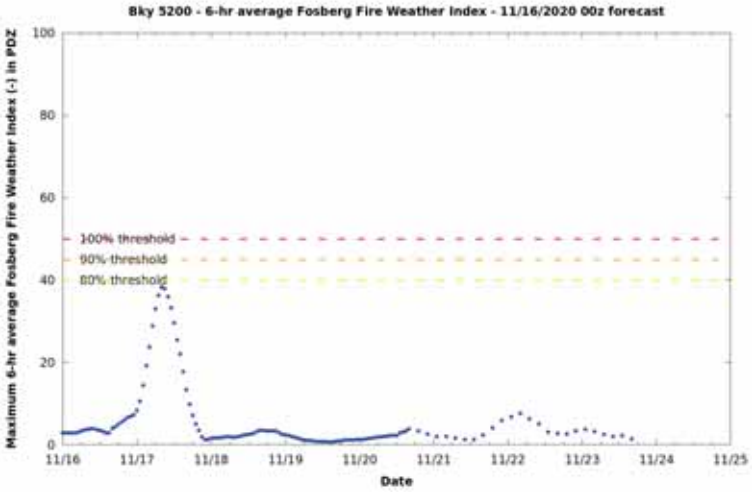


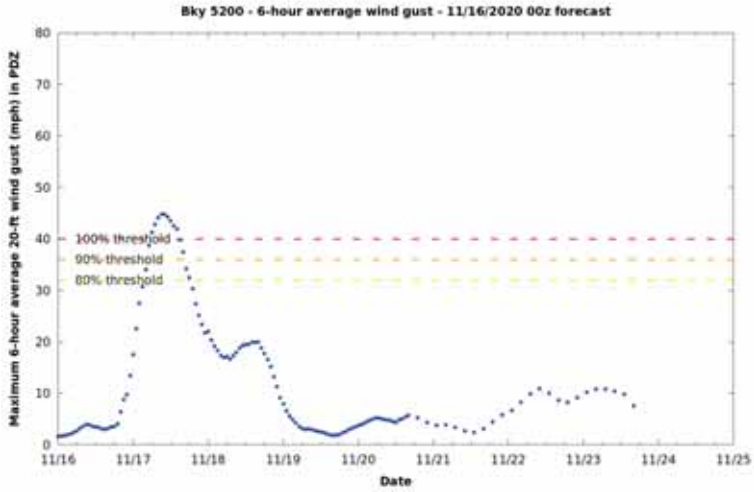
625 Line



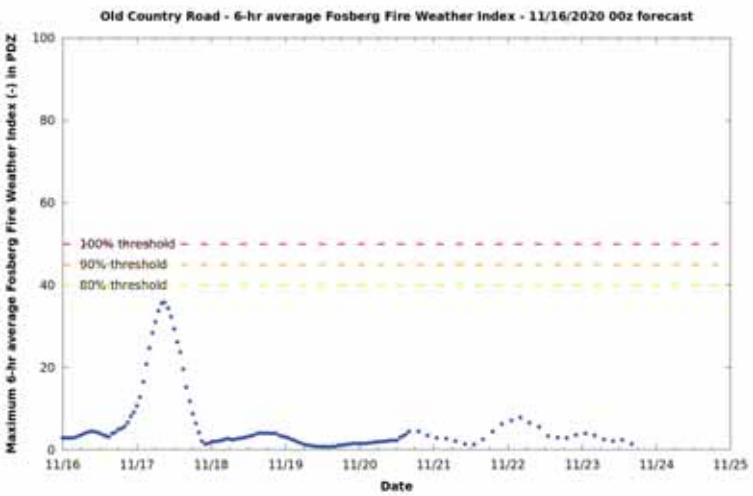


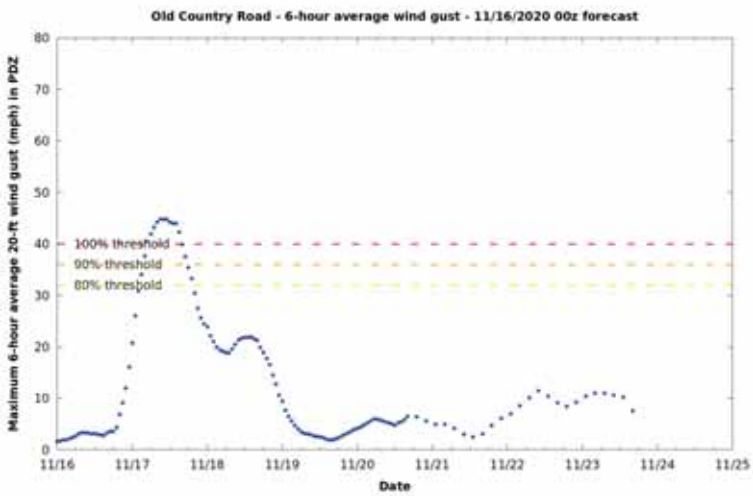
Bky 5200



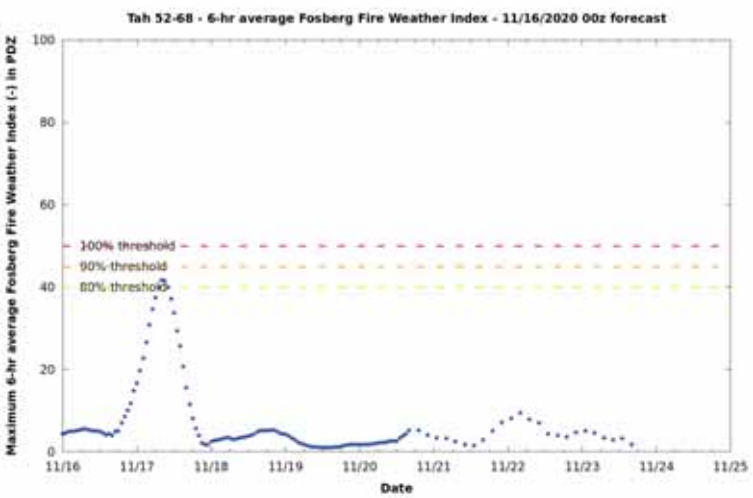


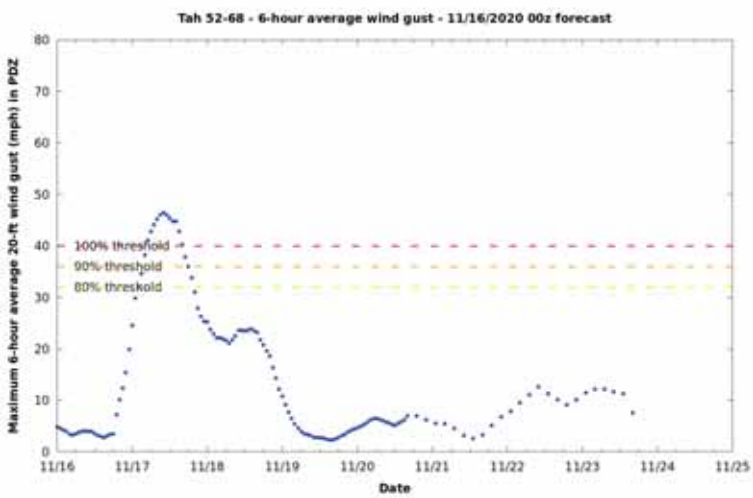
Old Country Road



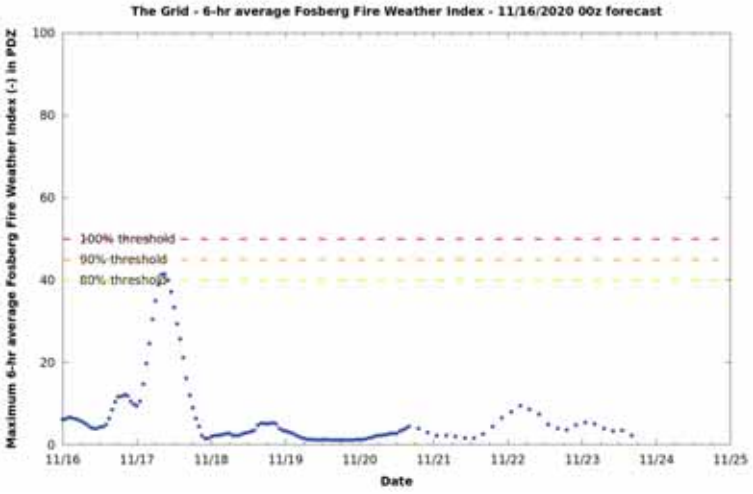


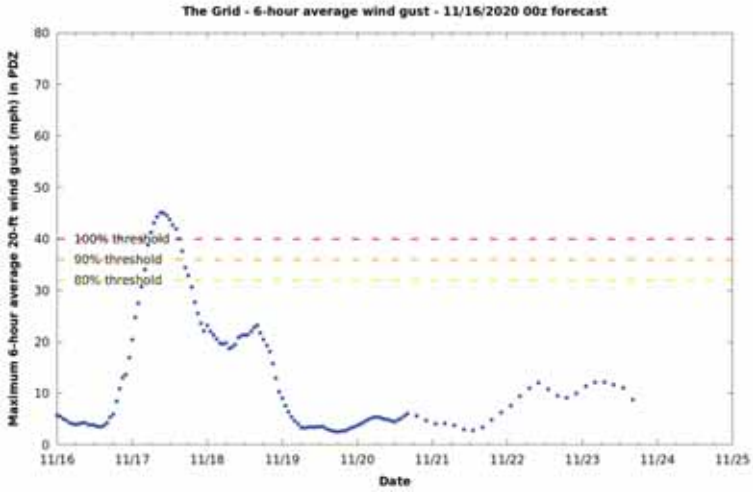
Tah 52-68



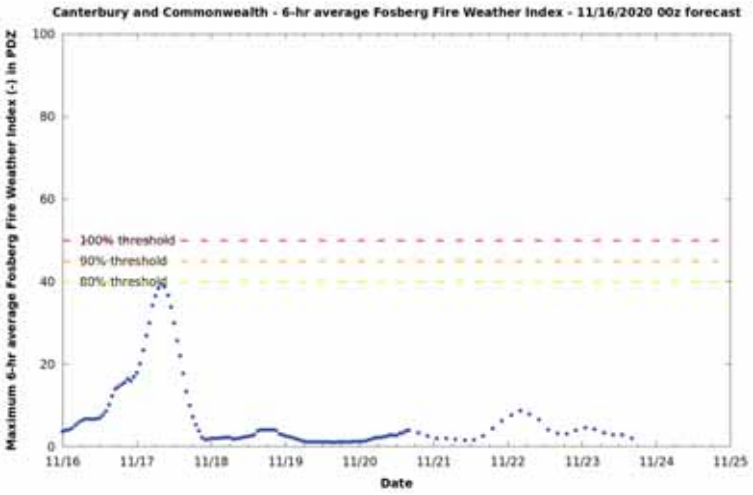


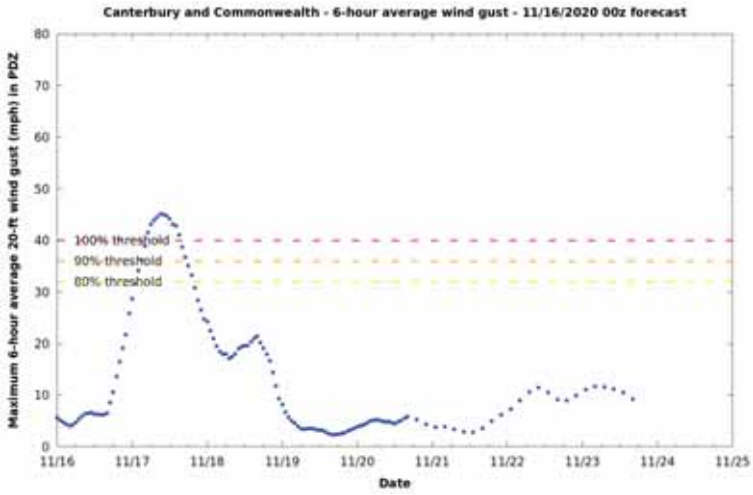
The Grid



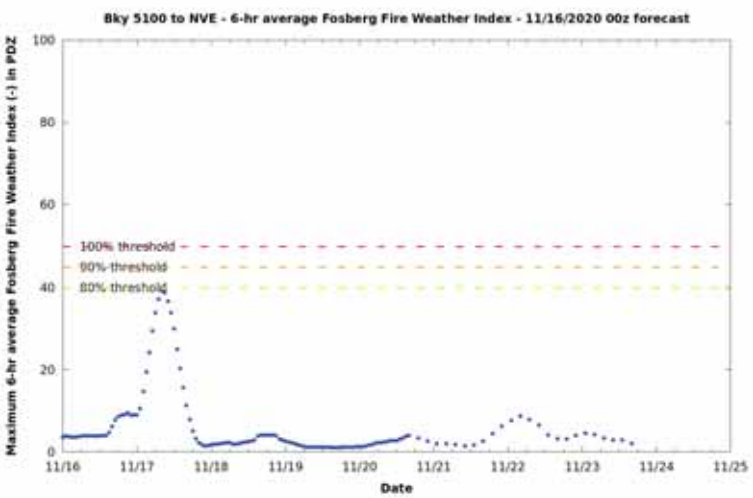


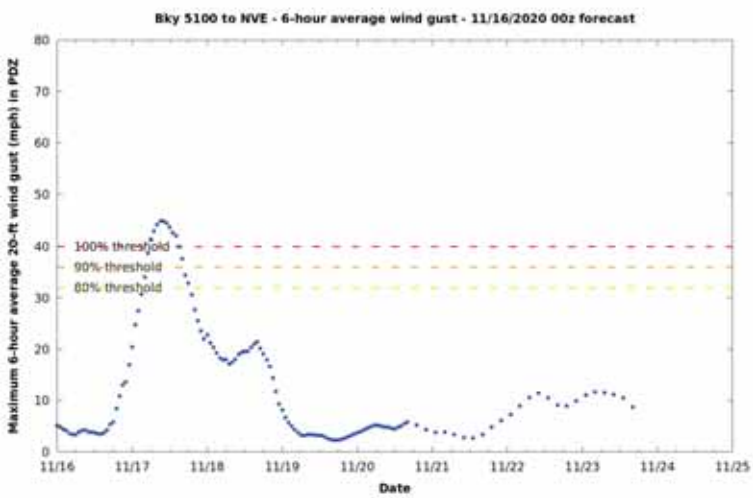
Canterbuy and Commonwealth



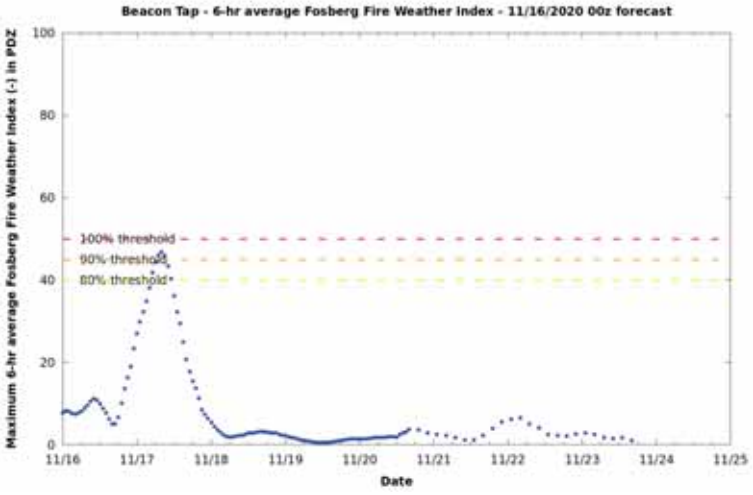


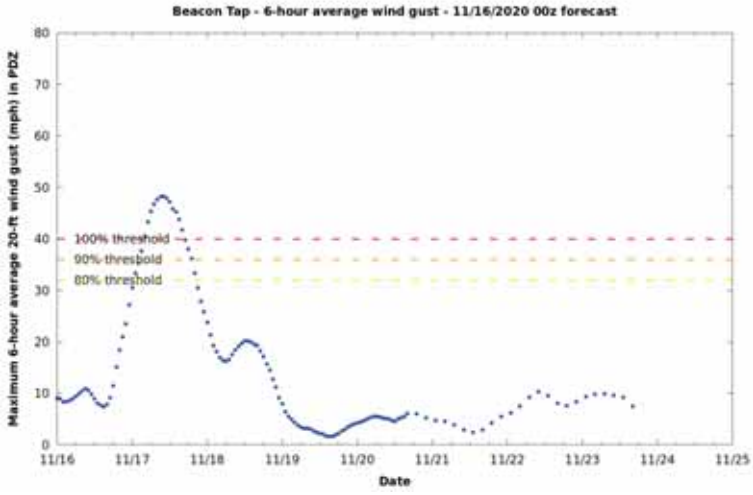
Bky 5100 to NVE



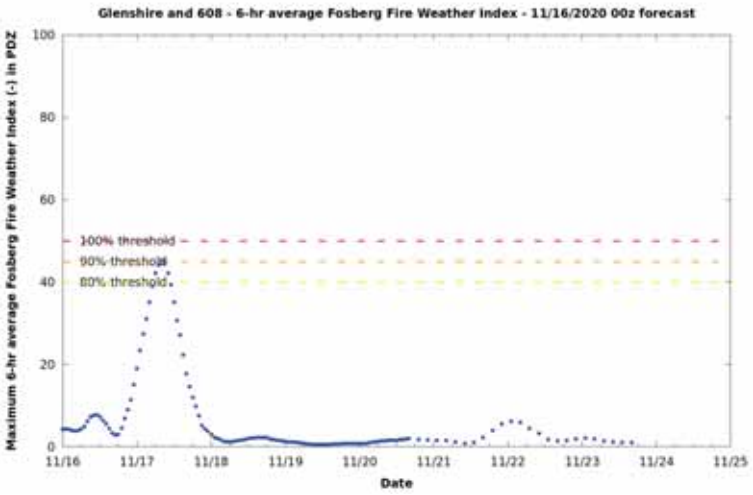


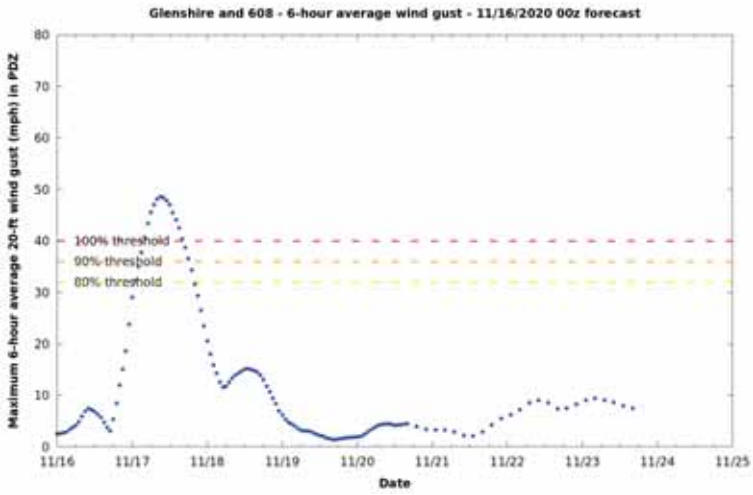
Beacon Tap



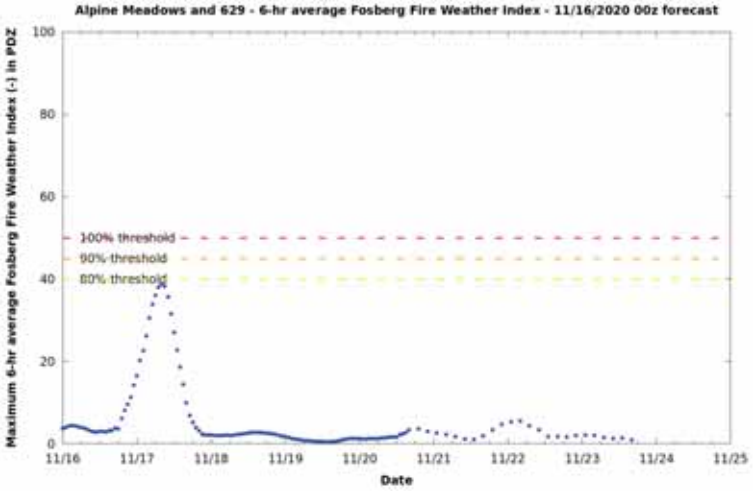


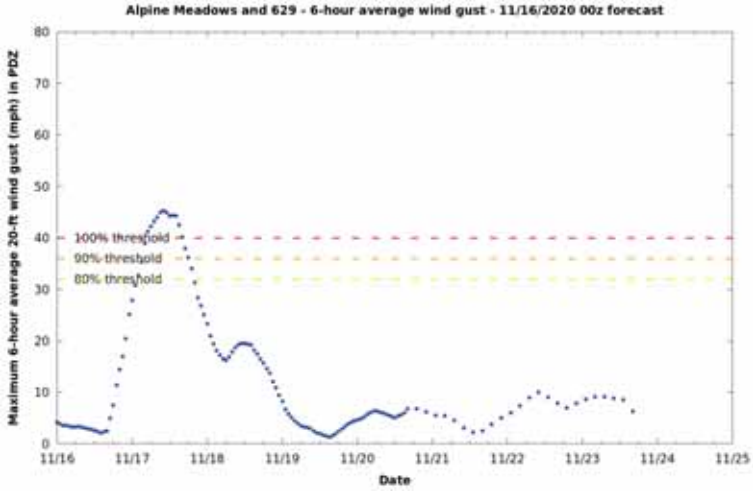
Glenshire and 608



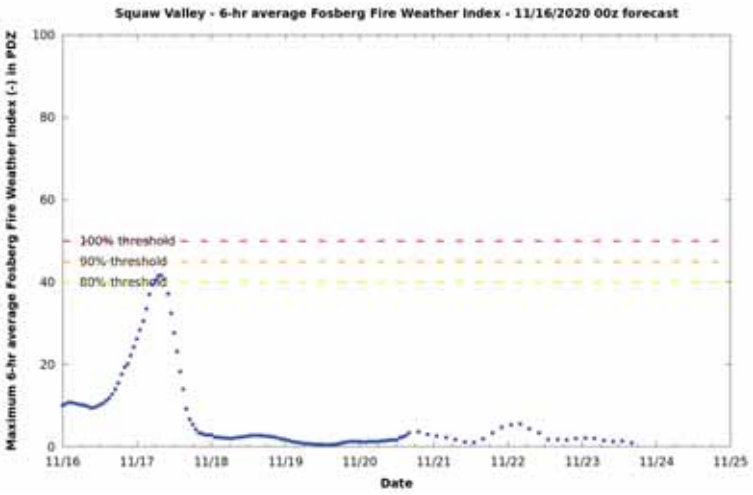


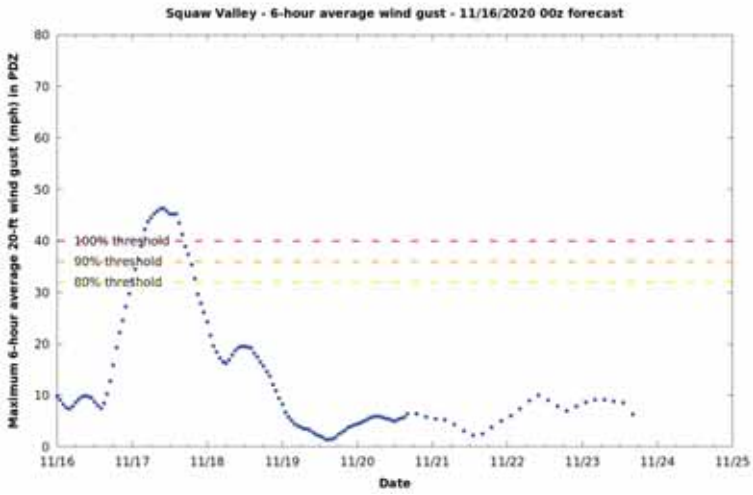
Alpine Meadows and 629



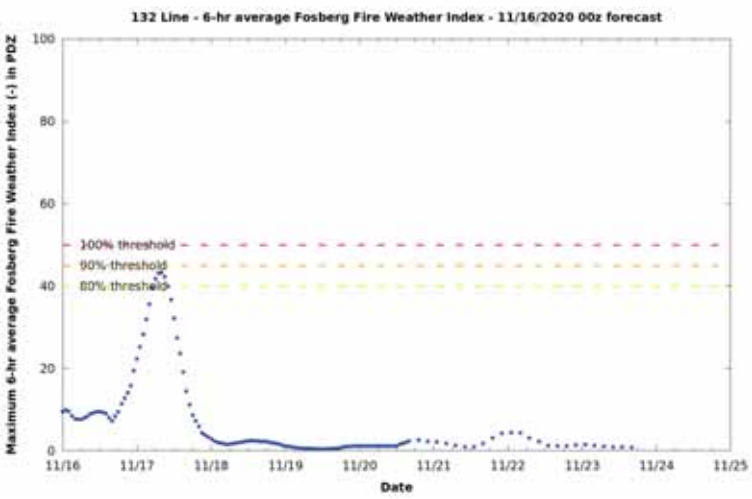


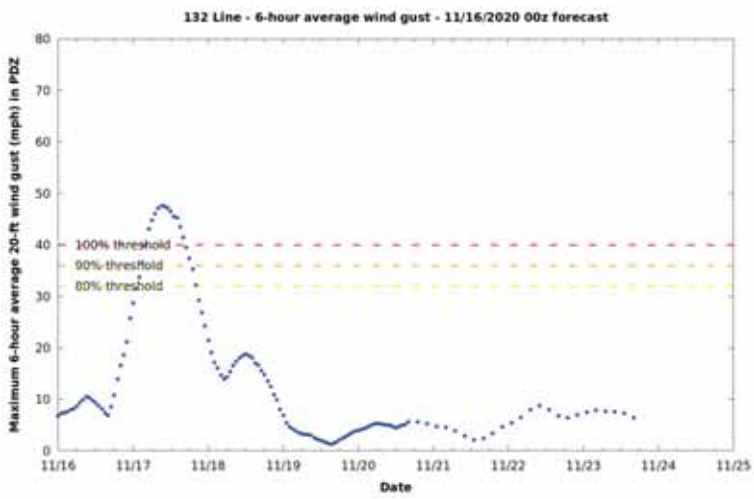
Squaw Valley



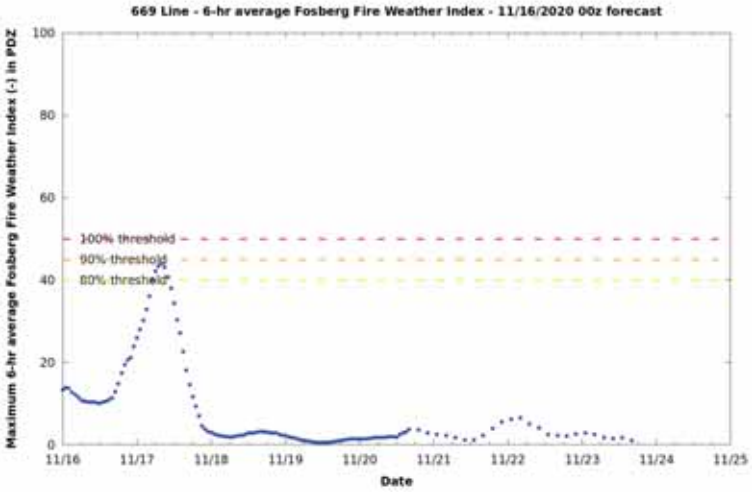


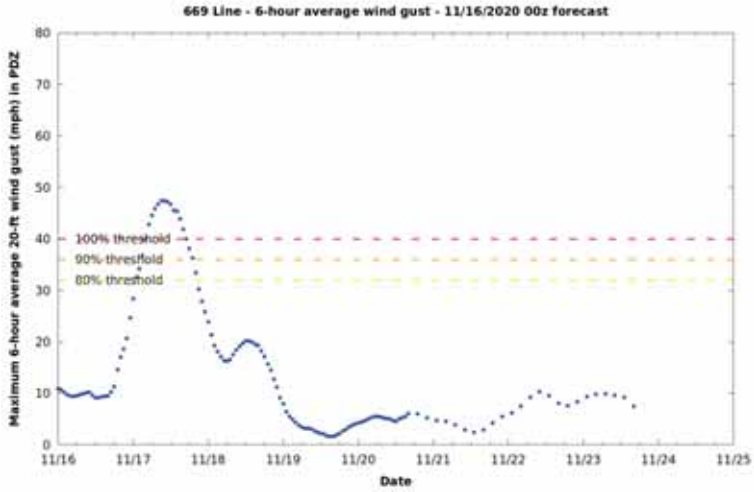
132 Line



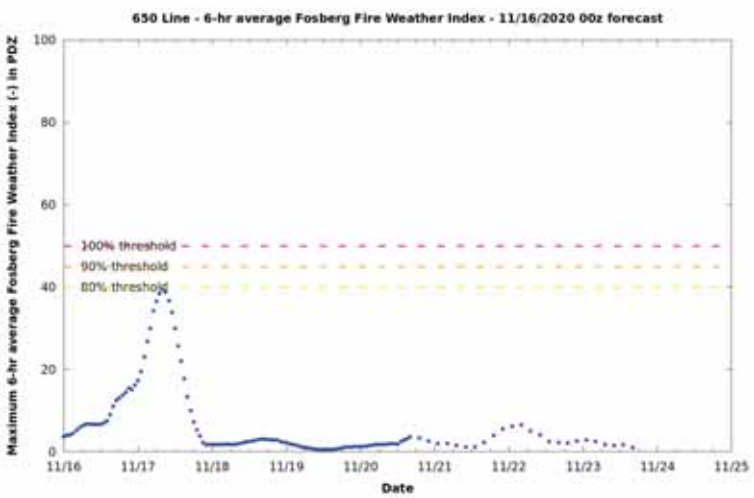


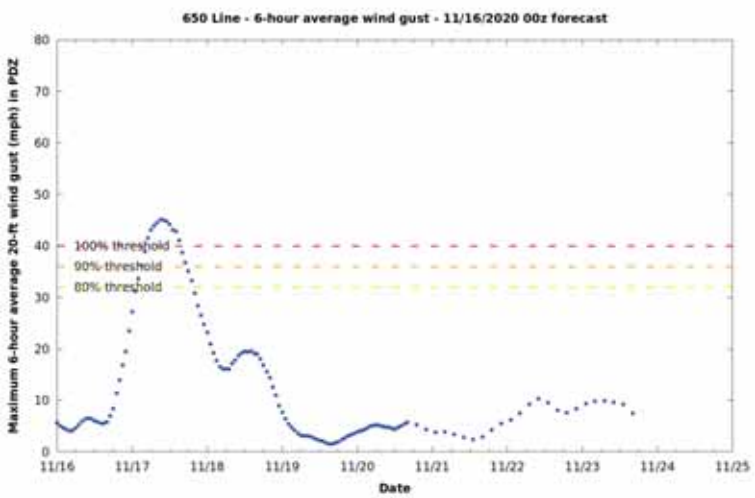
669 Line



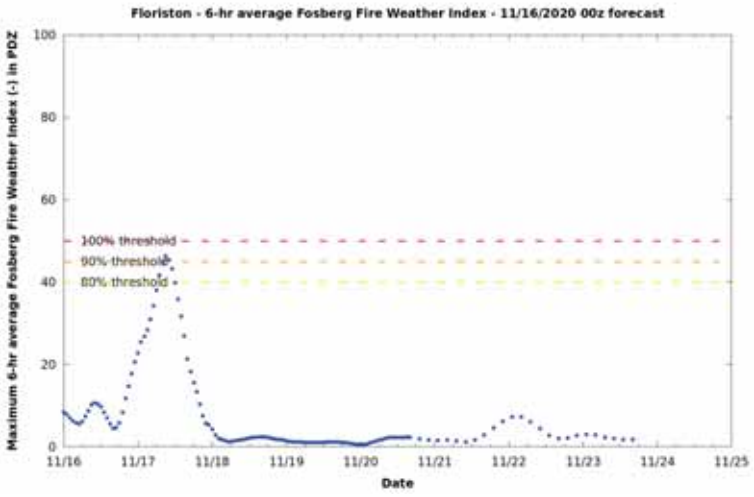


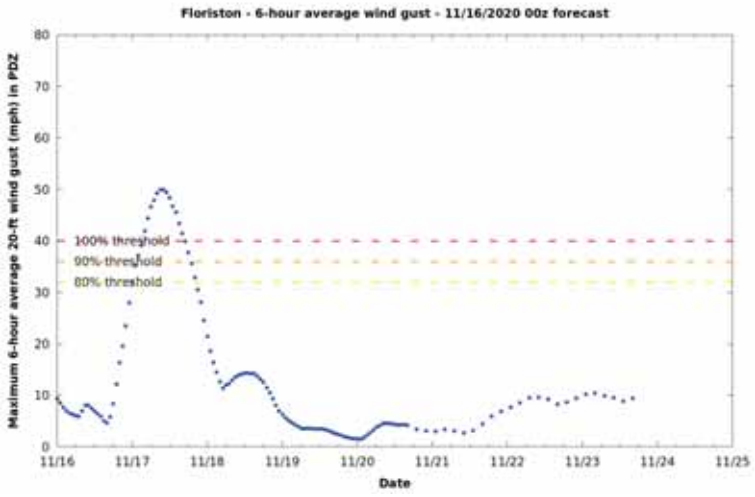
650 Line



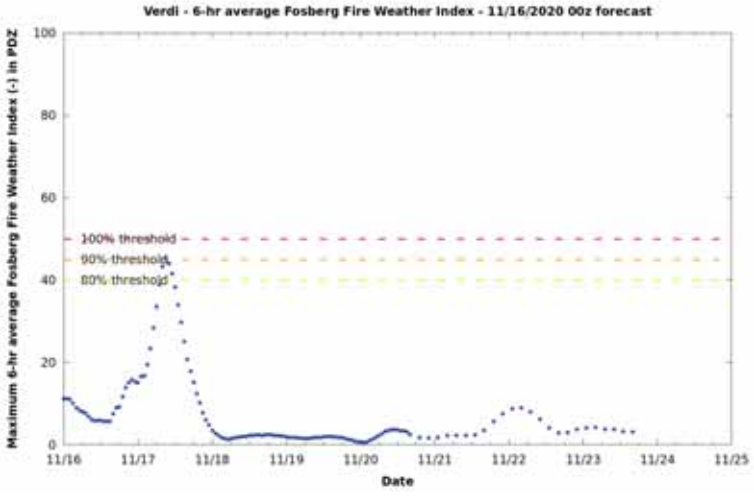


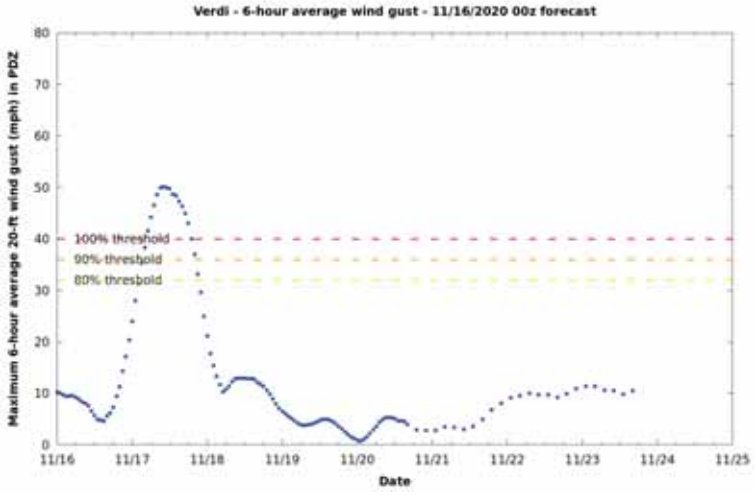
Floriston



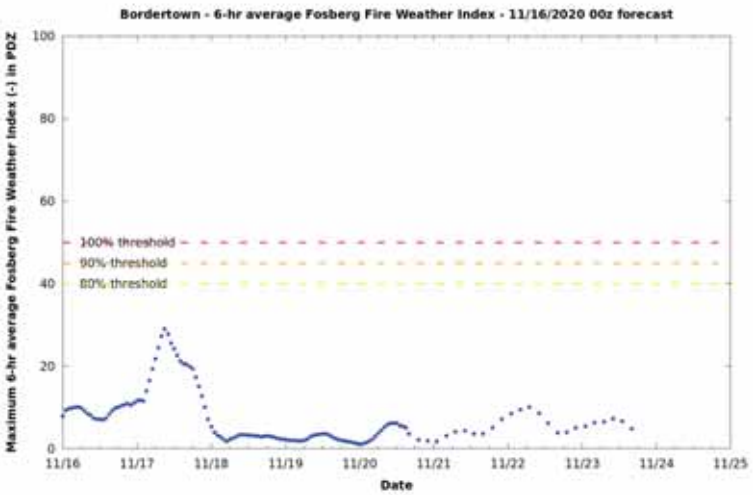


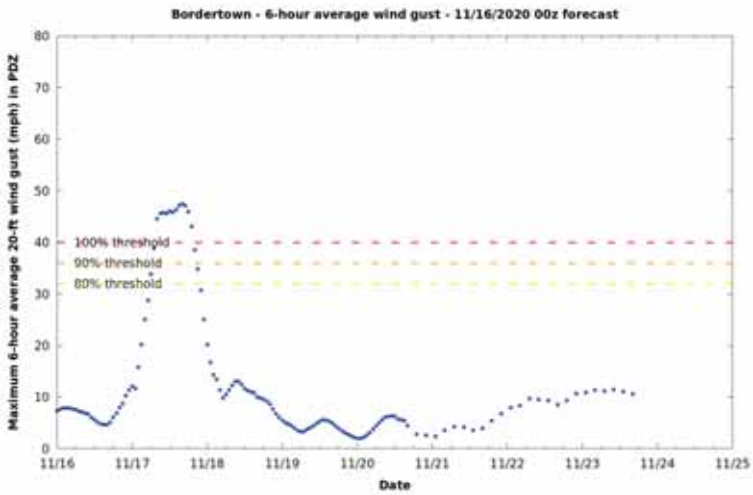
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/16/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/16/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/16/20 - 11/22/20

Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

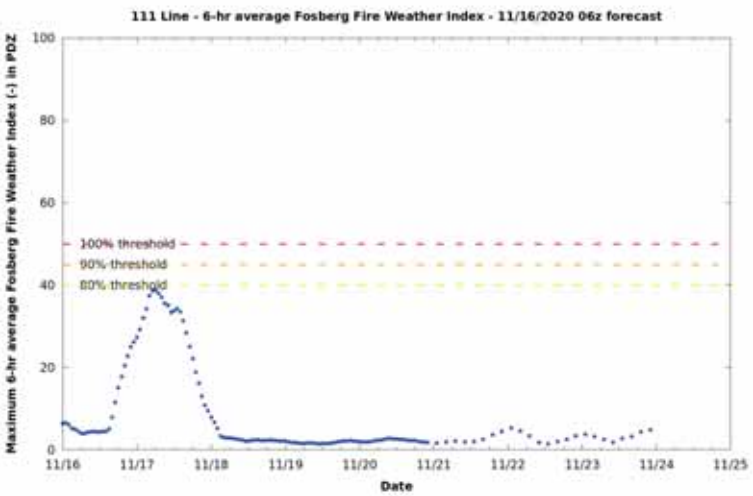
Liberty Utilities Energy Release Component Forecast for 11/16/20 - 11/22/20

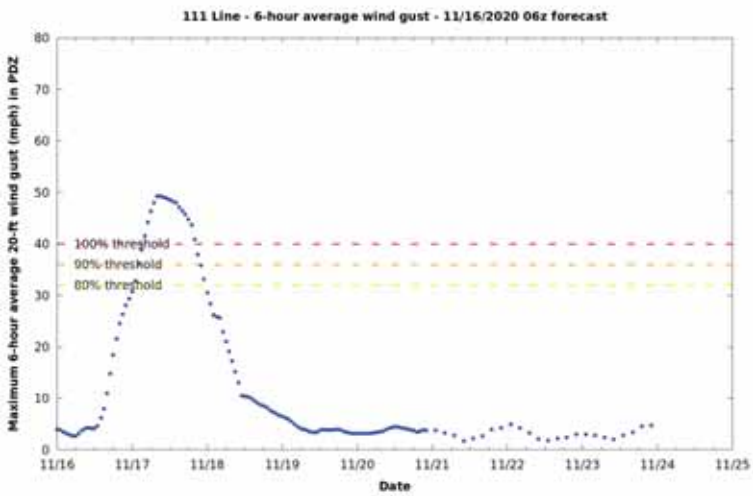
Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	47.6	49.4	47.7	33.9	33.0	34.5	36.9
Sierra Brooks	50.9	56.8	54.6	40.3	42.4	45.2	49.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.3	1.4	1.2	0.7	0.7	0.6	0.6
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	23.8	27.2	24.3	15.9	17.7	19.6	20.4
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	43.0	48.3	43.8	27.6	28.9	31.5	32.5
Topaz	53.4	57.9	54.1	36.4	39.2	40.9	42.2
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	3.4	3.8	3.4	2.1	1.9	1.9	1.8
Old Country Road	29.7	32.0	26.3	16.6	14.9	14.3	13.7
Tah 52-68	20.1	21.7	17.9	11.2	10.2	9.7	9.3
The Grid	8.3	9.5	8.1	4.6	4.3	3.8	3.6
Canterbury and Commonwealth	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5100 to NVE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
650 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Floriston	24.1	24.1	23.0	15.4	15.6	15.5	16.8
Verdi	51.1	51.1	47.8	31.7	34.6	36.6	41.1
Bordertown	54.6	54.6	52.1	35.8	37.8	40.5	44.7

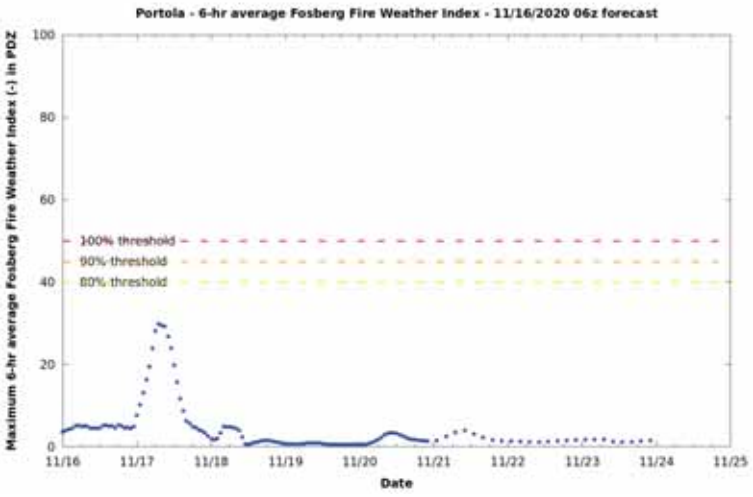
Liberty Utilities Fire Weather Summary Plots - 11/16/2020 06z forecast

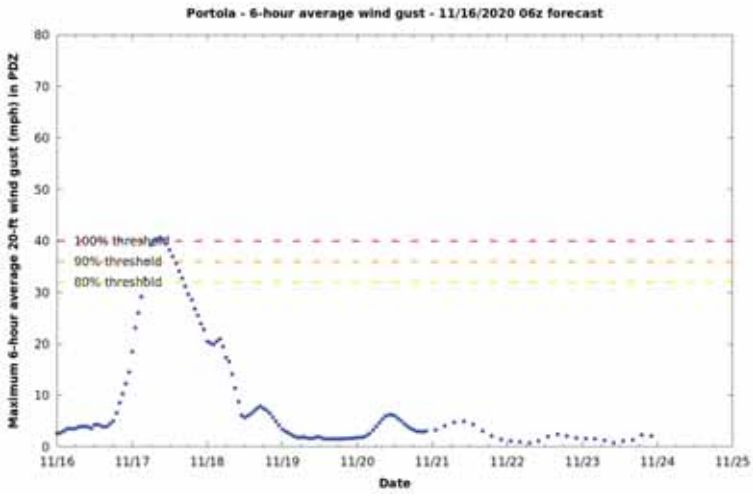
111 Line



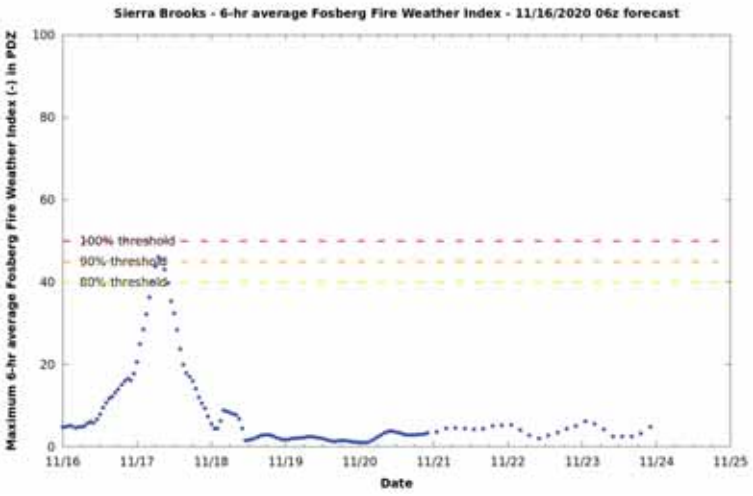


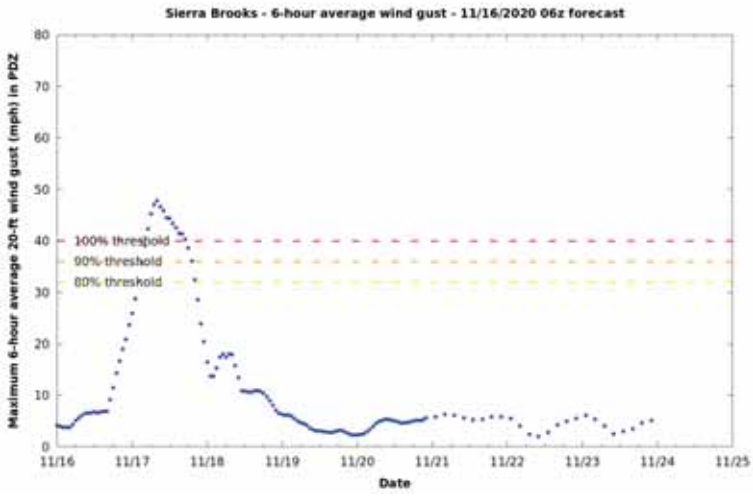
Portola



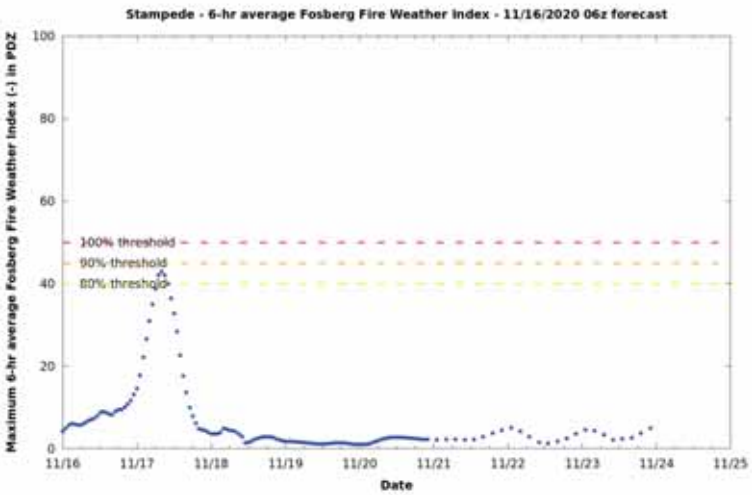


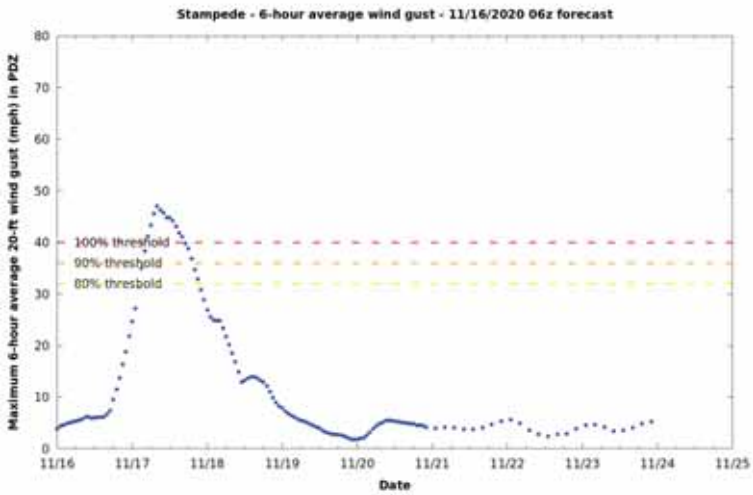
Sierra Brooks



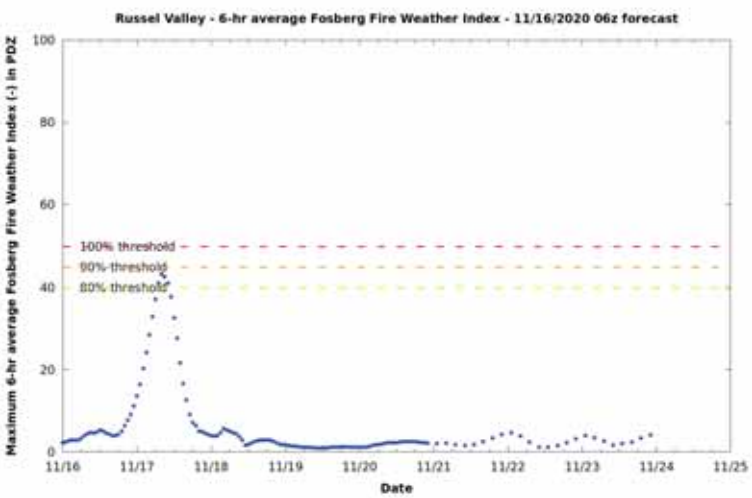


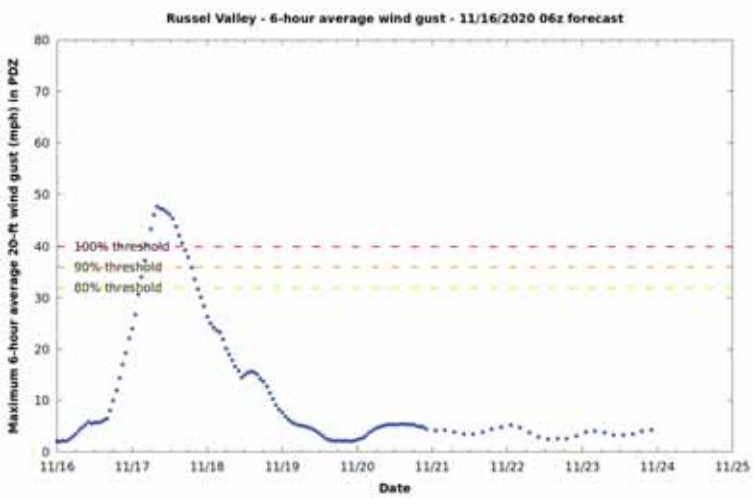
Stampede



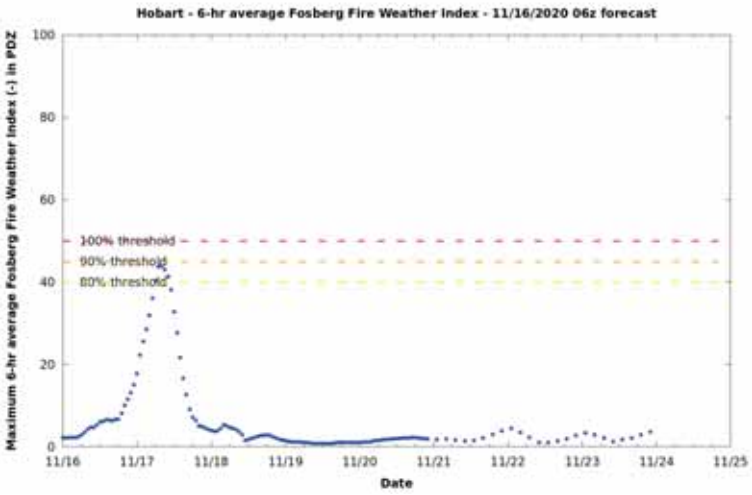


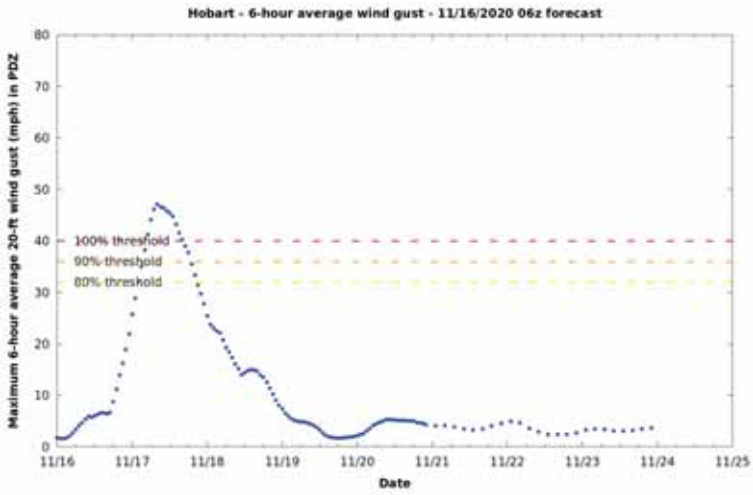
Russell Valley



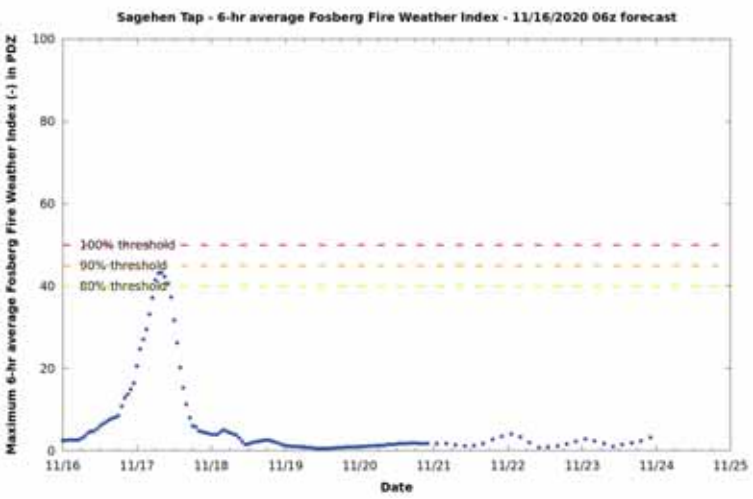


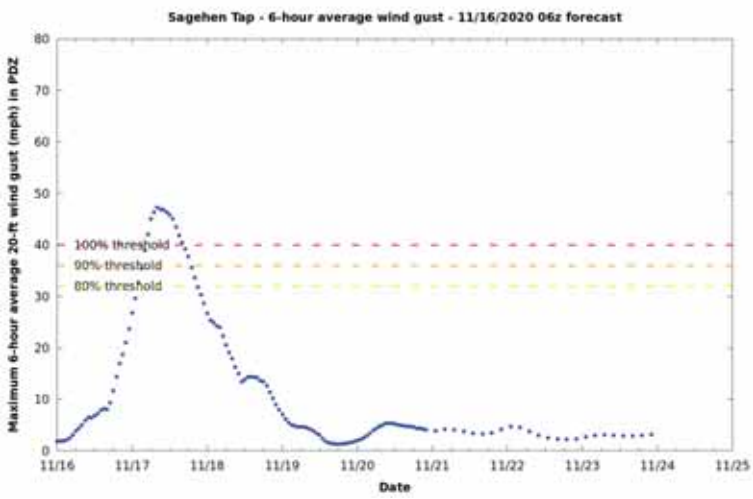
Hobart



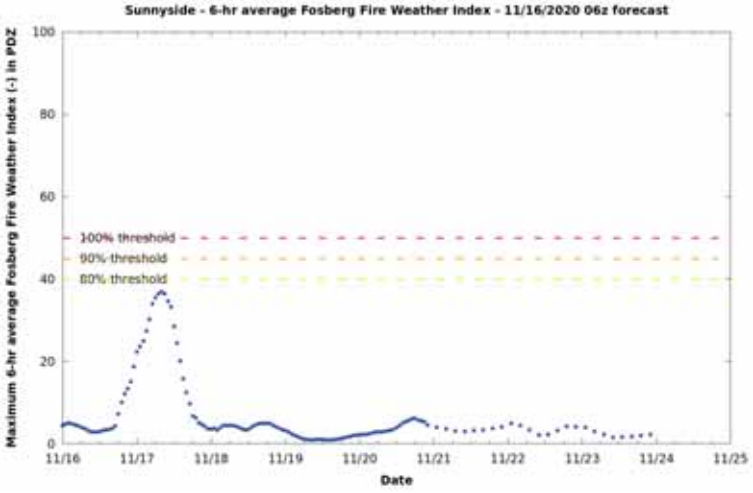


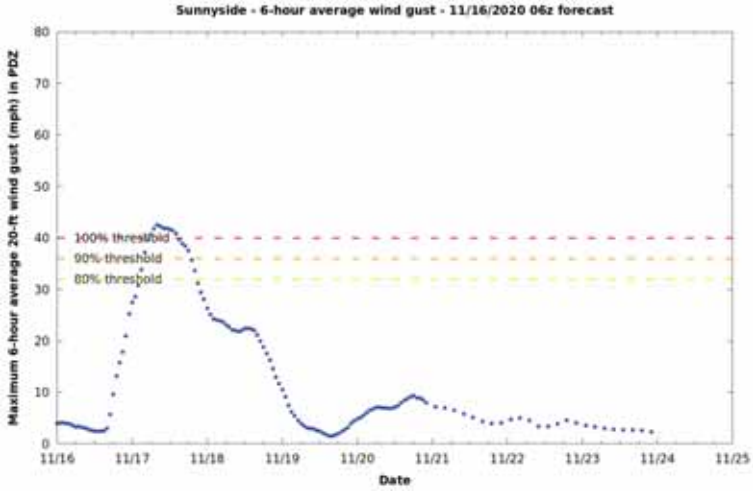
Sagehen tap



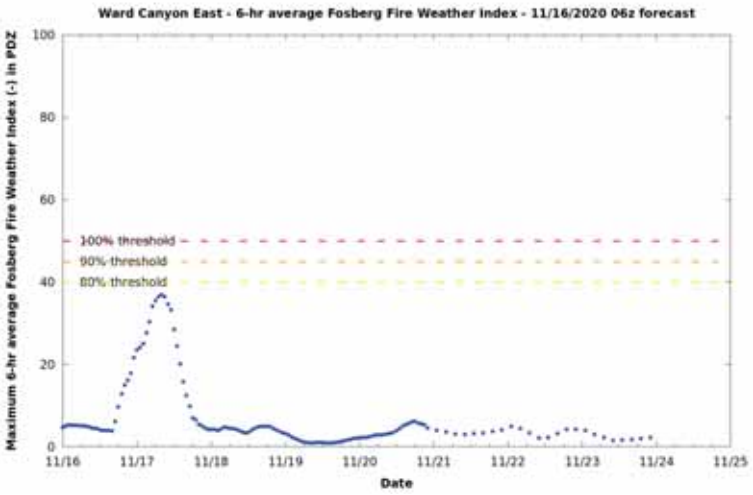


Sunnyside



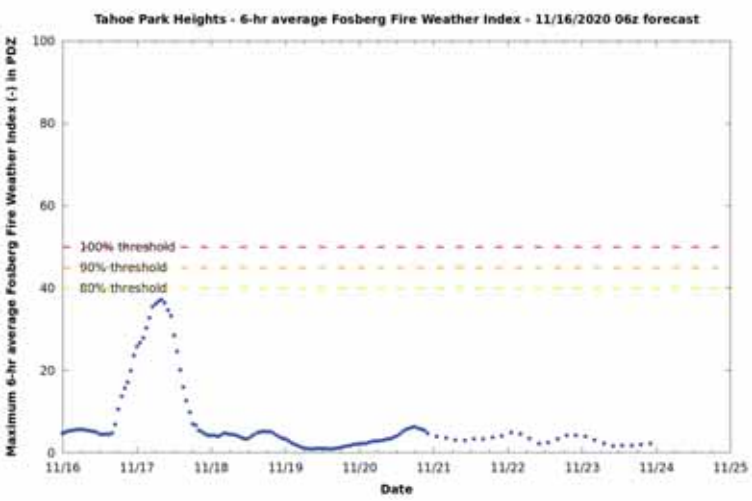


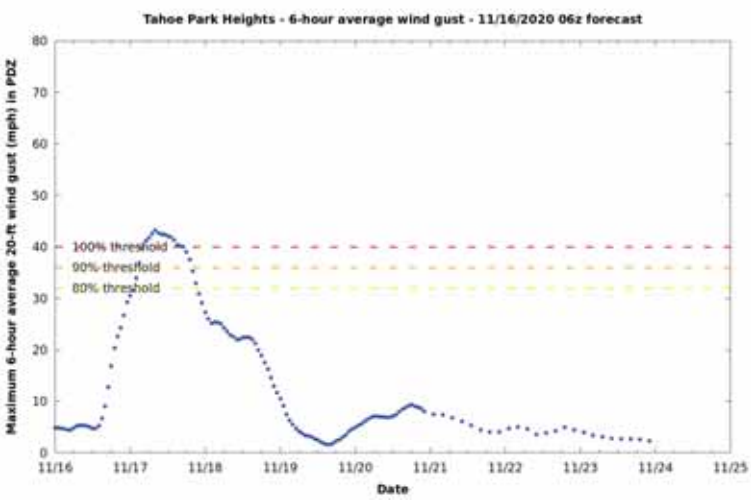
Ward Canyon East



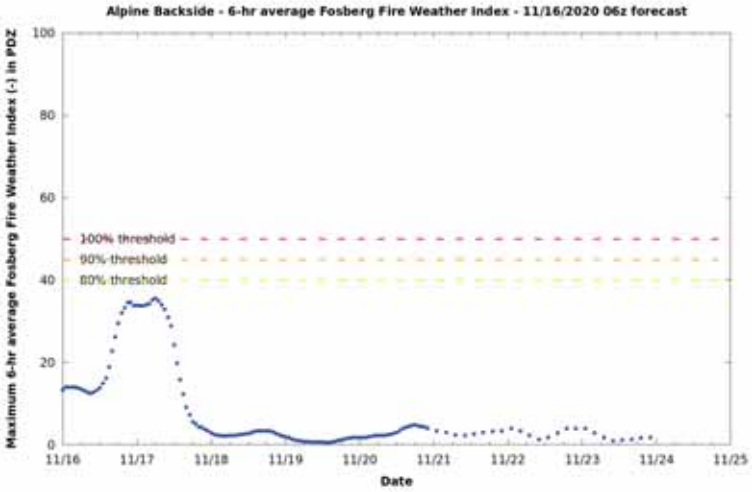


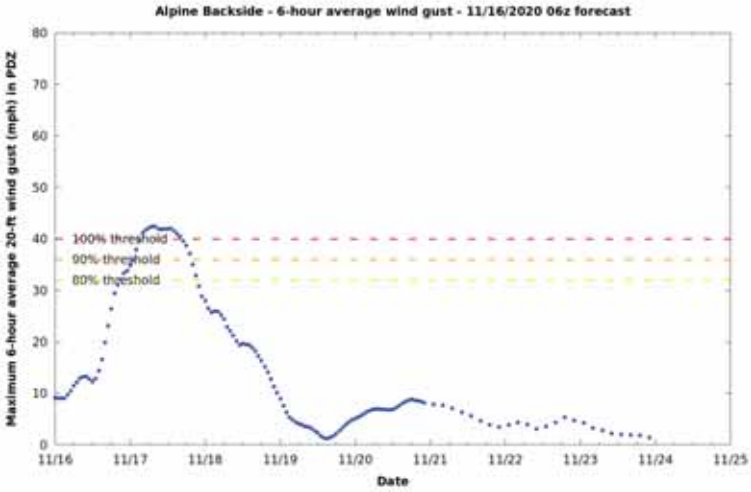
Tahoe Park Heights



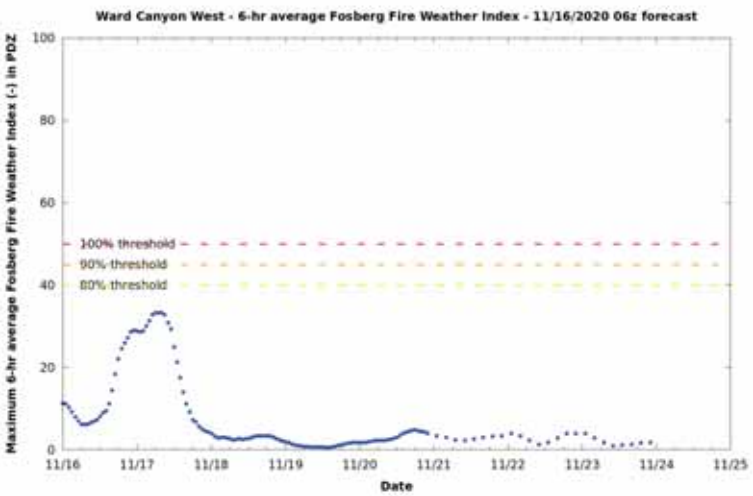


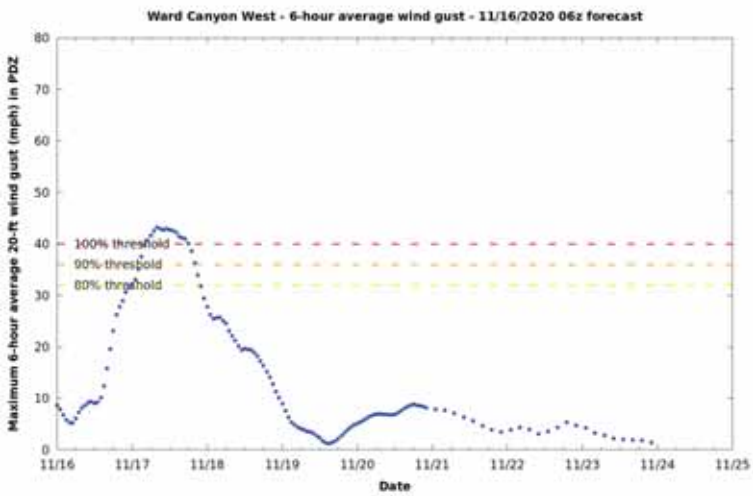
Alpine Backside



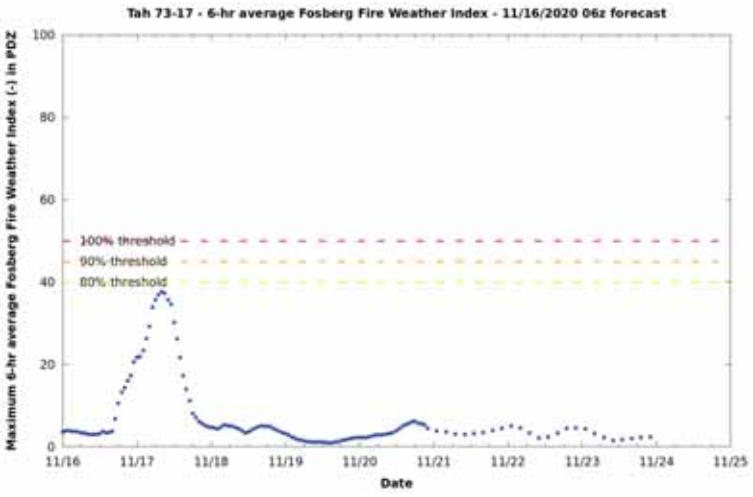


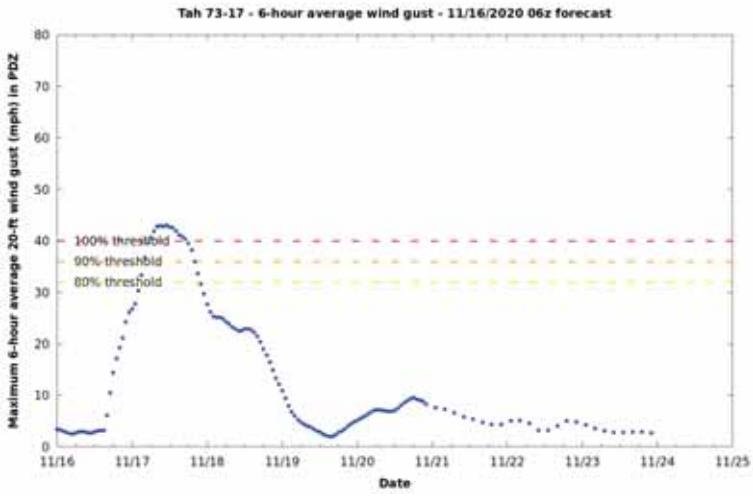
Ward Canyon West



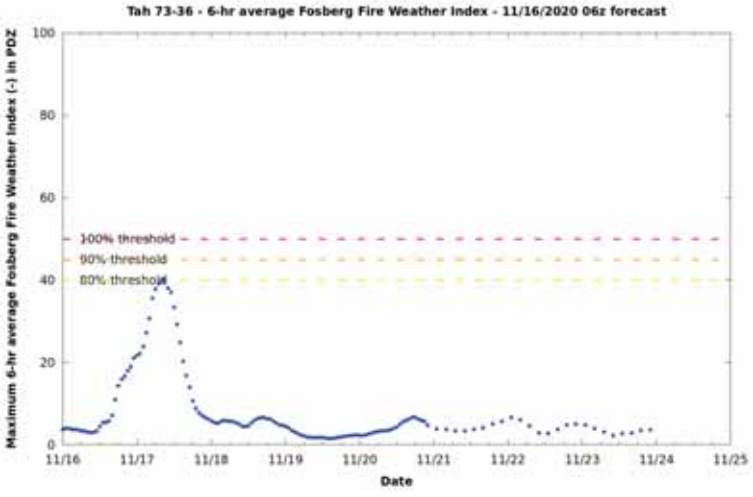


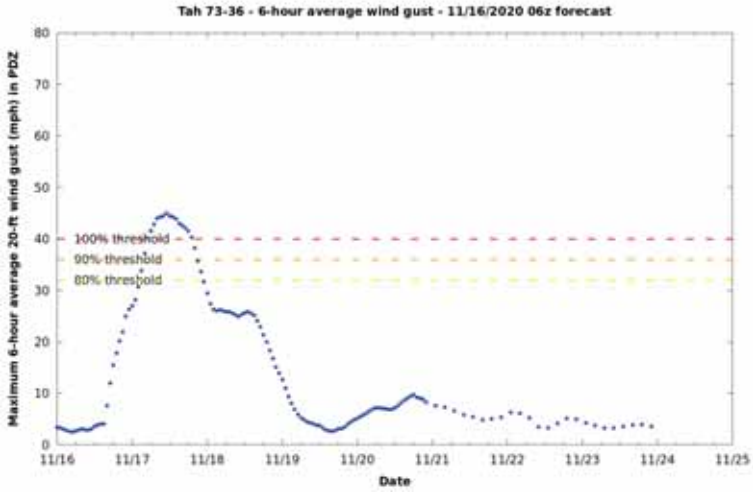
Tah 73-17



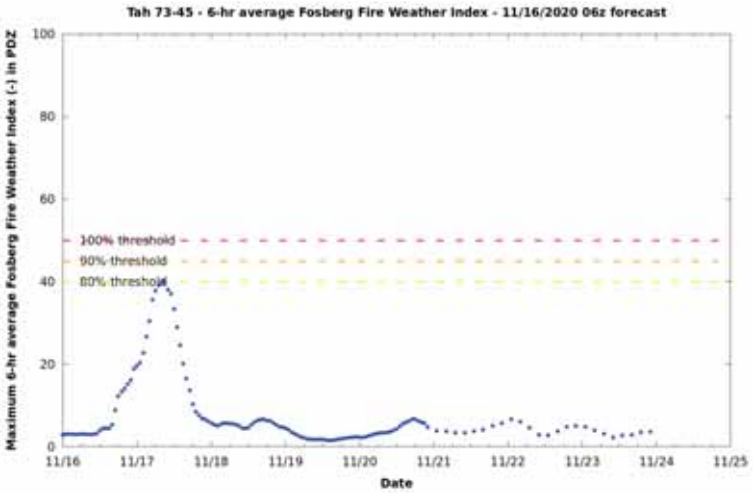


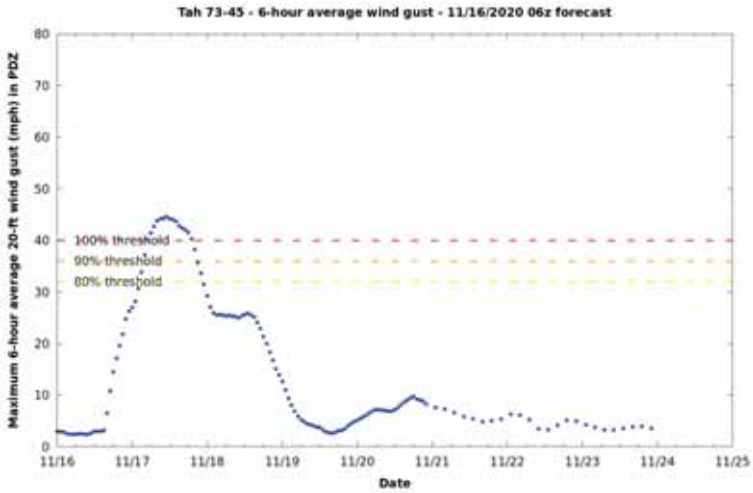
Tah 73-36



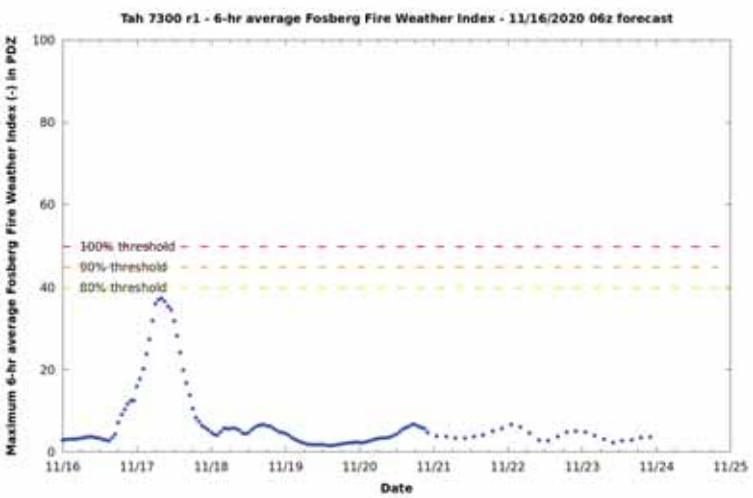


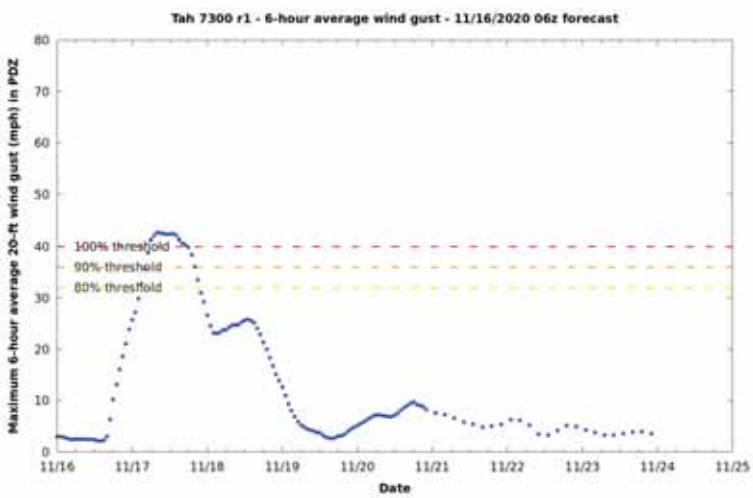
Tah 73-45



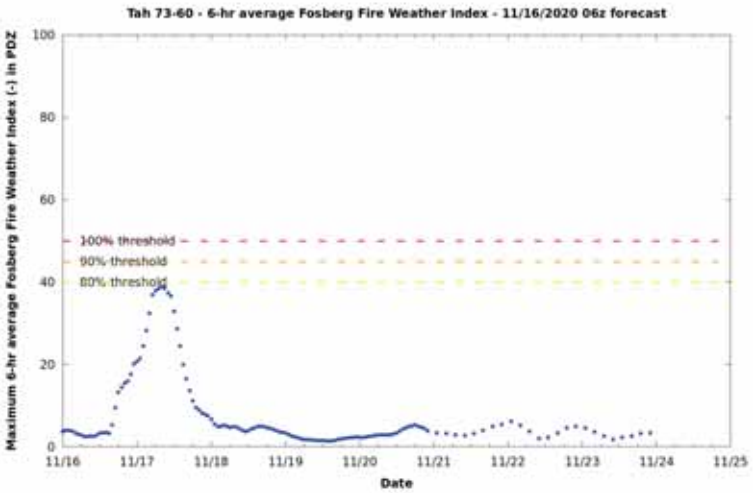


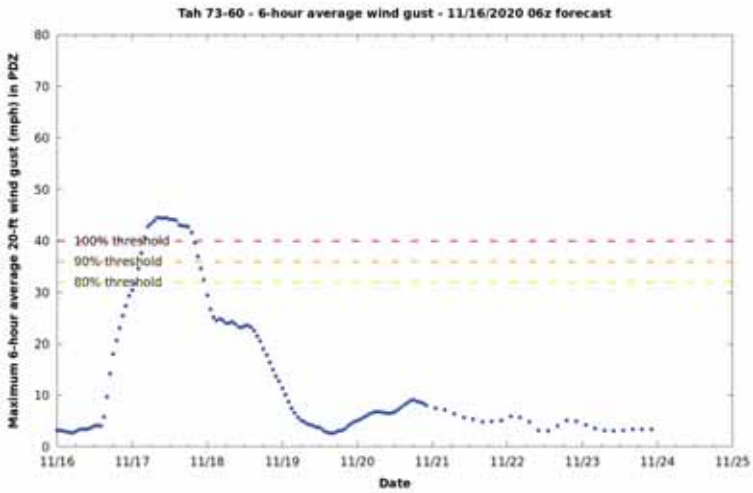
Tah 7300 r1



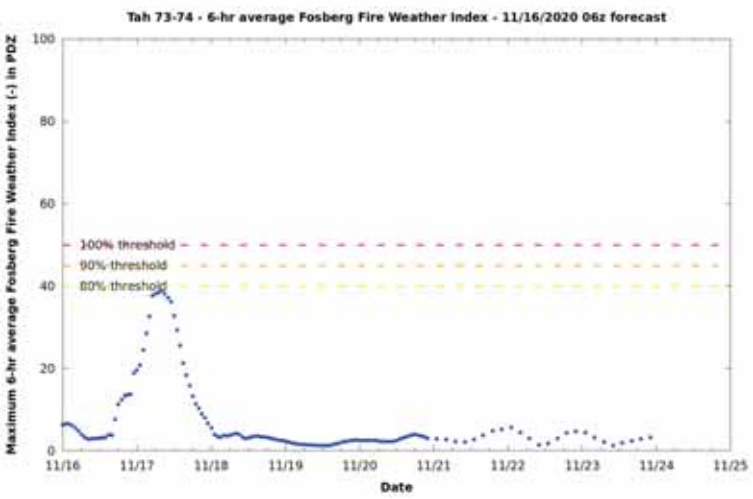


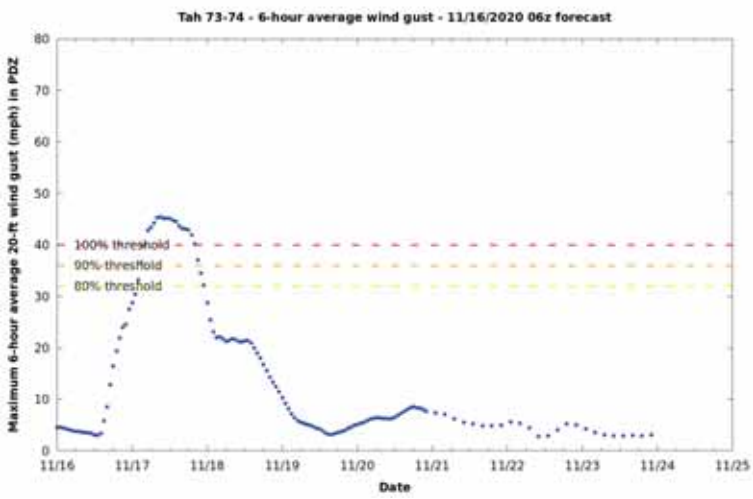
Tah 73-60



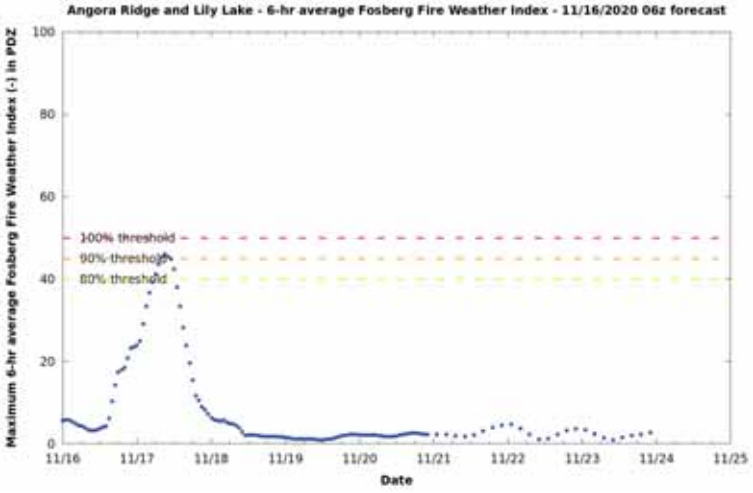


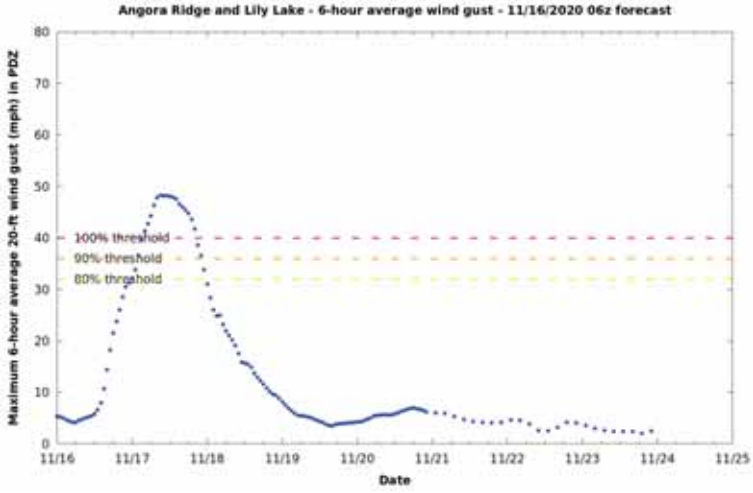
Tah 73-74



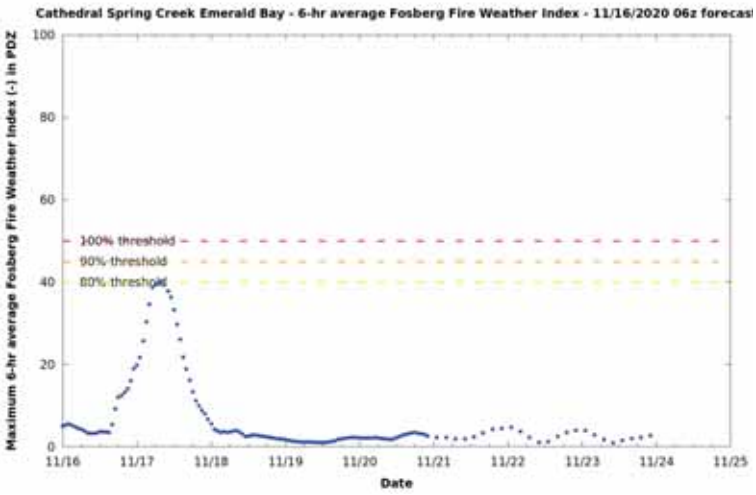


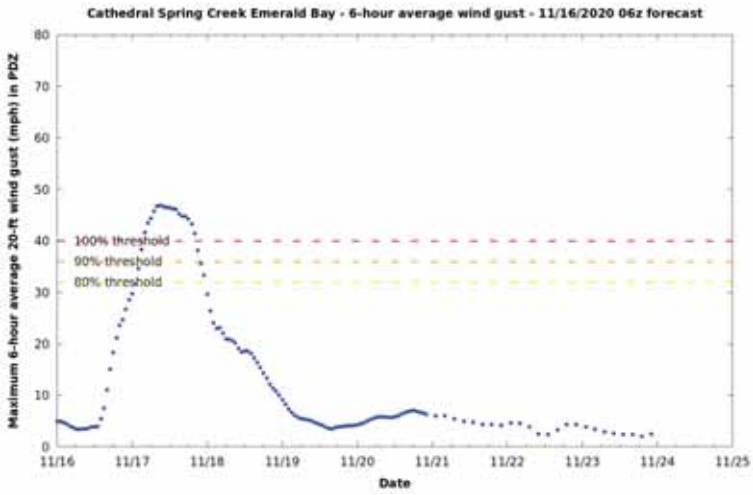
Angora Ridge and Lily Lake



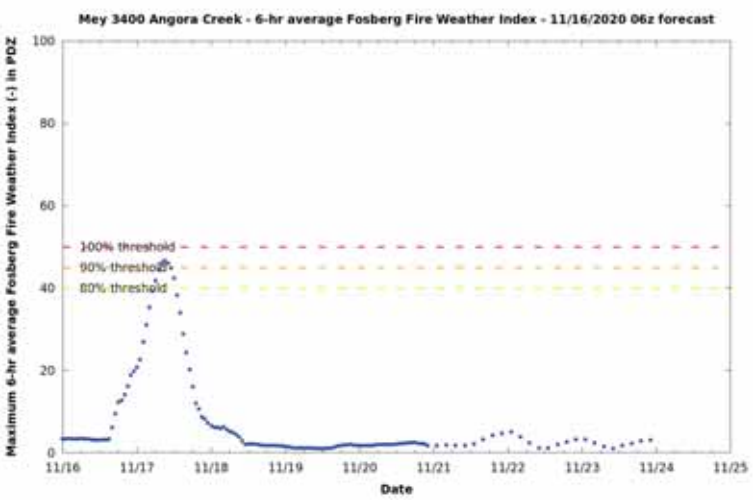


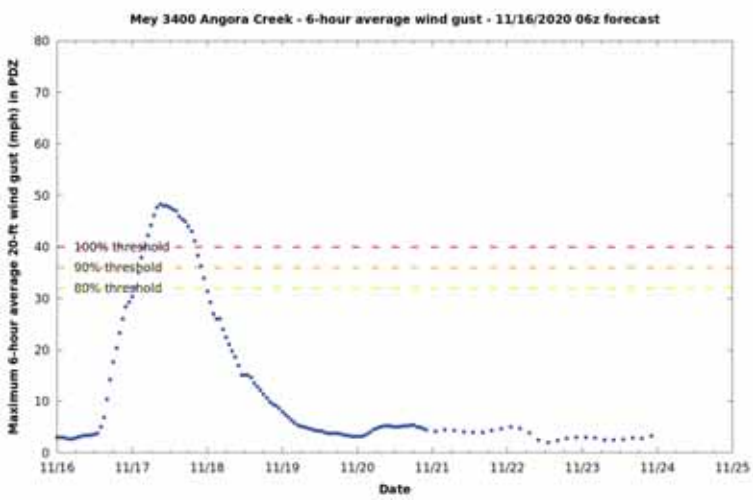
Cathedral Spring Creek Emerald Bay



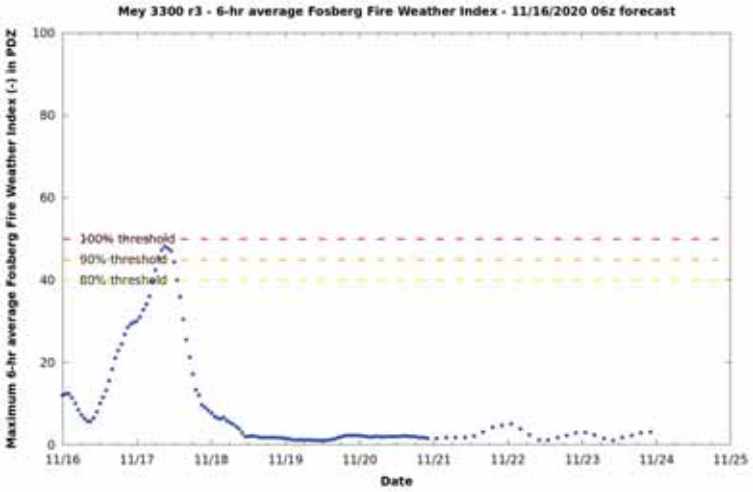


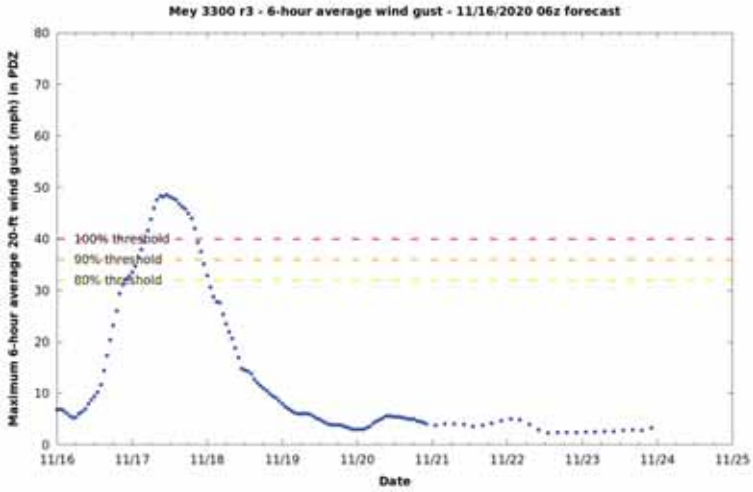
Mey 3400 Angora Creek



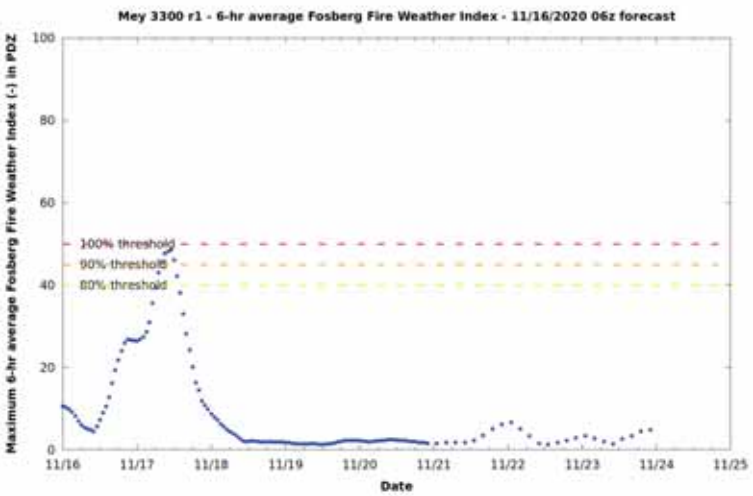


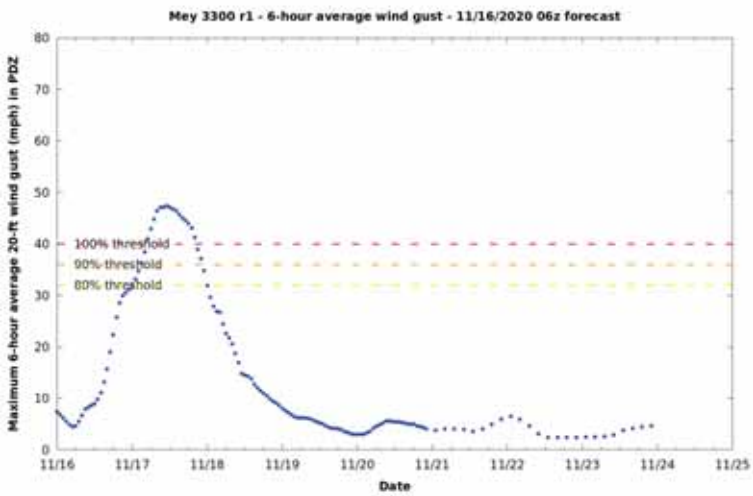
Mey 3300 r3



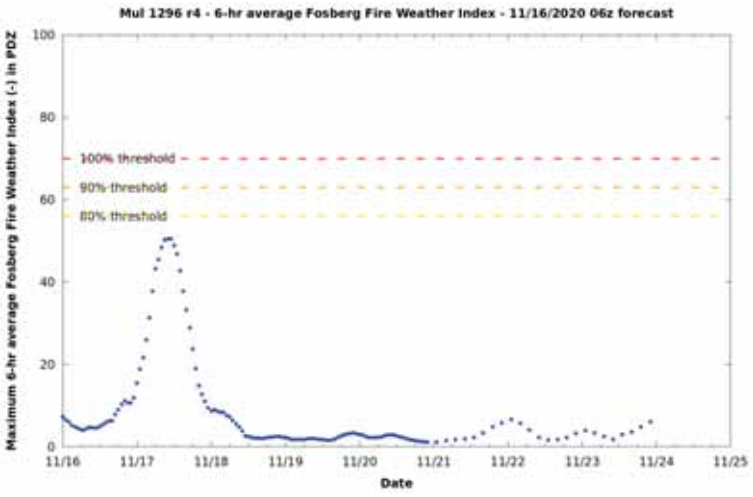


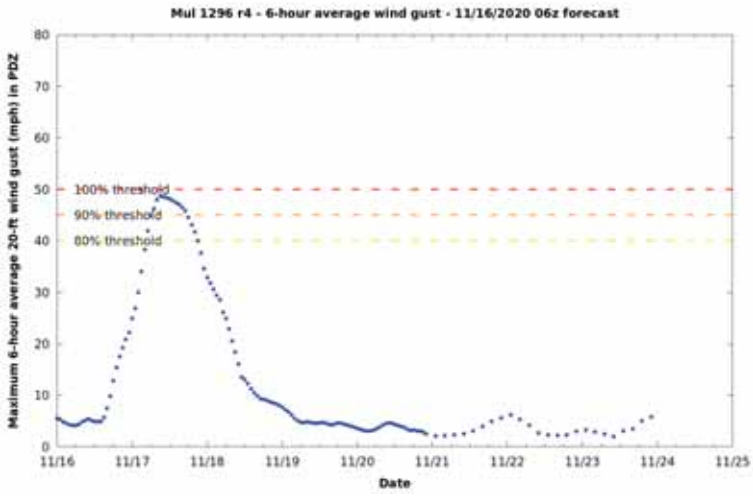
Mey 3300 r1



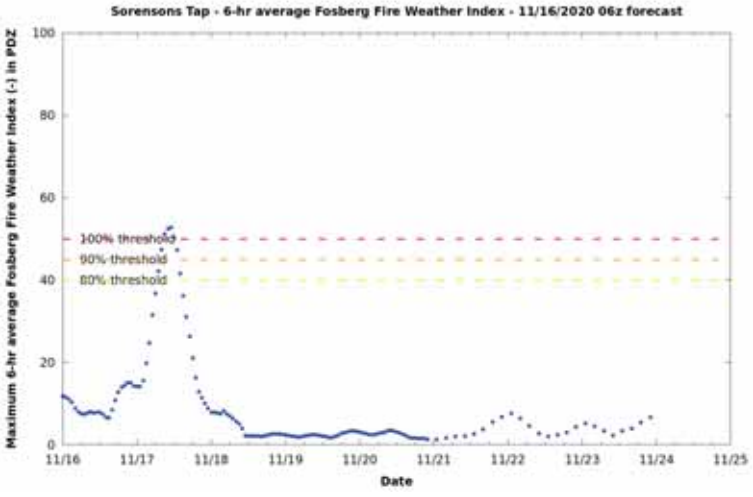


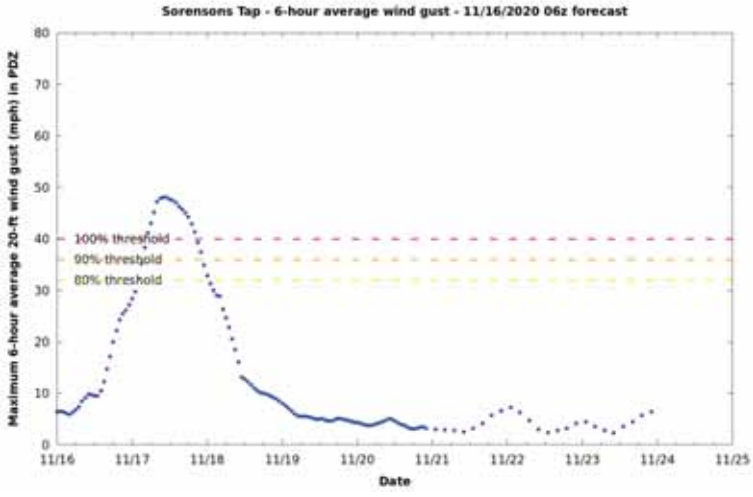
Mul 1296 r4



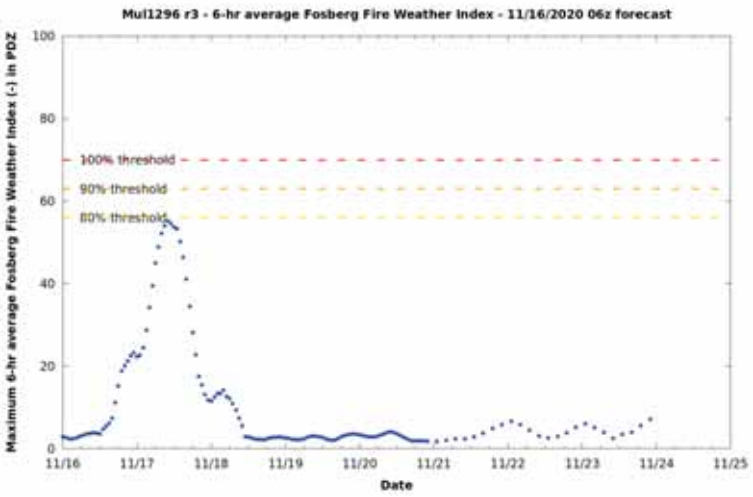


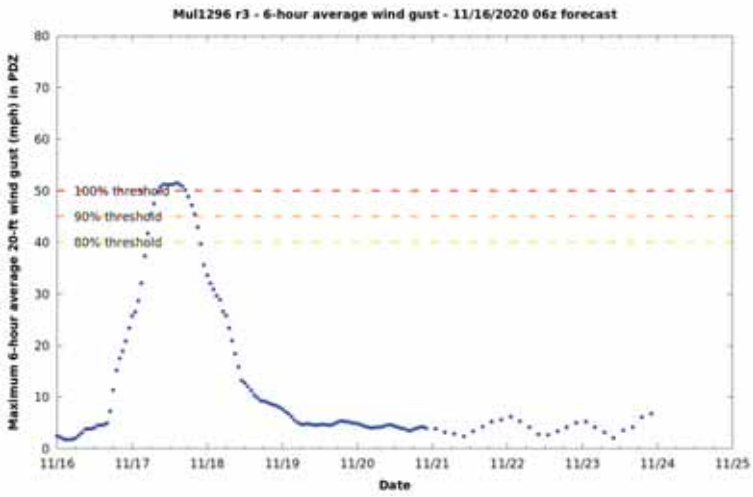
Sorensons Tap



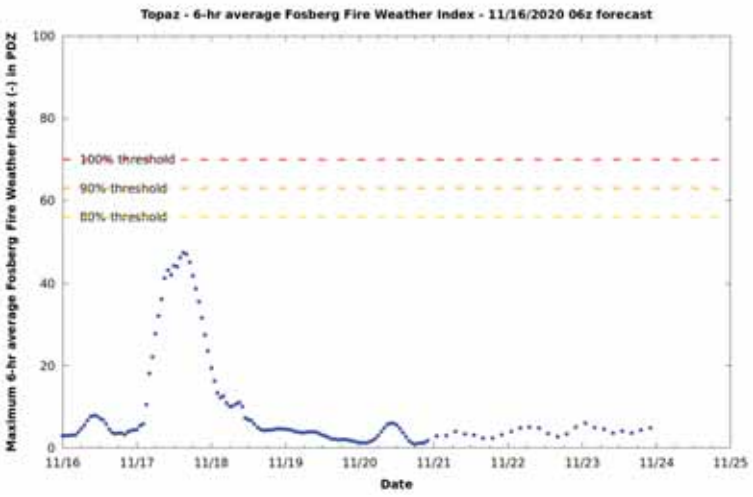


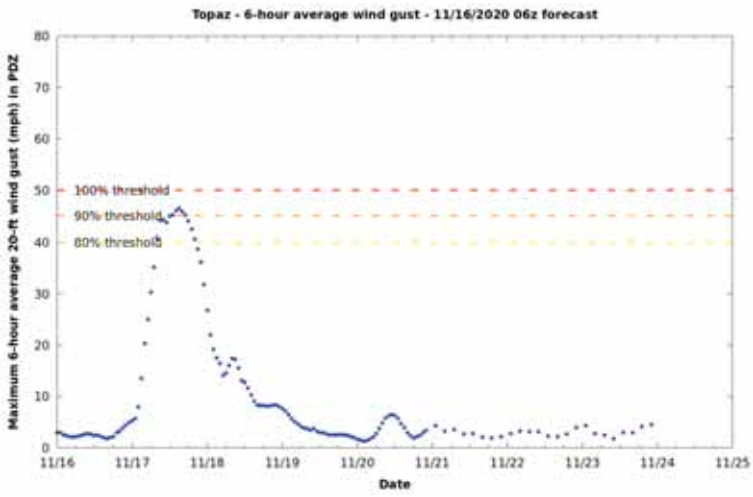
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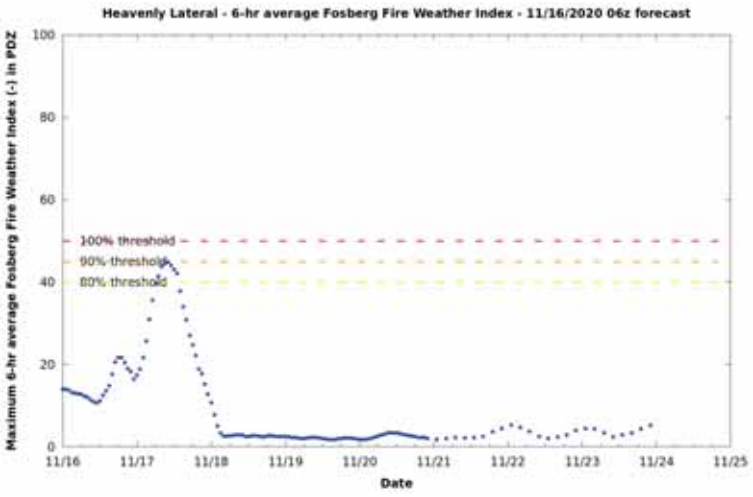


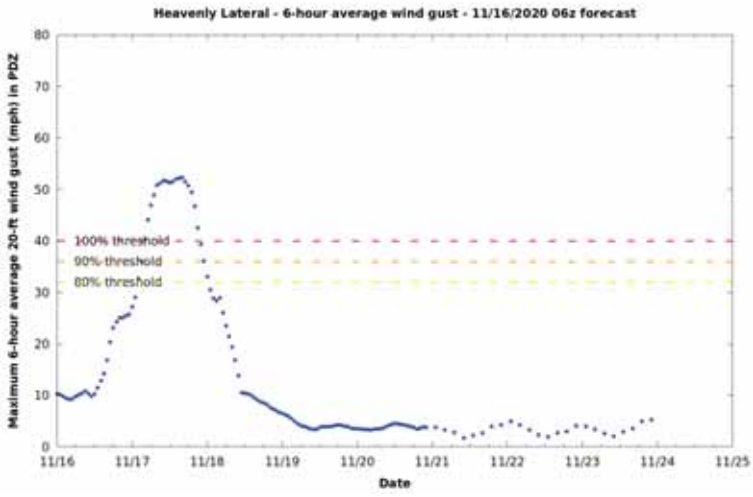
Topaz



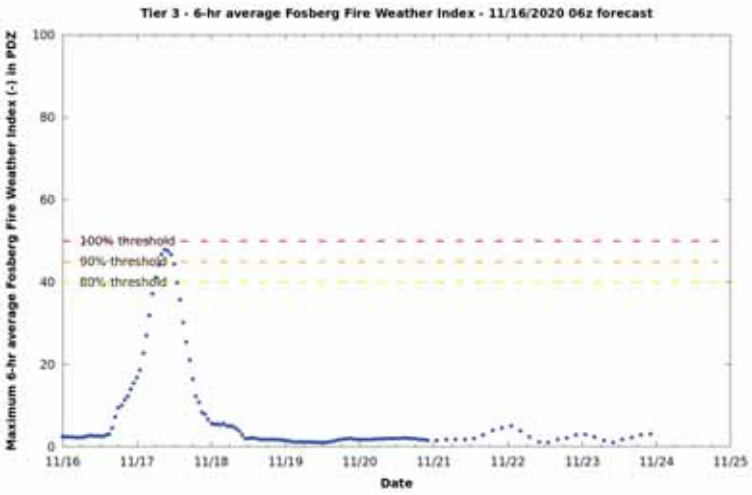


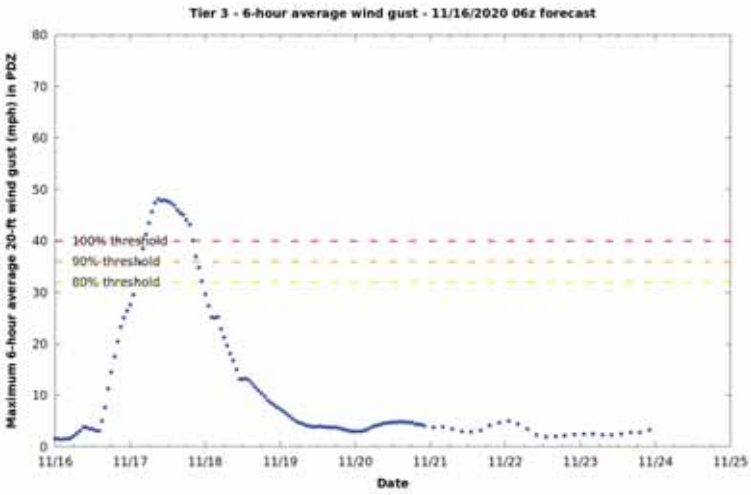
Heavenly Lateral



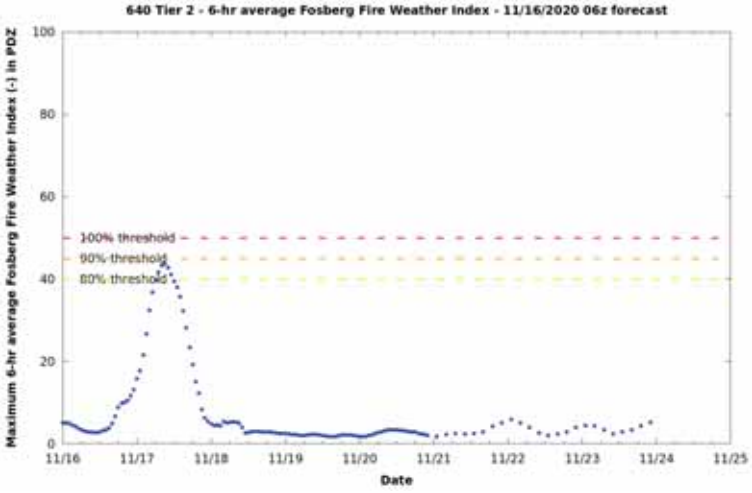


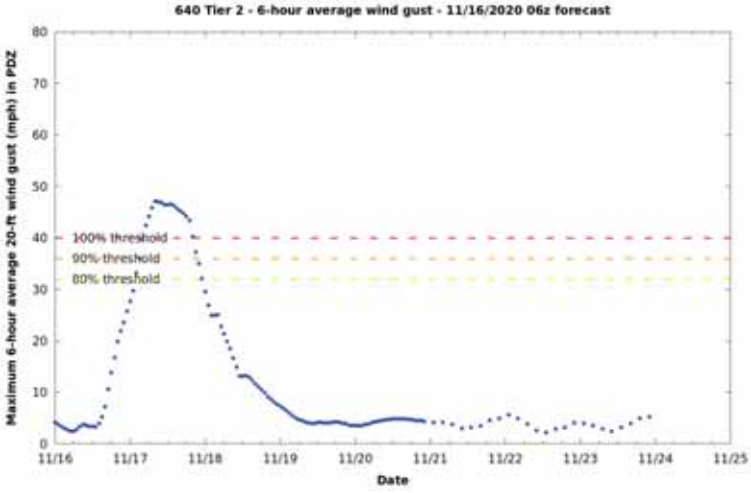
Tier 3



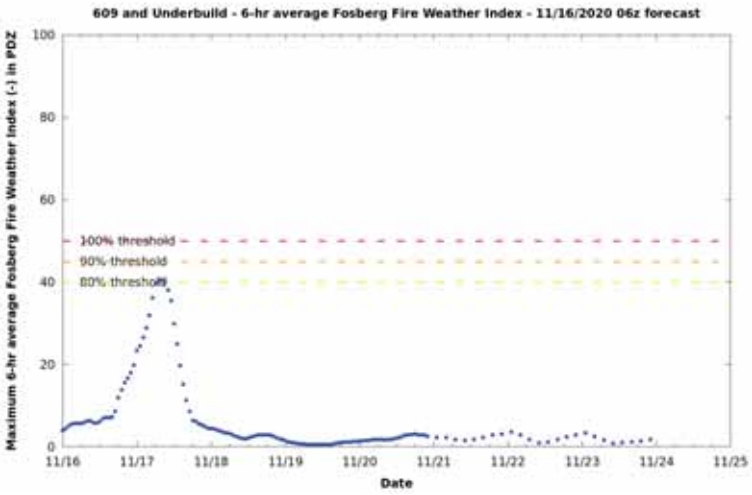


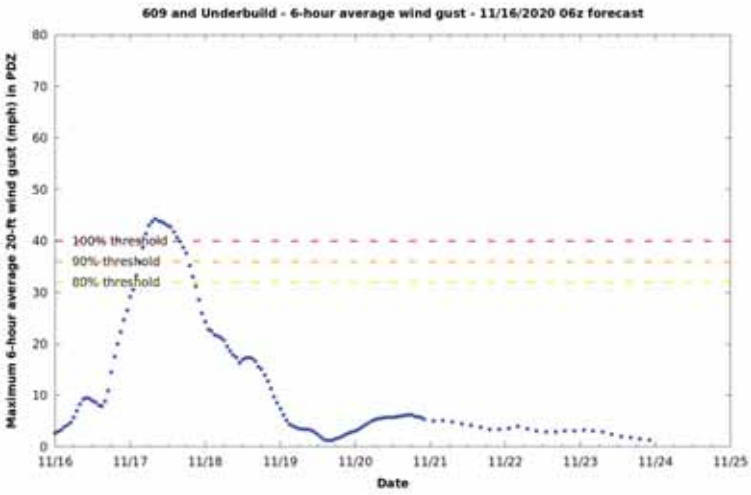
640 Tier 2



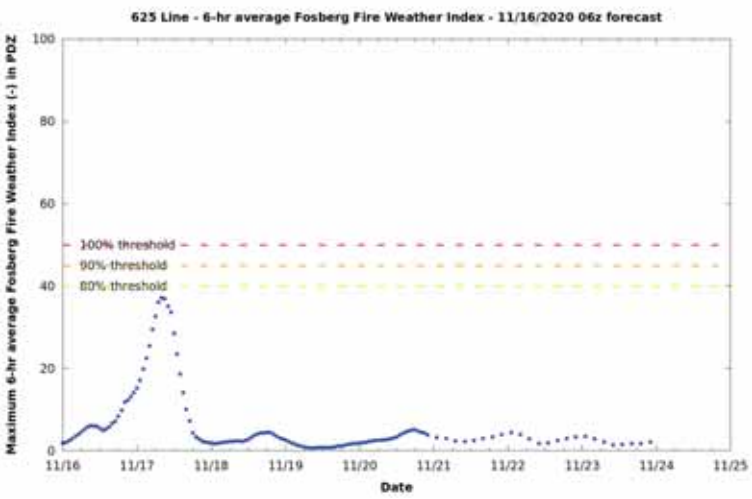


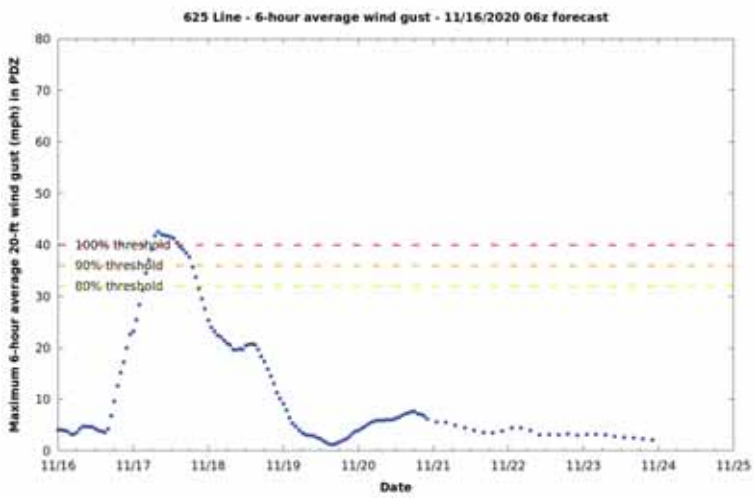
609 and Underbuild



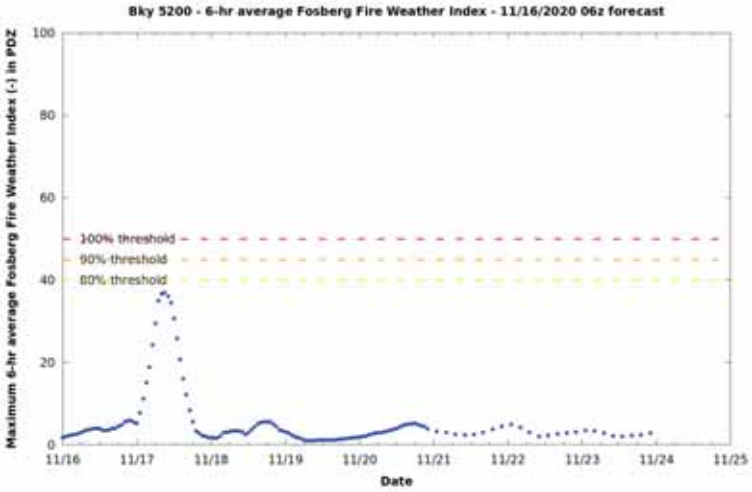


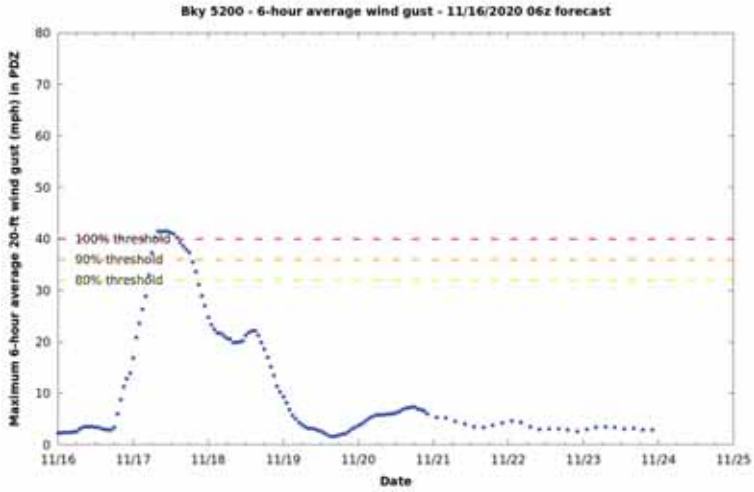
625 Line



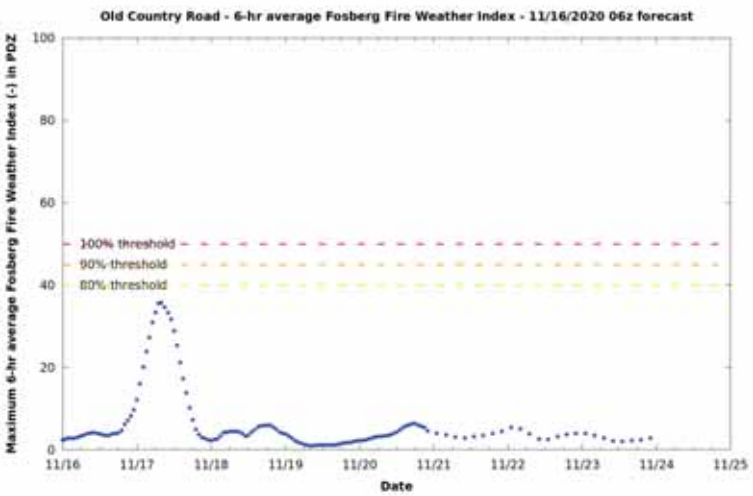


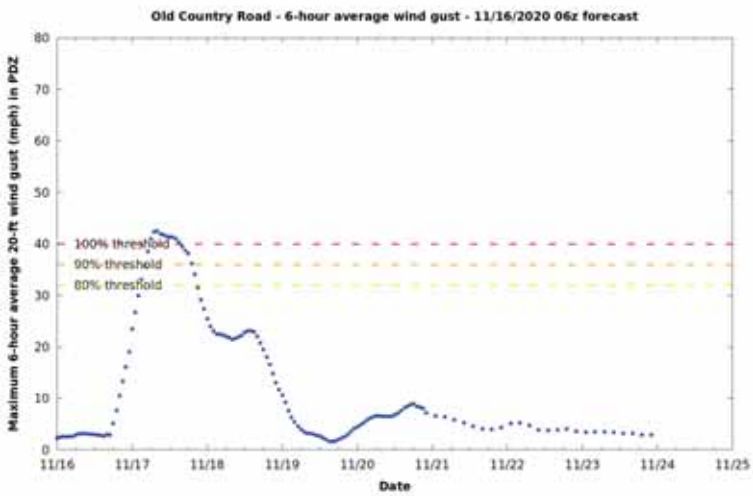
Bky 5200



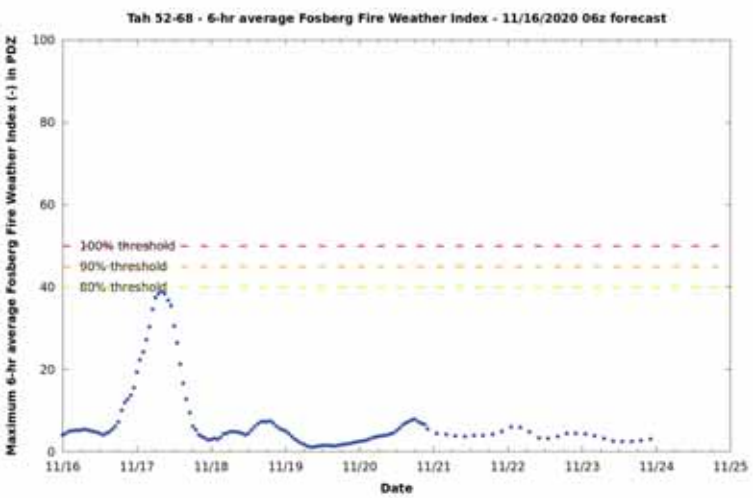


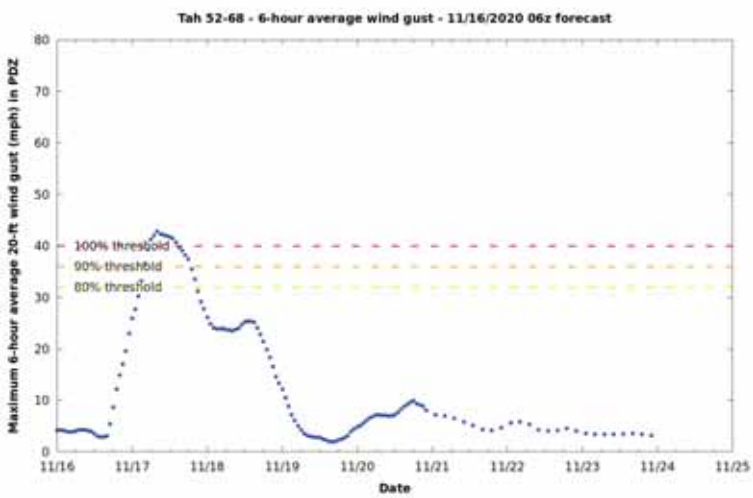
Old Country Road



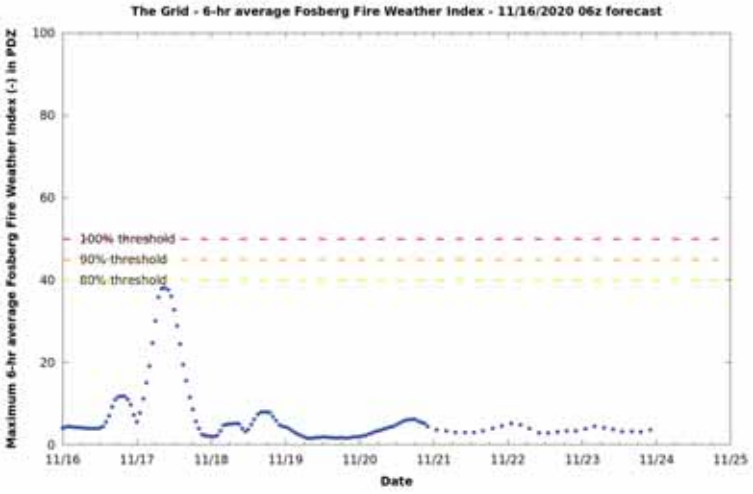


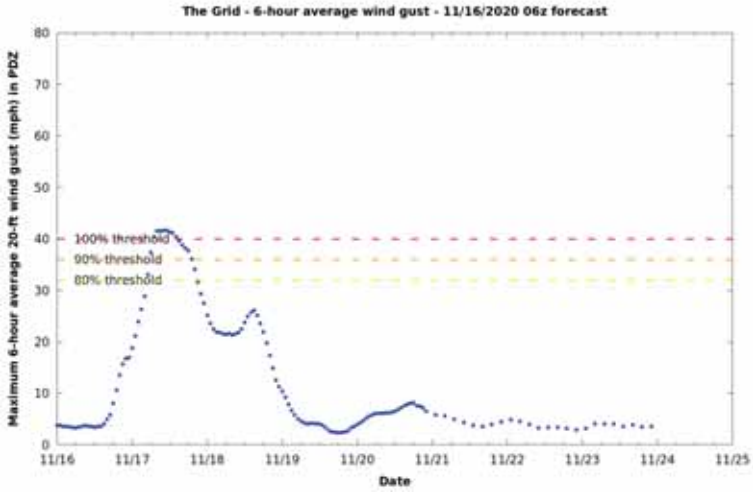
Tah 52-68



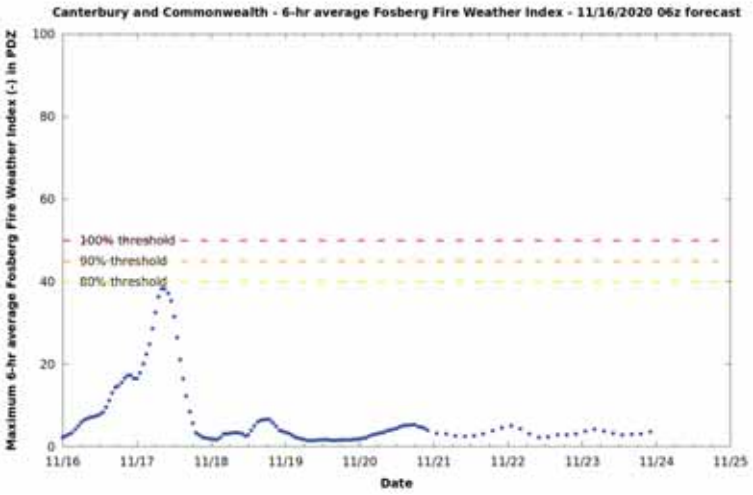


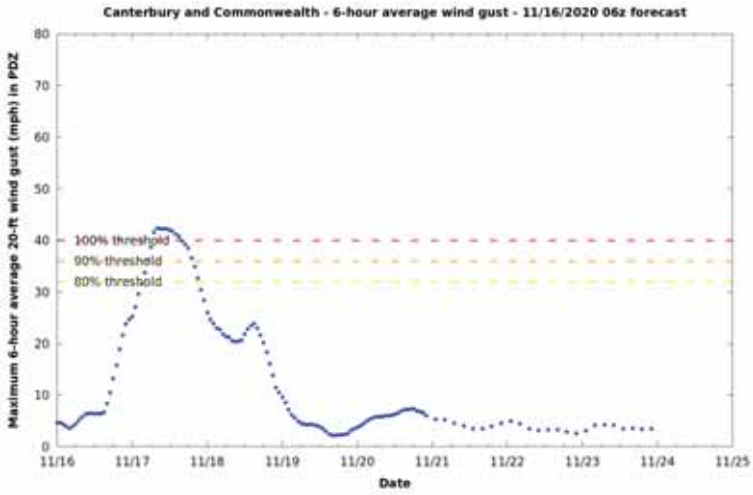
The Grid



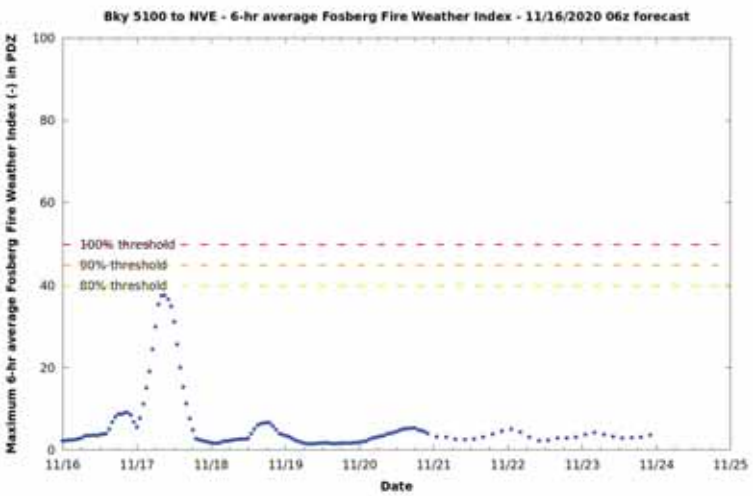


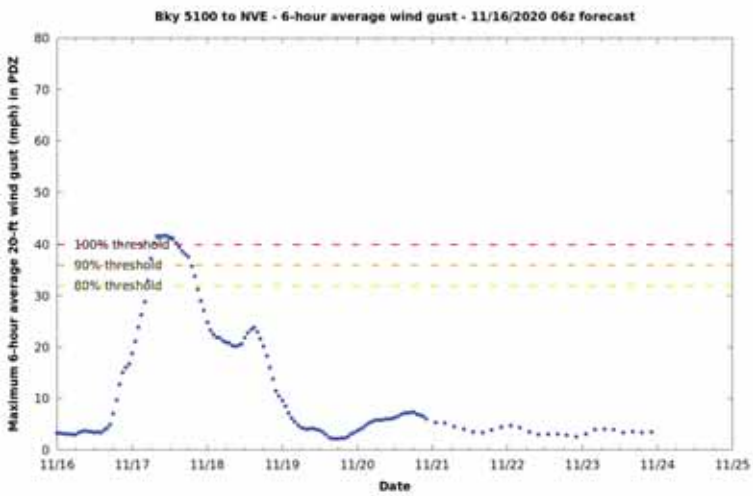
Canterbuy and Commonwealth



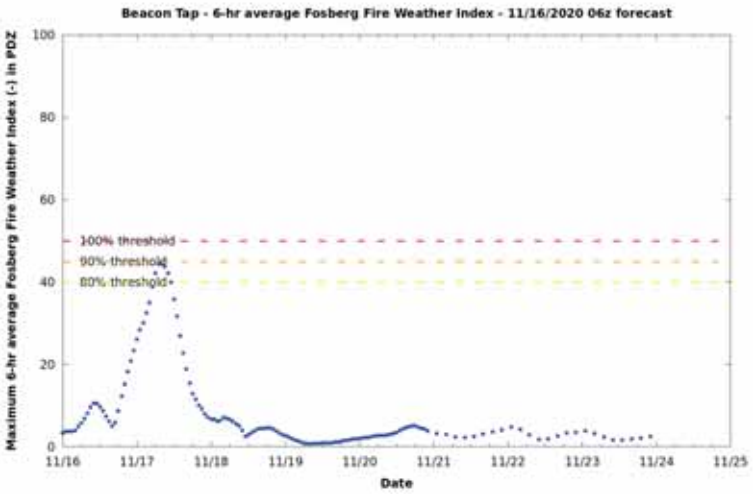


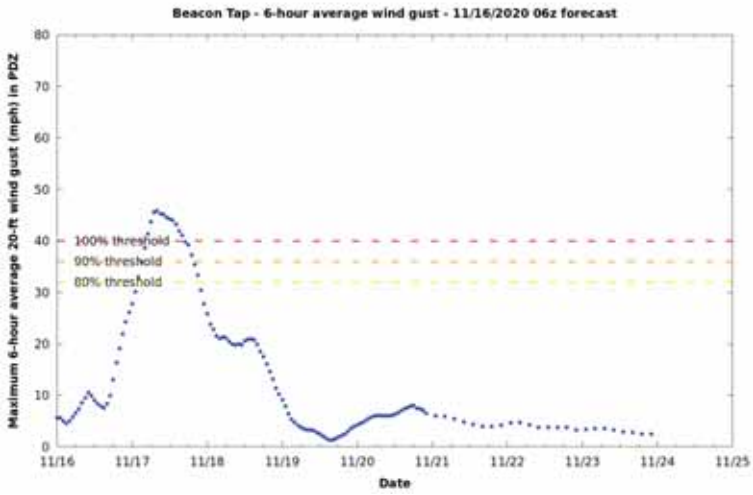
Bky 5100 to NVE



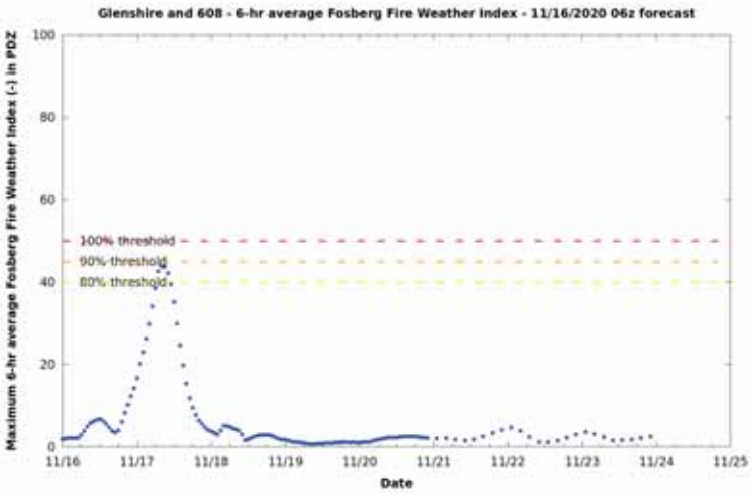


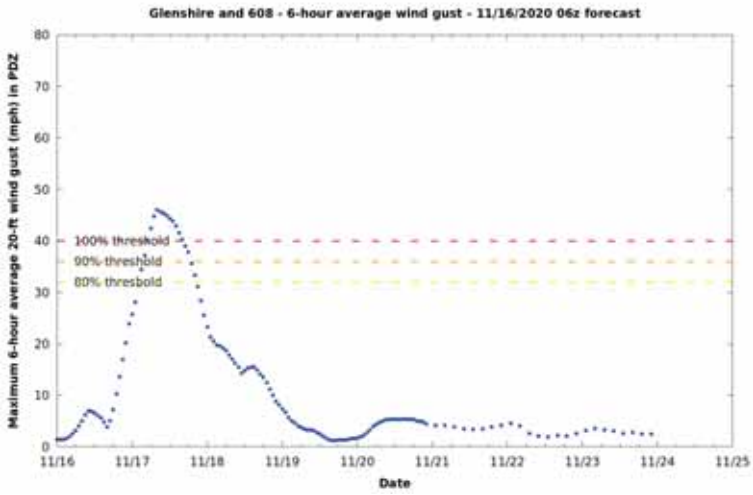
Beacon Tap



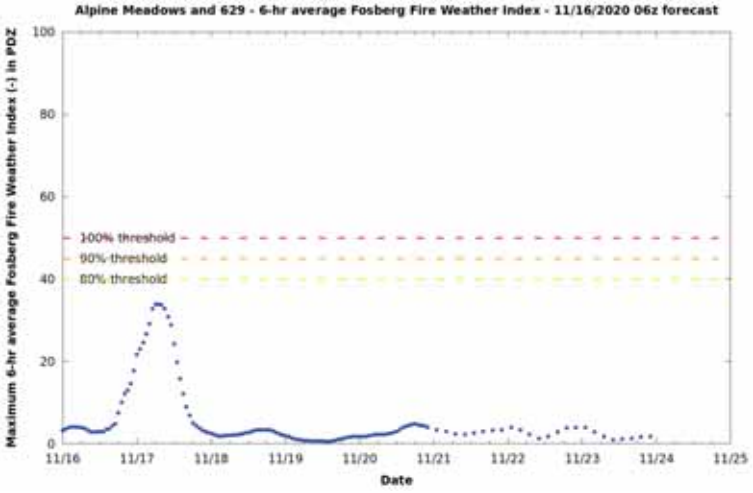


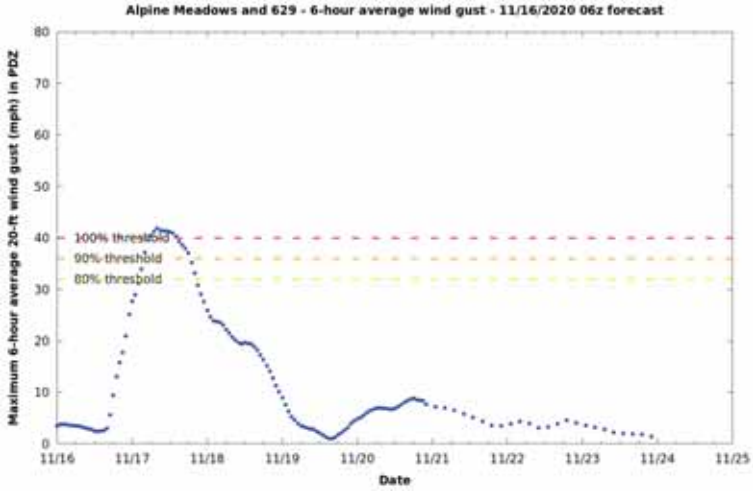
Glenshire and 608



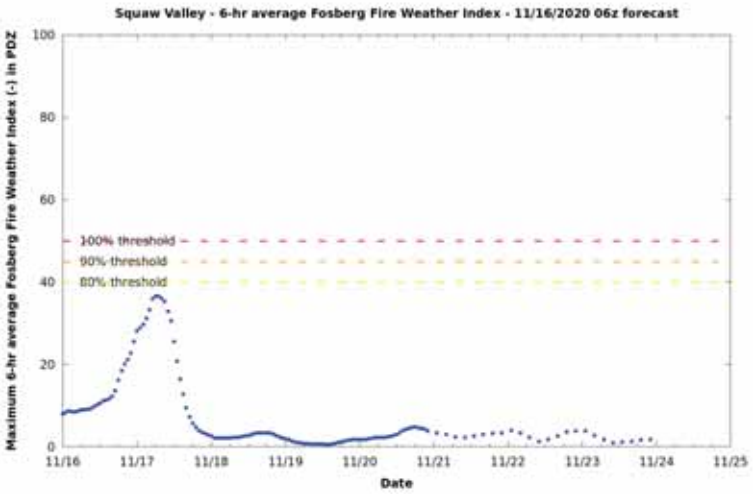


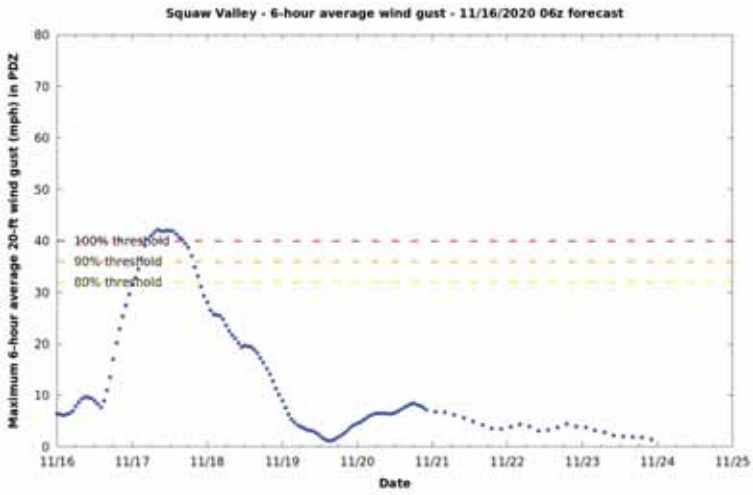
Alpine Meadows and 629



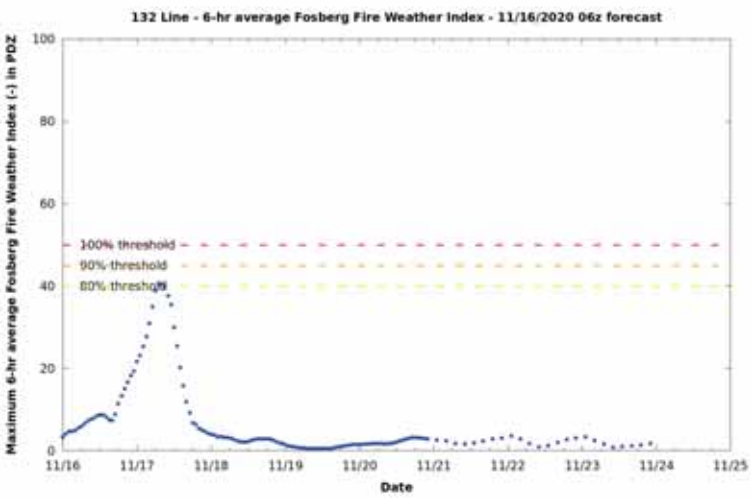


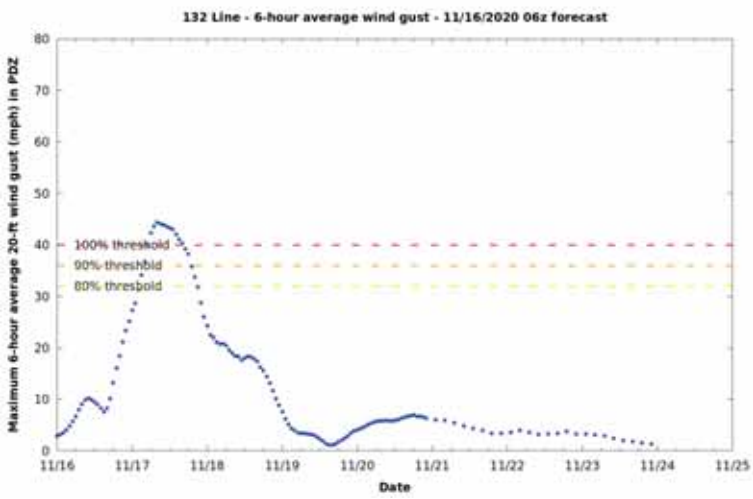
Squaw Valley



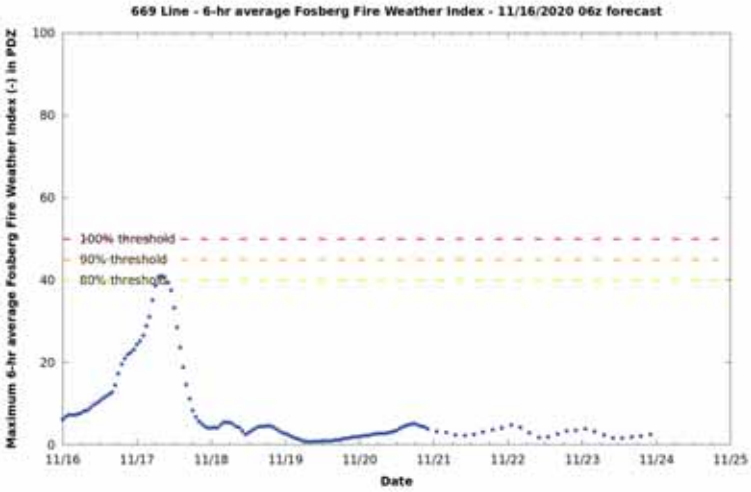


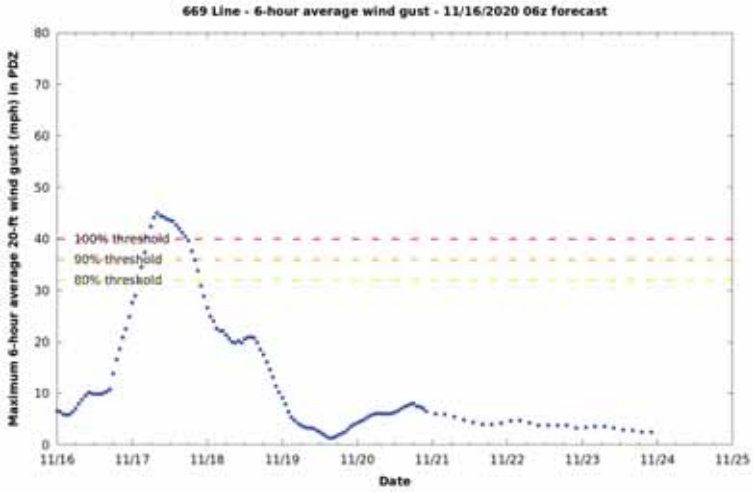
132 Line



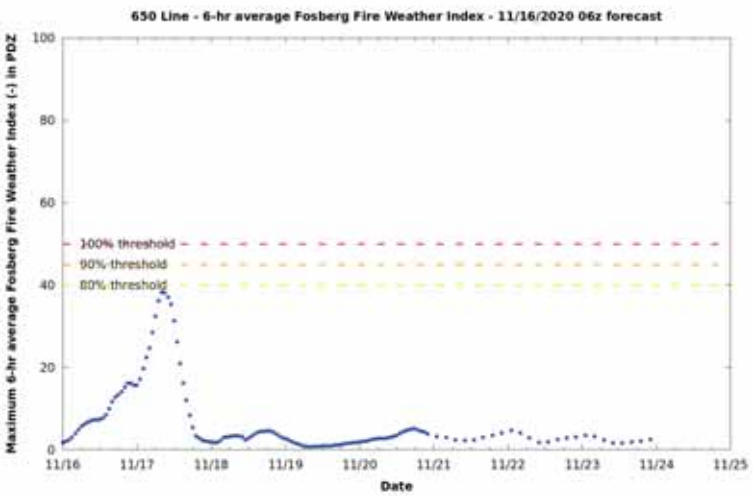


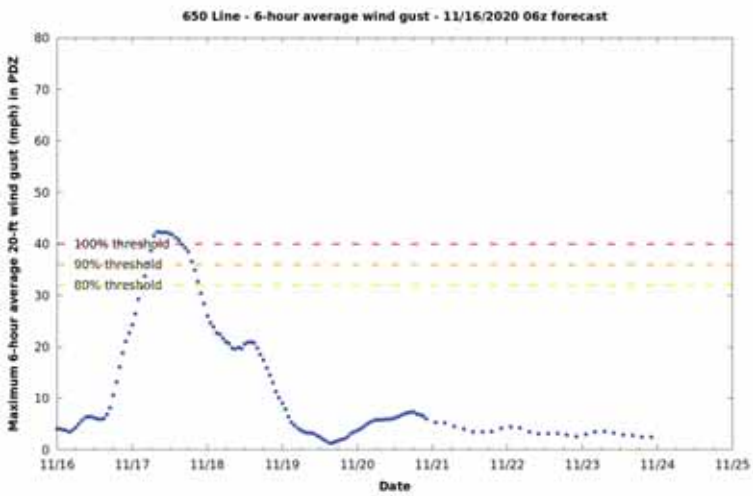
669 Line



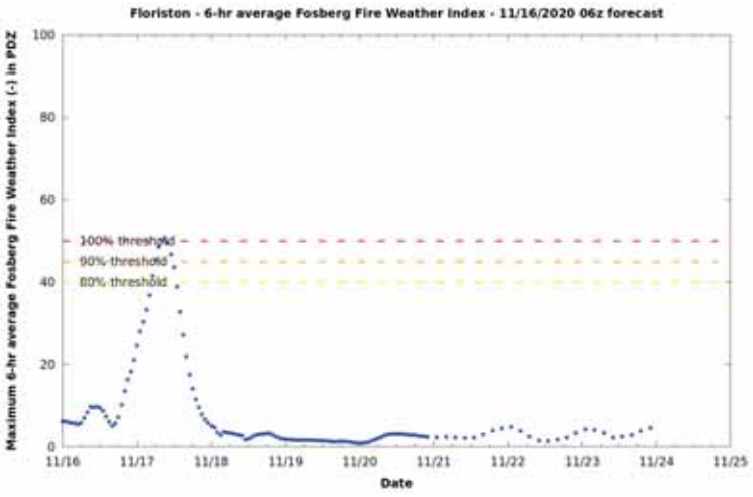


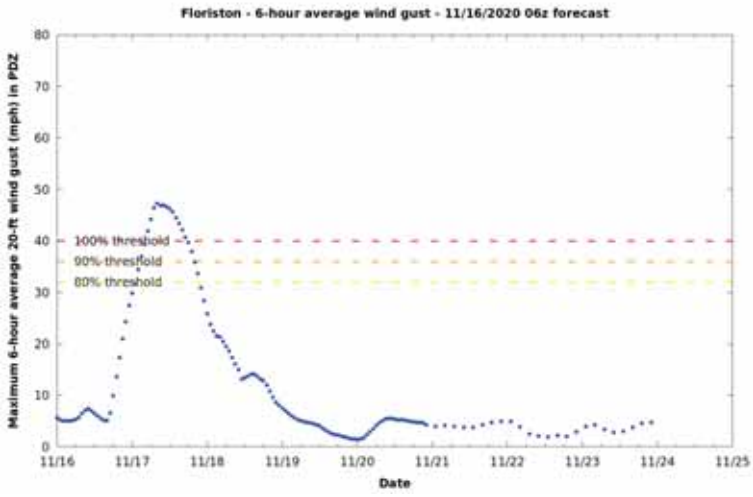
650 Line



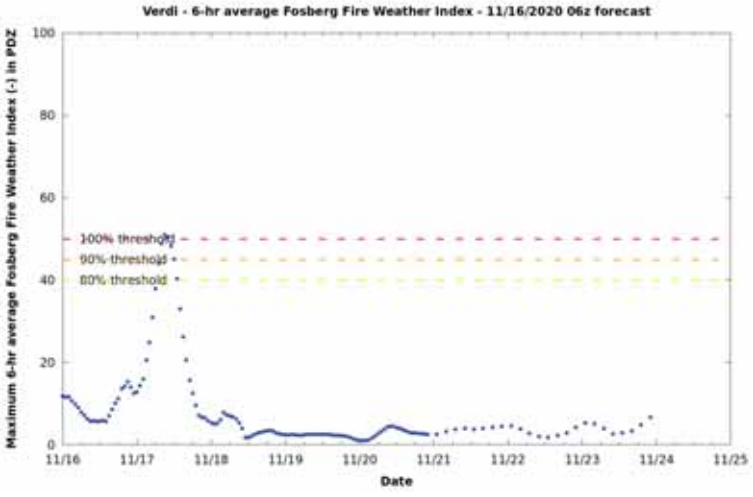


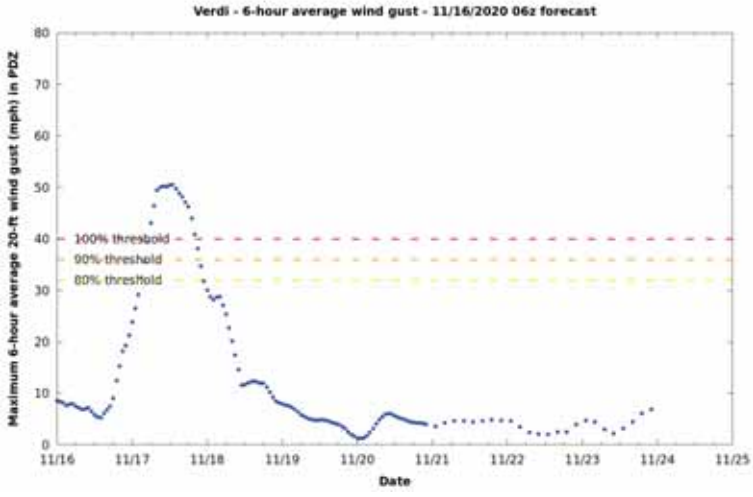
Floriston



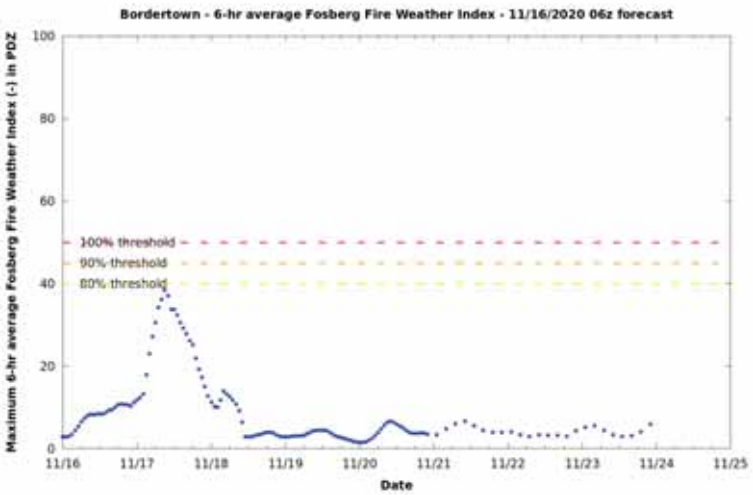


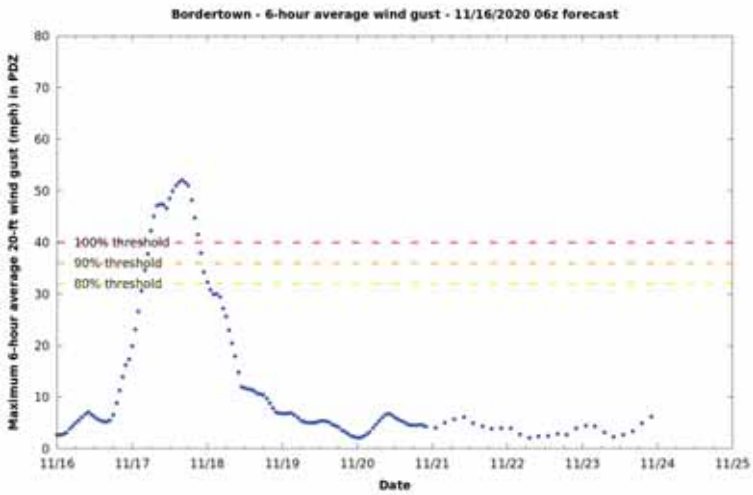
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/16/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/16/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/16/20 - 11/22/20

Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	moderate	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

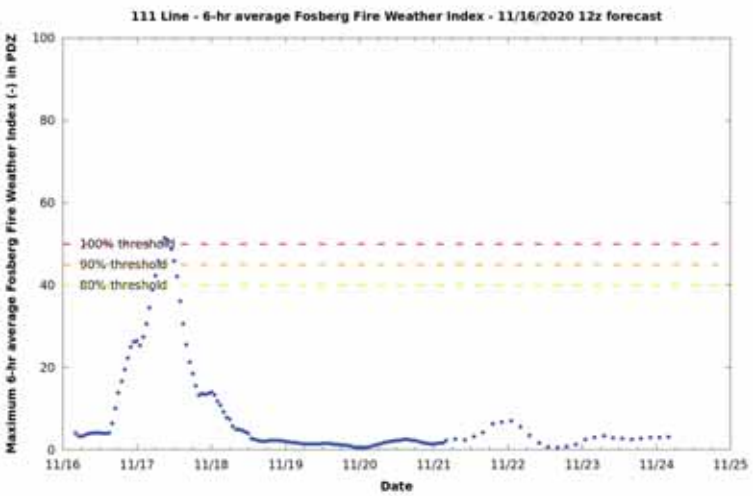
Liberty Utilities Energy Release Component Forecast for 11/16/20 - 11/22/20

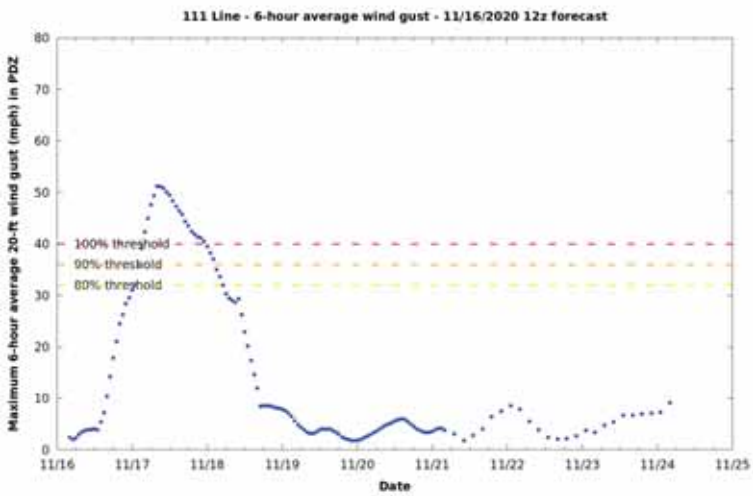
Zone	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	56.9	55.7	44.6	39.3	41.2	42.2	45.3
Sierra Brooks	59.8	60.7	49.5	44.4	45.0	48.8	53.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	13.0	12.8	9.8	8.2	7.5	7.5	7.7
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.5	1.4	1.1	1.1	1.0	1.0	1.1
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	40.0	41.8	29.9	25.4	26.6	27.9	32.7
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	49.2	51.7	36.8	30.1	30.2	32.5	34.7
Topaz	60.5	61.3	44.8	38.0	38.4	39.2	45.1
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	34.0	33.4	24.7	23.0	23.9	24.4	25.7
Old Country Road	60.9	57.6	45.7	43.9	44.3	45.3	47.6
Tah 52-68	23.2	21.3	17.0	16.7	16.7	17.0	17.4
The Grid	57.2	55.8	39.0	36.3	38.1	38.9	39.4
Canterbury and Commonwealth	41.8	41.1	28.6	26.4	27.9	28.6	29.3
Bky 5100 to NVE	23.9	23.5	16.4	15.1	15.9	16.4	16.8
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	24.2	23.3	18.7	15.8	14.7	14.1	14.7
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	33.4	33.4	27.0	25.0	25.0	25.5	27.5
650 Line	1.9	1.9	1.3	1.2	1.3	1.3	1.4
Floriston	46.6	46.6	34.7	31.2	31.1	33.6	36.2
Verdi	55.7	55.7	44.1	36.2	39.6	44.1	46.8
Bordertown	58.8	58.8	47.7	40.0	41.6	45.7	48.9

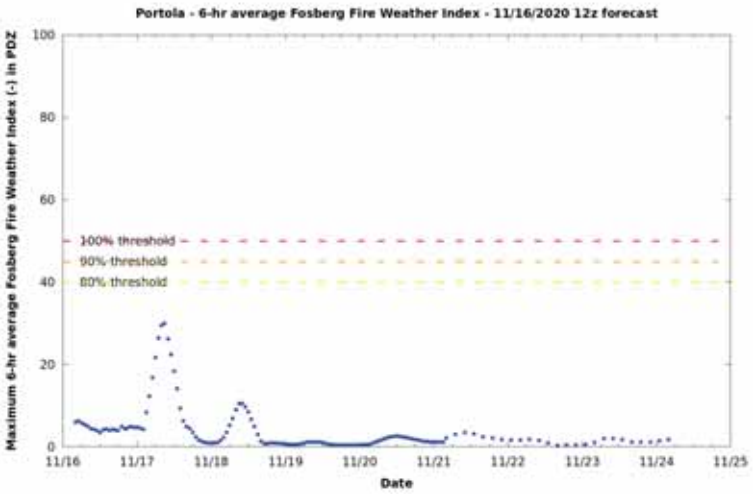
Liberty Utilities Fire Weather Summary Plots - 11/16/2020 12z forecast

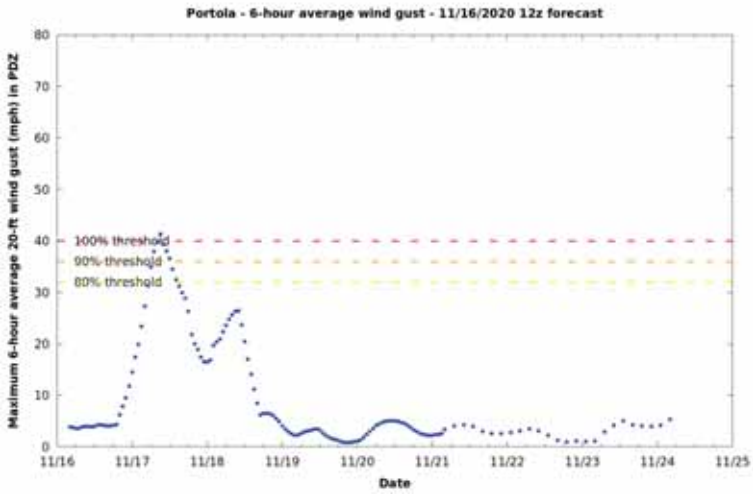
111 Line



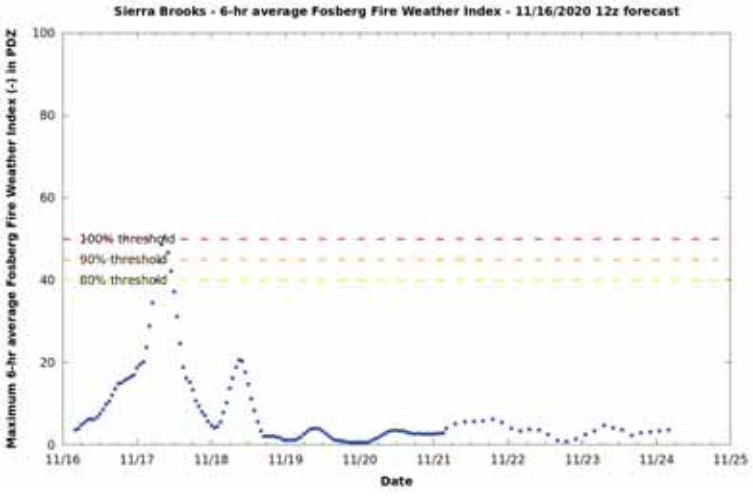


Portola



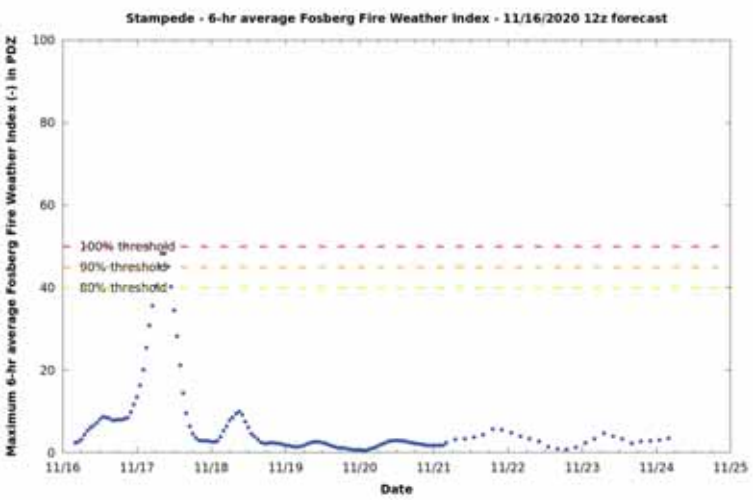


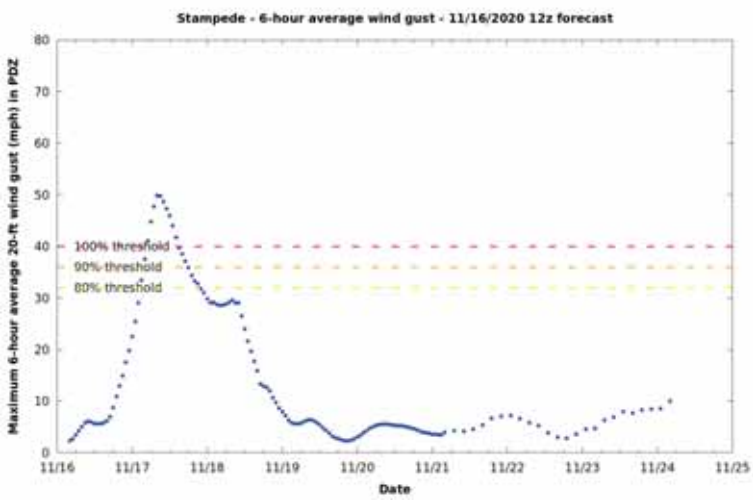
Sierra Brooks



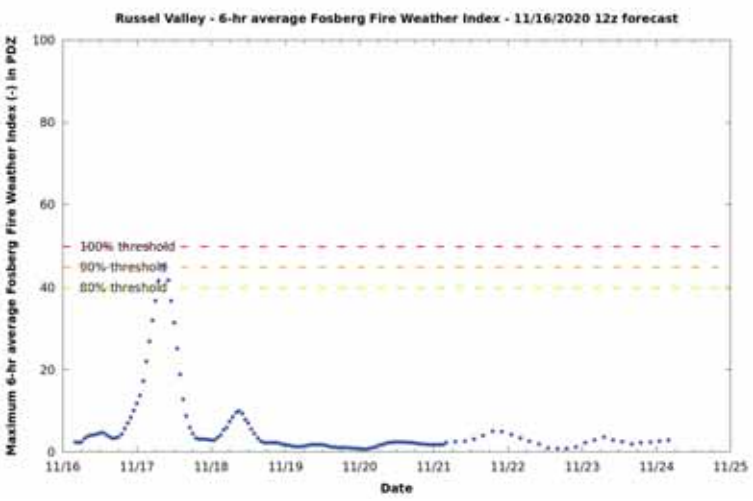


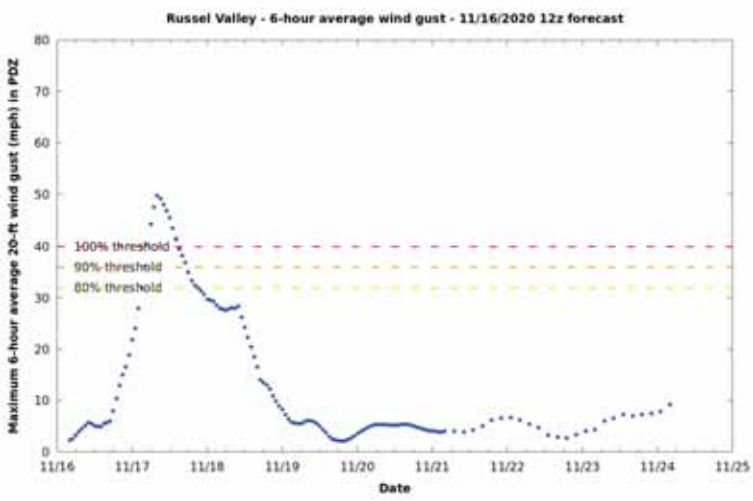
Stampede



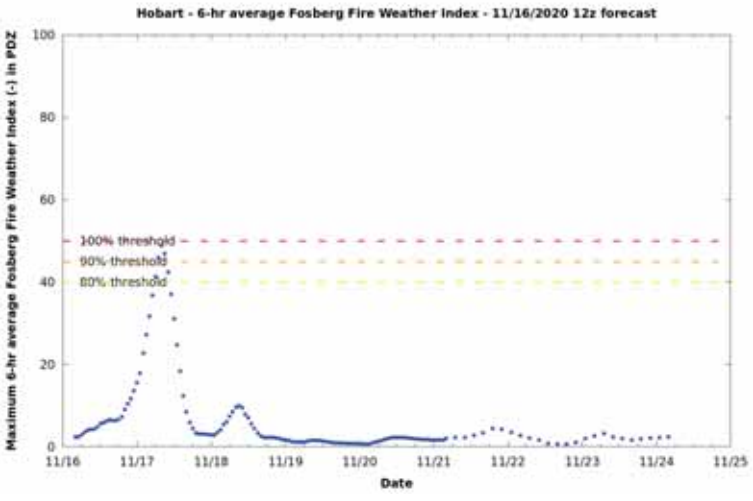


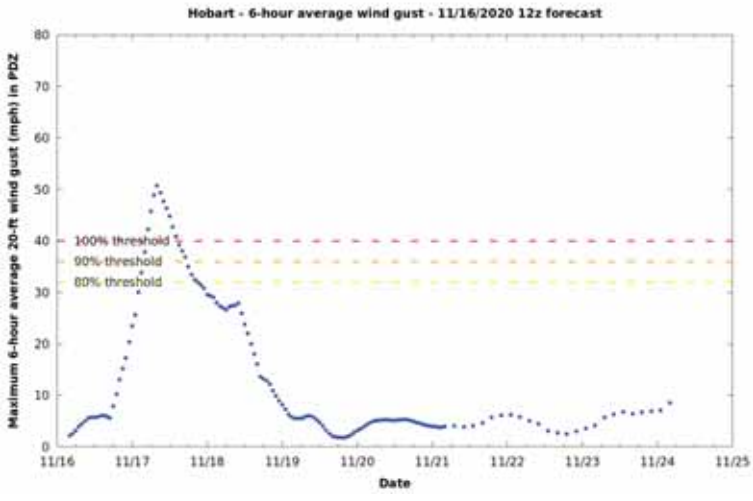
Russell Valley



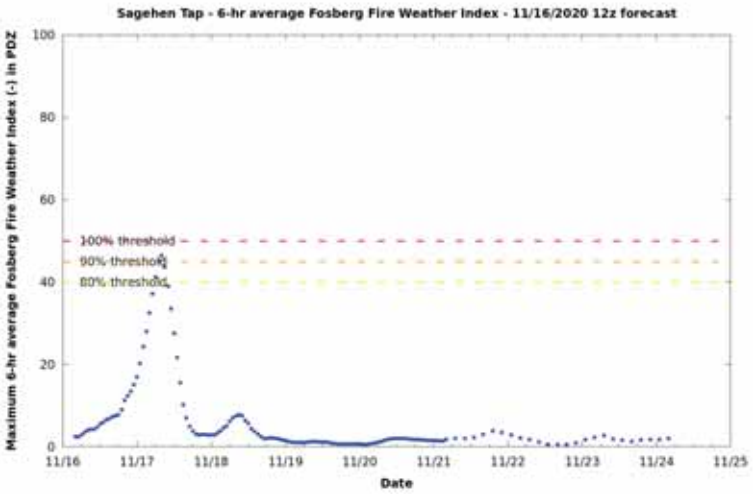


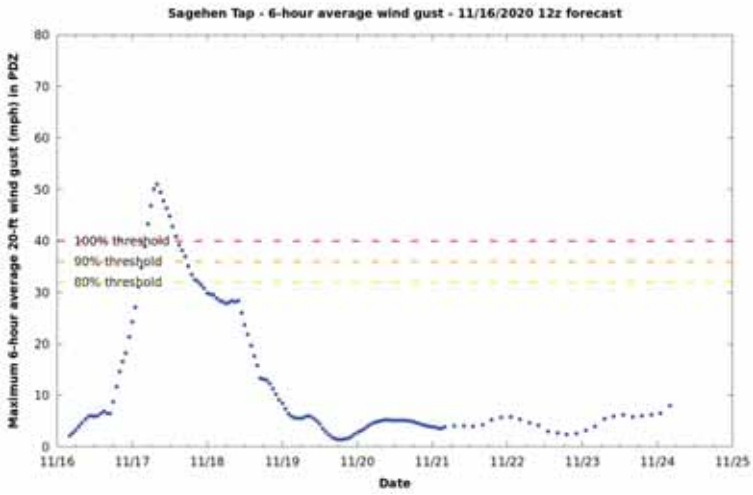
Hobart



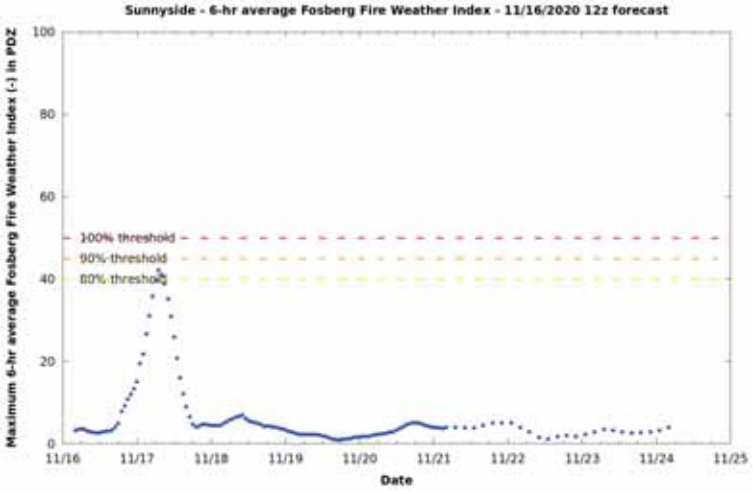


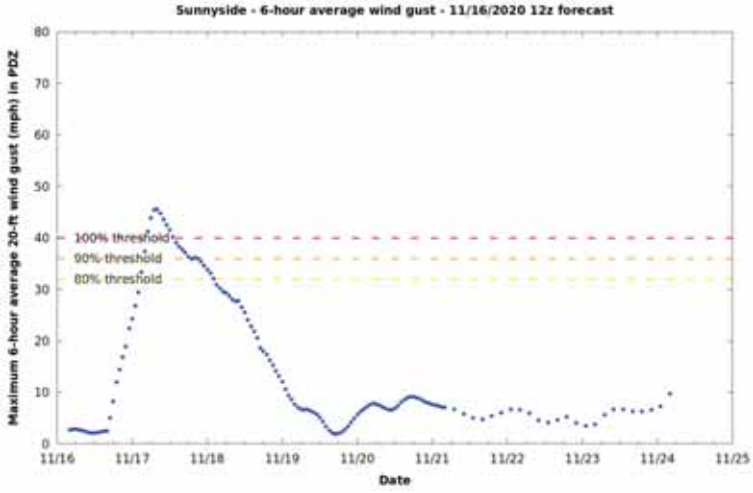
Sagehen tap



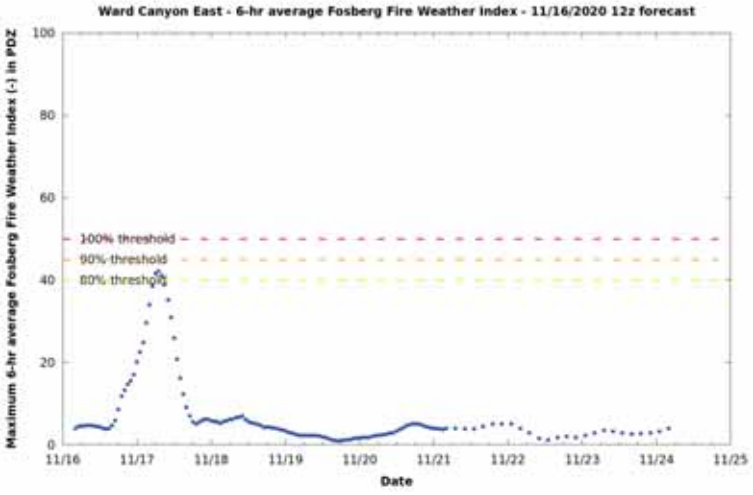


Sunnyside



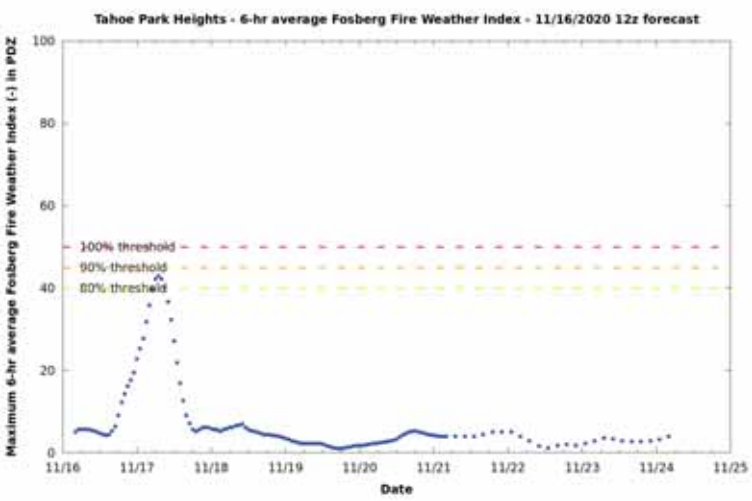


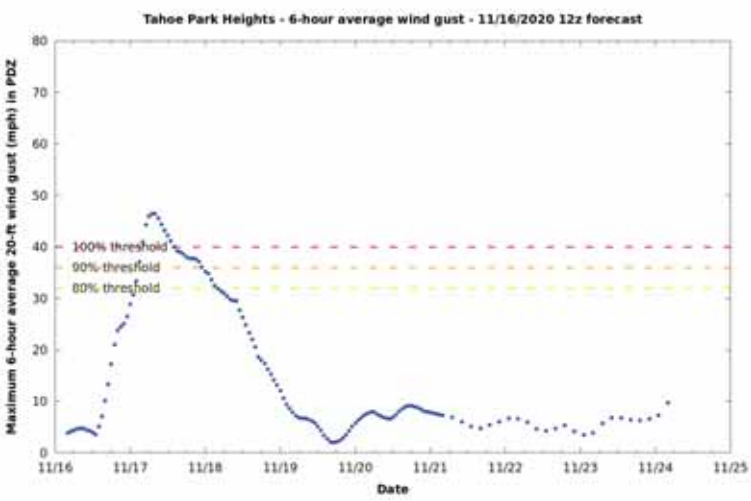
Ward Canyon East



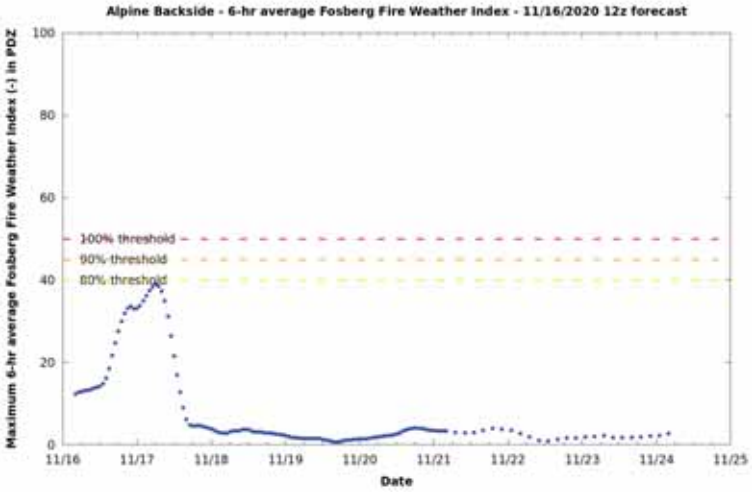


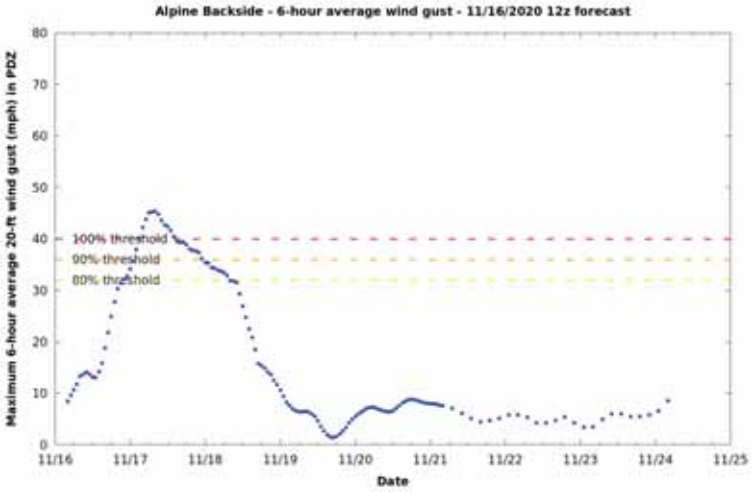
Tahoe Park Heights



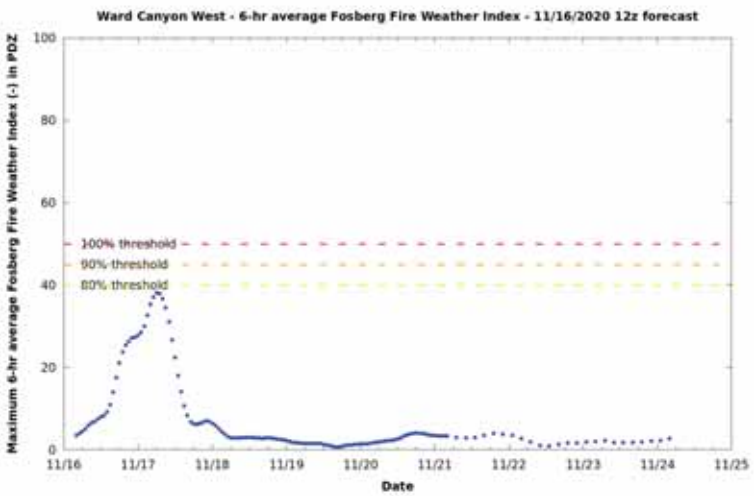


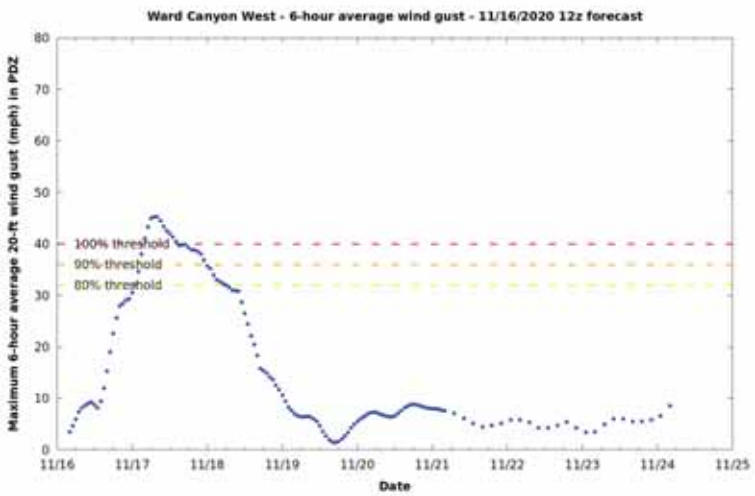
Alpine Backside



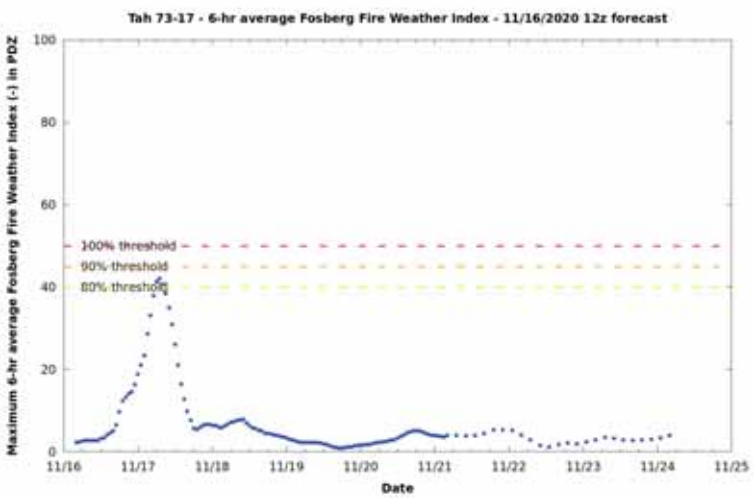


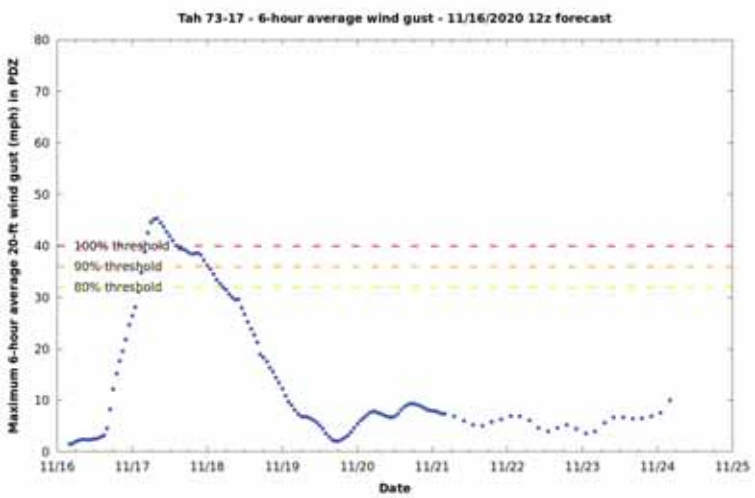
Ward Canyon West



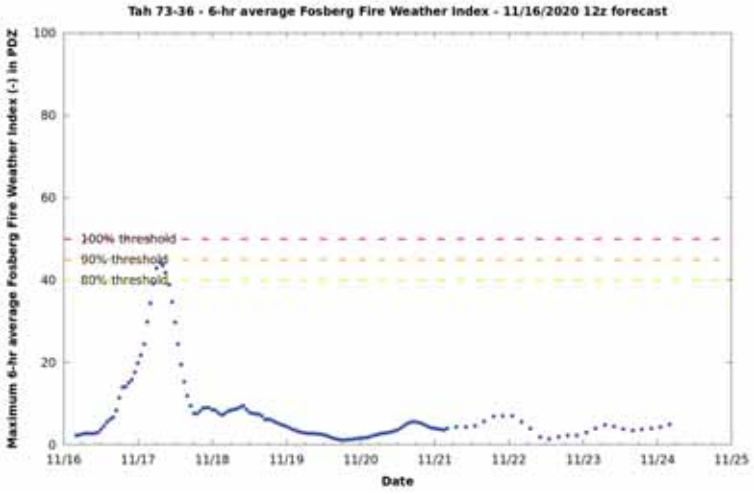


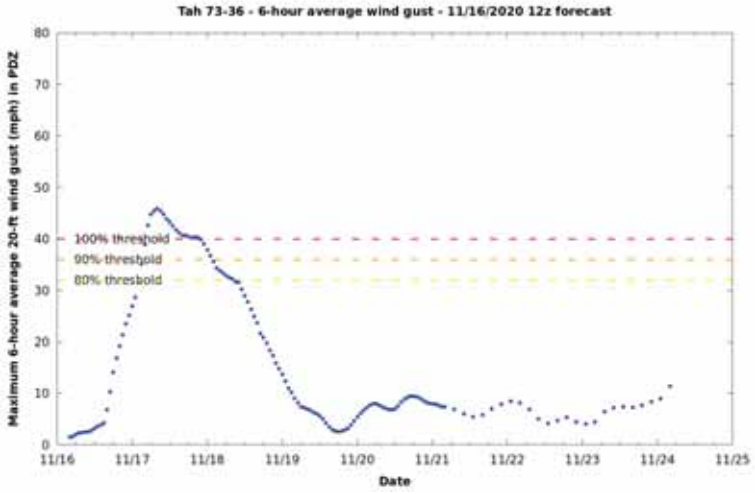
Tah 73-17



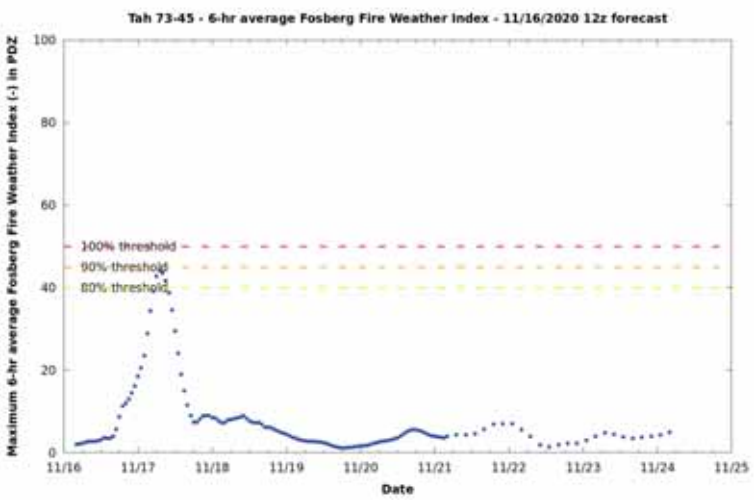


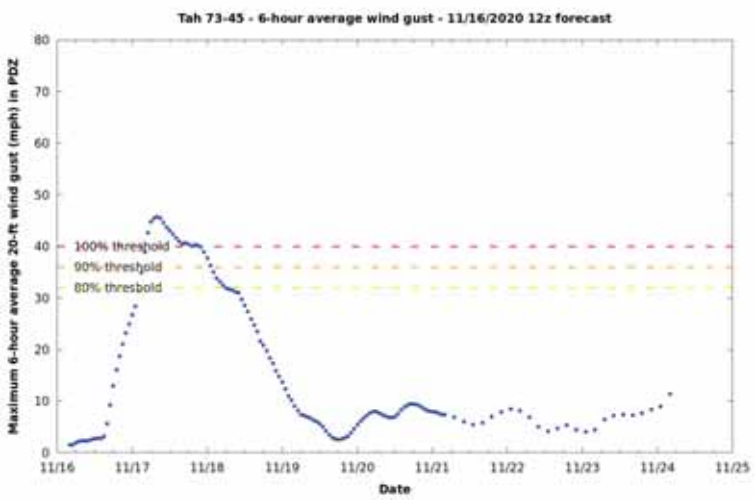
Tah 73-36



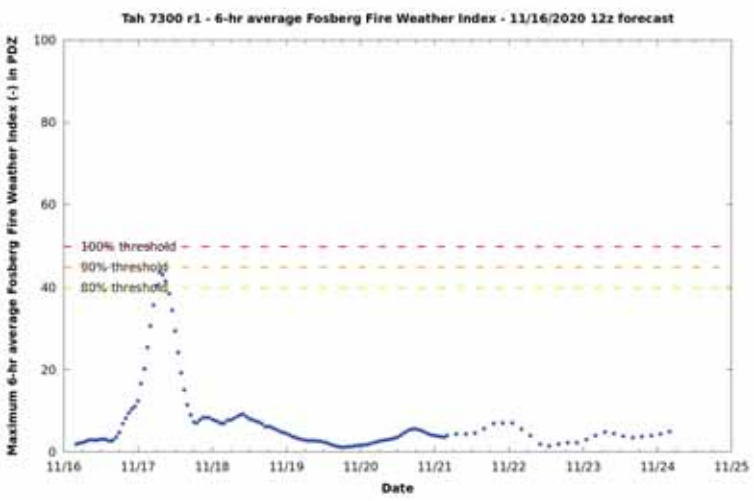


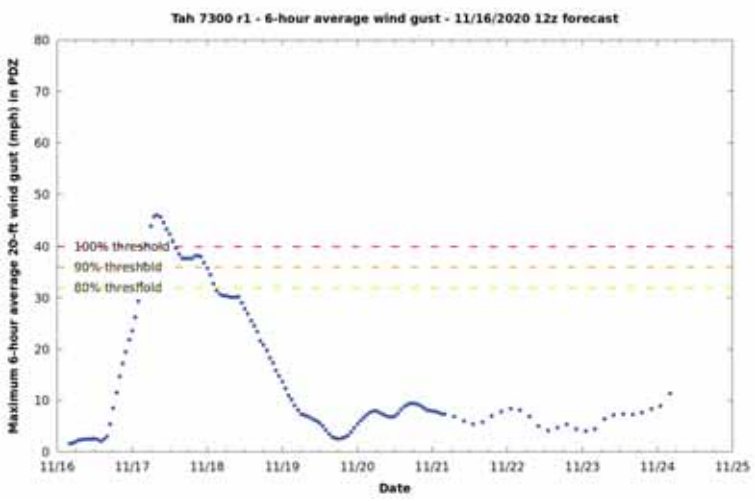
Tah 73-45



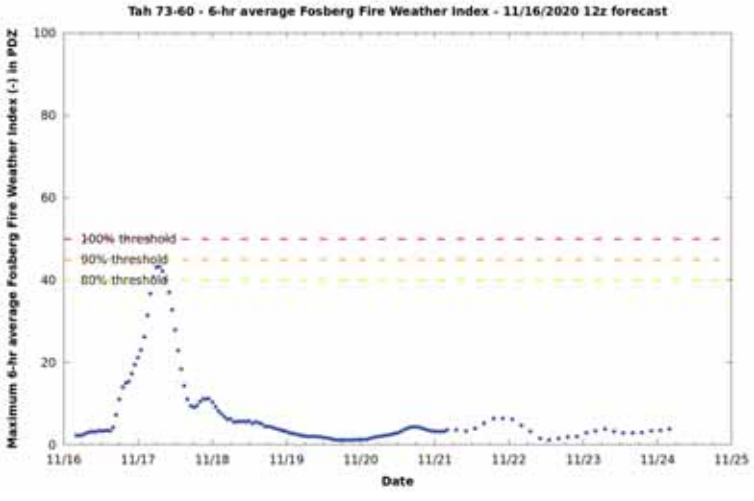


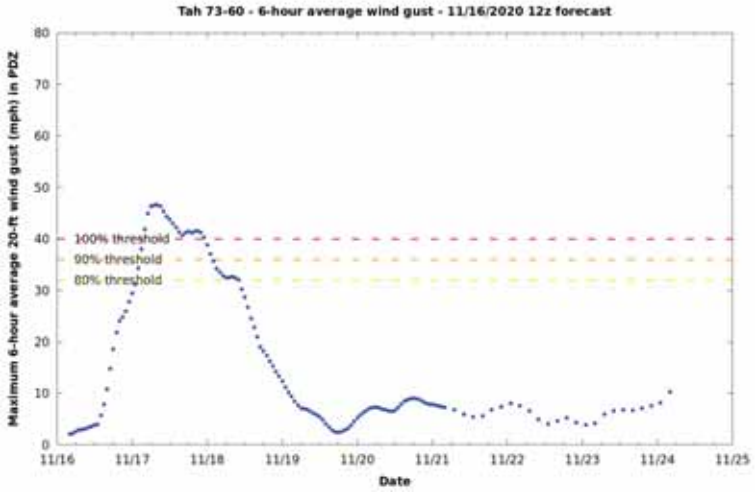
Tah 7300 r1



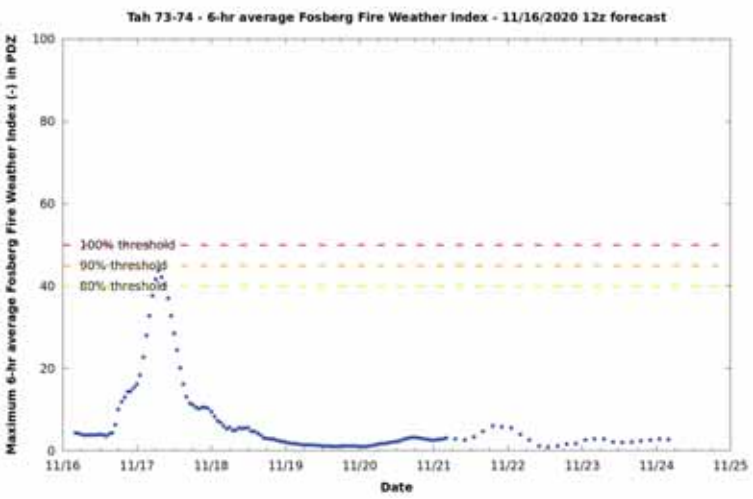


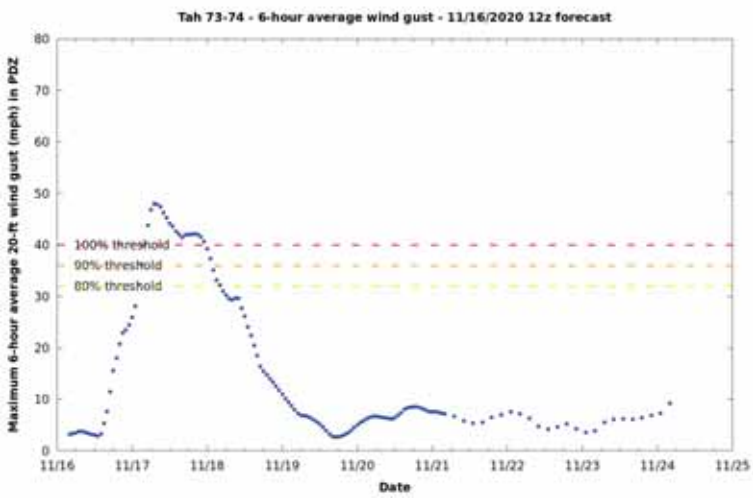
Tah 73-60



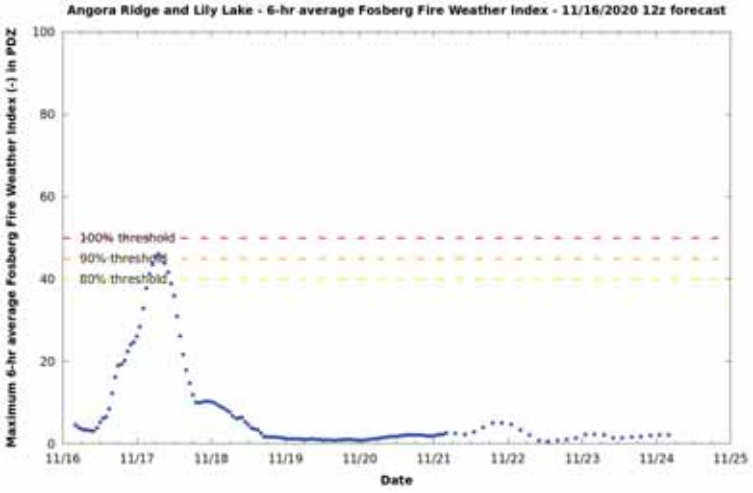


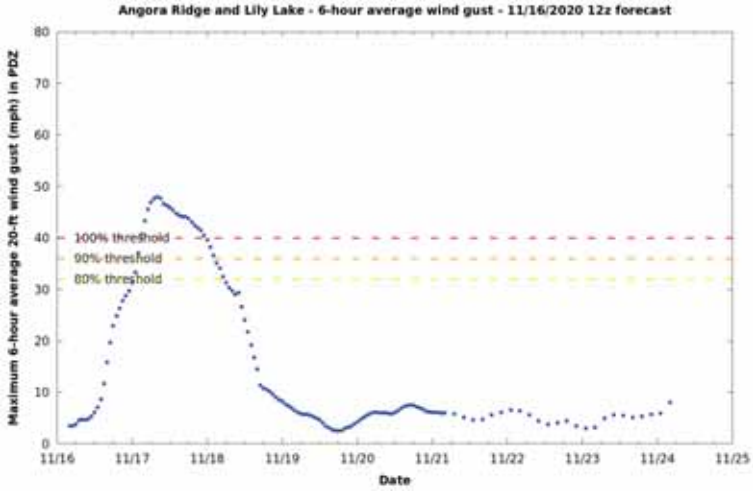
Tah 73-74



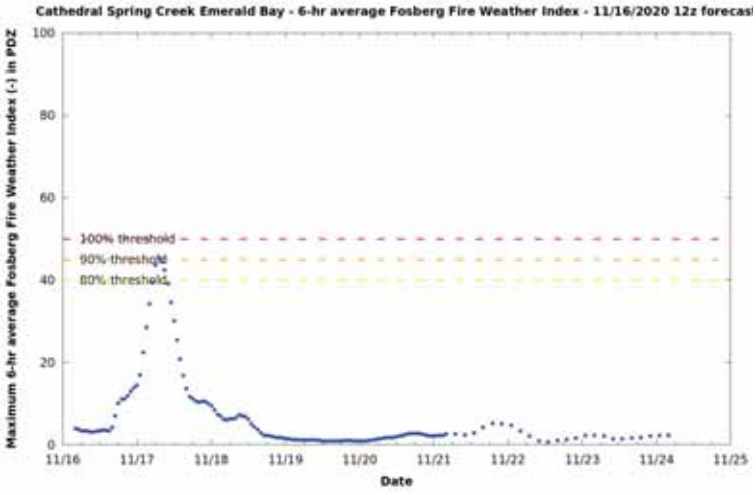


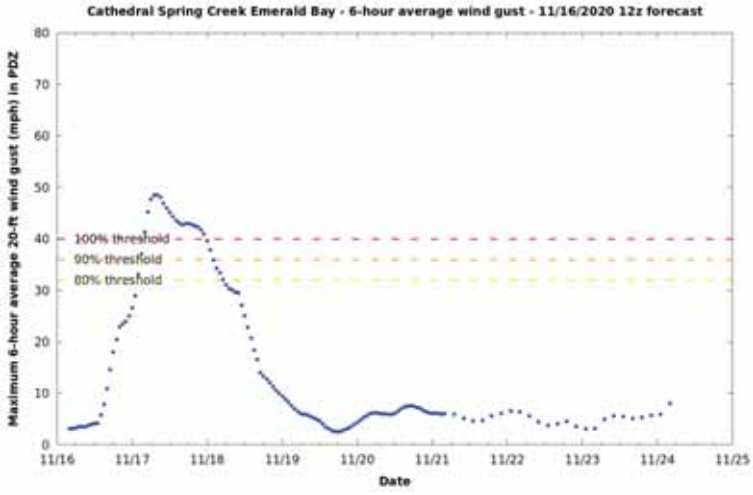
Angora Ridge and Lily Lake



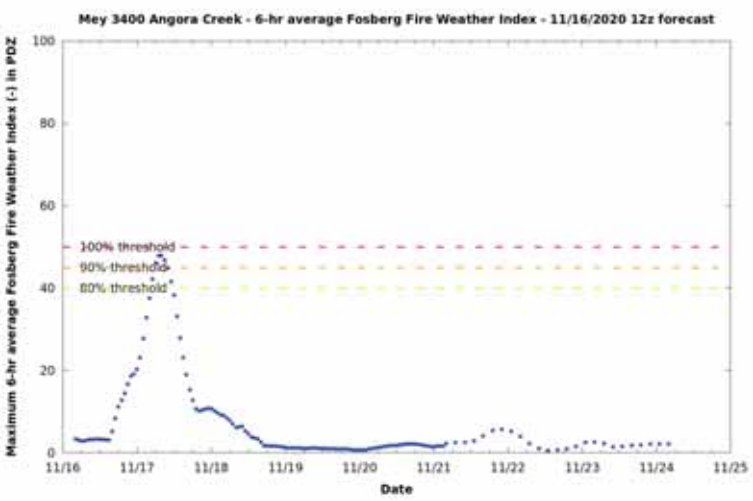


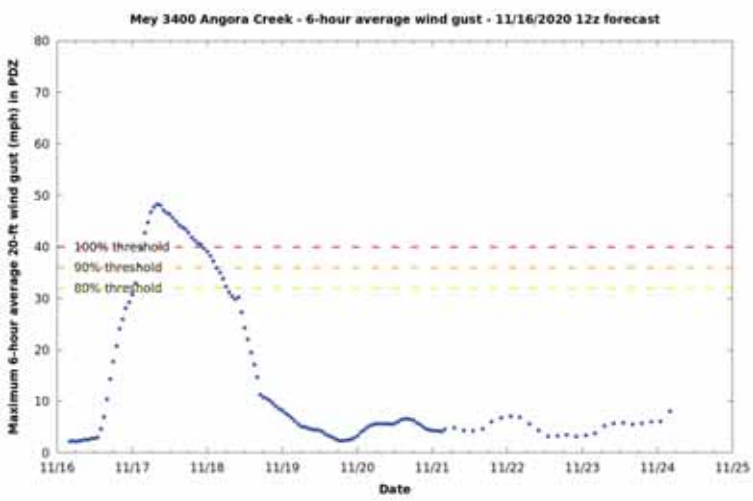
Cathedral Spring Creek Emerald Bay



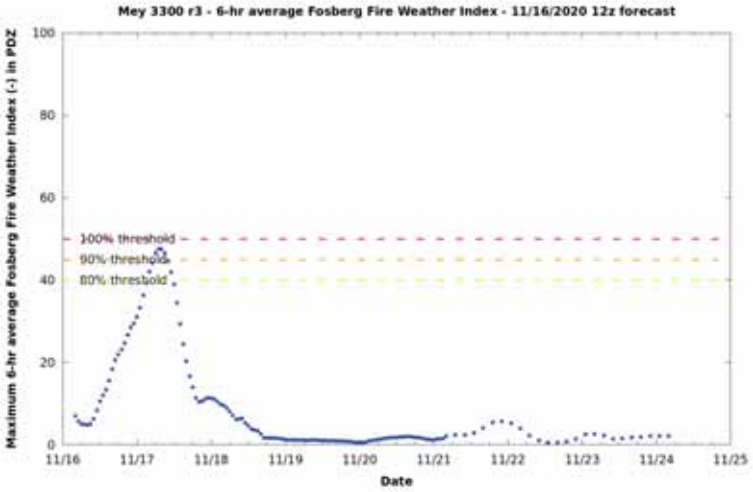


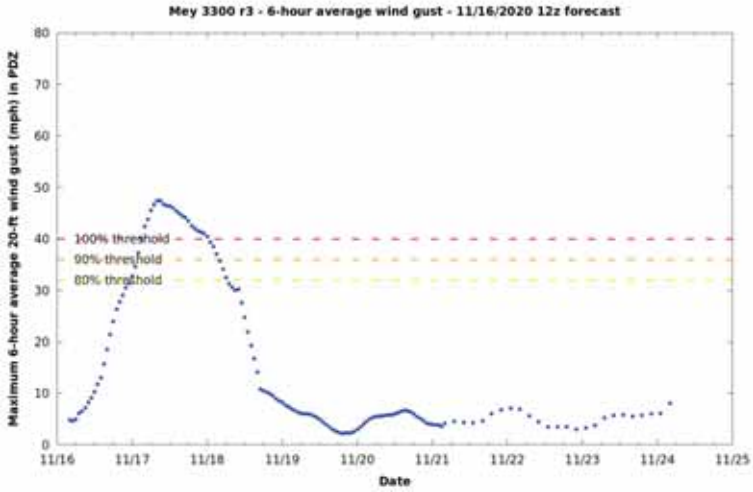
Mey 3400 Angora Creek



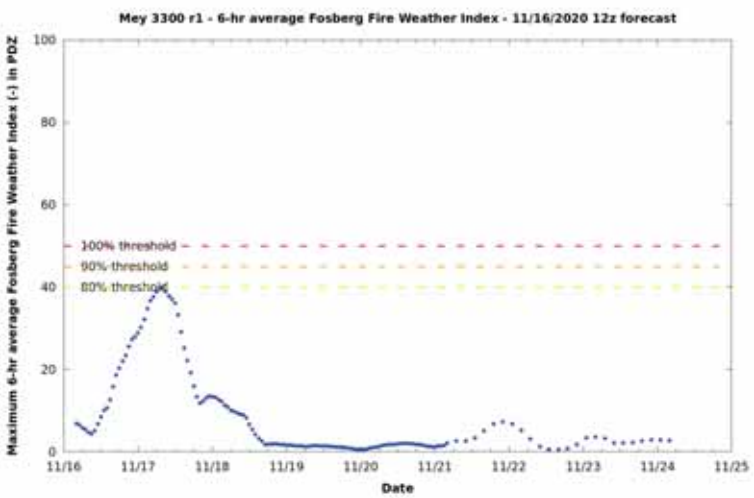


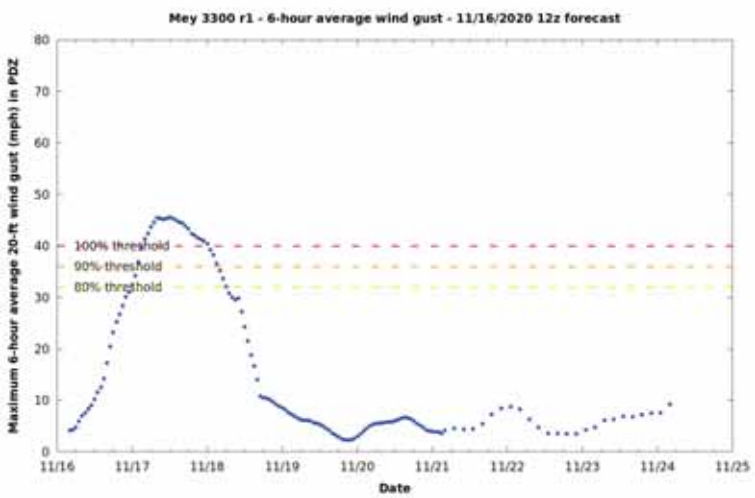
Mey 3300 r3



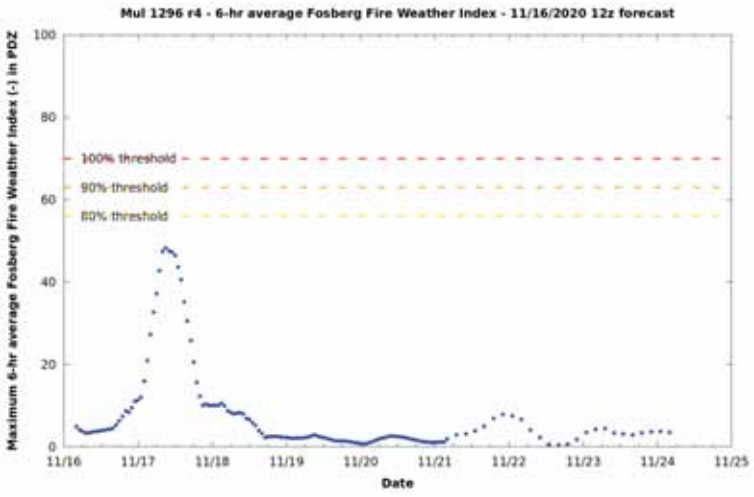


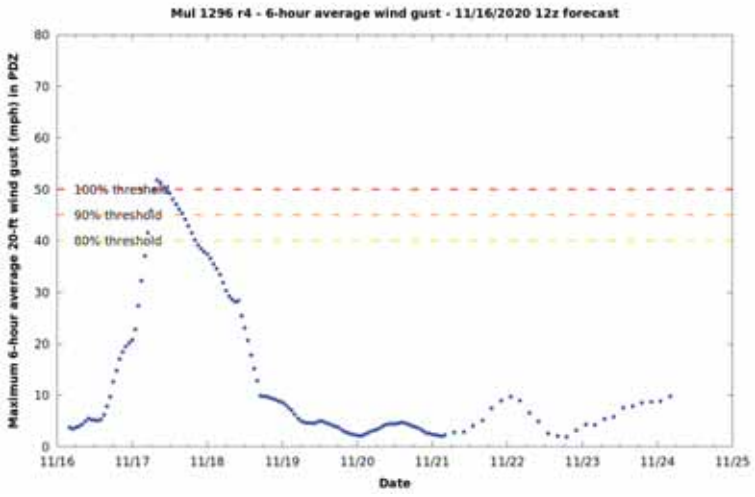
Mey 3300 r1



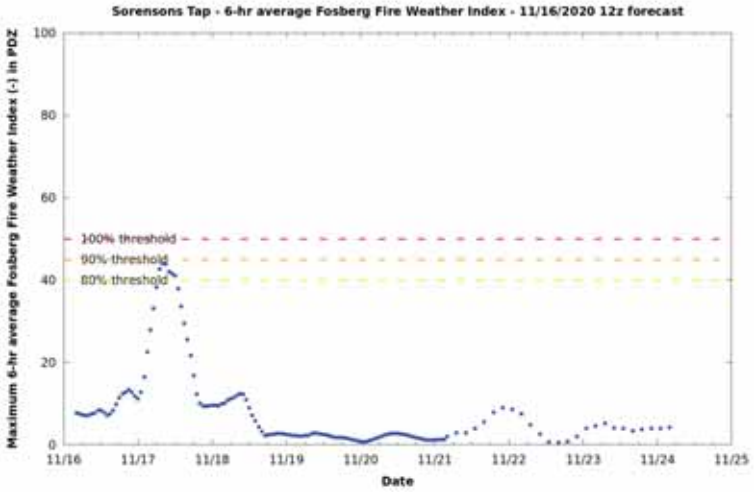


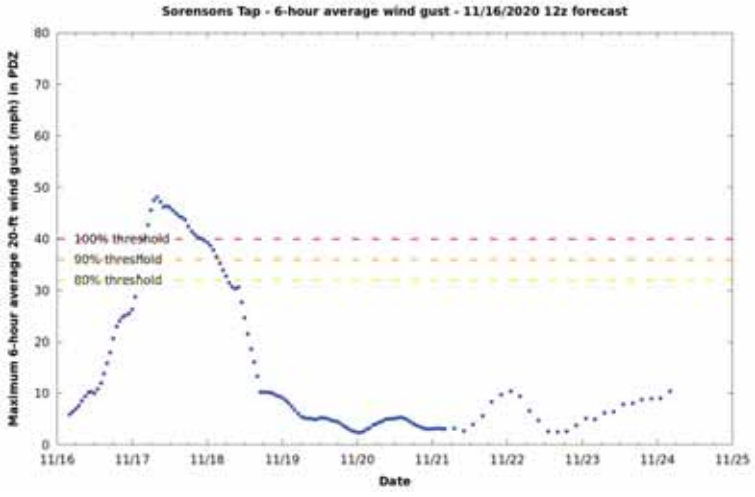
Mul 1296 r4



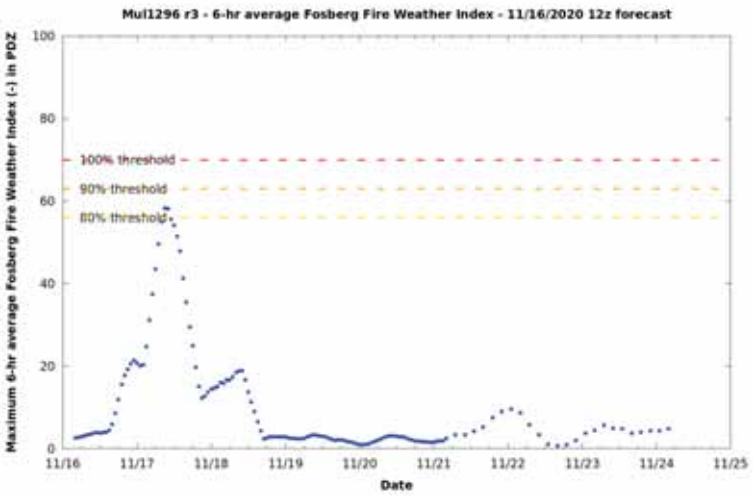


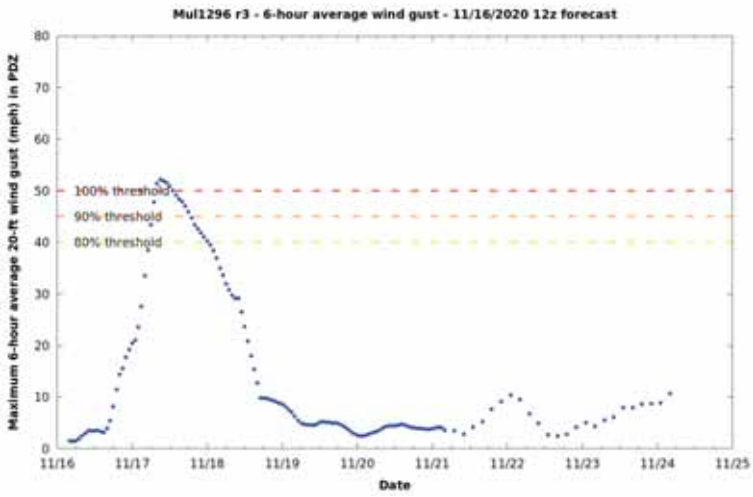
Sorensons Tap



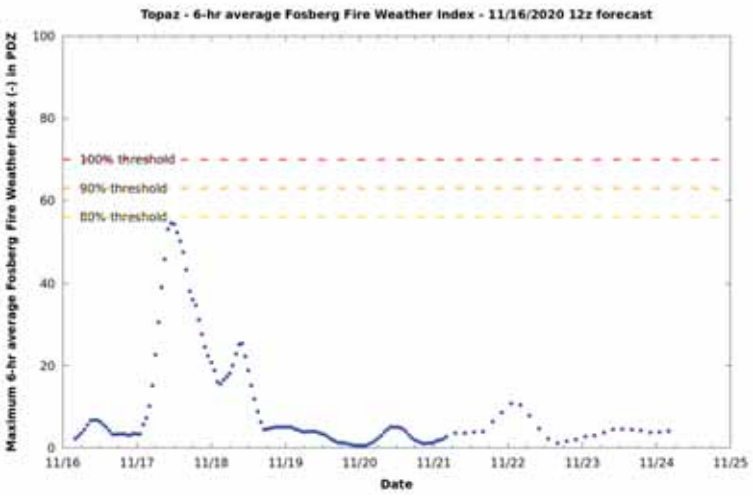


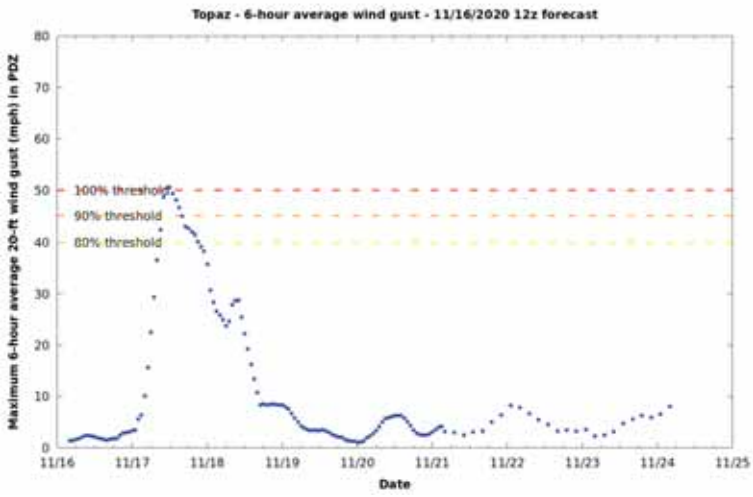
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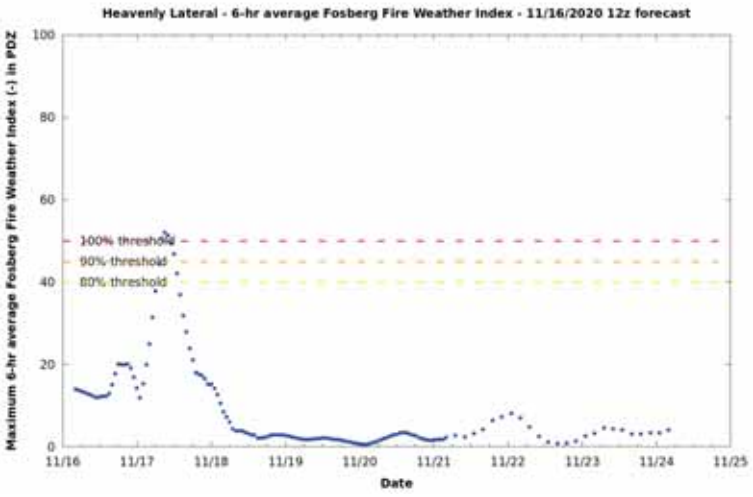


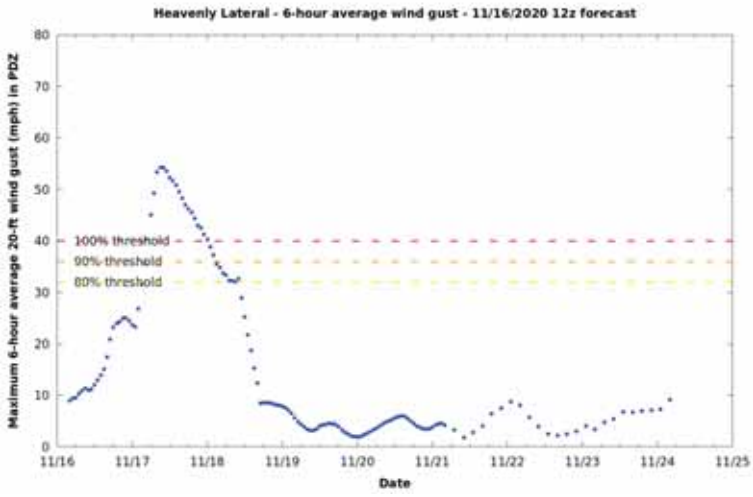
Topaz



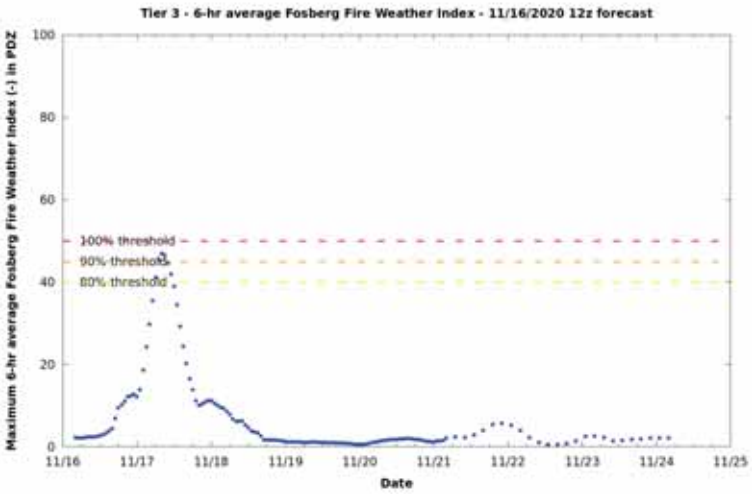


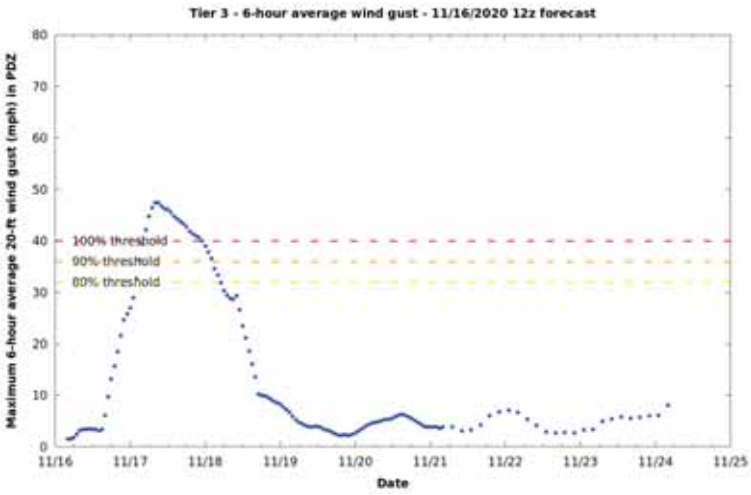
Heavenly Lateral



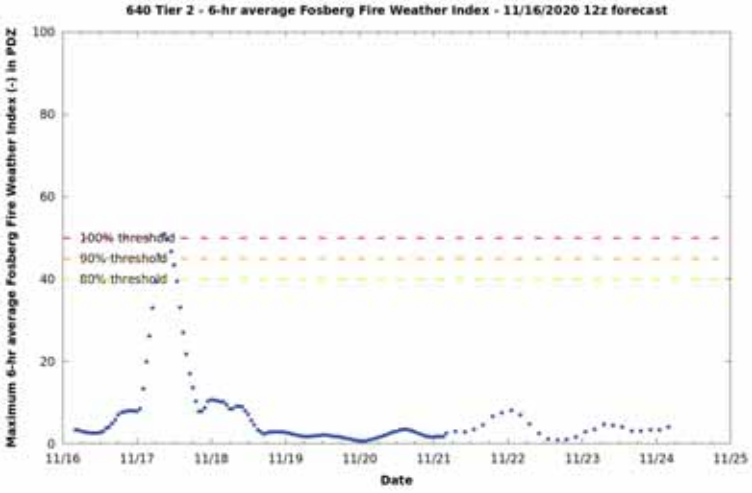


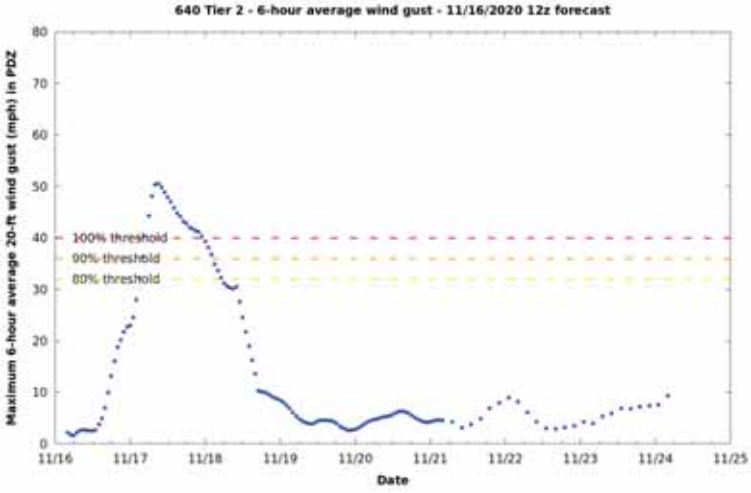
Tier 3



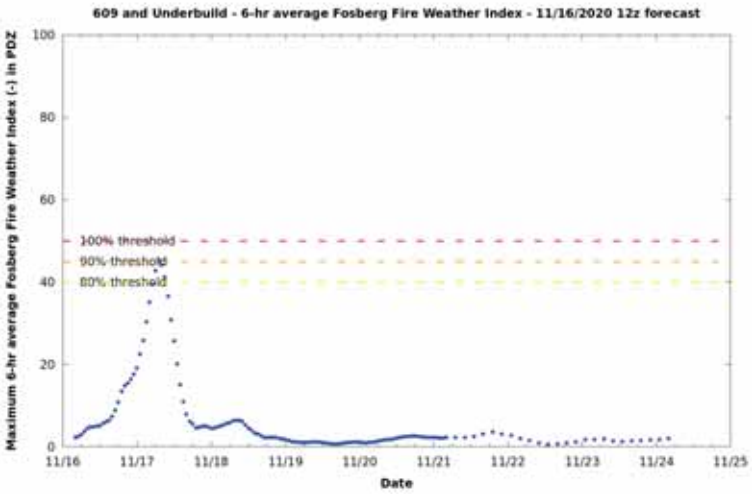


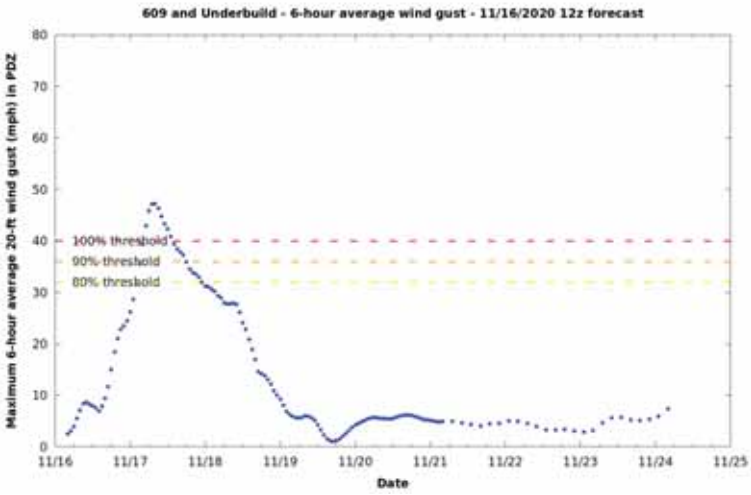
640 Tier 2



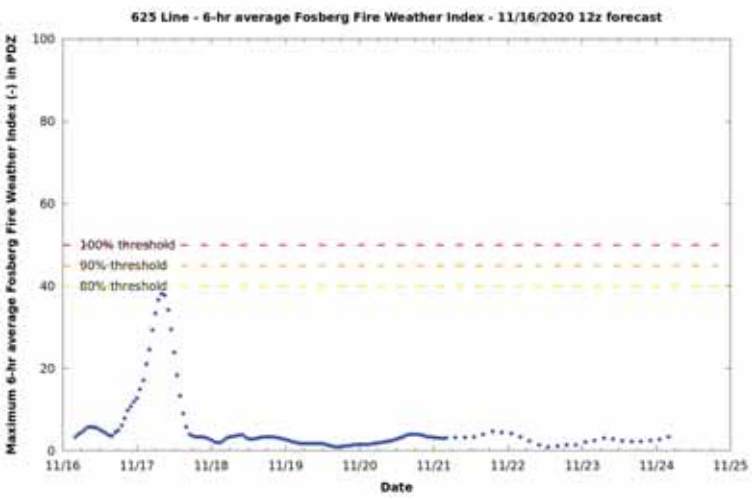


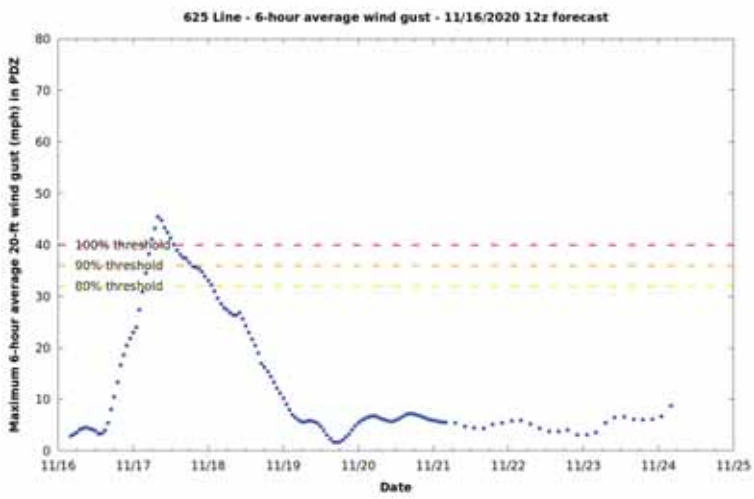
609 and Underbuild



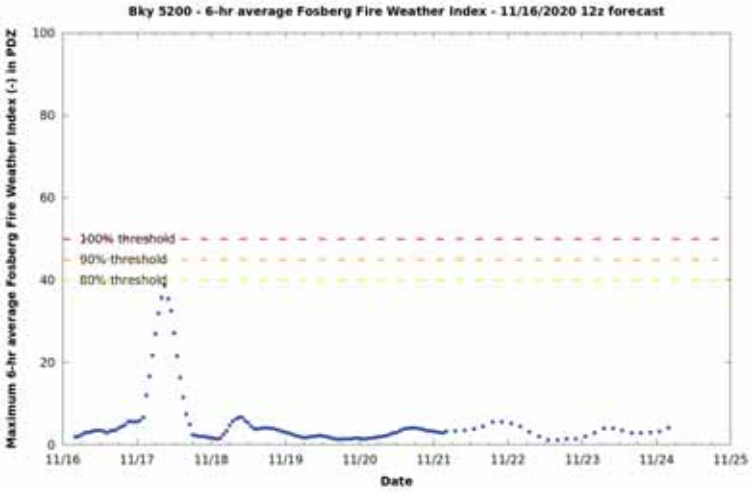


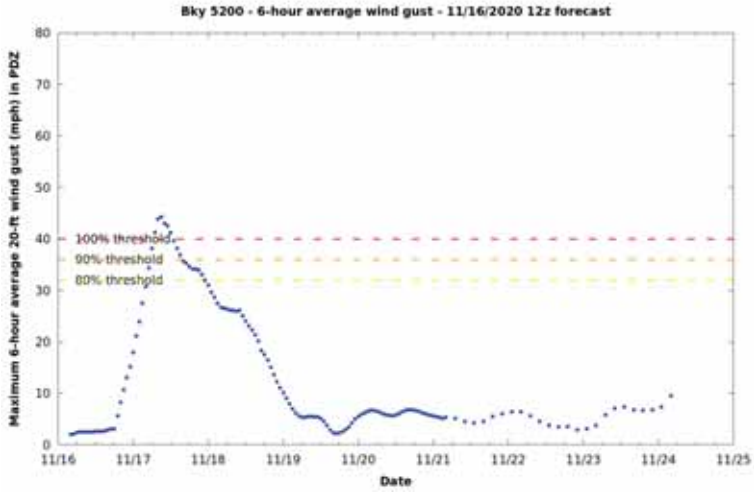
625 Line



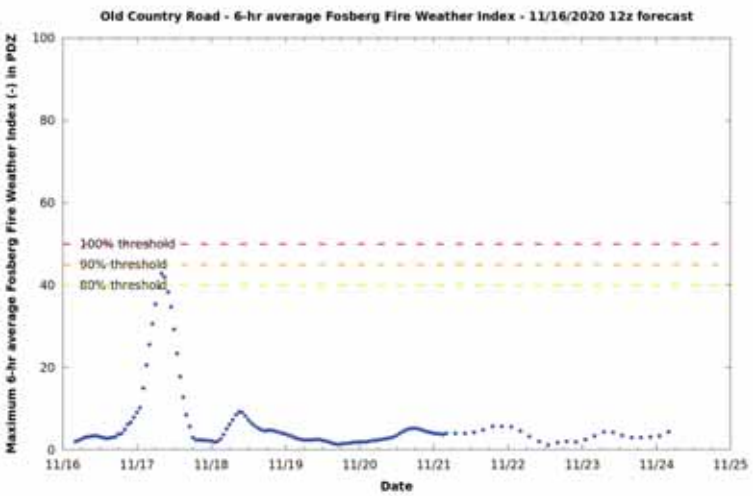


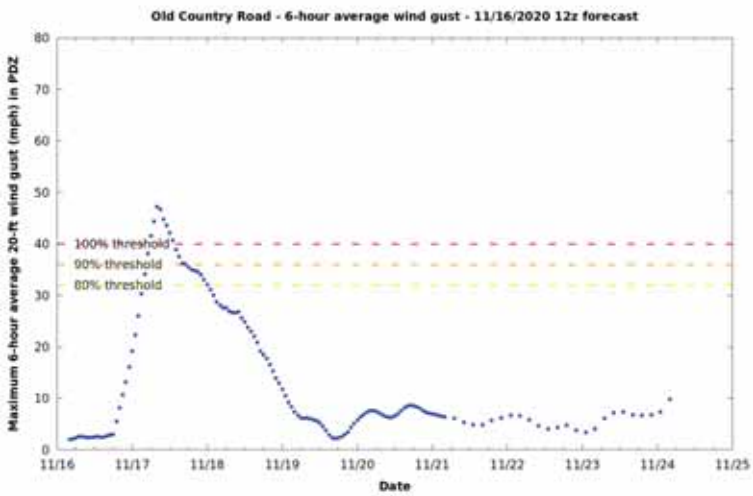
Bky 5200



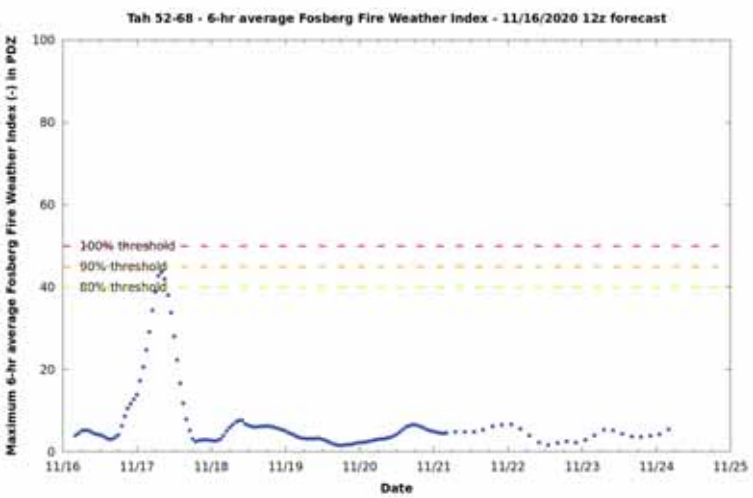


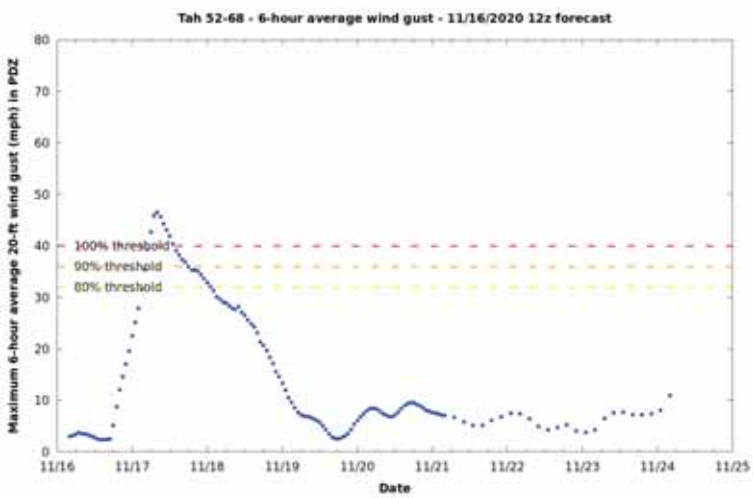
Old Country Road



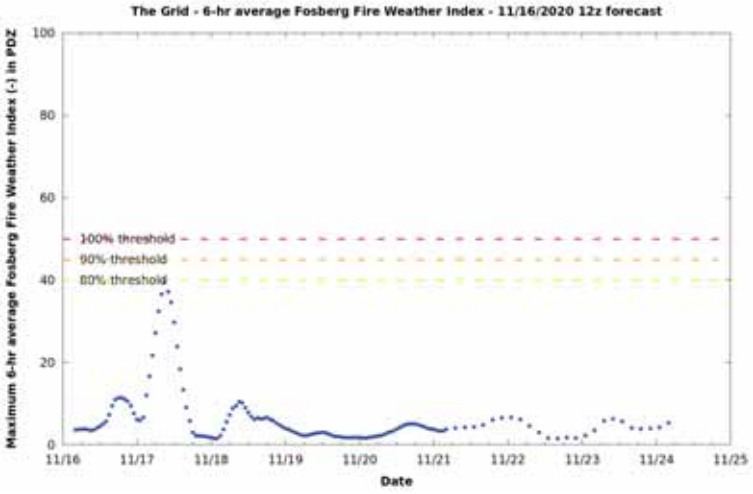


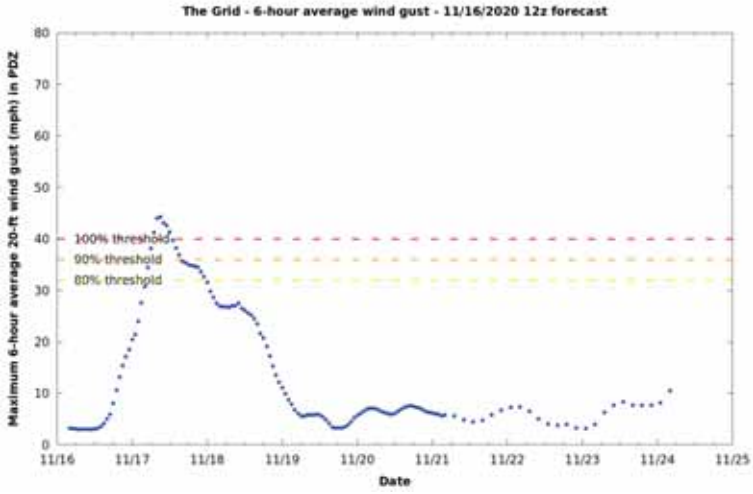
Tah 52-68



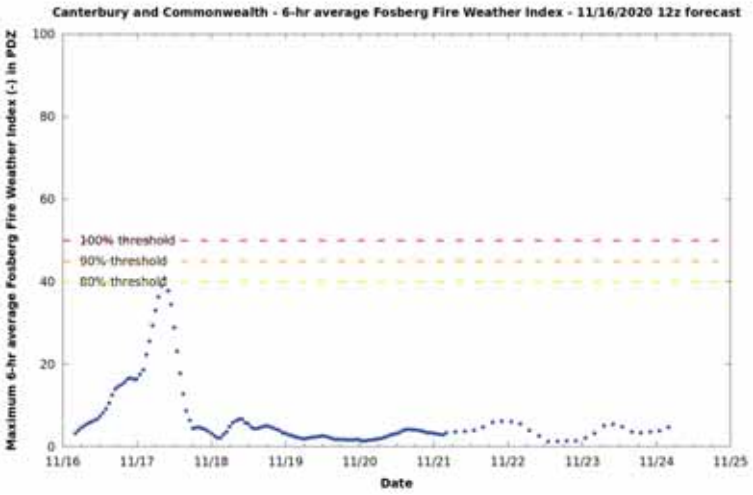


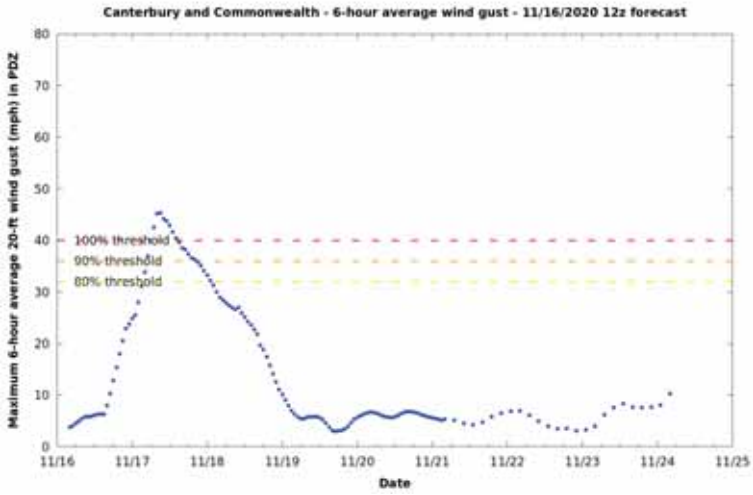
The Grid



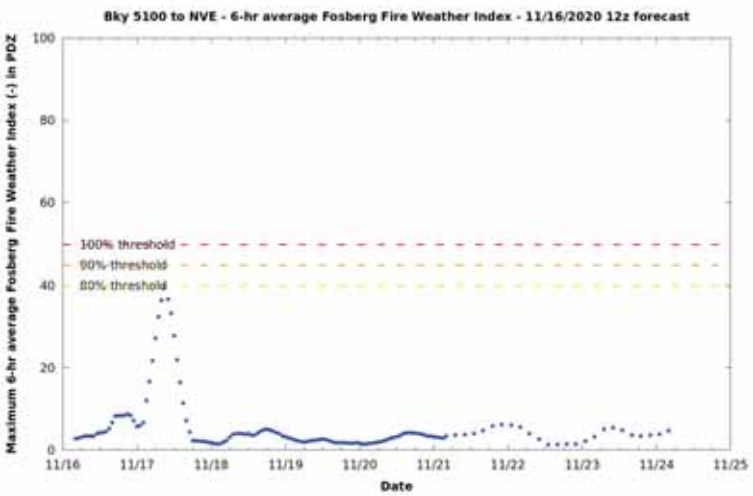


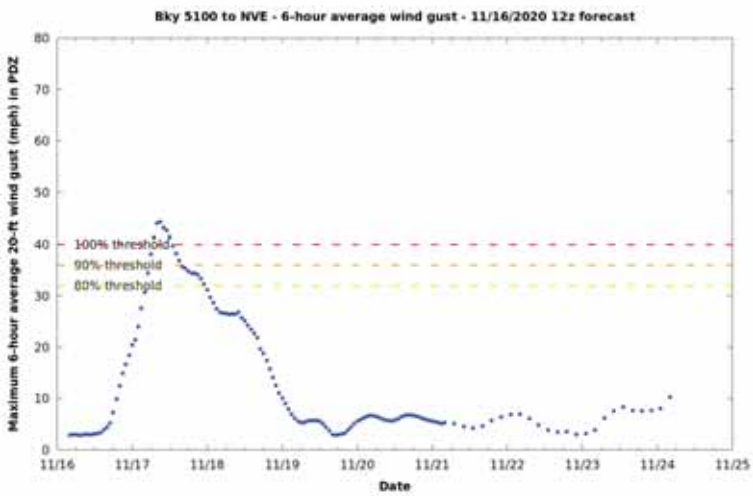
Canterbuy and Commonwealth



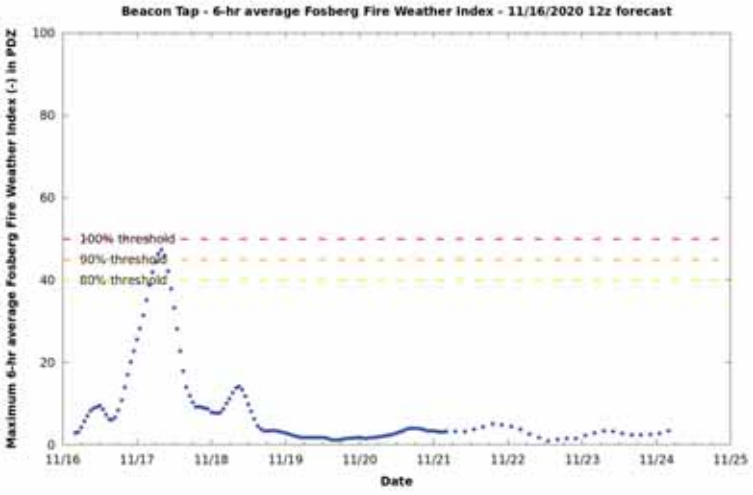


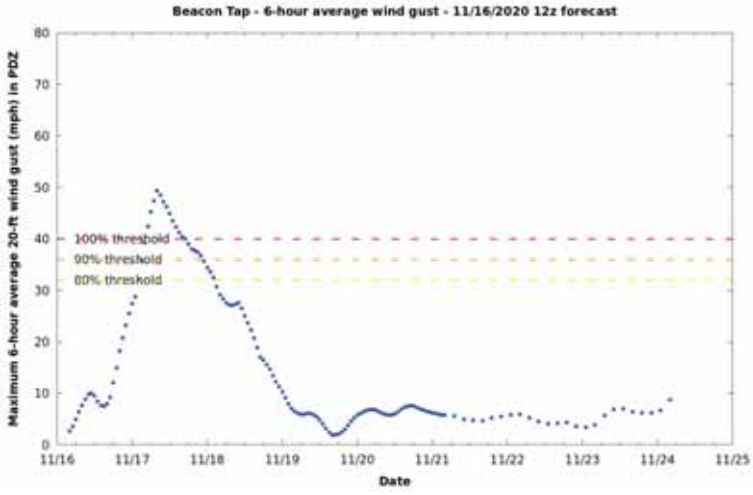
Bky 5100 to NVE



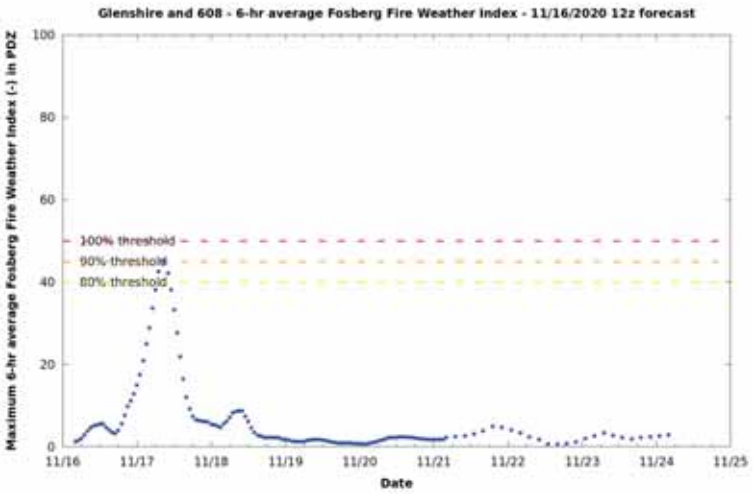


Beacon Tap



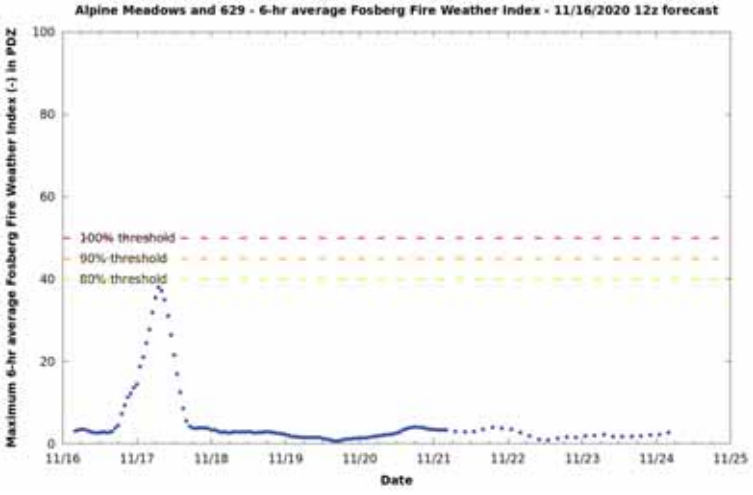


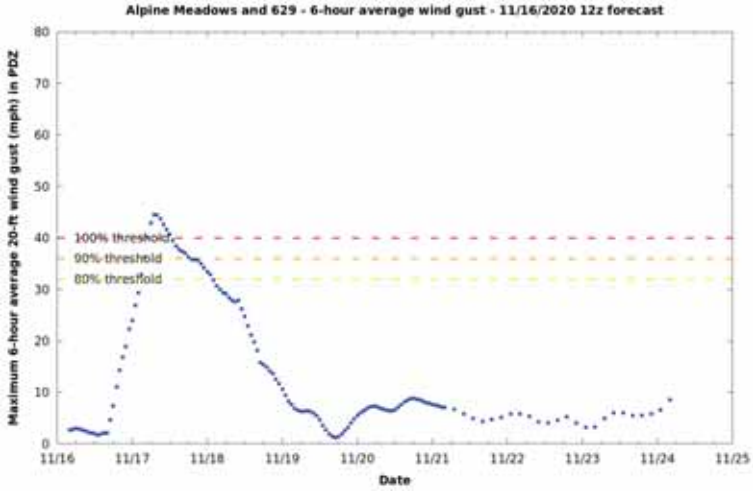
Glenshire and 608



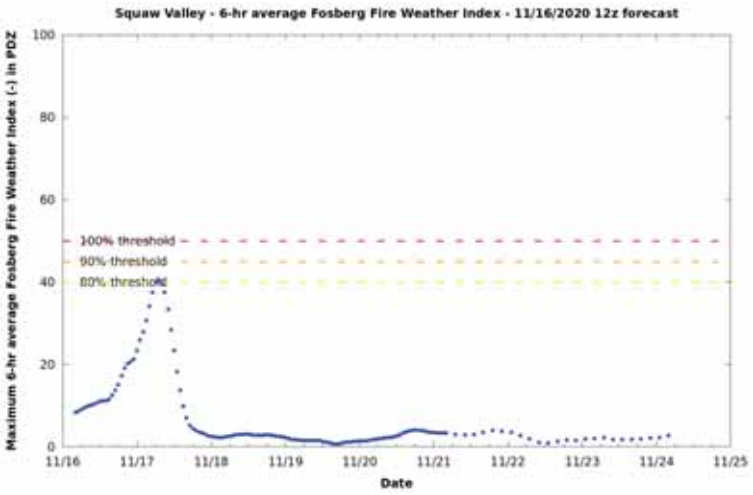


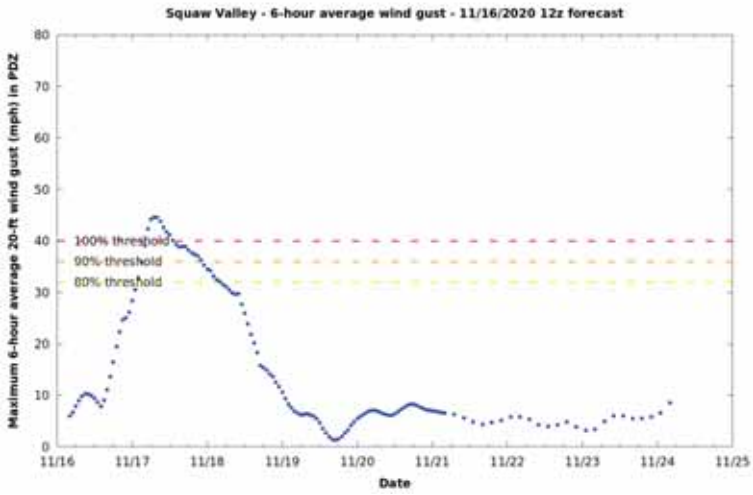
Alpine Meadows and 629



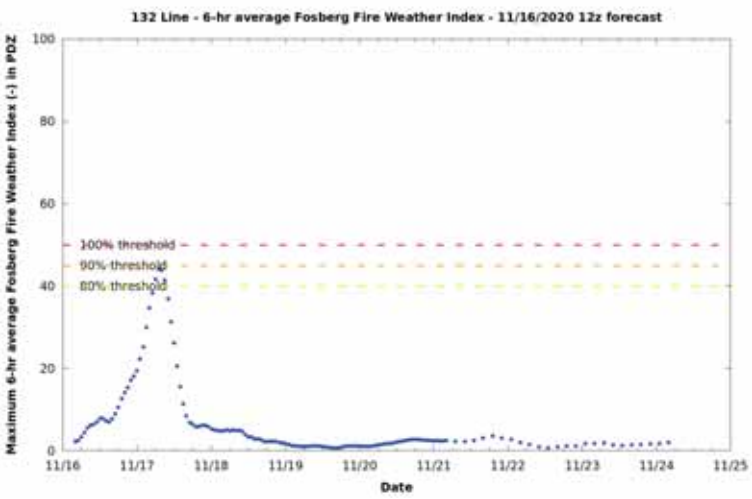


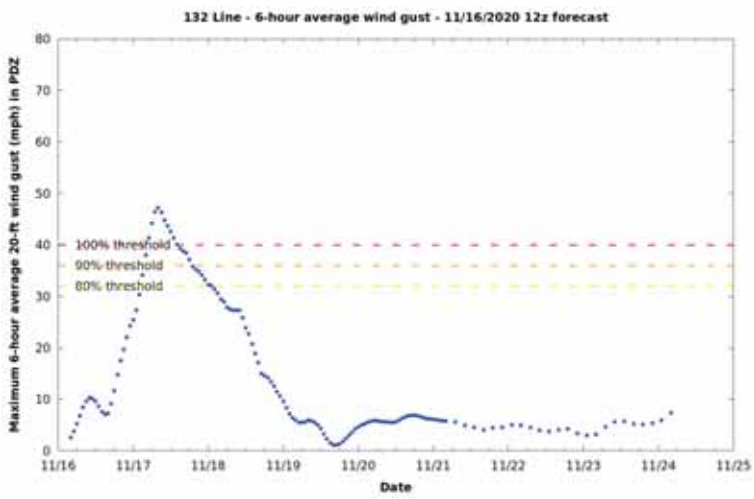
Squaw Valley



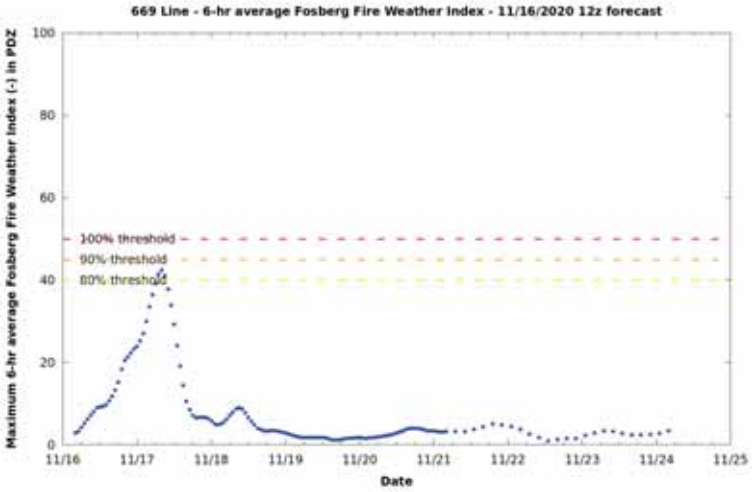


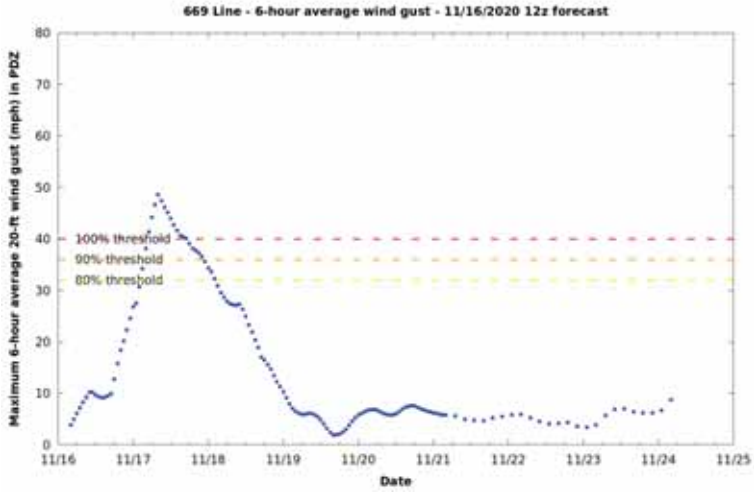
132 Line



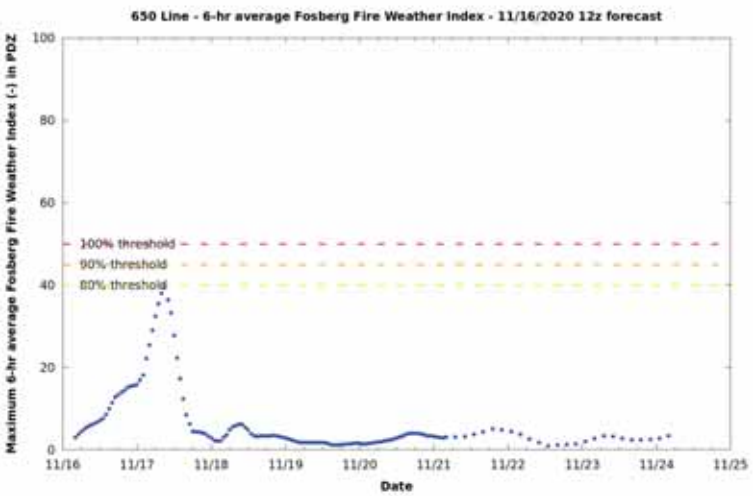


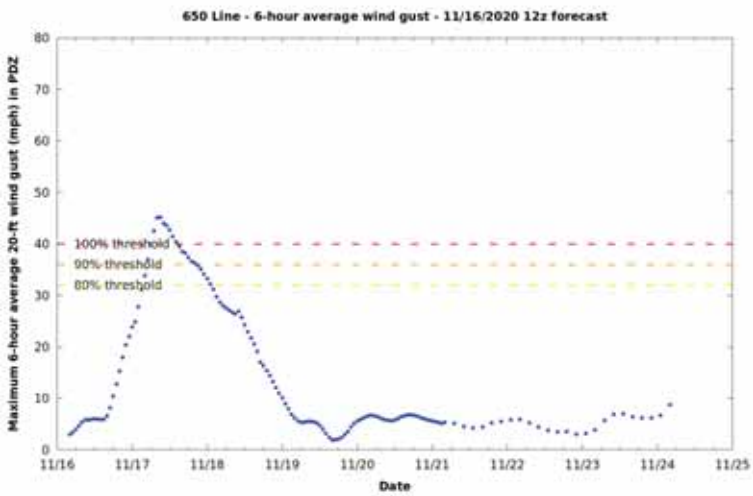
669 Line



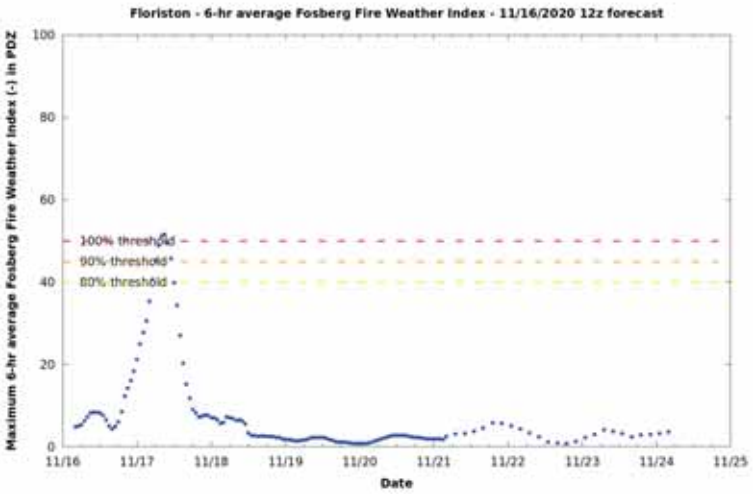


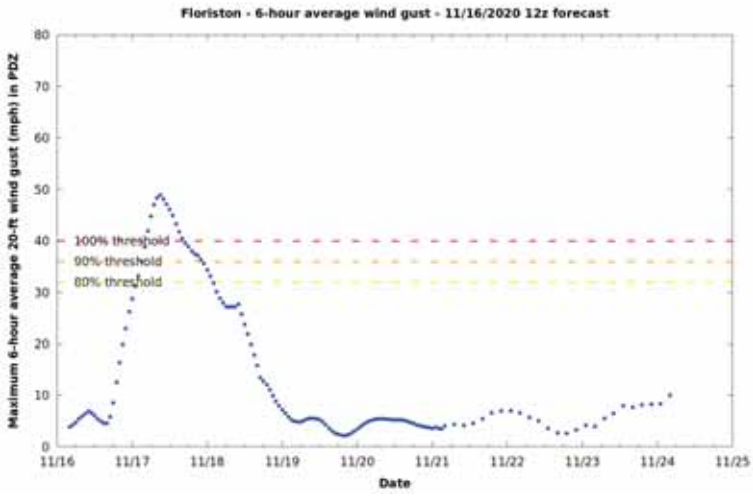
650 Line



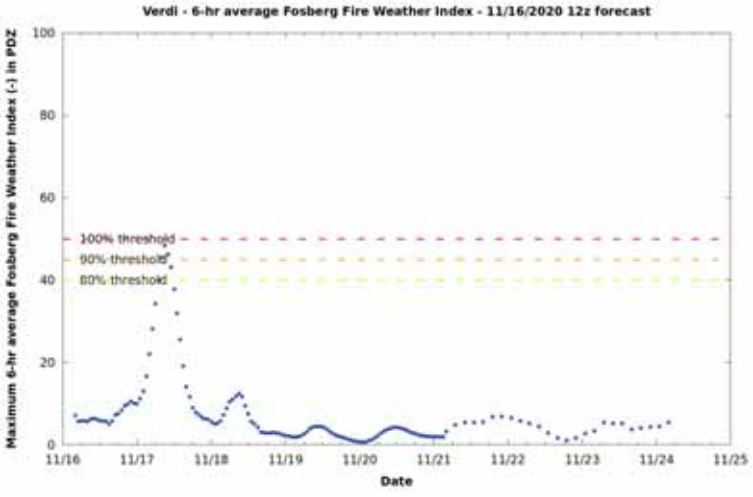


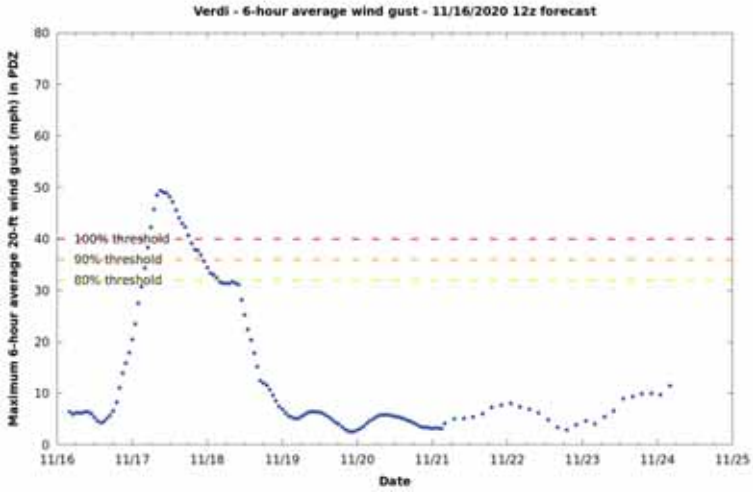
Floriston



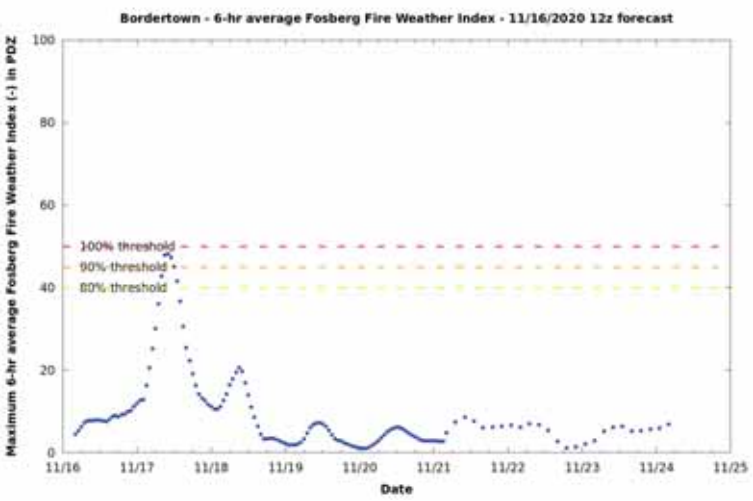


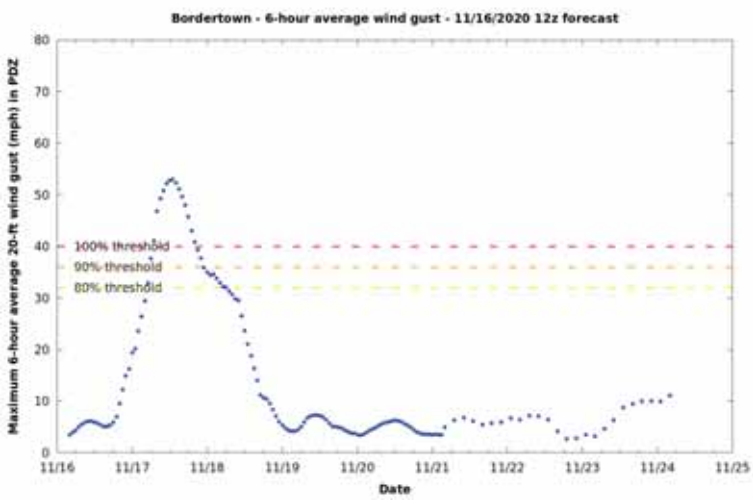
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/16/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/16/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/17/20 - 11/23/20

Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	moderate	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

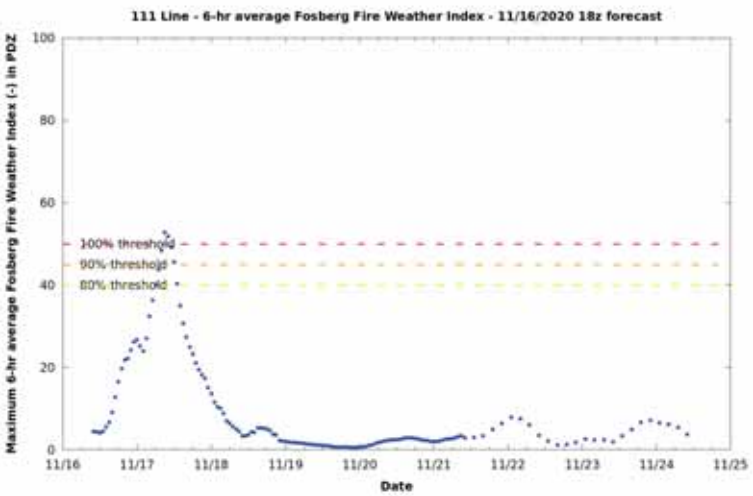
Liberty Utilities Energy Release Component Forecast for 11/17/20 - 11/23/20

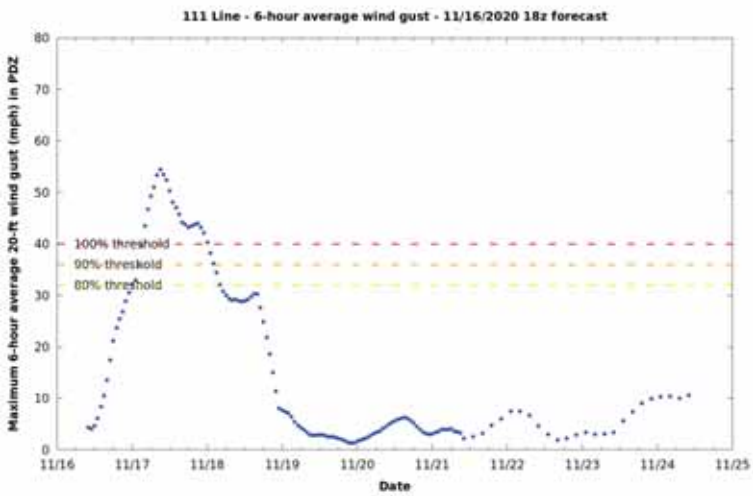
Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	56.9	55.7	44.6	39.3	41.2	42.2	45.3
Sierra Brooks	59.8	60.7	49.5	44.4	45.0	48.8	53.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	13.0	12.8	9.8	8.2	7.5	7.5	7.7
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.5	1.4	1.1	1.1	1.0	1.0	1.1
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	40.0	41.8	29.9	25.4	26.6	27.9	32.7
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	49.2	51.7	36.8	30.1	30.2	32.5	34.7
Topaz	60.5	61.3	44.8	38.0	38.4	39.2	45.1
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	34.0	33.4	24.7	23.0	23.9	24.4	25.7
Old Country Road	60.9	57.6	45.7	43.9	44.3	45.3	47.6
Tah 52-68	23.2	21.3	17.0	16.7	16.7	17.0	17.4
The Grid	57.2	55.8	39.0	36.3	38.1	38.9	39.4
Canterbury and Commonwealth	41.8	41.1	28.6	26.4	27.9	28.6	29.3
Bky 5100 to NVE	23.9	23.5	16.4	15.1	15.9	16.4	16.8
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	24.2	23.3	18.7	15.8	14.7	14.1	14.7
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	33.4	33.4	27.0	25.0	25.0	25.5	27.5
650 Line	1.9	1.9	1.3	1.2	1.3	1.3	1.4
Floriston	46.6	46.6	34.7	31.2	31.1	33.6	36.2
Verdi	55.7	55.7	44.1	36.2	39.6	44.1	46.8
Bordertown	58.8	58.8	47.7	40.0	41.6	45.7	48.9

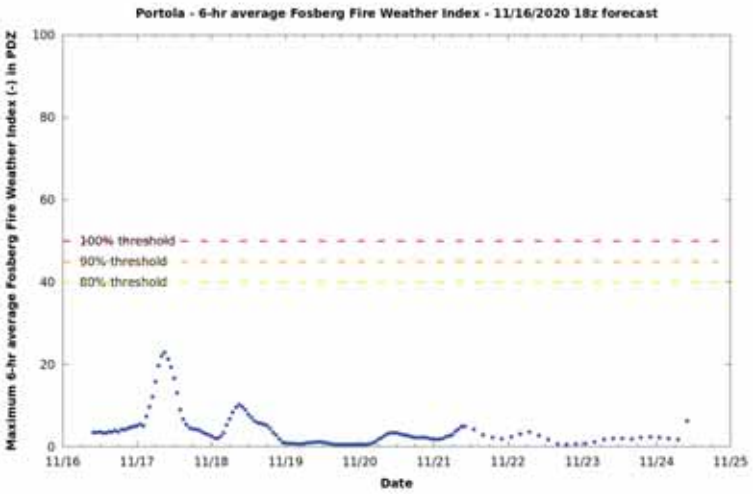
Liberty Utilities Fire Weather Summary Plots - 11/16/2020 18z forecast

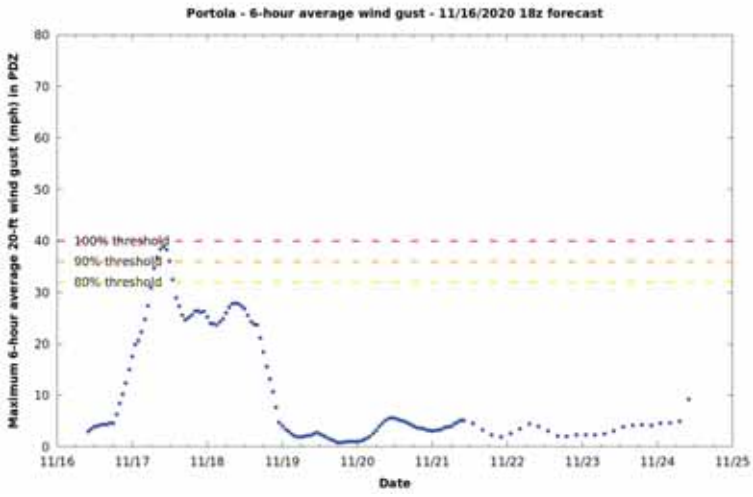
111 Line



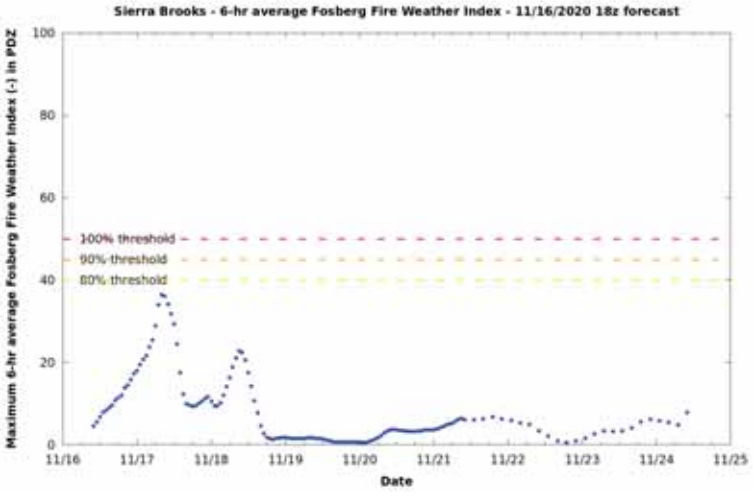


Portola



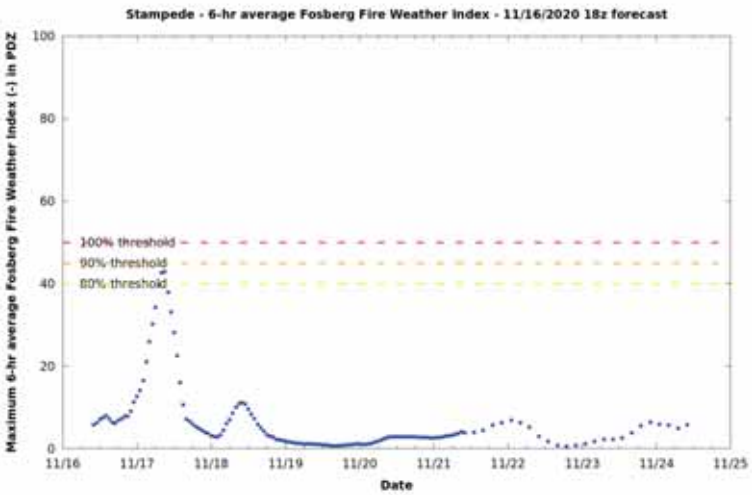


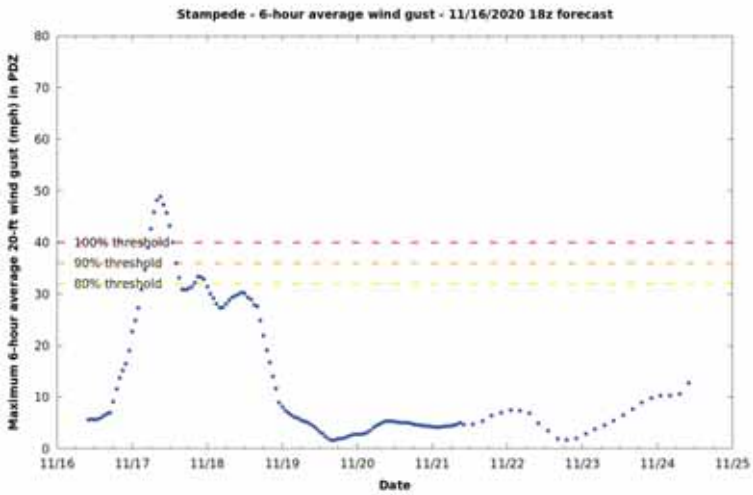
Sierra Brooks



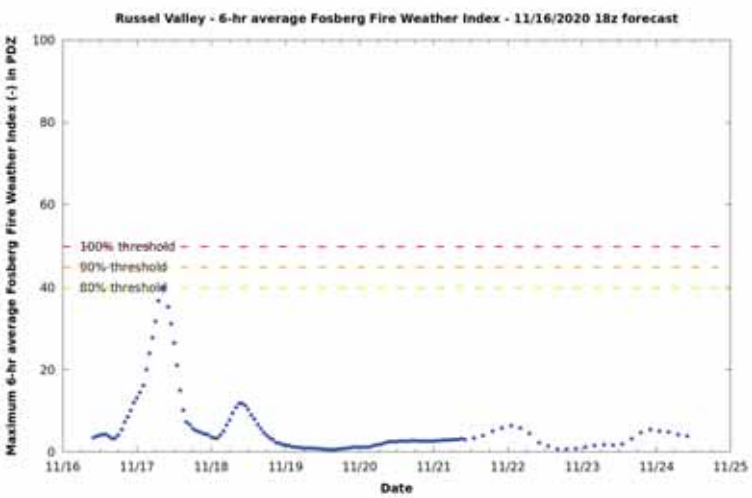


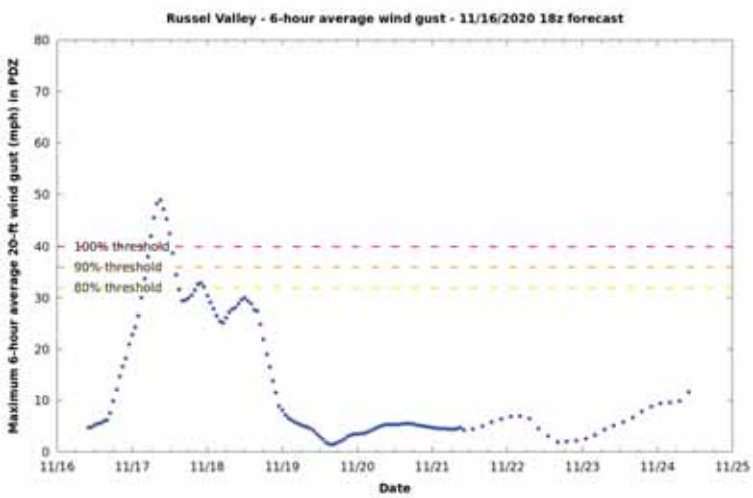
Stampede



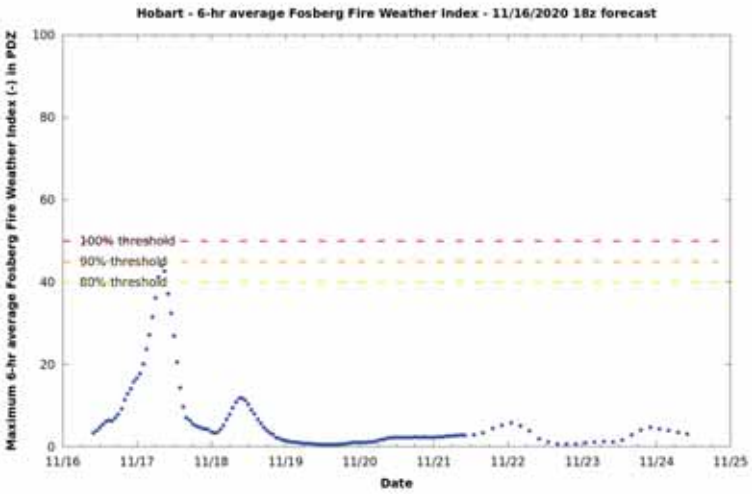


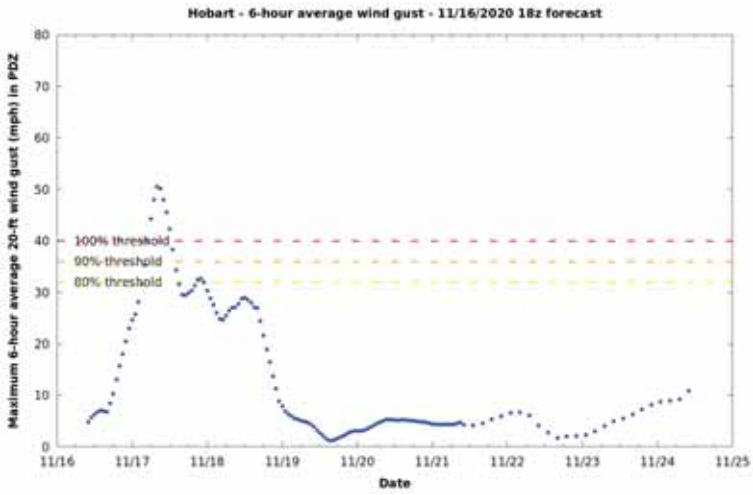
Russell Valley



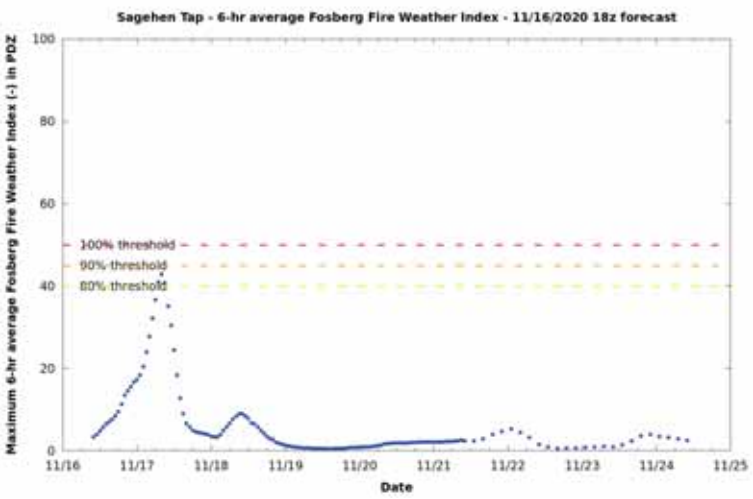


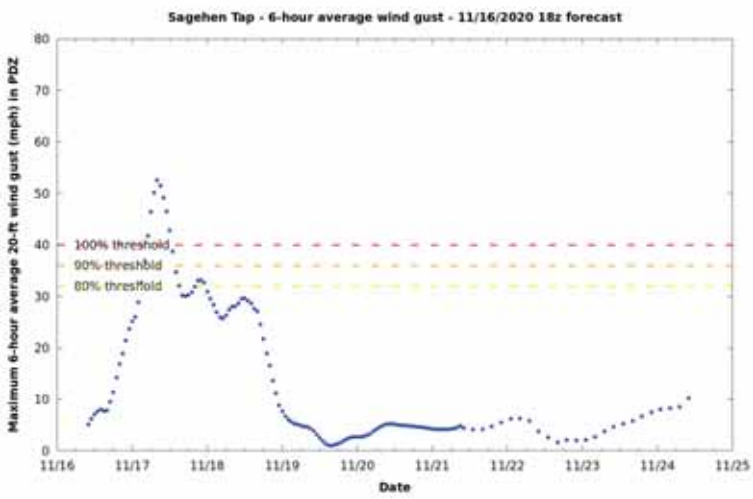
Hobart



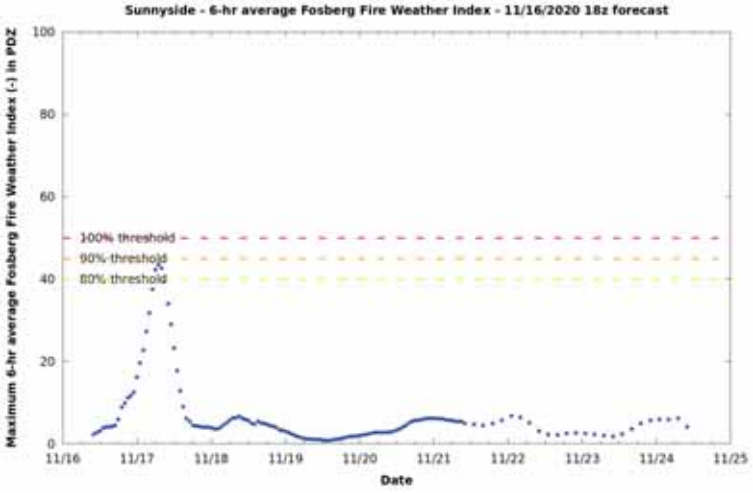


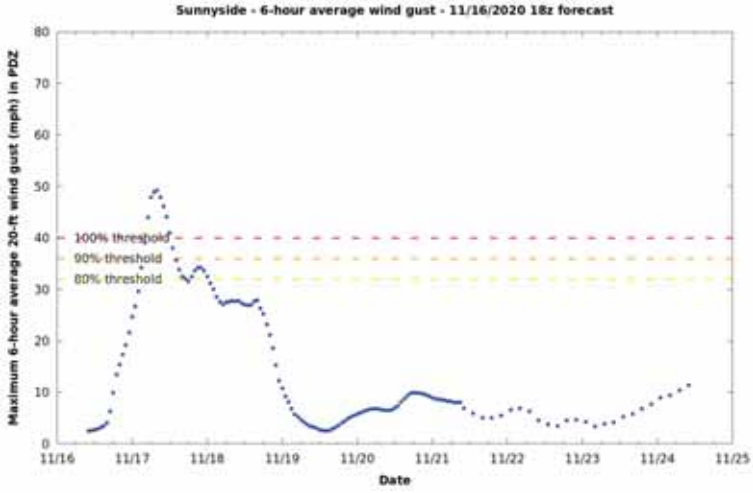
Sagehen tap



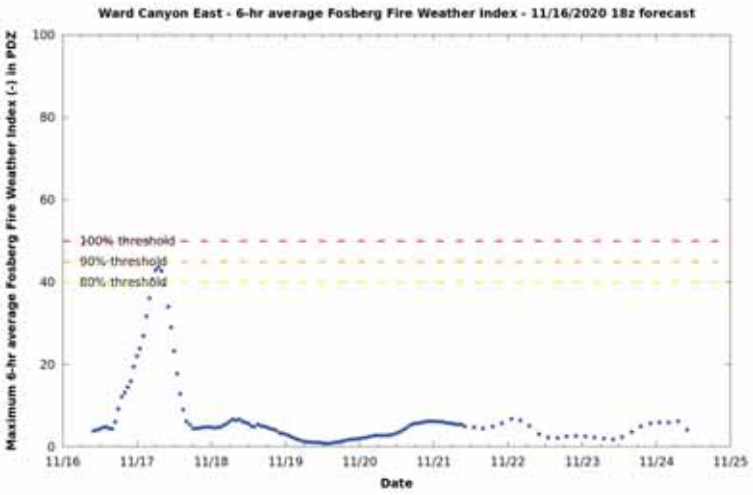


Sunnyside



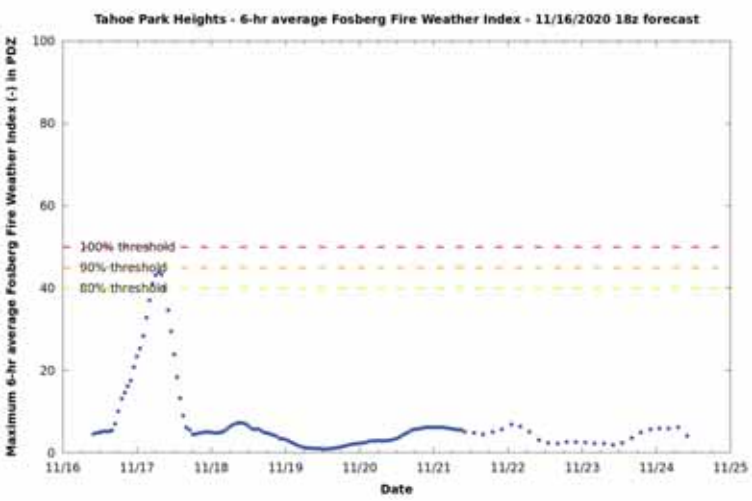


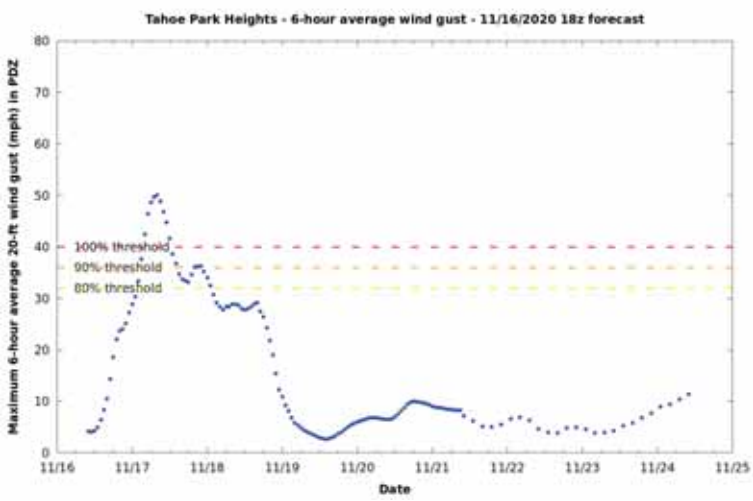
Ward Canyon East



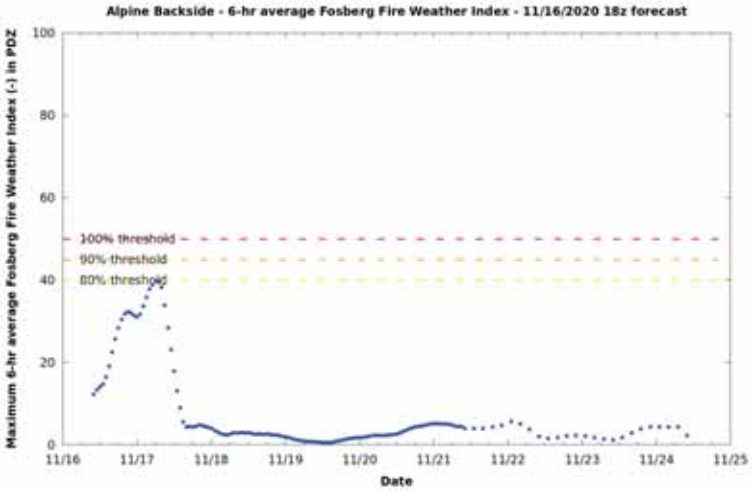


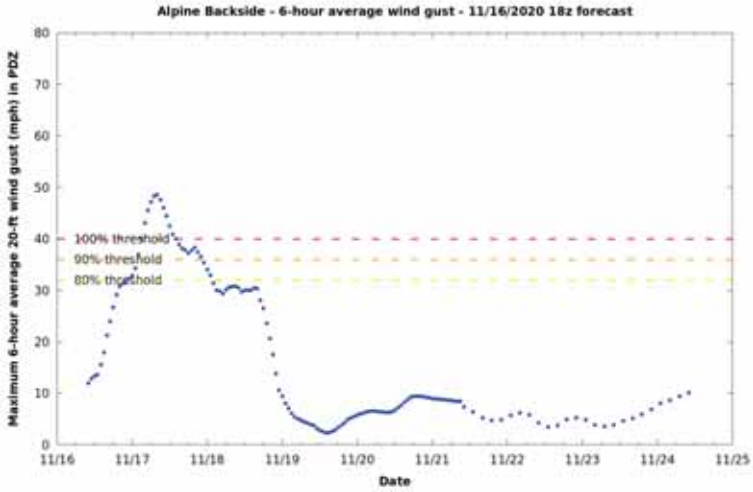
Tahoe Park Heights



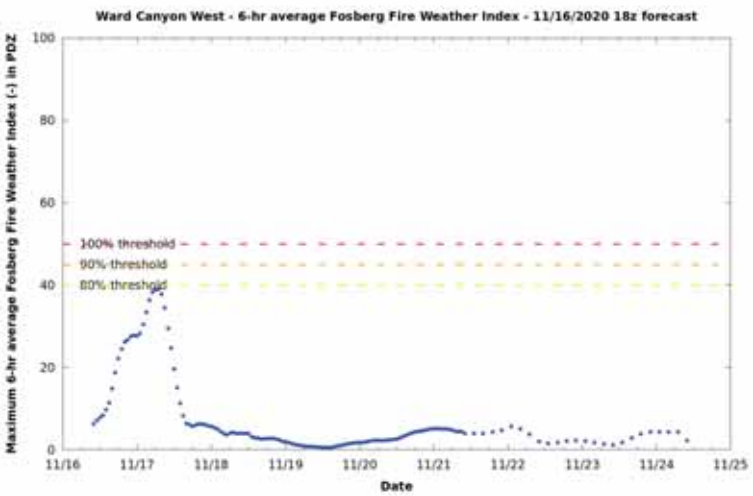


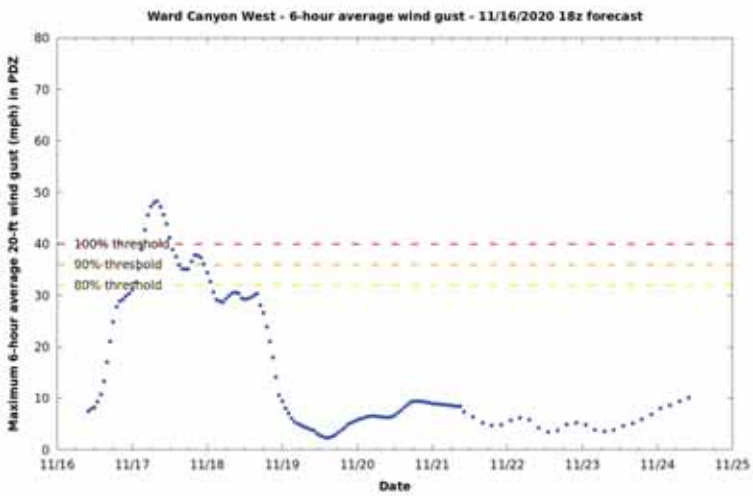
Alpine Backside



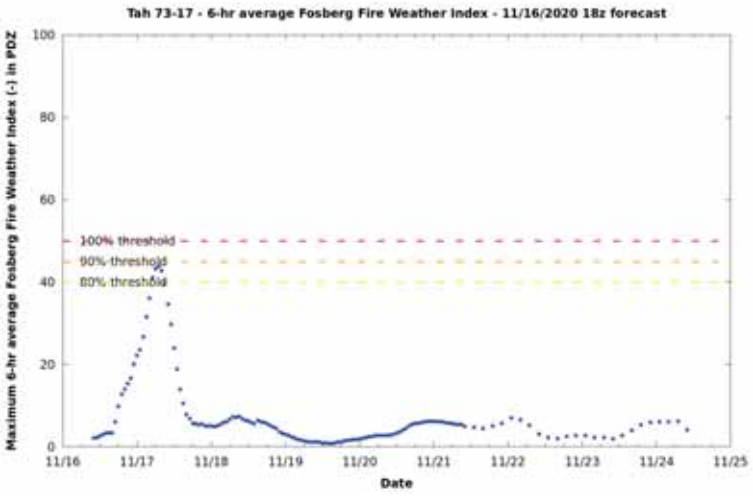


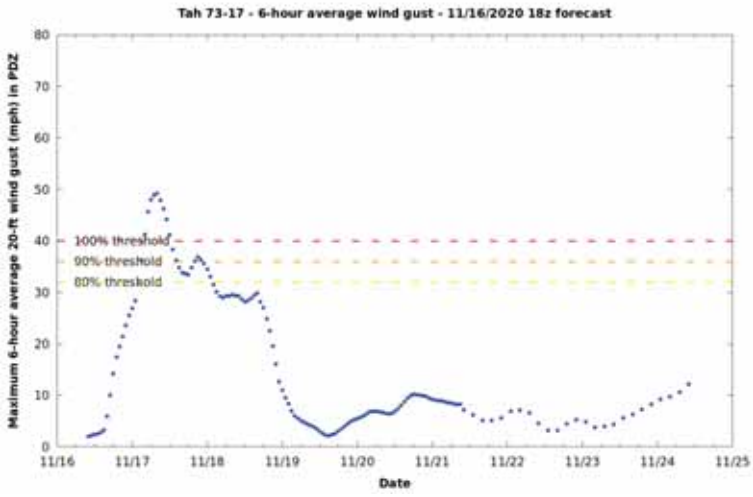
Ward Canyon West



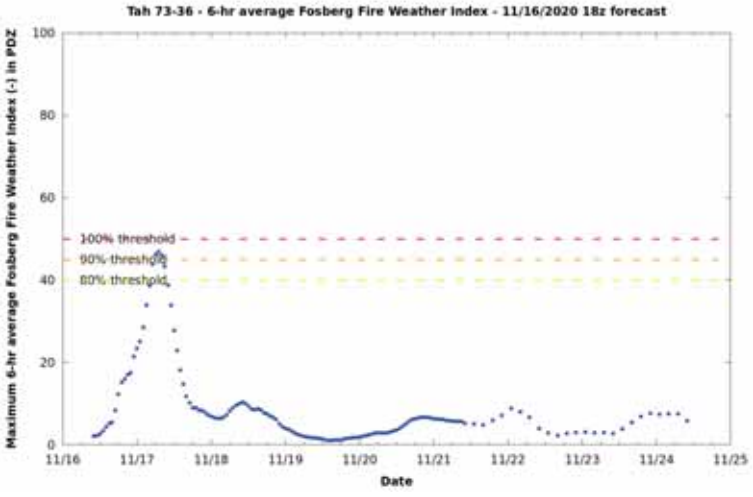


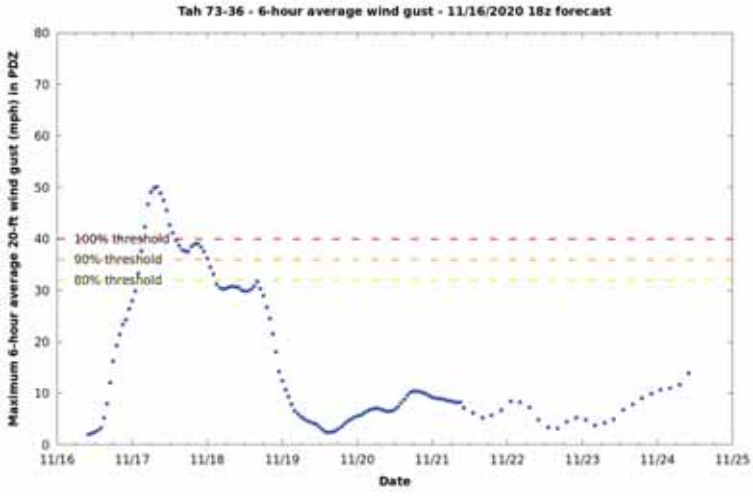
Tah 73-17



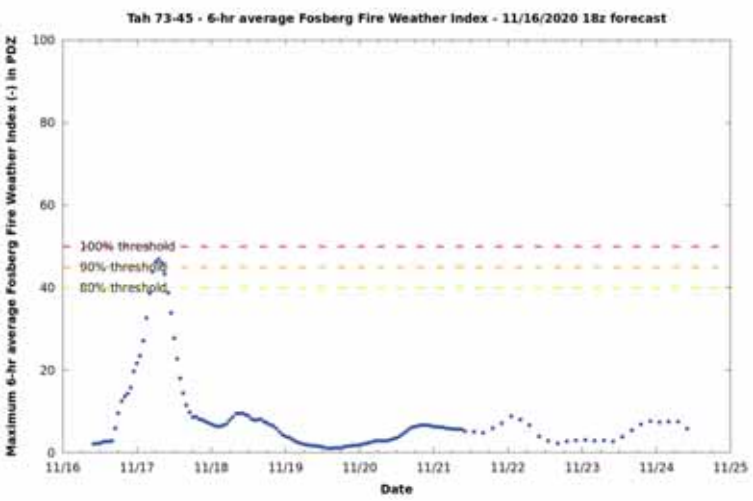


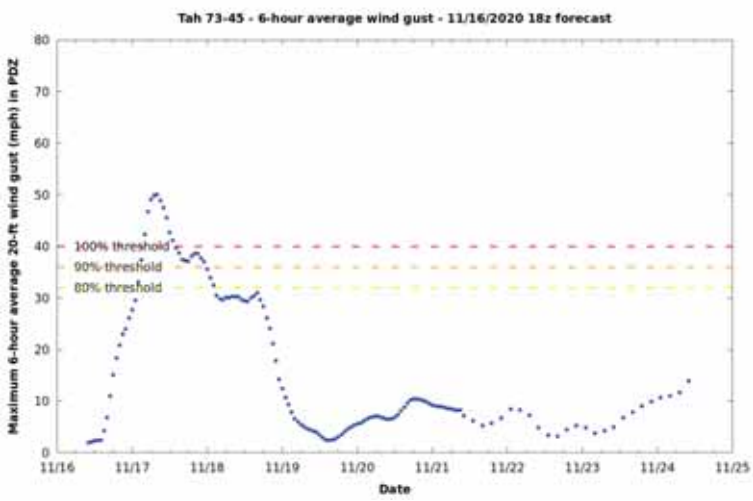
Tah 73-36



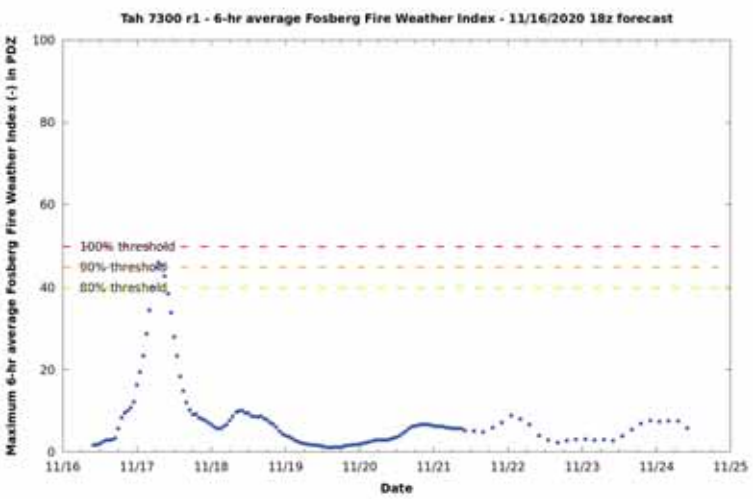


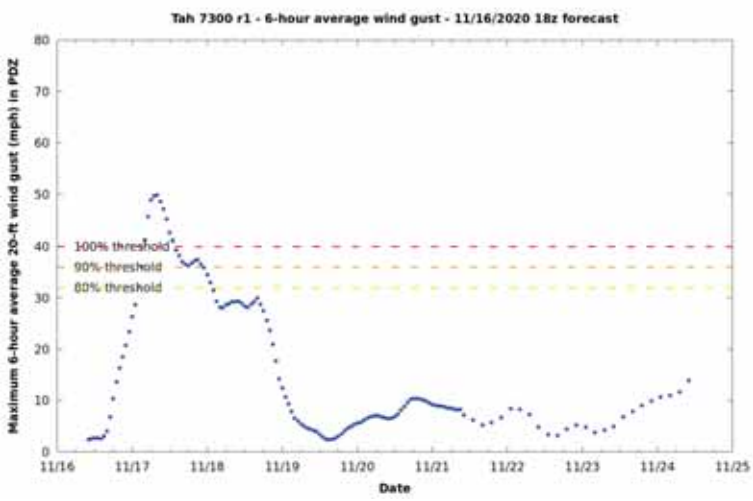
Tah 73-45



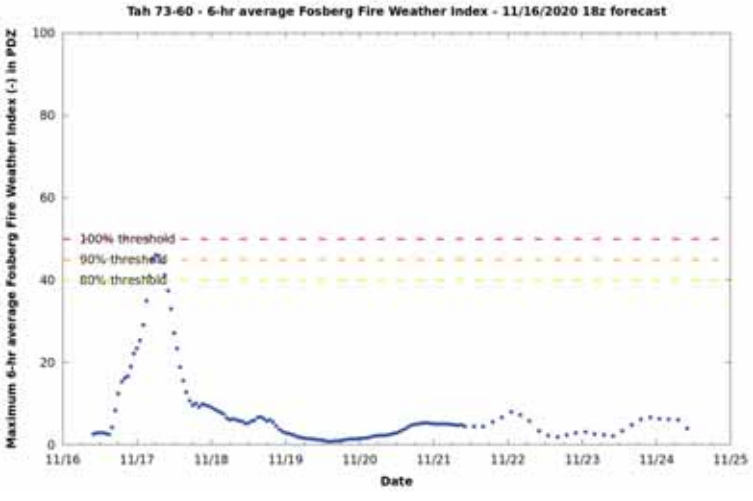


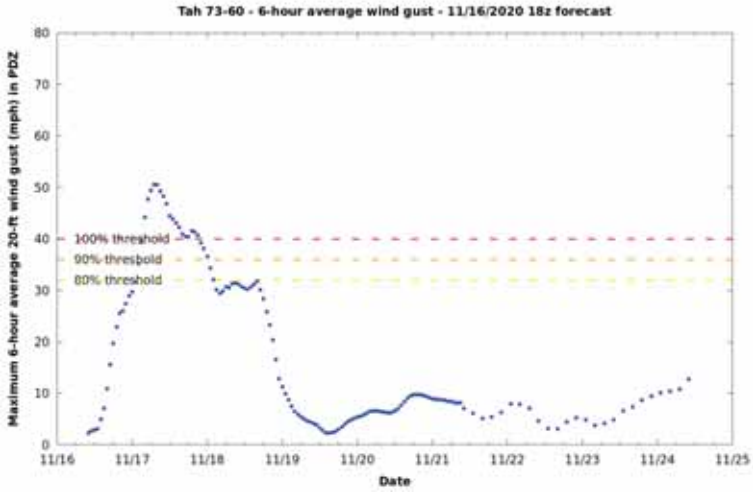
Tah 7300 r1



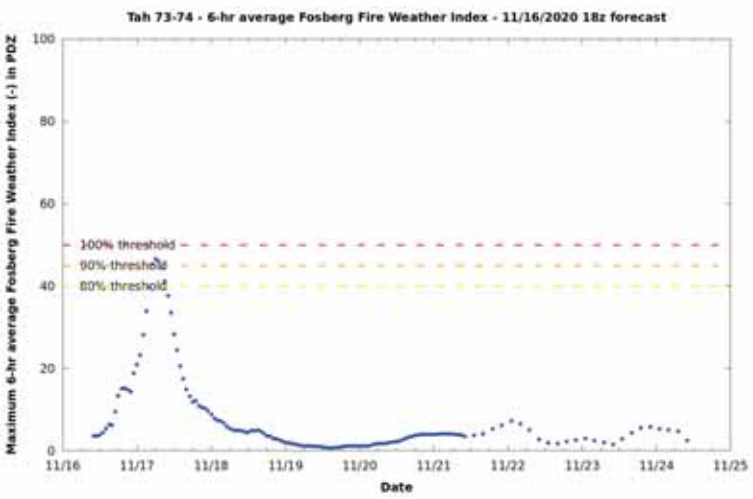


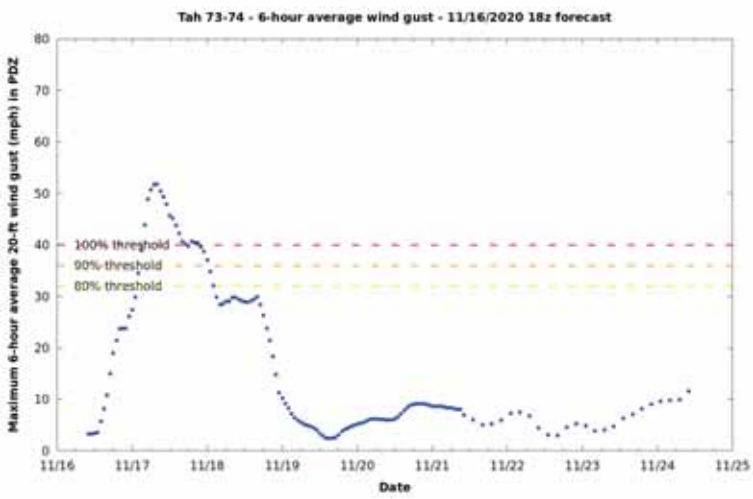
Tah 73-60



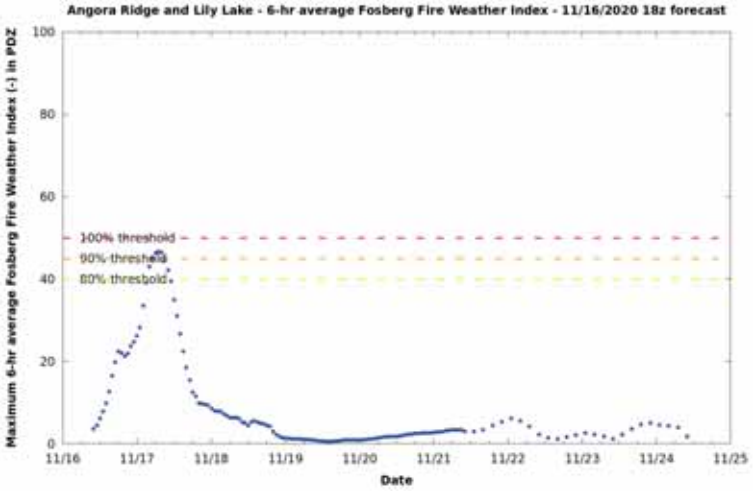


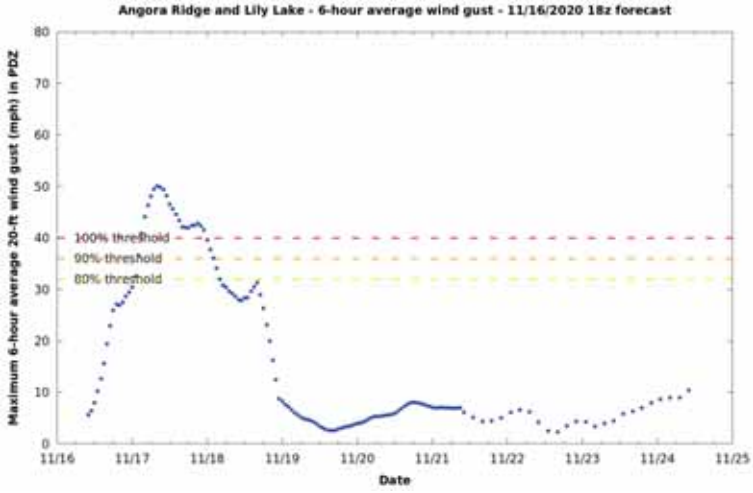
Tah 73-74



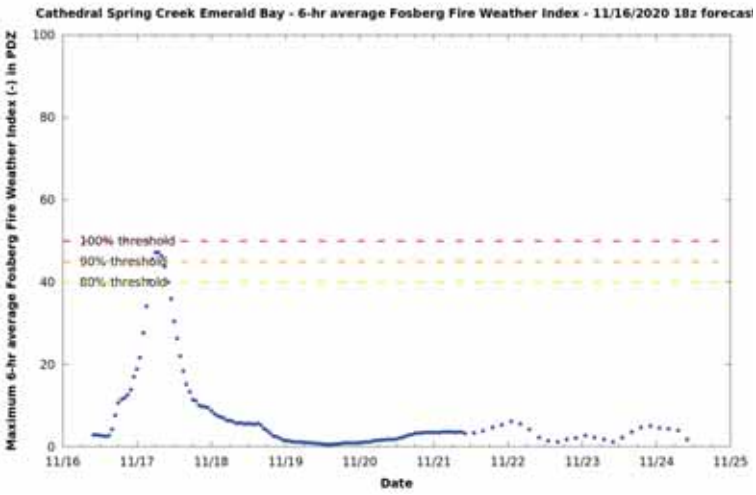


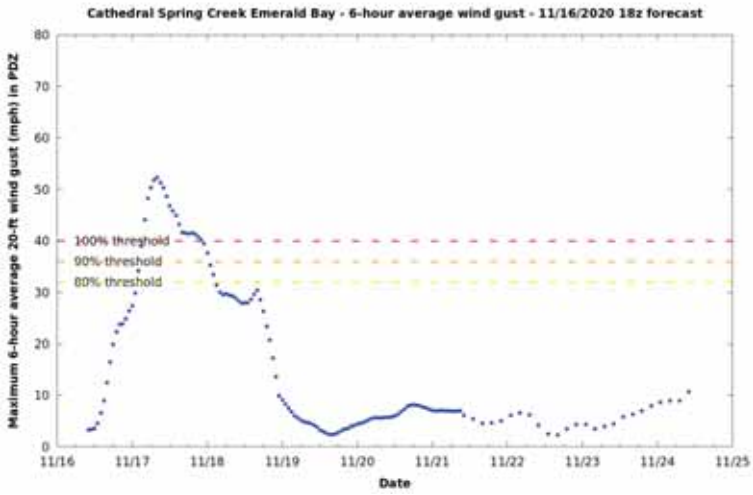
Angora Ridge and Lily Lake



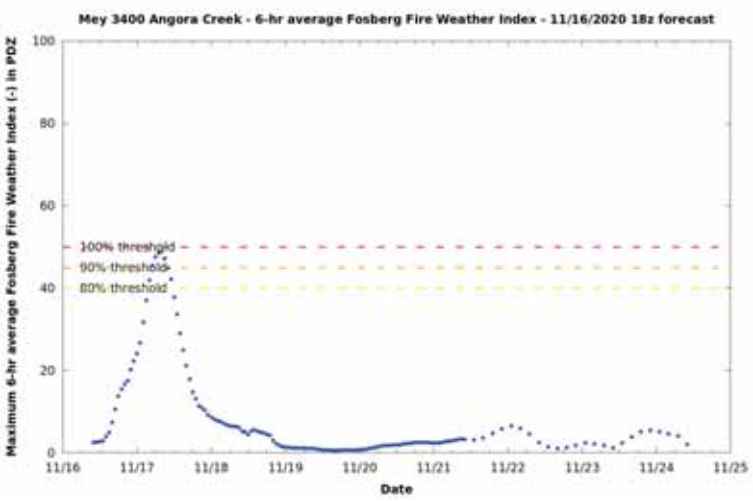


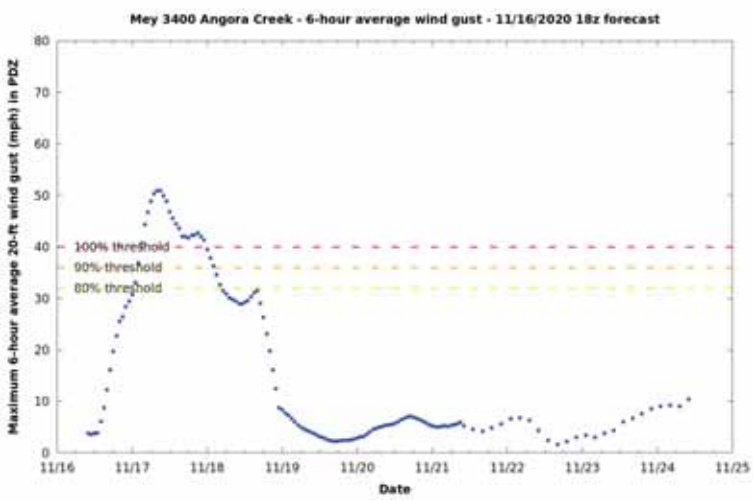
Cathedral Spring Creek Emerald Bay



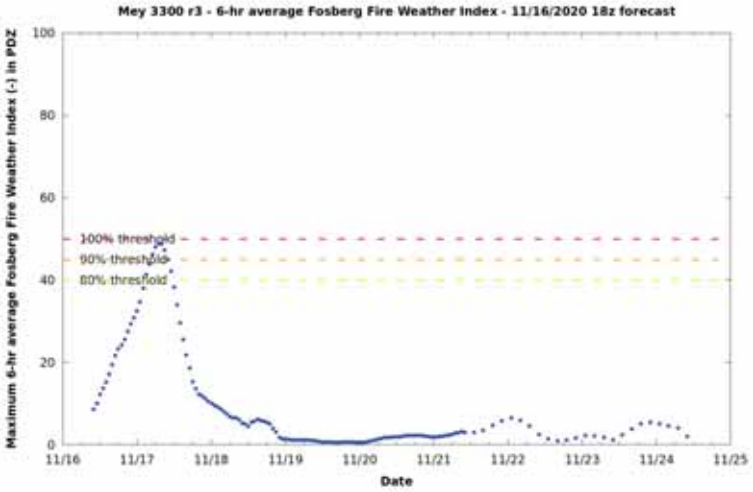


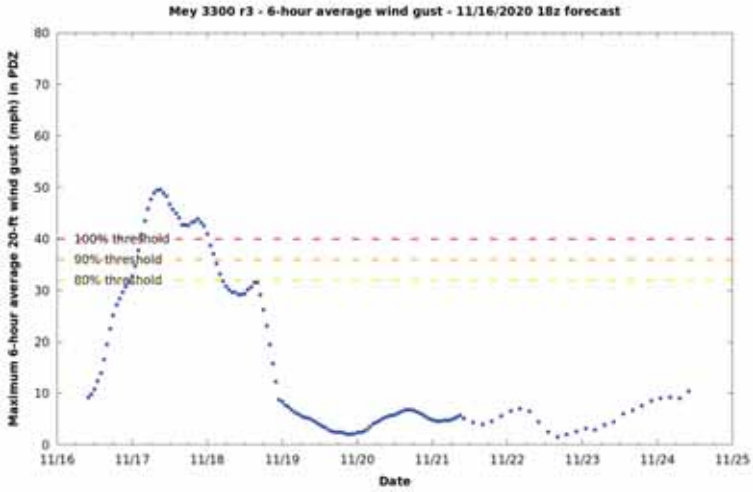
Mey 3400 Angora Creek



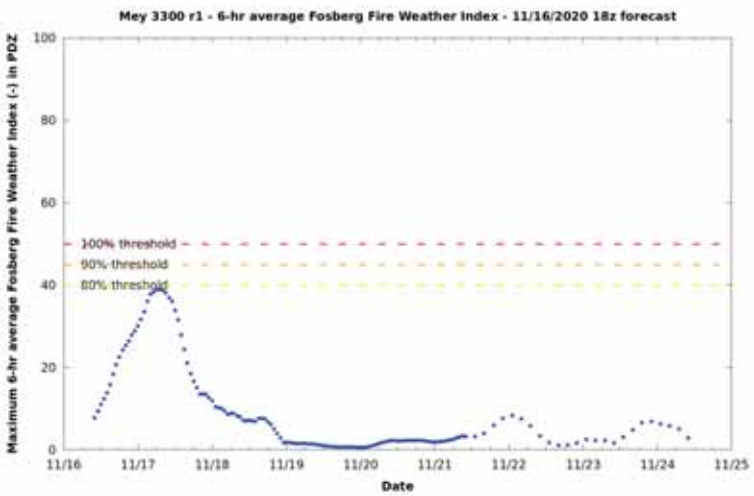


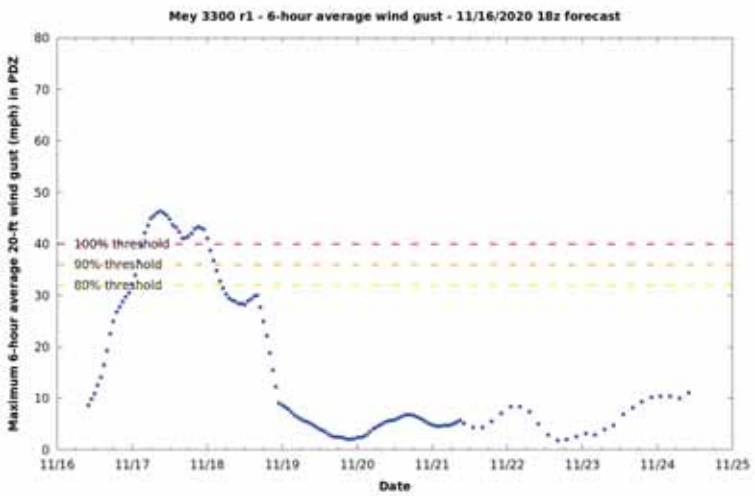
Mey 3300 r3



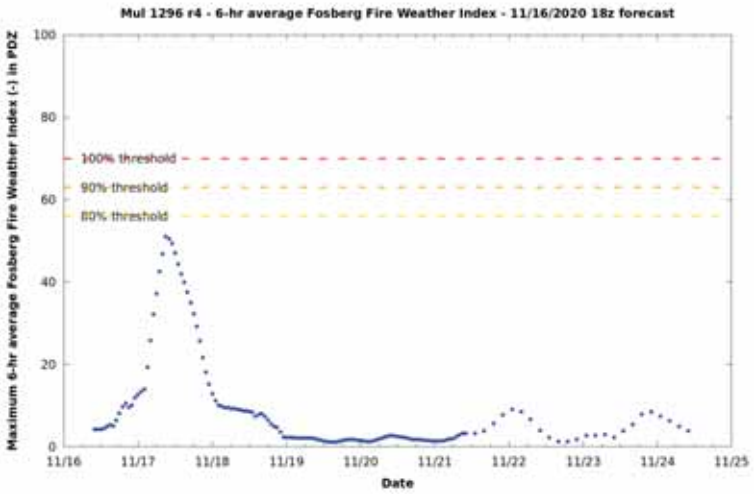


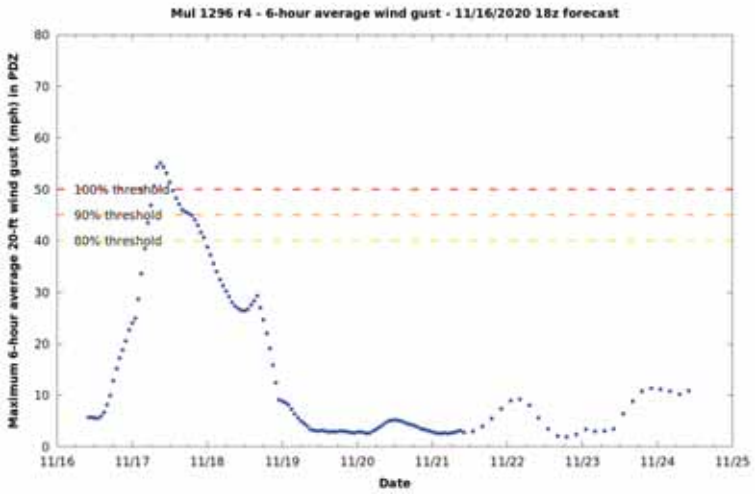
Mey 3300 r1



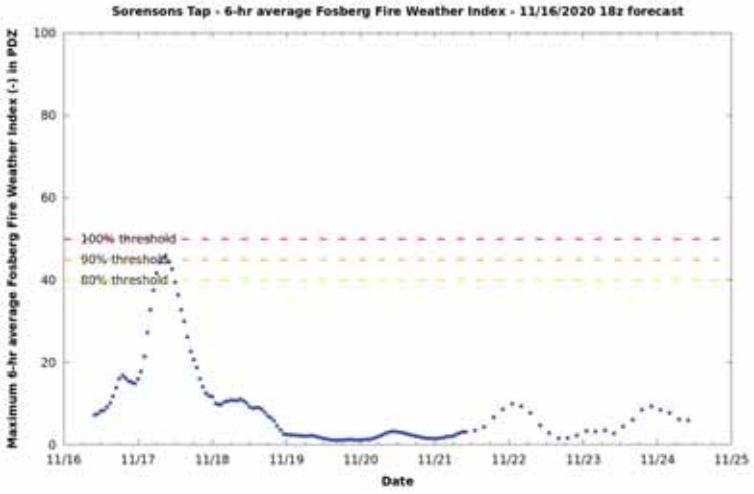


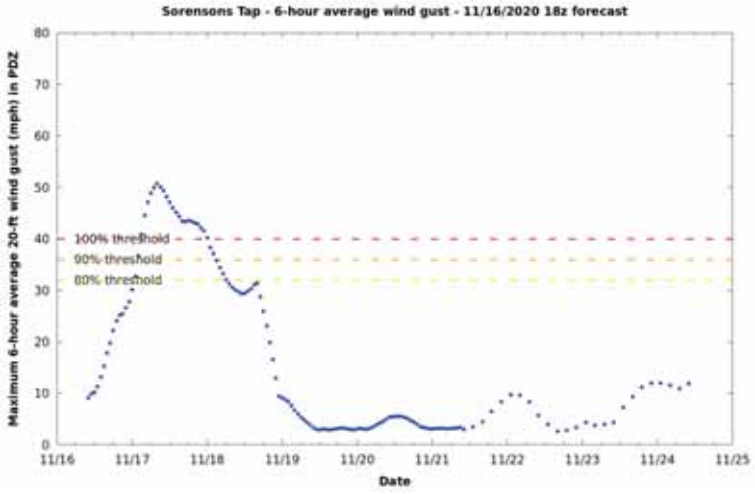
Mul 1296 r4



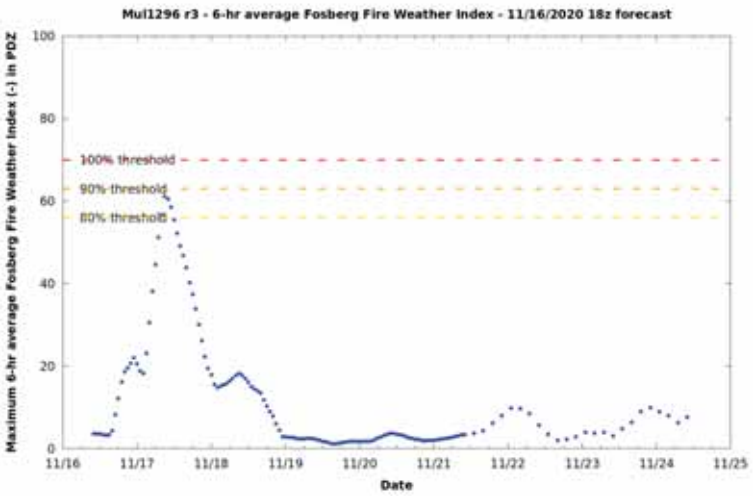


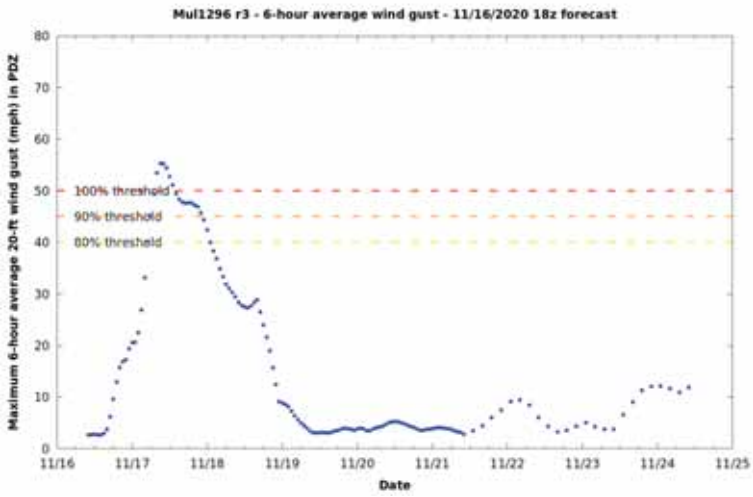
Sorensons Tap



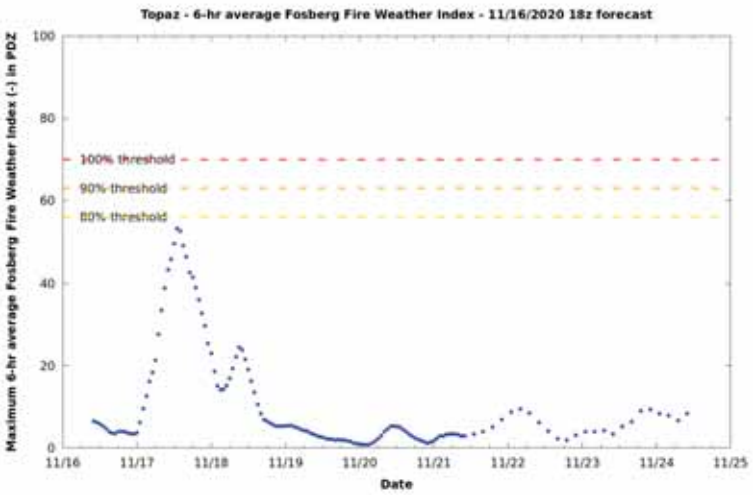


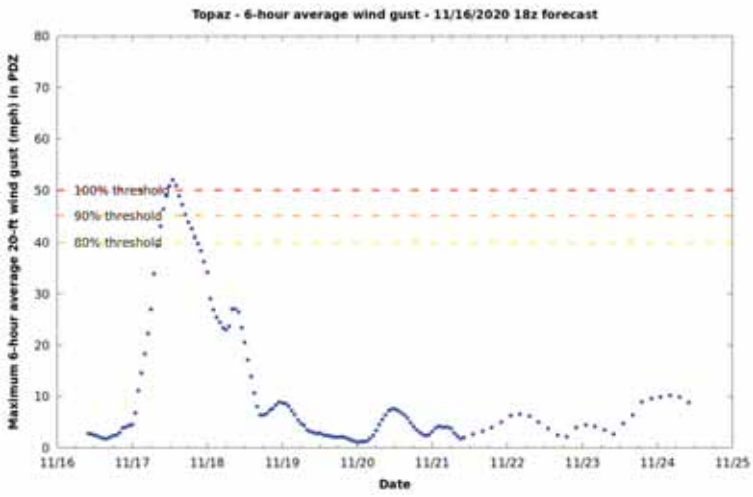
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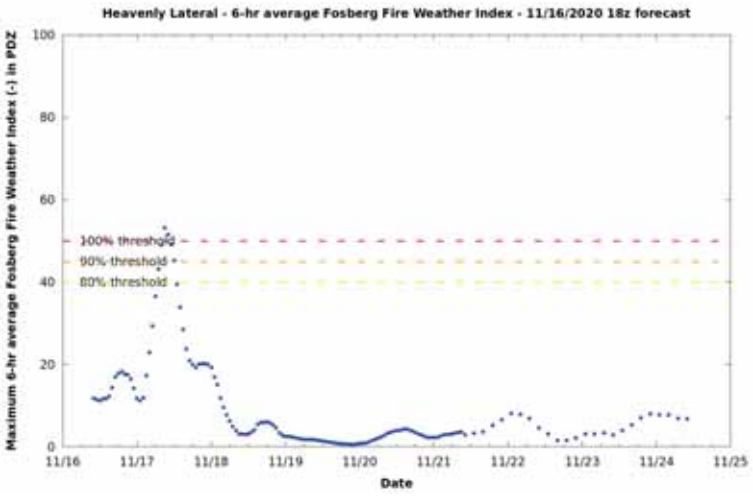


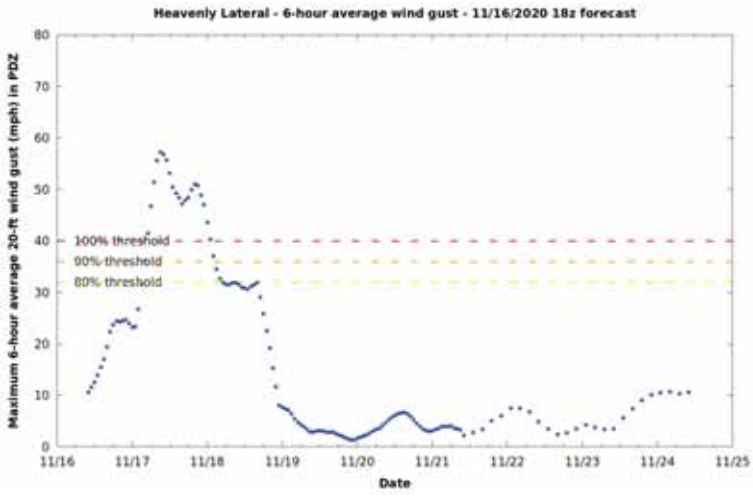
Topaz



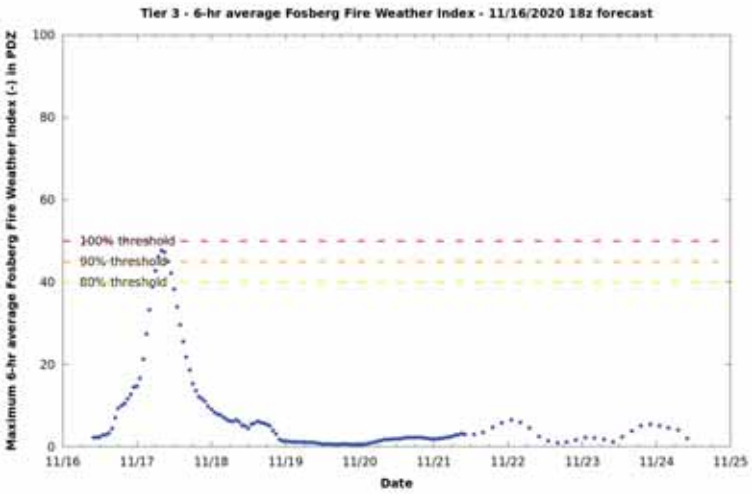


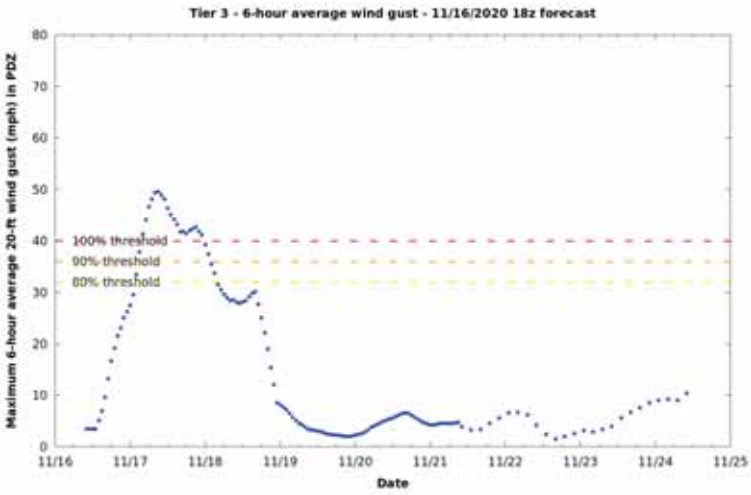
Heavenly Lateral



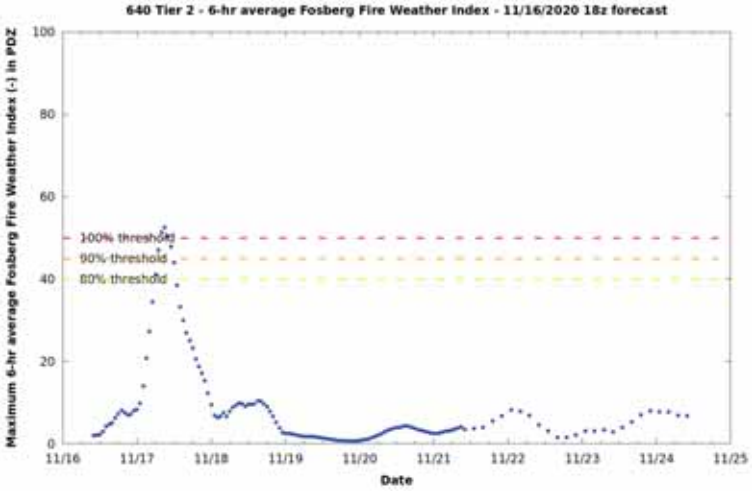


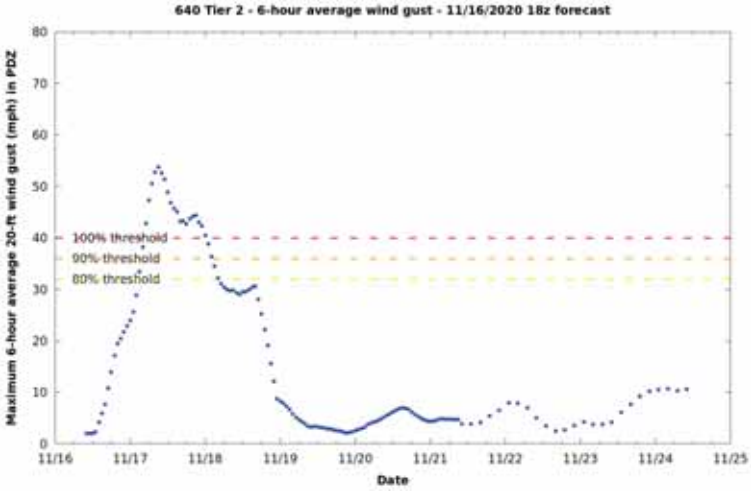
Tier 3



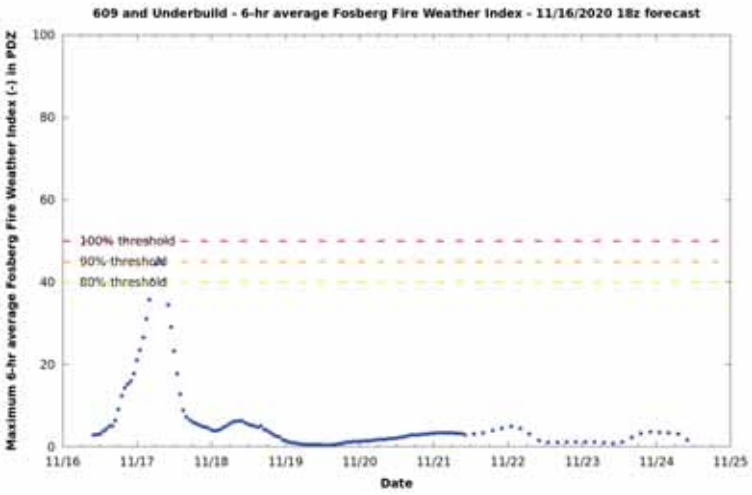


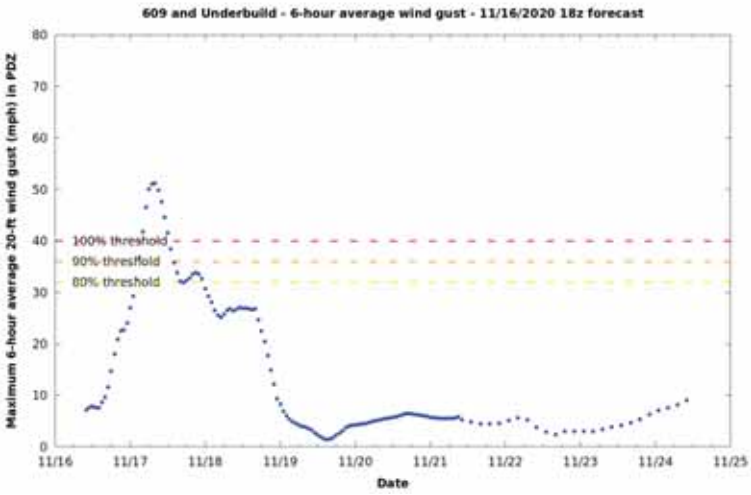
640 Tier 2



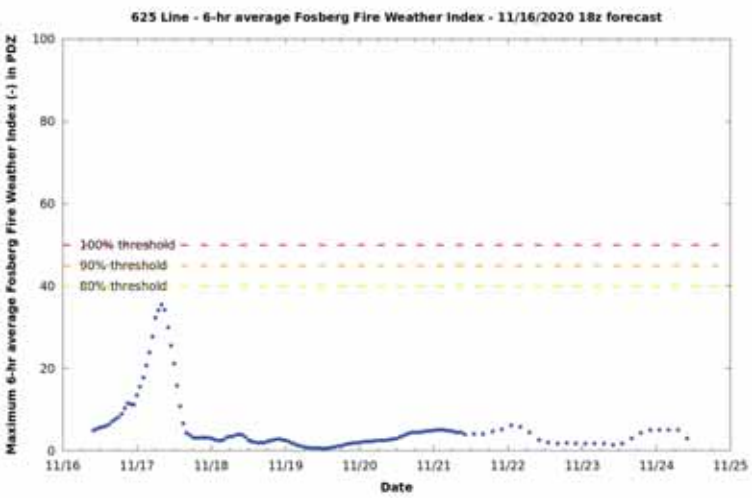


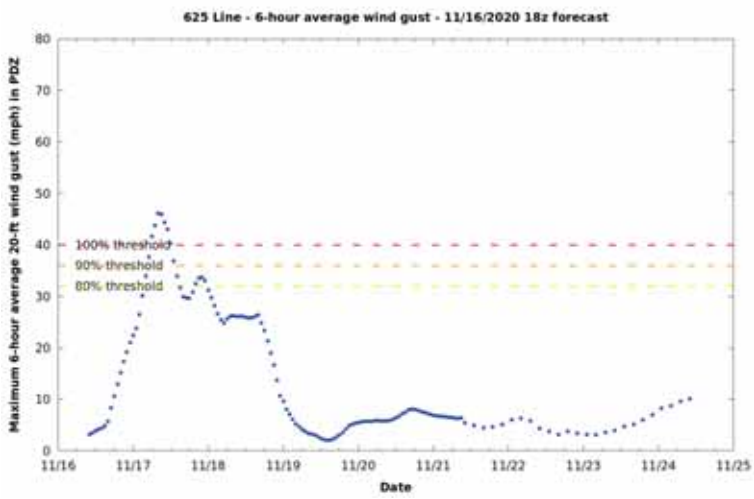
609 and Underbuild



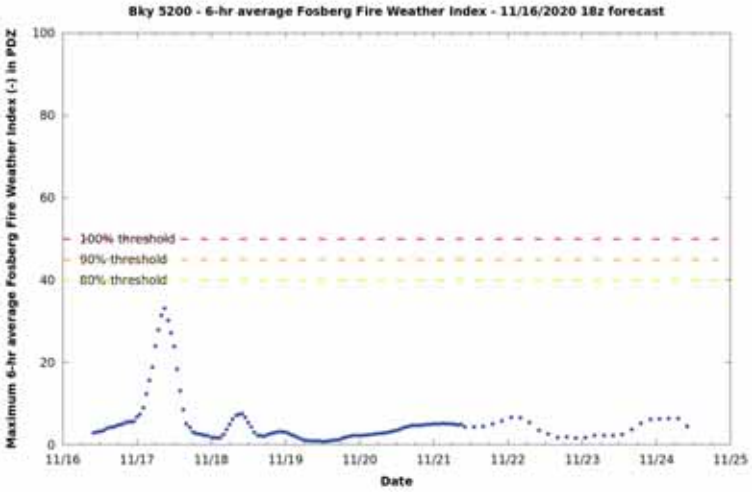


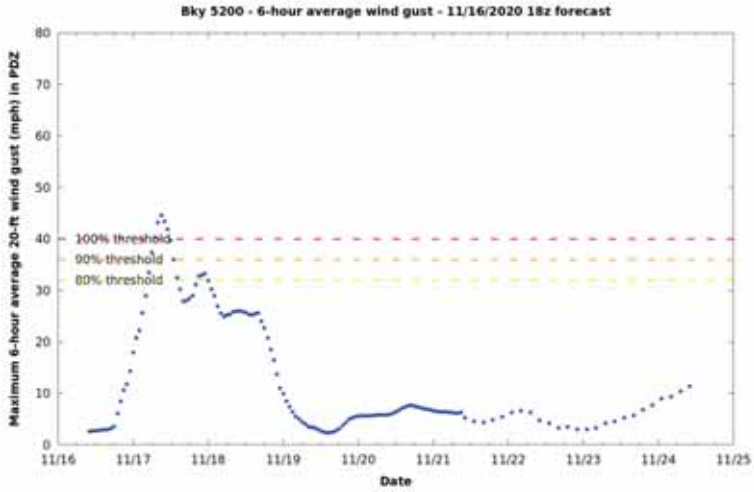
625 Line



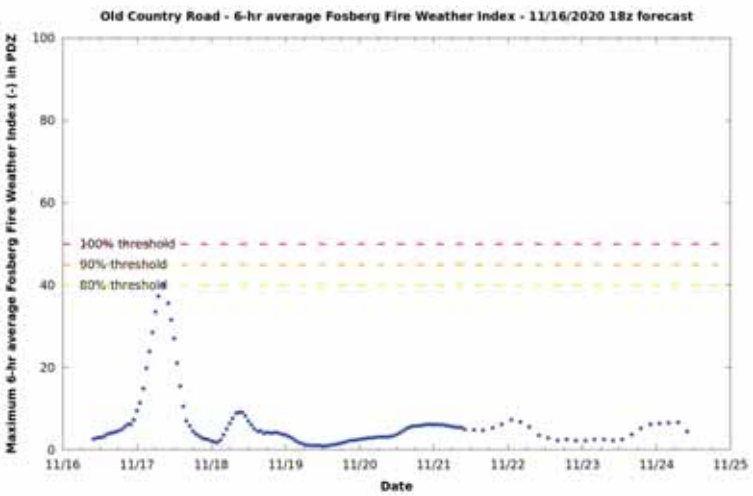


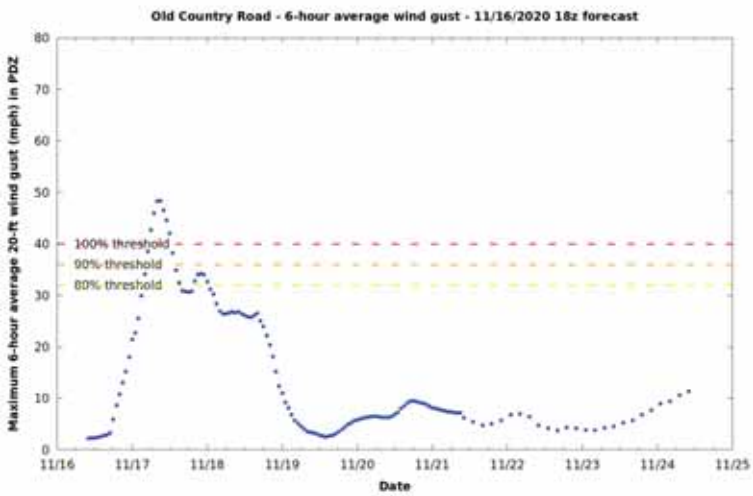
Bky 5200



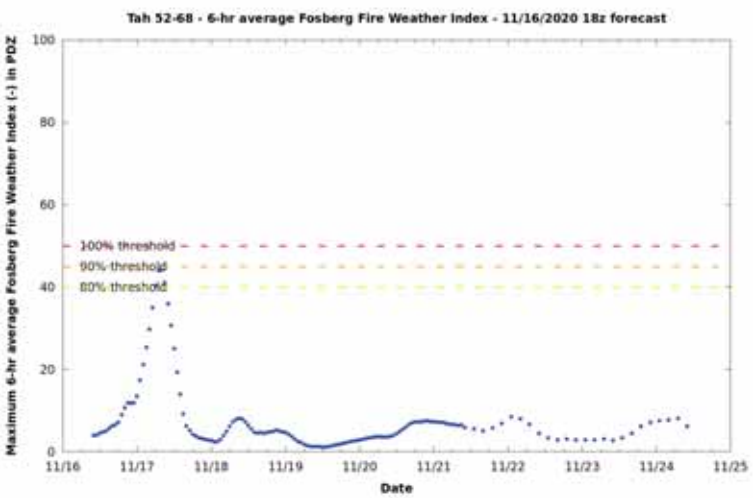


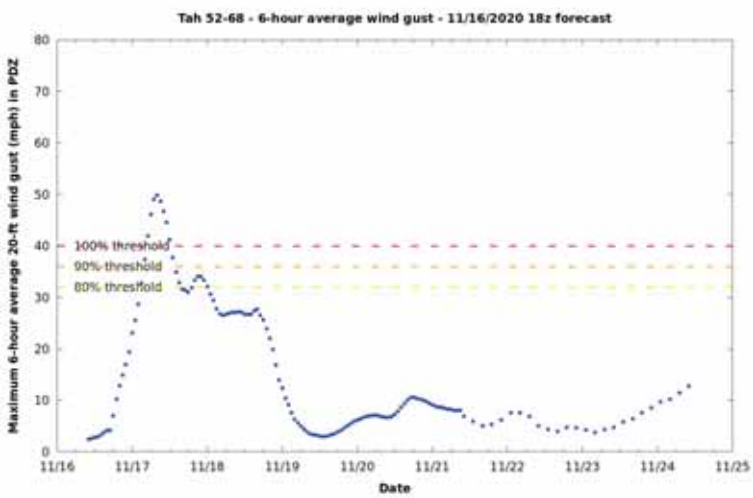
Old Country Road



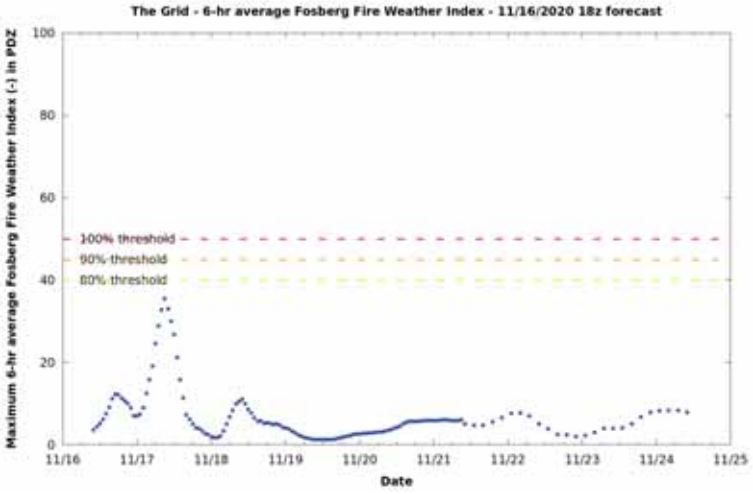


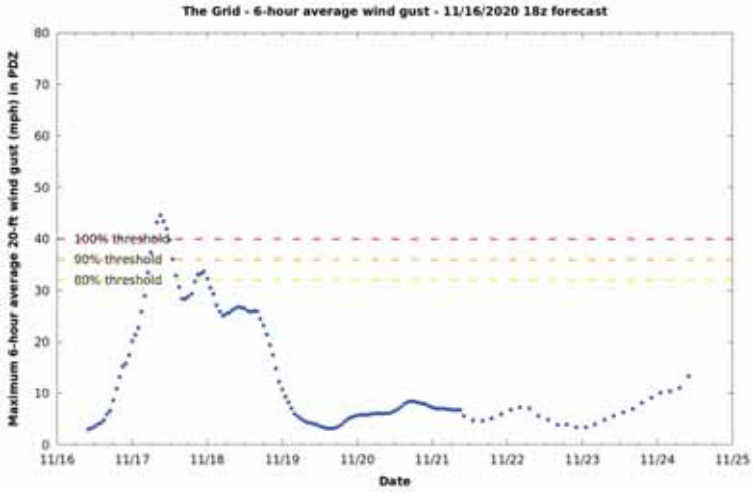
Tah 52-68



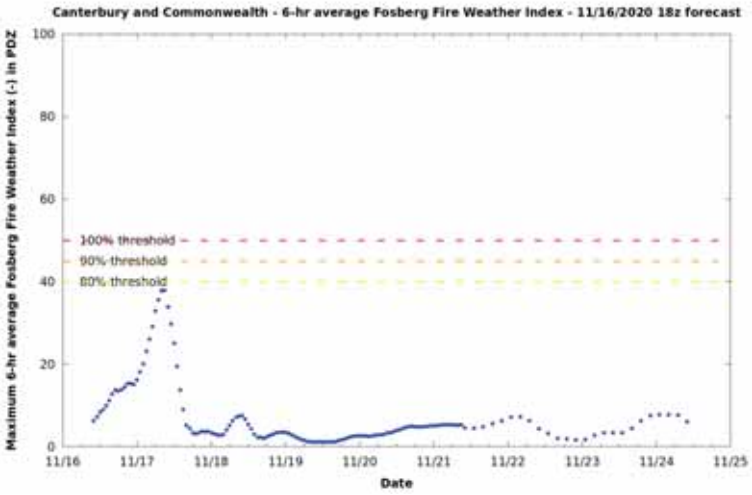


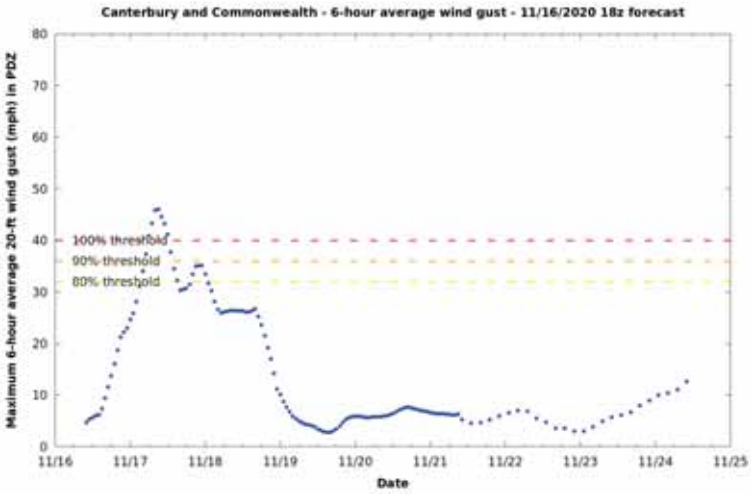
The Grid



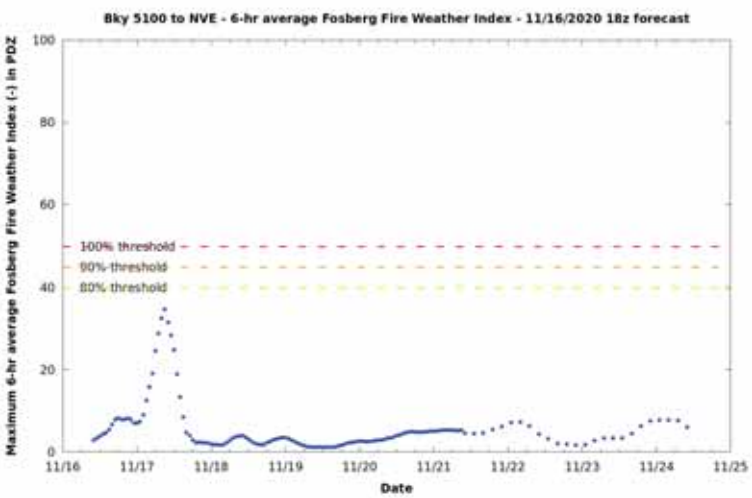


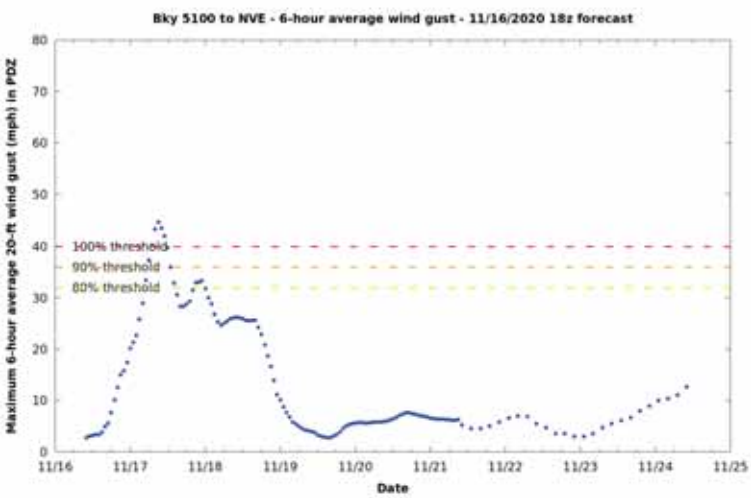
Canterbuy and Commonwealth



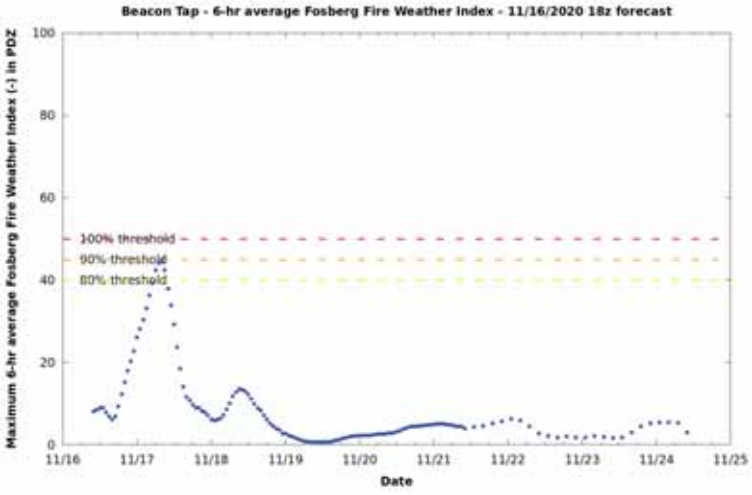


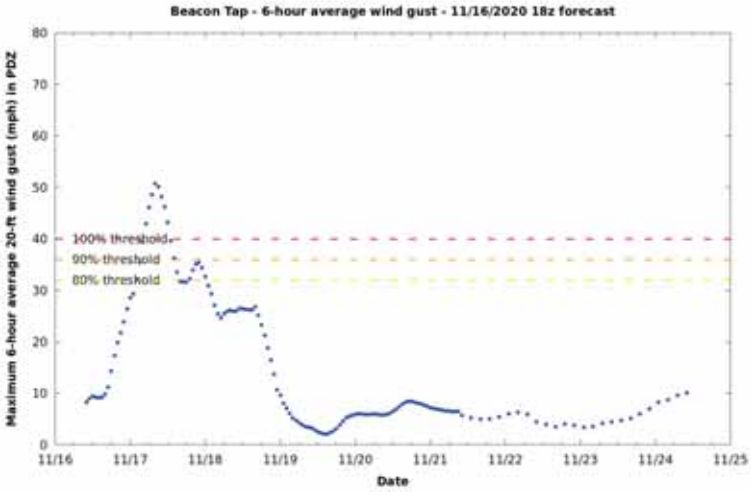
Bky 5100 to NVE



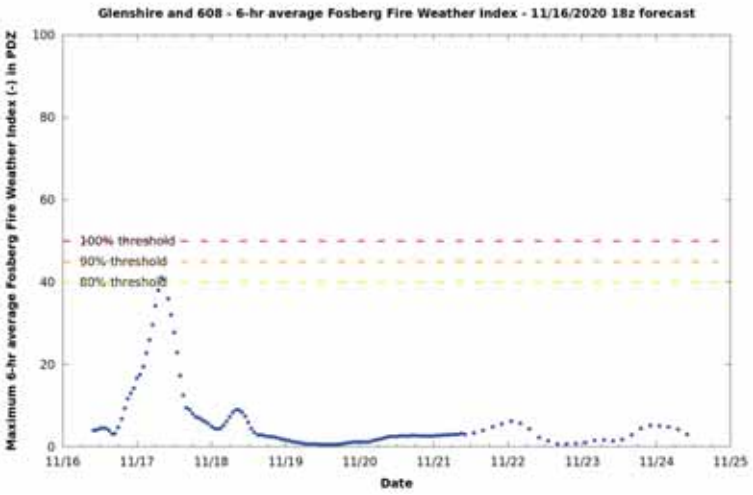


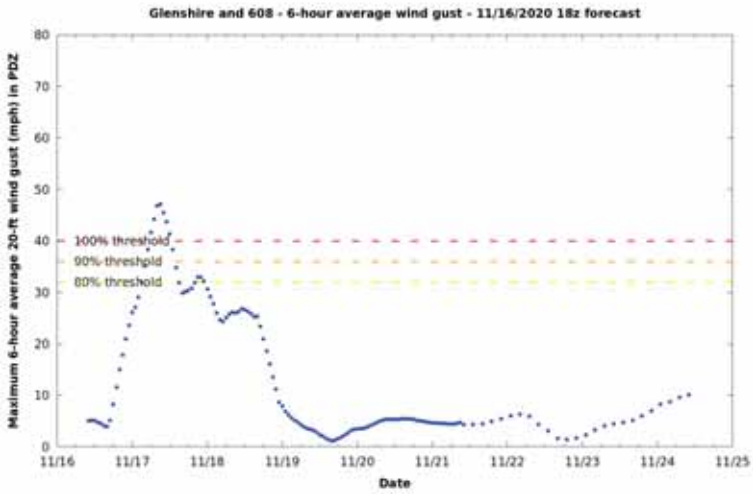
Beacon Tap



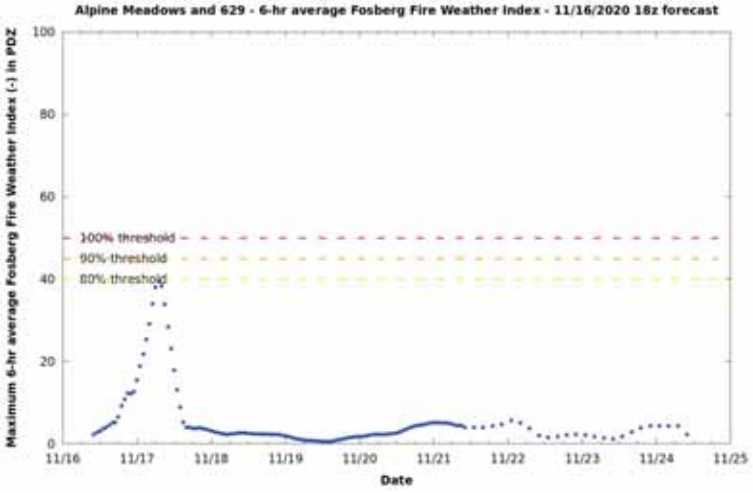


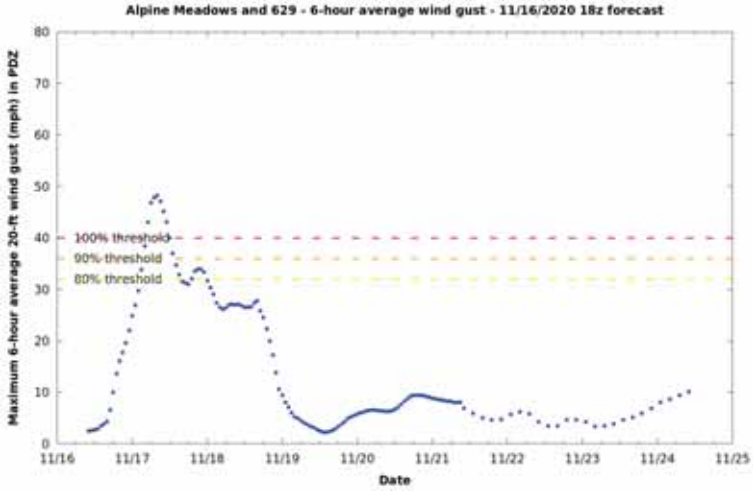
Glenshire and 608



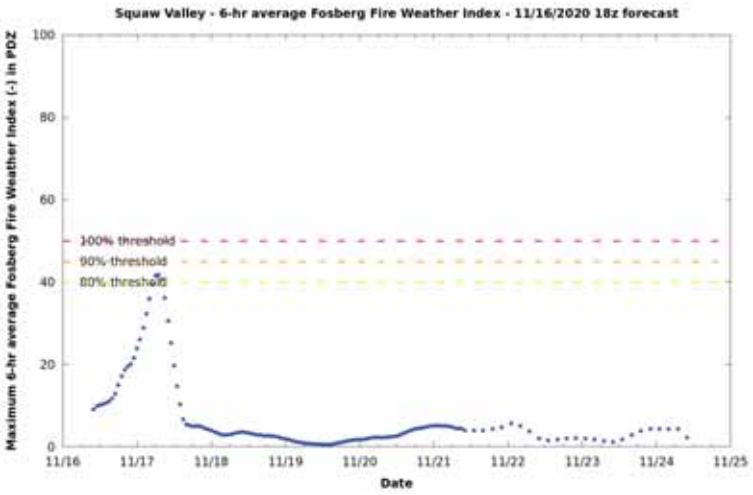


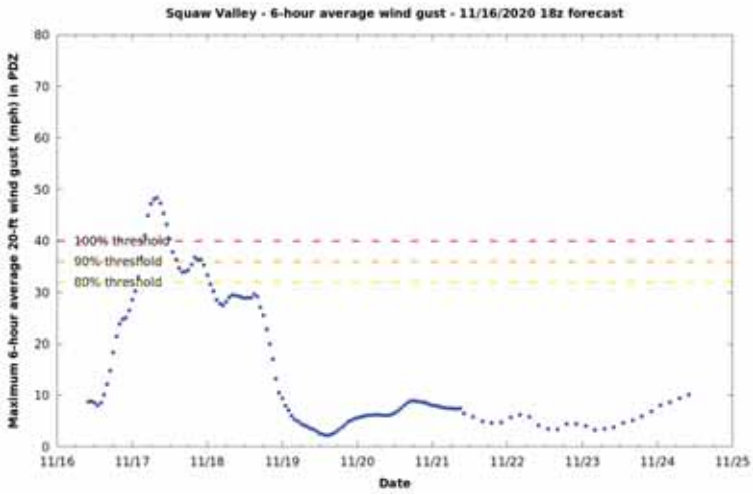
Alpine Meadows and 629



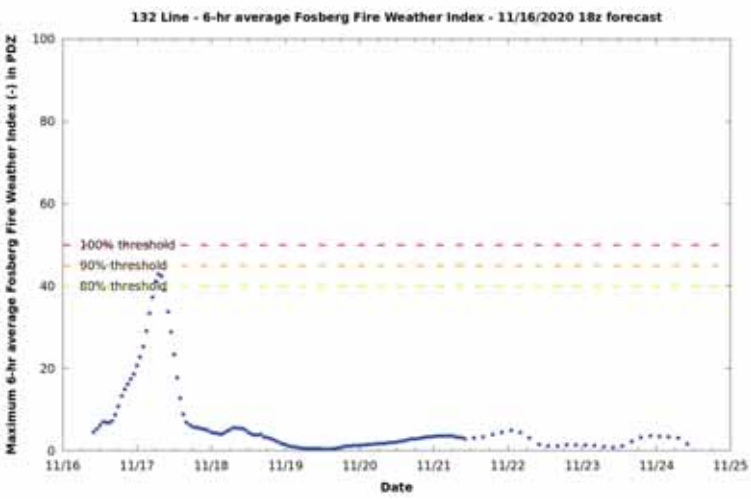


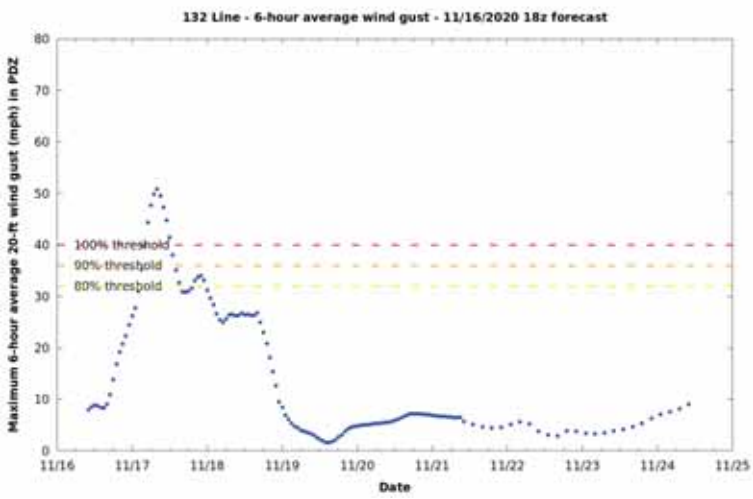
Squaw Valley



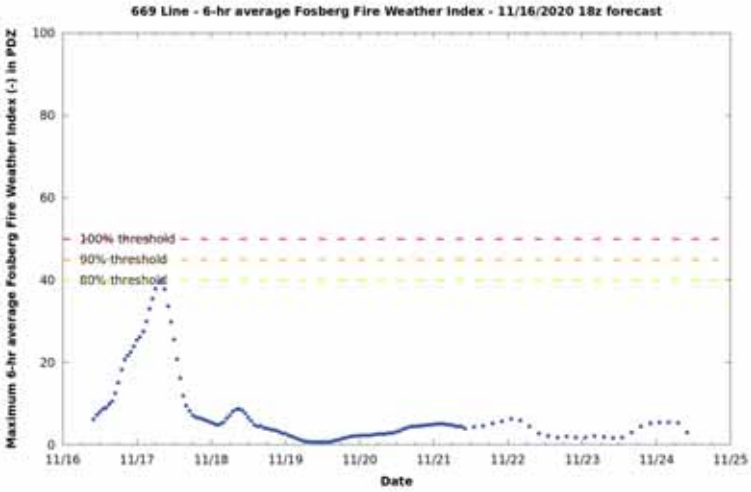


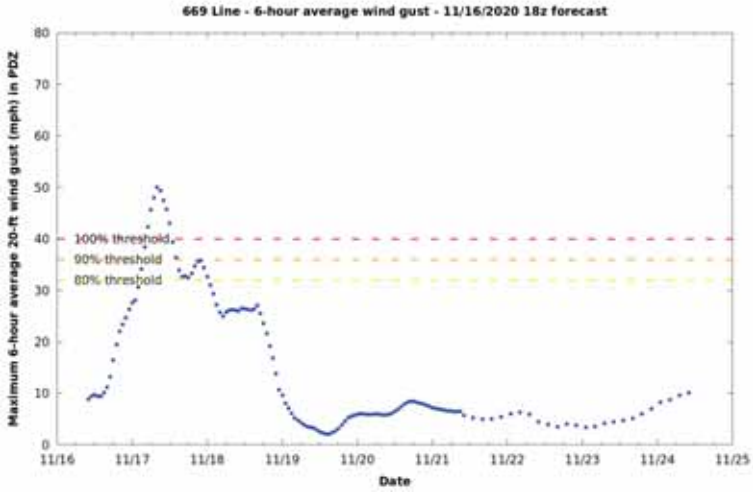
132 Line



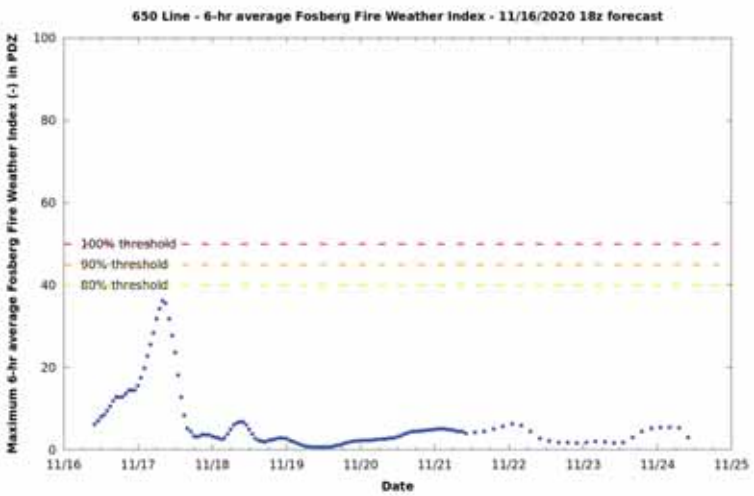


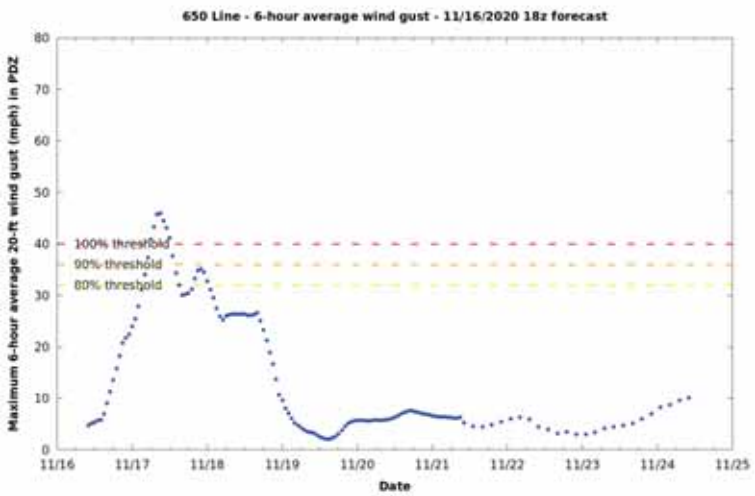
669 Line



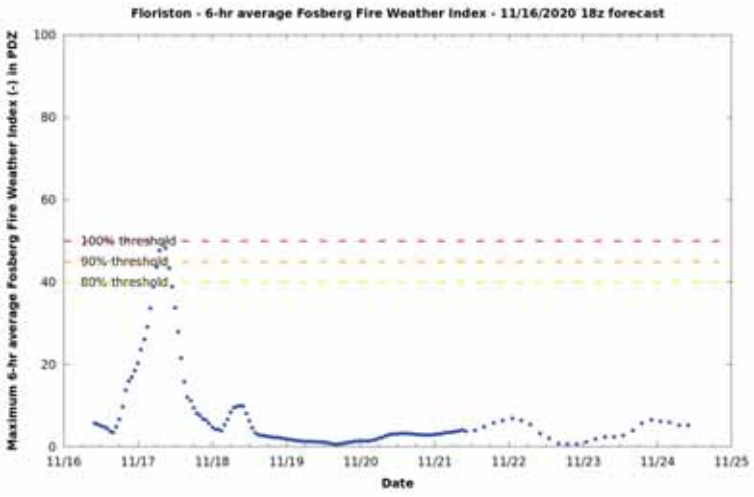


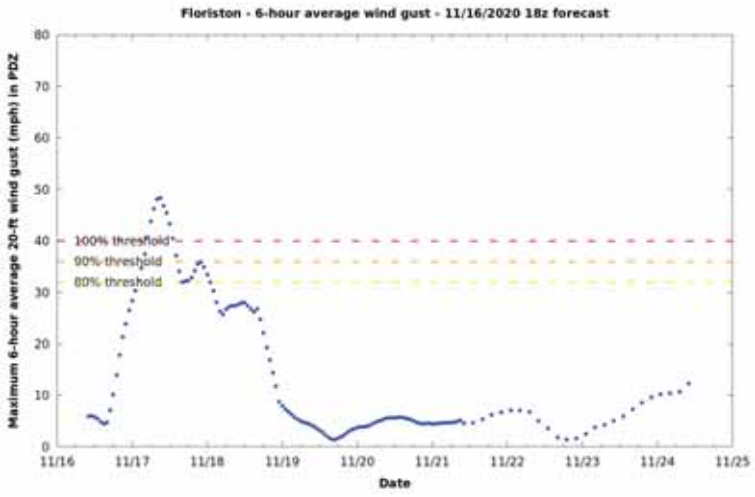
650 Line



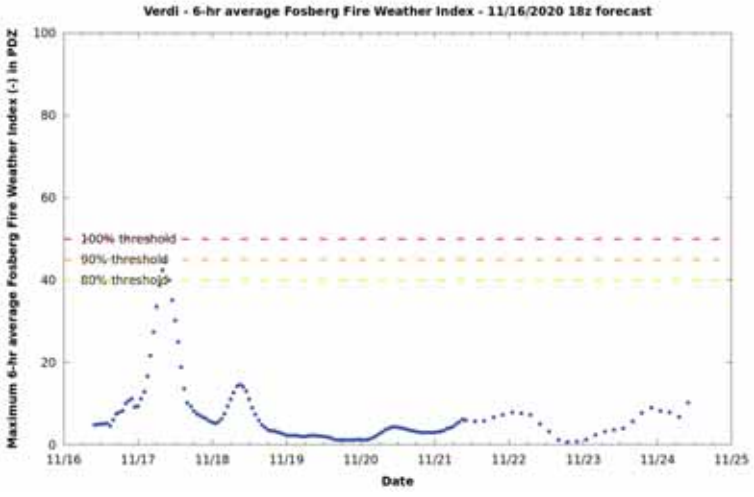


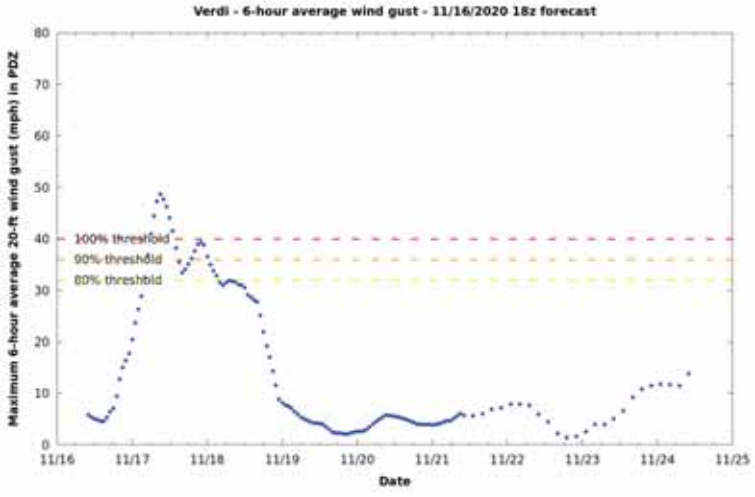
Floriston



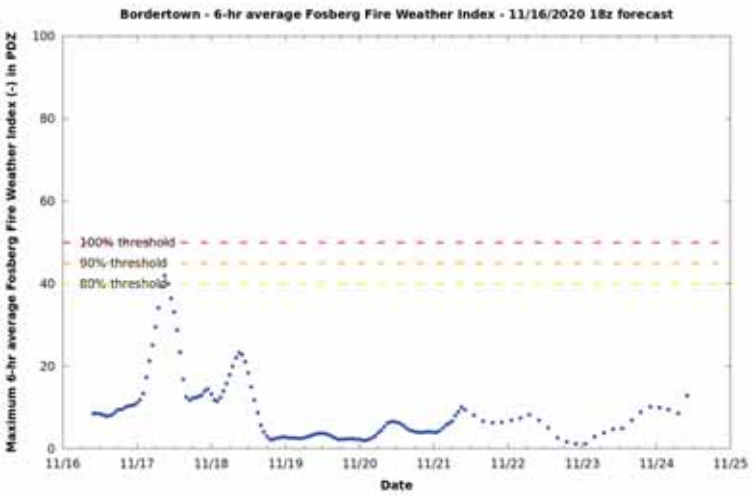


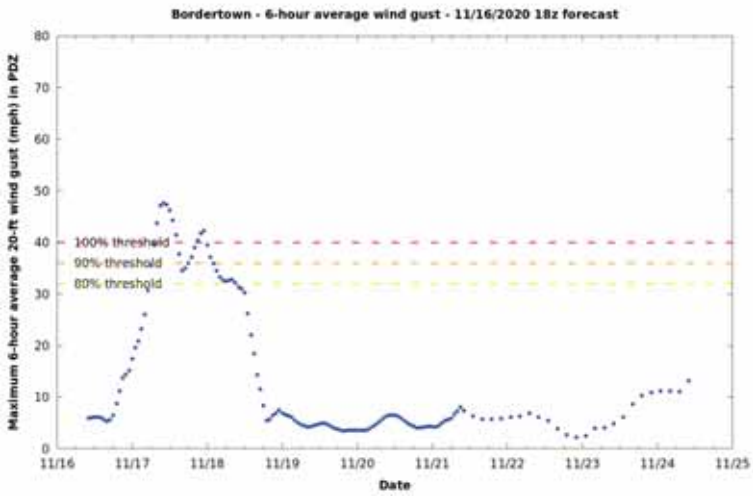
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/16/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
11/25


Bordertown - 6-hour average wind gust - 11/16/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/16
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
11/25

Liberty Utilities Fire Potential Index Forecast for 11/17/20 - 11/23/20

Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	moderate	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

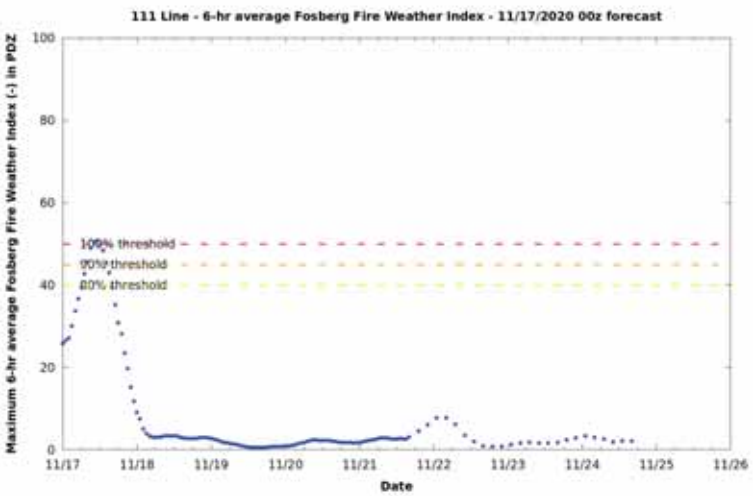
Liberty Utilities Energy Release Component Forecast for 11/17/20 - 11/23/20

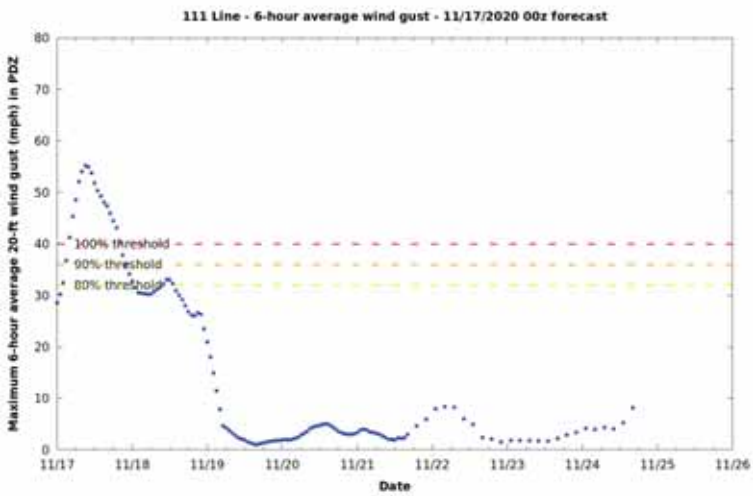
Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	56.9	55.7	44.6	39.3	41.2	42.2	45.3
Sierra Brooks	59.8	60.7	49.5	44.4	45.0	48.8	53.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	13.0	12.8	9.8	8.2	7.5	7.5	7.7
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.5	1.4	1.1	1.1	1.0	1.0	1.1
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	40.0	41.8	29.9	25.4	26.6	27.9	32.7
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	49.2	51.7	36.8	30.1	30.2	32.5	34.7
Topaz	60.5	61.3	44.8	38.0	38.4	39.2	45.1
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	34.0	33.4	24.7	23.0	23.9	24.4	25.7
Old Country Road	60.9	57.6	45.7	43.9	44.3	45.3	47.6
Tah 52-68	23.2	21.3	17.0	16.7	16.7	17.0	17.4
The Grid	57.2	55.8	39.0	36.3	38.1	38.9	39.4
Canterbury and Commonwealth	41.8	41.1	28.6	26.4	27.9	28.6	29.3
Bky 5100 to NVE	23.9	23.5	16.4	15.1	15.9	16.4	16.8
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	24.2	23.3	18.7	15.8	14.7	14.1	14.7
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	33.4	33.4	27.0	25.0	25.0	25.5	27.5
650 Line	1.9	1.9	1.3	1.2	1.3	1.3	1.4
Floriston	46.6	46.6	34.7	31.2	31.1	33.6	36.2
Verdi	55.7	55.7	44.1	36.2	39.6	44.1	46.8
Bordertown	58.8	58.8	47.7	40.0	41.6	45.7	48.9

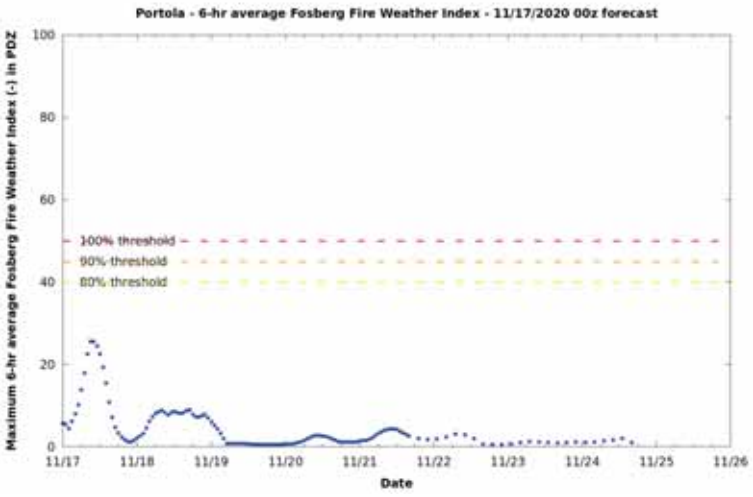
Liberty Utilities Fire Weather Summary Plots - 11/17/2020 00z forecast

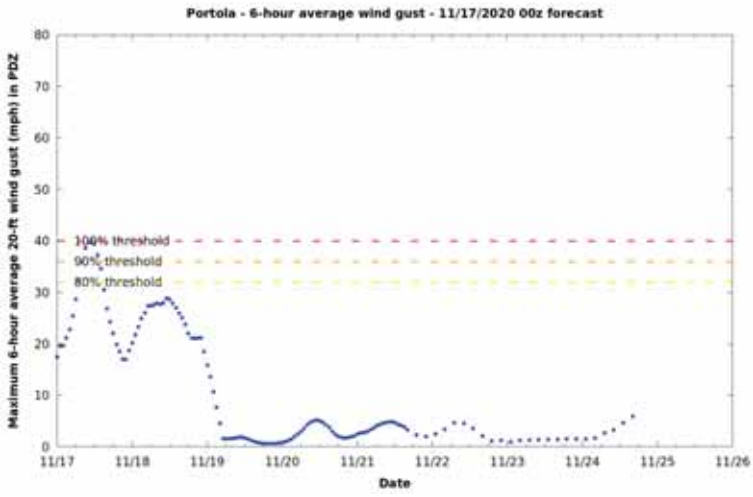
111 Line



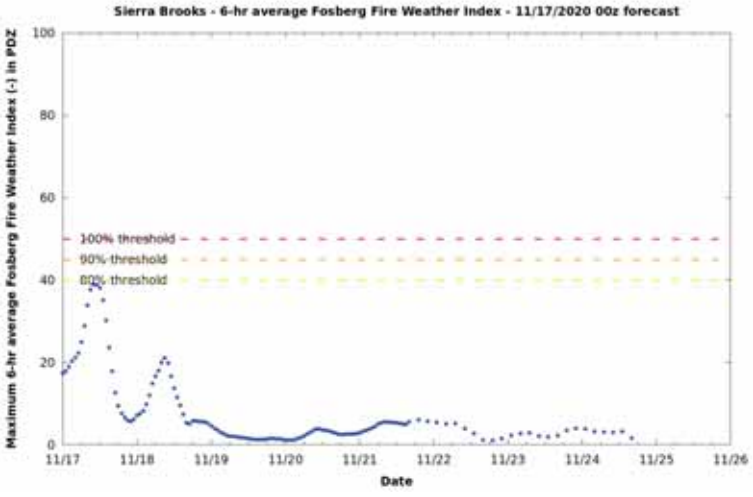


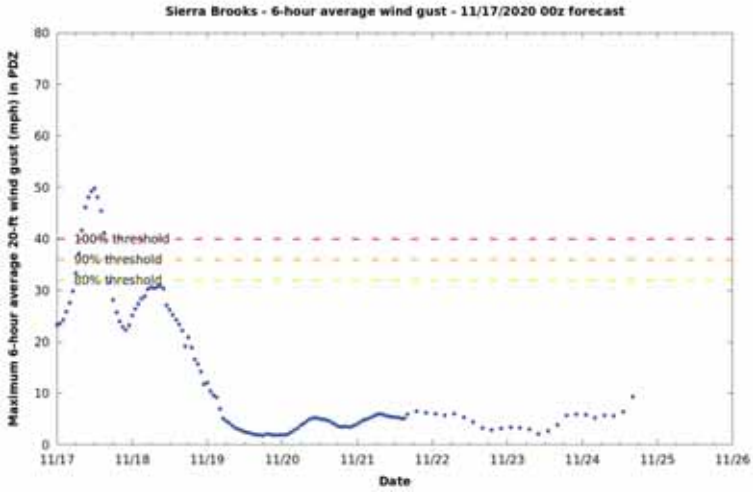
Portola



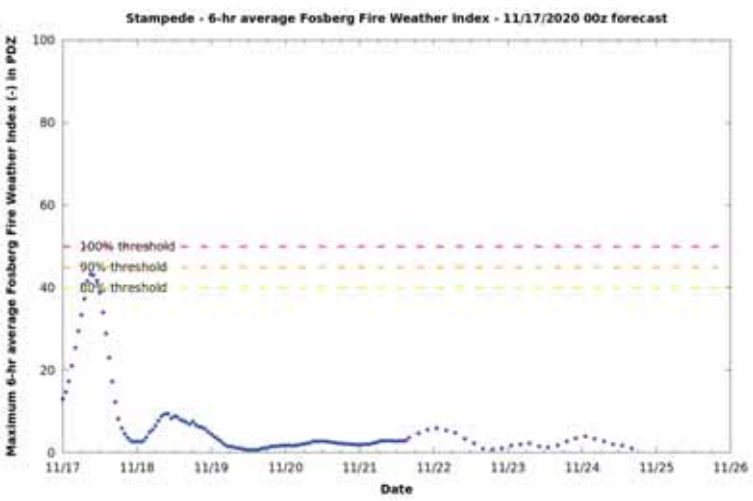


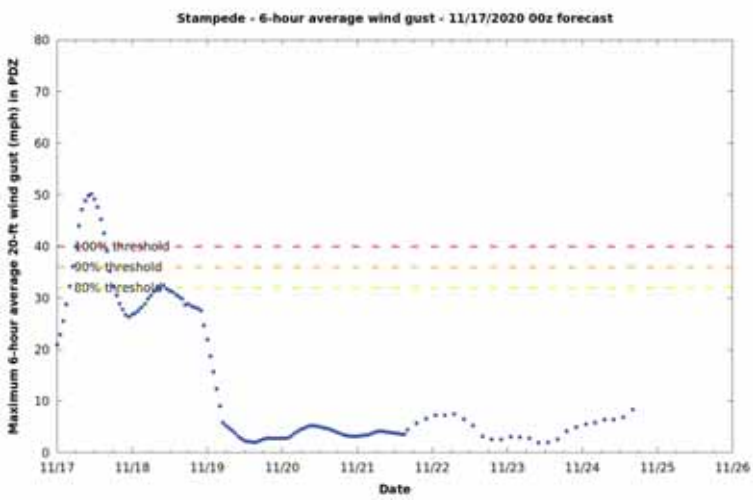
Sierra Brooks



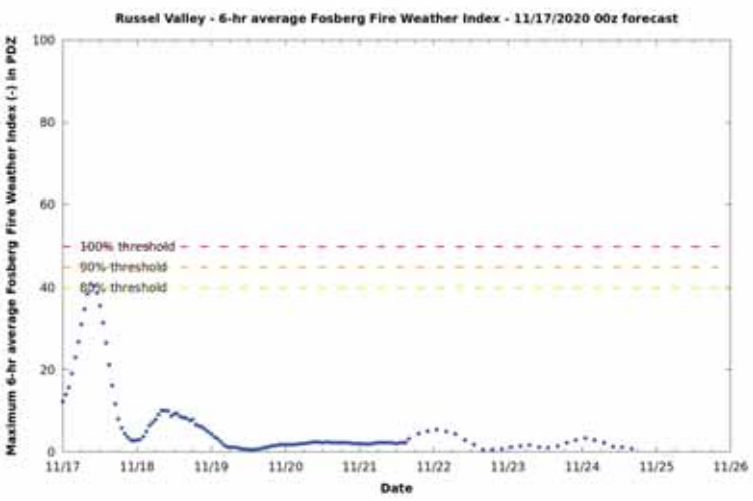


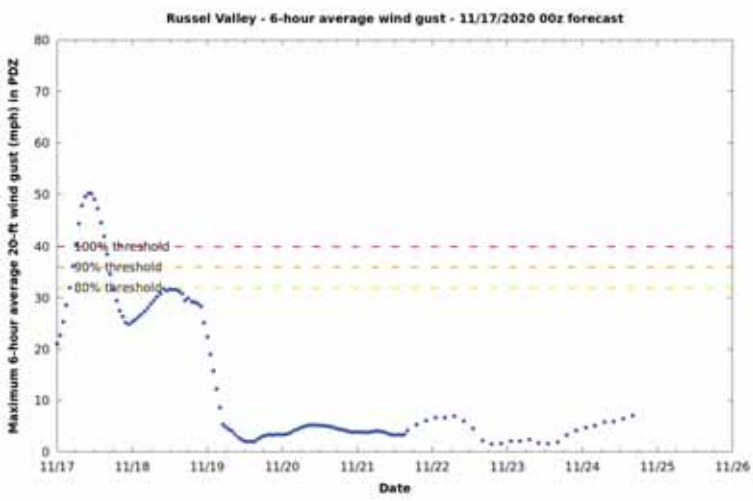
Stampede





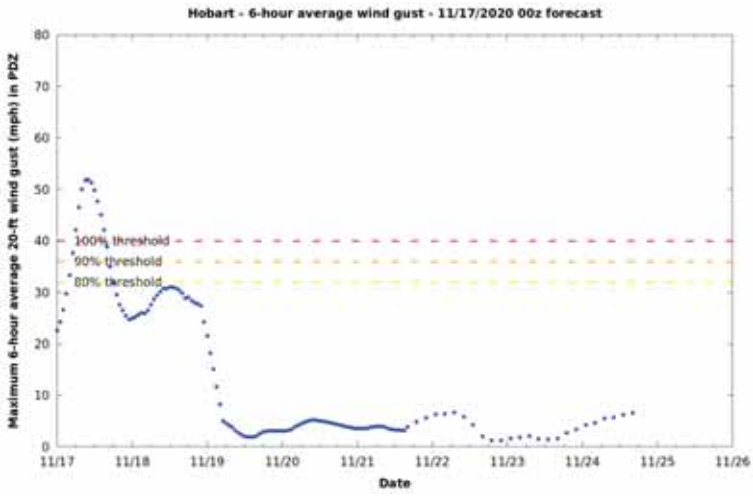
Russell Valley



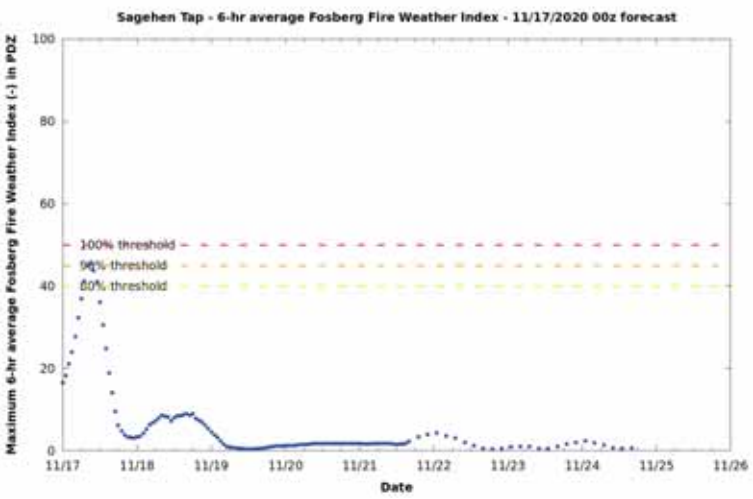


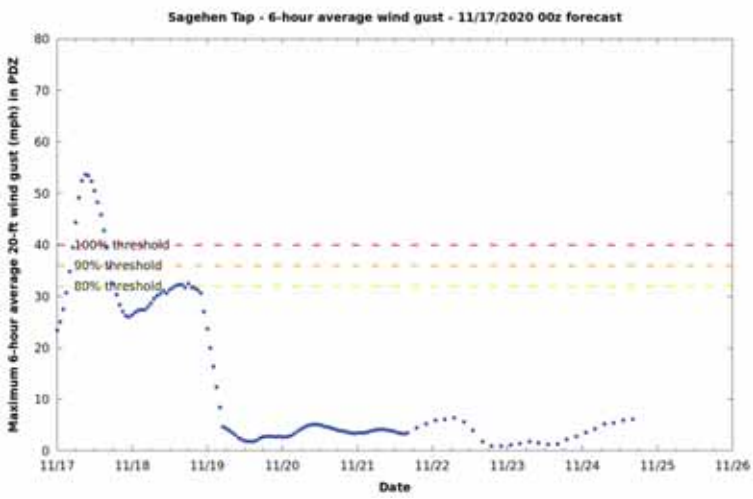
Hobart



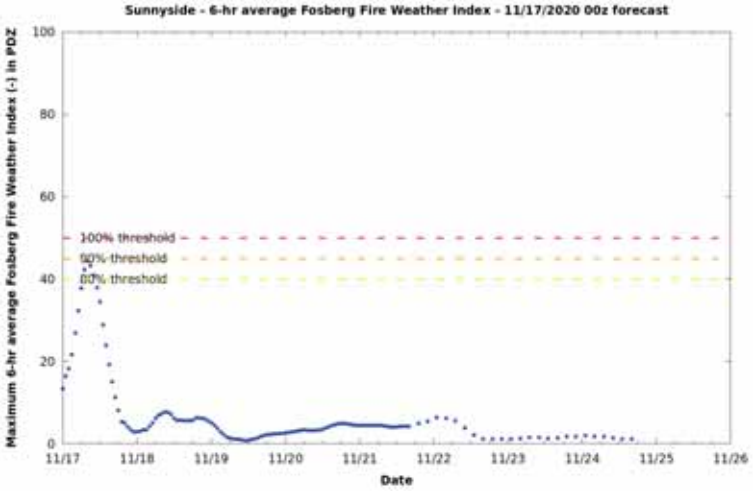


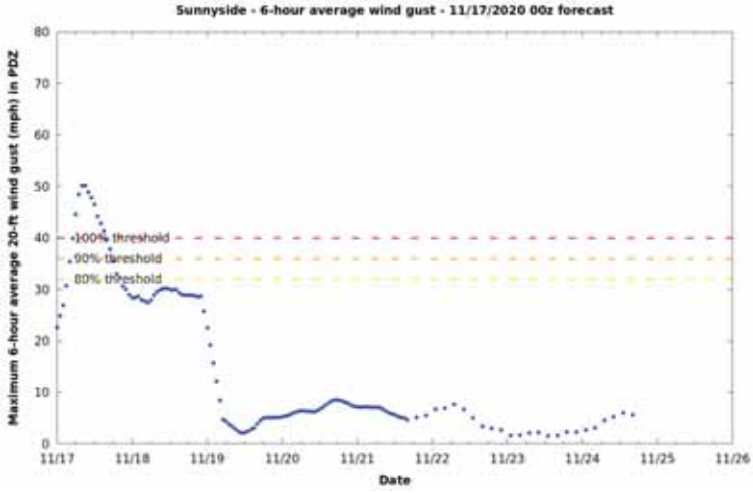
Sagehen tap



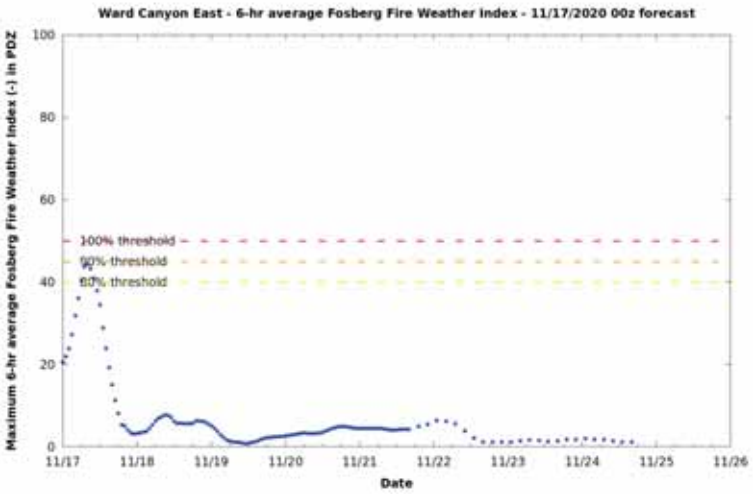


Sunnyside



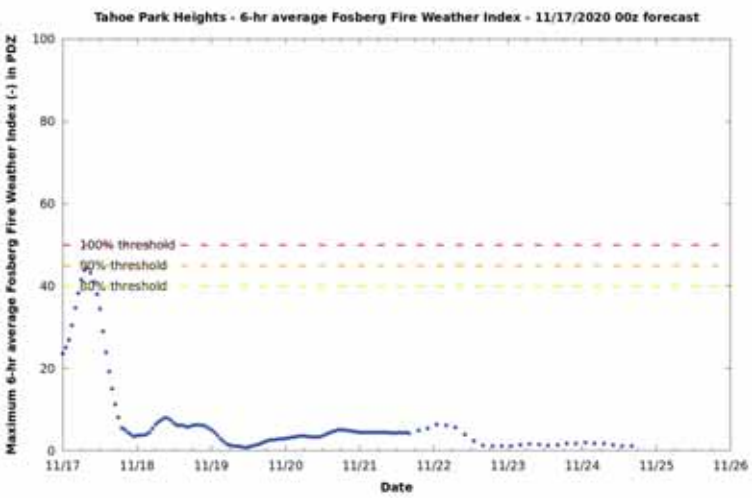


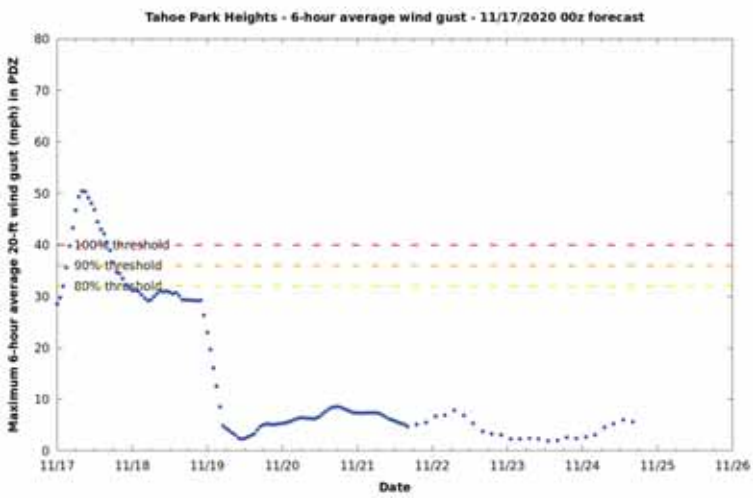
Ward Canyon East



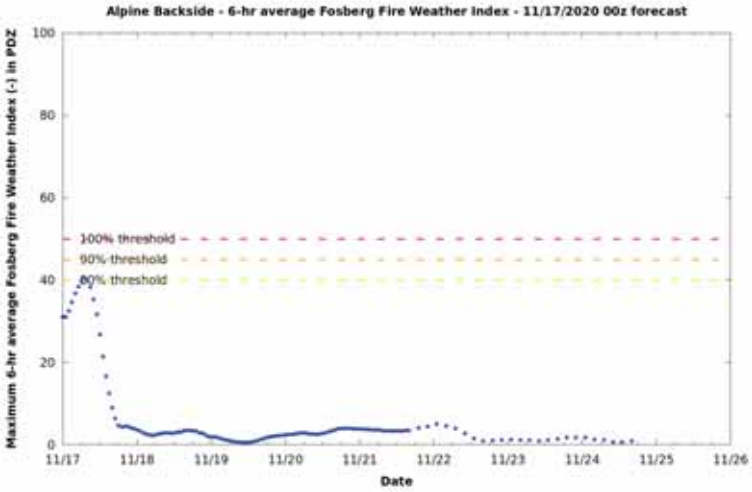


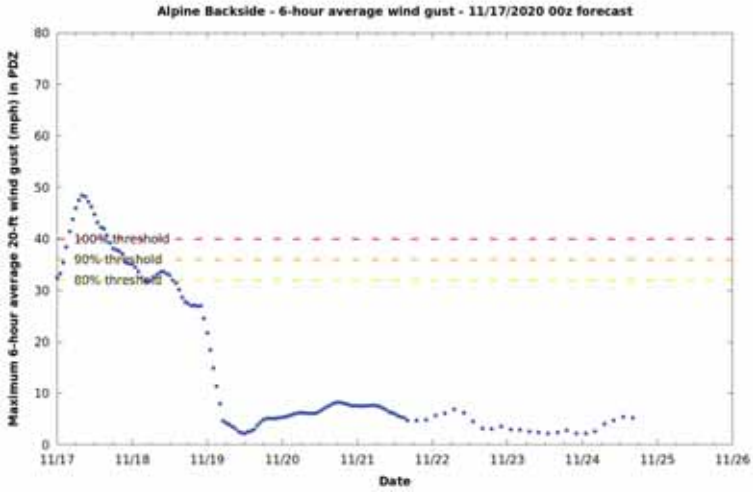
Tahoe Park Heights



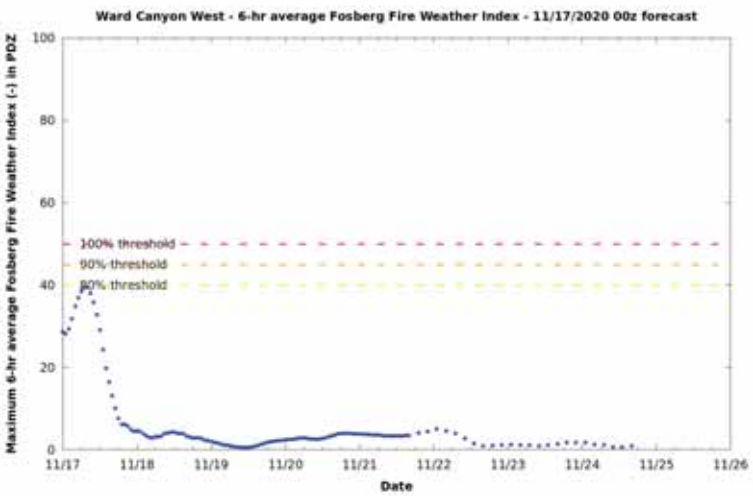


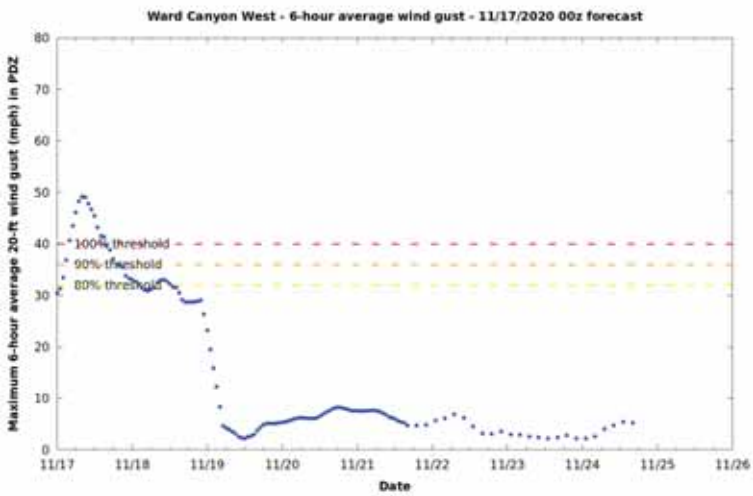
Alpine Backside



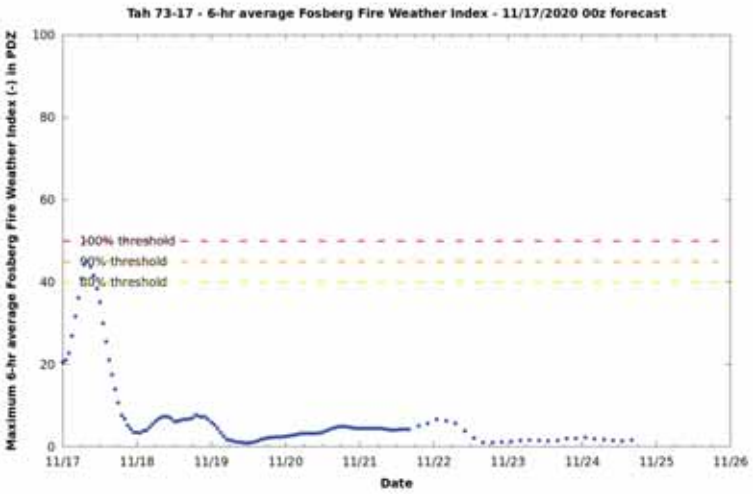


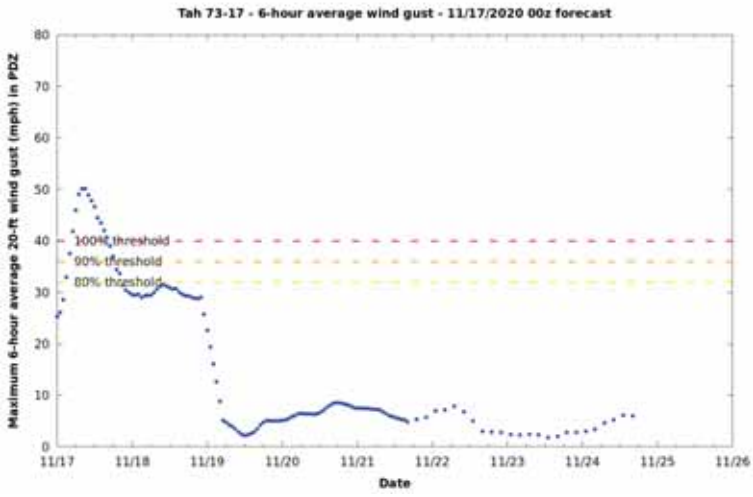
Ward Canyon West



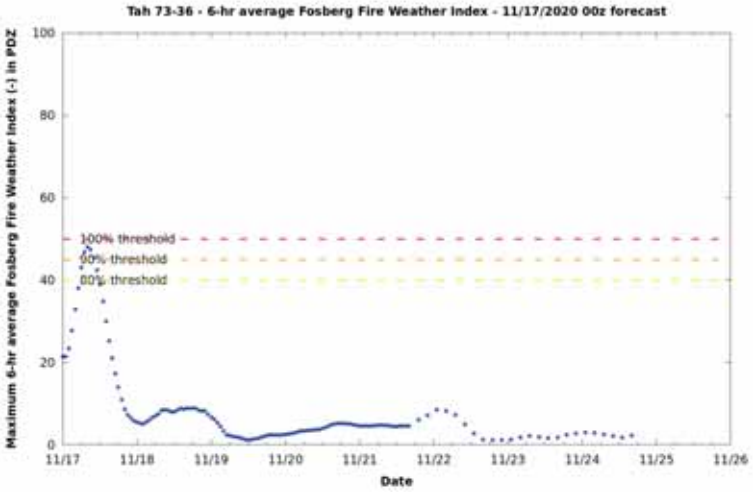


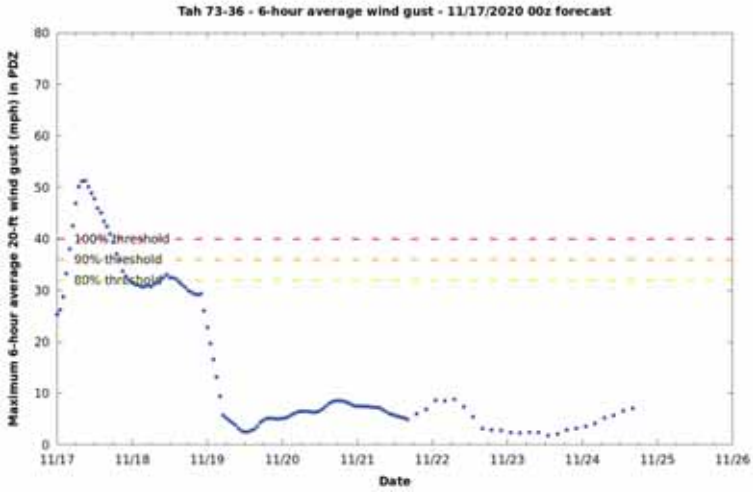
Tah 73-17



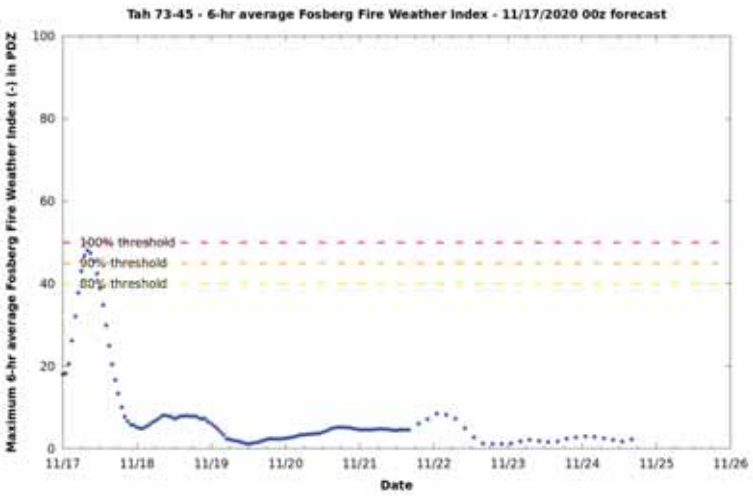


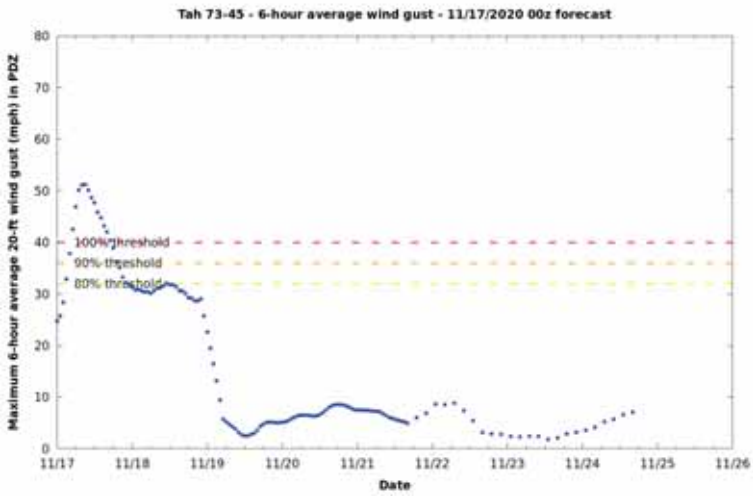
Tah 73-36



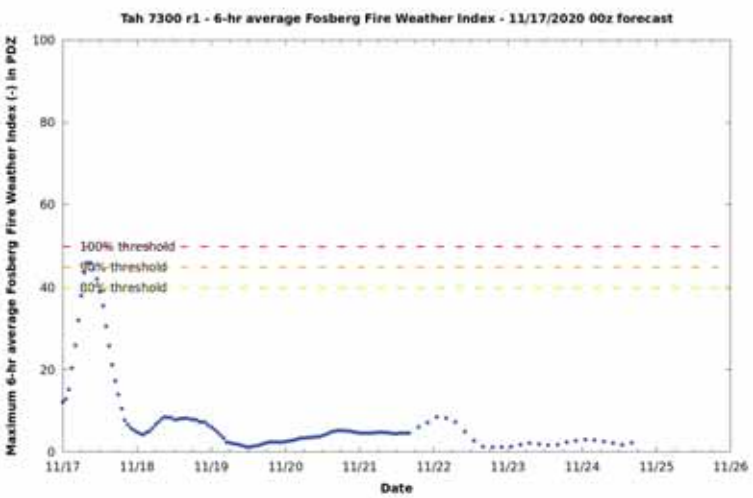


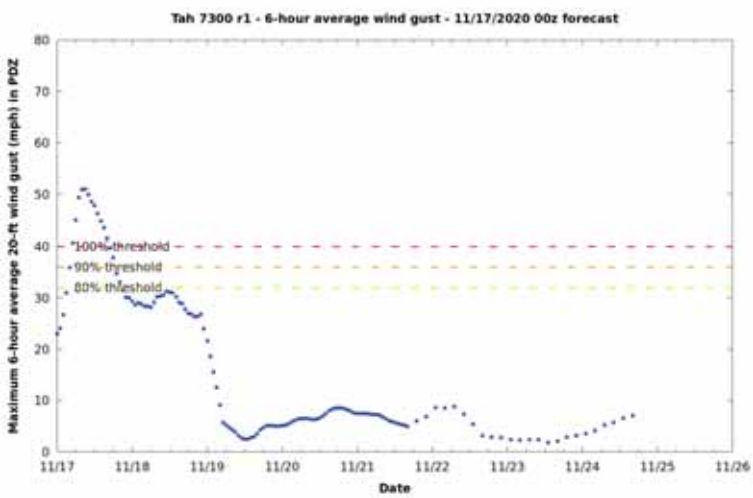
Tah 73-45



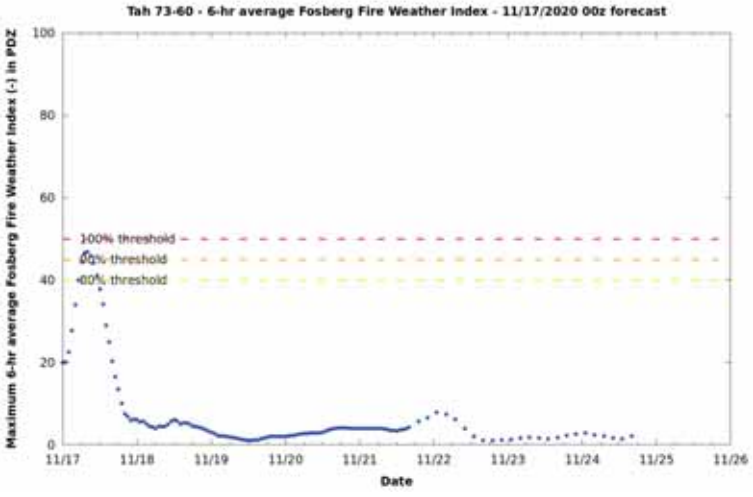


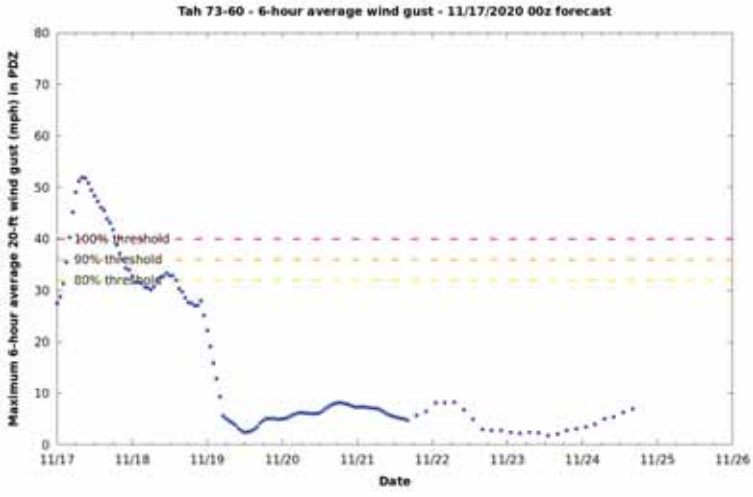
Tah 7300 r1



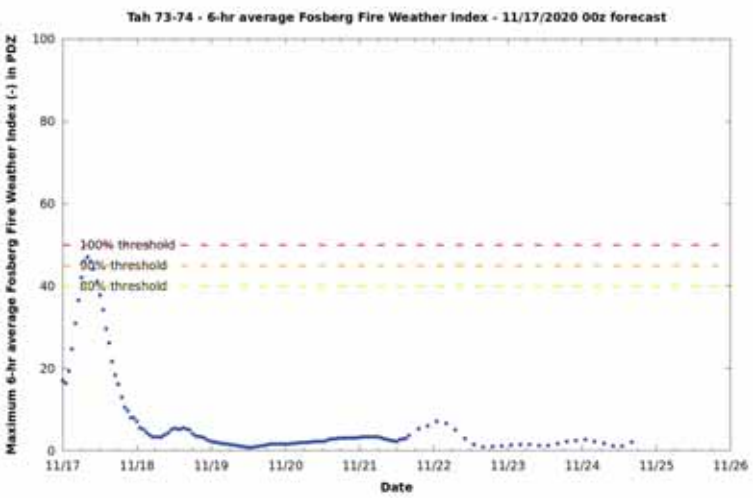


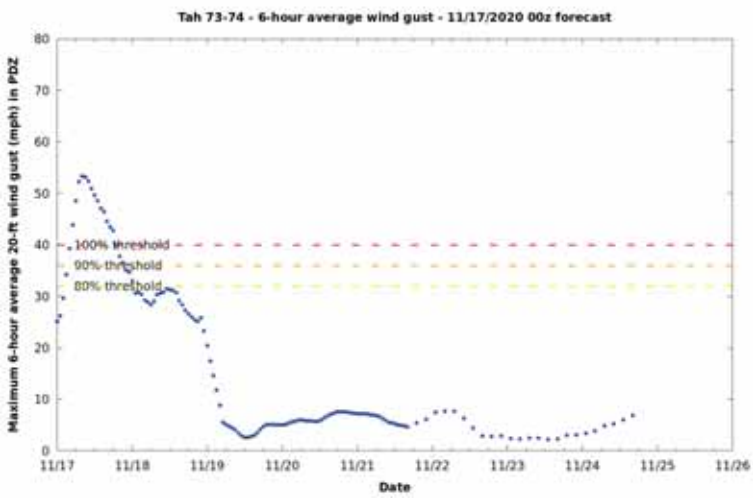
Tah 73-60



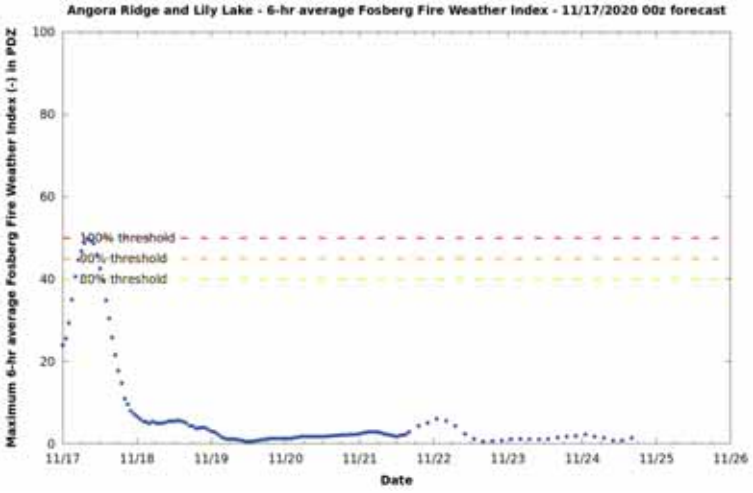


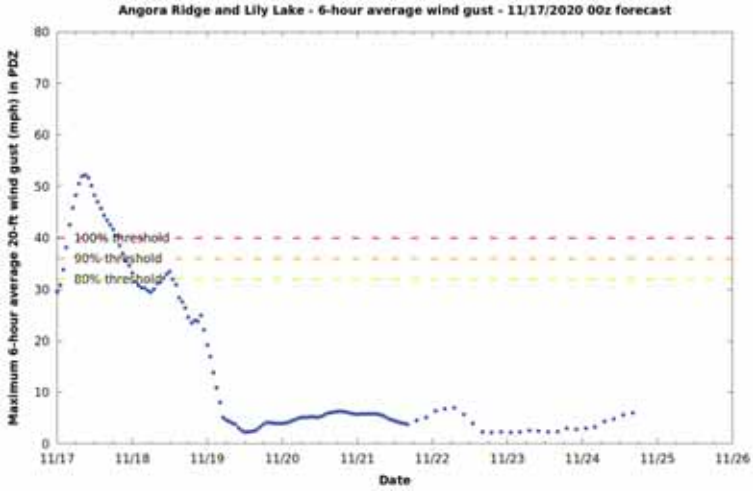
Tah 73-74



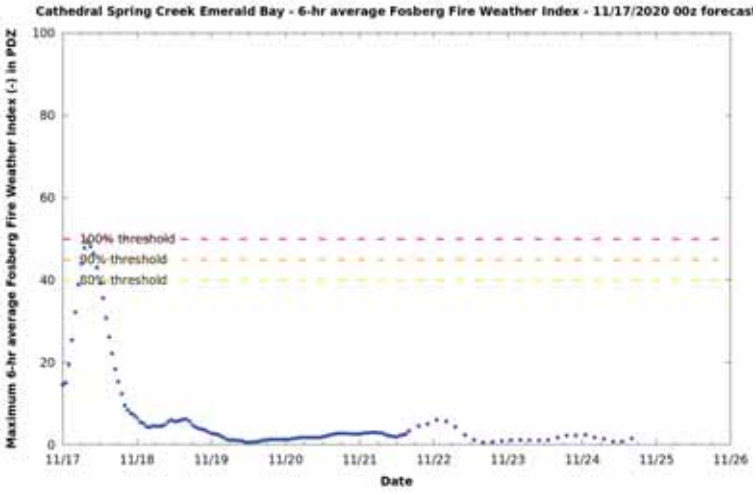


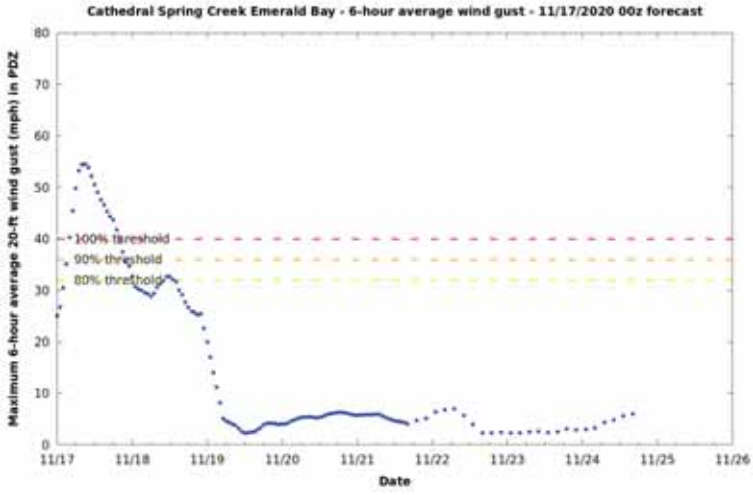
Angora Ridge and Lily Lake



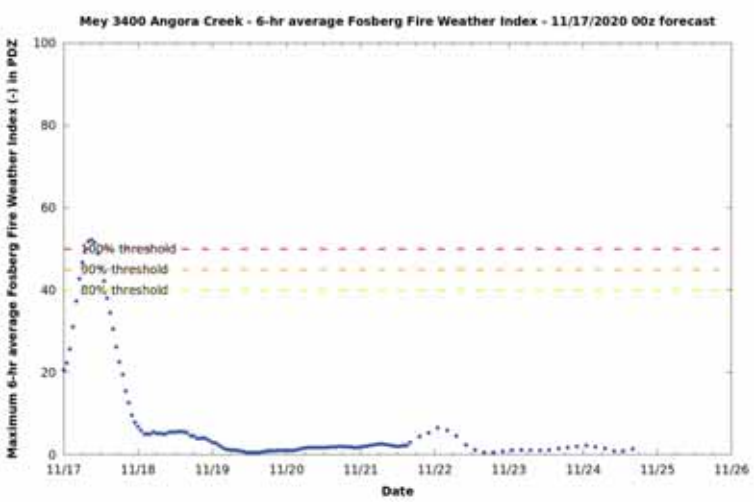


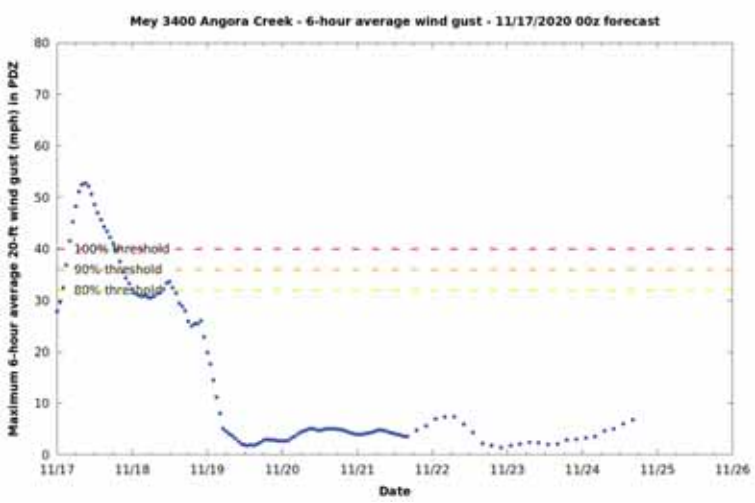
Cathedral Spring Creek Emerald Bay



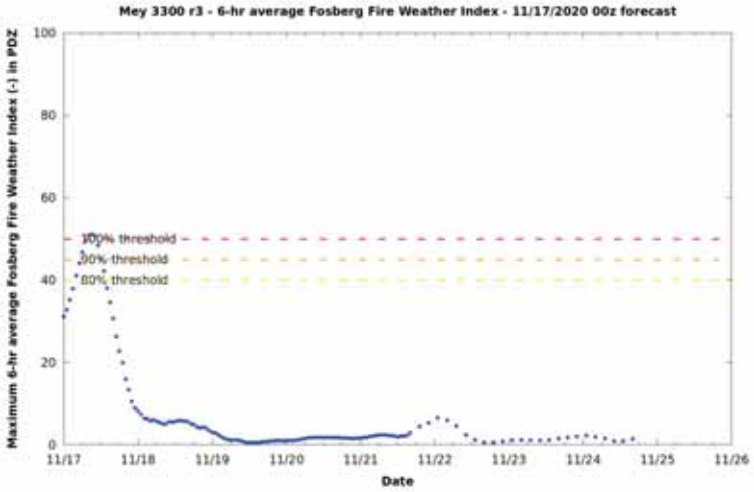


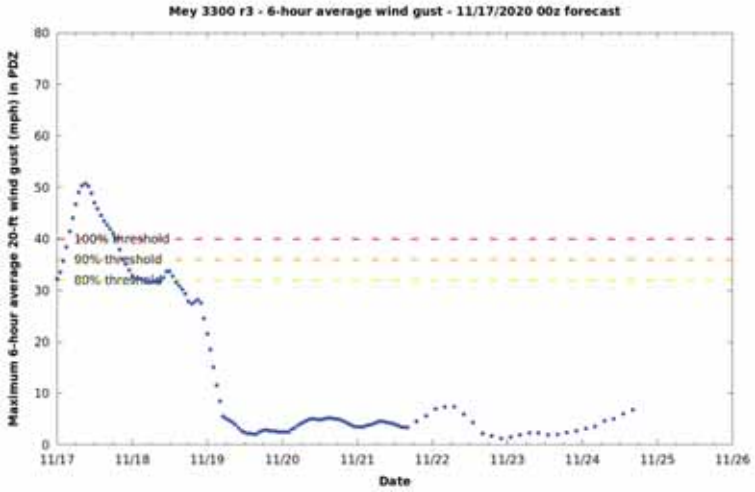
Mey 3400 Angora Creek



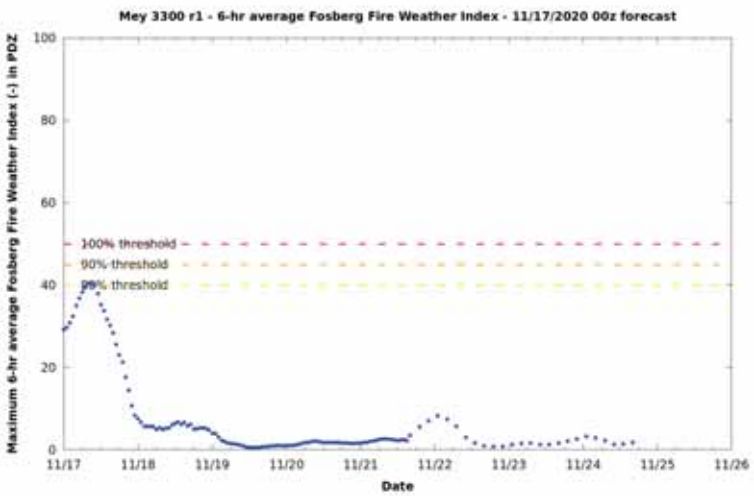


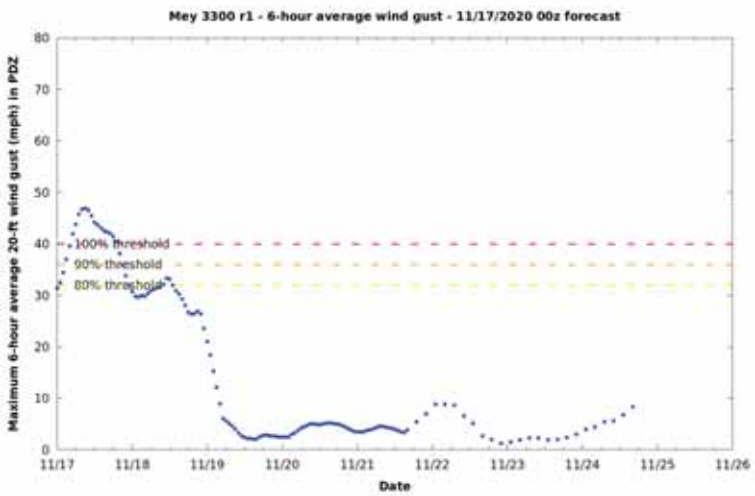
Mey 3300 r3



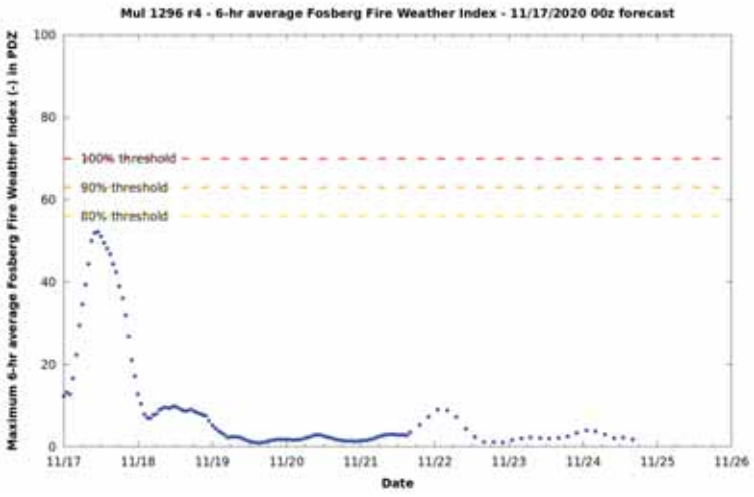


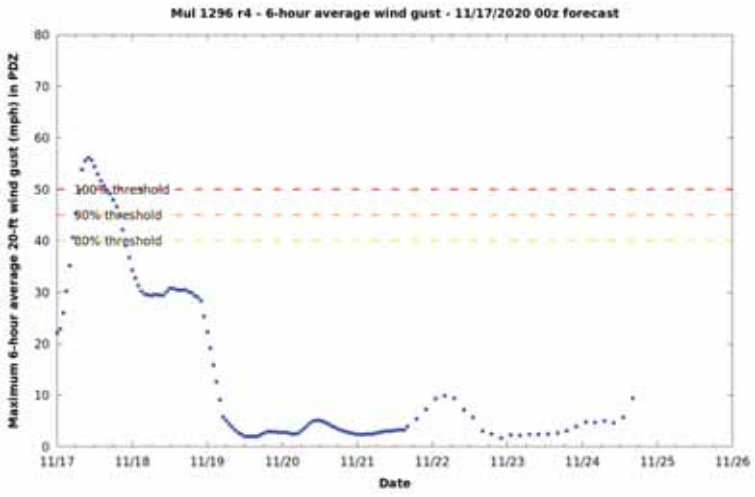
Mey 3300 r1



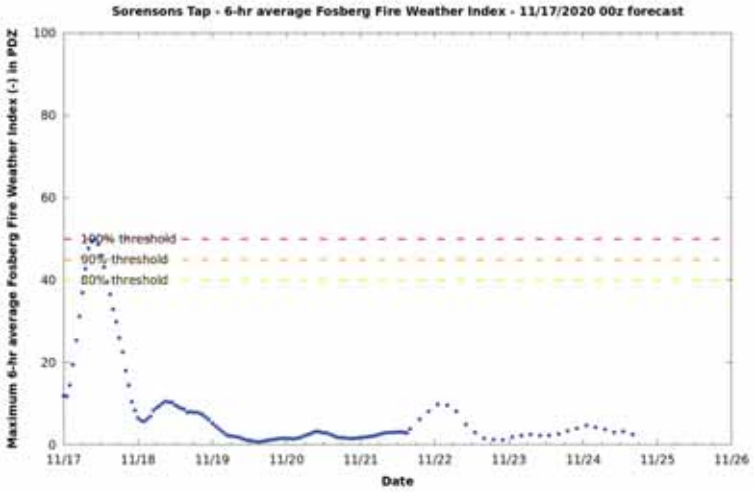


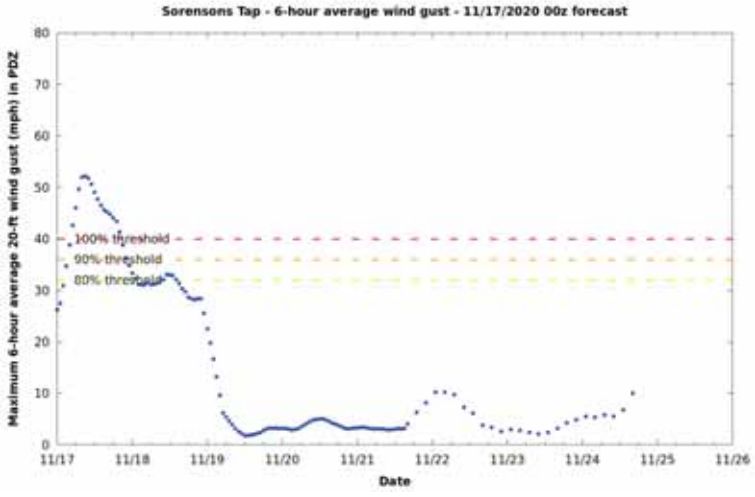
Mul 1296 r4



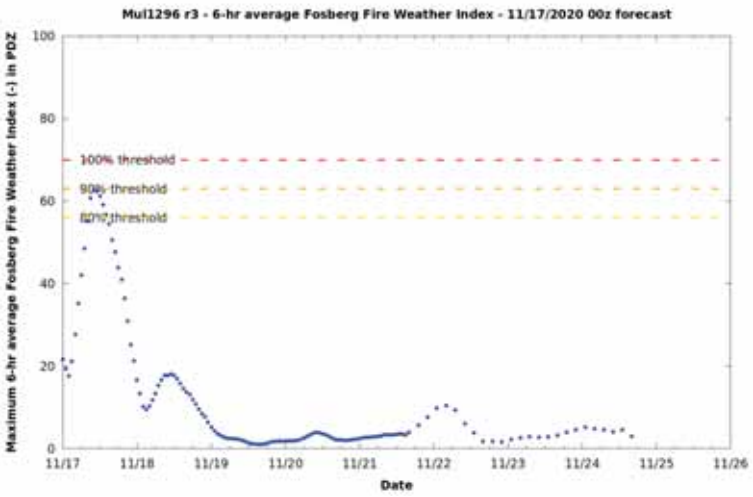


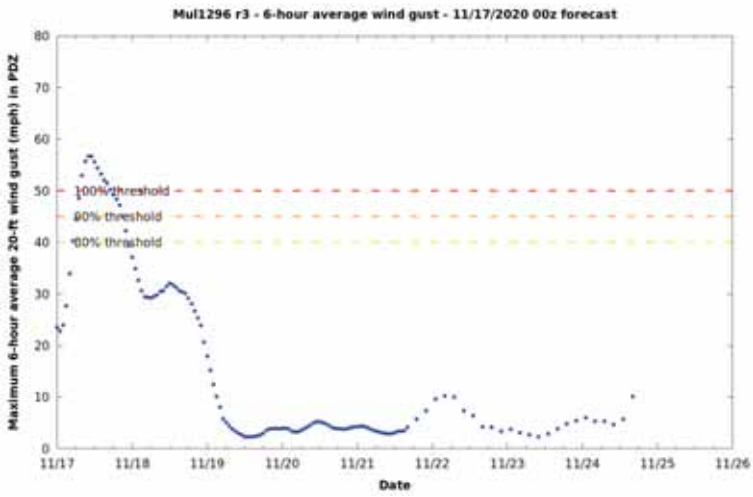
Sorensons Tap



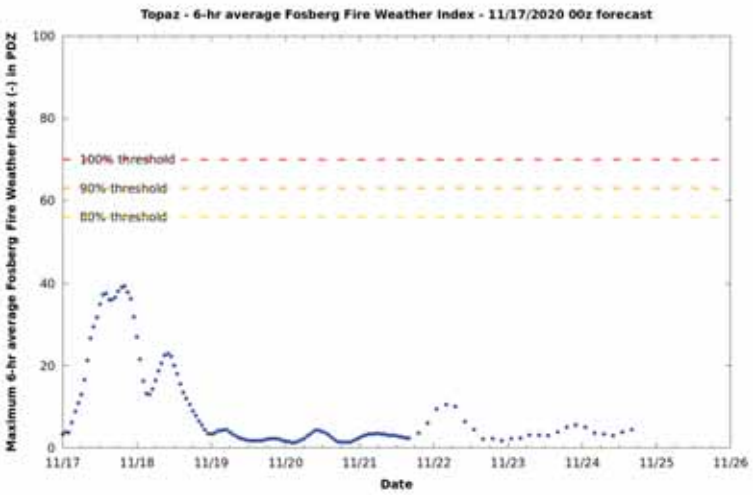


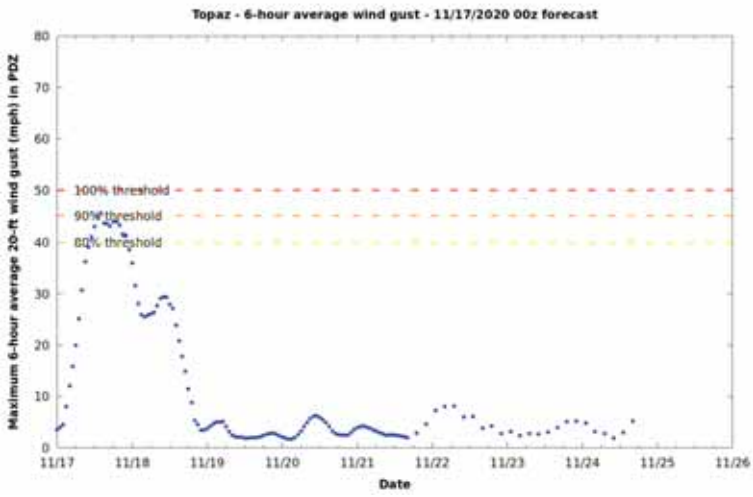
Mul 1296 r3



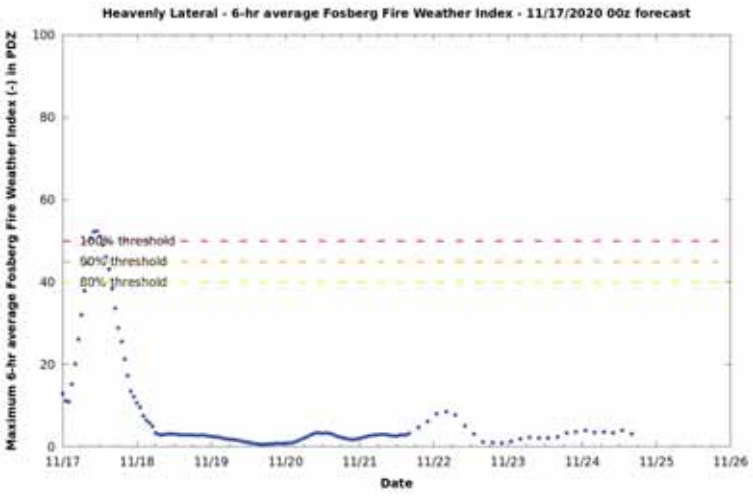


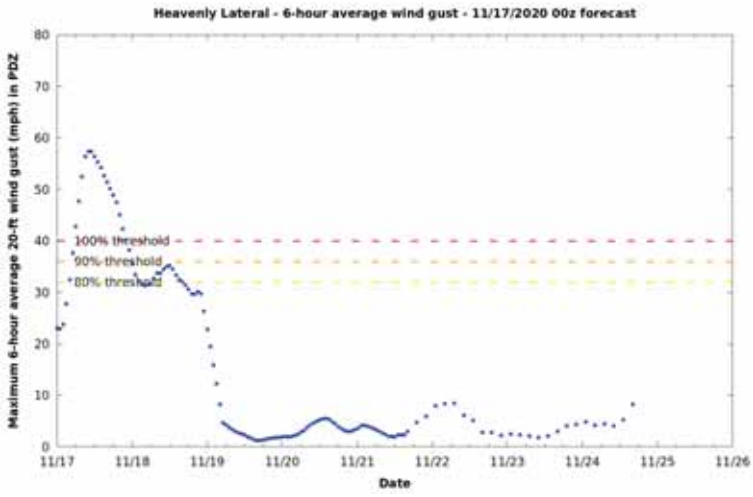
Topaz



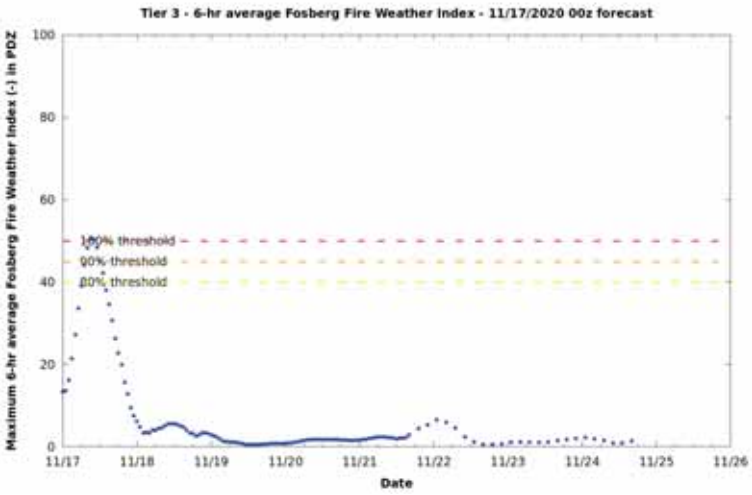


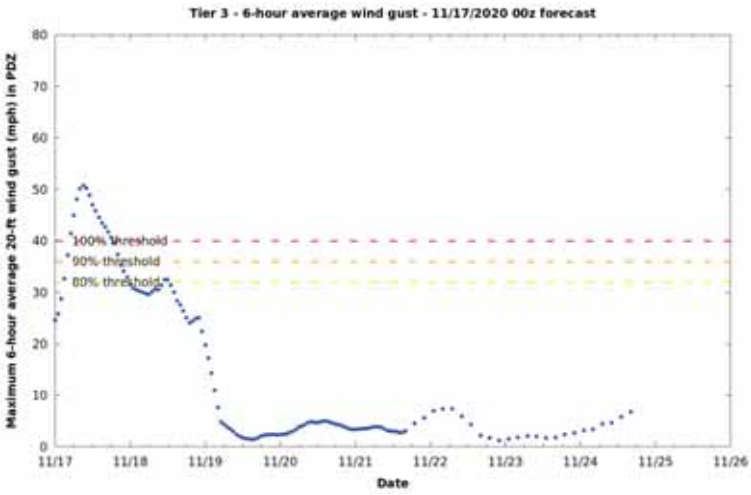
Heavenly Lateral



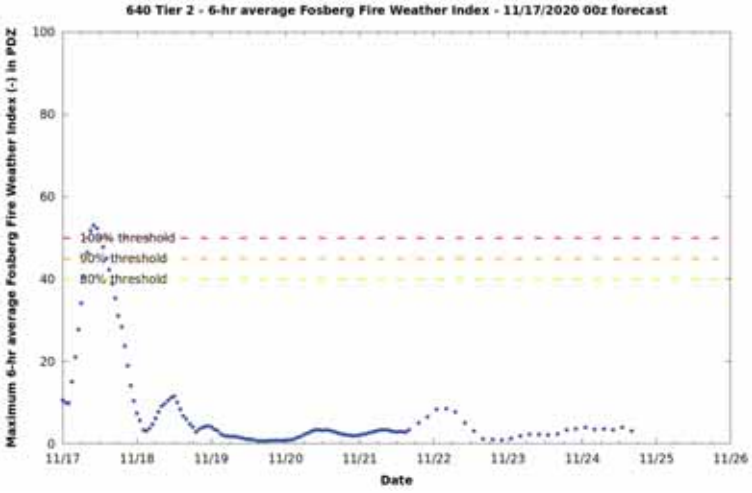


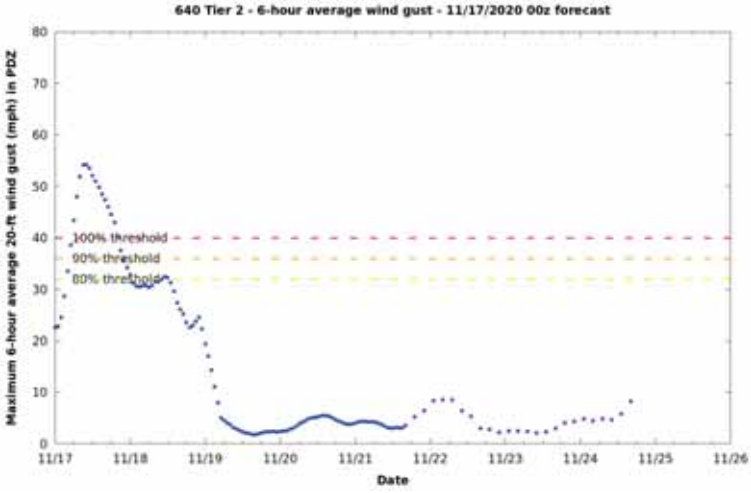
Tier 3



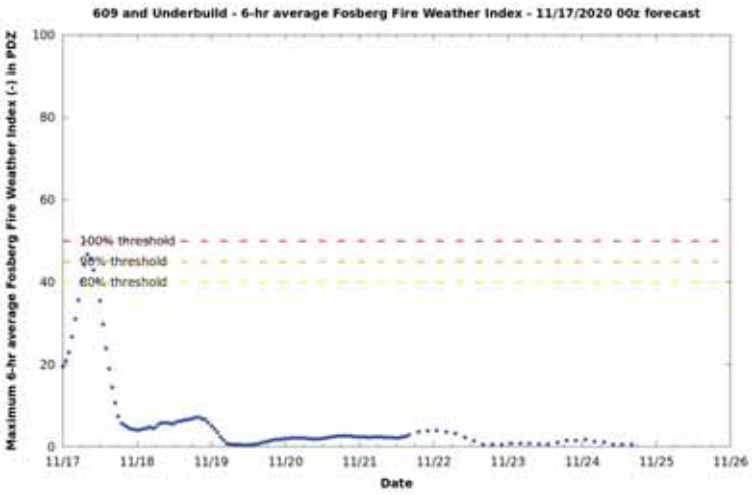


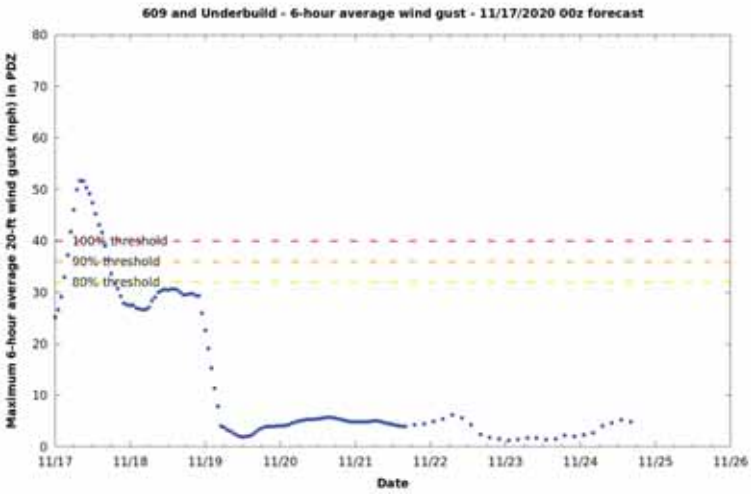
640 Tier 2



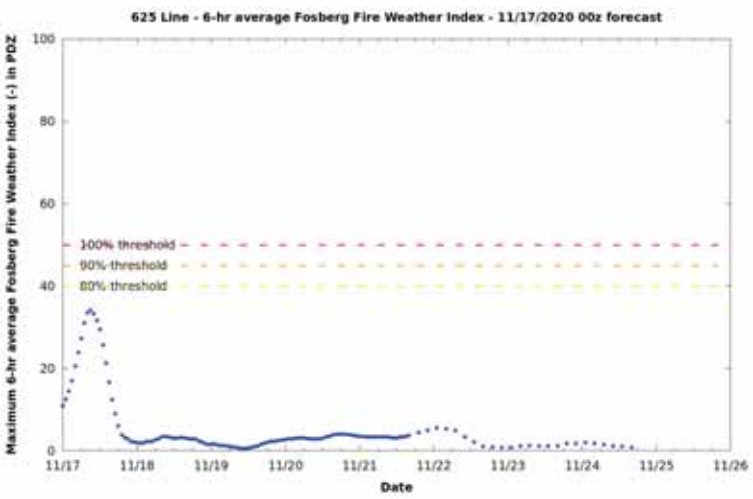


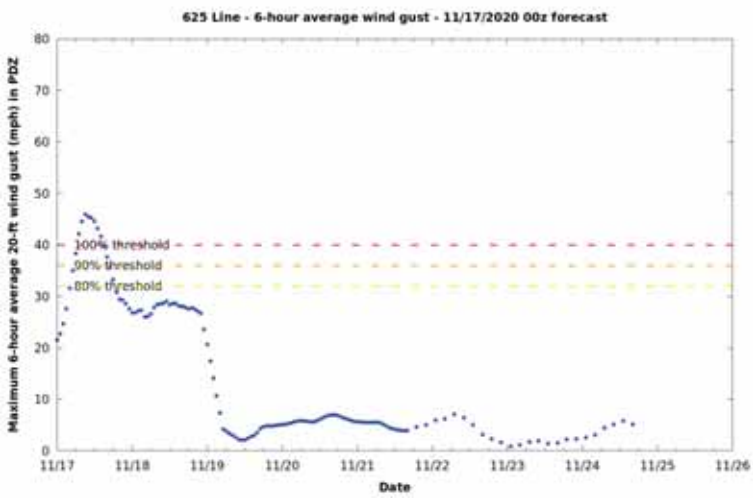
609 and Underbuild



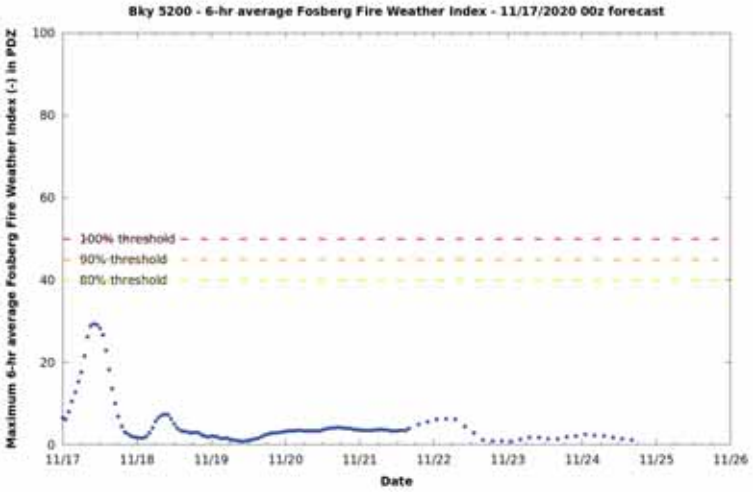


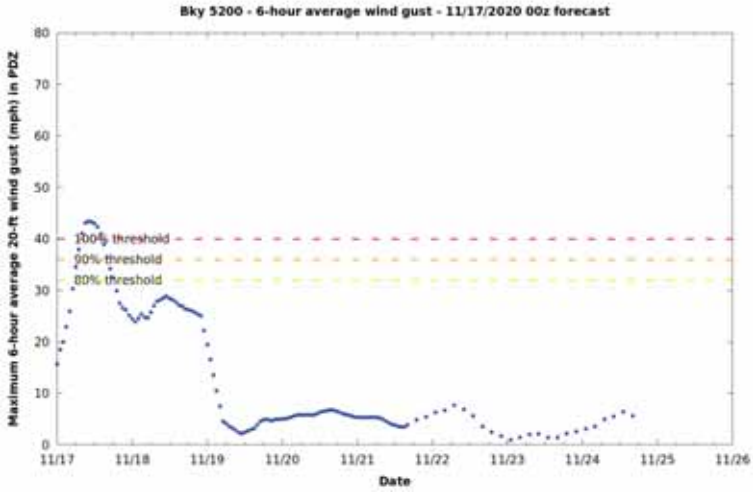
625 Line



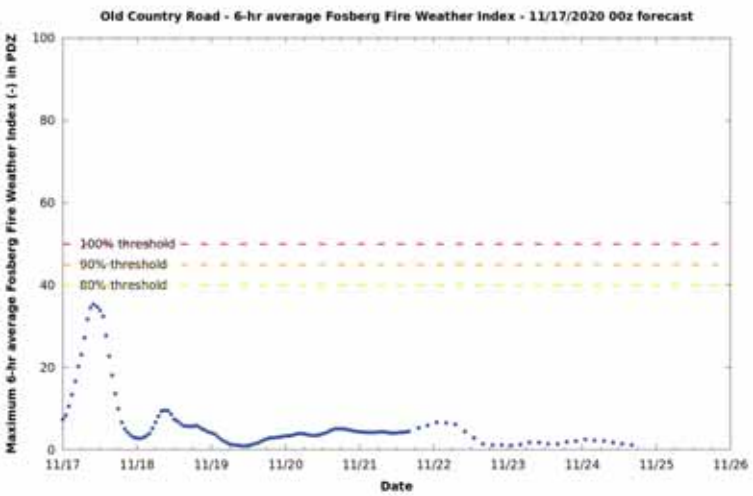


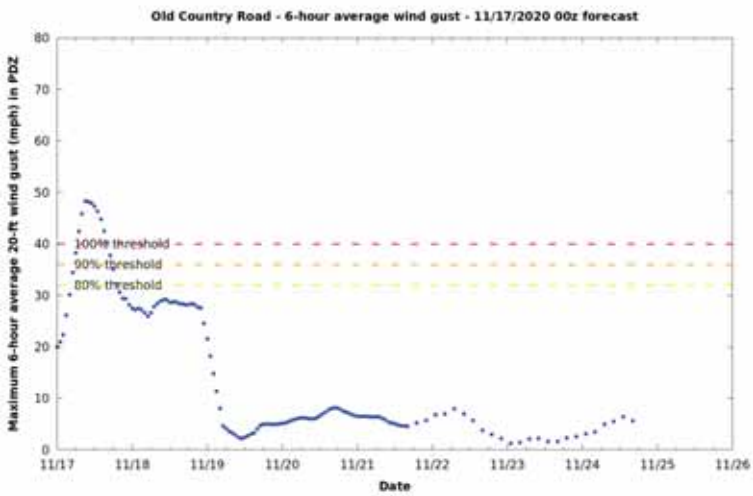
Bky 5200



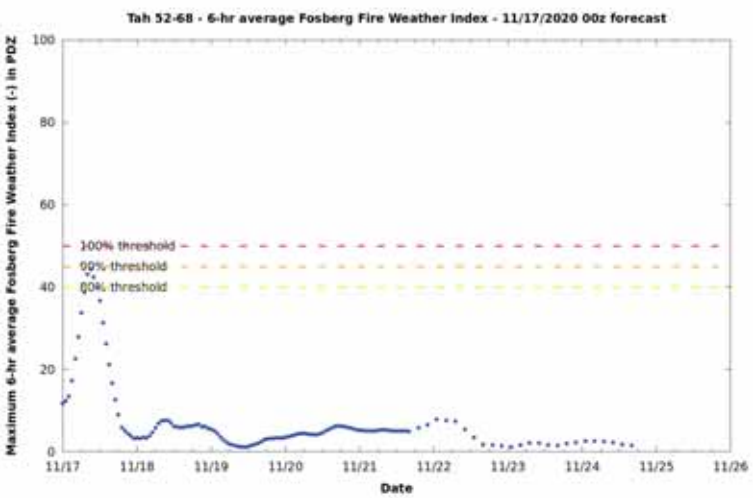


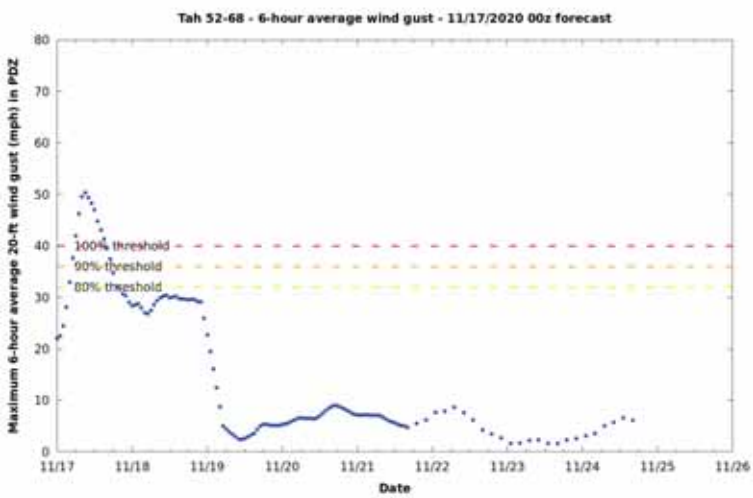
Old Country Road



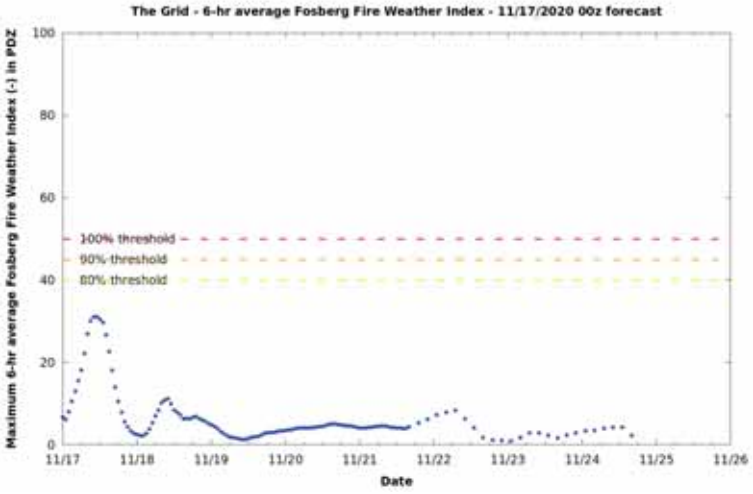


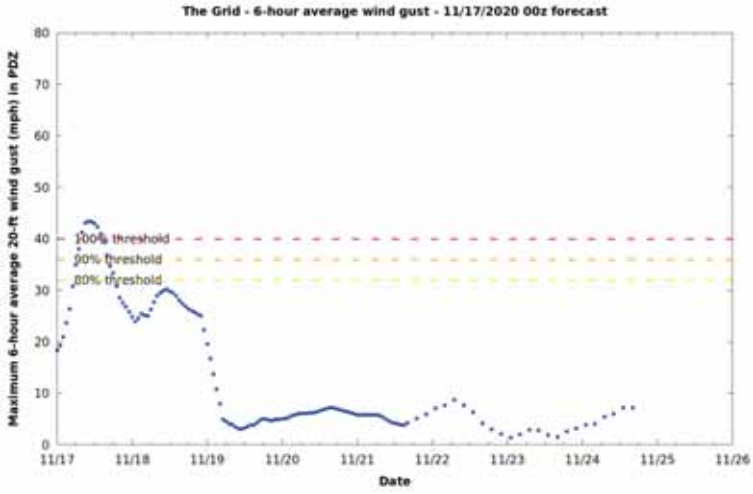
Tah 52-68



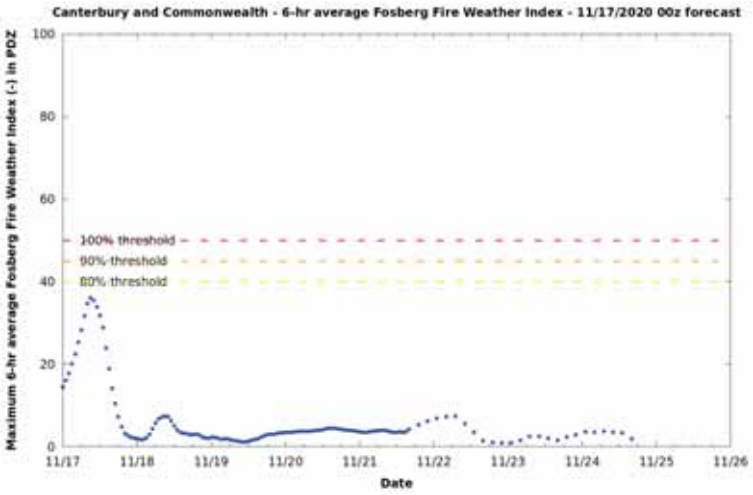


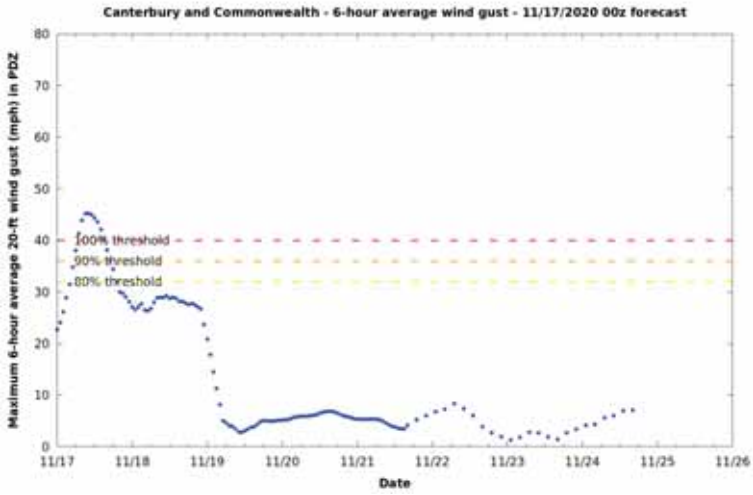
The Grid



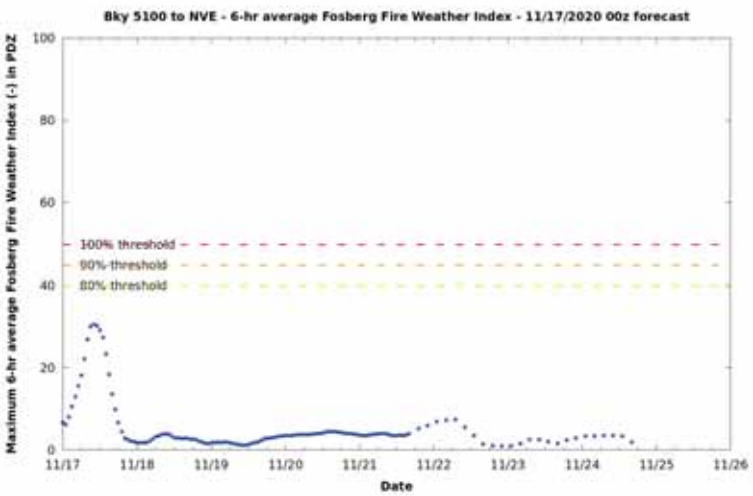


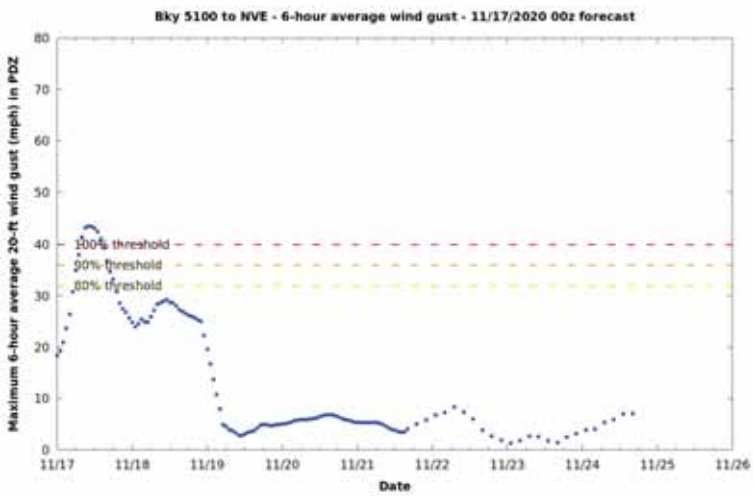
Canterbuy and Commonwealth



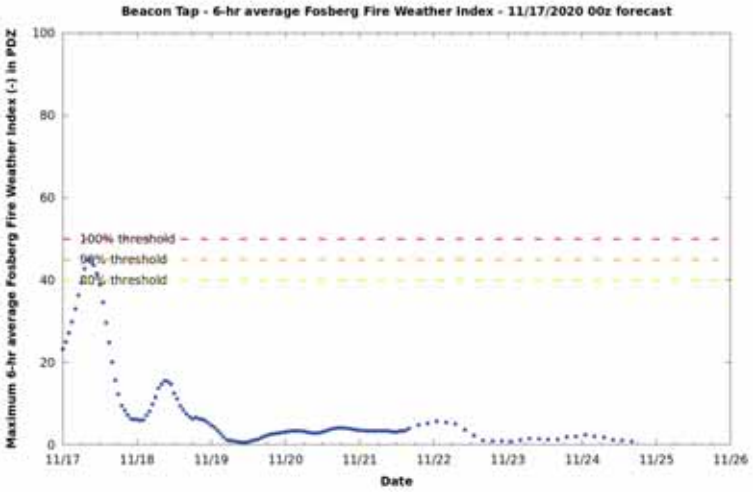


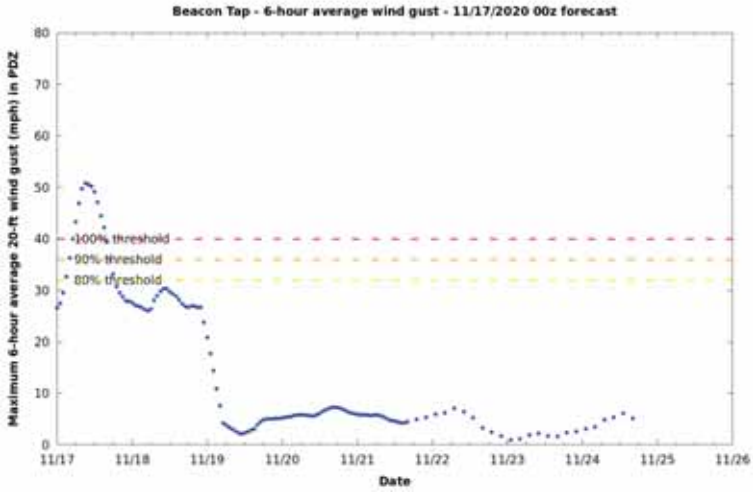
Bky 5100 to NVE



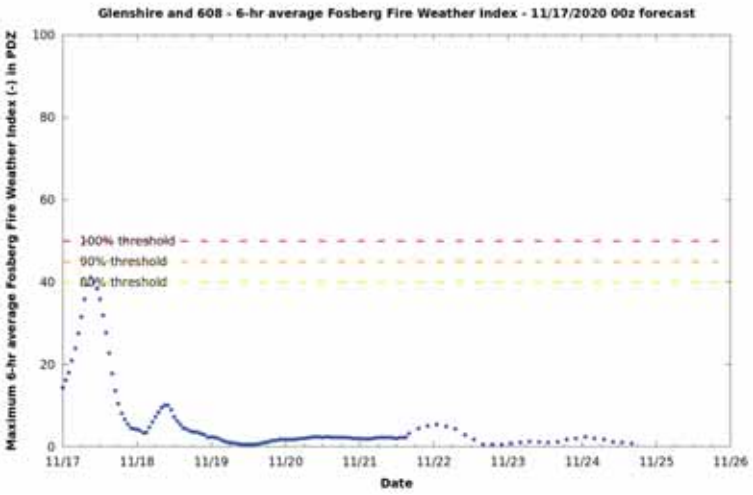


Beacon Tap



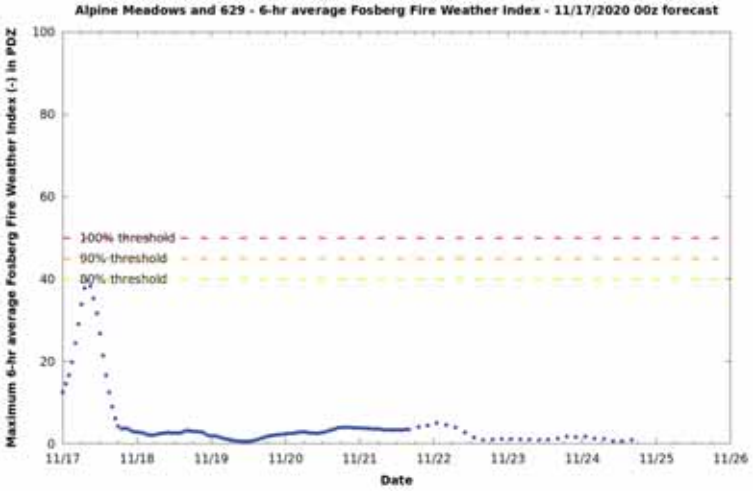


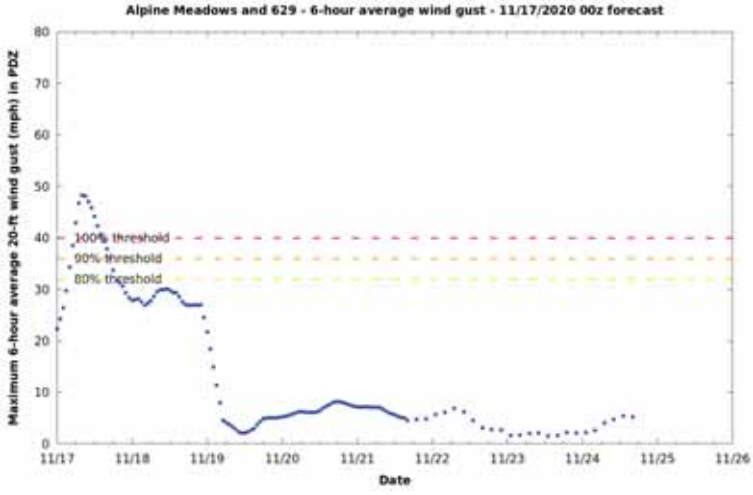
Glenshire and 608



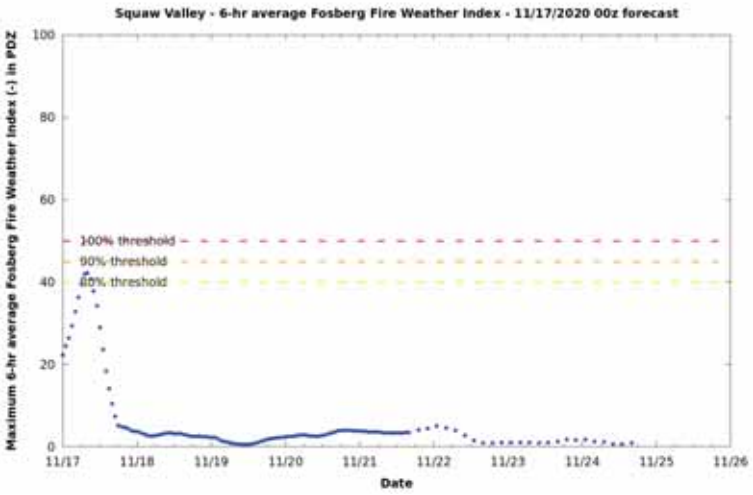


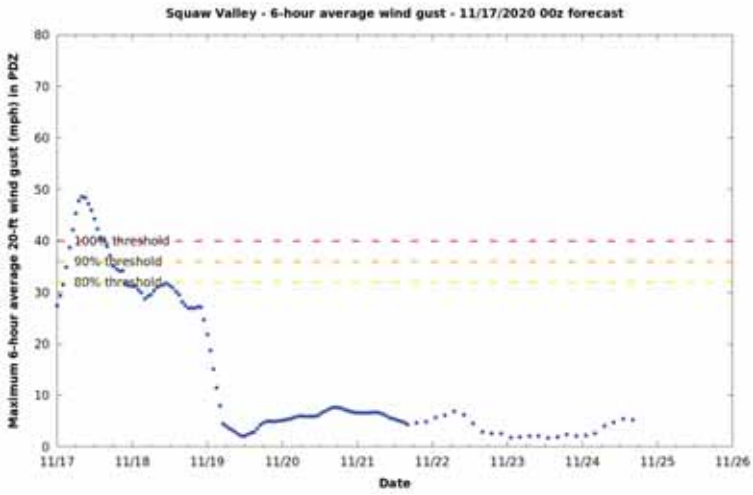
Alpine Meadows and 629



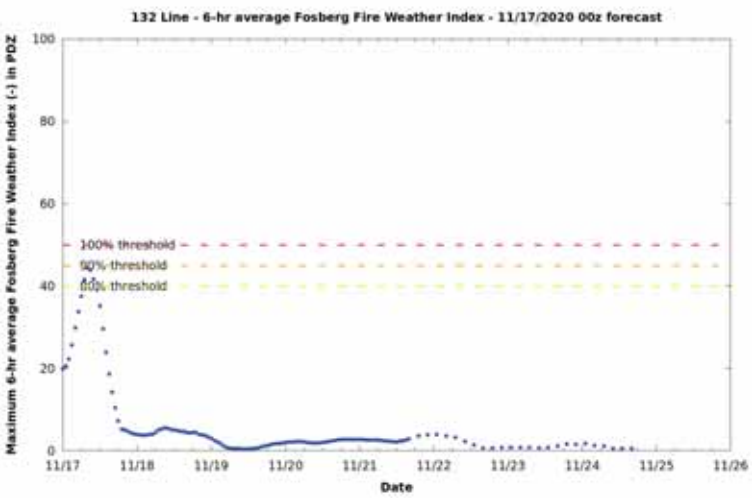


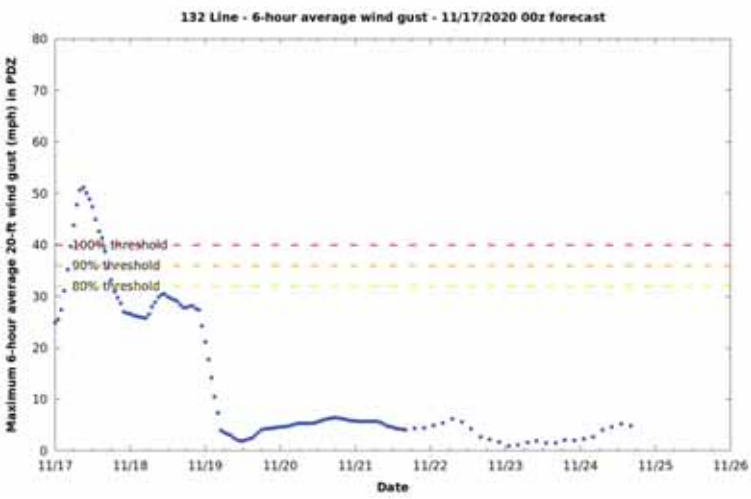
Squaw Valley



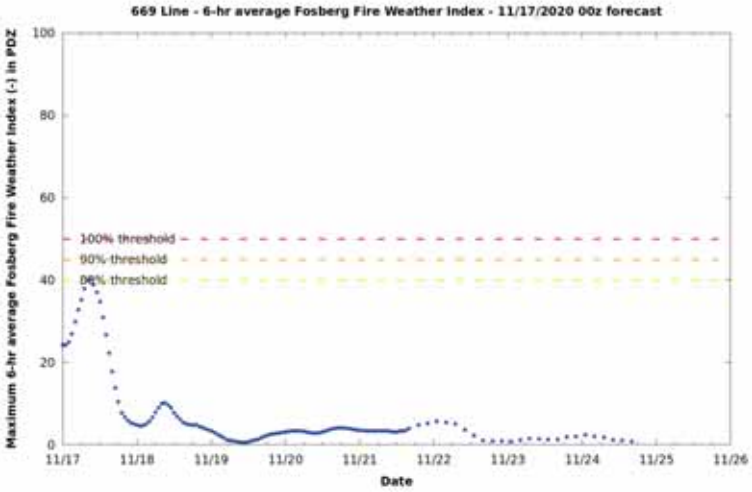


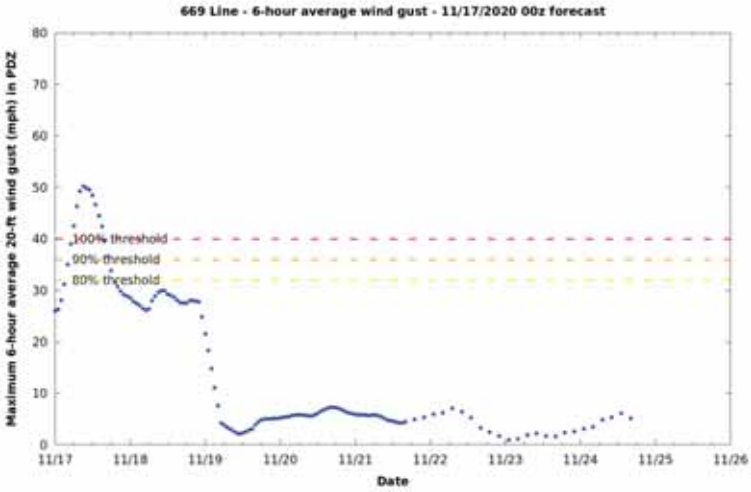
132 Line



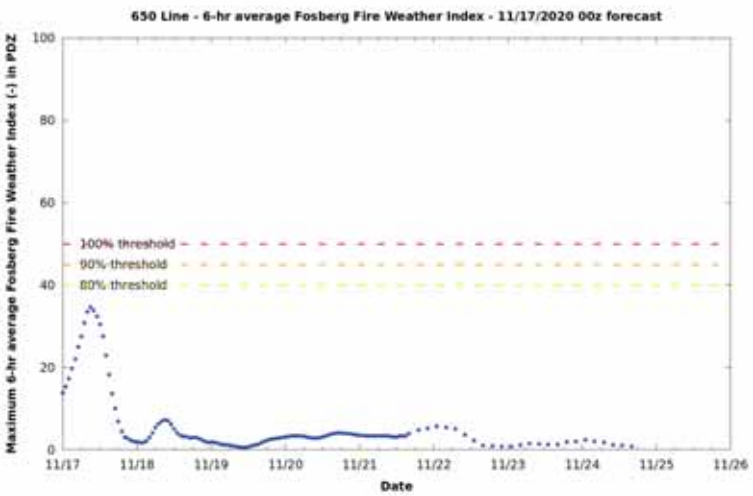


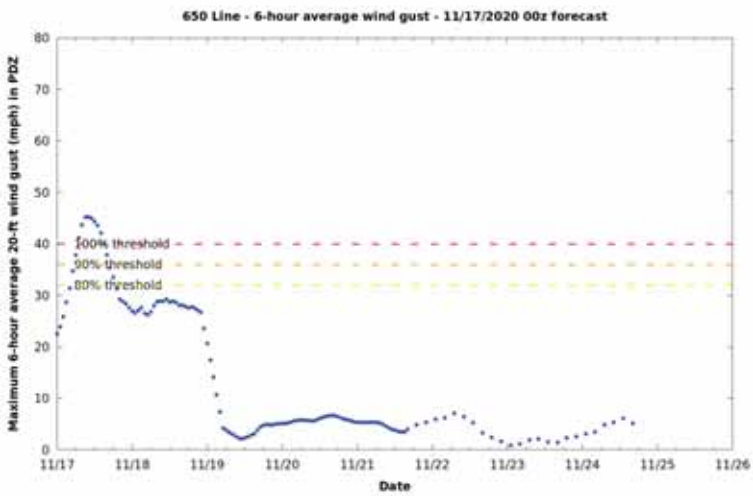
669 Line



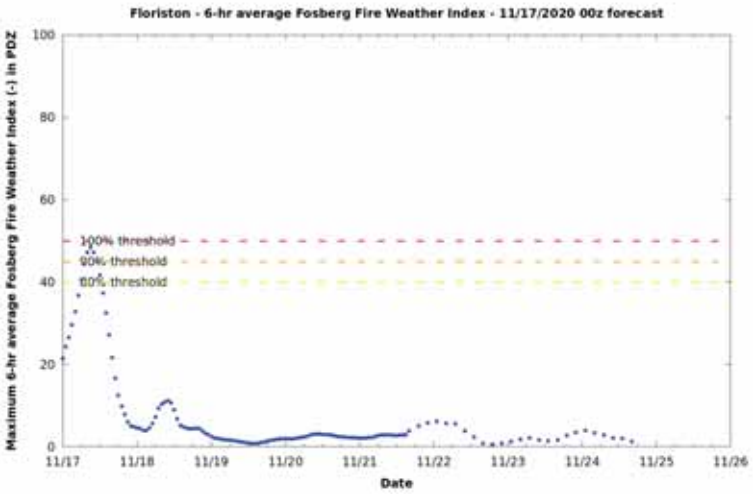


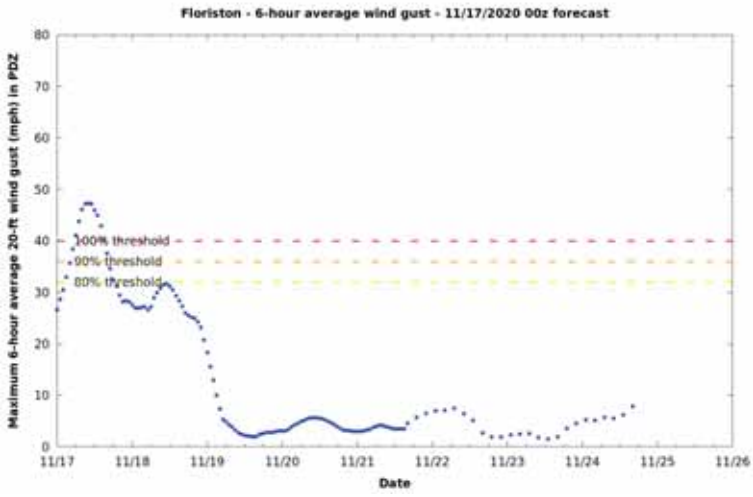
650 Line



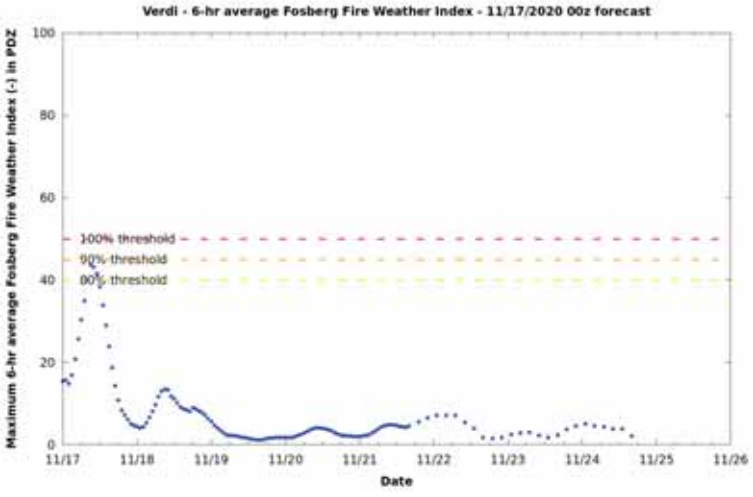


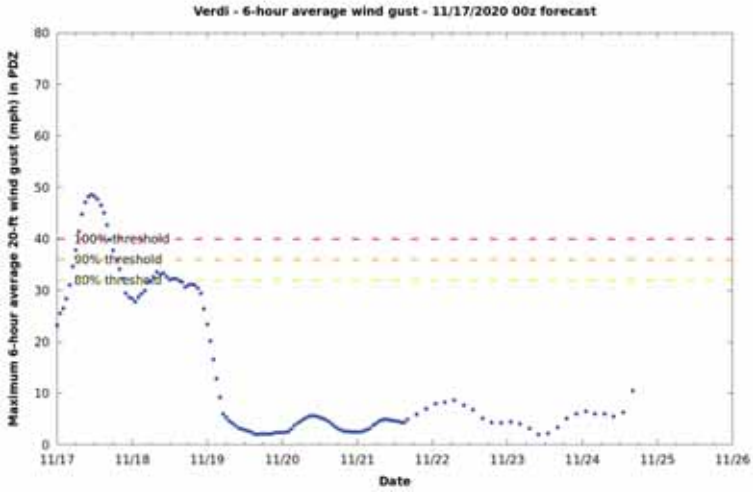
Floriston



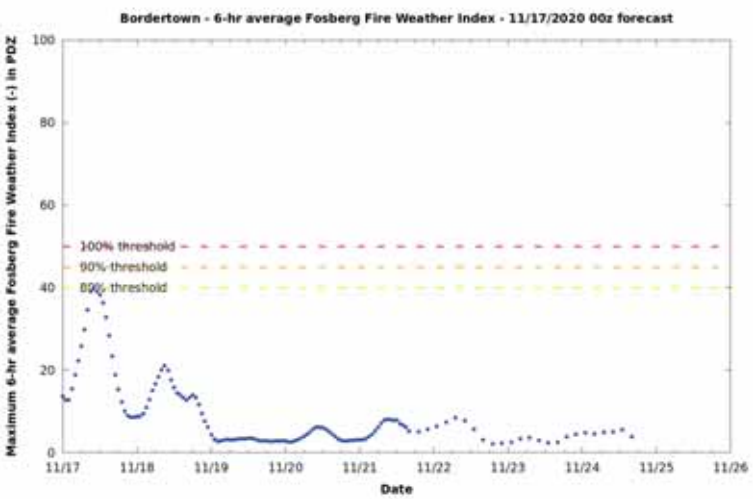


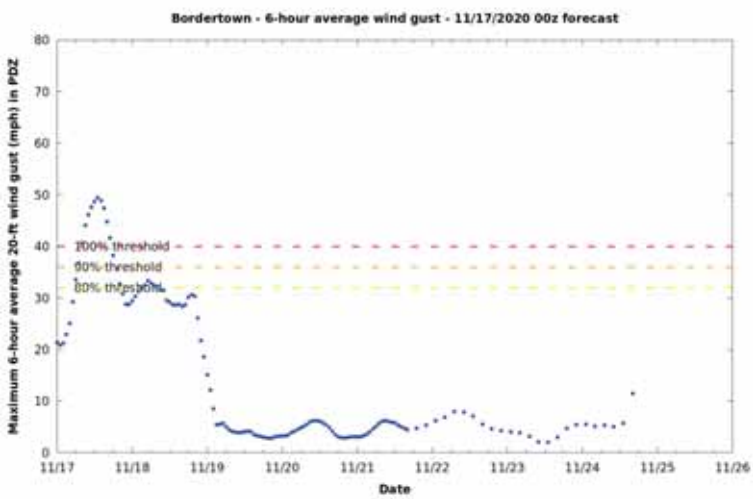
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/17/2020 00z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/17/2020 00z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/17/20 - 11/23/20

Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	low	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	moderate	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	low	low	low	low	low	low	low

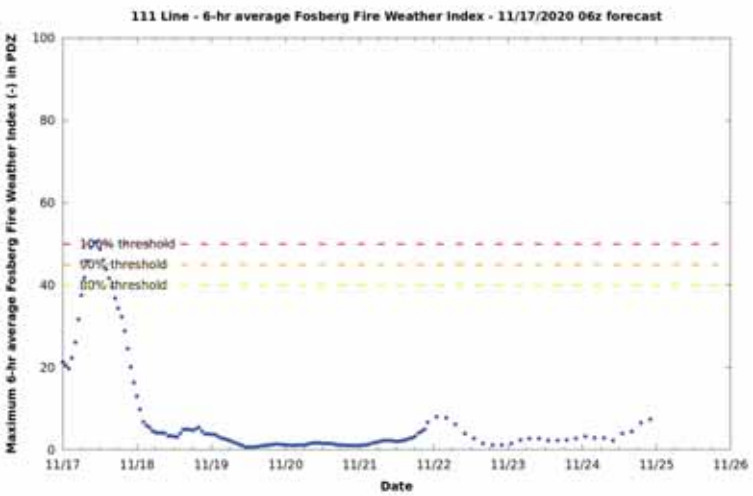
Liberty Utilities Energy Release Component Forecast for 11/17/20 - 11/23/20

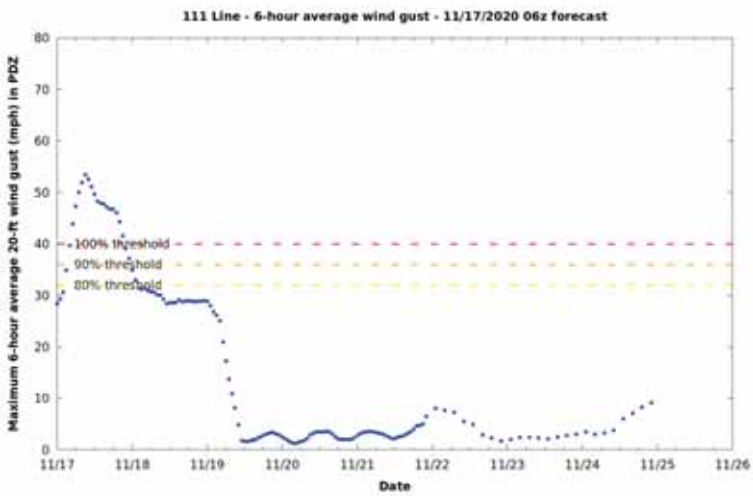
Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
111 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portola	56.9	55.7	44.6	39.3	41.2	42.2	45.3
Sierra Brooks	59.8	60.7	49.5	44.4	45.0	48.8	53.2
Stampede	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russel Valley	13.0	12.8	9.8	8.2	7.5	7.5	7.7
Hobart	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sagehen Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunnyside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon East	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-36	1.5	1.4	1.1	1.1	1.0	1.0	1.1
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Angora Ridge and Lily Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cathedral Spring Creek Emerald Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	40.0	41.8	29.9	25.4	26.6	27.9	32.7
Sorensons Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul1296 r3	49.2	51.7	36.8	30.1	30.2	32.5	34.7
Topaz	60.5	61.3	44.8	38.0	38.4	39.2	45.1
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
640 Tier 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
609 and Underbuild	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bky 5200	34.0	33.4	24.7	23.0	23.9	24.4	25.7
Old Country Road	60.9	57.6	45.7	43.9	44.3	45.3	47.6
Tah 52-68	23.2	21.3	17.0	16.7	16.7	17.0	17.4
The Grid	57.2	55.8	39.0	36.3	38.1	38.9	39.4
Canterbury and Commonwealth	41.8	41.1	28.6	26.4	27.9	28.6	29.3
Bky 5100 to NVE	23.9	23.5	16.4	15.1	15.9	16.4	16.8
Beacon Tap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenshire and 608	24.2	23.3	18.7	15.8	14.7	14.1	14.7
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669 Line	33.4	33.4	27.0	25.0	25.0	25.5	27.5
650 Line	1.9	1.9	1.3	1.2	1.3	1.3	1.4
Floriston	46.6	46.6	34.7	31.2	31.1	33.6	36.2
Verdi	55.7	55.7	44.1	36.2	39.6	44.1	46.8
Bordertown	58.8	58.8	47.7	40.0	41.6	45.7	48.9

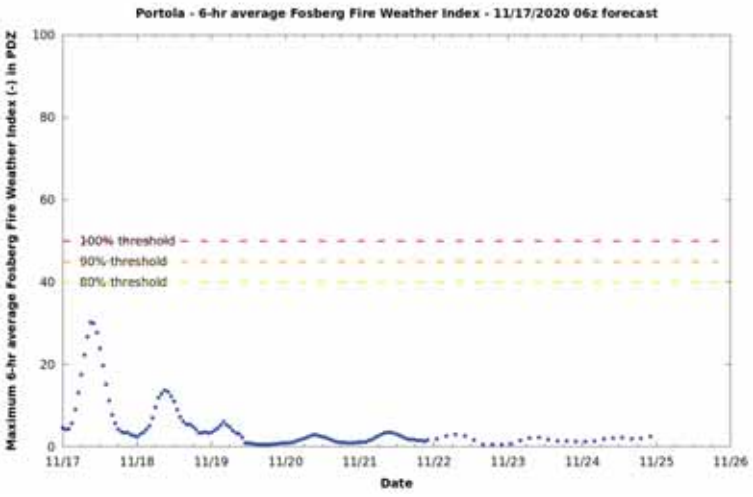
Liberty Utilities Fire Weather Summary Plots - 11/17/2020 06z forecast

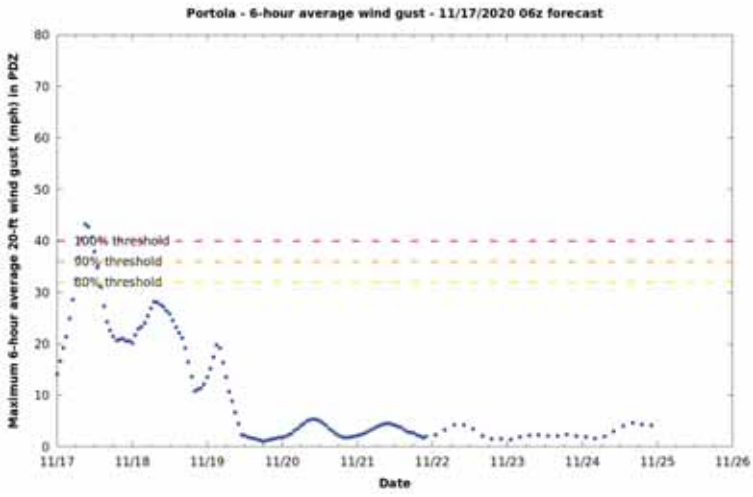
111 Line



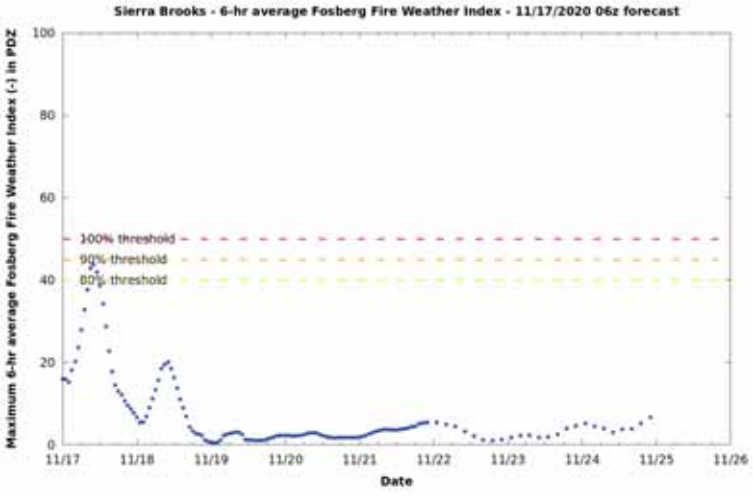


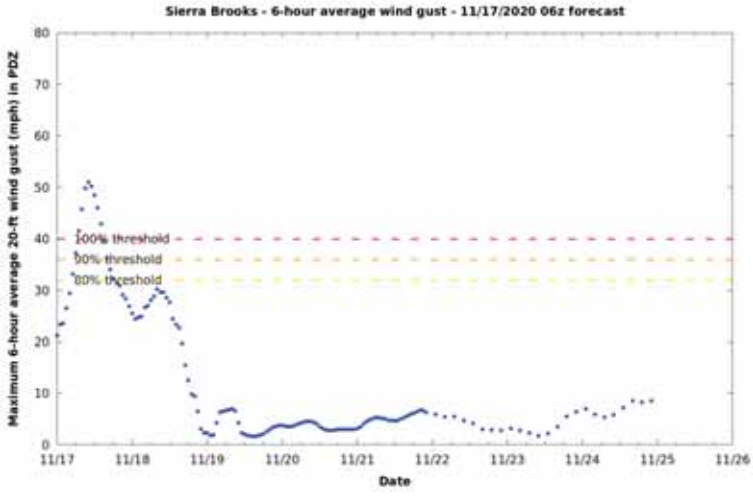
Portola



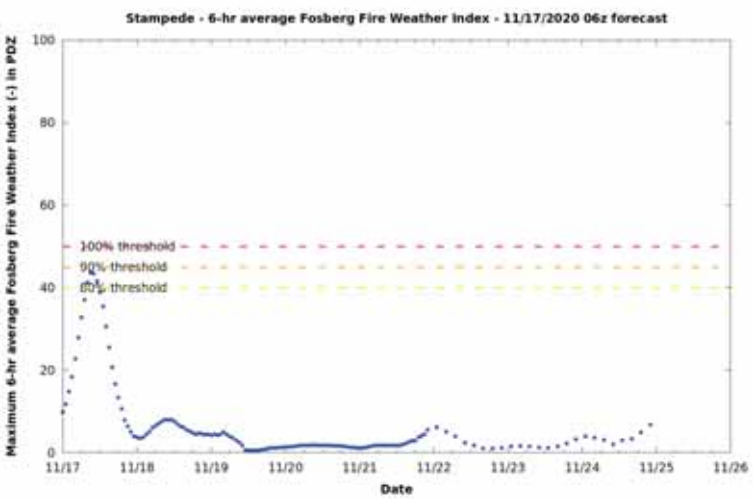


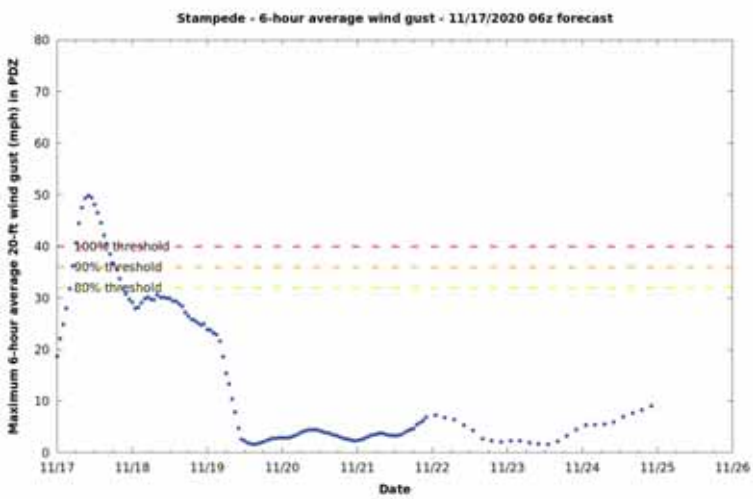
Sierra Brooks



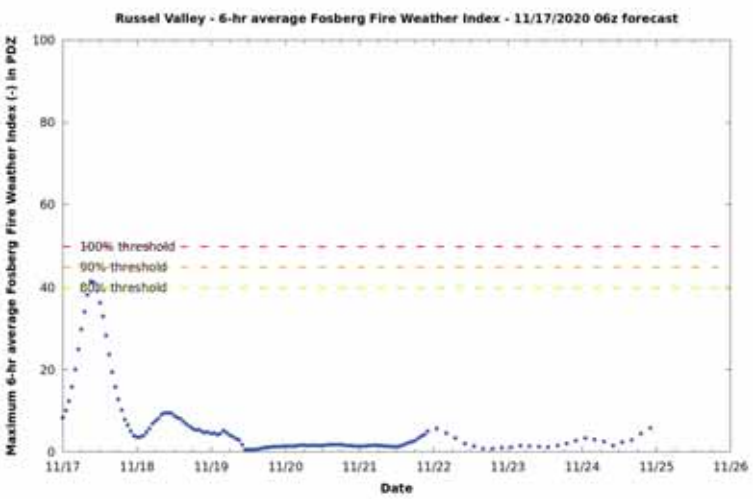


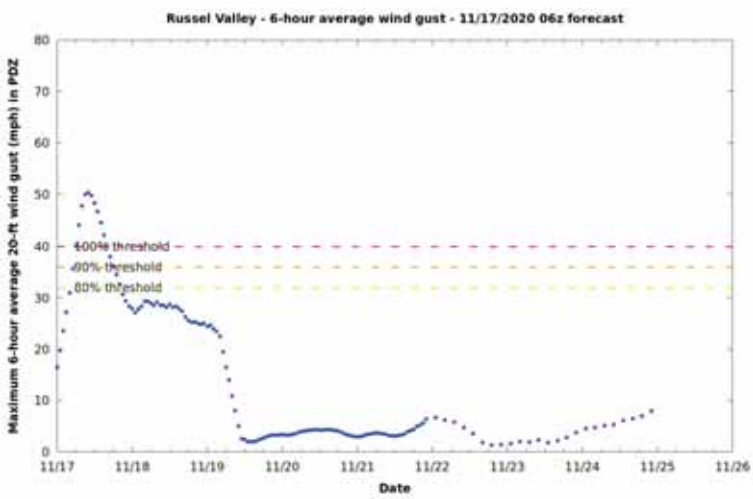
Stampede



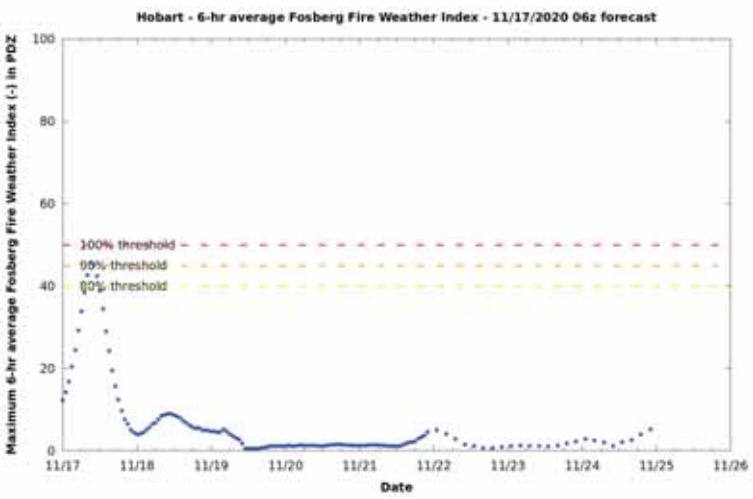


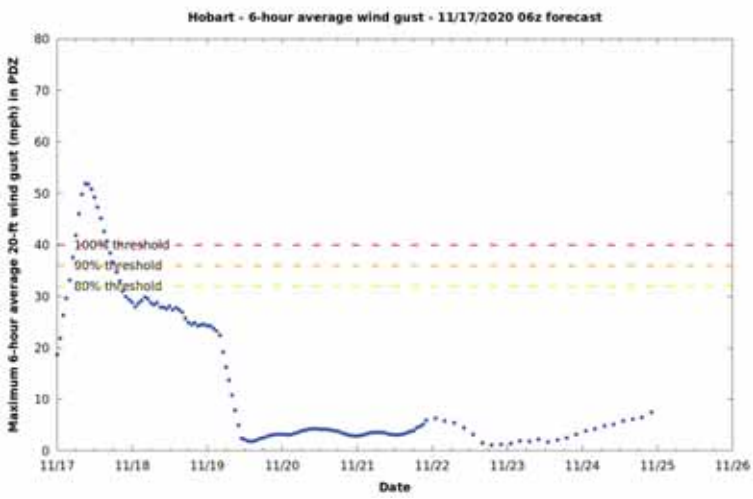
Russell Valley



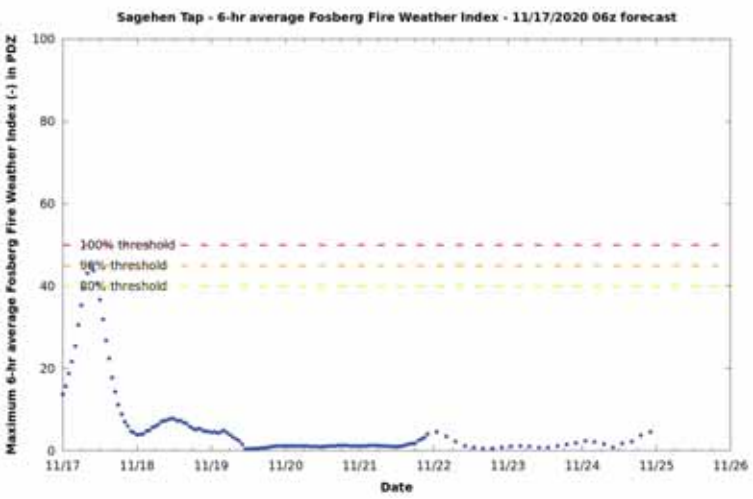


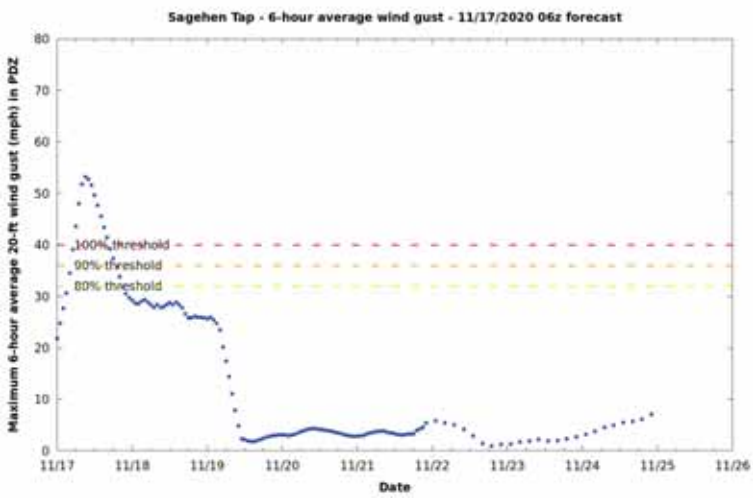
Hobart



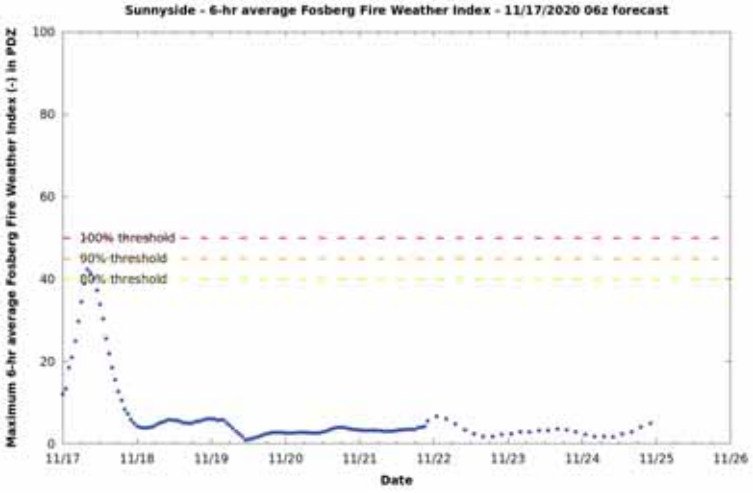


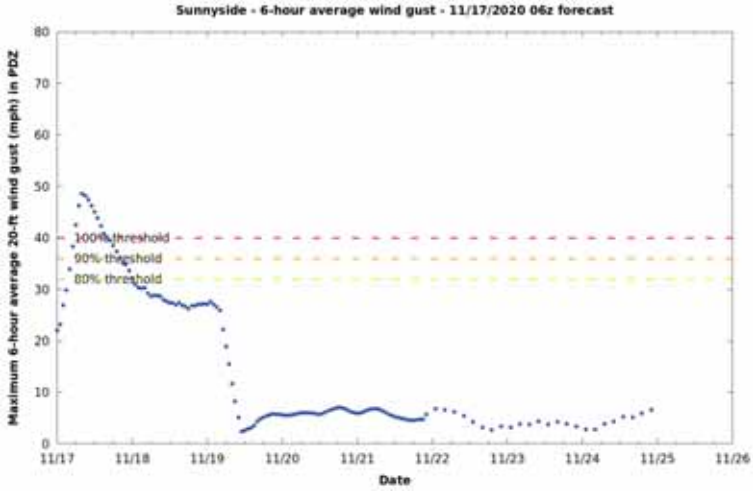
Sagehen tap



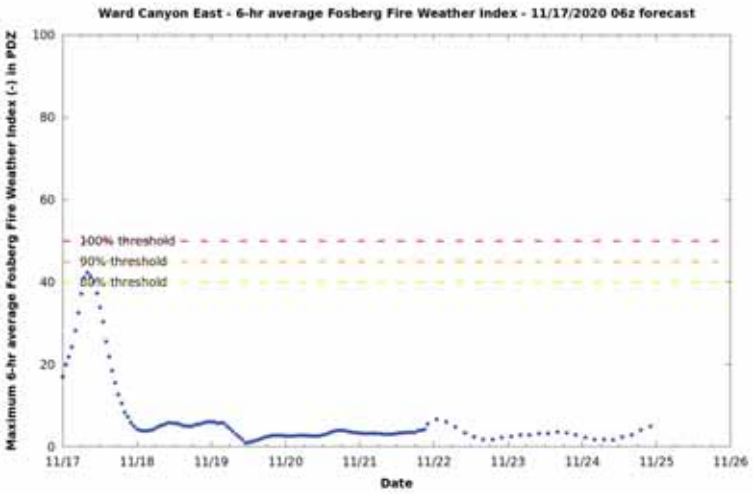


Sunnyside



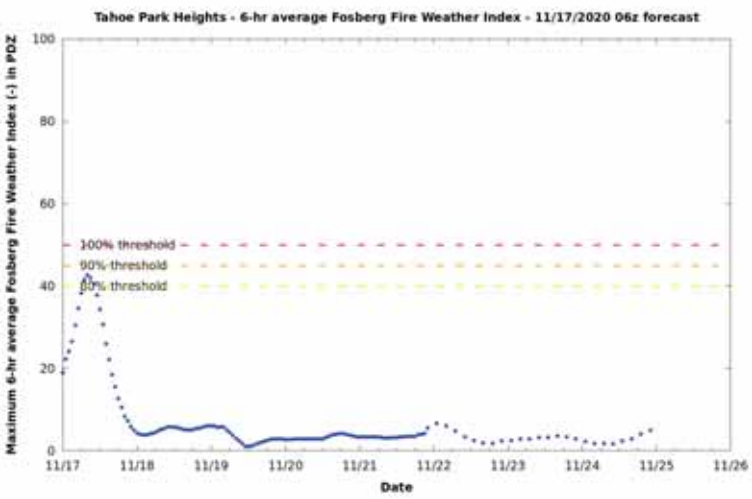


Ward Canyon East



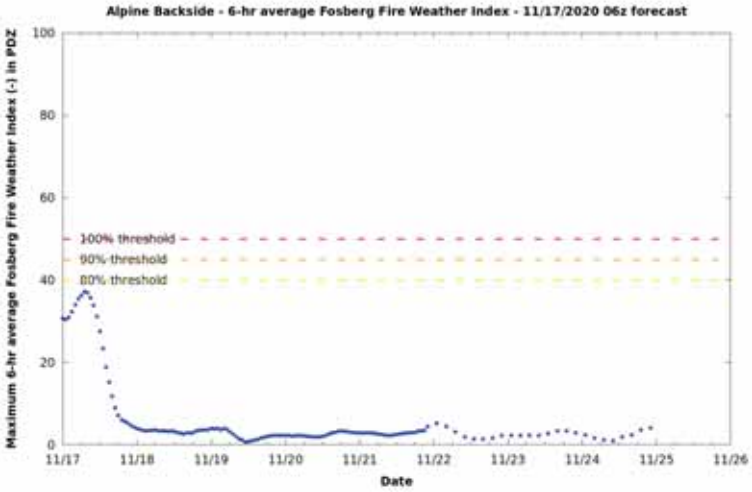


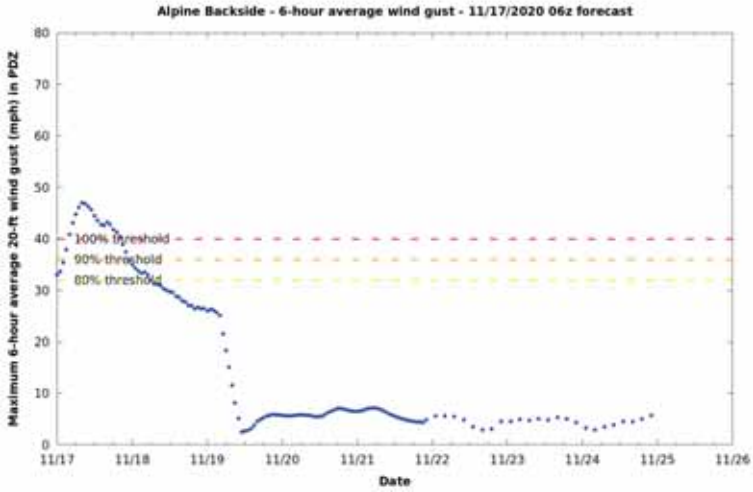
Tahoe Park Heights



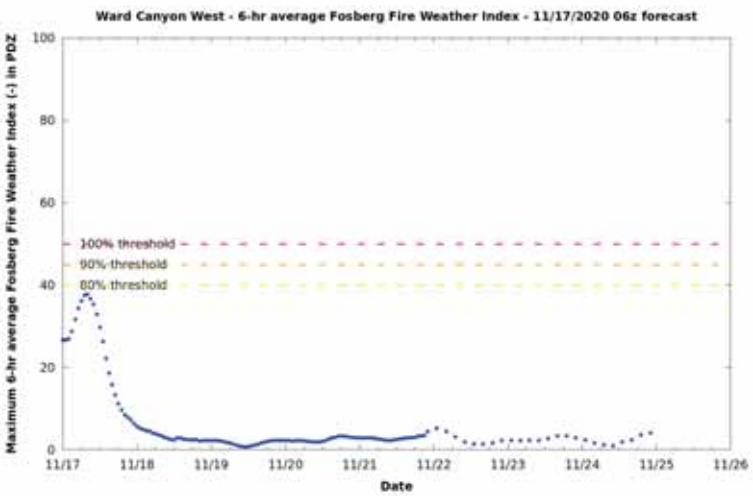


Alpine Backside



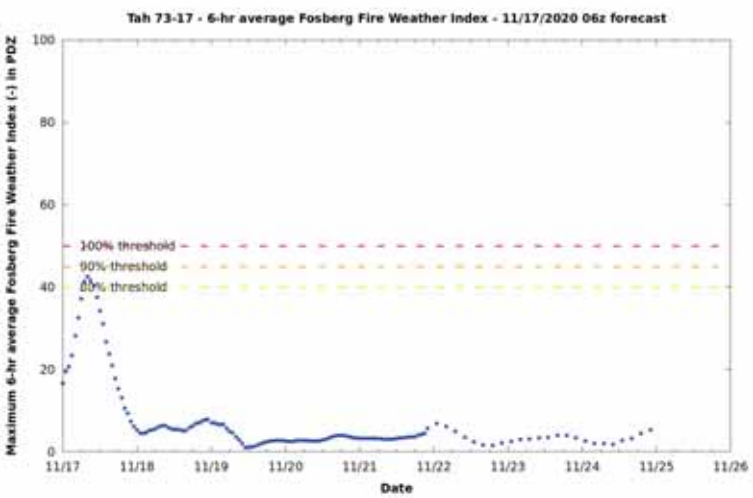


Ward Canyon West



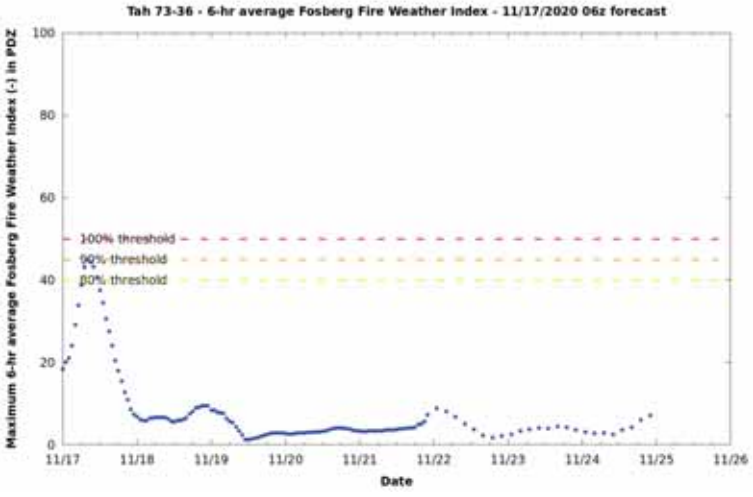


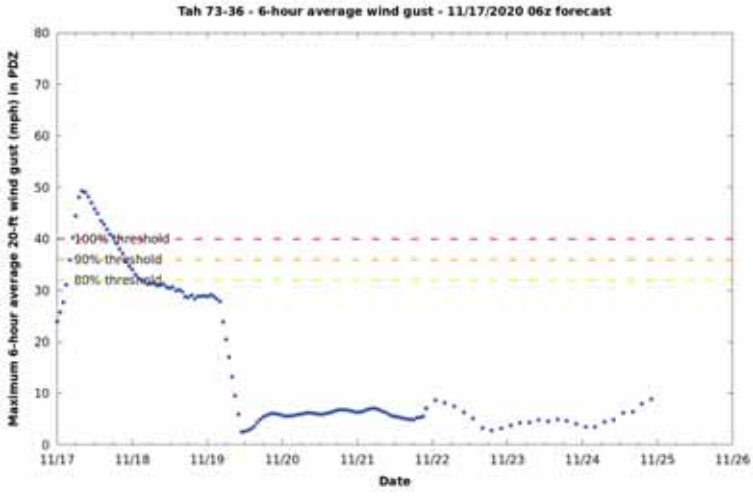
Tah 73-17



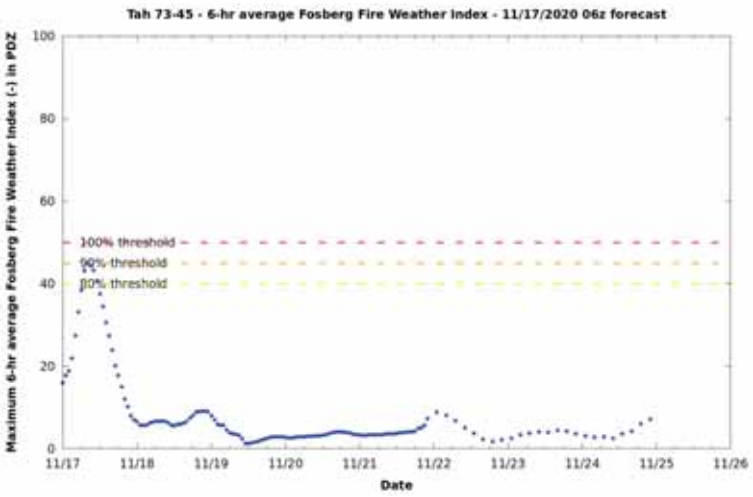


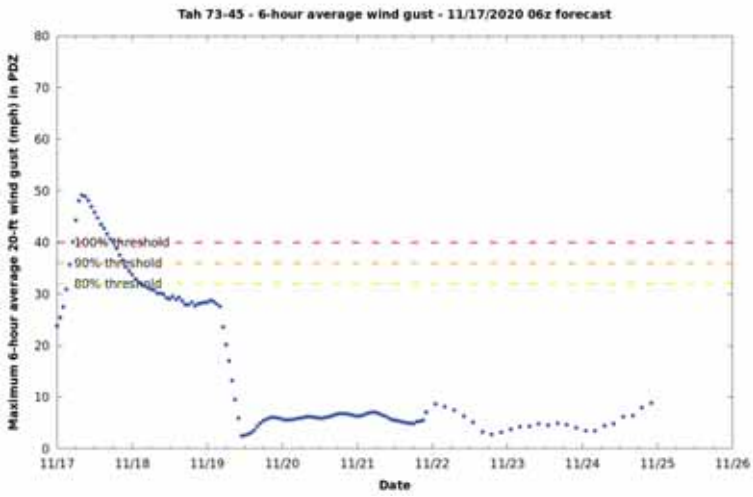
Tah 73-36



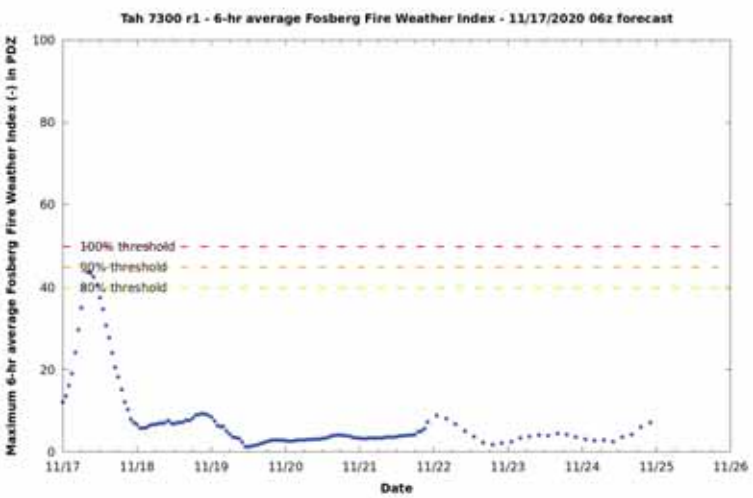


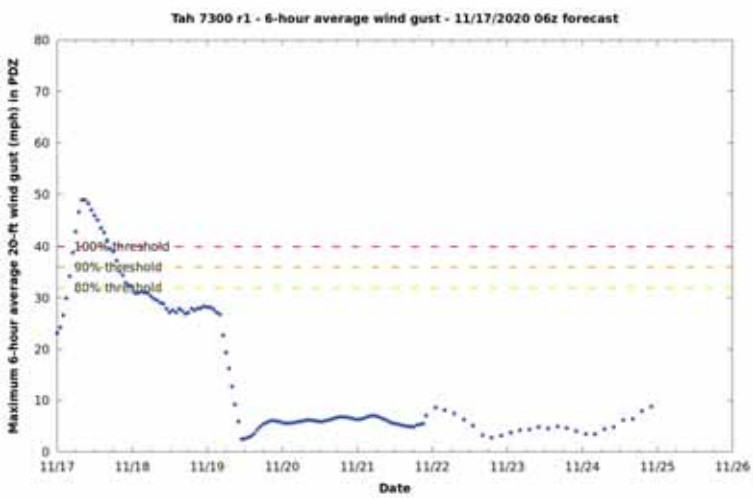
Tah 73-45



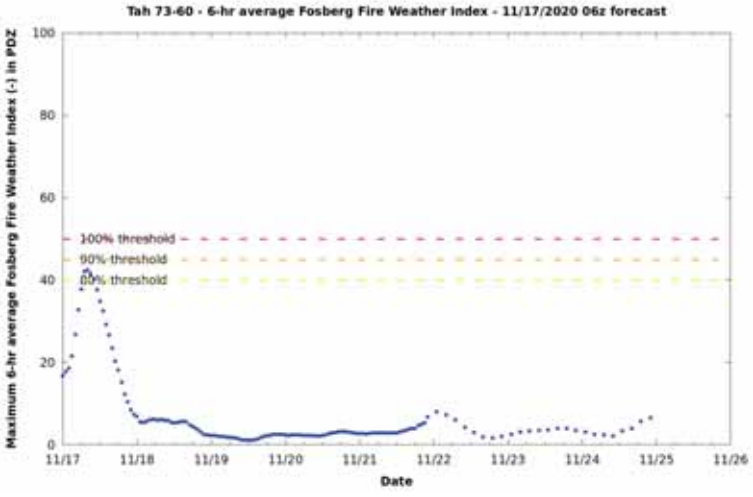


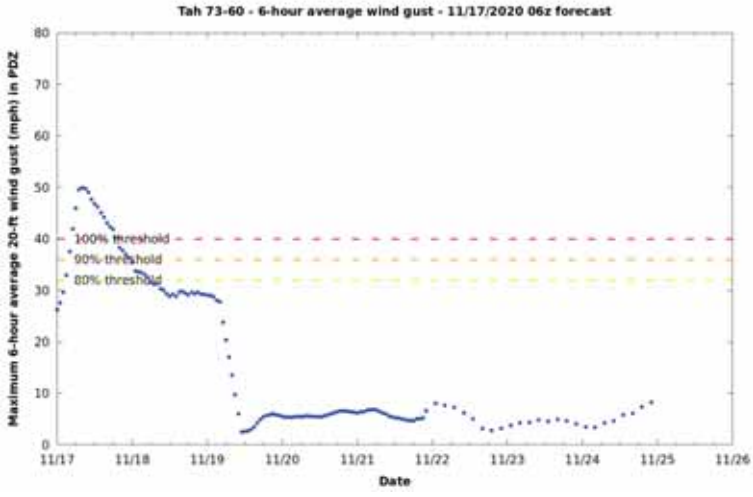
Tah 7300 r1



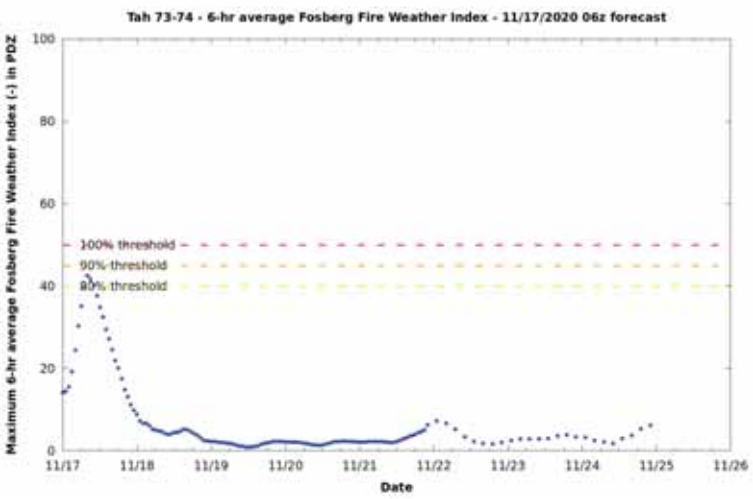


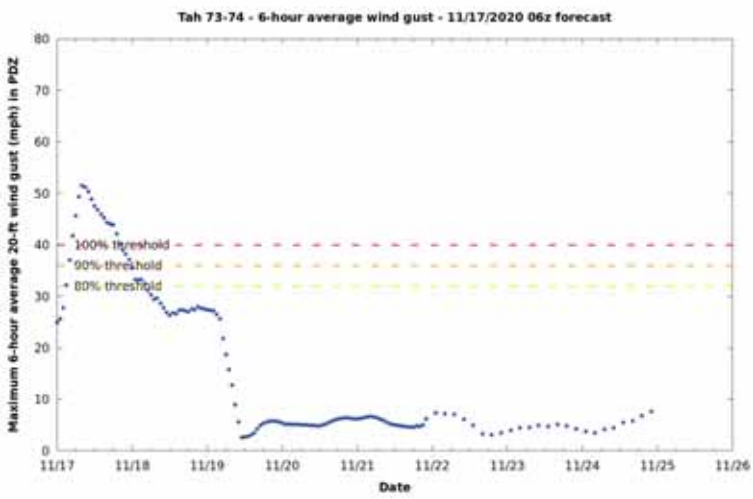
Tah 73-60



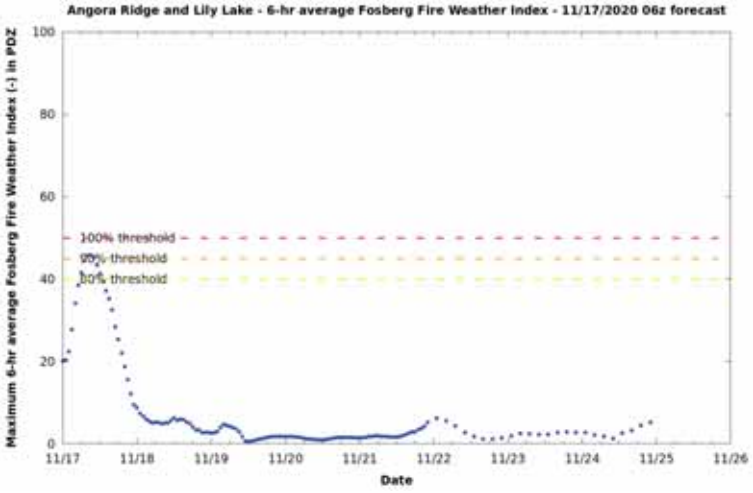


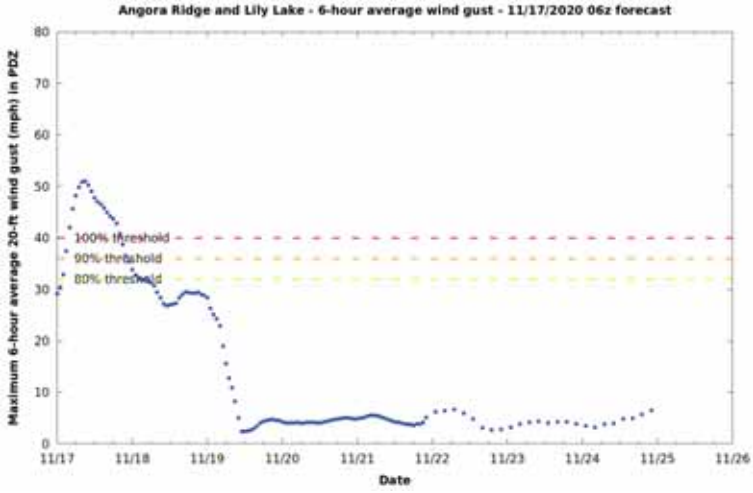
Tah 73-74



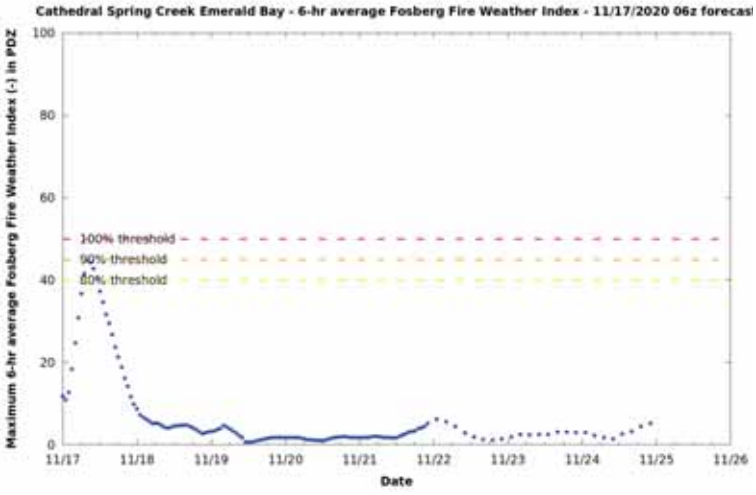


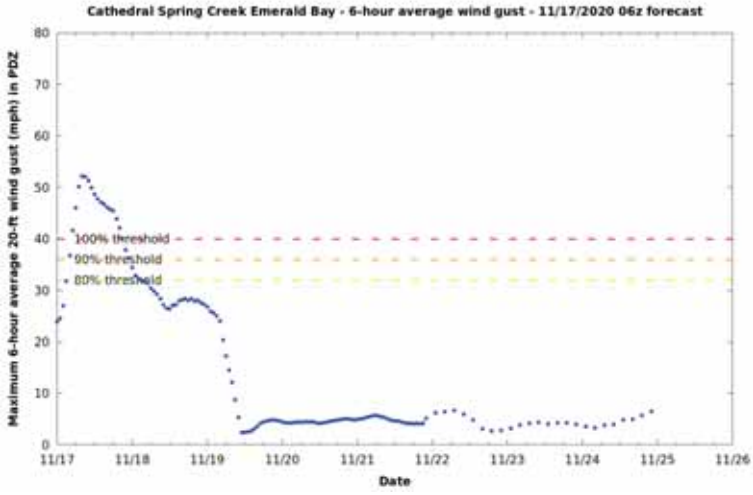
Angora Ridge and Lily Lake



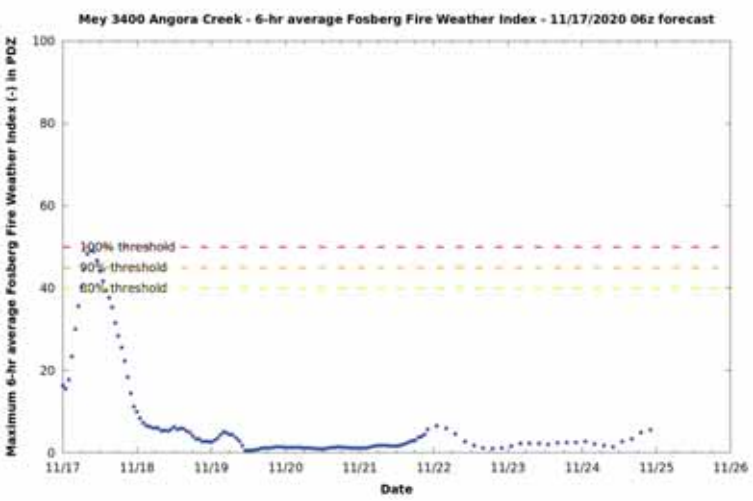


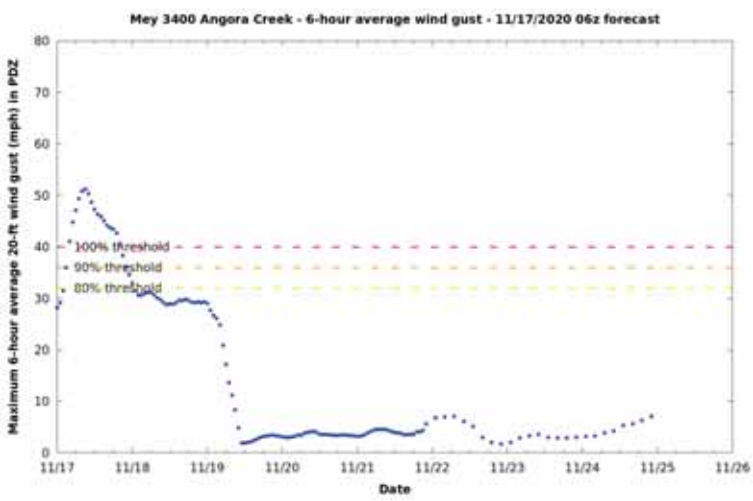
Cathedral Spring Creek Emerald Bay



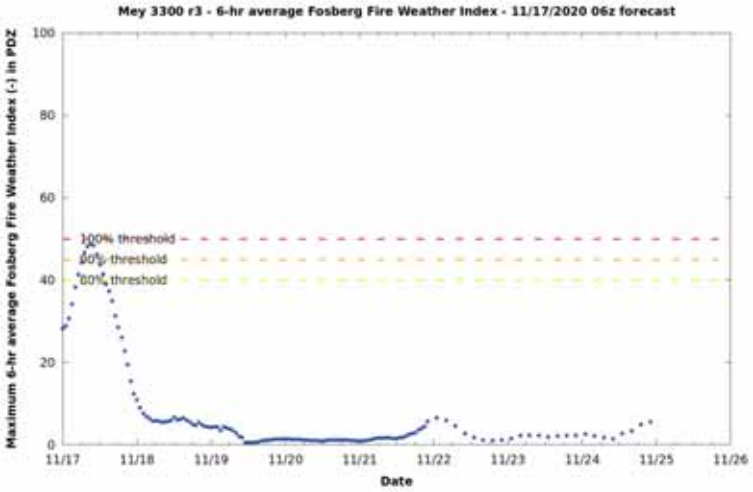


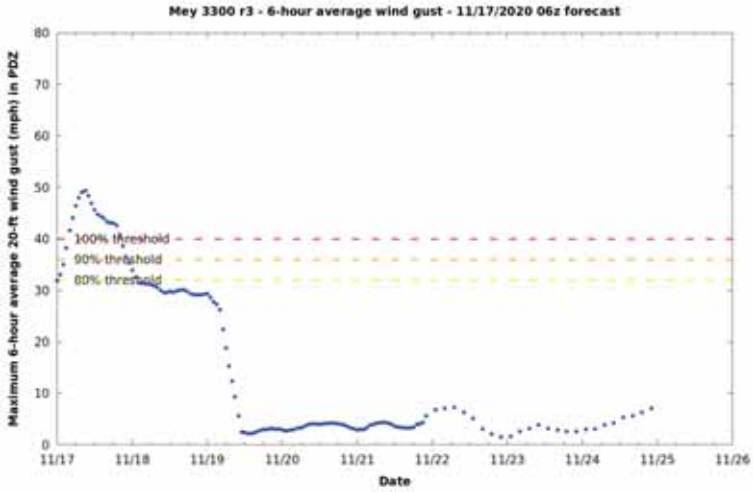
Mey 3400 Angora Creek



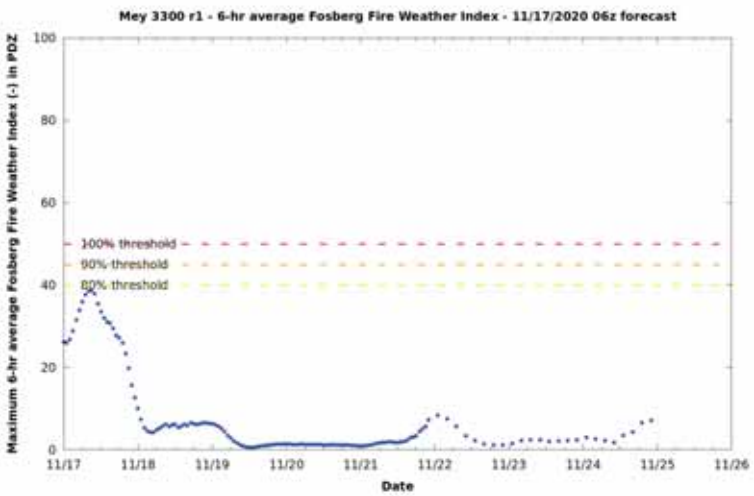


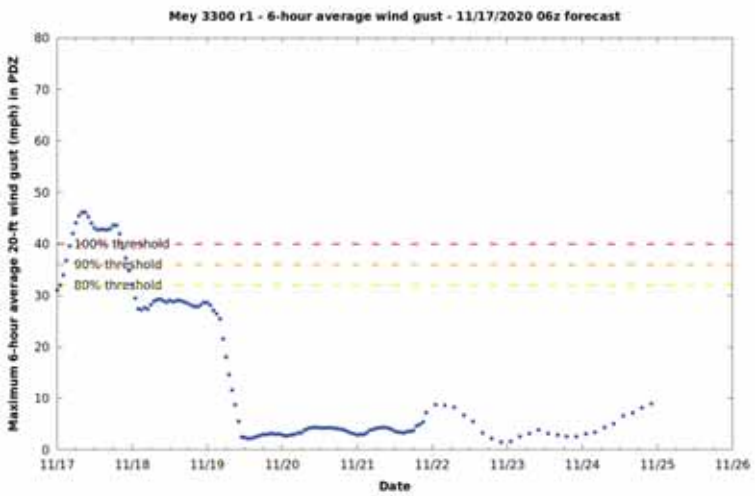
Mey 3300 r3



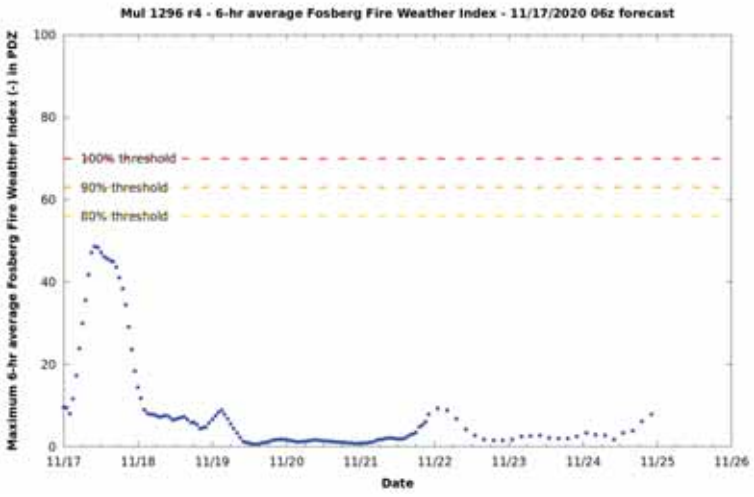


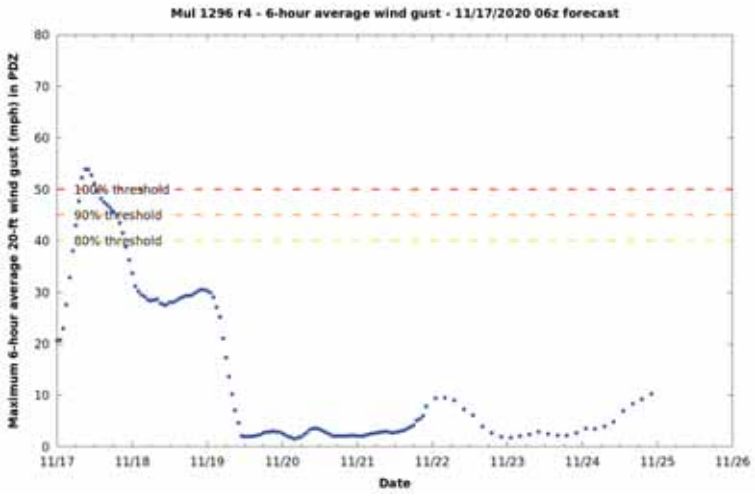
Mey 3300 r1



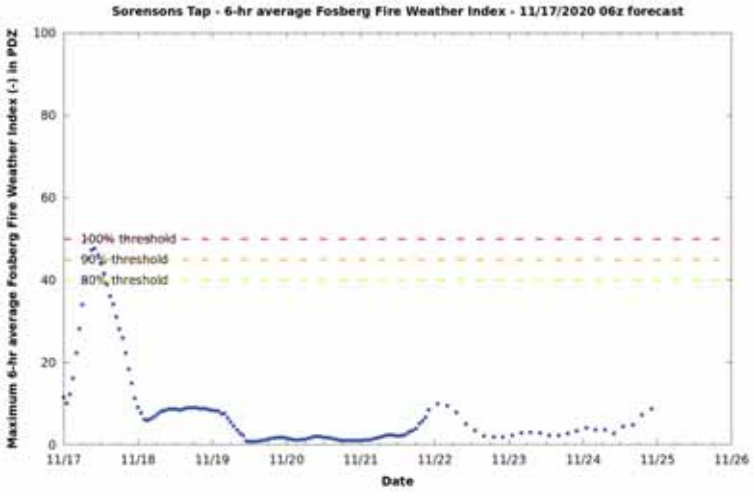


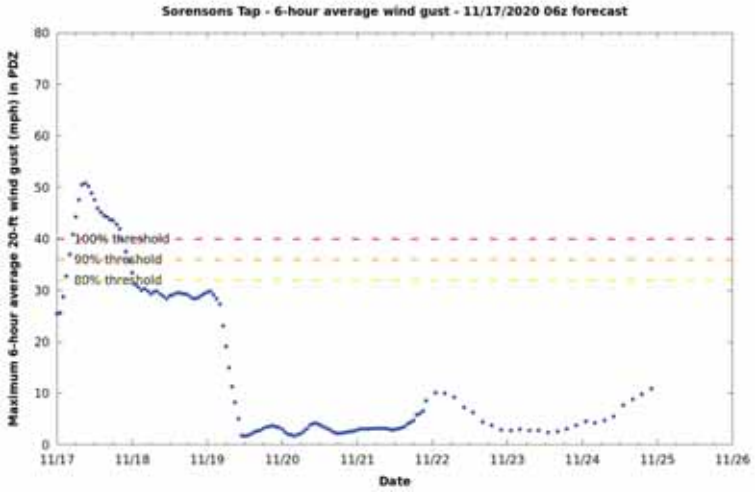
Mul 1296 r4



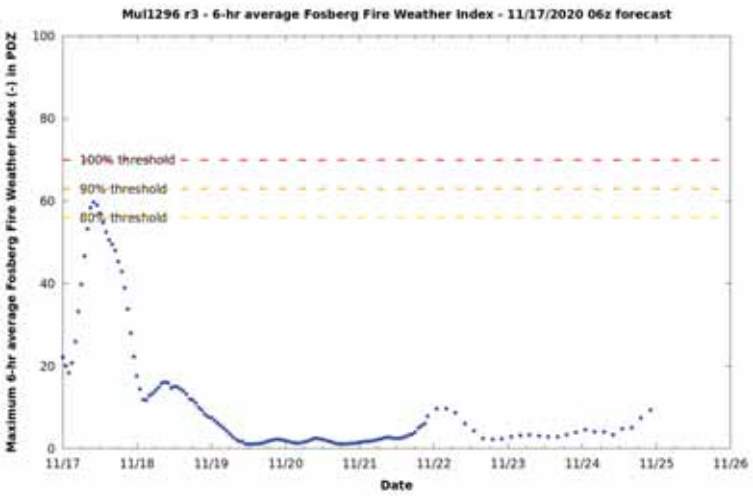


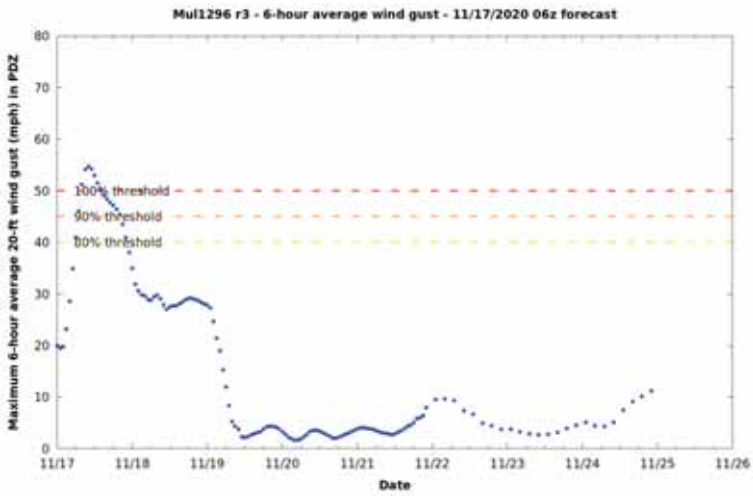
Sorensons Tap



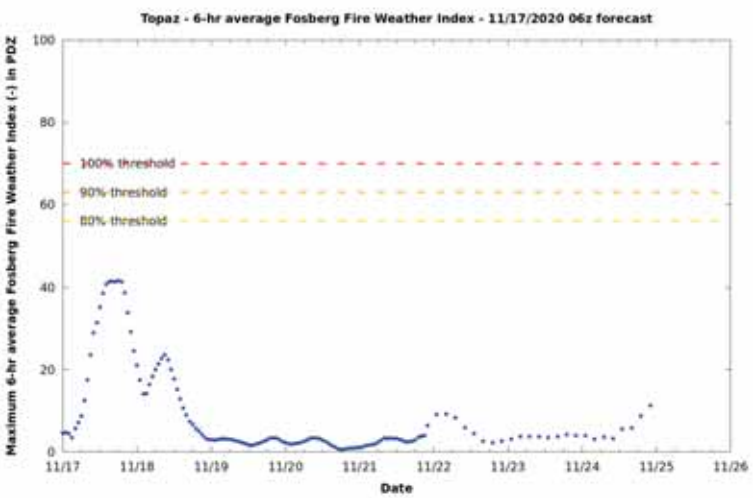


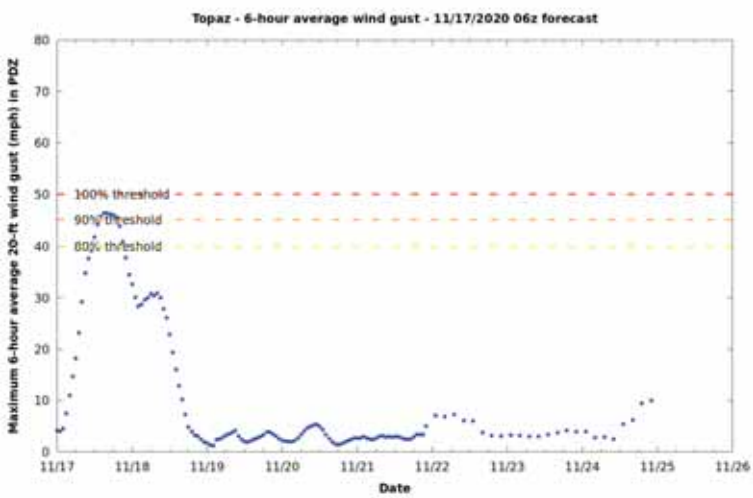
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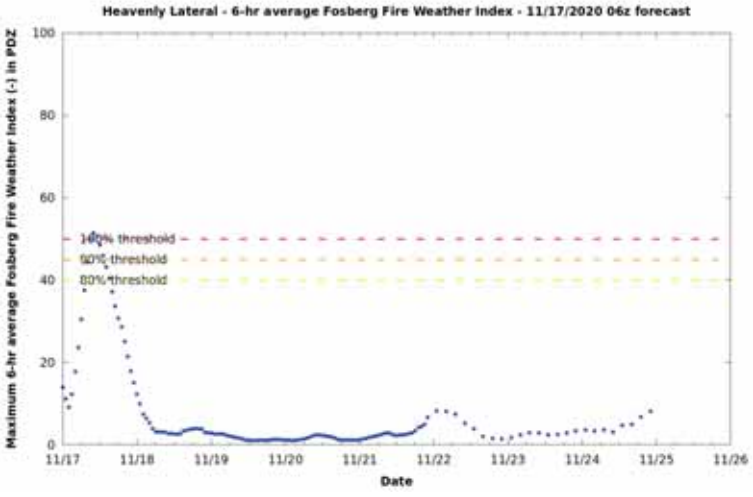


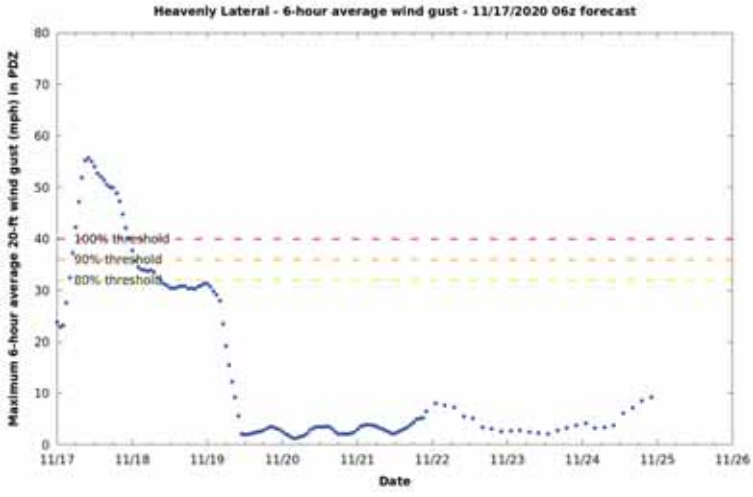
Topaz



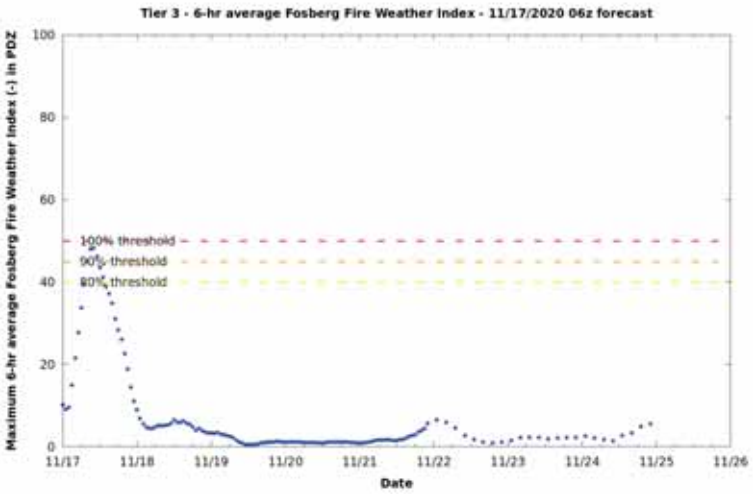


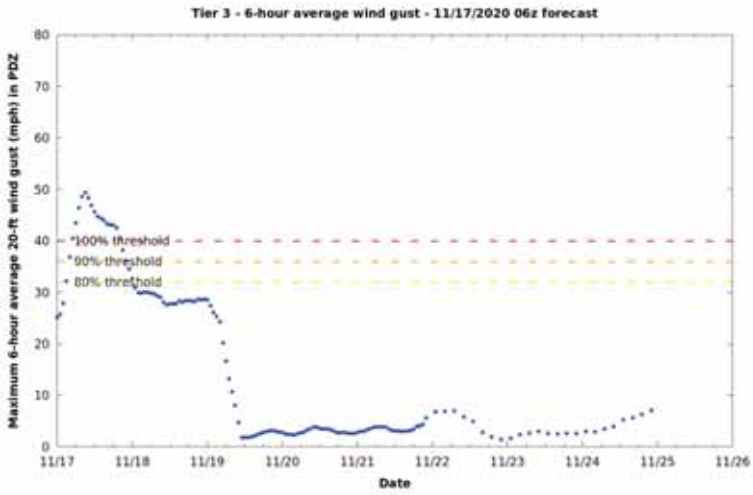
Heavenly Lateral



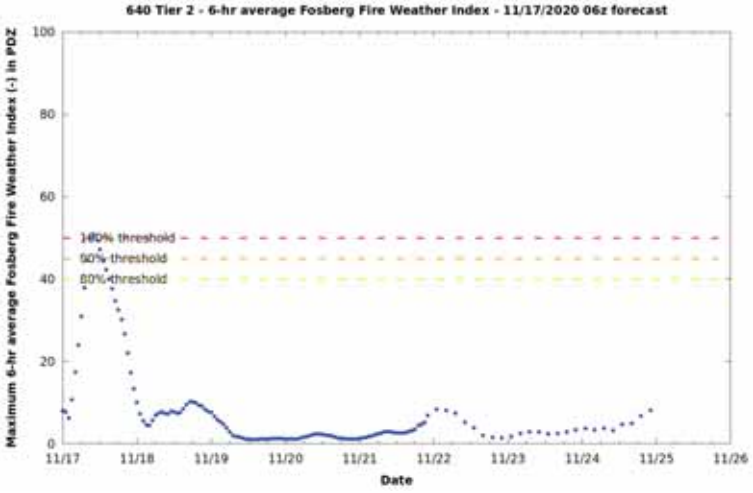


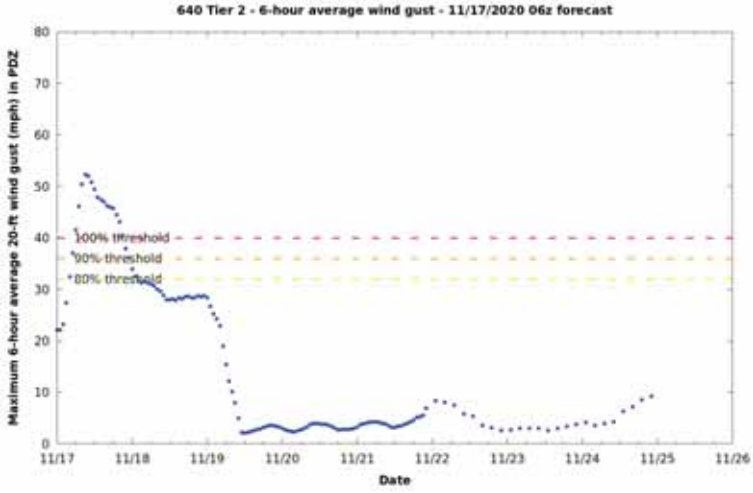
Tier 3



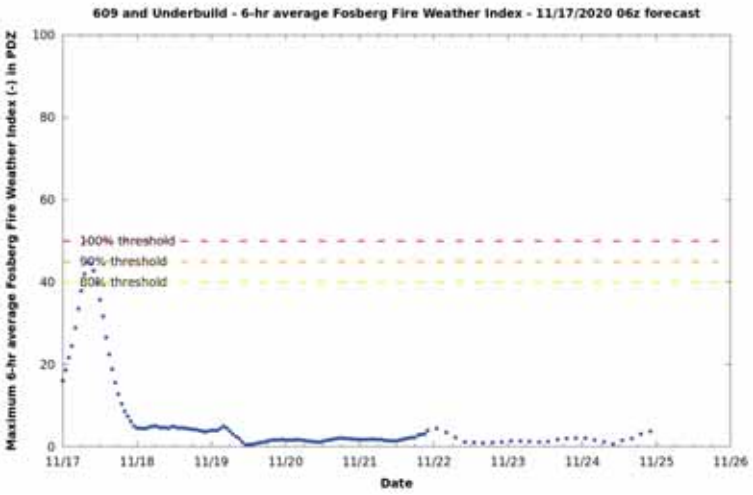


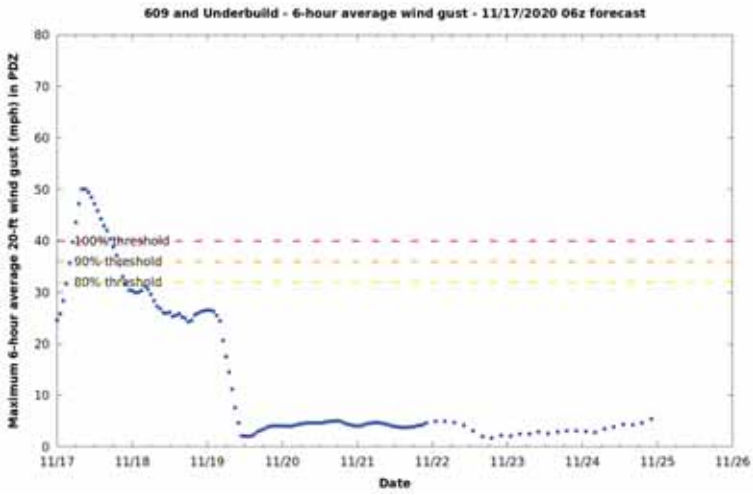
640 Tier 2



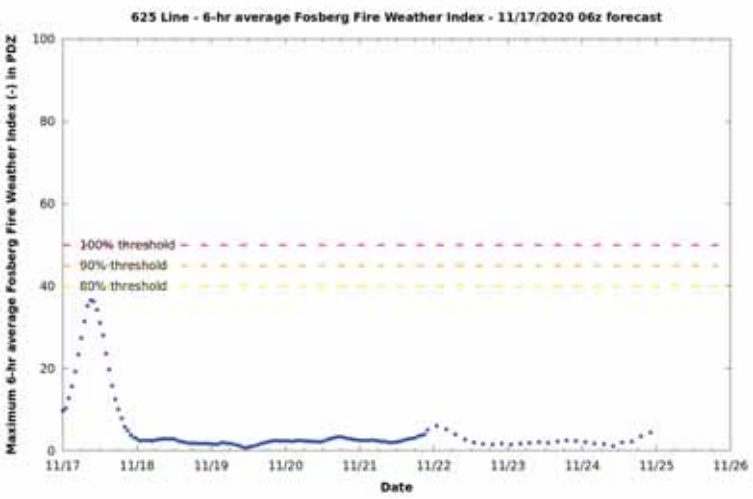


609 and Underbuild



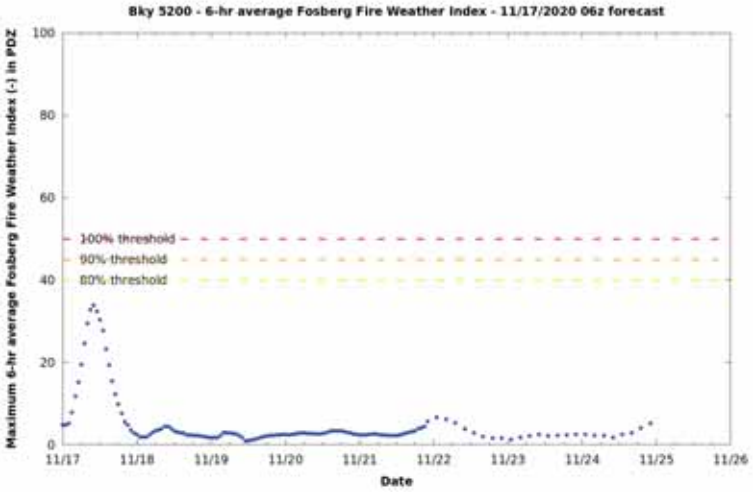


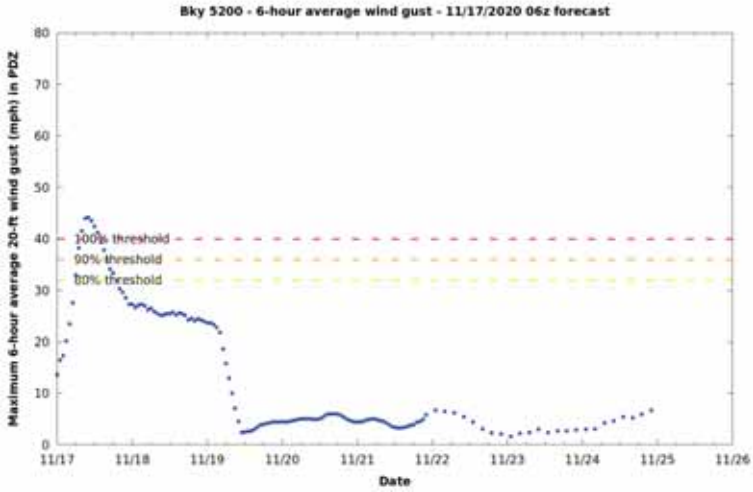
625 Line



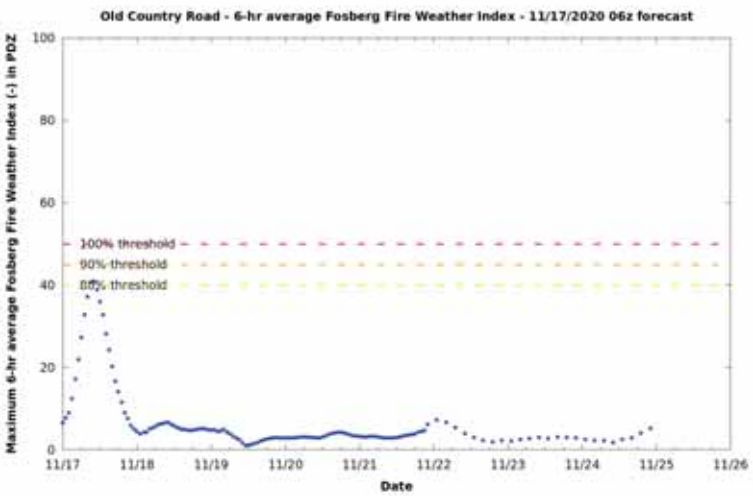


Bky 5200



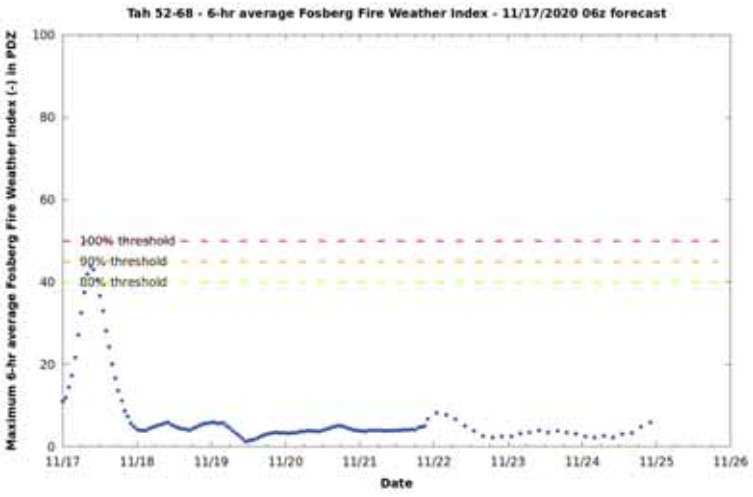


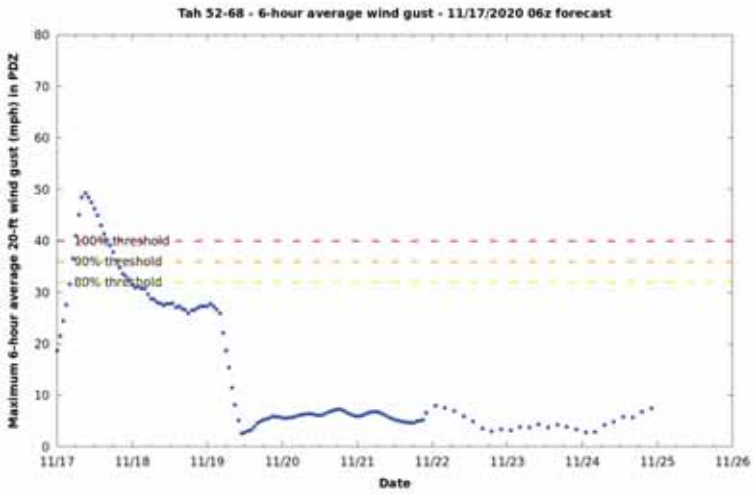
Old Country Road



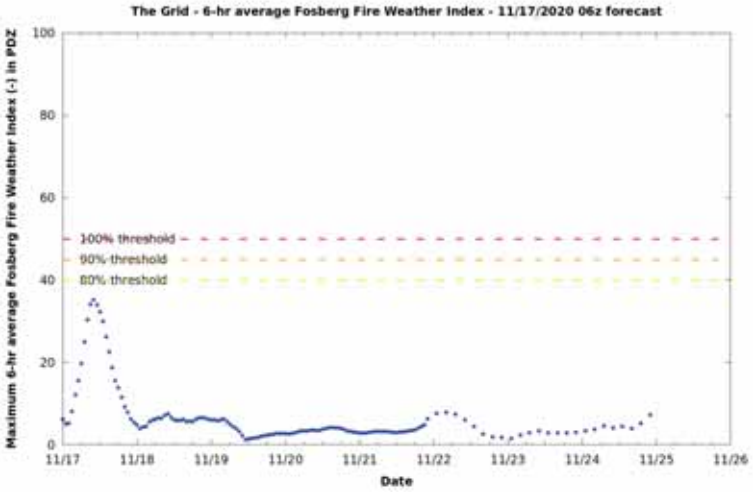


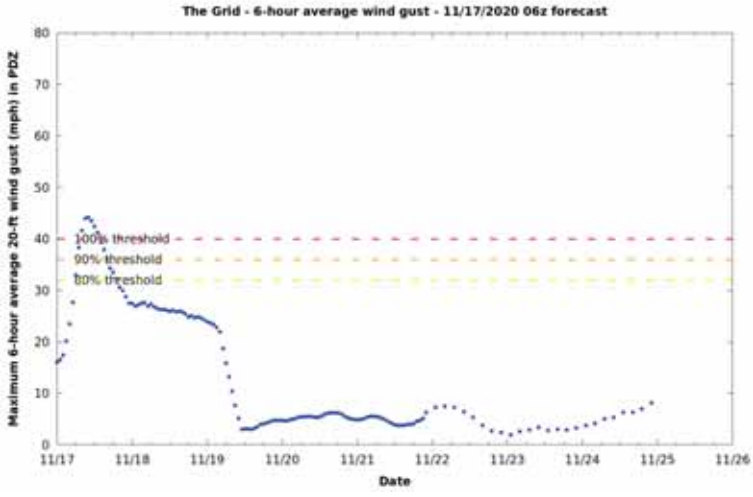
Tah 52-68



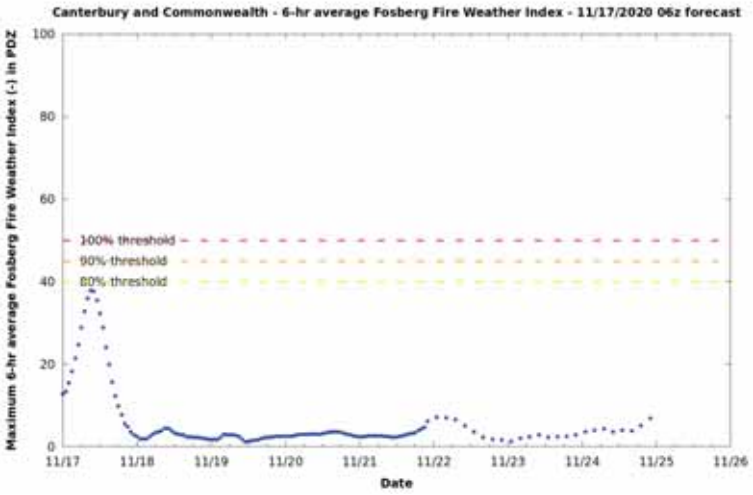


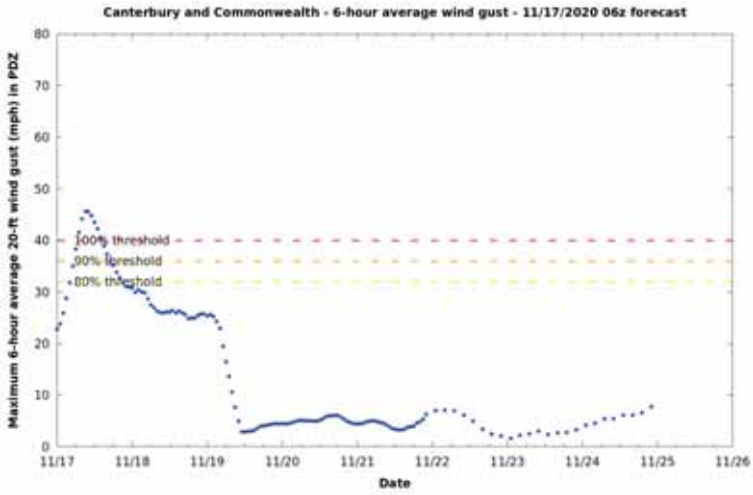
The Grid



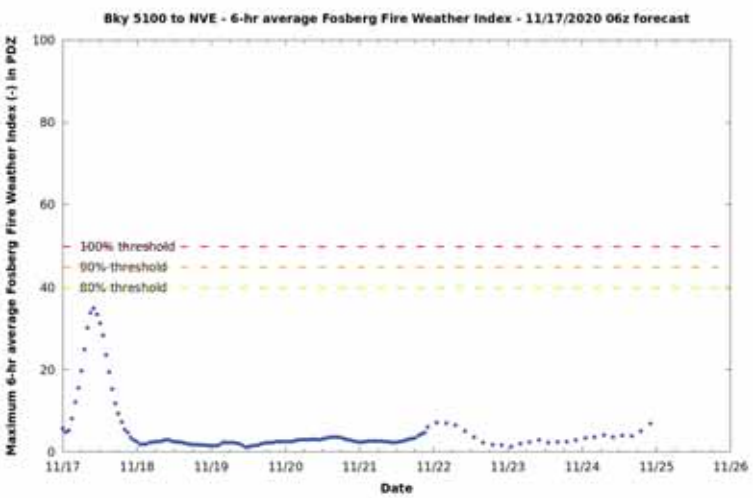


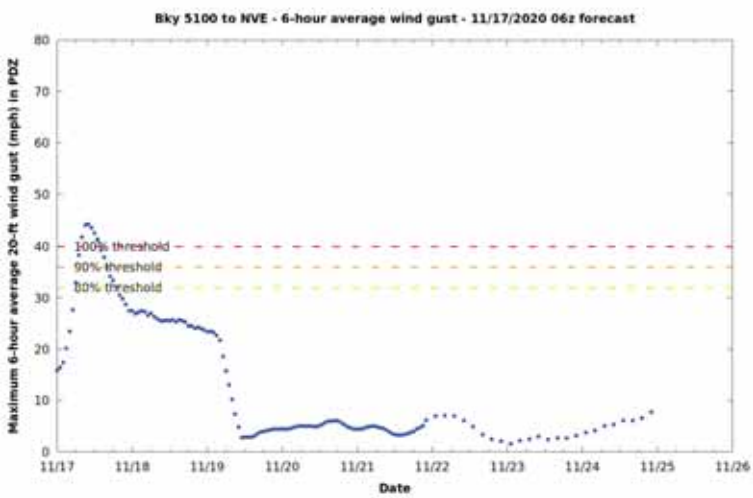
Canterbuy and Commonwealth



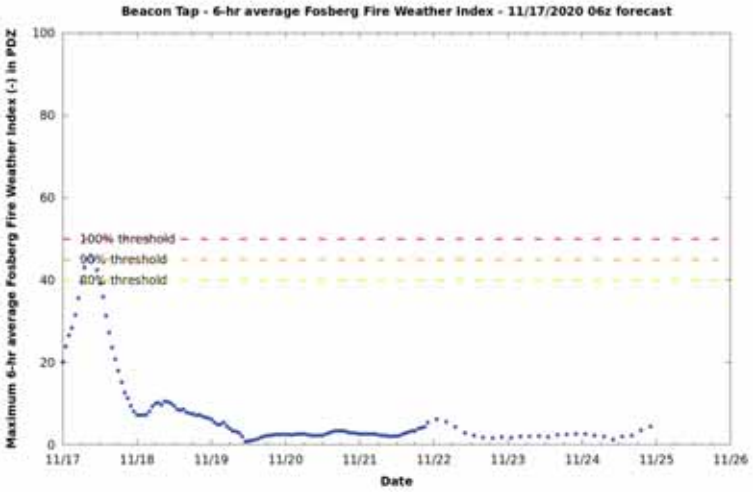


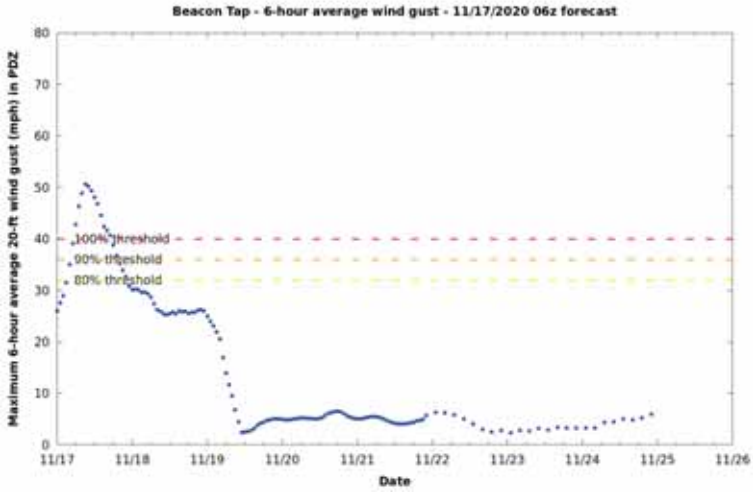
Bky 5100 to NVE



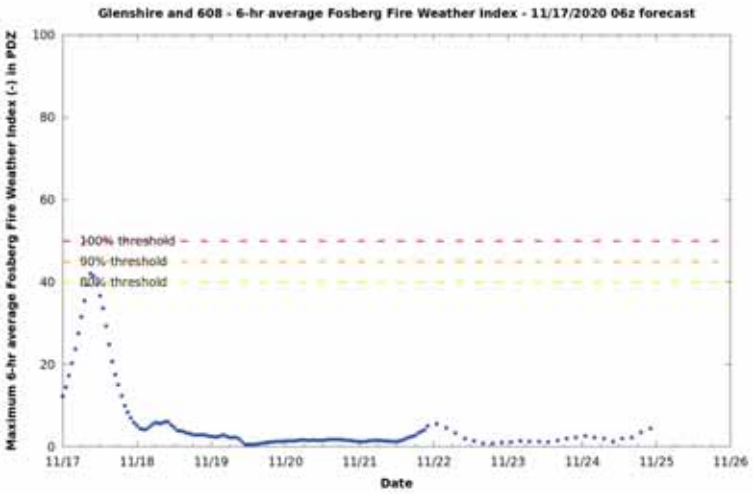


Beacon Tap



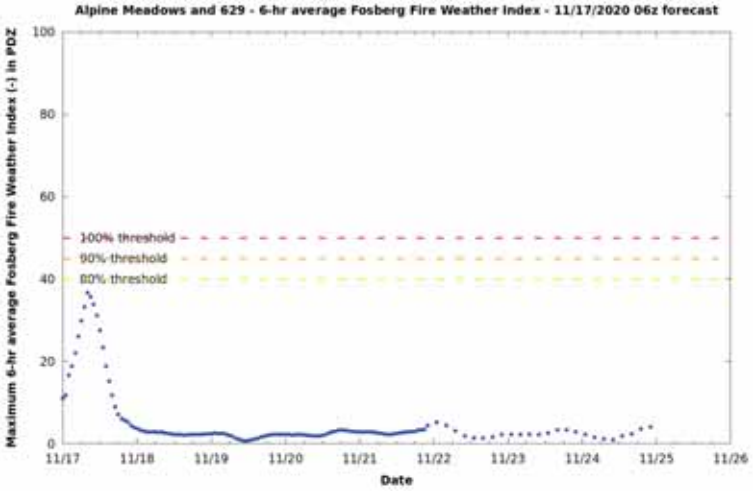


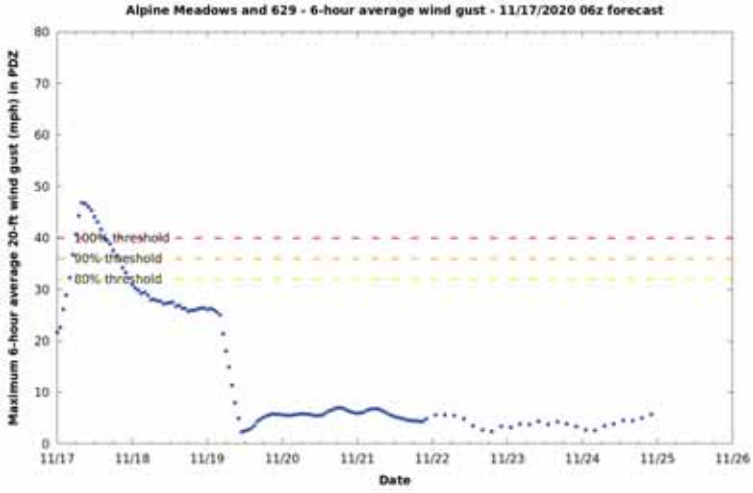
Glenshire and 608



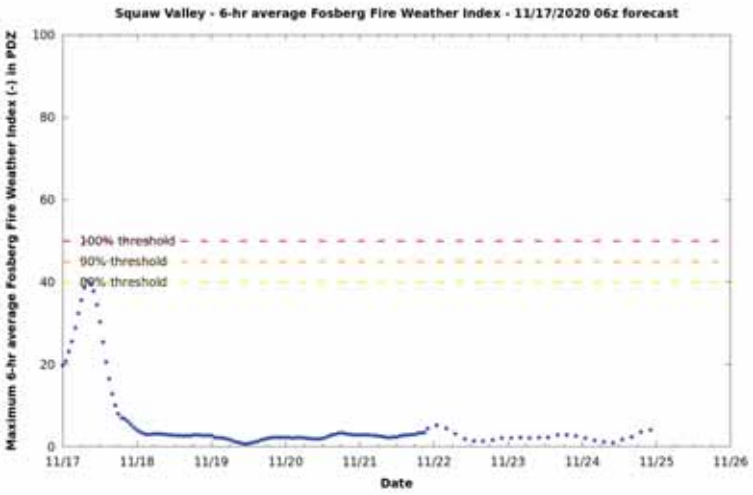


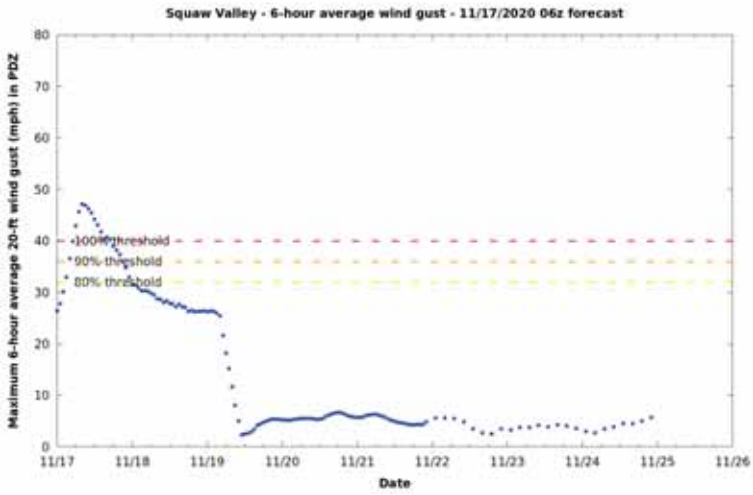
Alpine Meadows and 629



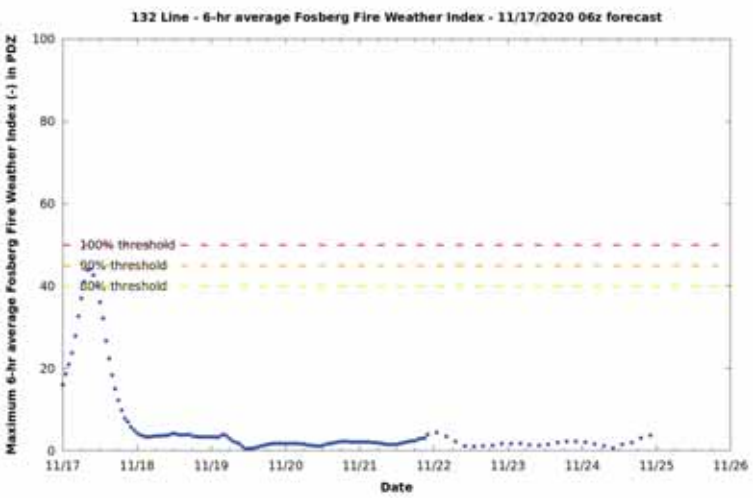


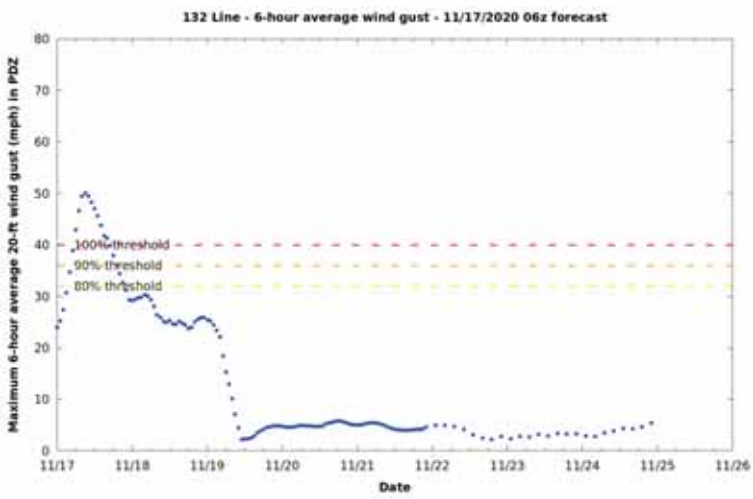
Squaw Valley



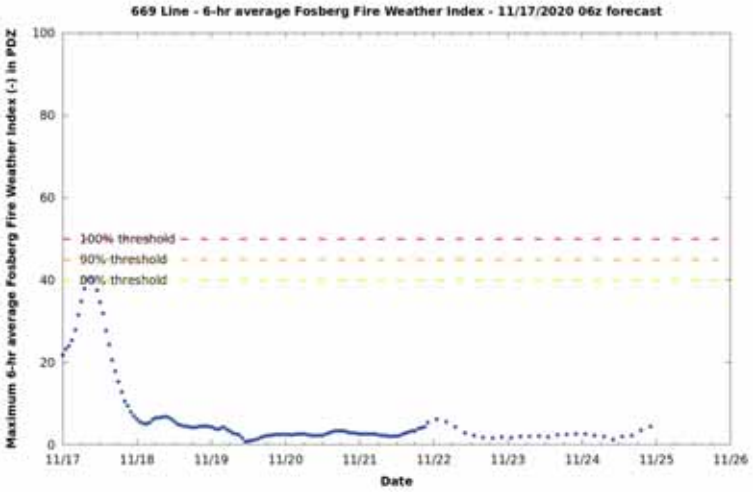


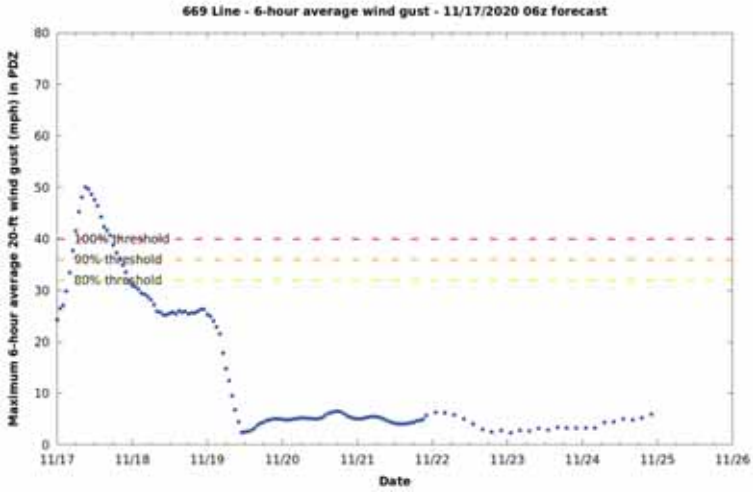
132 Line



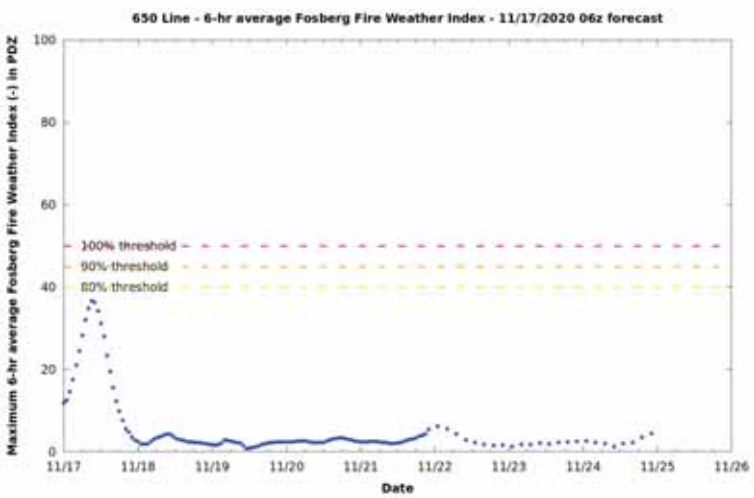


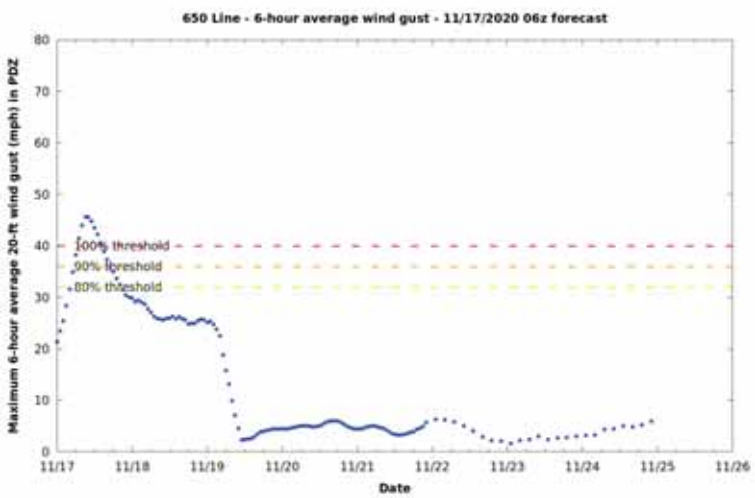
669 Line



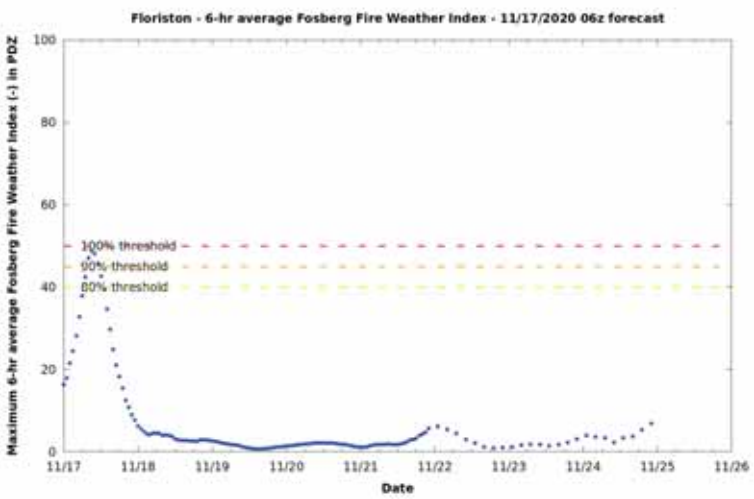


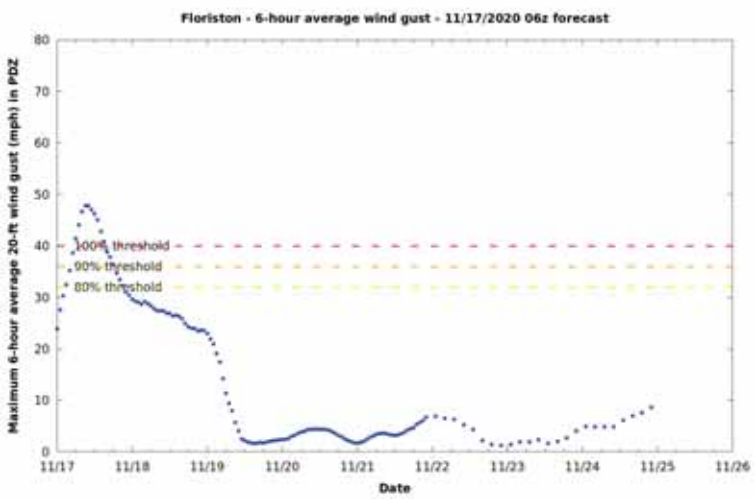
650 Line



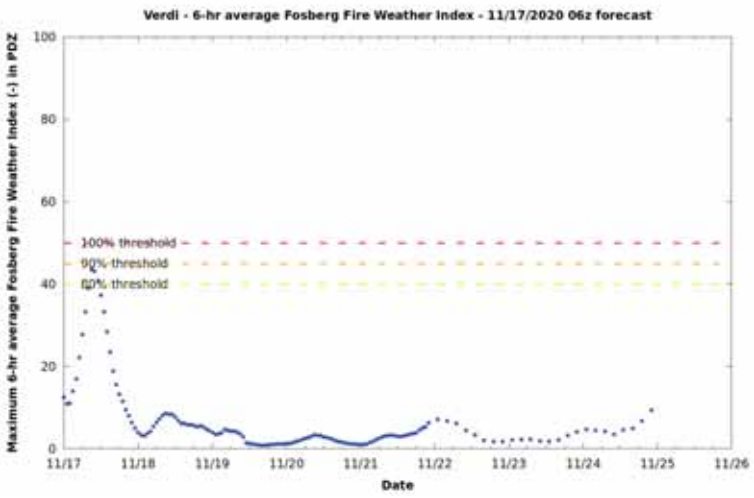


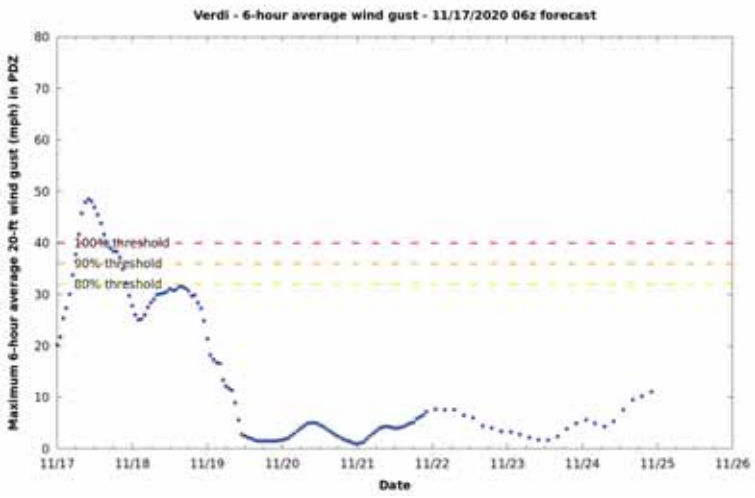
Floriston



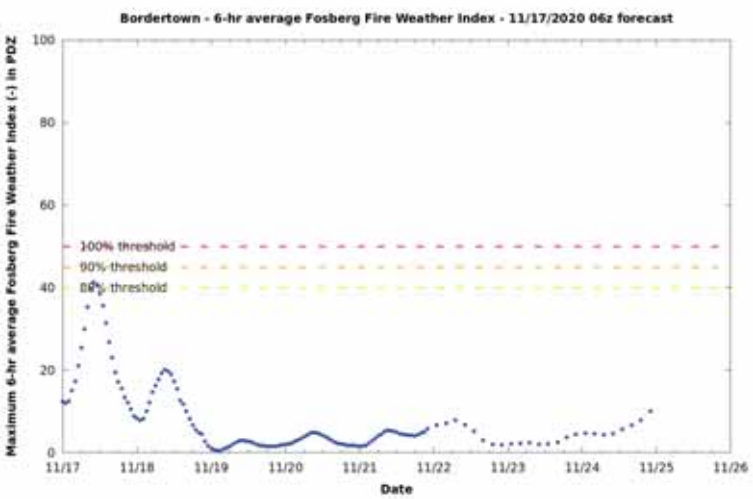


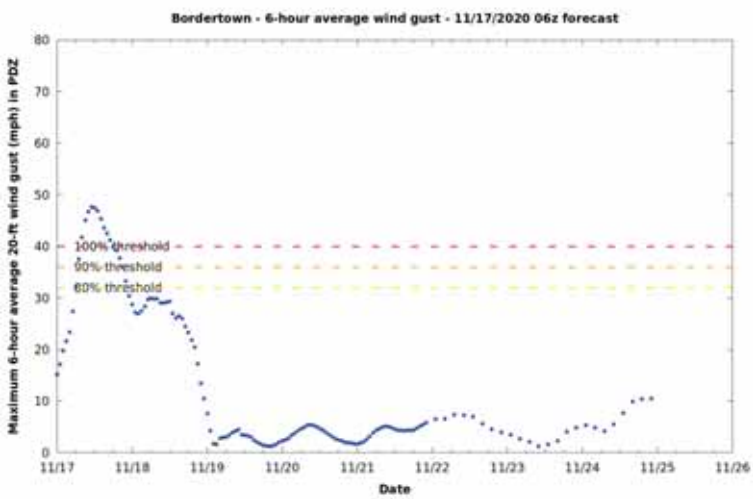
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/17/2020 06z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/17/2020 06z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/17/20 - 11/23/20

Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	moderate	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	moderate	low	low	low	low	low	low

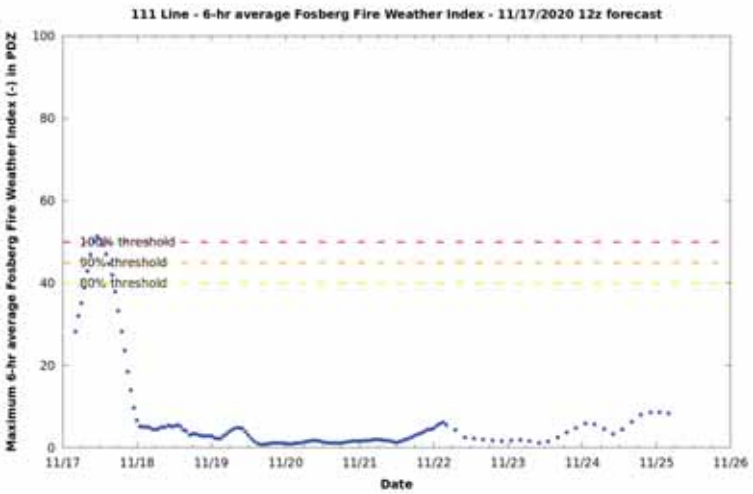
Liberty Utilities Energy Release Component Forecast for 11/17/20 - 11/23/20

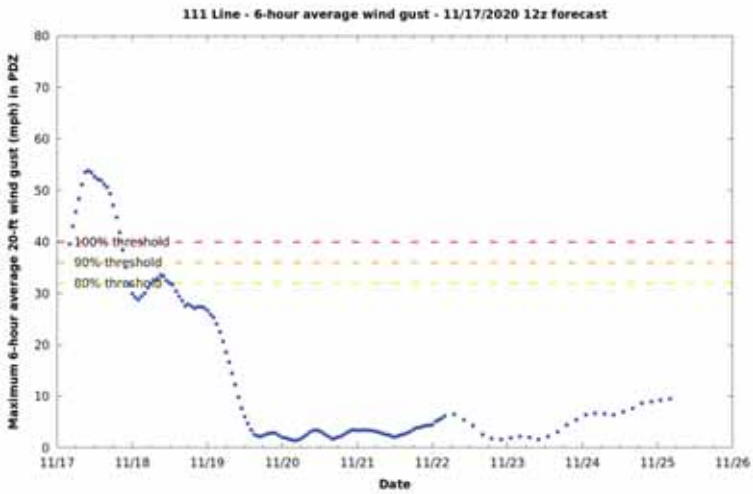
Zone	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23
111 Line	7.2	5.1	5.7	5.0	5.6	6.3	6.4
Portola	52.8	36.9	41.6	36.9	39.6	43.0	43.0
Sierra Brooks	61.8	49.5	52.5	46.4	50.4	54.4	55.2
Stampede	57.0	41.0	43.0	36.0	37.0	39.0	40.0
Russel Valley	63.0	48.1	50.6	40.5	40.4	40.1	39.1
Hobart	53.9	41.6	42.4	35.2	35.2	34.7	34.3
Sagehen Tap	17.9	13.7	14.2	12.0	12.0	12.0	12.0
Sunnyside	21.1	14.8	15.8	11.6	12.0	12.7	11.3
Ward Canyon East	54.5	38.2	40.9	30.0	30.9	32.7	29.1
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	42.4	31.4	33.0	26.8	29.7	32.3	32.3
Tah 73-36	1.5	1.1	1.0	0.8	0.7	0.7	0.7
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	44.1	32.9	37.0	31.0	35.7	38.1	39.1
Angora Ridge and Lily Lake	1.0	0.6	0.8	0.6	0.6	0.6	0.6

Cathedral Spring Creek Emerald Bay	19.0	12.9	15.6	12.0	13.1	14.1	14.1
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	49.3	33.3	35.9	28.2	32.9	37.1	38.6
Sorensons Tap	25.2	16.5	19.2	15.7	18.4	20.3	21.0
Mul1296 r3	55.2	37.7	40.2	30.5	34.3	38.0	39.7
Topaz	48.9	34.1	38.4	29.5	34.1	39.1	39.9
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	27.2	19.3	22.1	18.7	21.2	23.6	23.9
640 Tier 2	58.7	40.4	44.9	36.1	40.0	43.7	44.5
609 and Underbuild	2.6	1.8	1.9	1.6	1.8	2.0	2.0
625 Line	4.9	3.8	3.9	3.5	3.8	4.1	4.2
Bky 5200	57.3	38.1	45.2	35.2	32.6	33.8	30.6
Old Country Road	57.7	42.4	45.4	37.6	33.4	33.1	30.3
Tah 52-68	21.9	16.4	16.4	13.6	11.7	10.9	10.2
The Grid	60.9	39.5	46.7	33.7	33.0	33.5	31.5
Canterbury and Commonwealth	44.7	29.3	34.5	24.9	24.9	25.7	24.2
Bky 5100 to NVE	25.6	16.8	19.7	14.3	14.3	14.7	13.8
Beacon Tap	69.0	53.0	55.0	46.0	45.0	46.0	46.0
Glenshire and 608	66.9	51.8	54.4	44.6	46.2	46.7	46.2
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	9.7	9.7	10.4	8.8	10.0	10.9	10.9
132 Line	13.9	13.9	14.7	12.1	12.9	13.6	13.9
669 Line	49.4	49.4	51.9	43.6	45.0	48.7	49.4
650 Line	27.7	27.7	29.2	25.4	27.2	29.3	30.1
Floriston	38.1	38.1	41.8	33.3	36.0	38.1	39.0
Verdi	43.6	43.6	46.7	38.2	43.1	46.7	48.7
Bordertown	49.2	49.2	51.0	42.6	47.0	51.4	52.4

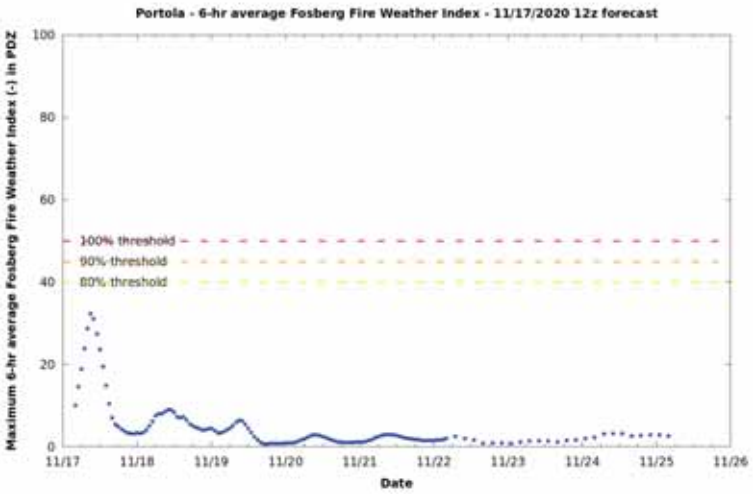
Liberty Utilities Fire Weather Summary Plots - 11/17/2020 12z forecast

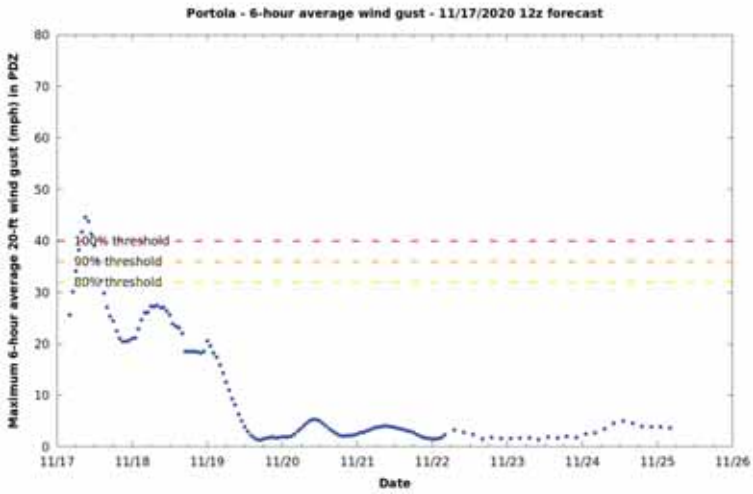
111 Line



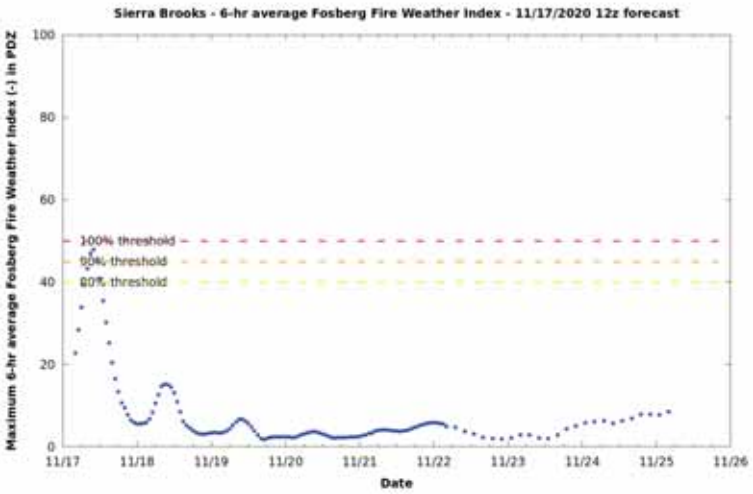


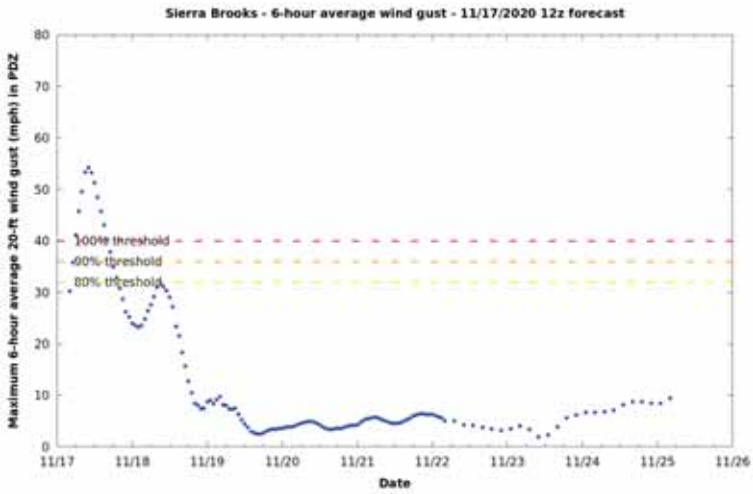
Portola



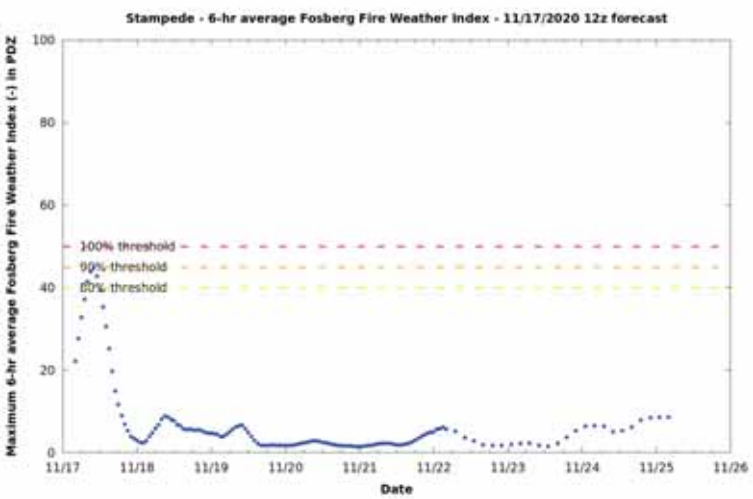


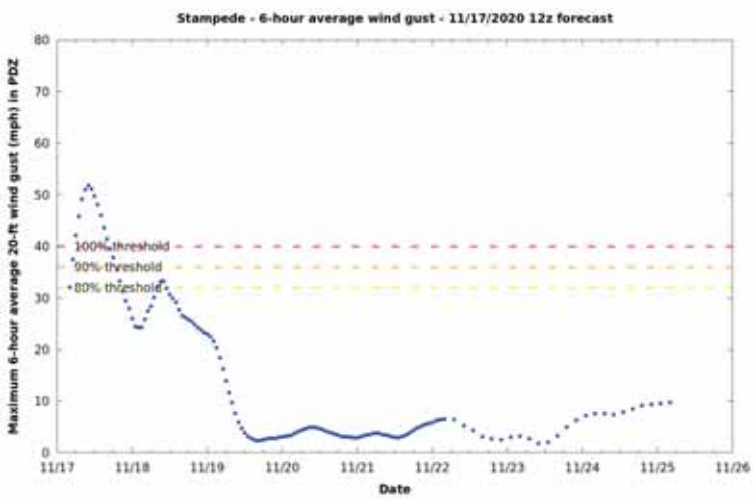
Sierra Brooks



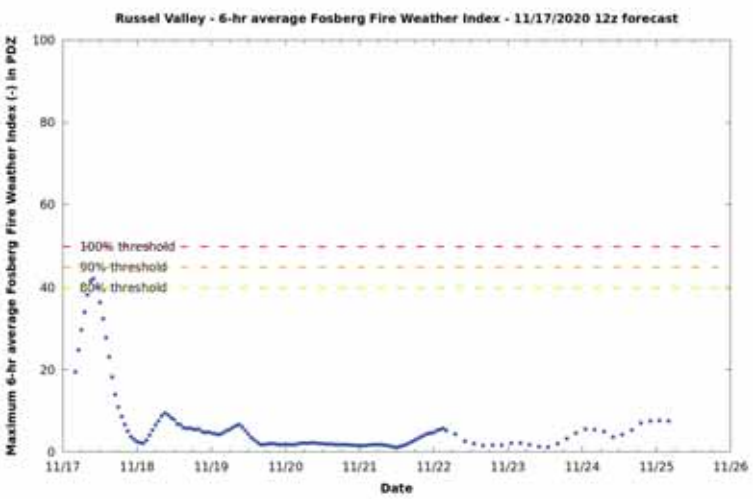


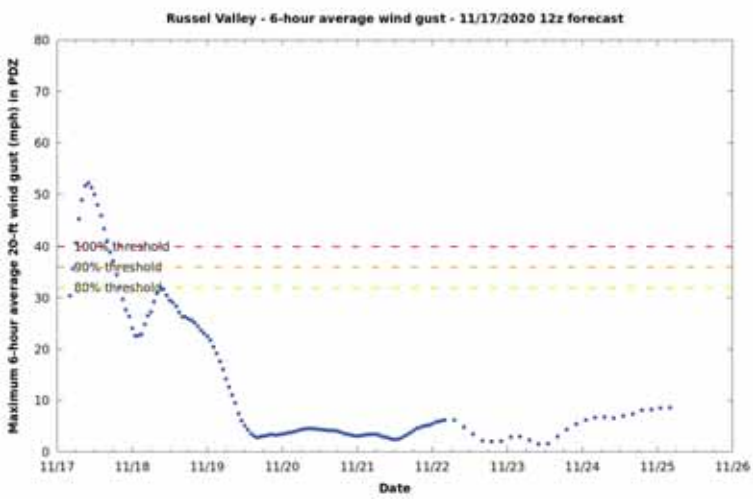
Stampede



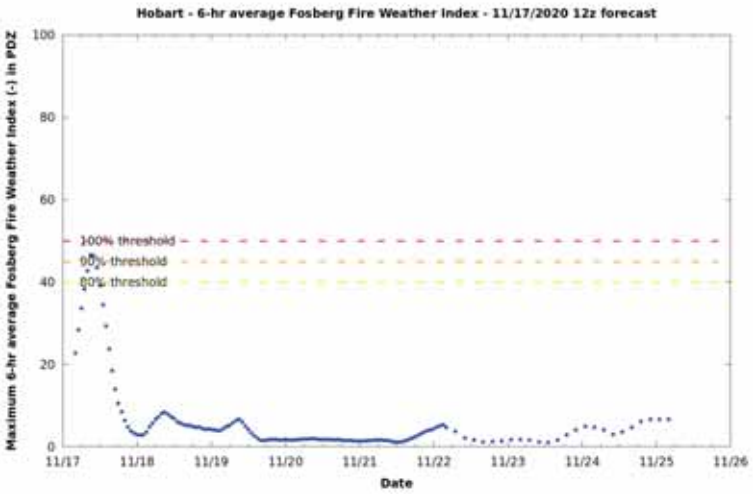


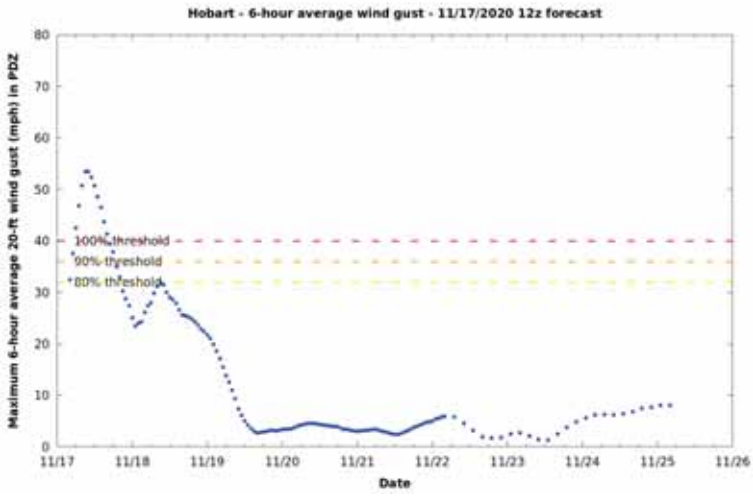
Russell Valley



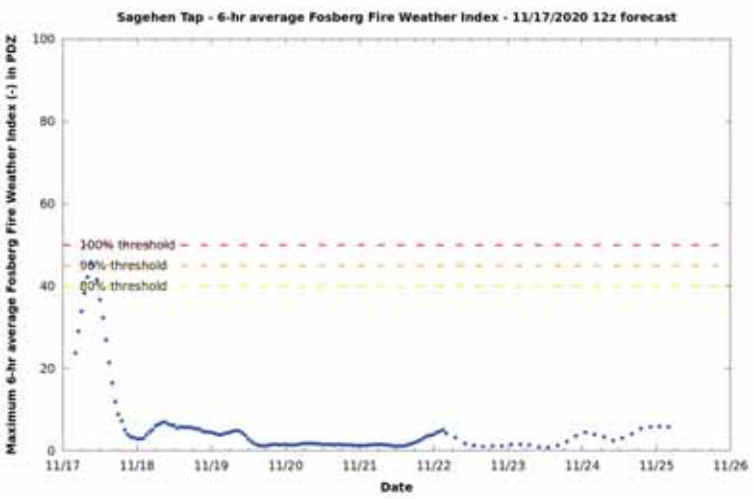


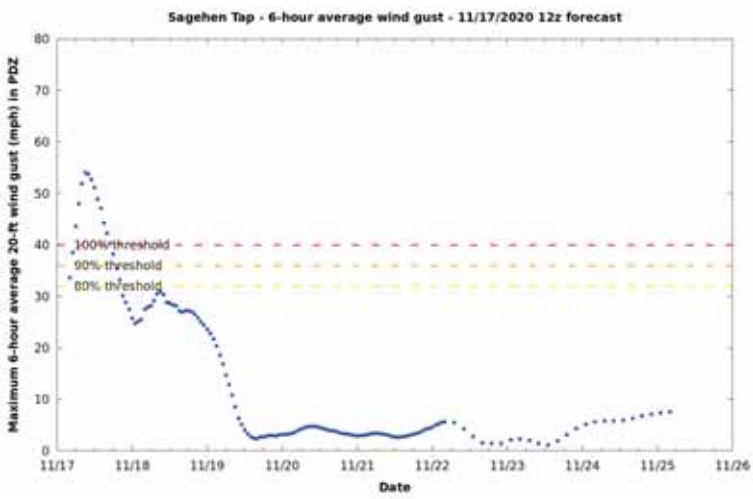
Hobart



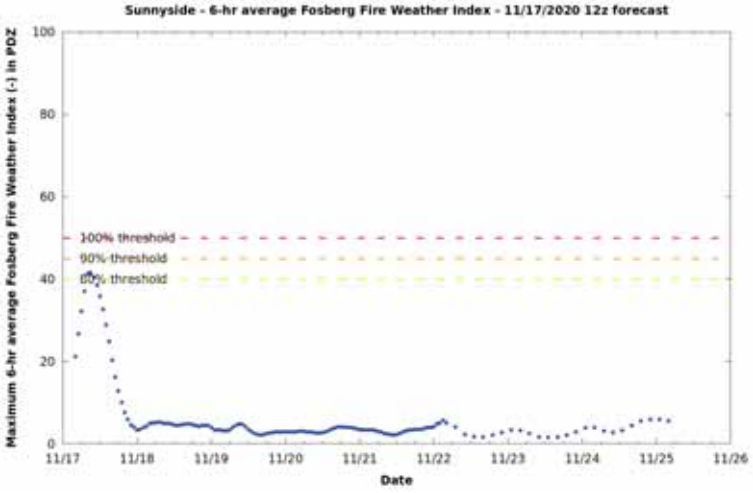


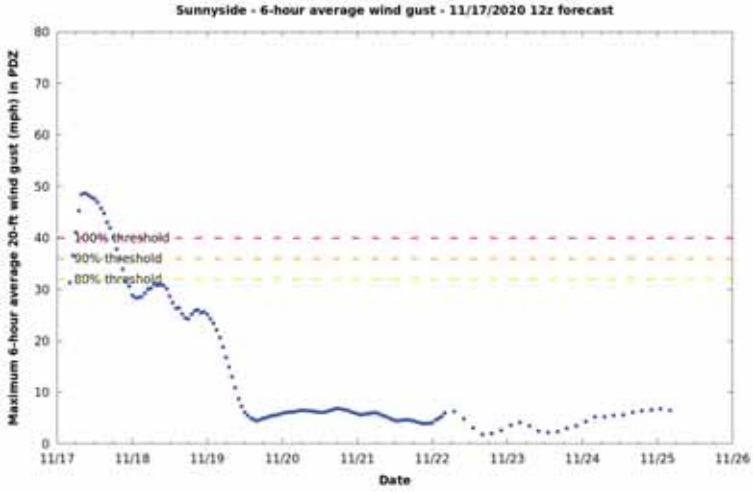
Sagehen tap



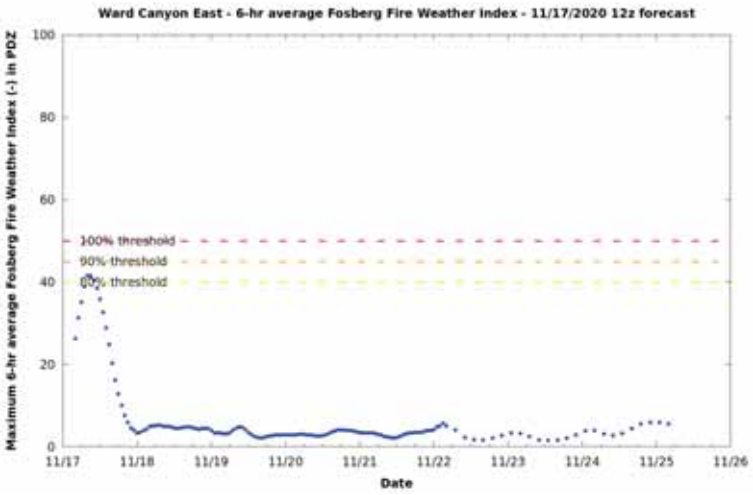


Sunnyside



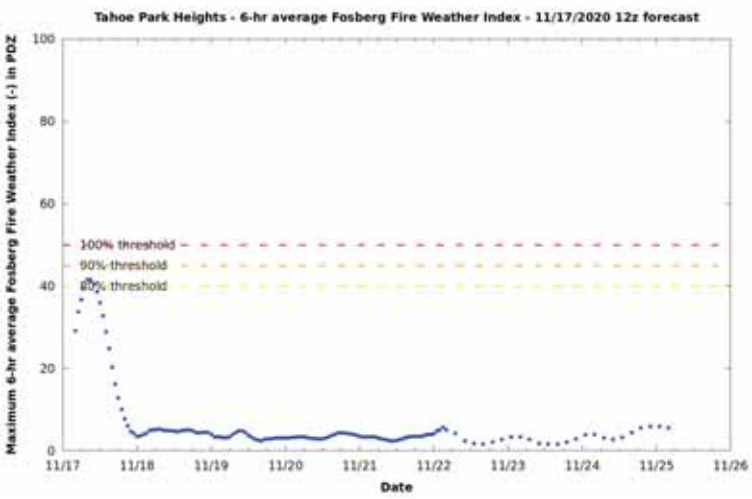


Ward Canyon East



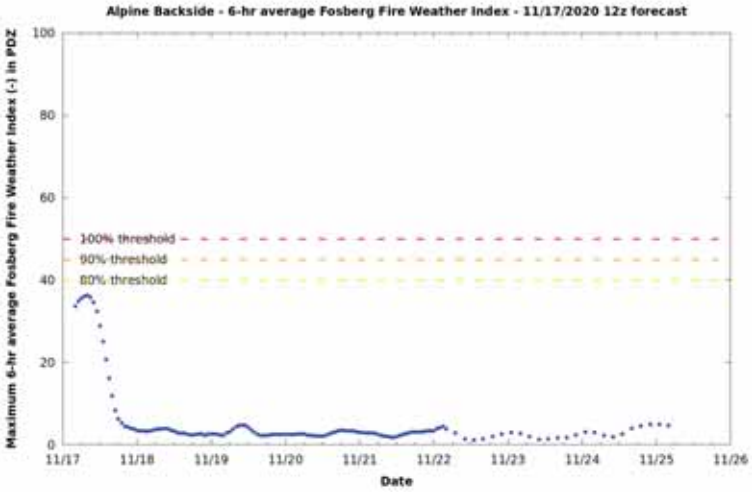


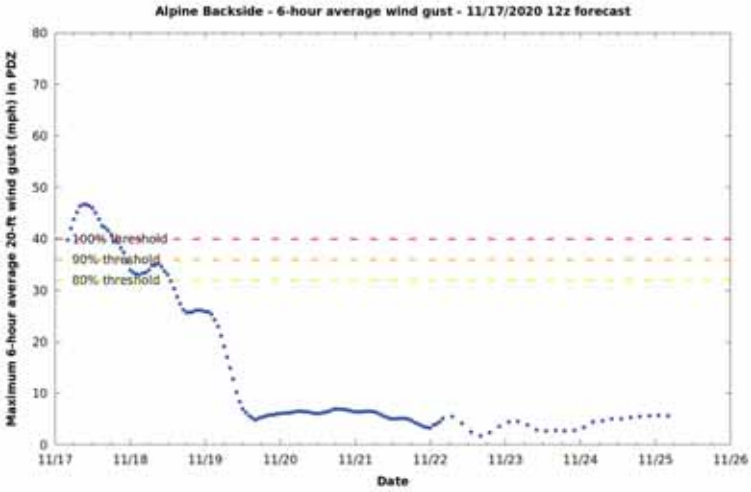
Tahoe Park Heights



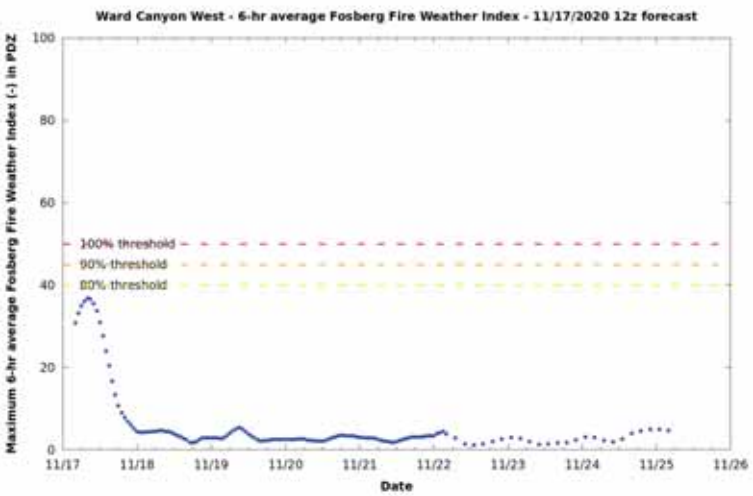


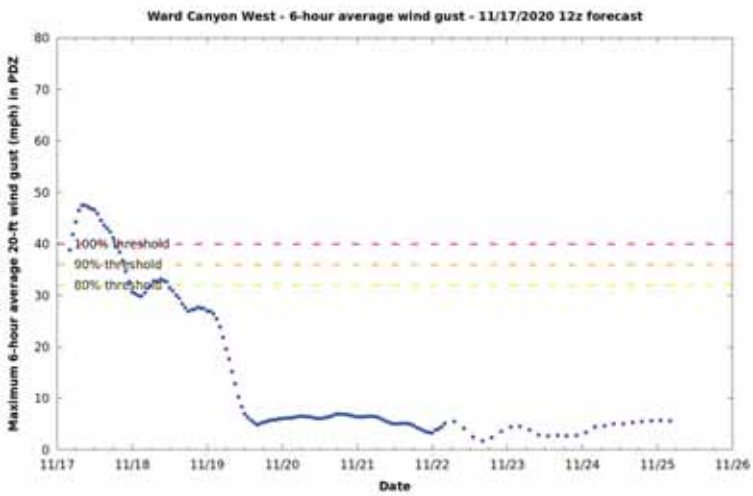
Alpine Backside



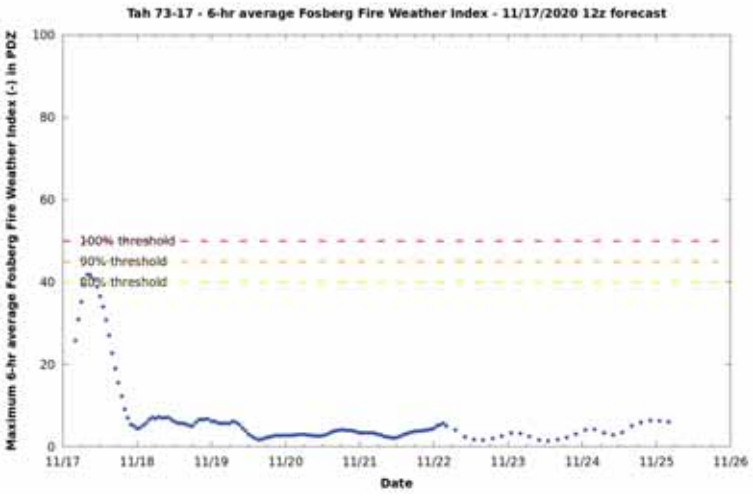


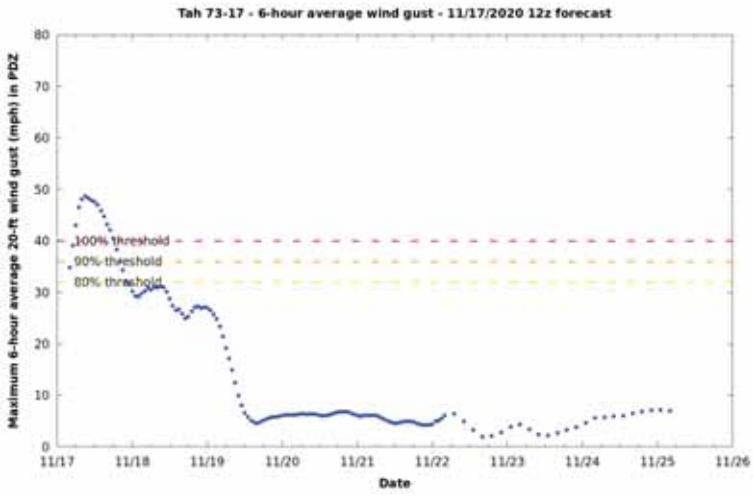
Ward Canyon West



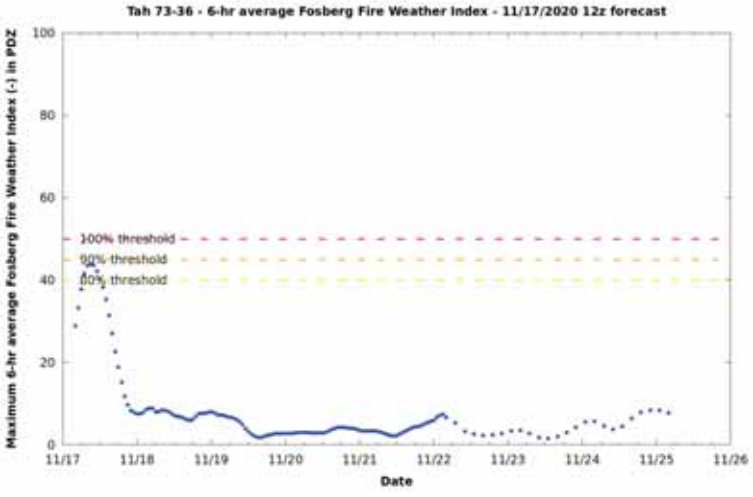


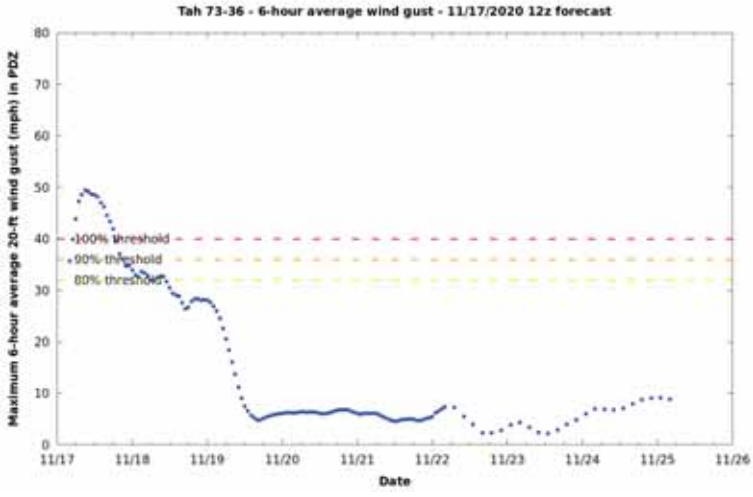
Tah 73-17



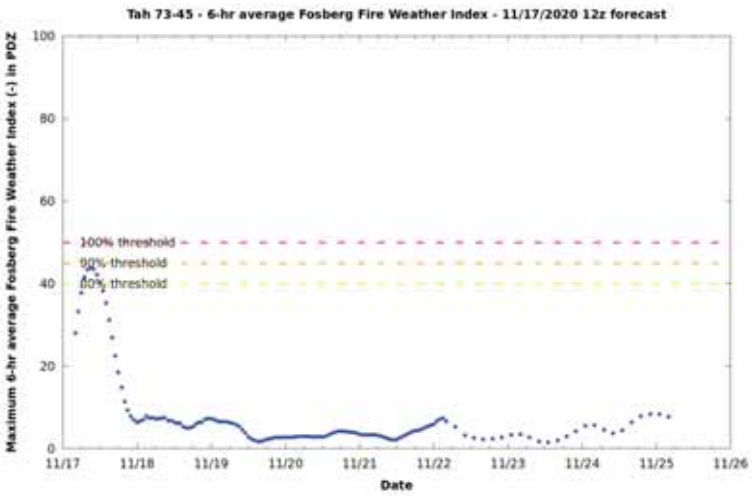


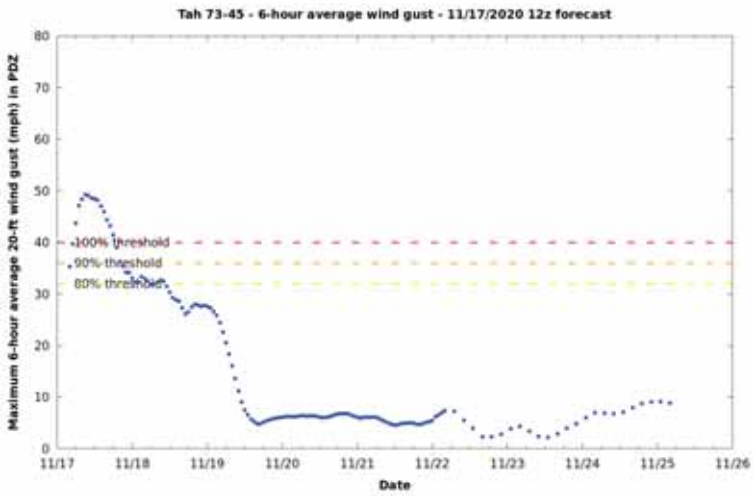
Tah 73-36



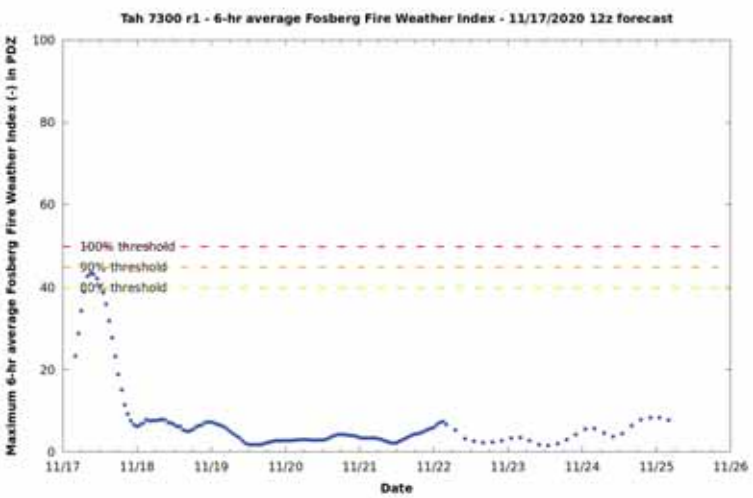


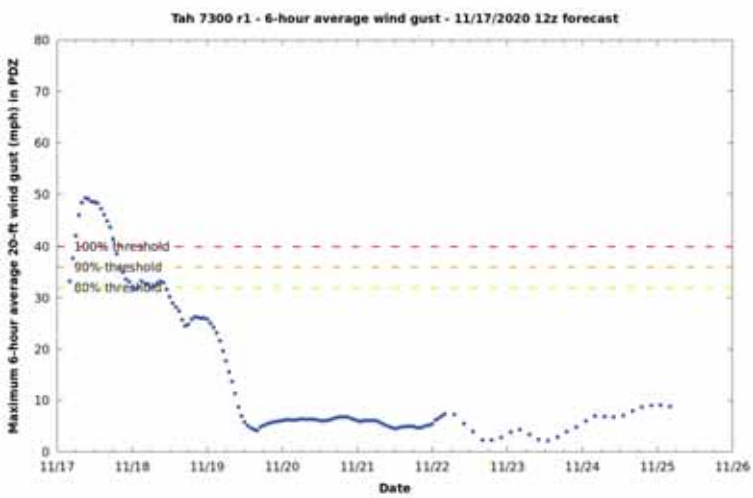
Tah 73-45



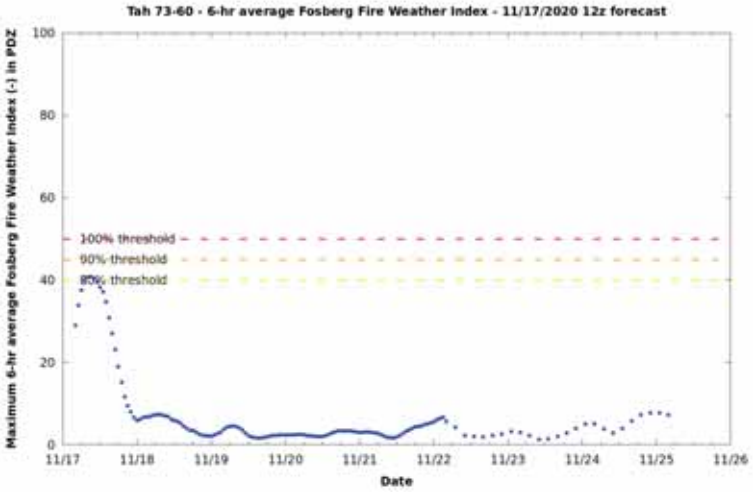


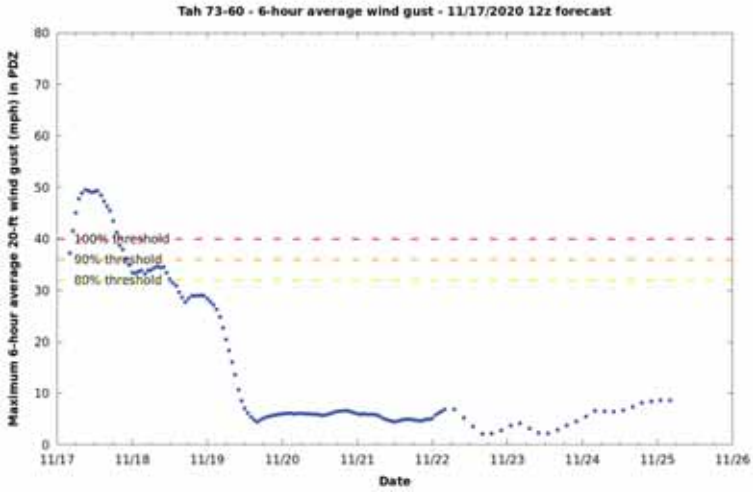
Tah 7300 r1



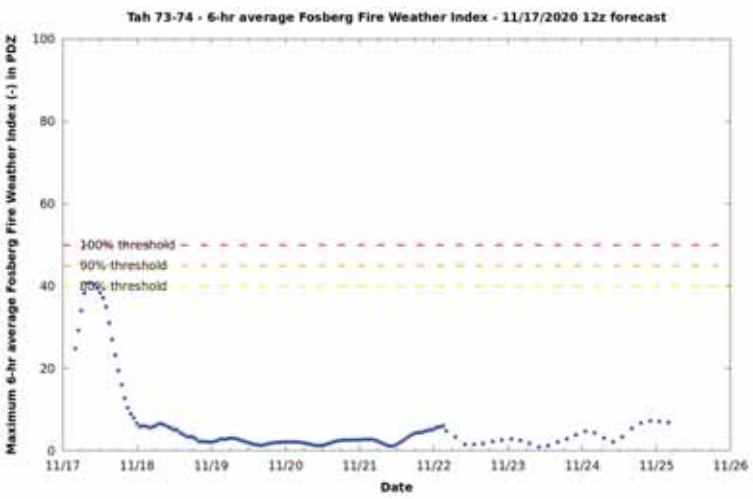


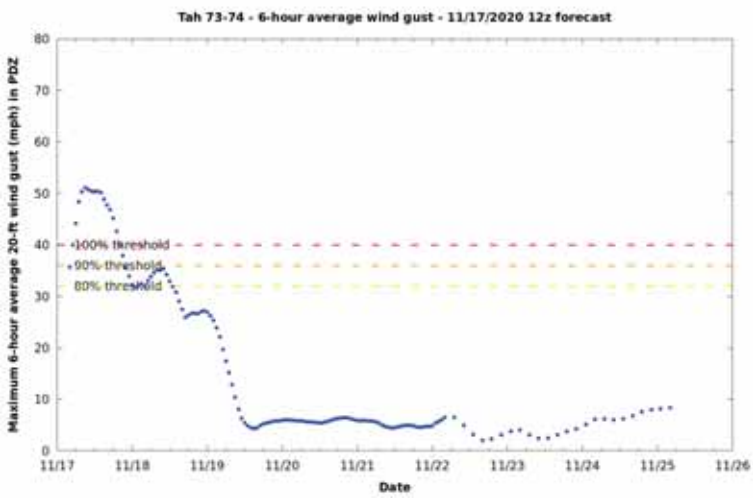
Tah 73-60



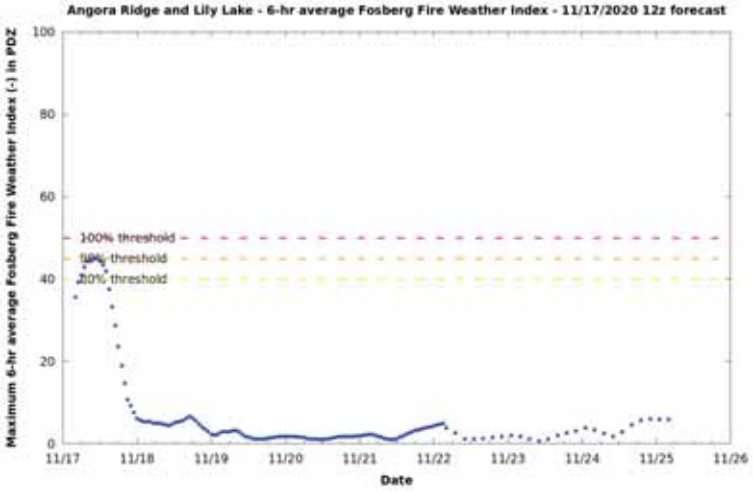


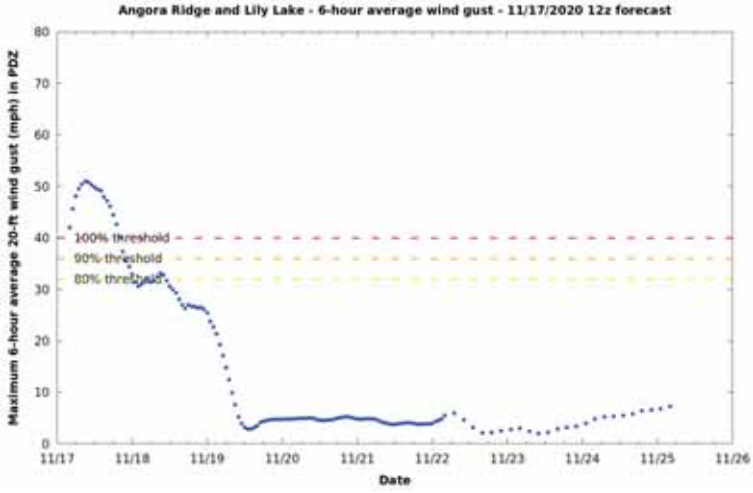
Tah 73-74



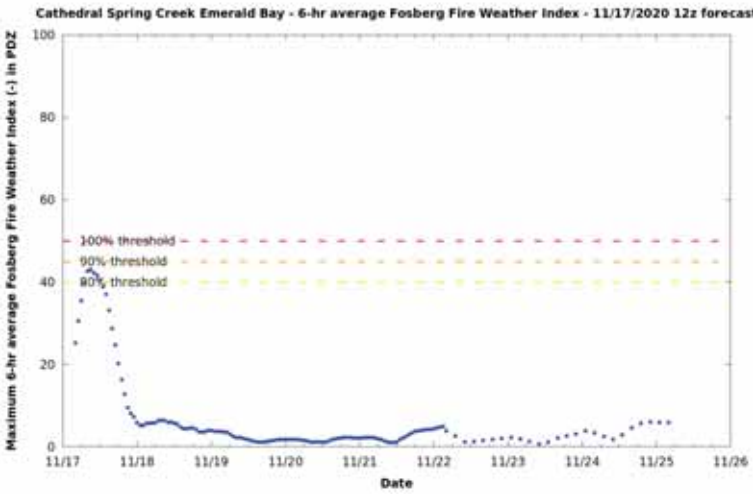


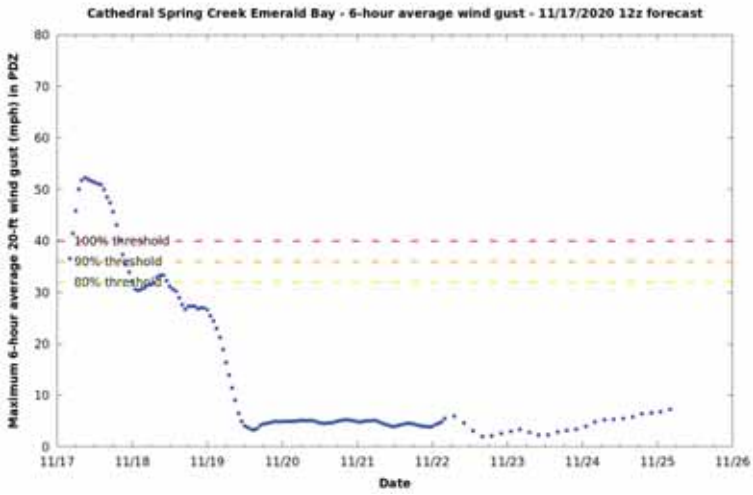
Angora Ridge and Lily Lake



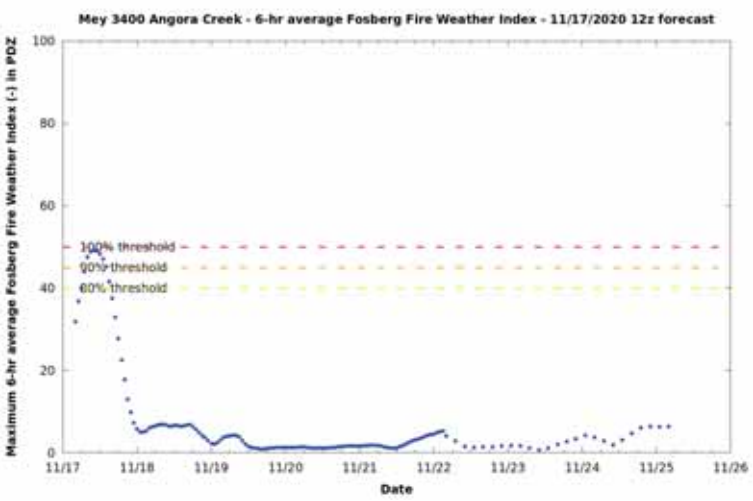


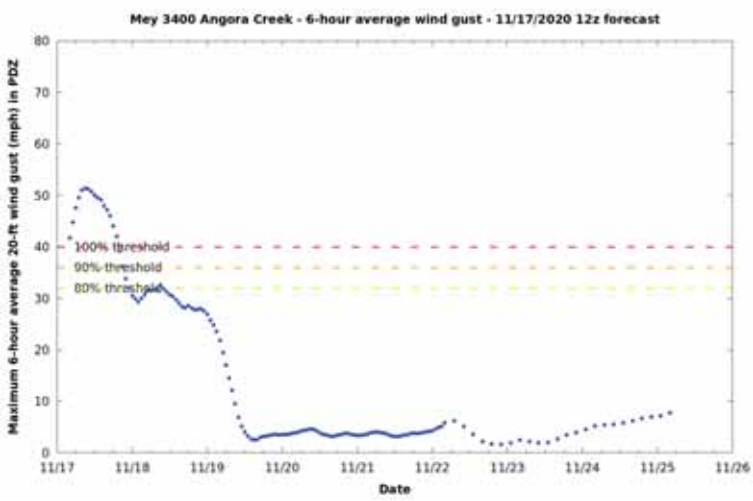
Cathedral Spring Creek Emerald Bay



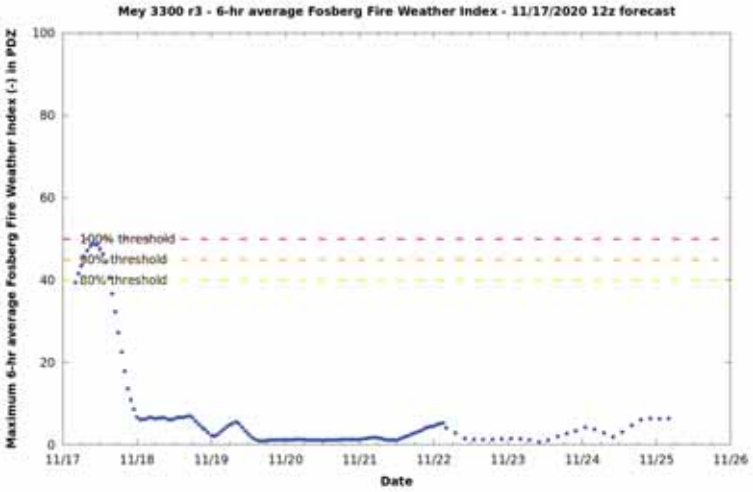


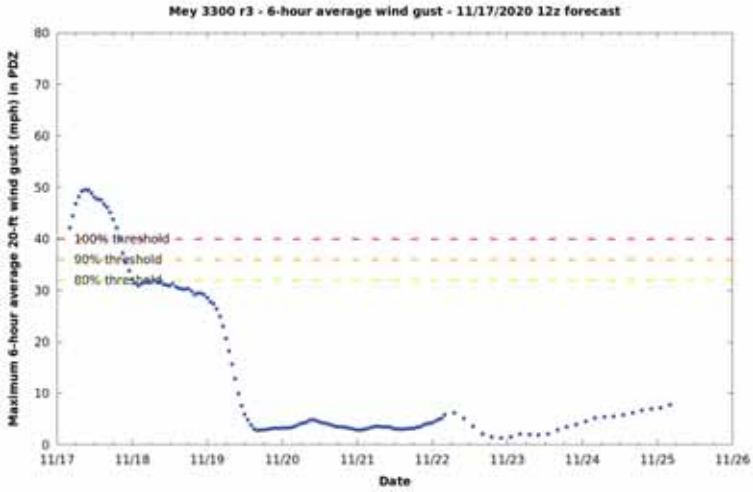
Mey 3400 Angora Creek



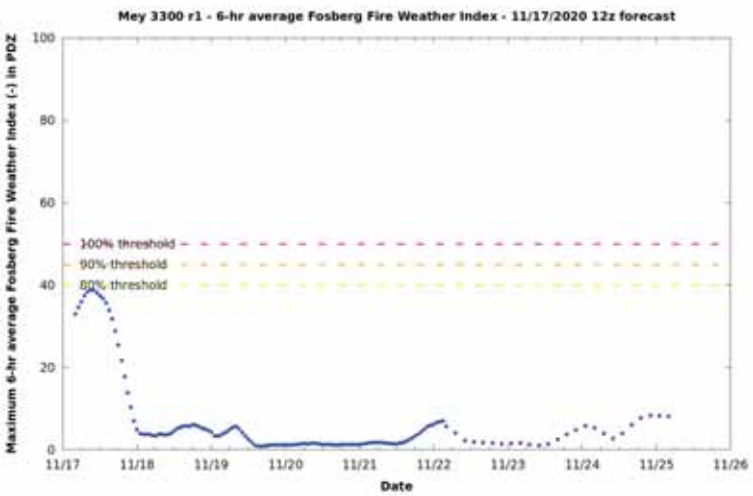


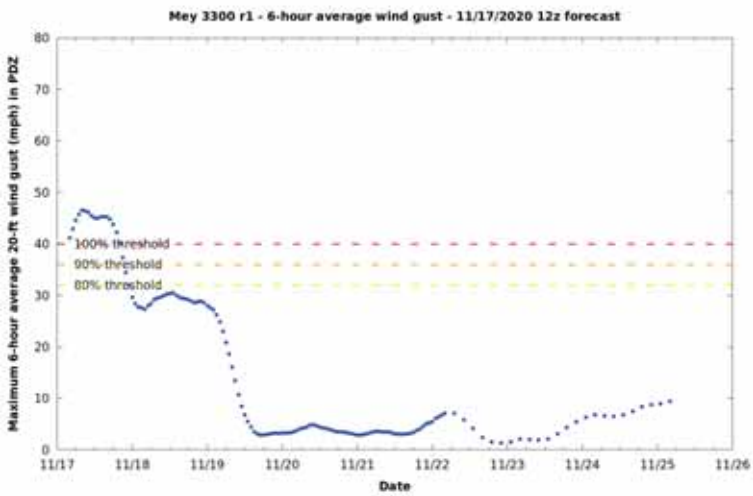
Mey 3300 r3



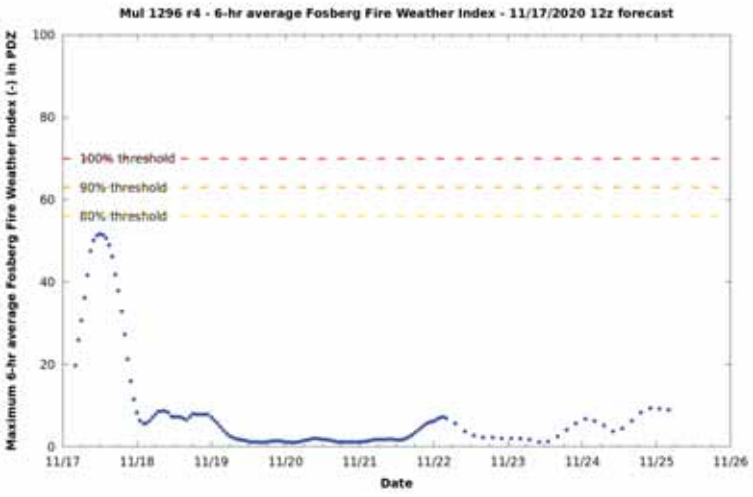


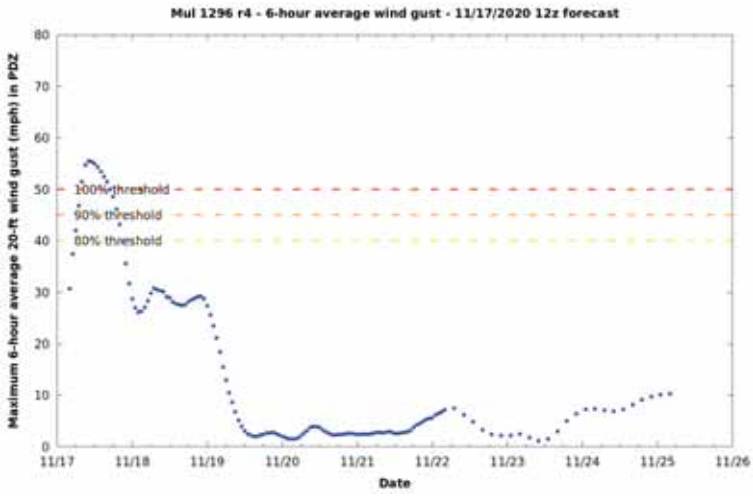
Mey 3300 r1



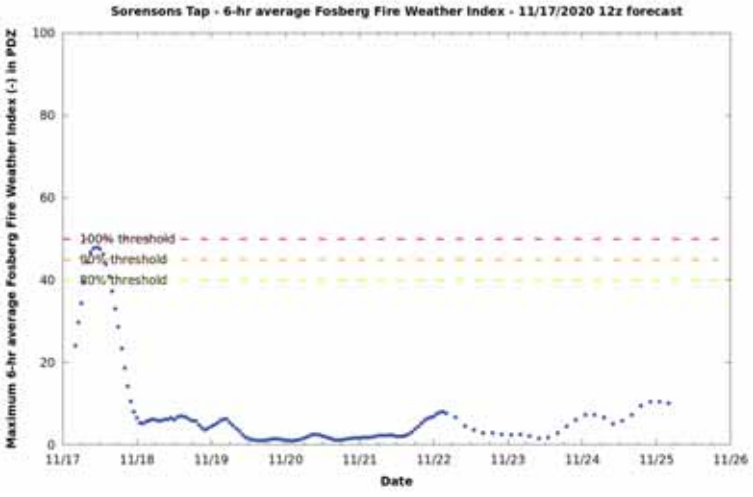


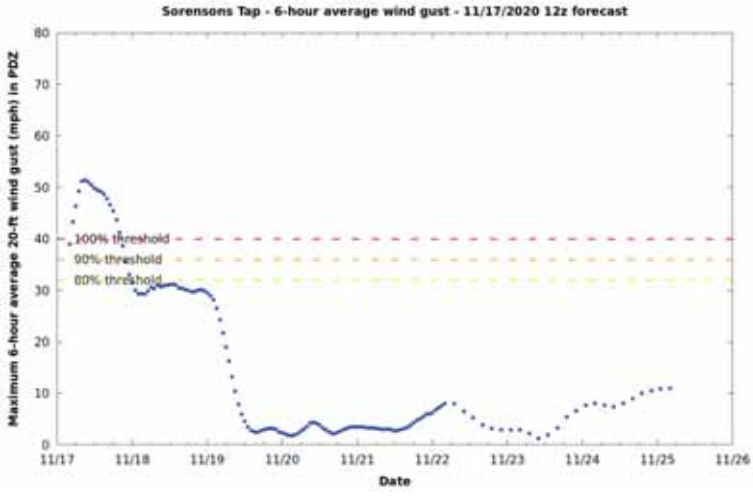
Mul 1296 r4



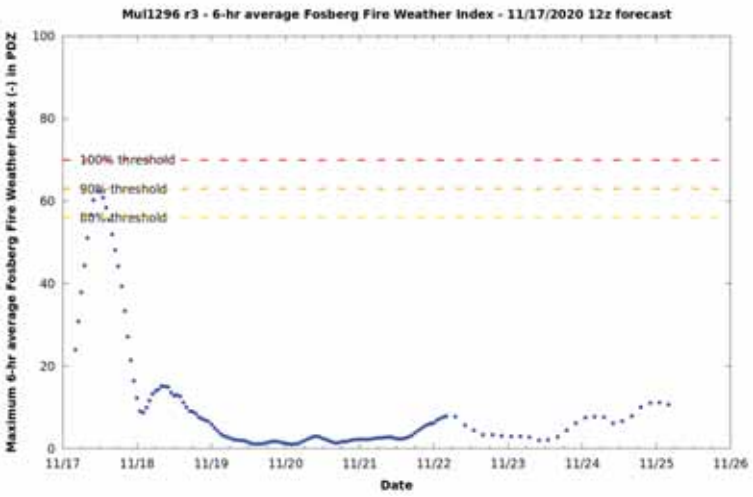


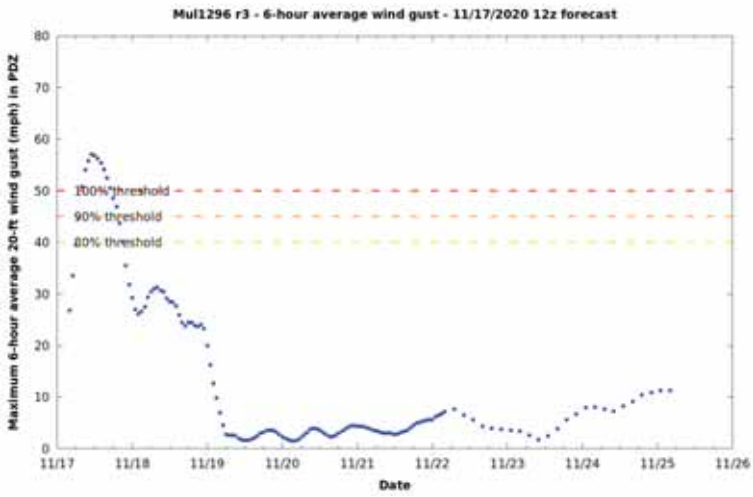
Sorensons Tap



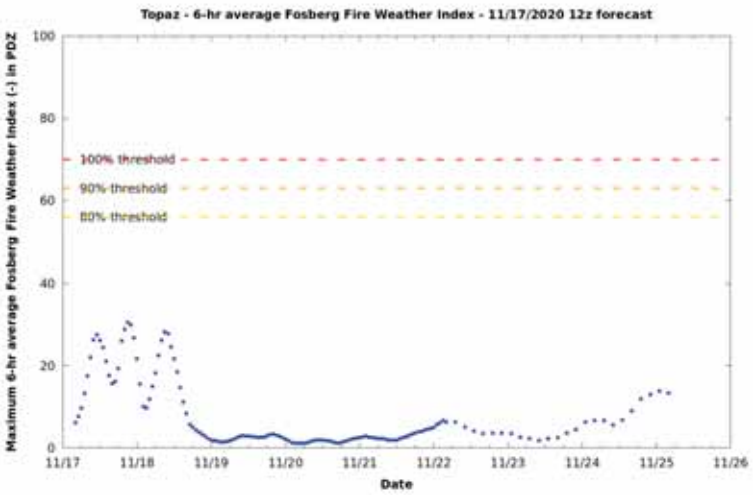


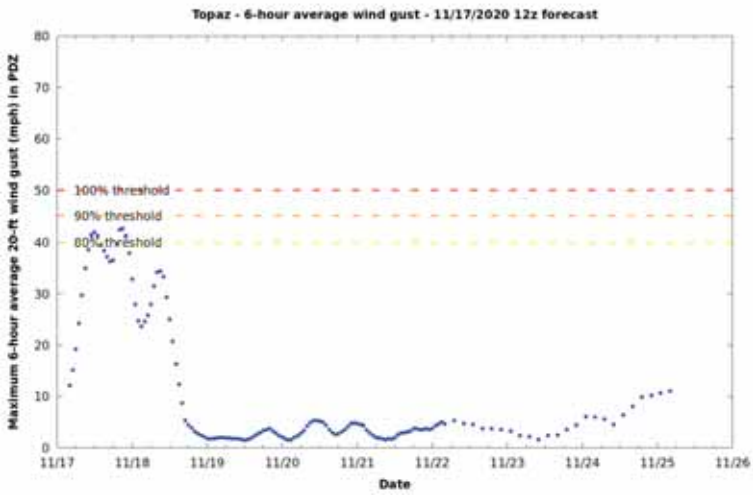
Mul 1296 r3



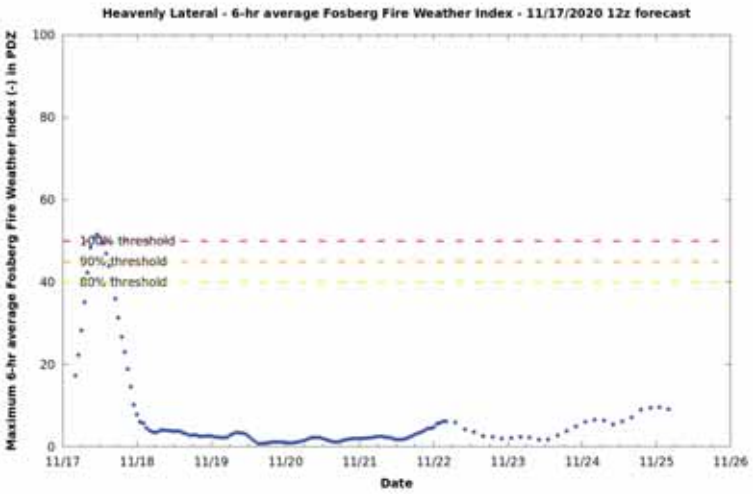


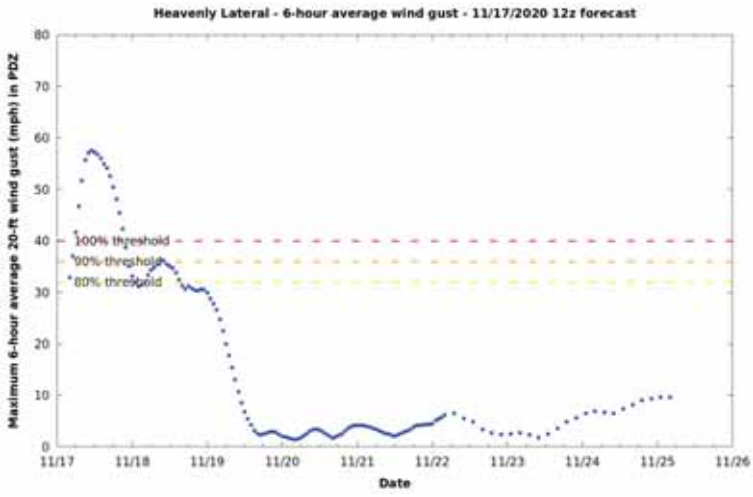
Topaz



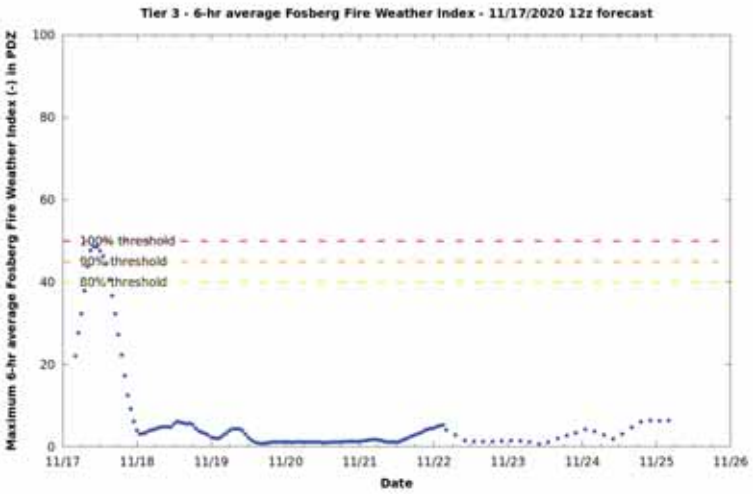


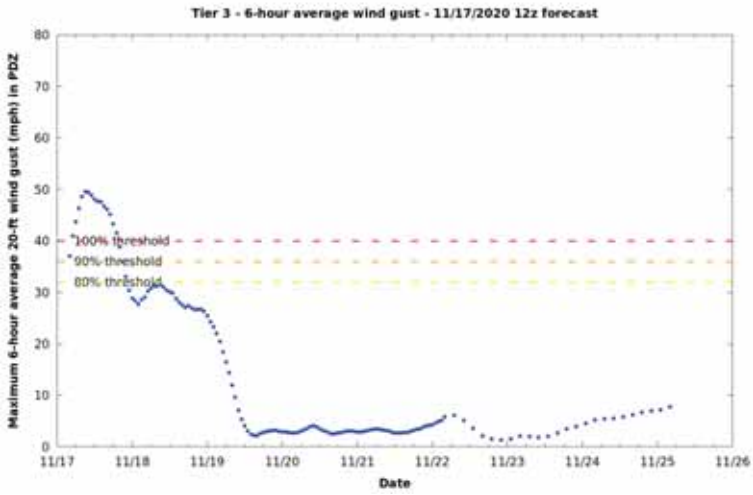
Heavenly Lateral



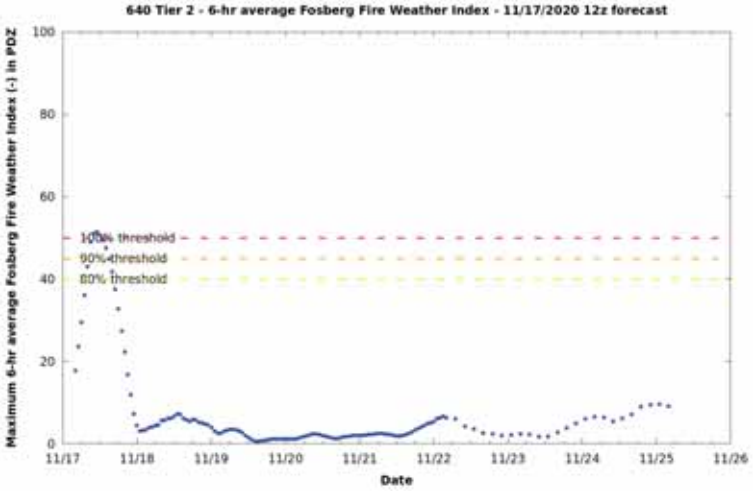


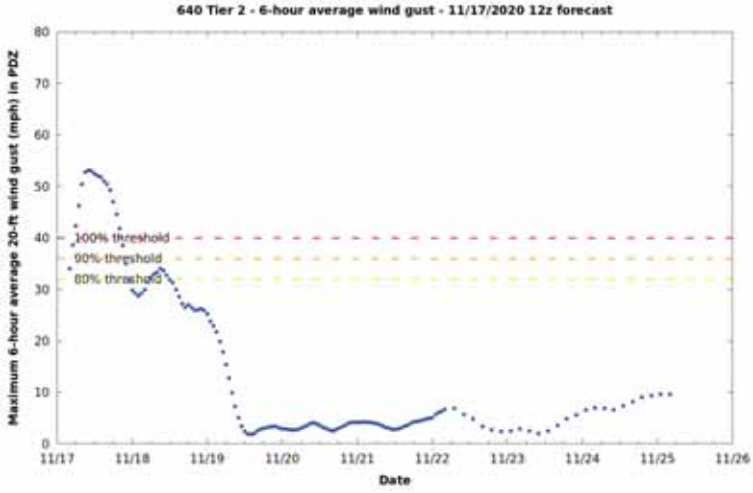
Tier 3



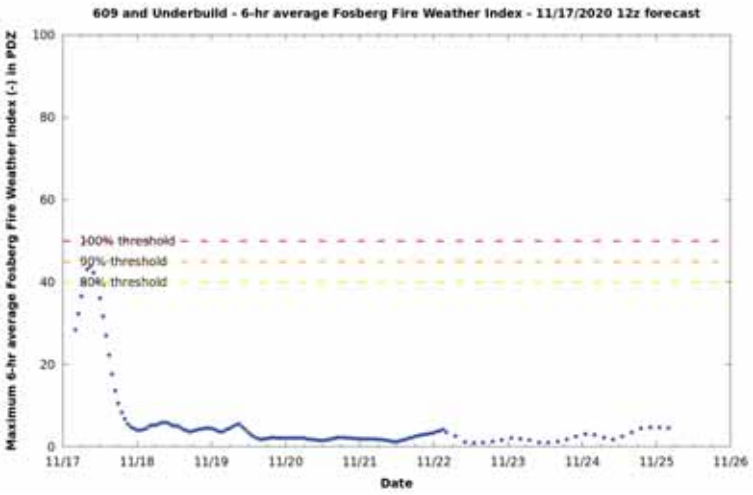


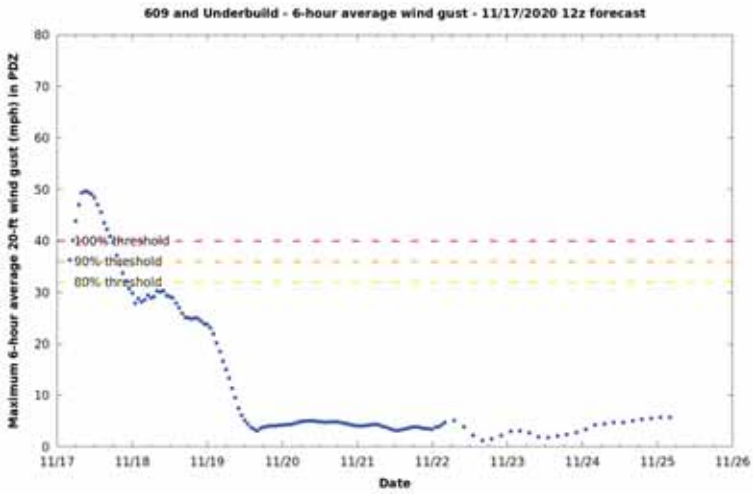
640 Tier 2



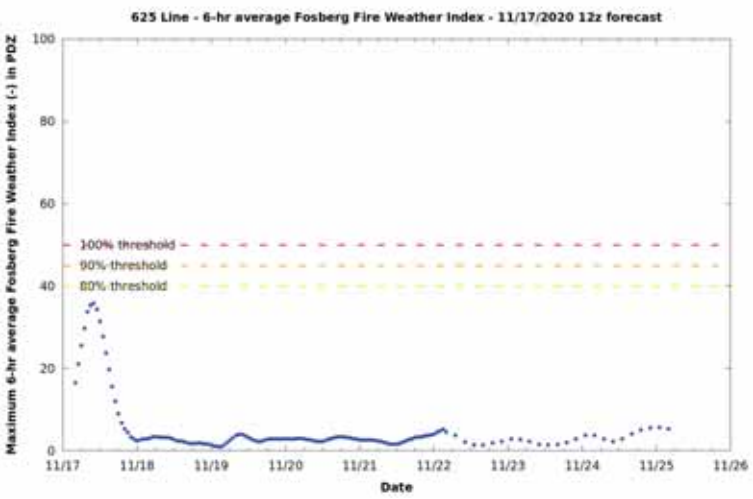


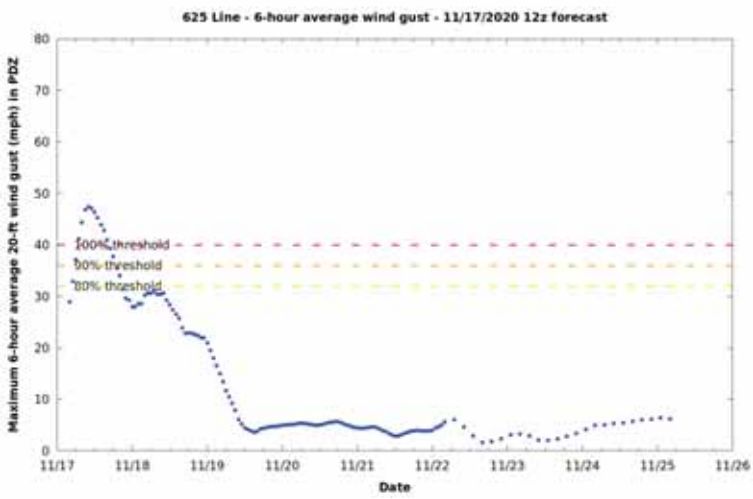
609 and Underbuild



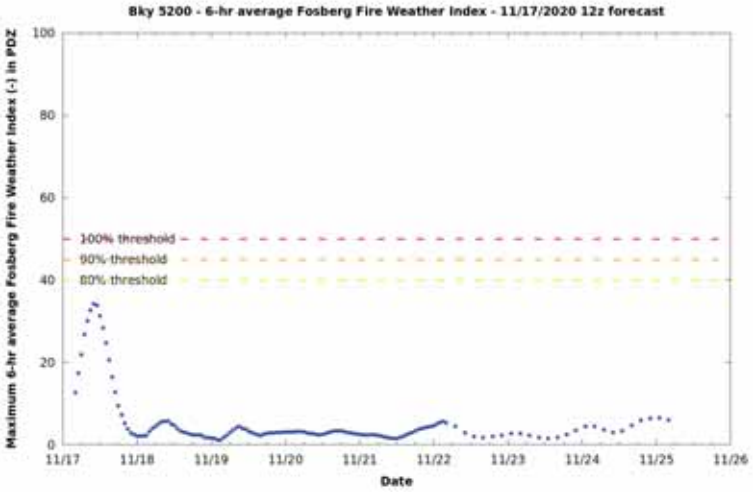


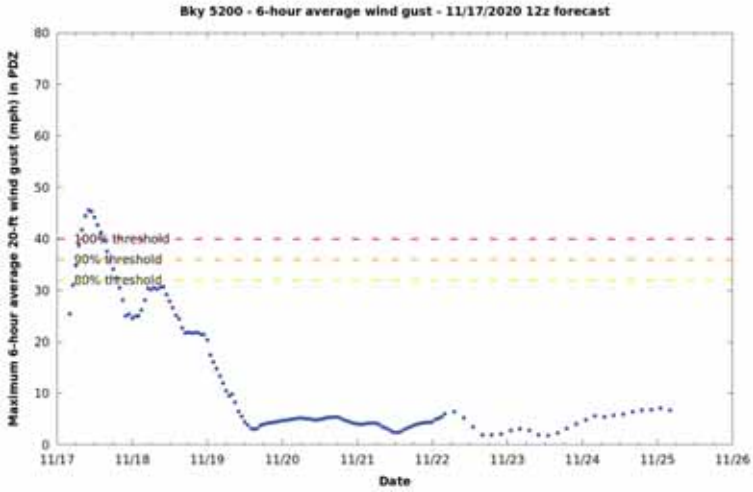
625 Line



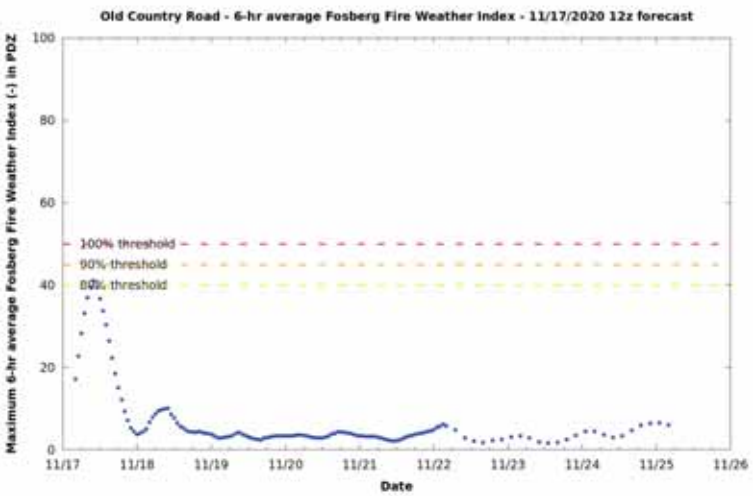


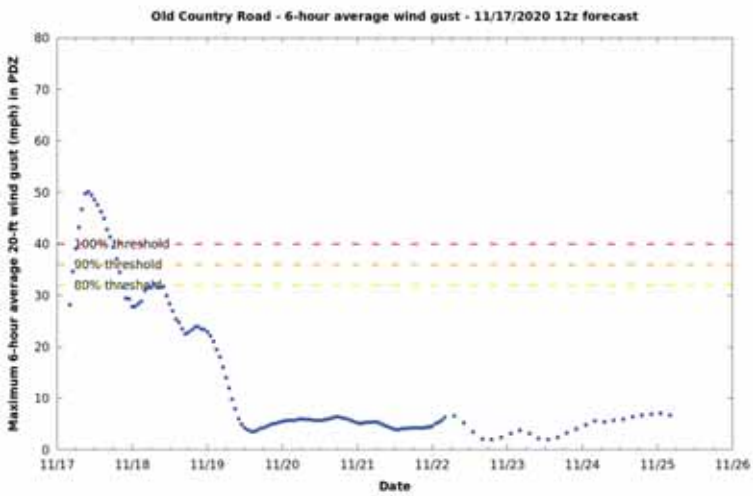
Bky 5200



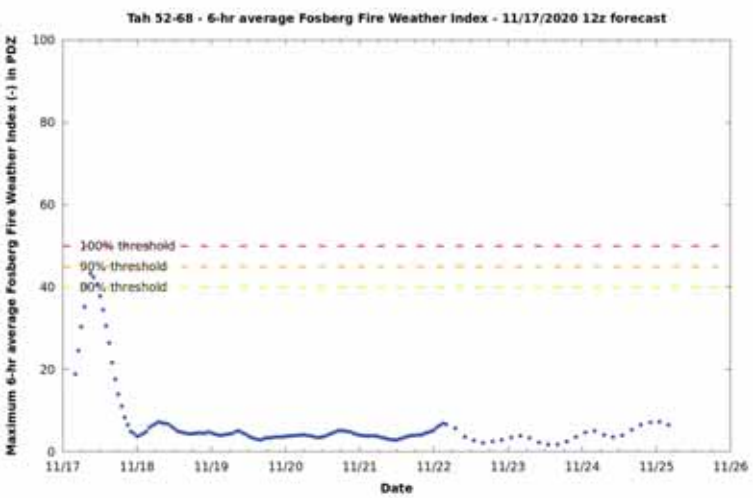


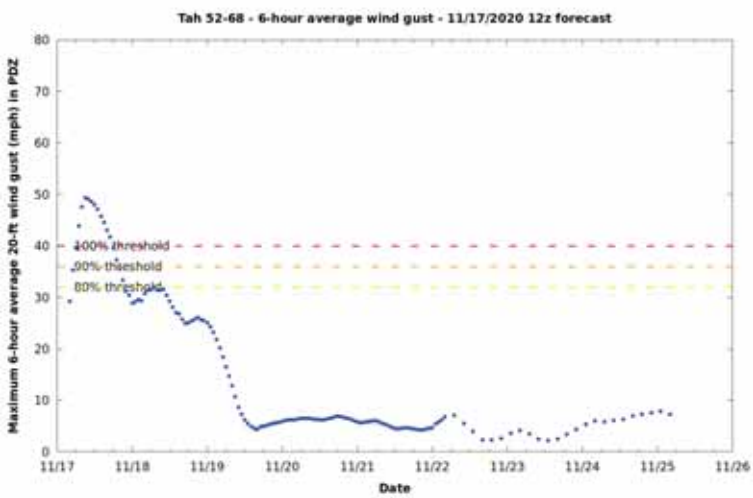
Old Country Road



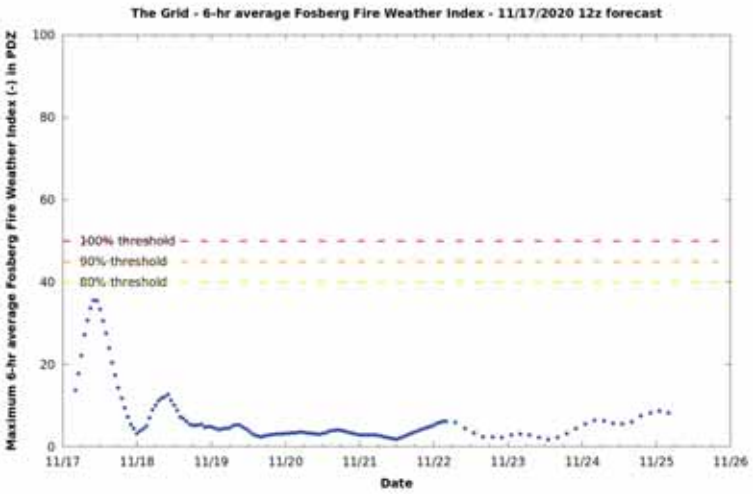


Tah 52-68



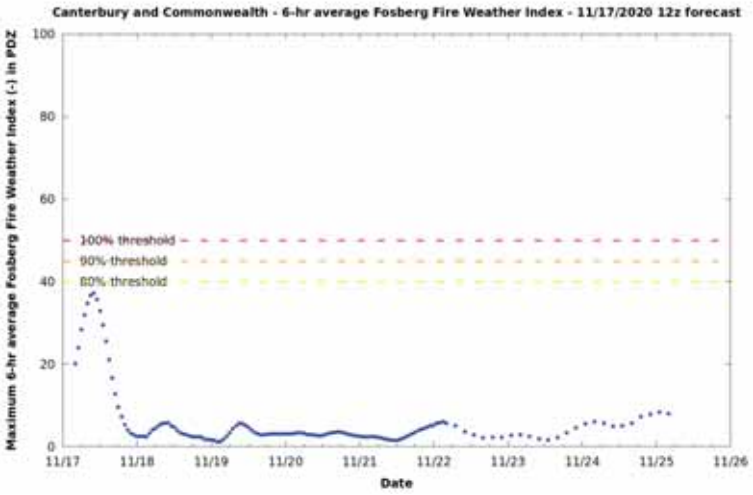


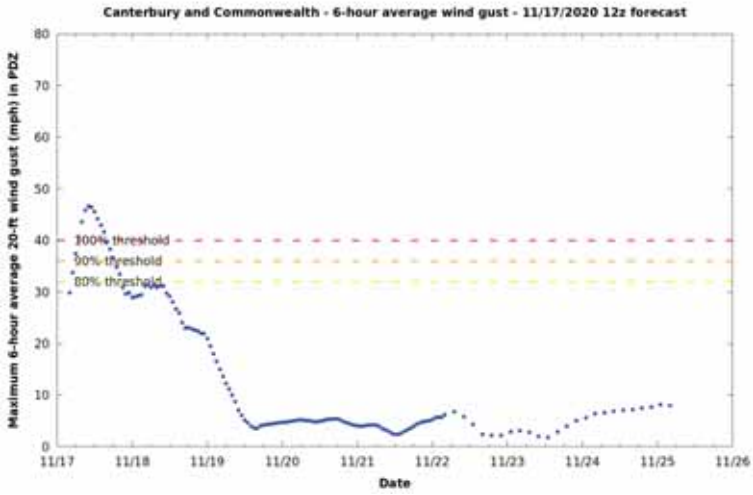
The Grid



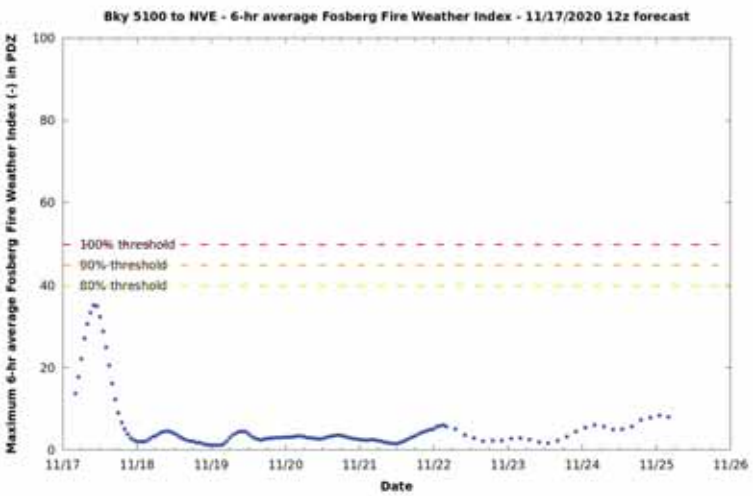


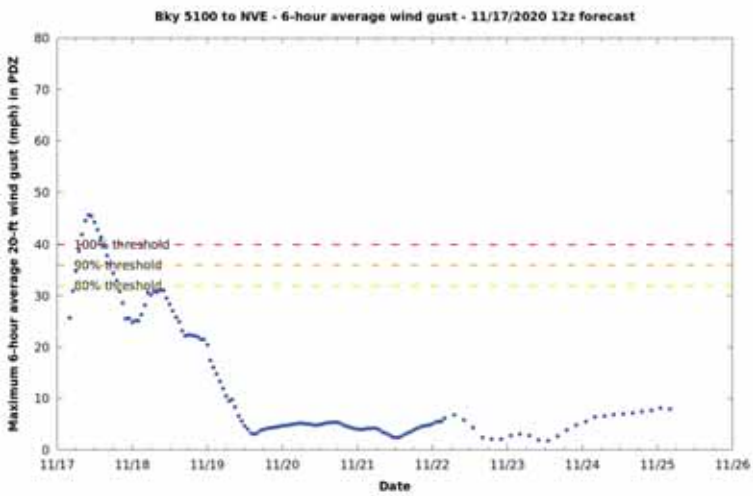
Canterbuy and Commonwealth



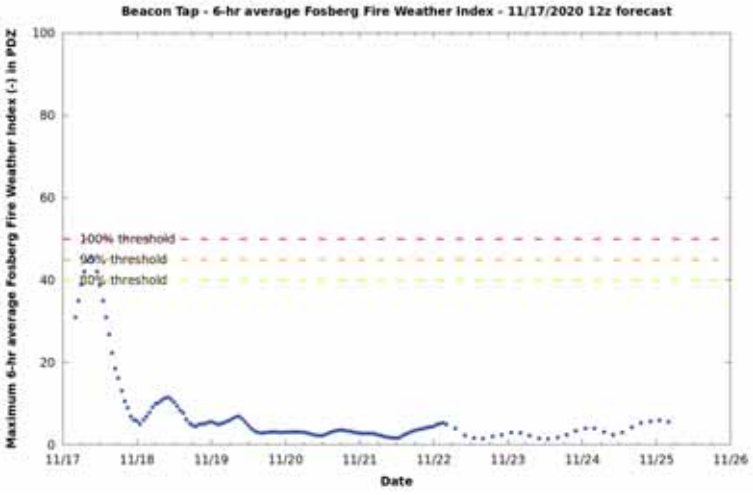


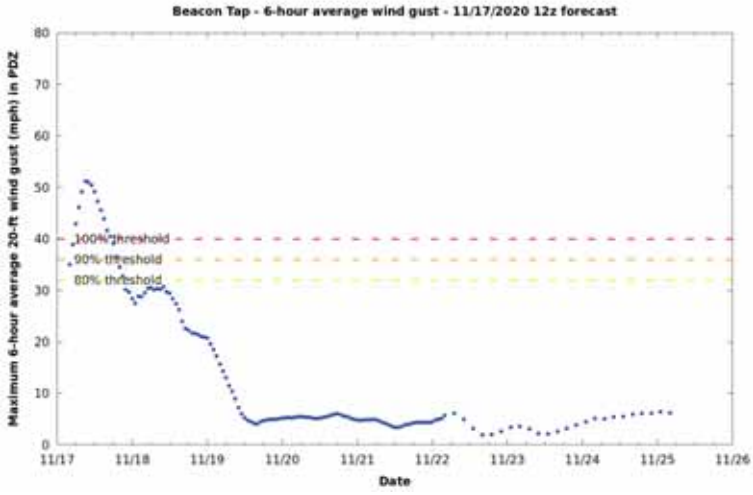
Bky 5100 to NVE



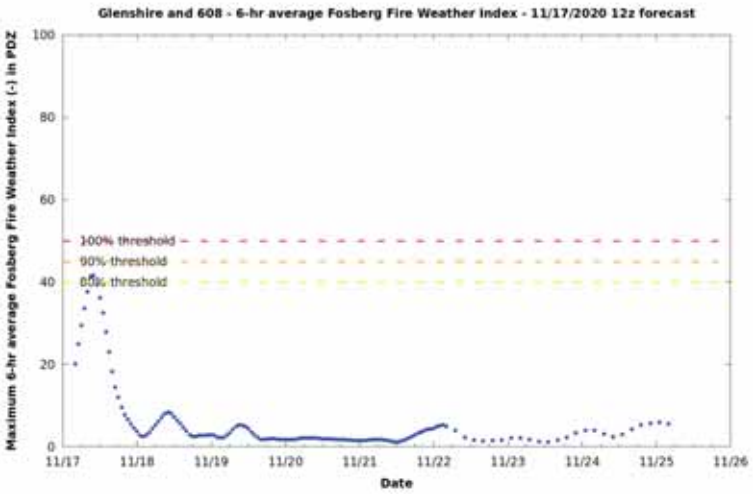


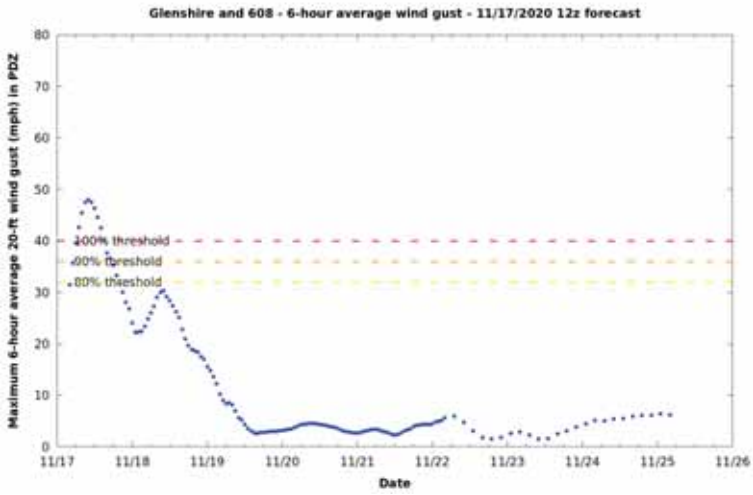
Beacon Tap



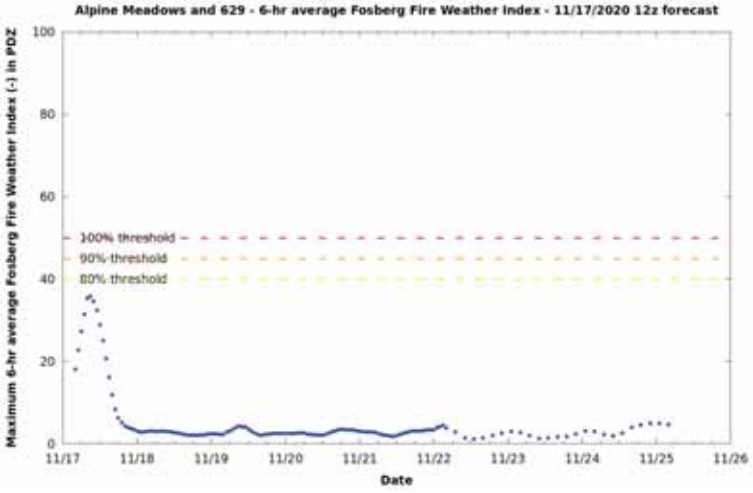


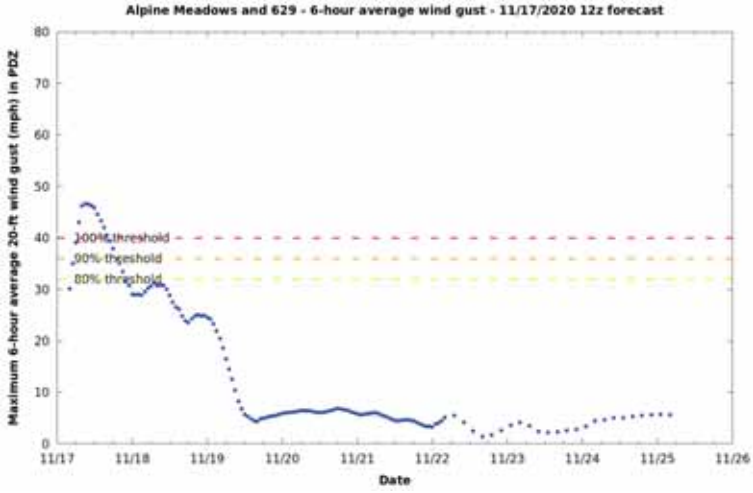
Glenshire and 608



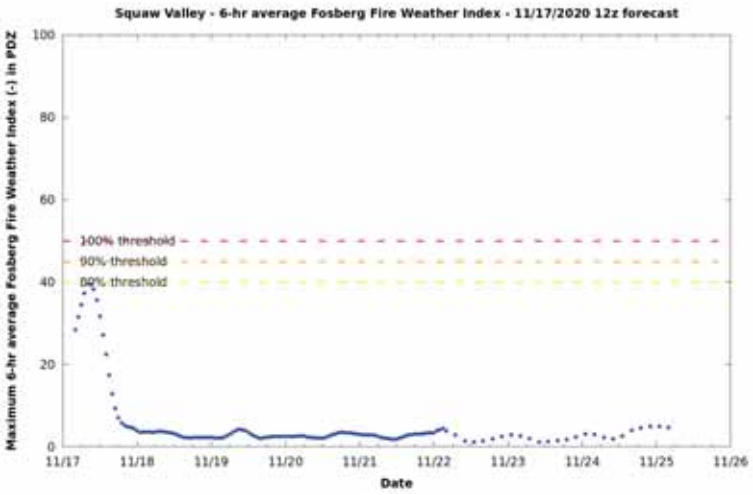


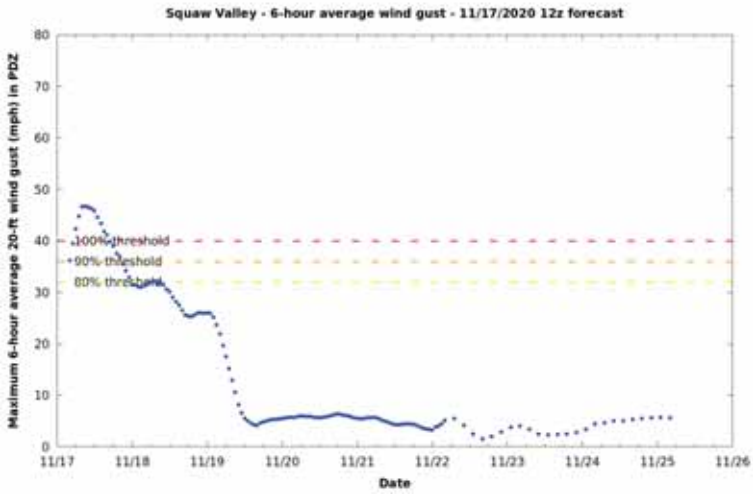
Alpine Meadows and 629



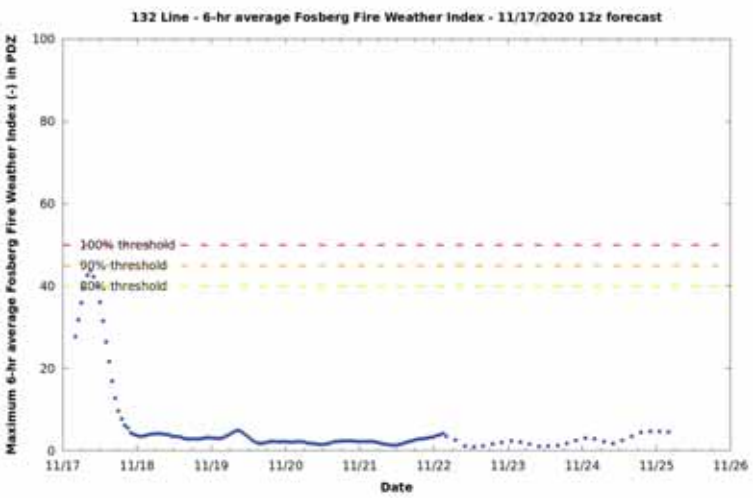


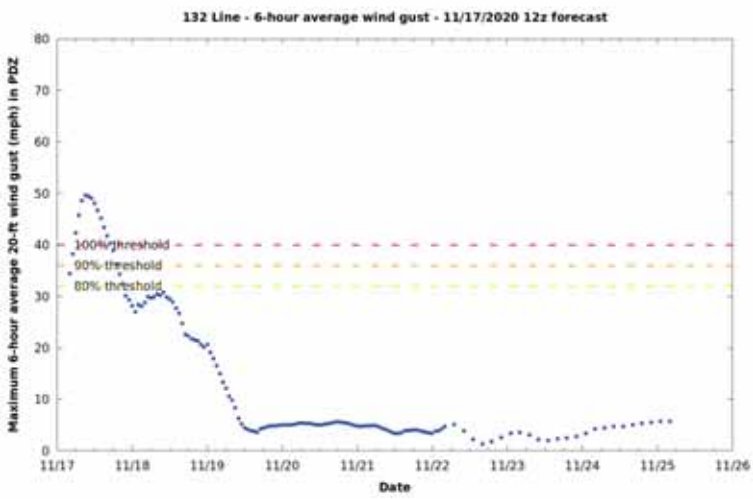
Squaw Valley



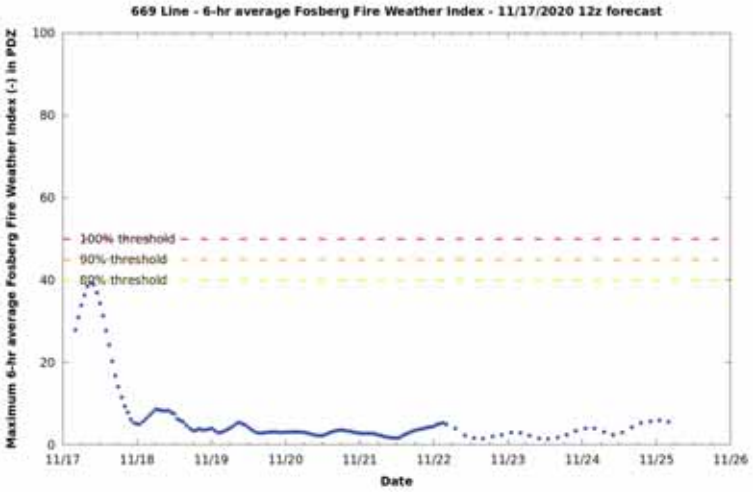


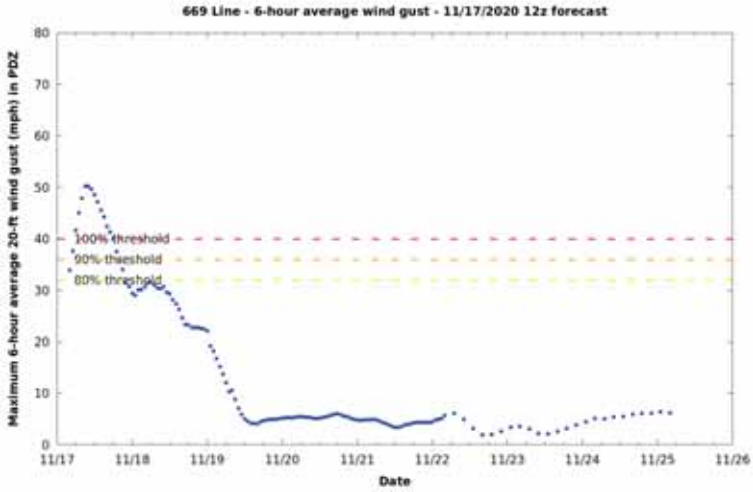
132 Line



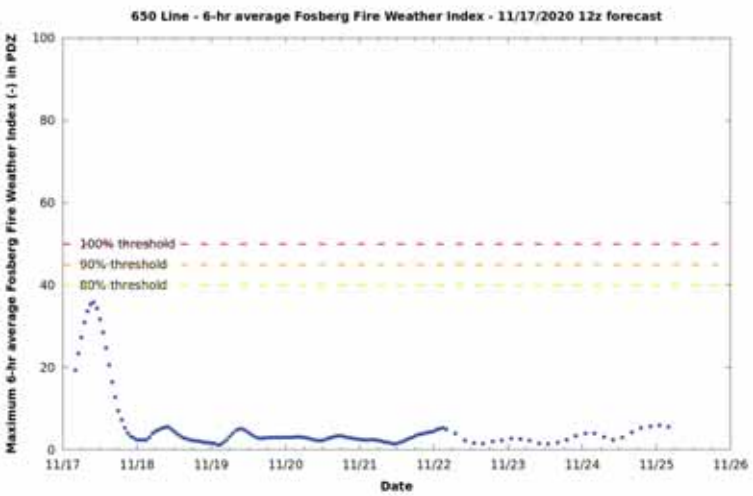


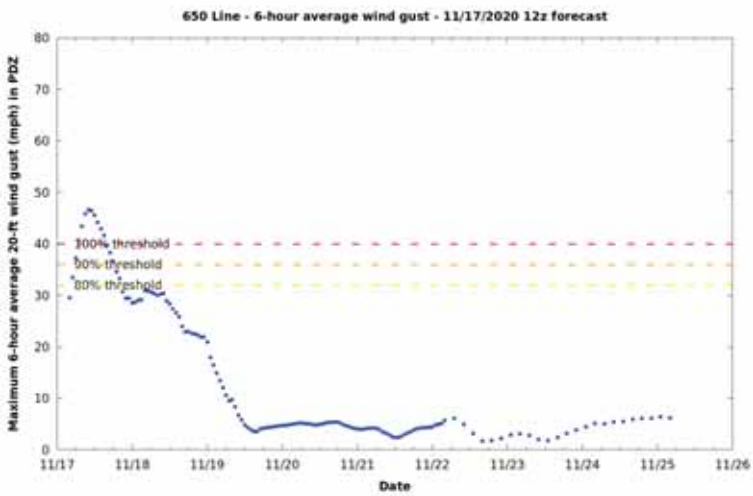
669 Line



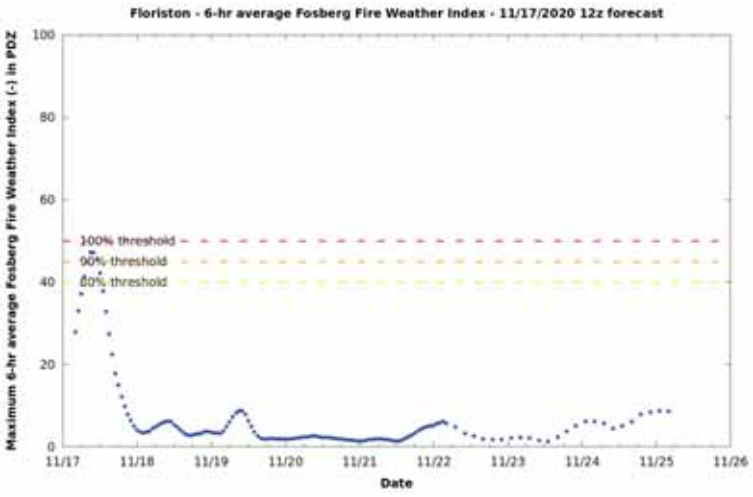


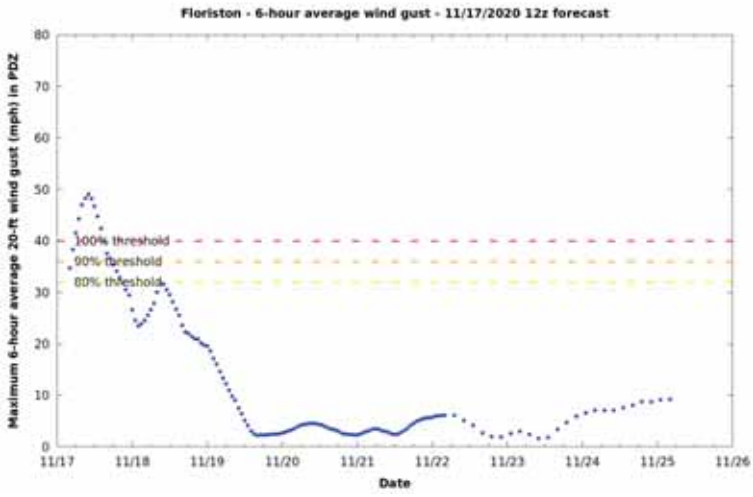
650 Line



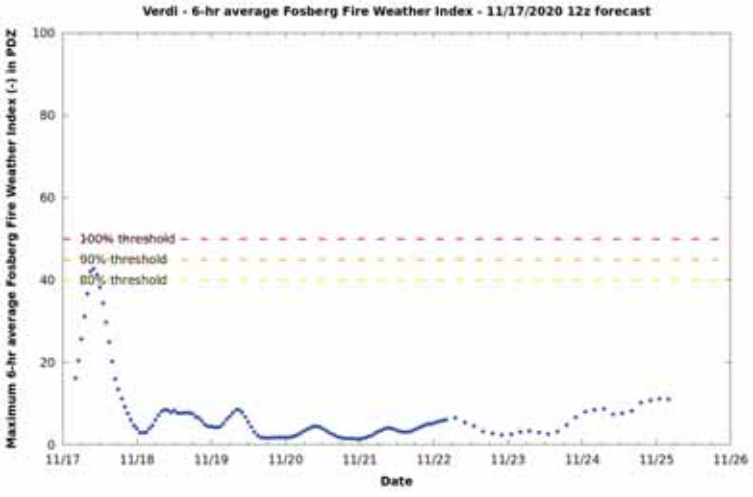


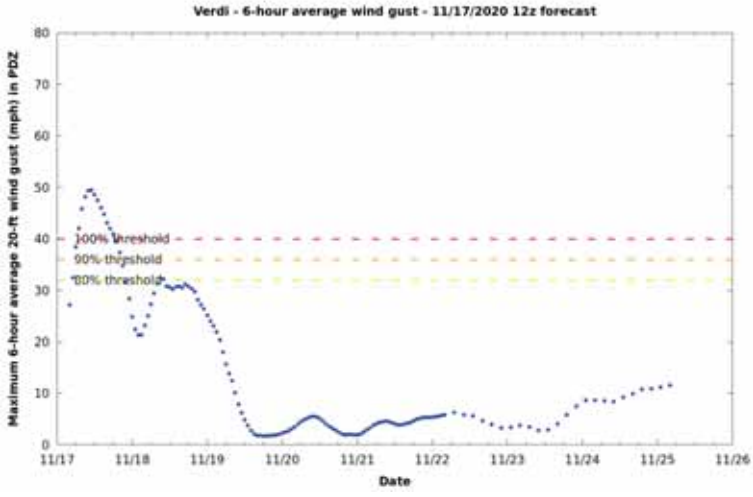
Floriston



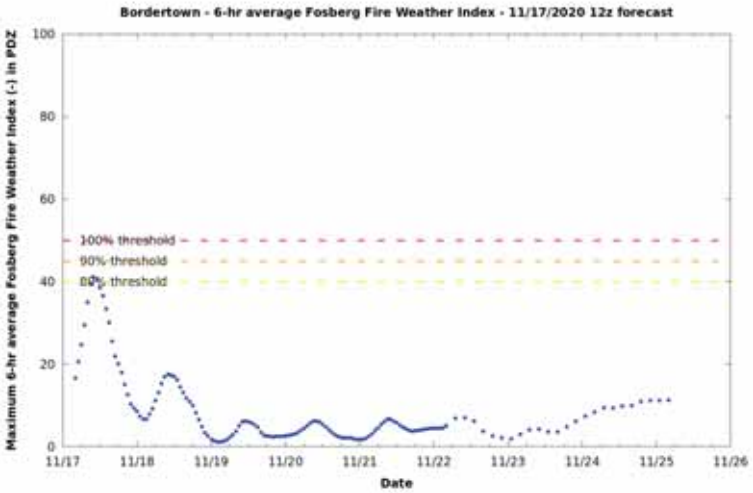


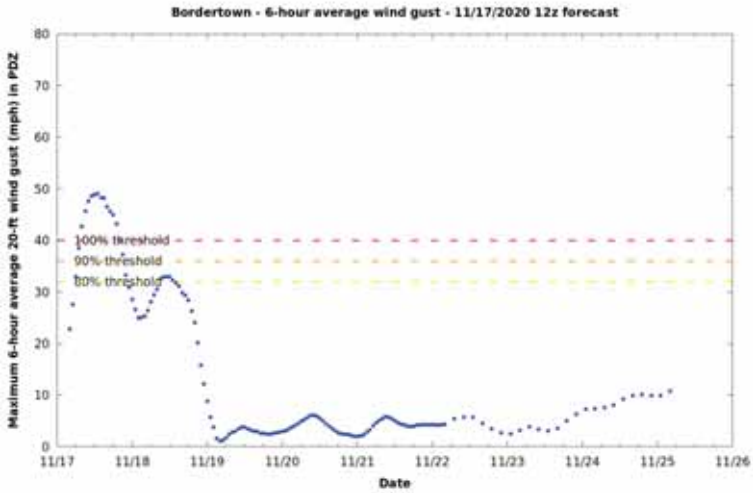
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/17/2020 12z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date


Bordertown - 6-hour average wind gust - 11/17/2020 12z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date

Liberty Utilities Fire Potential Index Forecast for 11/18/20 - 11/24/20

Zone	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23	Nov 24
North Shore	low	low	low	low	low	low	low
West Shore	low	low	low	low	low	low	low
Sierra Brooks	moderate	low	low	low	low	low	low
Glenshire	low	low	low	low	low	low	low
Portola	low	low	low	low	low	low	low
South Shore	low	low	low	low	low	low	low
Russell Valley	low	low	low	low	low	low	low
Topaz	low	low	low	low	low	low	low
Markleeville	low	low	low	low	low	low	low
Floriston Verdi	low	low	low	low	low	low	low
Bordertown	moderate	low	low	low	low	low	low

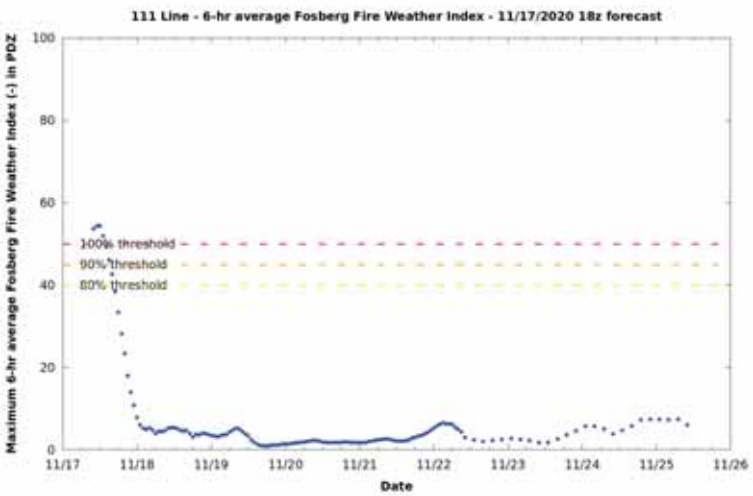
Liberty Utilities Energy Release Component Forecast for 11/18/20 - 11/24/20

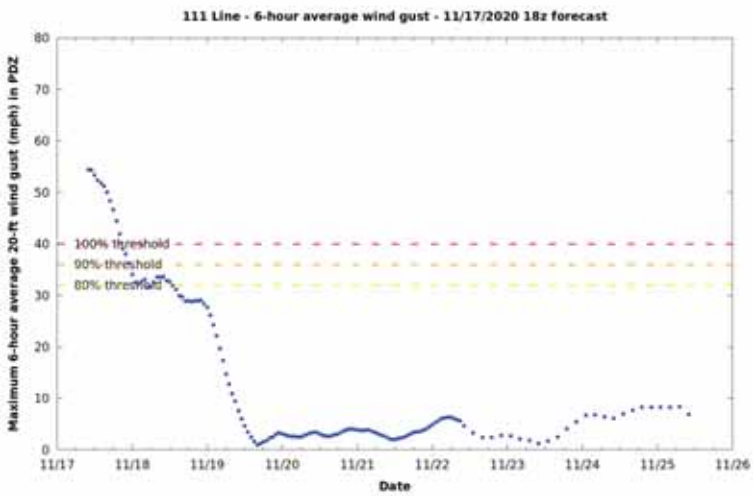
Zone	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23	Nov 24
111 Line	7.2	5.1	5.7	5.0	5.6	6.3	6.4
Portola	52.8	36.9	41.6	36.9	39.6	43.0	43.0
Sierra Brooks	61.8	49.5	52.5	46.4	50.4	54.4	55.2
Stampede	57.0	41.0	43.0	36.0	37.0	39.0	40.0
Russel Valley	63.0	48.1	50.6	40.5	40.4	40.1	39.1
Hobart	53.9	41.6	42.4	35.2	35.2	34.7	34.3
Sagehen Tap	17.9	13.7	14.2	12.0	12.0	12.0	12.0
Sunnyside	21.1	14.8	15.8	11.6	12.0	12.7	11.3
Ward Canyon East	54.5	38.2	40.9	30.0	30.9	32.7	29.1
Tahoe Park Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alpine Backside	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ward Canyon West	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-17	42.4	31.4	33.0	26.8	29.7	32.3	32.3
Tah 73-36	1.5	1.1	1.0	0.8	0.7	0.7	0.7
Tah 73-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 7300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tah 73-74	44.1	32.9	37.0	31.0	35.7	38.1	39.1
Angora Ridge and Lily Lake	1.0	0.6	0.8	0.6	0.6	0.6	0.6

Cathedral Spring Creek Emerald Bay	19.0	12.9	15.6	12.0	13.1	14.1	14.1
Mey 3400 Angora Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mey 3300 r1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mul 1296 r4	49.3	33.3	35.9	28.2	32.9	37.1	38.6
Sorensons Tap	25.2	16.5	19.2	15.7	18.4	20.3	21.0
Mul1296 r3	55.2	37.7	40.2	30.5	34.3	38.0	39.7
Topaz	48.9	34.1	38.4	29.5	34.1	39.1	39.9
Heavenly Lateral	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tier 3	27.2	19.3	22.1	18.7	21.2	23.6	23.9
640 Tier 2	58.7	40.4	44.9	36.1	40.0	43.7	44.5
609 and Underbuild	2.6	1.8	1.9	1.6	1.8	2.0	2.0
625 Line	4.9	3.8	3.9	3.5	3.8	4.1	4.2
Bky 5200	57.3	38.1	45.2	35.2	32.6	33.8	30.6
Old Country Road	57.7	42.4	45.4	37.6	33.4	33.1	30.3
Tah 52-68	21.9	16.4	16.4	13.6	11.7	10.9	10.2
The Grid	60.9	39.5	46.7	33.7	33.0	33.5	31.5
Canterbury and Commonwealth	44.7	29.3	34.5	24.9	24.9	25.7	24.2
Bky 5100 to NVE	25.6	16.8	19.7	14.3	14.3	14.7	13.8
Beacon Tap	69.0	53.0	55.0	46.0	45.0	46.0	46.0
Glenshire and 608	66.9	51.8	54.4	44.6	46.2	46.7	46.2
Alpine Meadows and 629	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squaw Valley	9.7	9.7	10.4	8.8	10.0	10.9	10.9
132 Line	13.9	13.9	14.7	12.1	12.9	13.6	13.9
669 Line	49.4	49.4	51.9	43.6	45.0	48.7	49.4
650 Line	27.7	27.7	29.2	25.4	27.2	29.3	30.1
Floriston	38.1	38.1	41.8	33.3	36.0	38.1	39.0
Verdi	43.6	43.6	46.7	38.2	43.1	46.7	48.7
Bordertown	49.2	49.2	51.0	42.6	47.0	51.4	52.4

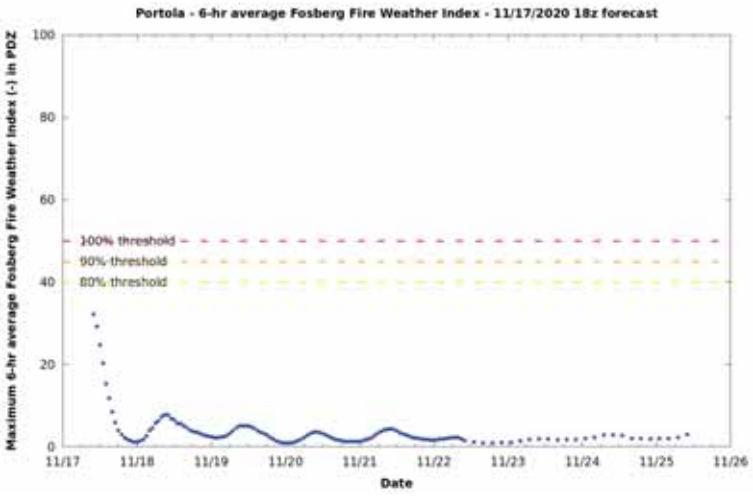
Liberty Utilities Fire Weather Summary Plots - 11/17/2020 18z forecast

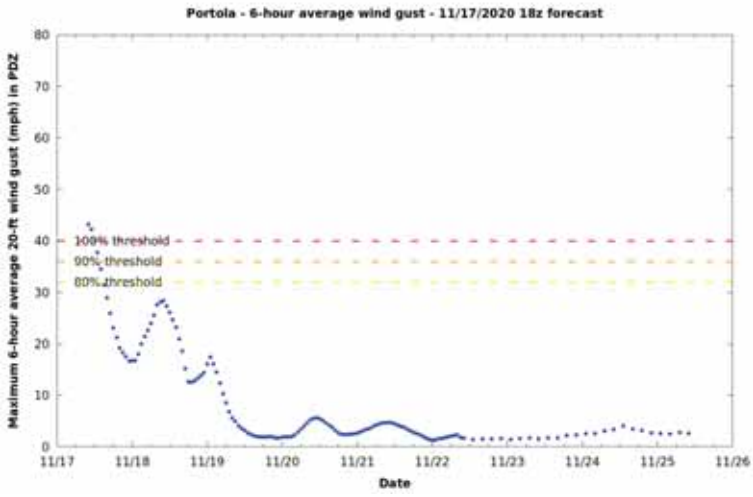
111 Line



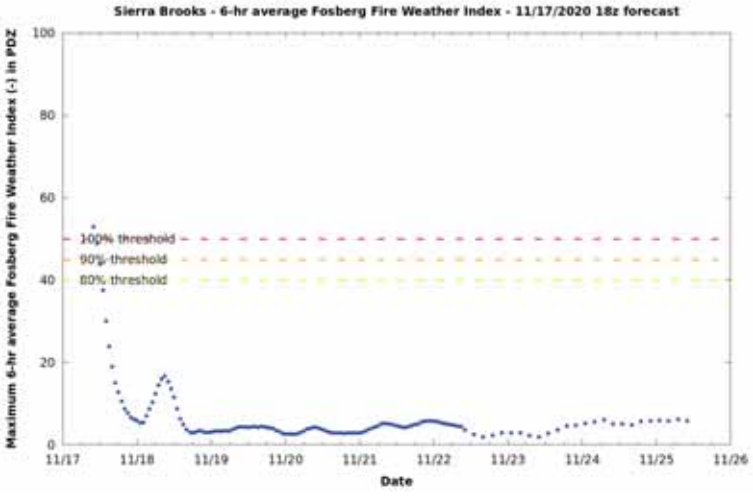


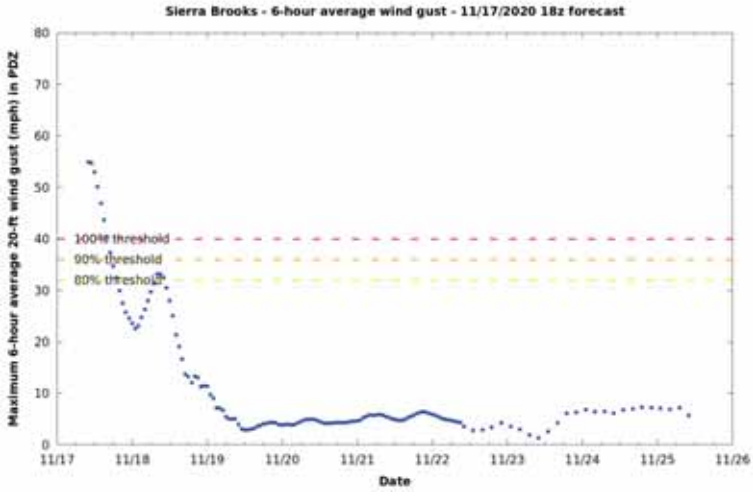
Portola



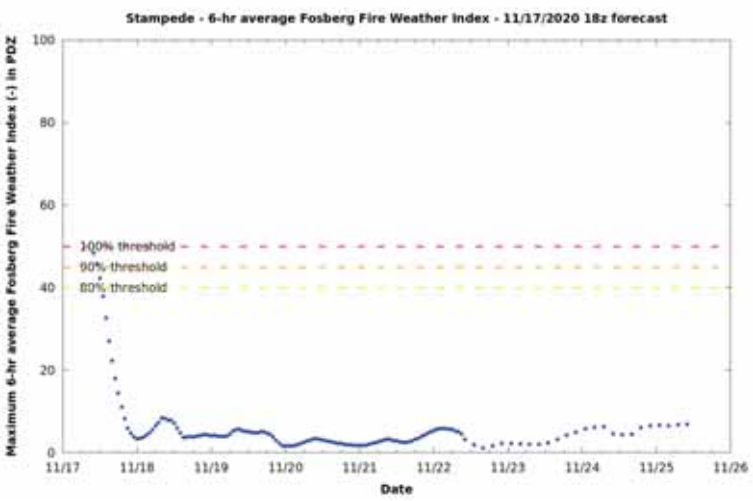


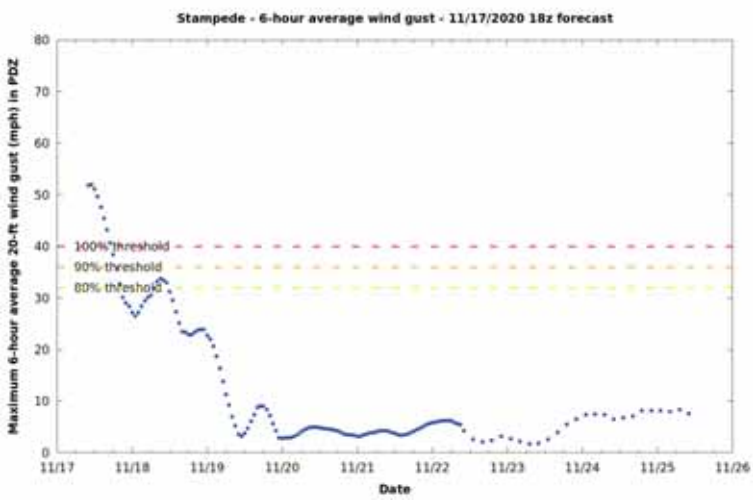
Sierra Brooks



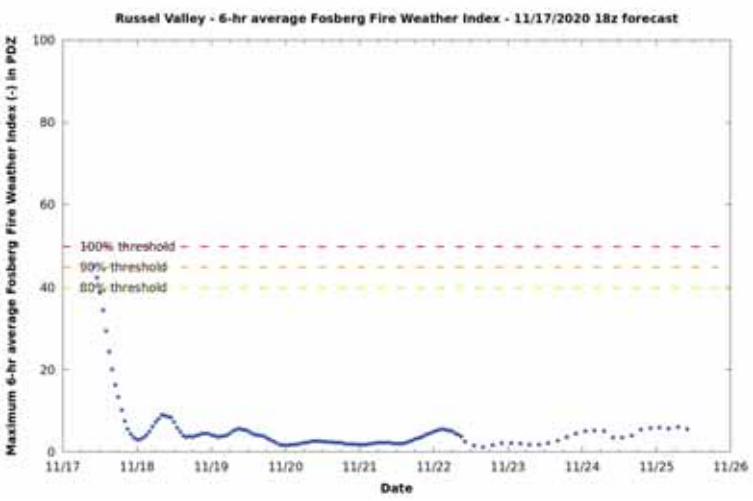


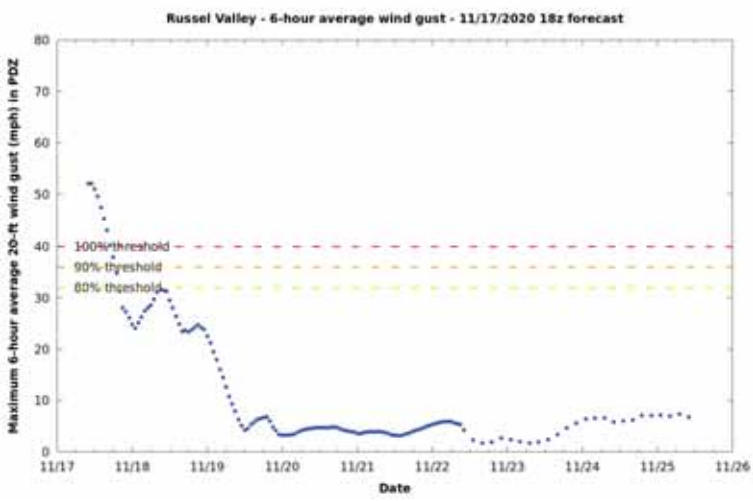
Stampede



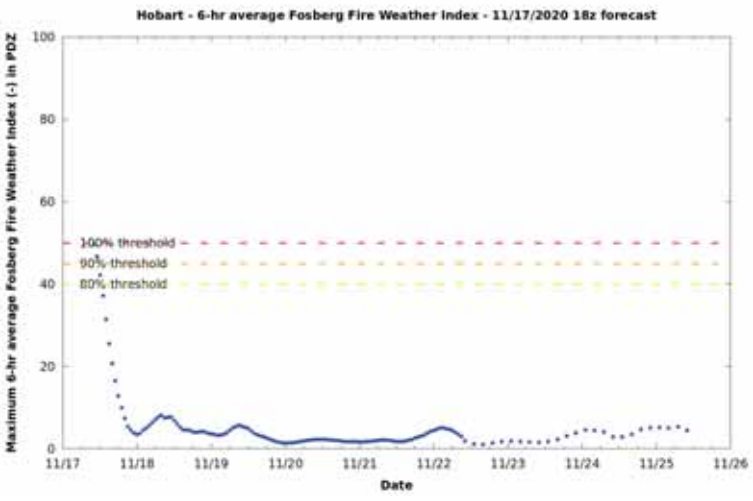


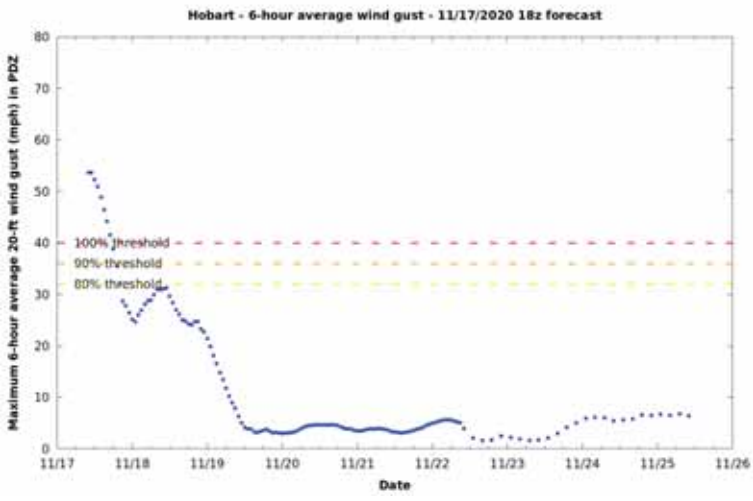
Russell Valley



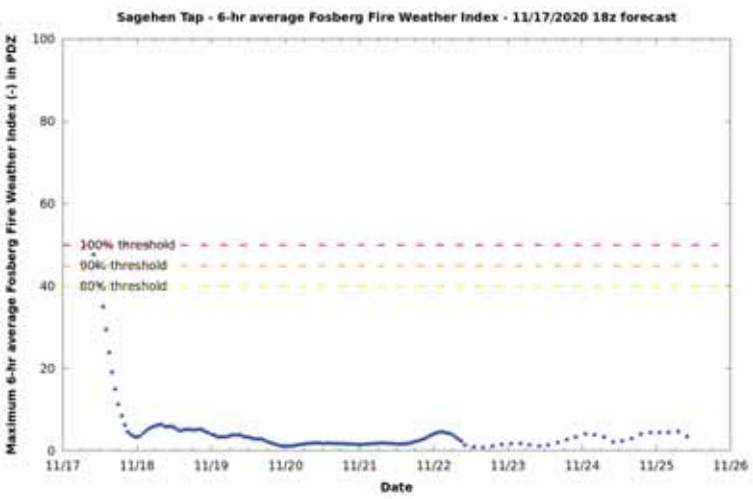


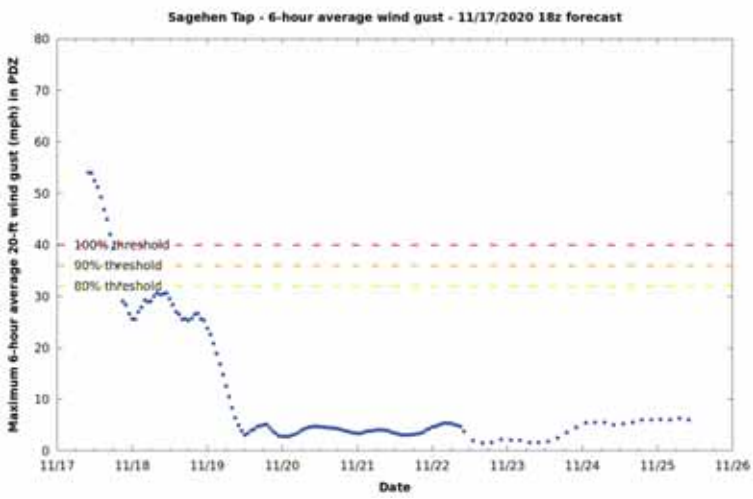
Hobart



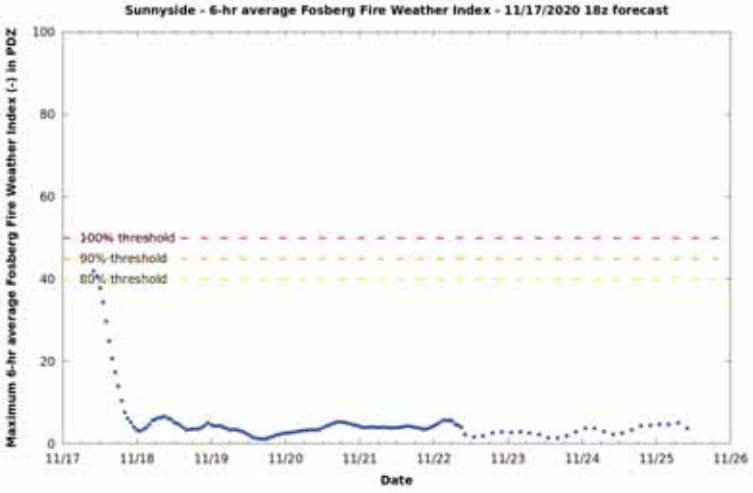


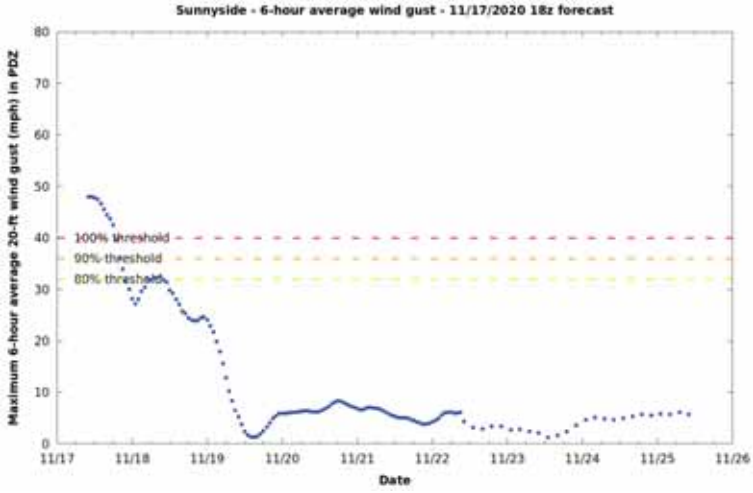
Sagehen tap



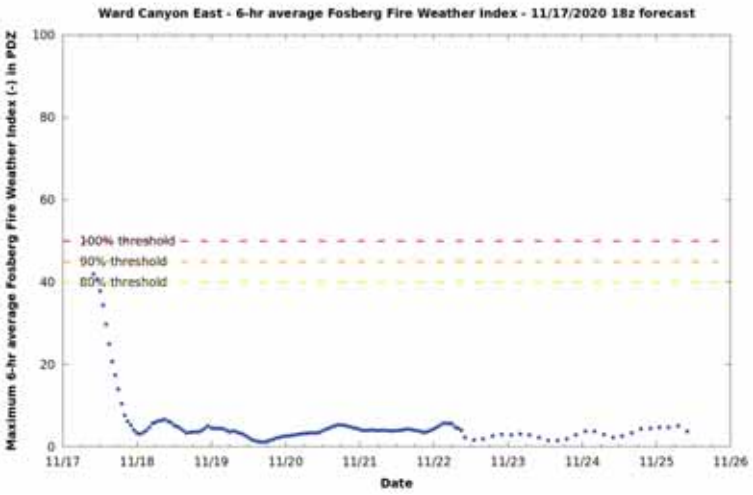


Sunnyside



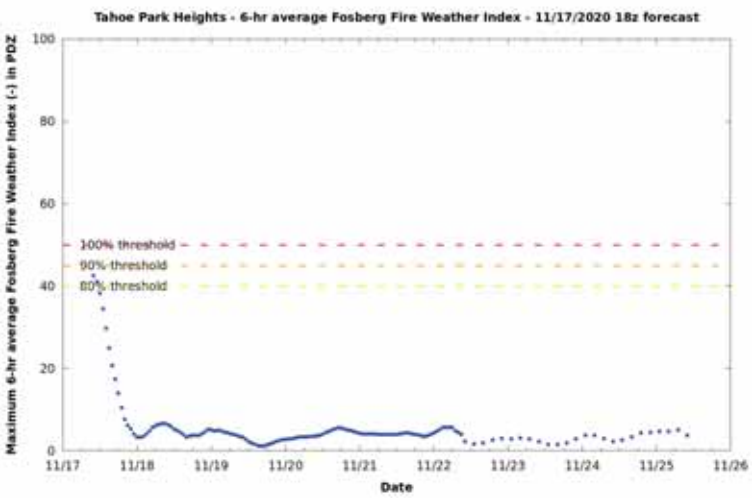


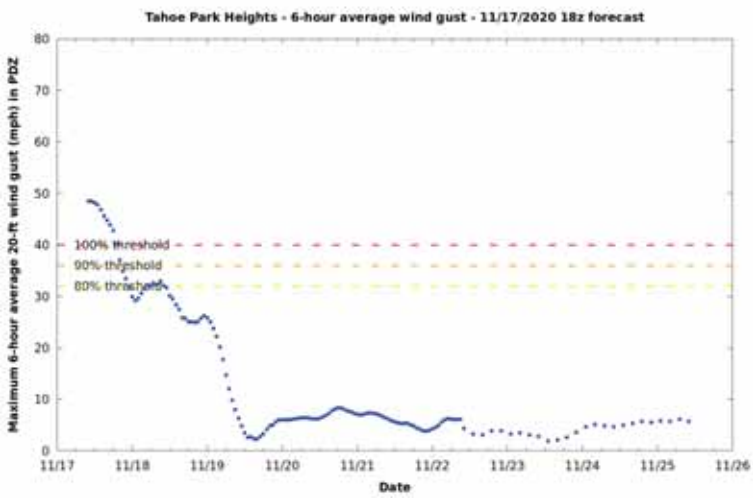
Ward Canyon East



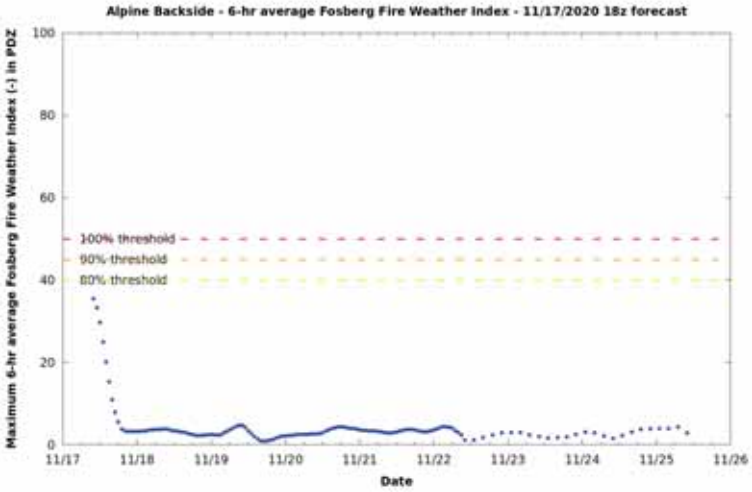


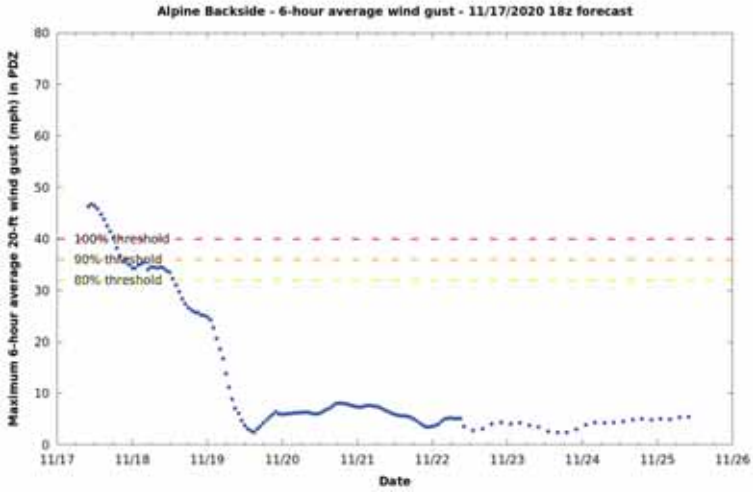
Tahoe Park Heights



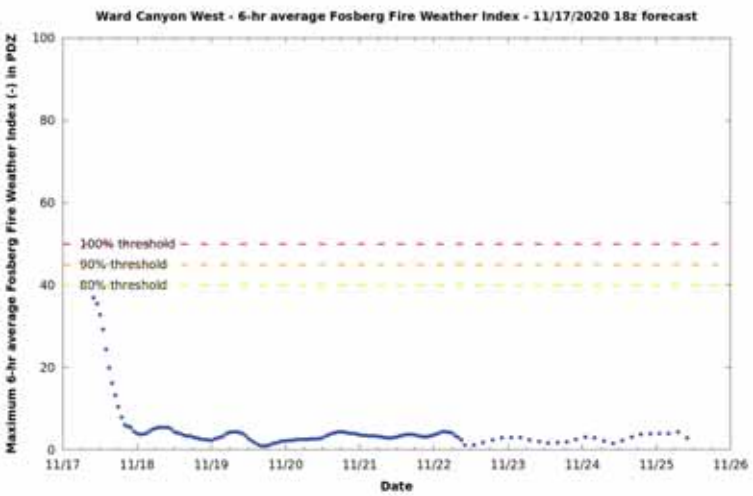


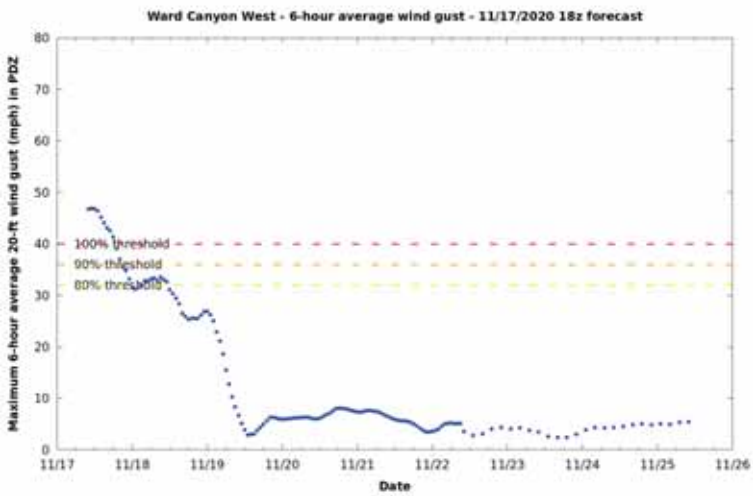
Alpine Backside



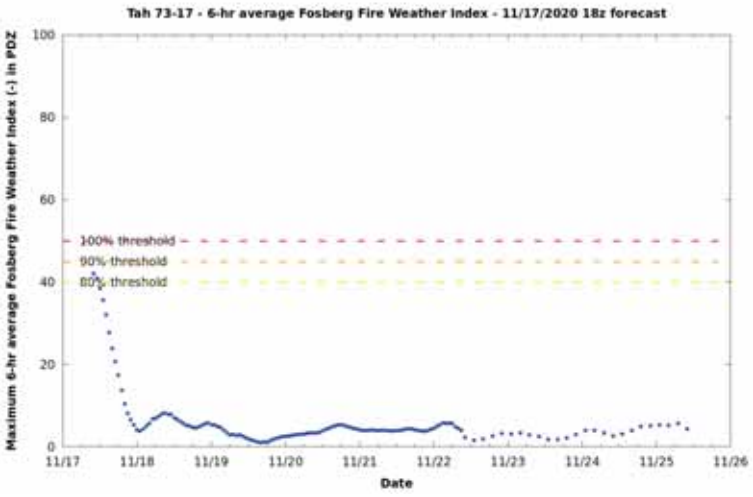


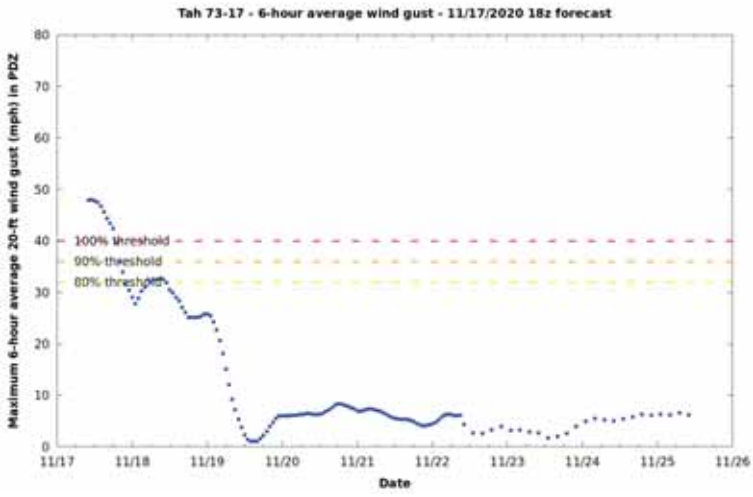
Ward Canyon West



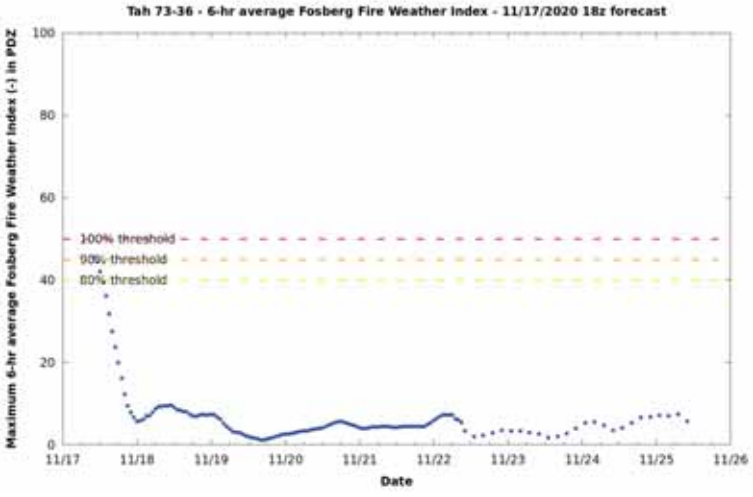


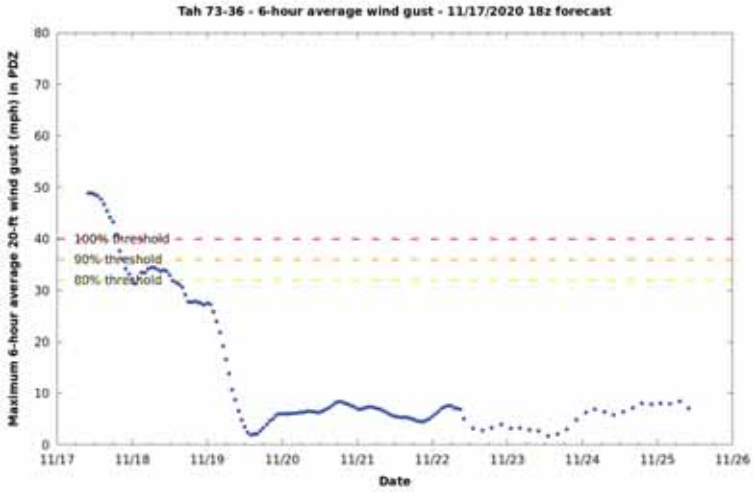
Tah 73-17



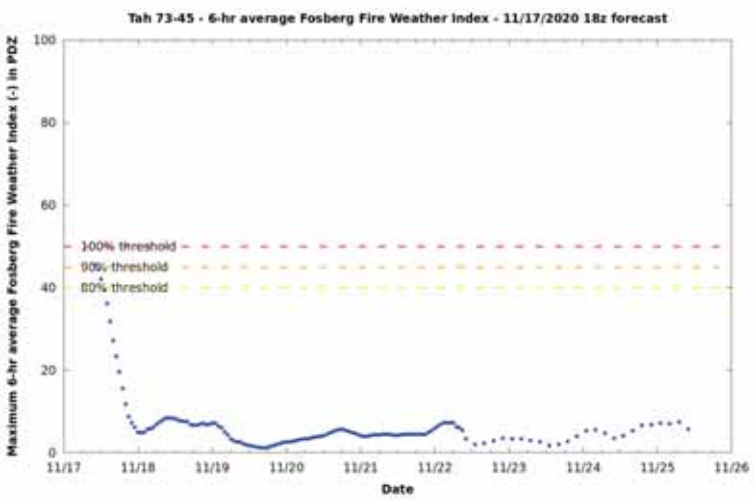


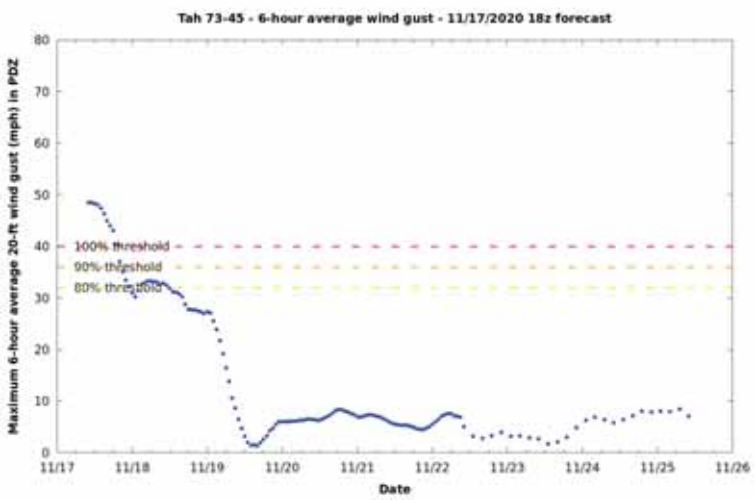
Tah 73-36



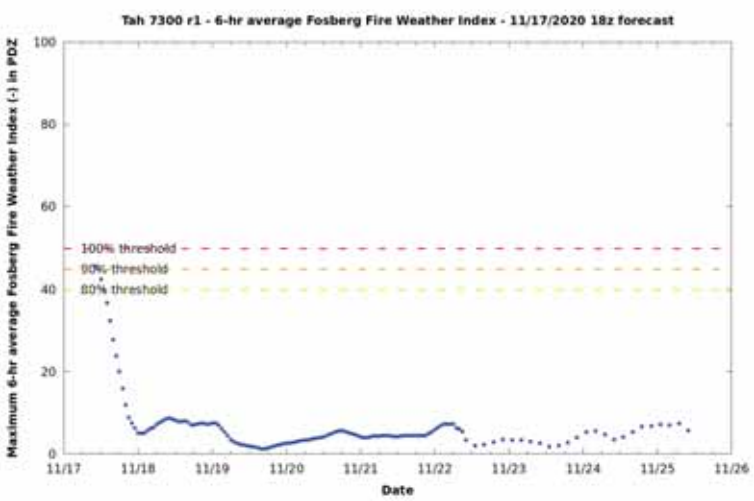


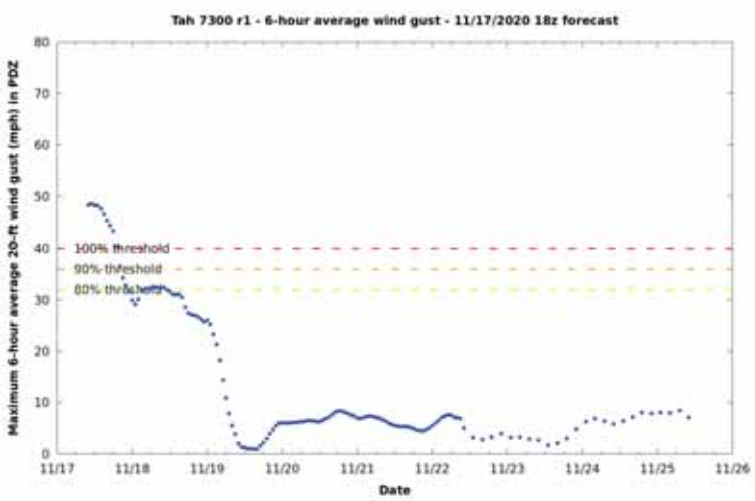
Tah 73-45



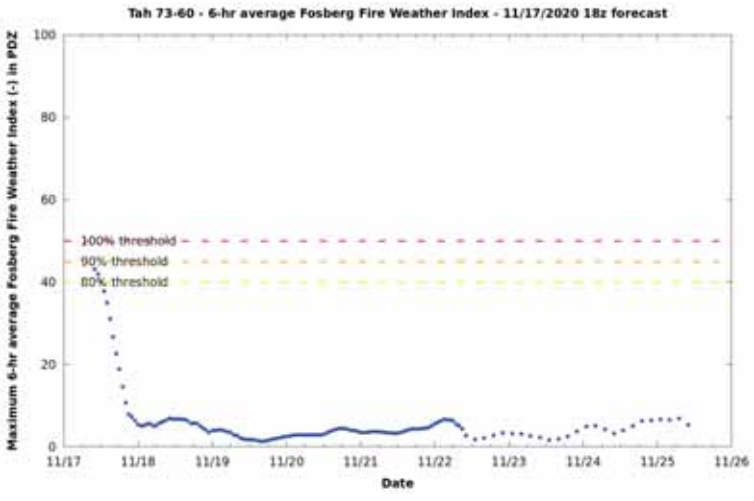


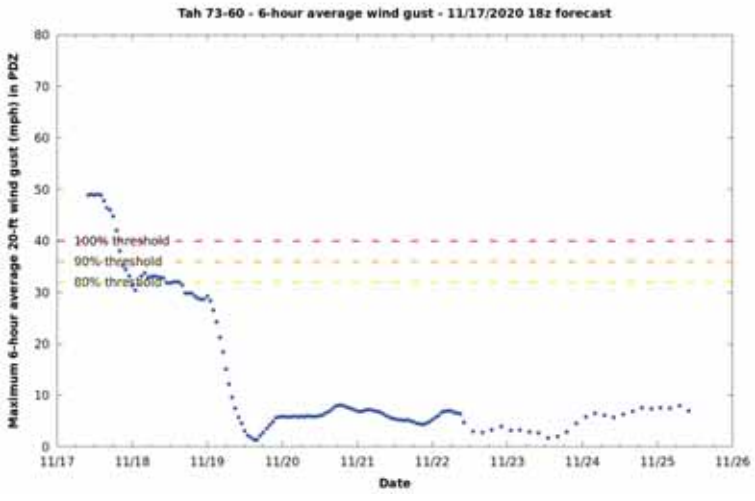
Tah 7300 r1



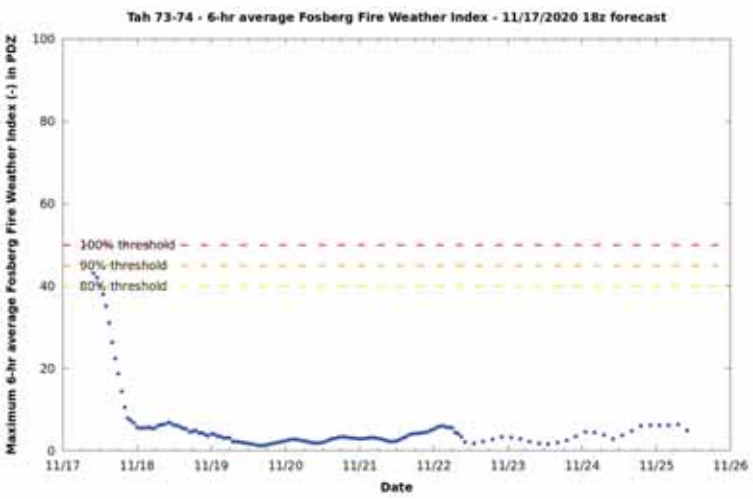


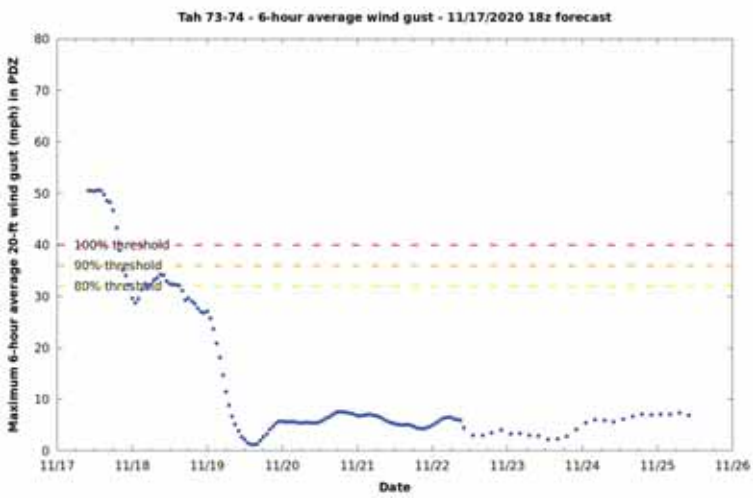
Tah 73-60



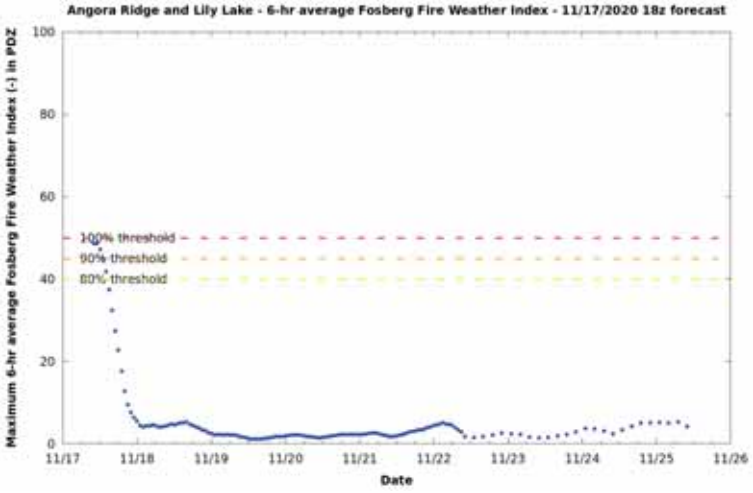


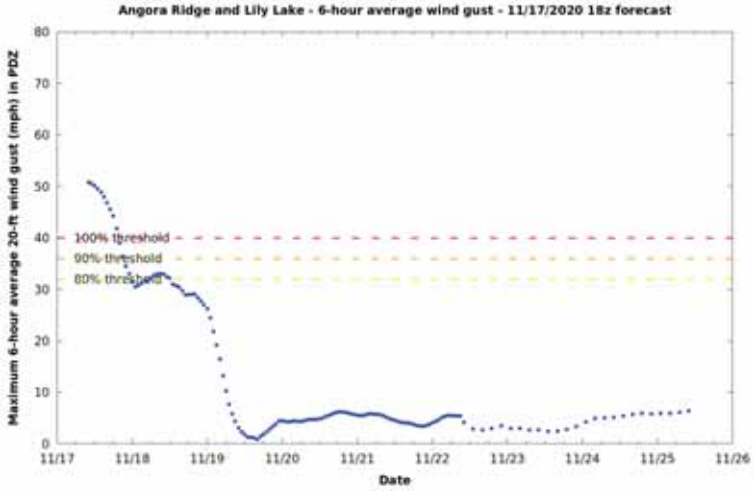
Tah 73-74



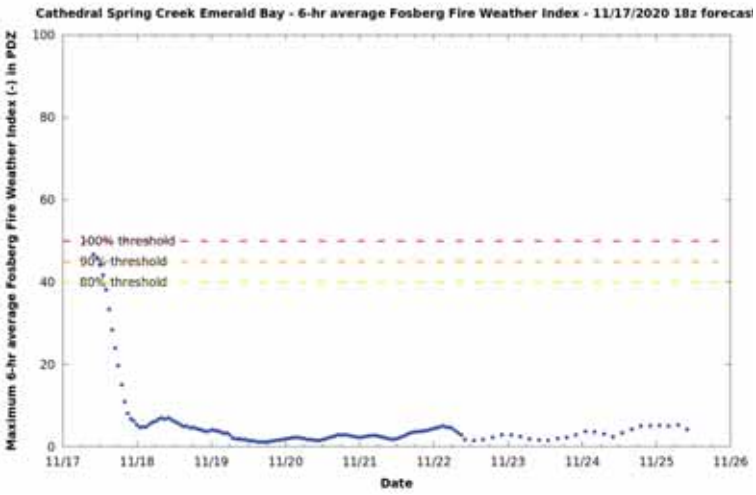


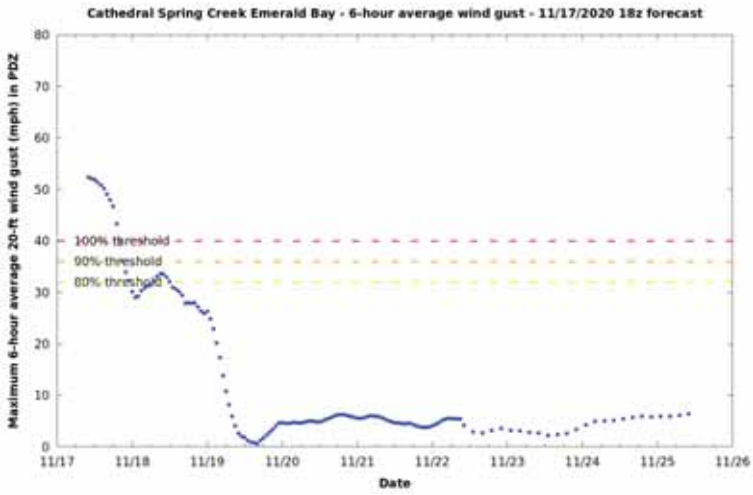
Angora Ridge and Lily Lake



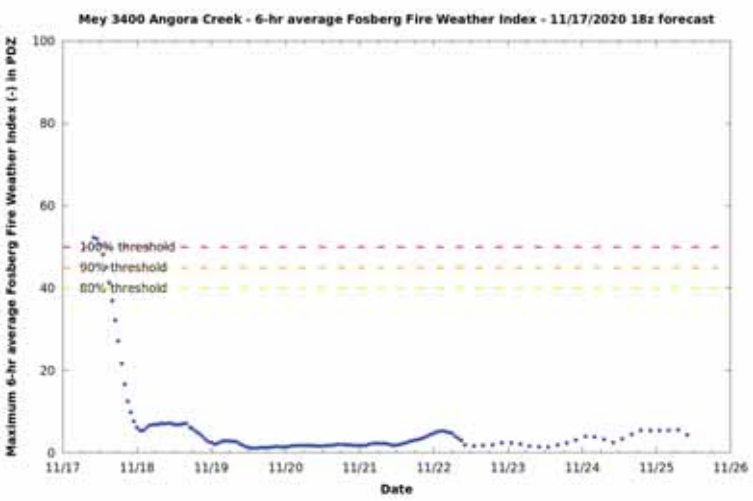


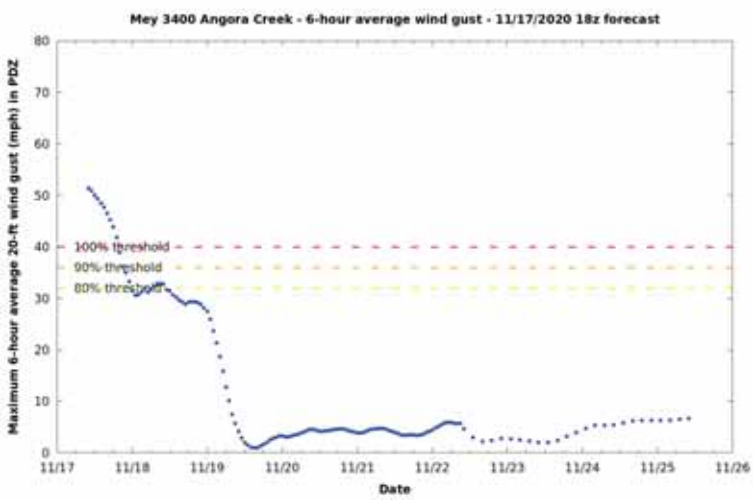
Cathedral Spring Creek Emerald Bay



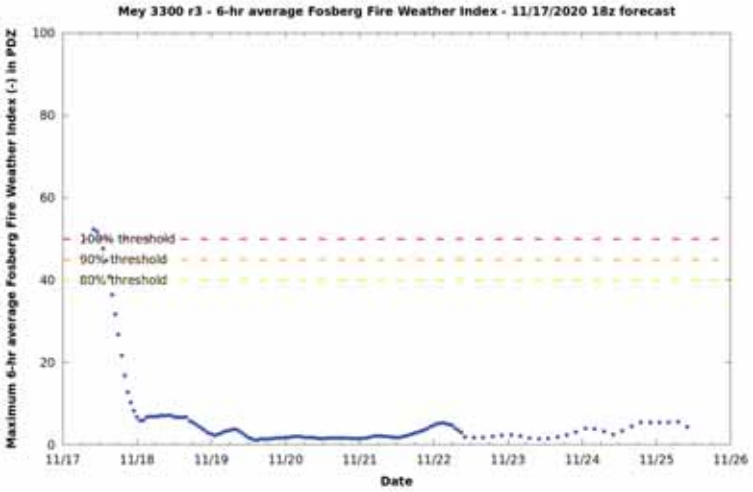


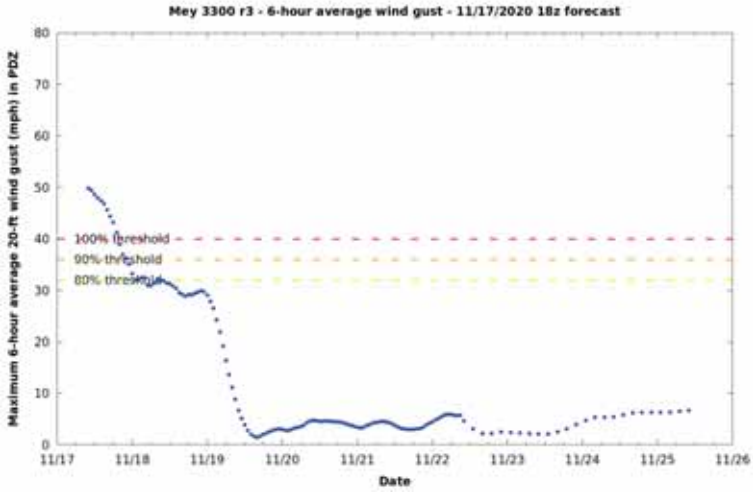
Mey 3400 Angora Creek



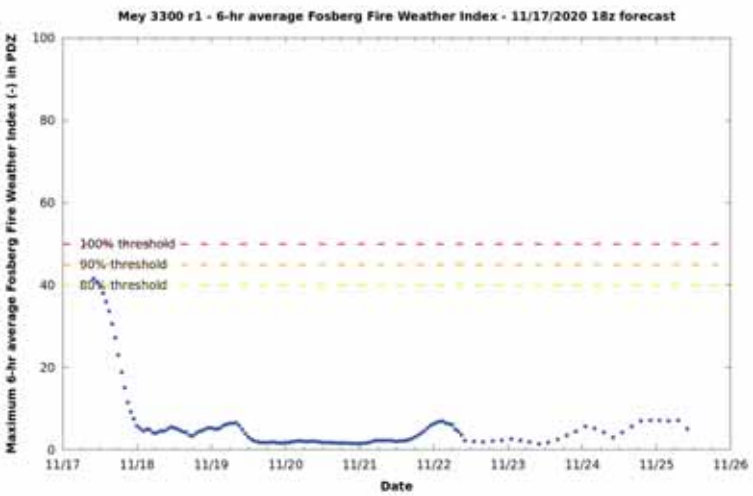


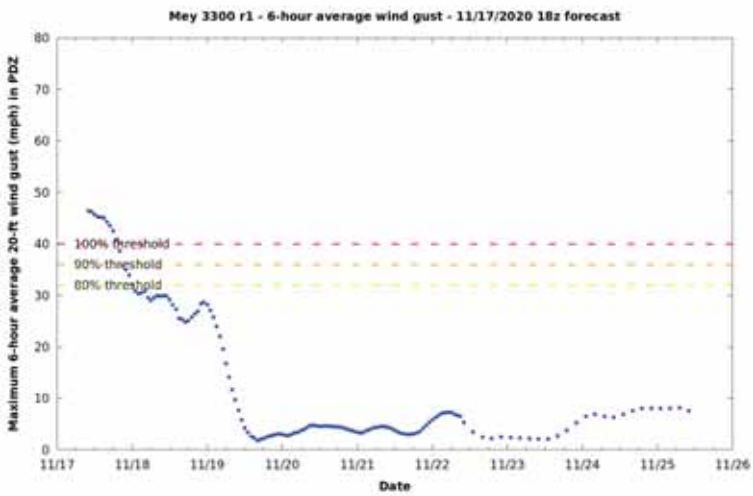
Mey 3300 r3



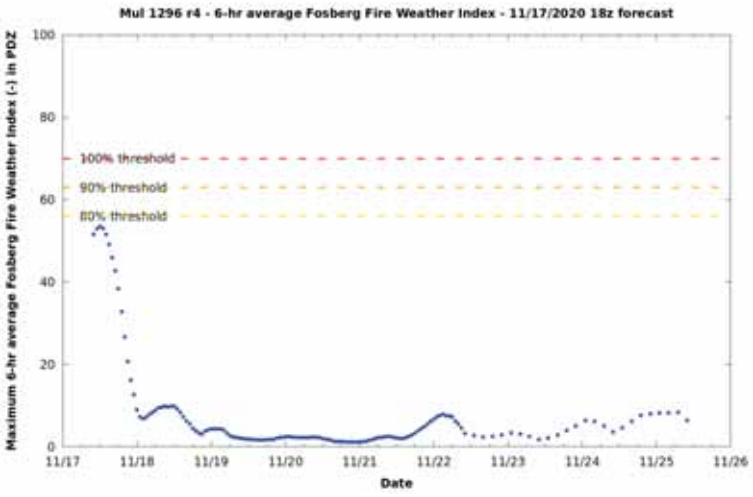


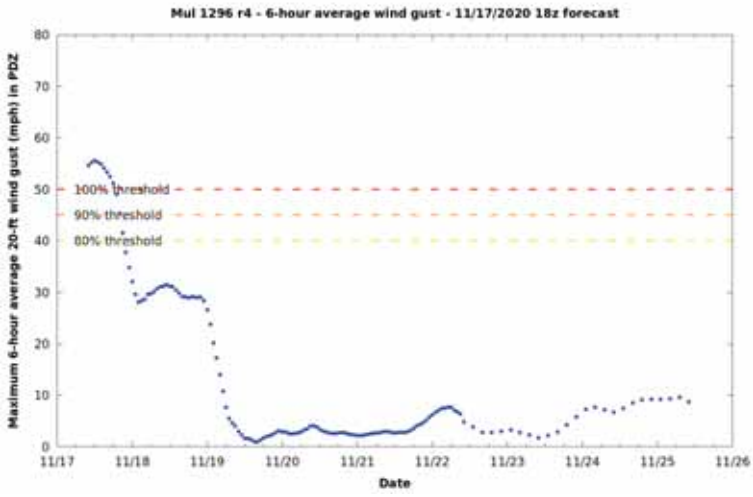
Mey 3300 r1



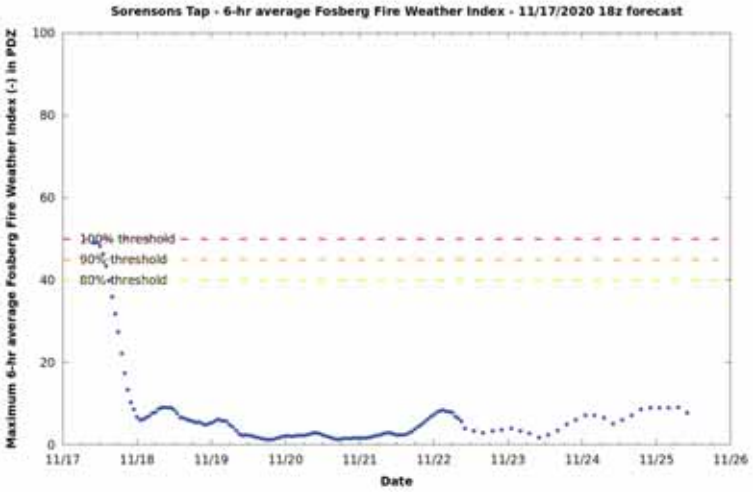


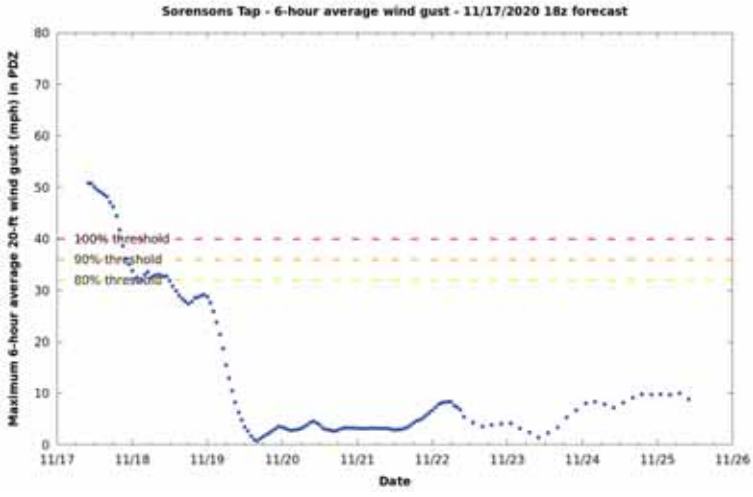
Mul 1296 r4



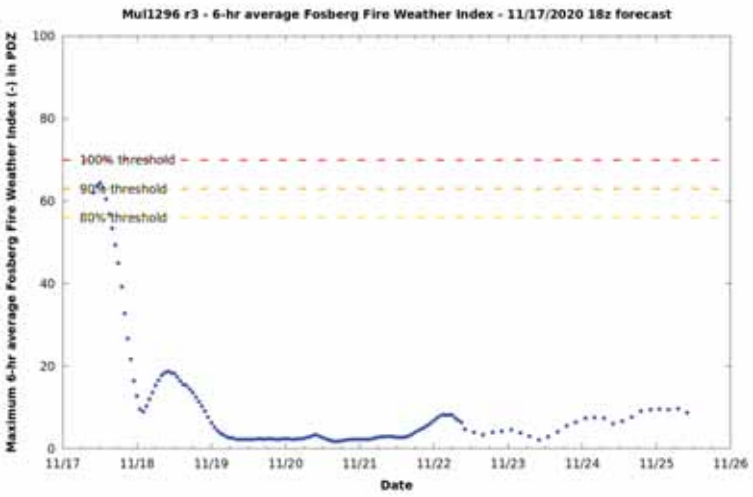


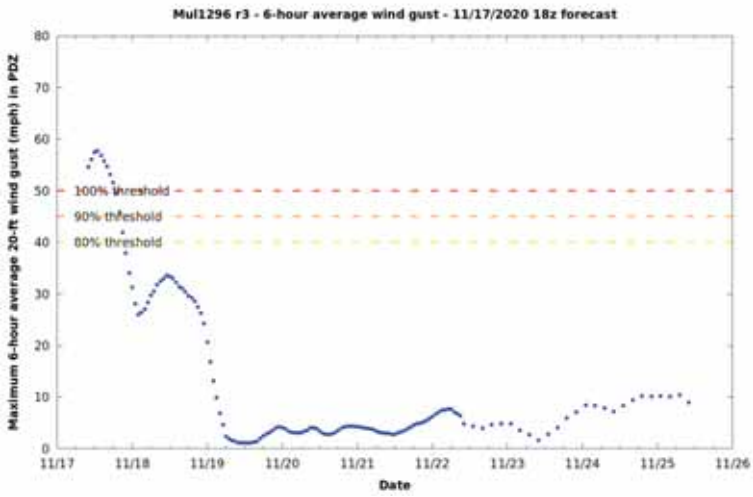
Sorensons Tap



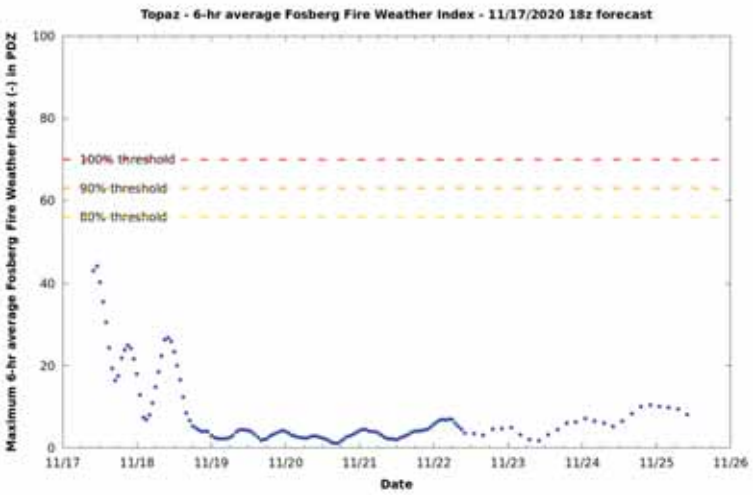


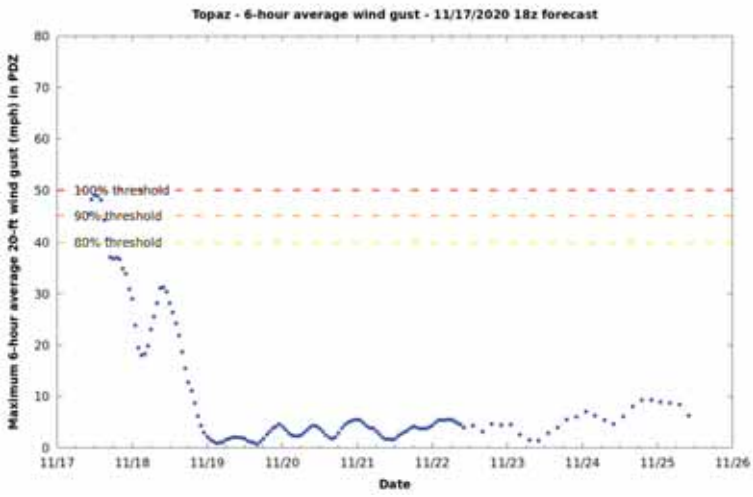
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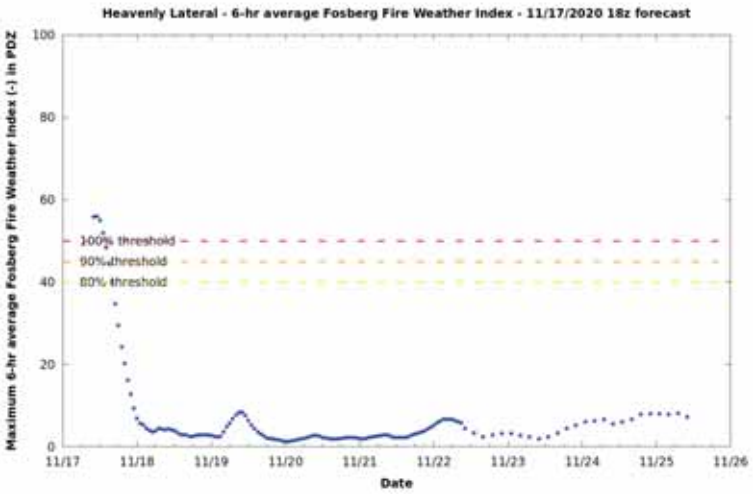


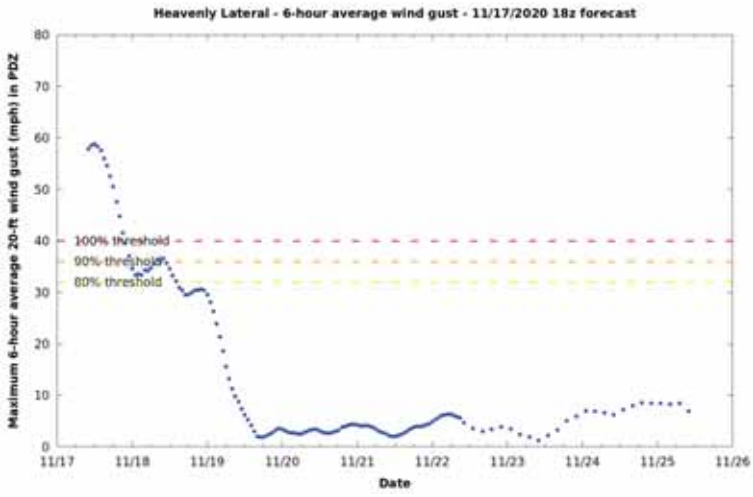
Topaz



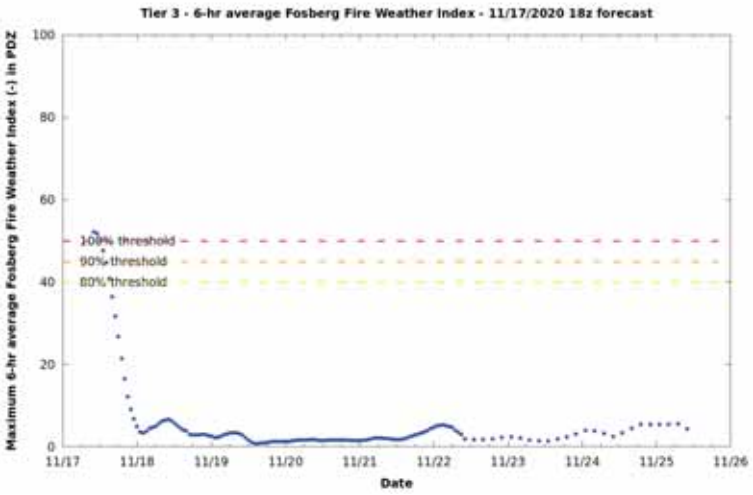


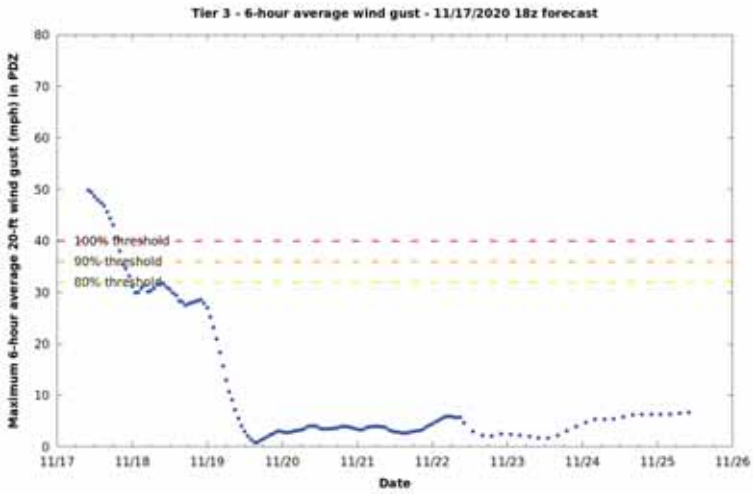
Heavenly Lateral



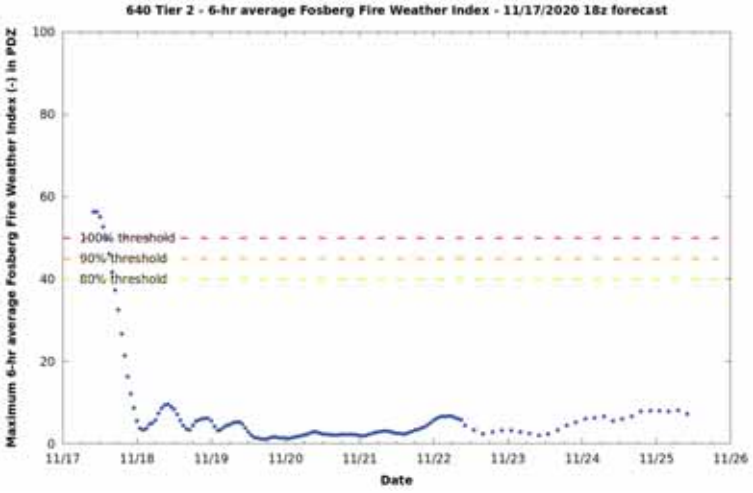


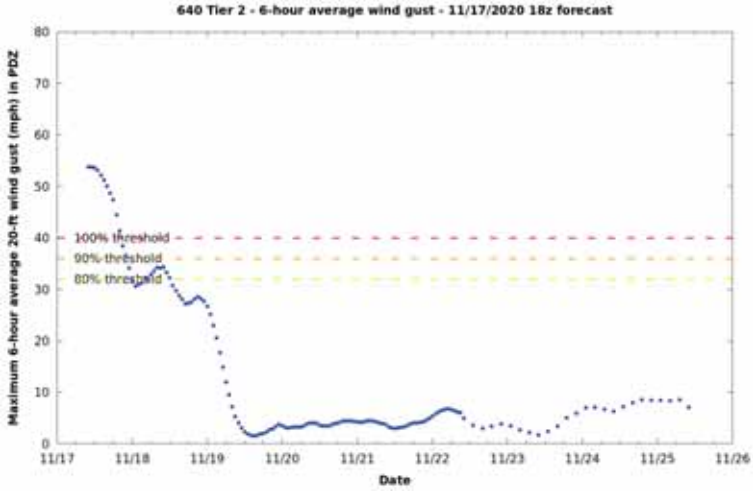
Tier 3



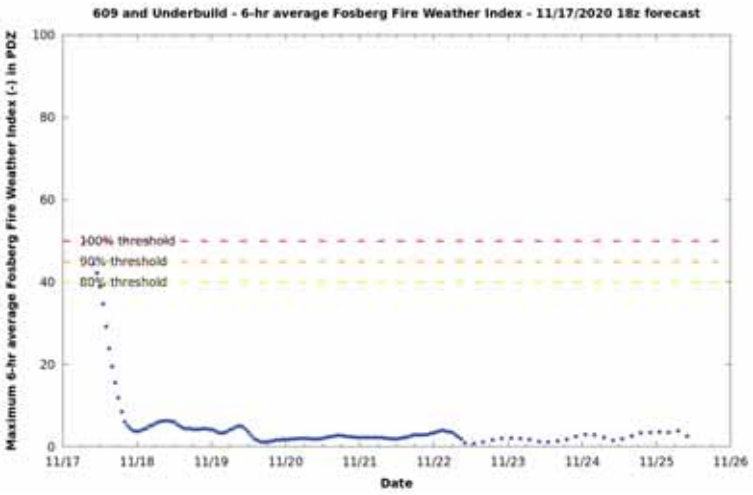


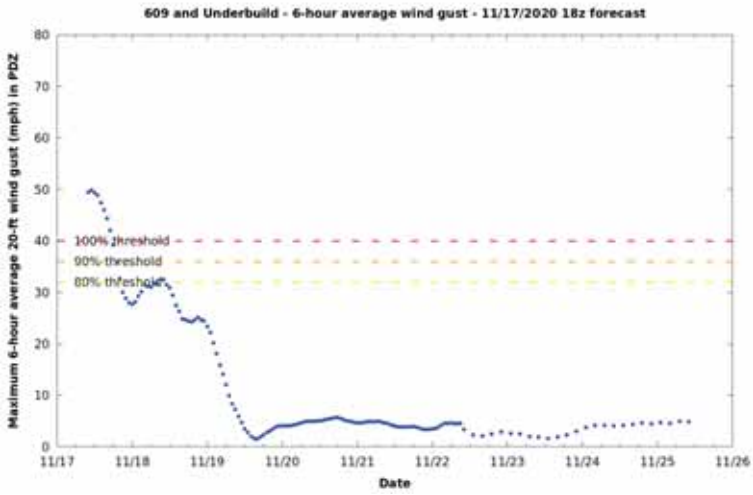
640 Tier 2



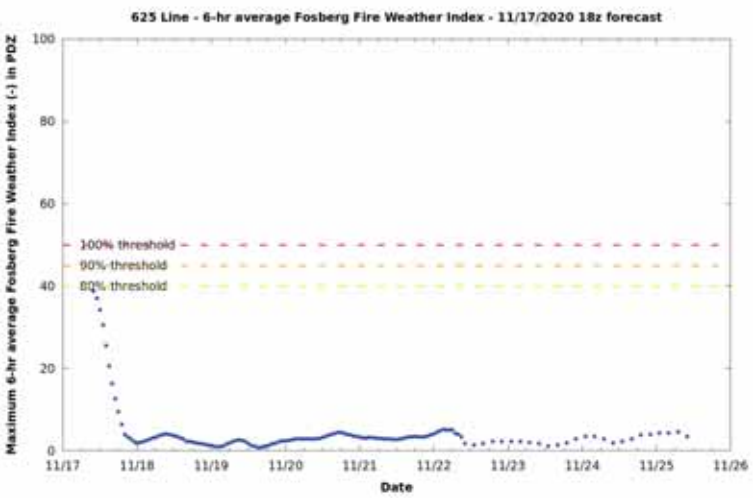


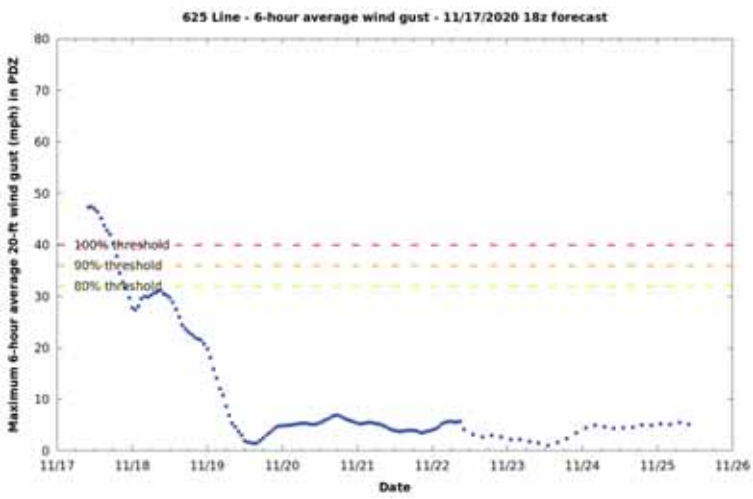
609 and Underbuild



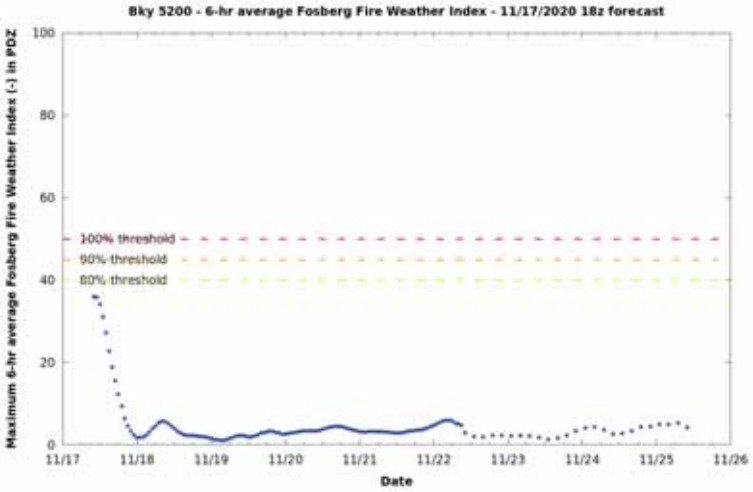


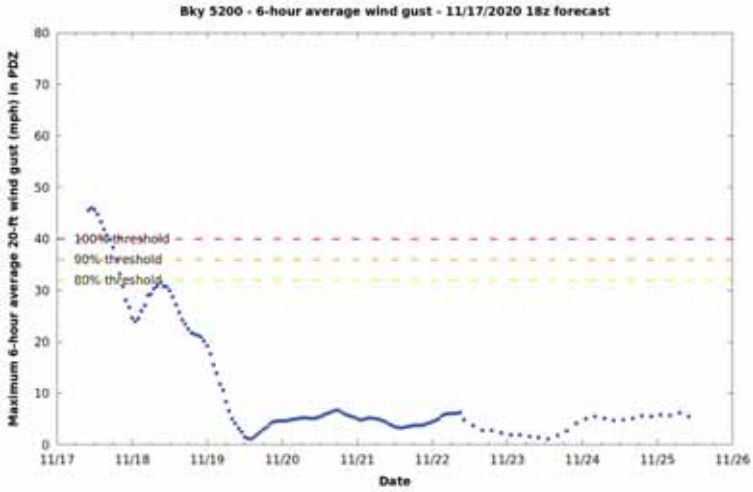
625 Line



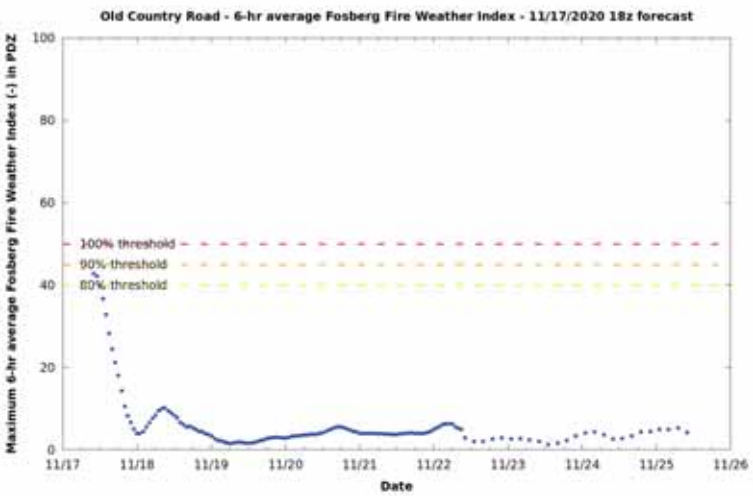


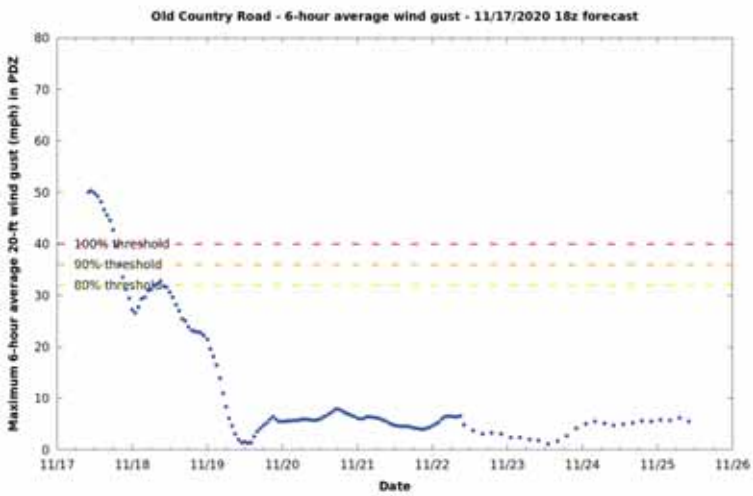
Bky 5200



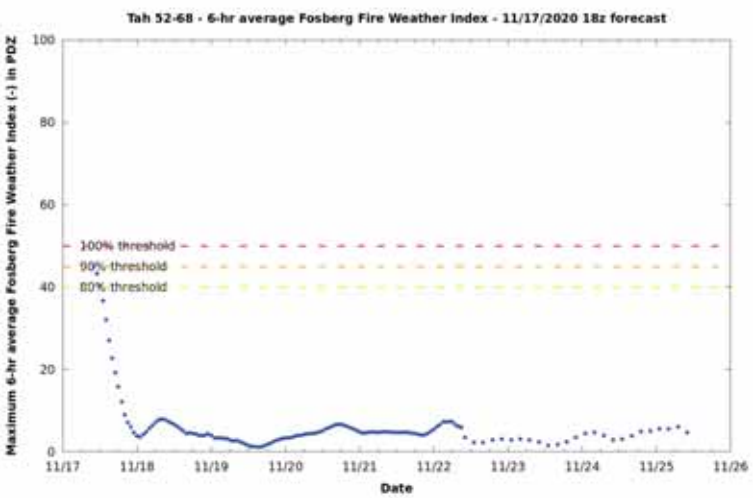


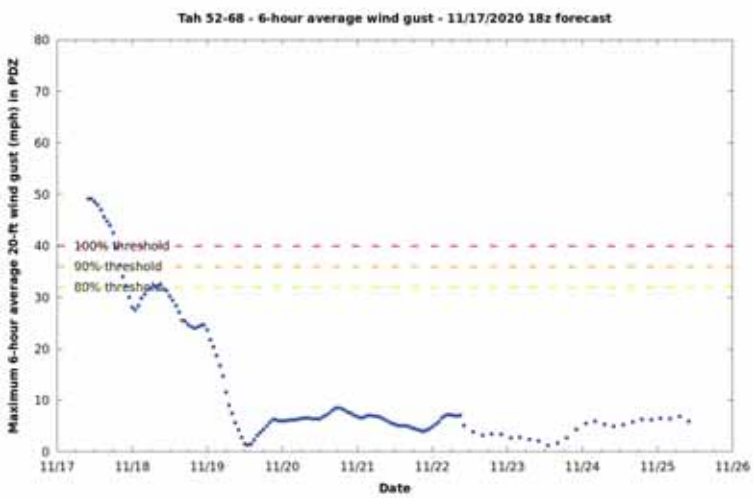
Old Country Road



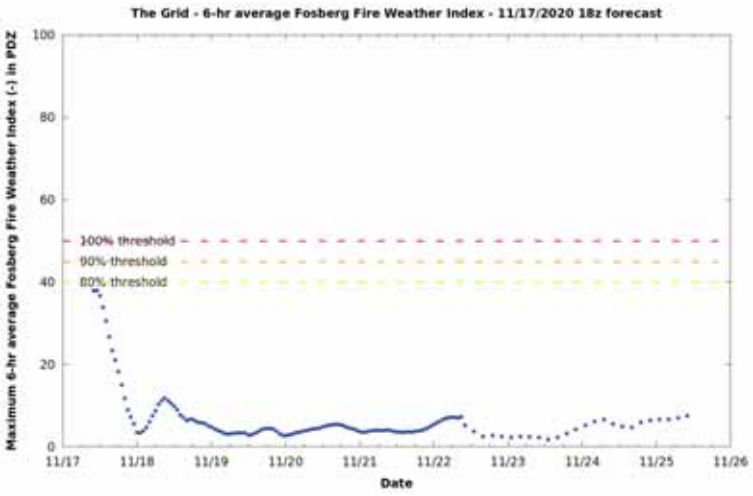


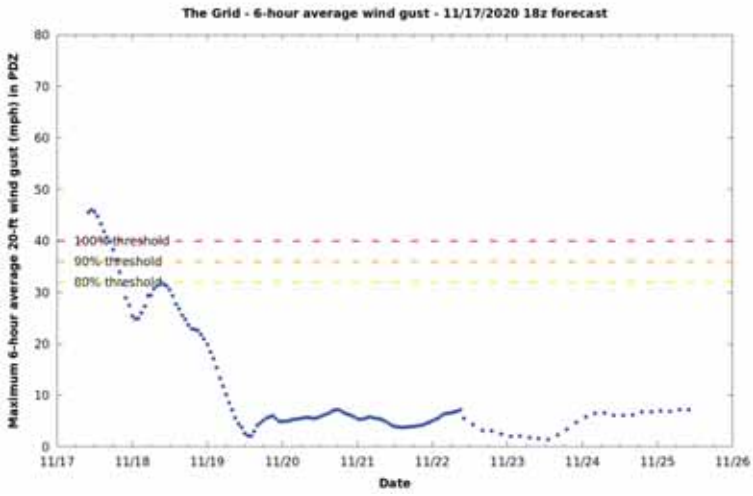
Tah 52-68



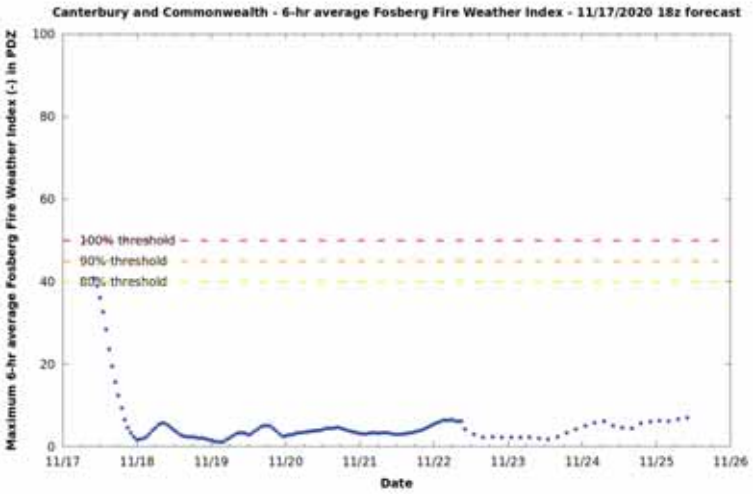


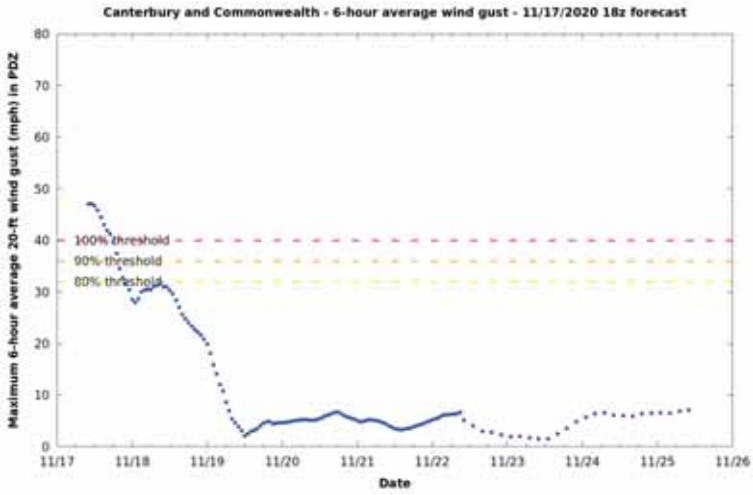
The Grid



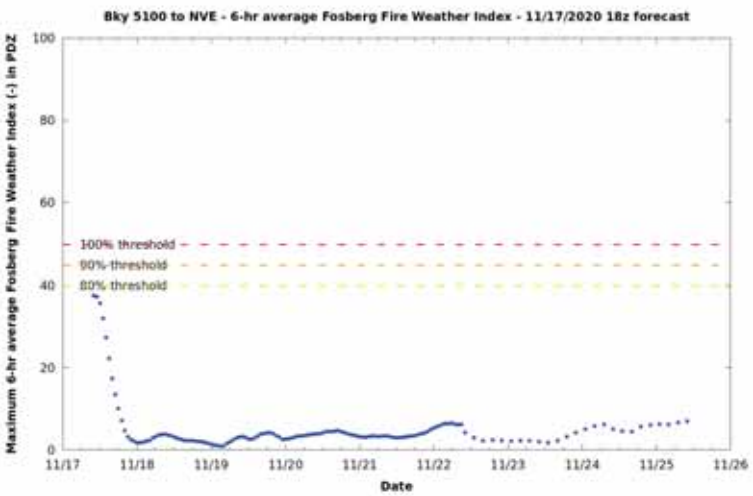


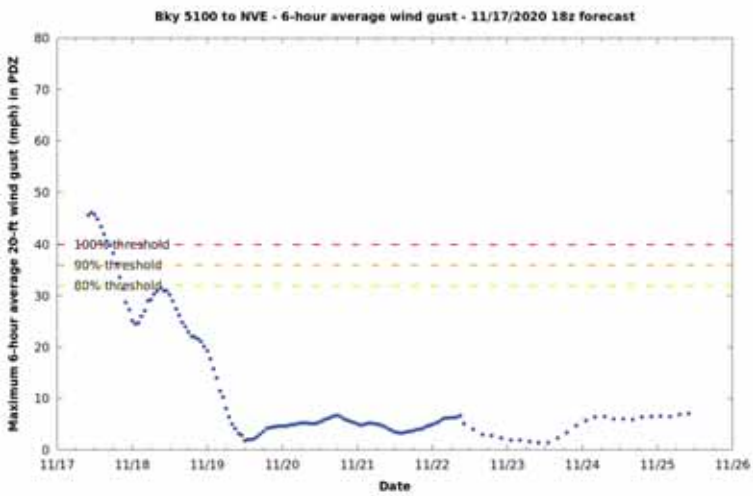
Canterbuy and Commonwealth



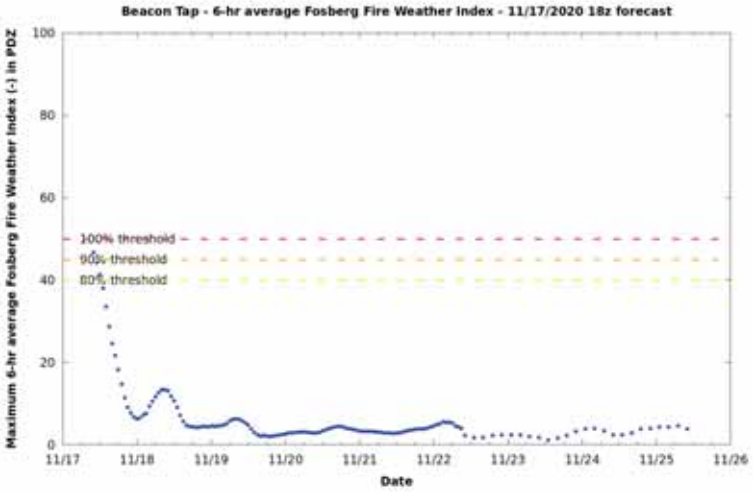


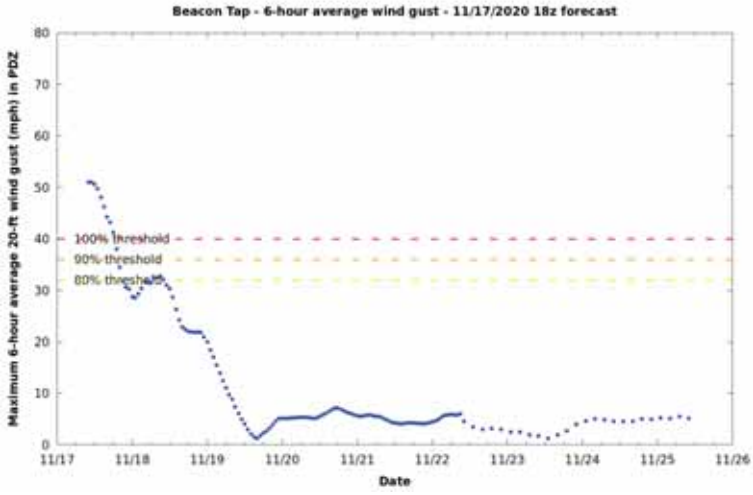
Bky 5100 to NVE



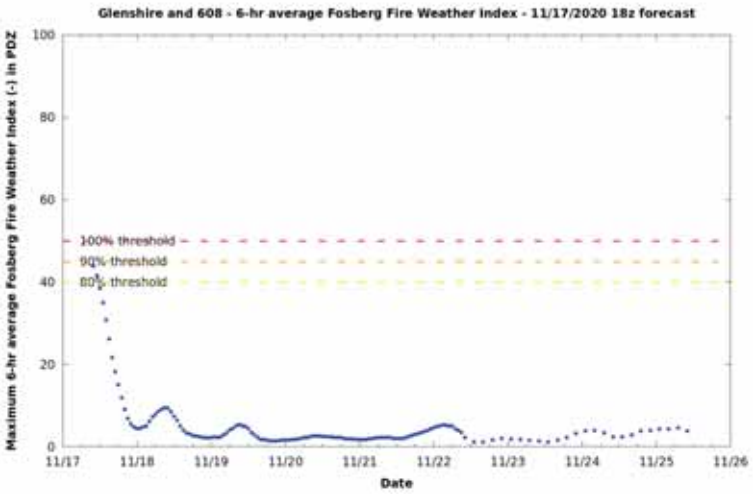


Beacon Tap



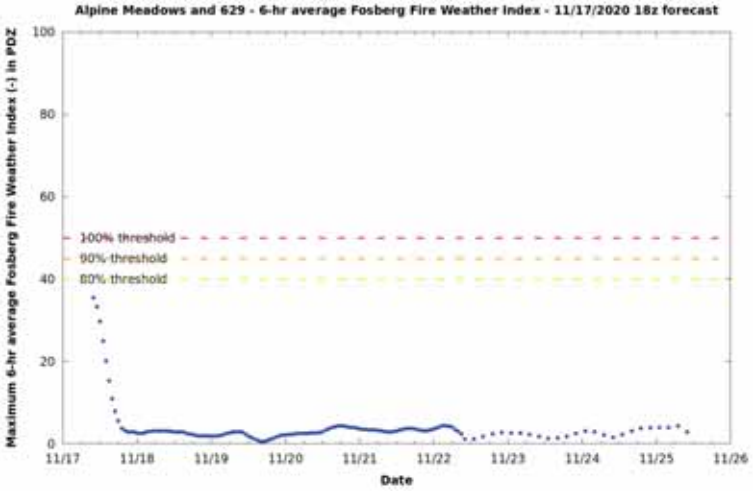


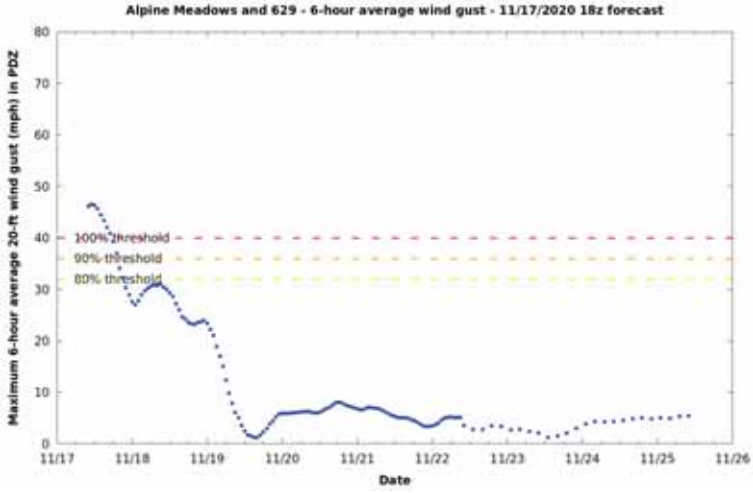
Glenshire and 608



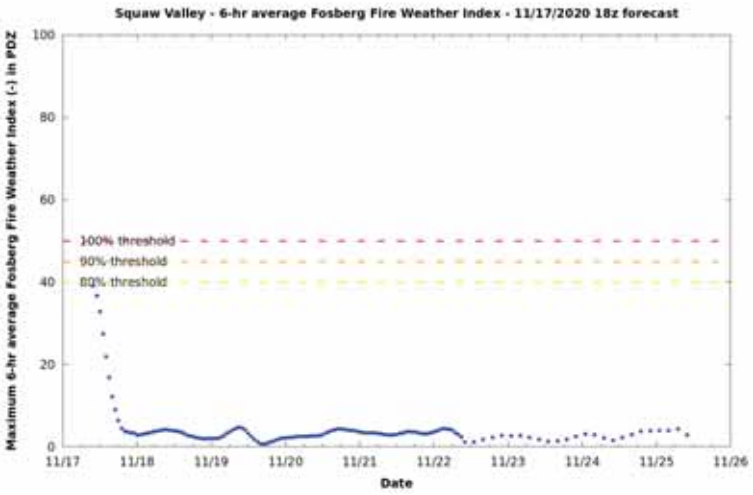


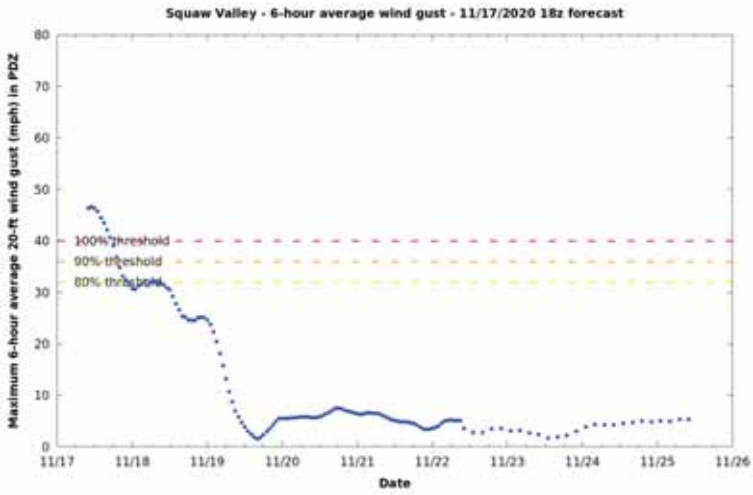
Alpine Meadows and 629



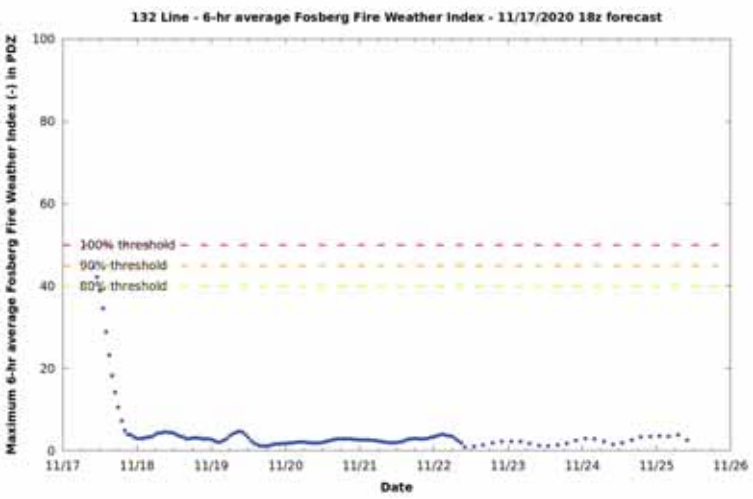


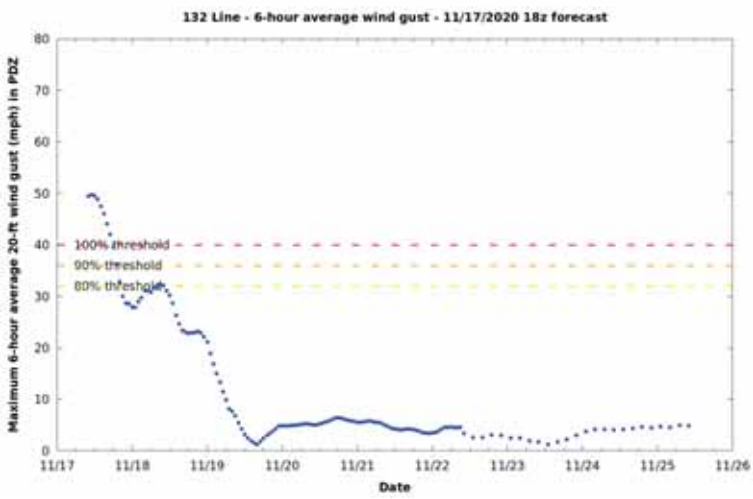
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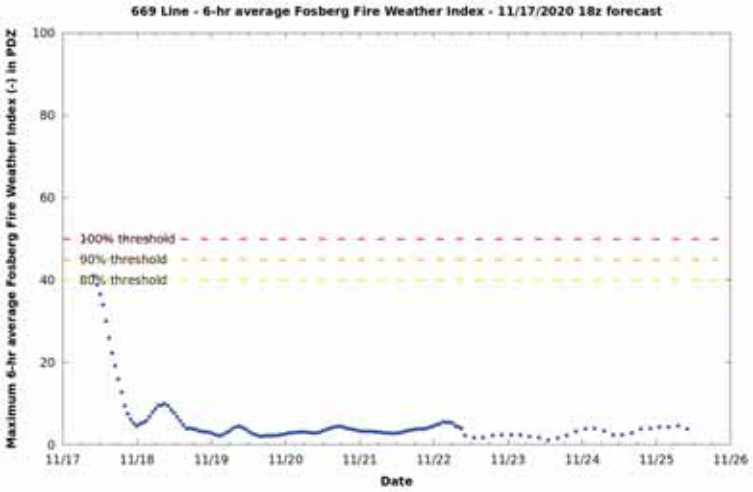


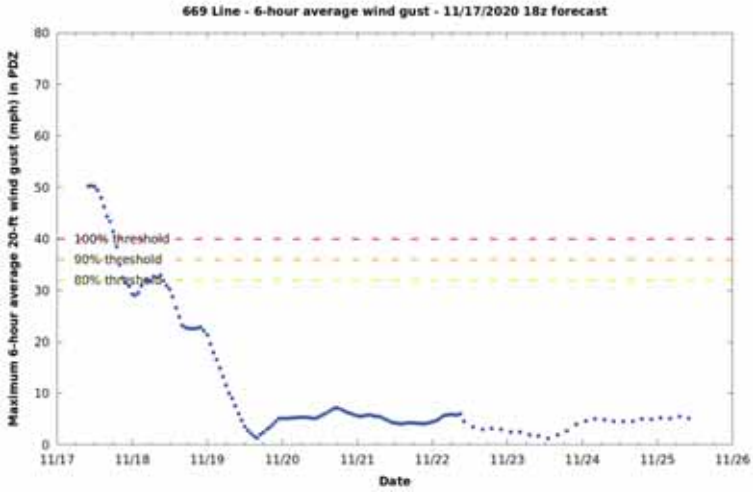
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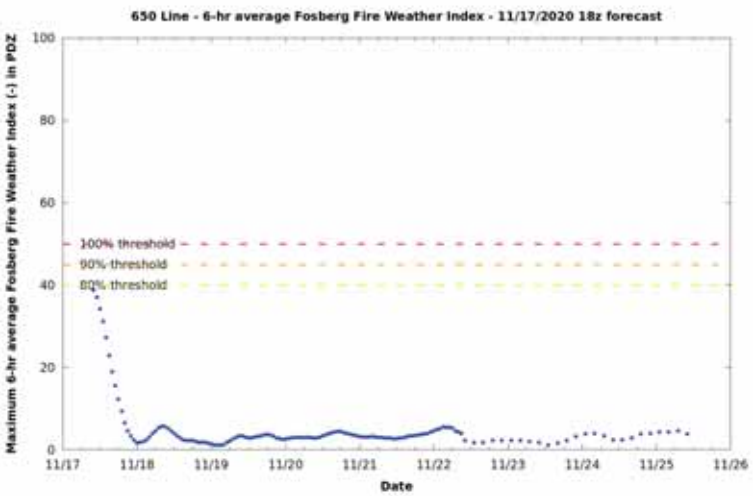


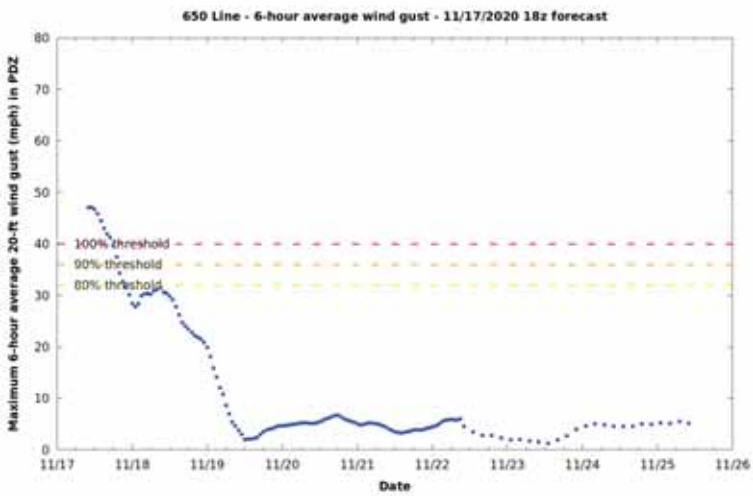
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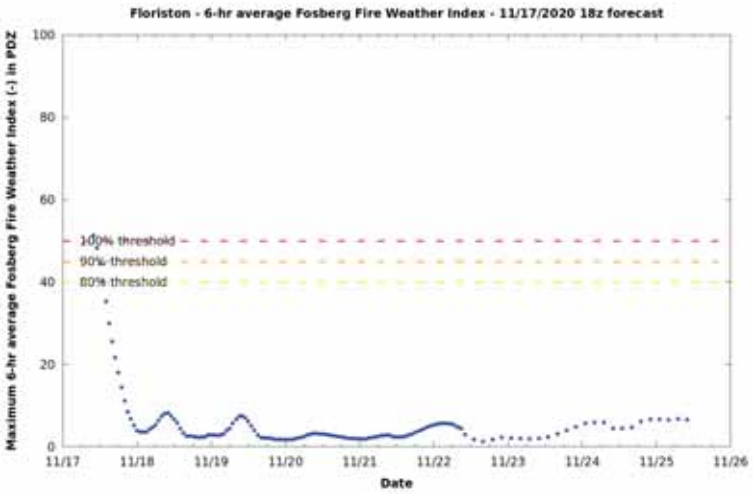


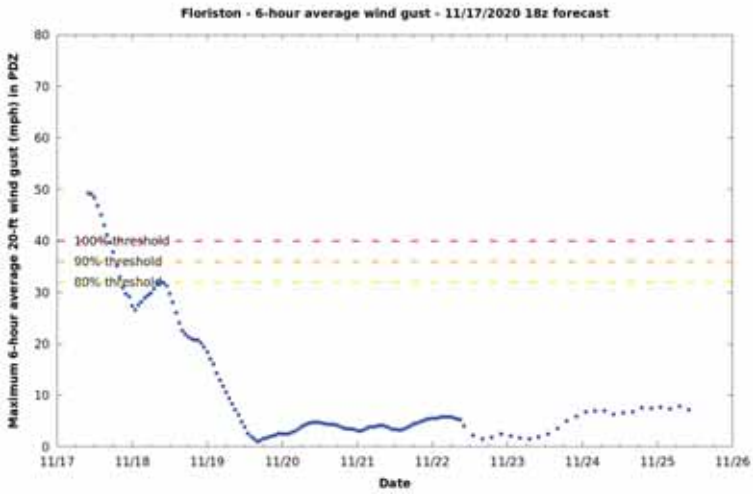
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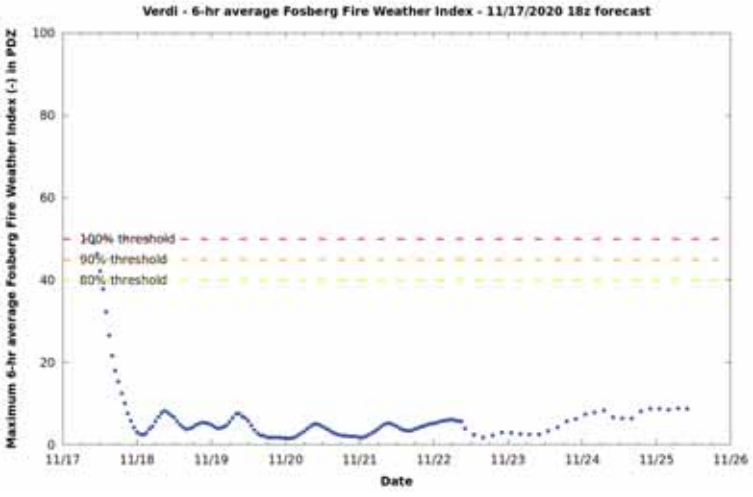


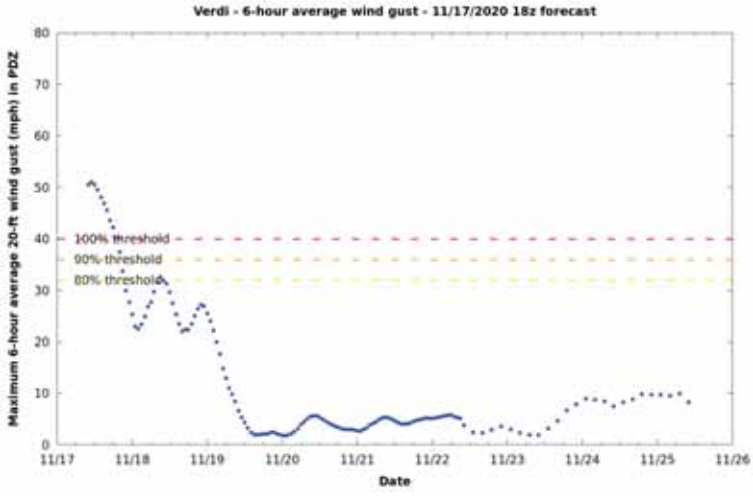
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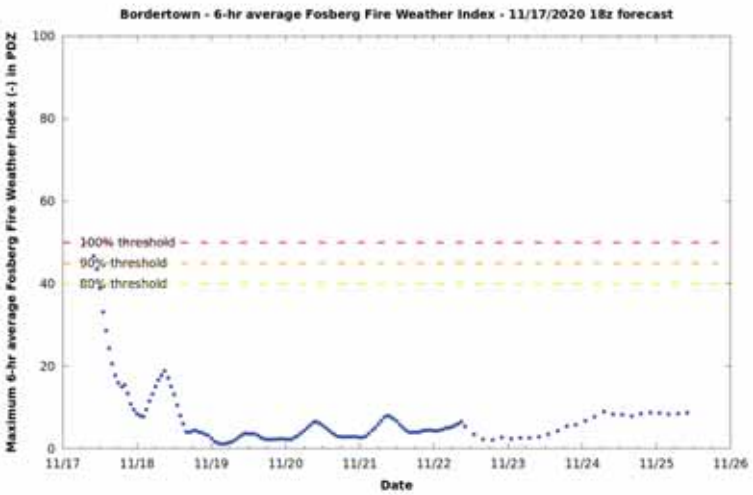


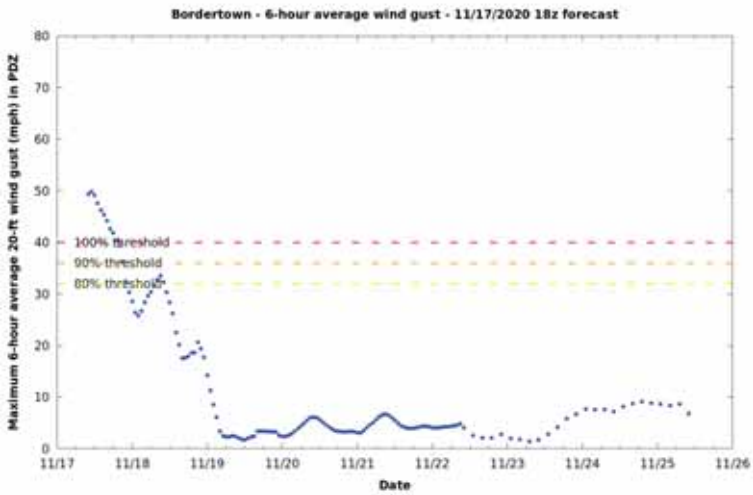
Verdi





Bordertown


Bordertown - 6-hr average Fosberg Fire Weather Index - 11/17/2020 18z forecast
Maximum 6-hr average Fosberg Fire Weather Index (-) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
11/25
11/26


Bordertown - 6-hour average wind gust - 11/17/2020 18z forecast
Maximum 6-hour average 20-ft wind gust (mph) in PDZ
100% threshold
90% threshold
80% threshold
Date
11/17
11/18
11/19
11/20
11/21
11/22
11/23
11/24
11/25
11/26

Attachment 7

Liberty amended response to data request CalAdvocates-LIB-A2506017-017, October 22, 2025

Liberty Utilities (CalPeco Electric) LLC
933 Eloise Avenue
South Lake Tahoe, CA 96150
Tel: 800-782-2506
Fax: 530-544-4811

October 22, 2025

Liberty Utilities (CalPeco Electric) LLC

A.25-06-017
WEMA

The Public Advocates Office

Data Request No.:	CalAdvocates-LIB-A2506017-017
Requesting Party:	Public Advocates Office
Originator:	Amanda Asadi, Amanda.Asadi@cpuc.ca.gov
	Aaron Louie, Aaron.Louie@cpuc.ca.gov
	Patrick Huber, Patrick.Huber@cpuc.ca.gov
cc:	Matthew Karle, Matthew.Karle@cpuc.ca.gov
	Cal Advocates Wildfire Discovery CalAdvocates.WildfireDiscovery@cpuc.ca.gov
Date Received:	September 24, 2025
Due Date:	October 8, 2025
Response Date:	October 8, 2025
Amended Response Date:	October 22, 2025

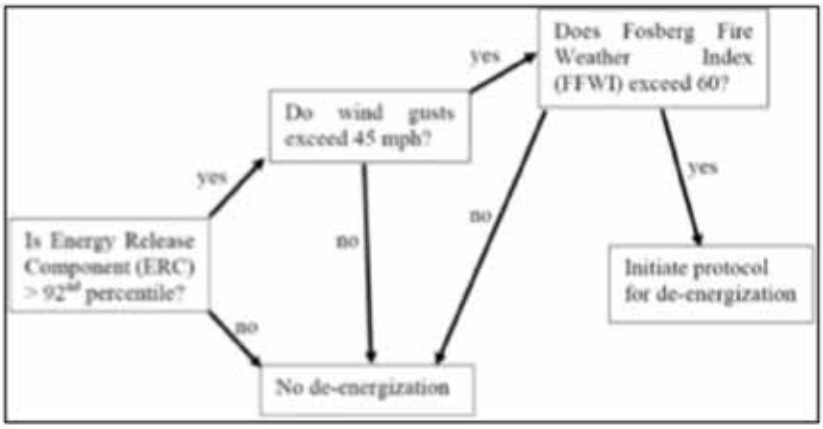
Situational Awareness

REQUEST NO. 1:

In the Application, Exhibit Liberty-03, page 39, Liberty states:

CA-04-1156

Figure 17: De-Energization Decision Tree for Topaz and Muller 1296 R3 PSPS Zones



In the Application, Exhibit Liberty-03, page 40, Liberty also states:

> On November 17, 2020, forecast weather and fire risk modeling did not meet Liberty's approved PSPS criteria for the Topaz 1261 Circuit prior to ignition of the Mountain View Fire. Indeed, in the days leading up to November 17, 2020, the FPI forecasts for the Topaz zone for that day ranged from "Low" to "Moderate."

a) Explain how Liberty's FPI forecasts were used in Liberty's approved PSPS criteria.
b) What weight was given to Liberty's FPI forecasts compared to the Energy Release Component (ERC), Wind Gusts, and Fosberg Fire Weather Index (FFWI)?
c) Did Liberty have a way to measure or calculate the ERC in real-time (i.e., using real-time weather station or other data to calculate ERC at a present moment in lieu of calculating a forecasted ERC for a time in the future)?
d) If the answer to subpart (c) is yes, provide copies of Liberty's real-time ERC as calculated on November 16, 2020 and November 17, 2020.
e) If the answer to subpart (c) is no, explain why not.

AMENDED RESPONSE:

a) FPI forecasts were not used for PSPS decision-making. As described in *Liberty-03: Prudence of Operations*, and illustrated in Figure 17 therein, the three criteria for PSPS decision-making were Energy Release Component ("ERC") percentile, (ii) wind gusts, and (iii) Fosberg Fire Weather Index ("FFWI").
b) See Liberty's response to subpart (a).
c) Liberty did not measure or calculate ERC in real-time, as Liberty understands that term. ERC is a National Fire Danger Rating System ("NFDRS") index. Liberty's ERC percentile forecasts were obtained from the U.S. Forest Service Wildland Fire Assessment System ("WFAS") and updated on Liberty's fire weather dashboard daily. With support from its vendor, Liberty also calculated ERC values on a weekly or bi-weekly basis as part of its field fuel moisture sampling to support situational awareness.

d) N/A
e) WFAS typically provided updated ERC values on a daily basis. Because ERC is a fire danger index intended to measure intermediate- to longer-term dryness and its calculation considers antecedent conditions over the prior several weeks, ERC calculations typically show little variation at sub-daily timescales.

REQUEST NO. 2:

In the Application, Exhibit Liberty-03, page 34, Liberty states:

> Liberty's FPI tool provided a seven-day forecast for 11 different geographic zones across Liberty's service area, ranking fire risk conditions on a five-category scale: Low, Moderate, High, Very High, and Extreme.

Explain how each FPI category affected Liberty's operational protocols (e.g., PSPS protocols, recloser operations, Control Center operations).

RESPONSE:

FPI forecasts were used to guide operation and maintenance crew activities, and were not used for PSPS decision-making or system operations. Please refer to attachment *LU Fire Prevention Plan 10-9-2020.pdf*, which described operating procedures for the five categories of FPI risk conditions.

REQUEST NO. 3:

Liberty's response to data request CalAdvocates-LIB-A2506017-008, Question 4 provides "FPI Forecasts.pdf," which shows Liberty's FPI forecast, ERC forecast, 6-hour average FFWI forecast, and Wind Gust Forecasts taken at 0000 hours, 0600 hours, 1800 hours on each day from November 11, 2020 through November 17, 2020.

a) Explain the following discrepancies:
   1. 11/12/2020 at 0600 hours: all FFWI and Wind Gust forecasts are missing data from 11/15 to 11/19;
   2. 11/12/2020 at 1800 hours: all FFWI and Wind Gust forecasts are missing data from 11/13 to 11/20;
   3. 11/13/2020 at 0000 hours: all FFWI and Wind Gust forecasts are missing data from 11/13 to 11/21;
   4. 11/13/2020 at 0600 hours: all FFWI and Wind Gust forecasts are missing data from 11/13 to 11/21;
   5. 11/13/2020 at 1200 hours: all FFWI and Wind Gust forecasts are missing data from 11/13 to 11/21;
   6. 11/14/2020 at 1800 hours: majority of FFWI and Wind Gust forecasts are missing data from 11/17 to 11/22;
   7. 11/15/2020 at 0000 hours: all ERCs went to 0.0 (previous day forecast showed values for Portola and Sierra Brooks) and all FFWI and Wind Gust forecasts are missing data from 11/17 to 11/23; and
   8. 11/15/2020 at 0600 hours: all ERCs stayed at 0.0 and all FFWI and Wind Gust forecasts are missing data from 11/17 to 11/23.
b) Did Liberty notice the discrepancies described in subpart (a)?

c) If the answer to subpart (b) is yes, when did Liberty discover the discrepancies?
d) If the answer to subpart (b) is yes, what did Liberty do about the discrepancies and when did Liberty perform those actions?
e) How often did discrepancies similar to those described in subpart (a) occur?
f) When did similar discrepancies previously occur and what were Liberty's actions?

AMENDED RESPONSE:

Liberty objects to this Question as vague and ambiguous as framed. Liberty further objects to this Question as overbroad and unduly burdensome. Subject to and without waiving its objections, Liberty responds as follows:

a) *FPI Forecasts.pdf* reflects information downloaded from Liberty's fire weather dashboard (https://tahoefireweather.com/) shortly after the Mountain View Fire. Liberty is not aware of any specific systemic reporting issues within its fire weather dashboard during the relevant time period that would explain the data issues referenced in this Question. It is possible that on occasion, there were delays in the reporting or incorporation of certain data, which could cause some data points within the FFWI and wind gust forecast plots to appear incomplete at certain points in time. In addition, because the ERC percentile forecasts displayed on Liberty's fire weather dashboard were obtained from the U.S. Forest Service Wildland Fire Assessment System ("WFAS"), it is possible that some data in the ERC tables did not display correctly on occasion due to delays or other issues with WFAS reporting, such as when there was an outage in the WFAS.
b) As explained in Liberty's response to subpart (a), *FPI Forecasts.pdf* reflects information downloaded from Liberty's fire weather dashboard (https://tahoefireweather.com/) shortly after the Mountain View Fire. Liberty does not know exactly when it became aware of the data issues described in this Question regarding forecast information contained in *FPI Forecasts.pdf*.
c) See Liberty's response to subpart (a).
d) See Liberty's responses to subparts (a) and (b). Liberty is not aware of any specific systemic reporting issues within its fire weather dashboard during the relevant time period that would explain these data issues or require a systematic response.
e) Liberty is not aware of records formally tracking instances in which data issues such as those referenced in this Question occurred.
f) See Liberty's response to subpart (e).

Control Center

REQUEST NO. 4:

In the Application, Exhibit Liberty-03, page 33, Liberty states: "By the end of 2018, Liberty's system operations had fully transitioned from NV Energy to Liberty Utilities' System Control Center in New Hampshire."

In the Application, Exhibit Liberty-03, page 34, Liberty also states:

On the day of the Mountain View Fire, a System Operator was actively monitoring Liberty's electric operations, and communicated directly with field personnel about scheduled work and outages on the Topaz 1261 Circuit that day, as discussed further in Section VI.D below.

a) On each of the days leading up to the Mountain View Fire ignition, starting from November 11, 2020, up through November 17, 2020, how many System Operators did Liberty have actively monitoring electric operations and what was their shift coverage?
b) Identify any times, from November 11, 2020 through November 17, 2020, when there was no System Operator on duty.
c) When did Liberty's system operations fully transition to Liberty Utilities' System Control Center in New Hampshire?
d) On each of the days leading up to the Mountain View Fire ignition, starting from November 11, 2020, up through November 17, 2020, was the System Operator for Liberty from NV Energy or Liberty Utilities' System Control Center in New Hampshire? Also, where was the System Operator located?
e) From November 11, 2020 through November 17, 2020, how did the System Operator use Liberty's FPI Forecasts to inform its decision-making?
f) From November 11, 2020 through November 17, 2020, how did the System Operator use Liberty's real-time data (including FPI, ERC, and weather data) to inform its decision-making?

AMENDED RESPONSE:

a) Liberty had four System Operators, one System Operator-in-training and one Manager on shifts monitoring electric operations during the specified time period. System Operators were on 12-hour shift coverage from 6:00 a.m. to 6:00 p.m. Eastern time (daytime shift) and from 6:00 p.m. to 6:00 a.m. Eastern time (nighttime shift). There was at least one Operator working per shift. The Operator-in-training and the Manager typically worked daytime shifts.
b) There was always at least one System Operator on duty during the specified time period.
c) Liberty's system operations had fully transitioned to Liberty Utilities' System Control Center in New Hampshire by February 14, 2019.
d) During the specified time period, the System Operators, System Operator-in training, and Manager were located at Liberty Utilities' System Control Center in Londonderry, New Hampshire.
e) – f) Liberty's operations team in California was responsible for monitoring Liberty's fire weather dashboard and communicating PSPS and other operational decisions to Liberty Utilities' System Control Center in New Hampshire as needed. The System Operators were not directly responsible for monitoring FPI or PSPS criteria. Please refer to Liberty's responses to Questions 1-2 of this set of data requests and Liberty's response to CalAdvocates-LIB-A250617-006, Question 3.

REQUEST NO. 5:

In Liberty's 2020 Wildfire Mitigation Plan (WMP), page 34, Liberty states:

2019 Public Safety Power Shutoff ("PSPS") Near Miss Lessons Learned	
Steering Committee	Bright red line threshold is clear, but as we approach, is there room to define cusp thresholds and potential action items?
Operations	More patrols if there is a forecast threshold exceeds.
Dispatch and Control	New Hampshire Dispatch and Control – indications staffing could be a challenge.
Communications	One agency notification was missed Disjointed systems (Responder, Everbridge, GIS, etc.)
Administration	Logistics, admin requirements are significant and difficult for team lead and other core members to manage in addition to executing the PSPS. Overlap in roles between emergency management and PSPS requirements
Documentation & Records Management	Explore establishing a role dedicated to documentation and records management

a) Explain what the 2019 PSPS Near Miss event was that led to the lesson learned that "New Hampshire Dispatch and Control – indications staffing could be a challenge." When did it occur?
b) What steps did Liberty take to address this lesson learned and when did Liberty implement them?

AMENDED RESPONSE:

a) The event referred to in Liberty's 2020 WMP, page 34, was an activation of Liberty's event team in September 2019 for a potential PSPS event.

b) Liberty understands that the Dispatch and Control issue related to a general concern regarding staffing for emergency events such as PSPS which could require coordination between Liberty Utilities' System Control Center and local emergency operations personnel. Actions that Liberty took to address lessons learned from the September 2019 event included:

- Hired a Manager of Emergency Services and a Fire Protection Specialist to strengthen emergency response capabilities.
- Conducted a tabletop exercise with public safety partners to test communication protocols on November 2, 2019.
- Conducted PSPS tabletop exercises May 11, 2020.
- Conducted Communications Exercise May 12, 2020.
- Planned and executed a comprehensive PSPS simulation on June 25, 2020, to prepare for the 2020 wildfire season.
- Updated the Incident Command Structure roles/responsibilities, cross-trained team members, and identified backup roles to maintain adequate staffing during PSPS events.

Fire Prevention Plan for Overhead Electric Facilities

REVISION HISTORY

The Liberty Utilities (CalPeco Electric), LLC (U 933-E) (Liberty CalPeco) Wildfire Prevention Department (Department) updated the Fire Prevention Plan (FPP or Plan) October 2019.[1] The Department will oversee the execution of required training for Liberty CalPeco personnel and contractors prior to the 2020 fire season.

PURPOSE

In 2017 and 2018, California experienced some of the most destructive wildfires in its history. The combination of drought, extreme winds and build-up of dry vegetation contributed to increased wildland fires. The wildfire season and associated forest fire risk factors have increased due to warmer spring and summer temperatures, reduced snowpack, and earlier spring snowmelt, leading to higher levels of dry fuels. Liberty CalPeco recognizes that the operations, maintenance and construction on the electric grid, and characteristics of associated equipment may present an ignition risk. Our goal is to develop reasonable and actionable plans to mitigate ignition risks, be prepared to suppress small fires, keep our employees safe while working in wildland areas and provide general fire safety precautions for field operations.

Liberty CalPeco developed this Plan in compliance with Ordering Paragraph 3 of California Public Utilities Commission (CPUC) Decision (D.) 12-01-032 and the revisions of D.17-12-024 pursuant to General Order (GO) 166 Standard 11 and information specified in GO 166 Standard 1, Part E as applicable to Liberty CalPeco's service territory (See Attachment 1). The FPP identifies operational protocols for Liberty CalPeco overhead facilities that lie within Tiers 2 and 3 of the High Fire-Threat District (HFTD) Map adopted by the CPUC on January 19, 2018. The Plan delineates operational pathways in working with electrical assets and overhead facilities that may pose a fire ignition threat under notification of rated fire watch conditions.

The FPP establishes procedures to be followed by the utility for facilities in Tier 2 or 3 of the HFTD or during the Fire Precautionary Period, which is considered to be sustained by the Department of Forestry and Fire Protection (CAL FIRE). Due to the high alpine climate of Liberty CalPeco's electric service territory, late fall and winter months present a seasonal swing of reduced risk due to snow conditions as compared to spring and summer months. Liberty CalPeco personnel operate with consideration of stringent fire safety requirements for high risk areas and conditions. Currently, a combination of Red Flag Warning (RFW) notifications, interpretations from the Reax predictive tool, and information gathered from Liberty CalPeco weather stations will help determine avenues and countermeasures to mitigate the threat of utility-caused fire ignitions during

[1] Navigant Consulting, Inc., a Guidehouse company (Navigant) assisted Liberty CalPeco in preparing this report for filing, based on the information the utility provided. The information presented in this report represents Navigant's professional judgment based on the information available at the time this report was prepared with Liberty CalPeco's overall decision-making. Navigant is not responsible for the reader's use of, or reliance upon, the Plan, or any decisions based on the Plan. NAVIGANT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED. Readers of this Plan are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the Plan, or the data, information, recommendations, and opinions contained in the report.

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periods of “Low and Moderate,” “High,” “Very High” and “Extreme” fire ratings. (*See* Fire Potential Index.) These procedures include practices for field operations and maintenance (O&M) activities in applicable areas and conditions.

The FPP establishes procedures and routine operational practices that:

1) Provide employees and contractors an understanding of the enacted processes and procedures that will improve reliable and safe operation of overhead electric facilities in high-risk areas or under fire weather conditions;
2) Establish Liberty CalPeco standards of equipment and vehicle use and operations during fire risk seasons and work near potential ignition sources;
3) Determine work restrictions during cautionary periods issued by internal meteorological and predictive tools and RFWs, as designated by the National Weather Service (NWS);
4) Outline the operational and communication procedures when working adjacent to or immediately after a fire ignition within the service territory;
5) Present the future use of the Fire Potential Index (FPI) as it relates to additional risk measurements that may be warranted and discerning the appropriate operational procedures for field activities; and
6) Introduce general fire safety considerations and precautions for performing work in high risk areas and/or during high risk weather periods.

DEFINITIONS

Activity: Specific operation of a piece of equipment, such as a chainsaw or tractor.

Baseline Fire Tools: Items available to field personnel to prevent and quickly suppress small ignitions for a designated worksite. These tools include but are not limited to:

Fire Box: Container available at the worksite containing fire suppression equipment and additional as deemed appropriate for the performed activity.
Backpack Pump: Canister containing fire suppressant material.
Shovel: Rounded tip with a length of approximately 48 inches.
Wildland McLeod tool: Fire hand tool used for raking and scraping.

Fire Potential Index: Ranking system that aligns predetermined operational practices with elevated risks restrictions due to the threat of potential ignition. Liberty CalPeco has identified five tiers of risk: low and moderate fire risk, high fire risk, very high fire risk and extreme fire risk.

Fire Safety Leader: Designated field supervisor or crew member who has a ***dedicated*** role for fire safety requirement oversight during extreme fire risk working conditions.

Fire Safety Monitor: Designated field supervisor or crew member responsible for fire safety requirement oversight during Elevated Fire Risk working conditions.

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Manager in Charge: Non-represented employee designated by Liberty CalPeco to implement this policy during normal hours of operation.

Mechanical Operations: Any activity that requires the use of motorized power equipment.

On-call Supervisor: Employee designated by Liberty CalPeco to implement this policy in the absence of the Manager in Charge.

Operating Area: Property on which active operations, including transportation, are to be conducted. The area within 100 feet of the traveled surface of roads is generally considered part of the Operating Area, whether or not it is included in the rights-of-way or easements.

Red Flag Warning (RFW): The National Weather Service will typically declare a RFW within a zone when wind gusts exceed 30 miles per hour (mph), and the relative humidity is less than 20 percent for more than three hours. Other factors considered include timber conditions and forecasts for weather elements, such as dry lightning. Typically, the RFW is issued for a specified period.

Fire Weather Watch: A National Weather Service notice which alerts land management agencies of the potential for a Red Flag event in the near future. A forecaster is reasonably confident that Red Flag criteria will be met. Fire Weather Watches are generally issued 12-72 hours in advance of an event, but can be issued in the first 12 hours for dry lightning events.

ASSESSMENT METHODOLOGY

Liberty CalPeco pursued a structured approach to determining whether an FPP was required for Liberty CalPeco facilities under the Rulemaking (R.) 08-11-005, as described in the final decision. The approach utilized the information collected to identify specific facilities that meet the Plan criteria for inclusion in the FPP. This Plan is sufficient for most routine work activities. In the event a project-specific fire plan is deemed necessary, the Project Manager, or Project Manager's designee, will coordinate with field crew to frame additional criteria. The assessment methodology for the FPP is described below.

1) Liberty/Reax Fire Forecast: Reax is a predictive tool that captures three main methods of fire weather condition measurement: Energy Release Component (ERC), wind gusts, and the Fosberg Fire Weather Index (FFWI). Liberty CalPeco will issue proactive patrols and inspection procedures during applicable work if a triggered scenario is revealed through the predictive software tool. When the Reax tool predicts potential fire weather conditions, the Manager in Charge or designee will refer to the tiered risk categories in this Plan and initiate operational protocols based on the determined rating.

2) Red Flag Warnings: Fire Weather Zone Boundaries were compared to Liberty CalPeco's service territory, and it was identified that the territory spans portions of three different zones. Liberty

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CalPeco will monitor the applicable zones 271, Zone 272, and Zone 273. Historical data for the past 10 years' RFWs within each of these zones was collected for each occurrence, so that wind data could be collected and evaluated for each identified RFW.[2]

During Red Flag Events, Liberty CalPeco will monitor wind gusts at the peak elevation located at Bliss State Park using the link below or other available data.[3]

Liberty CalPeco has identified 46 Public Safety Power Shut-off (PSPS) zones that are based on isolation points within certain circuits or areas. If Reax forecasts for these zones that the ERC, wind, and FFWI will come within 80%, 90%, or 100% of the thresholds for de-energization, Liberty CalPeco will enact a PSPS upon or just before reaching 100%. During a PSPS event, Liberty CalPeco will suspend noncritical operational work to focus efforts on current conditions and proactive patrols after de-energizing and when restoring power. Liberty CalPeco adheres to the guidelines provided in R. 18-12-005, an open proceeding that prescribes utilities' PSPS processes, among other issues. Liberty CalPeco will provide updated protocols for internal PSPS practices in the 2020 version of its Wildfire Mitigation Plan.

3) Liberty CalPeco Design Standards: An engineer examined the Liberty CalPeco facilities design standards to evaluate the minimum standard for wind loading design. The design standard utilizes the criteria specified in GO 95 Section IV. However, this is a minimum design standard, and facilities are often oversized for a variety of reasons. Liberty CalPeco will review applicable wind loading design standards, monitor regulatory changes to standard design requirements, and update standards for minimum wind loading design criteria as deemed prudent.

4) Wind Data: NWS Remote Automatic Weather Stations were mapped for the area within 25 miles of the Liberty CalPeco service territory. Wind gust data from the NWS site is monitored for each RFQ. The station automatically records the maximum instantaneous gust over the past hour, while wind speed averages are recorded by the stations over 10-minute periods. Because it is not possible to discern if gusts lasted three seconds or more, it is assumed that all maximum gusts meet the three-second criteria to guard against underestimating a fire threat.

In addition to fire weather and fuels data from the NWS and United States Department of Agriculture National Fire Danger Rating System, Liberty CalPeco tracks instantaneous meteorological conditions received from the 10 weather stations in the service territory. Liberty CalPeco also proposes to install 20 additional weather stations during 2020. The server data capturing meteorological conditions will serve as a principle variable underlying the development of the FPI. Until the FPI is developed and adopted by Liberty CalPeco, operational designations for fire ratings will be derived from the meteorological data expressed above.

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2 Alerts may be monitored using the links below and Liberty CalPeco will make best efforts to subscribe to automatic alert notifications: http://inws.wrh.noaa.gov/page/faq and https://inws.wrh.noaa.gov/alerts.

3 Bliss State Park: https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCDLB

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5) Mapping: Tiers 2 and 3 of the HFTD are overlaid on the Liberty CalPeco service territory map. All Liberty CalPeco facilities are mapped without underground facilities, which are not subject to the Plan requirements. Operational work within Tier 2 and 3 of the HFTD or in response to issued RFWs are subject to more stringent fire safety requirements, as described in this Plan. The attached map complies with GO 95 Rule 21.2-D.

6) Fire Potential Index (FPI): The FPI is used as means to develop guidelines for utility and contractor operations and maintenance crews to follow under Liberty CalPeco's defined categories of wildfire risk. The Wildfire Prevention Department is responsible for determining and communicating the FPI on a daily basis. The current status of the FPI will be posted on the Liberty CalPeco intranet and will communicate the status to the Manager in Charge. The FPI rating framework is currently in development.

FIRE POTENTIAL INDEX

Liberty CalPeco is currently developing a FPI methodology that comprehensively assesses the fire risk utilizing several data points to influence operation and maintenance decisions related field work. The FPI forecasting application captures data from situational awareness tools and seven-day projections and will then present a fire ranking that aligns with a "Low", "Moderate", "High", "Very High" or "Extreme" fire potential. The FPI is scheduled for completion in 2020 and will be included in the FPP for the next filing cycle.

The five FPI Risk conditions are defined as follows:

Extreme Fire Risk: As determined by the Wildfire Prevention Department, Extreme Fire Risk is defined as periods of significant risk of wildfires and the associated ignition risks within Tier 2 or 3 of the HFTD. All O&M activities have stipulations, and significant fire mitigation activities are required. The Extreme Fire Risk status is indicated as "Red."

Very High Fire Risk: As determined by the Wildfire Prevention Department, Very High Fire Risk is defined as periods of increasing risk of wildfires and associated ignition risks within Tier 2 or 3 of the HFTD. Many O&M activities have stipulations and additional fire mitigation activities are required. The Very High Fire Risk status is indicated as "Orange."

High Fire Risk: As determined by the Wildfire Prevention Department, High Fire Risk is defined as periods of increasing risk of wildfires and associated ignition risks within Tier 2 or 3 of the HFTD. Many O&M activities have stipulations and additional fire mitigation activities are sometimes

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required. The High Fire Risk status is indicated as "Yellow."

Moderate Fire Risk: As determined by the Wildfire Prevention Department, Normal Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are not elevated but still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The FPI is indicated as "Green."

Low Fire Risk: As determined by the Wildfire Prevention Department, Normal Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are low but may sometimes still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The Low Fire Risk status is the default operational state and the FPI is indicated as "Blue."

PROCEDURE

General Safety Instructions for Utility and Contractor Crews

- **General Fire Awareness:** During the execution of work activities and use of company equipment and vehicles, all operating personnel must be actively aware and consider actions that may reduce fire risks and personal exposure.
    - Activities such as idling a vehicle near brush, grassland, or at-risk vegetation is prohibited, and drivers should always perform a perimeter check after exiting the vehicle and inspect underneath for potential fuel risk.
    - The Fire Safety Monitor/Leader should remain alert of crew vehicles traveling over low vegetation or brush.
    - Smoking is only permitted in site-specific designated areas or within a 10' clearance of any vegetation or grass.
    - When possible during days with high temperatures and low humidity, wet down adjacent vegetation when performing work with equipment that may spark or has an exposed exhaust system.
    - Consider the need to disable reclosers on potentially impacted equipment or de-energize circuits within the operating area to prevent potential sparks.
- **Safety Briefings:** When assigned to work within wildland areas, the tailboard safety briefing shall include review of the following:
    - 1. The current daily FPI Rating;
    - 2. Job site-specific fire risks;

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- 3. Elimination of tasks that pose an elevated fire risk;
- 4. Actions to reduce personal exposure; and
- 5. Any other possible fire risk mitigation actions.

- **Fire Safety Tools Responsibility:** The crew leader must check the availability and condition of the baseline fire tools during the daily truck safety inspection and make fire suppression equipment readily accessible near operating areas.
- **Tailboard Fire Briefings**: If, during the execution of work, the job site-specific fire risks are elevated, the crew leader shall stop work and hold a tailboard meeting to discuss revised actions. If warranted by elevated jobsite risk conditions, the crew leader may elect to declare the next highest level of Fire Potential Index Rating for the job site.
- **Fire Reporting and Actions:**
  - All fires must be reported to 911, verify and be prepared to report your location.
  - If the work crew cannot quickly extinguish a minor fire or rapidly accelerating fire conditions are encountered, the crew leader shall immediately report the situation to dispatch and relocate the crew, equipment, and materials to a safe location.
  - All fires must be reported to dispatch and follow appropriate incident reporting requirements to the CPUC Safety Enforcement Division (SED).

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Safety Instructions for Working Under Extreme Risk Index Conditions

When working under Extreme Risk Index conditions, the crew leader shall designate a crew member as a Fire Safety Leader. The Fire Safety Leader will not be assigned any job site tasks and will be assigned the specific duties of fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew. Liberty CalPeco will utilize alerts from Reax to determine if a proactive patrol of electrical equipment and vegetation clearances is warranted. Liberty CalPeco will activate proactive fire patrols if forecasted conditions for Fosberg Fire Weather Index and Average Wind Gust reach 90% or greater for PSPS threshold.

Operating Procedures – Extreme Risk Index Conditions

As a general rule, all work should be suspended during Extreme Risk Index conditions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	**Paved roads or bare improved roads**	**Assure fire safety precautions are followed.**
	Off-road and unimproved roads	**Not Allowed**
Facility Inspections and Patrols	**Driving inspections of poles, equipment, vegetation and security**	**Assign a Fire Safety Monitor**
	Climbing inspections of poles, equipment, vegetation and security	**Assign a Fire Safety Leader**
Overhead Line Corrective Maintenance and Repairs	**Replacement and/or installation of splices, fuses, lightning arrestors, and insulators**	**Perform only those activities that reduce wildfire risks and/or restore customer outages; assign a Fire Safety Leader**
Pole Setting and Removal	**Paved roads or bare improved roads**	**Perform only those activities that reduce wildfire risks and/or restore customer outages; assign a Fire Safety Leader**
	Off-road and unimproved roads	**Not allowed**
Replacing and Stringing Conductor	**Paved roads or bare improved roads**	**Perform only those activities that reduce wildfire risks and/or restore customer outages; assign a Fire Safety Leader**
	Off-road and unimproved roads	**Not allowed**
Vegetation Management Near Poles and Towers	**Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control**	**Not allowed**
T&D Overhead Line Vegetation Management	**Minor maintenance tree trimming and associated branch removals using buckets and/or hand tools to maintain company clearance standards**	**Perform only those activities that reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Leader**

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	Cycle trimming using buckets and/or hand tools to maintain company clearance standards	**Not allowed**

Safety Instructions for Working Under Extreme Risk Index Conditions (cont'd.)

When working under Extreme Risk Index conditions, the crew leader shall designate a crew member as a Fire Safety Leader. The Fire Safety Leader will not be assigned any job site tasks and will be assigned the specific duties of fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew. Liberty CalPeco will utilize alerts from Reax to determine if a proactive patrol of electrical equipment and vegetation clearances is warranted. Liberty CalPeco will activate proactive fire patrols if forecasted conditions for Fosberg Fire Weather Index and Average Wind Gust reach 90% or greater for PSPS threshold.

Operating Procedures – Extreme Risk Index Conditions

As a general rule, all work should be suspended during Extreme Risk Index conditions		
Reciprocating Construction Equipment	**Truck mounted compressors and/or generators**	**Assign a Fire Safety Leader**
	Non-truck mounted compressors and/or generators	**Not allowed**
	Welders and grinders	**Not allowed**
Blasting	**Blasting of rock with explosives**	**Not allowed**

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Safety Instructions for Working Under Very High Risk Index Conditions

When working under Very High Risk Index conditions, the crew leader shall designate a crew member as a Fire Safety Monitor or assign a Fire Safety Leader. In addition to the assigned work duties at the job site, the Fire Safety Monitor is responsible for fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew. **The Fire Safety Leader will not be assigned any job site tasks and will be assigned the specific duties of fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew.**

Operating Procedures – Very High Risk Index Conditions

As a general rule, work may be limited during Elevated Risk Index conditions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	Paved roads or bare improved roads	Assure fire safety precautions are followed.
	Off-road and unimproved roads	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Facility Inspections and Patrols	Driving inspections of poles, equipment, vegetation and security	Assure fire safety precautions are followed
	Climbing inspections of poles, equipment, vegetation and security	Assign a Fire Safety Monitor
Overhead Line Corrective Maintenance and Repairs	Replacement and/or installation of splices, fuses, lightning arrestors and insulators	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Pole Setting and Removal	Paved roads or bare improved roads	Assign a Fire Safety Monitor
	Off-road and unimproved roads	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Leader
Replacing and Stringing Conductor	Paved roads or bare improved roads	Assign a Fire Safety Monitor
	Off-road and unimproved roads	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Leader
Vegetation Management Near Poles and Towers	Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control	Perform only those activities which reduce wildfire risks and/or restore Customer outages
T&D Overhead Line Vegetation Management	Minor maintenance tree trimming using buckets and/or hand tools to maintain company clearance standards	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
	Cycle trimming and associated tree/branch removals using buckets and/or hand tools to maintain company clearance standards	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Leader
Reciprocating Construction Equip.	Truck/trailer-mounted compressors and/or generators	Assign a Fire Safety Monitor
	Non-truck-mounted compressors and/or generators	Not allowed

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	Welders and grinders	Not allowed
Blasting	Blasting of rock with explosives	Not allowed

Safety Instructions for Working Under High Risk Index Conditions

When working under High Risk Index conditions, the crew leader shall designate a crew member as a Fire Safety Monitor. In addition to the assigned work duties at the job site, the Fire Safety Monitor is responsible for fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew.

Operating Procedures – High Risk Index Conditions

As a general rule, work may be limited during Elevated Risk Index conditions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	Paved roads or bare improved roads	Assure fire safety precautions are followed.
	Off-road and unimproved roads	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Facility Inspections and Patrols	Driving inspections of poles, equipment, vegetation and security	Assure fire safety precautions are followed
	climbing inspections of poles, equipment, vegetation and security	Assign a Fire Safety Monitor
Overhead Line Corrective Maintenance and Repairs	Replacement and/or installation of splices, fuses, lightning arrestors and insulators	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Pole Setting and Removal	Paved roads or bare improved roads	Assign a Fire Safety Monitor
	Off-road and unimproved roads	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Replacing and Stringing Conductor	Paved roads or bare improved roads	Assign a Fire Safety Monitor
	Off-road and unimproved roads	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Vegetation Management Near Poles and Towers	Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control	Perform only those activities which reduce wildfire risks and/or restore Customer outages
T&D Overhead Line Vegetation Management	Minor maintenance tree trimming using buckets and/or hand tools to maintain company clearance standards	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
	Cycle trimming and associated tree/branch removals using buckets and/or hand tools to maintain company clearance standards	Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor
Reciprocating Construction Equip.	Truck/trailer-mounted compressors and/or generators	Assign a Fire Safety Monitor
	Non-truck-mounted compressors and/or generators	Assign a Fire Safety Monitor
	Welders and grinders	Not allowed

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Blasting	**Blasting of rock with explosives**	**Not allowed**

Safety Instructions for Working Under Low / Moderate Risk Index Conditions

When working under Low/Moderate Risk Fire Index conditions, workers should still maintain high awareness of the fire risk and safety hazards within the operating area.

Operating Procedures – Low/Moderate Risk Index Rating

As a general rule, work can proceed during Normal Risk Index conditions following General Safety Instructions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	**Paved roads or bare improved roads**	**No restrictions**
	Off-road and unimproved roads	**No restrictions**
Facility Inspections and Patrols	**Driving and climbing inspections of poles, equipment, vegetation and security**	**No restrictions**
Overhead Line Corrective Maintenance and Repairs	**Replacement and/or installation of splices, fuses, lightning arrestors and insulators**	**No restrictions**
Pole Setting and Removal	**Paved roads or bare improved roads**	**No restrictions**
	Off-road and unimproved roads	**No restrictions**
Replacing and Stringing Conductor	**Paved roads or bare improved roads**	**No restrictions**
	Off-road and unimproved roads	**No restrictions**
Vegetation Management Near Poles and Towers	**Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control**	**No restrictions**
T&D Overhead Line Vegetation Management	**Minor maintenance tree trimming using buckets and/or hand tools to maintain company clearance standards**	**No restrictions**
	Cycle trimming and associated tree/branch removals using buckets and/or hand tools to maintain company clearance standards	**No restrictions**
Reciprocating Construction Equipment	**Truck mounted compressors and/or generators**	**No restrictions**
	Non-truck mounted compressors and/or generators	**Assign a Fire Safety Monitor**
	Welders and grinders	**Assign a Fire Safety Monitor**
Blasting	**Blasting of rock with explosives**	**Truck must have permit with restrictions; assign a Fire Safety Monitor**

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ACTIVE FIRE SAFETY PRECAUTIONS

Liberty CalPeco values safety as a core competency of field and hot work performed in high risk areas. For all contractors and utility personnel, these precautions exist for critical work performed within Tiers 2 and 3 of the HTFD under threat of wildland fire. If a small fire ignites call 911 and be prepared to verify and provide your location. If rapid suppression is not achieved by field personnel, field crew are directed to stop work, retreat to a safe area adjacent to the work site, immediately notify dispatch services, and alert nearby agencies and entities.

All contractors and utility personnel working adjacent to active wildland fires should consider the following:

- Use Personal Protective Equipment (P.P.E.) when directed to work within, or adjacent to uncontrolled fire perimeter.
- Maintain communication lines through operational protocols when a fire ignites. This includes correspondence made with office and dispatch centers, local law and fire agencies, customers, and impacted jurisdictions, if any.[4] The Incident Commander (IC), once designated, should coordinate and effectuate these activities.
- Take increased precaution when driving near flames or in smoky conditions. Road obstructions may pose a risk, and drivers and crew should have a general awareness of nearby access and evacuation routes.
- Determine if any potentially impacted electrical assets will pose a risk to spreading the active wildland fire and de-energize if necessary or if requested by fire agency. Field crews should adhere to Liberty CalPeco procedures where applicable.
- Perform any routine investigations after fire suppression. Report incident data to SED and execute necessary reporting procedures as part of Liberty CalPeco business practices.

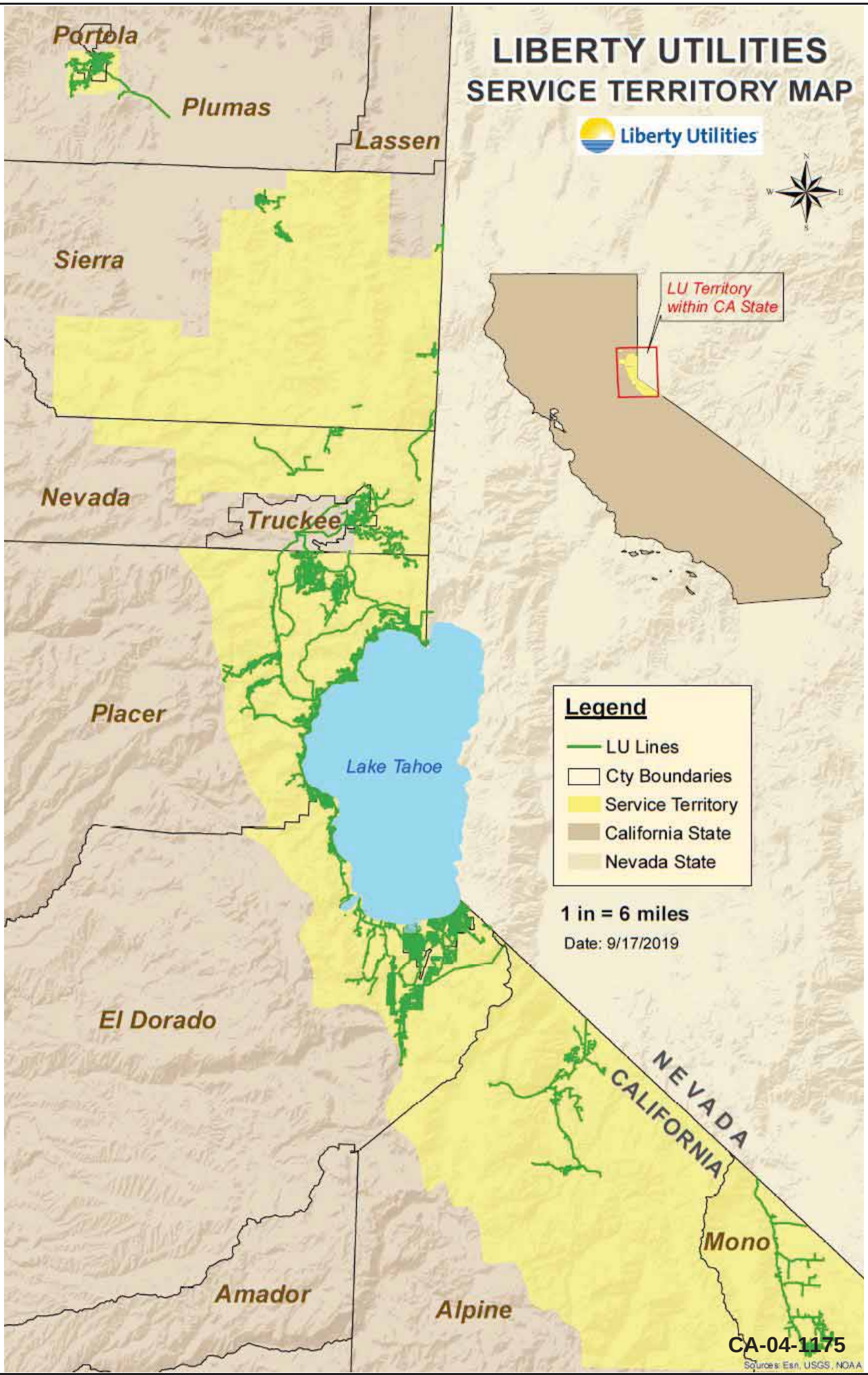
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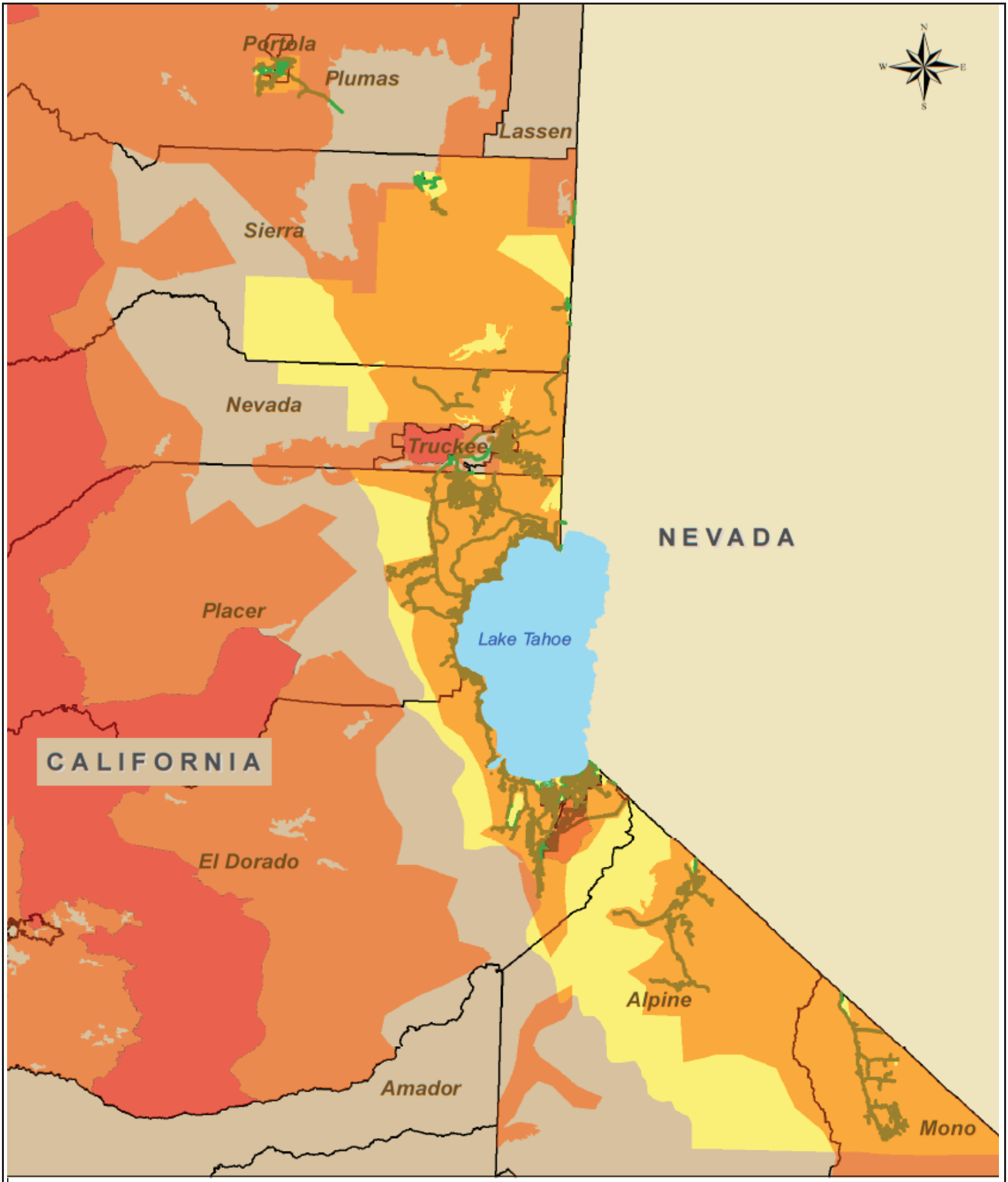
1) Attachment 1- Liberty CalPeco service territory map
2) Attachment 2- Liberty CalPeco service territory overlaid with the HFTD

[4] Notifications to customers during and post-fire suppression should occur in English and Spanish.

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LIBERTY UTILITIES
SERVICE TERRITORY MAP
Liberty Utilities
Portola
Plumas
Lassen
Sierra
Nevada
Truckee
Placer
Lake Tahoe
El Dorado
Amador
Alpine
Mono
NEVADA
CALIFORNIA
LU Territory within CA State
Legend
LU Lines
Cty Boundaries
Service Territory
California State
Nevada State
1 in = 6 miles
Date: 9/17/2019
CA-04-1175
Sources: Esri, USGS, NOAA


Portola
Plumas
Lassen
Sierra
Nevada
Truckee
NEVADA
Placer
Lake Tahoe
CALIFORNIA
El Dorado
Alpine
Amador
Mono
Legend
LU Lines
California
Nevada
Service Territory
Tier 2 Fire Threat
Tier 3 Fire Threat
HIGH FIRE THREAT WITHIN
LIBERTY UTILITIES
SERVICE TERRITORY
Date: 6/27/2019
1 in = 11 miles
Liberty Utilities
701 National Ave
Tahoe Vista CA 96148

CA-04-1176

ATTACHMENT 8

Oklahoma Mesonet, Oklahoma Climatological Survey, available at: https://content.mesonet.org/mesonet/okfire/OK-FIRE_Basics_for_Fire_Danger.pdf .

OK-FIRE Basics for *FIRE DANGER*

(https:// www.mesonet.org/index.php/okfire)

Fire Weather Variables:

Relative Humidity:	**30-80%**	Increasing fire danger as relative humidity decreases
	20-30%	Containment becomes difficult; quick ignition; spot fires increase
	< 20%	Extreme fire behavior; spot fires frequent
Wind Speed:	**> 20 mph**	Higher speeds cause increased fire danger and spread rates; winds and gusts over 20 mph become increasingly problematic
Temperature:		In general, higher temperatures increase fire danger, but relative humidity and wind speed are by far the most important factors among the weather variables

Relative humidity (RH) is the most important of the three weather variables above, since if RH is sufficiently high, the moisture content of the 1-hour and 10-hour dead fuels (see below) will be high enough to impede or exclude burning even with high wind speeds. Given sufficiently low RH, the second most important weather variable then becomes wind speed.

However, ***even with suitable fire weather, the existence and levels of fire danger depend on the FUEL COMPLEX –*** the fuel moisture levels of the live and dead fuels as well as their loads. One can have low RH and high wind speed, but if most of the surface fuels are green (live fuels) with high fuel moisture, there will be minimal fire danger. A general equation for fire danger level is:

Fuel Moisture (Live & Dead) + Fuel Loads (Live & Dead) + Weather ➡ Fire Danger Level

Dead Fuel Moisture:

A variable which is directly related to dead fuel is “dead fuel moisture” (DFM). In particular, 1-hour dead fuels (fine fuels like dead grasses and leaves) are critical, followed by 10-hour fuels (about ½" diameter). In OK-FIRE dead fuel moisture is calculated from weather variables using the Nelson model.

1-h Fuels	10-h Fuels	Fire Behavior
7-20%	**6-15%**	Increasing fire danger as dead fuel moisture values decrease
5-7%	**5-6%**	Containment becomes difficult; quick ignition; spot fires increase
< 5%	**< 5%**	Extreme fire behavior; spot fires frequent

However, remember that dead fuel moisture alone does not tell the entire story. One can have very low 1-h and 10-h DFM, and yet have minimal fire danger if most of the fuels are green (live fuels).

Fire Danger Variables:

The most important of the fire danger indices produced by the Oklahoma Fire Danger Model in OK-FIRE is **Burning Index** (BI), which relates to the intensity of the headfire and its flame length. Besides being a function of weather, BI is also strongly influenced by the type, amount (loads), and greenness levels of the wildland surface fuels being modeled. ***Thus, the GREENNESS level and the selected FUEL MODEL must be appropriate for the fire danger model to produce reasonable results.***

Greenness Level + Fuel Model + Weather ➡ Fire Danger Level

The **daily greenness level** that is assigned a given Mesonet station by the VIIRS satellite sensor can be found by looking at the "Relative Greenness Zoom Map" in the left menu section of OK-FIRE and zooming into your geographical area of interest. Relative Greenness (RG) is a critical variable in the fire danger model utilized in OK-FIRE. RG is used to model live fuel moisture (herbaceous and woody) and to apportion the fuel load distribution between 1-hour dead fuels and live herbaceous and live deciduous woody fuels. If you rely mainly on site-specific products (charts and tables), it is important that you ***regularly look at nearby Mesonet sites on the RG zoom map and select a station which has a RG value approximating the observed levels of greenness of your local wildland surface fuels.*** Else, if you're in an agricultural area, the Mesonet station's greenness level may be more reflective of the crops or barren fields, rather than the wildland fuels which are the focus of the fire danger predictions.

Each 500-m pixel of land in Oklahoma is modeled by one of seven "**fuel models**", each of which describes the fuel bed characteristics of the wildland surface fuels in that model ("Default Fuel Model Zoom Map" in left menu section). These "default" fuel models are used in all the OK-FIRE map products for the four fire danger indices (BI, SC, ERC, and IC). The seven fuel models are: **A** (western annual grasses; also used for urban areas and annual cropland), **B** (tall dense evergreen brush; eastern redcedar), **F** (intermediate evergreen brush), **L** (western perennial grasses), **P** (southern pine forest), **R** (hardwood forest), and **T** (tallgrass with open evergreen brush).

For **chart** and **table** products, however, the user has the ***ability to select a different fuel model*** (nine total models are available) for a given Mesonet station if the default model is deemed inappropriate ("Station Fuel Model Options" at bottom of left menu section). The fuel model currently being used by the fire danger model for that station is called the "current" fuel model, while the default model is called the "default" fuel model. The "current" fuel model can be changed by the user; the "default model" for the map products stays the same.

Of the seven default fuel models listed above, Model T is a reliable "worst case" scenario fuel model under most situations for Oklahoma fuels, so you may wish to use that model for your daily fire danger assessment and forecasts. However, if you wish to model just grasses, you can use a pure grassy model like Model L. If you're in forest settings, you can use Model R (hardwood forest) or Model P (southern pine forest). Two other fuel models in addition to the seven default models are also available: G (forest with heavy downed fuels) and K (light slash).

A general interpretation of fire danger based on Burning Index is as follows:

Burning Index (BI)	Flame Length	Fire Danger
<20	< 2 feet	LOW
20-40	2-4 feet	MODERATE
40-80	4-8 feet	HIGH
80-110	8-11 feet	SEVERE
> 110	> 11 feet	EXTREME

Burning Index will, on most days, go through a daily cycle, with highest values during the daytime and lower values at night, so there typically will be a few hours of appreciable fire danger each day. ***What is important to watch for are the relative LEVELS of fire danger (higher BI values) and the DURATION of those high values (sometimes persisting through the night). Also, with respect to the 84-h forecast, the TREND in BI is important and valid, even with inexact BI values.***

ATTACHMENT 9

Weather station measurements from University of Utah, MesoWest at: https://mesowest.utah.edu/.

Station Search Help
Address

QUICK LINKS

Find a Nearby Station

Current Status

Help

Synoptic Data PBC Services

Department of Atmospheric Sciences

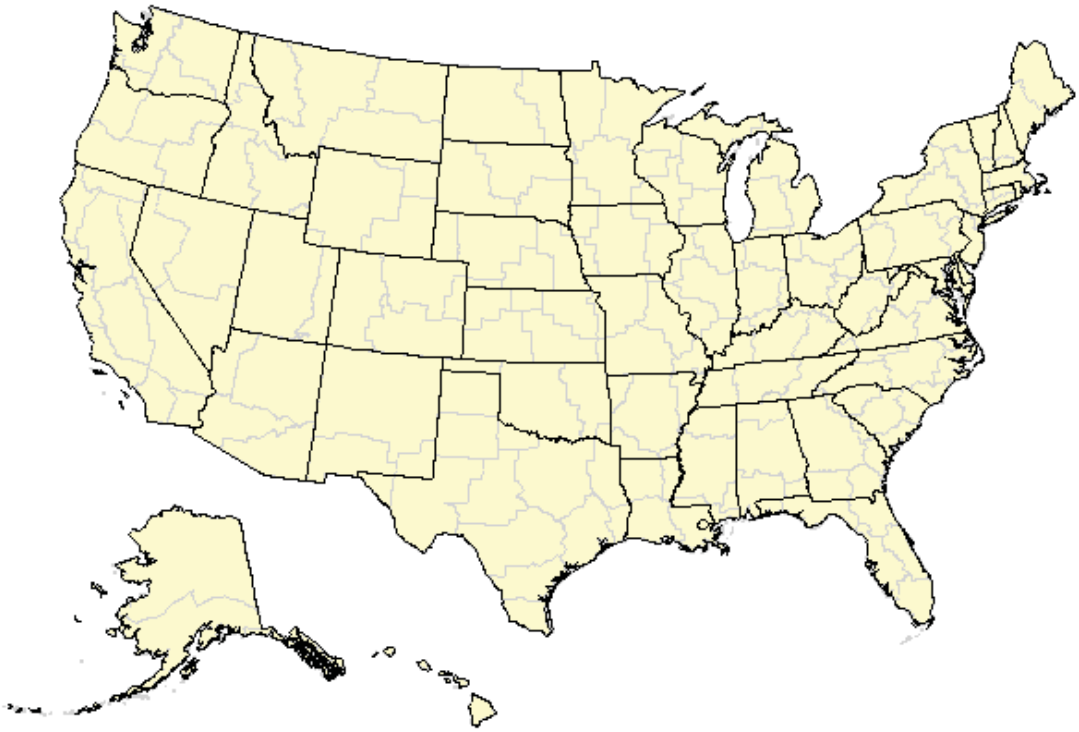
MESOWEST

THE UNIVERSITY OF UTAH

For Users: Recently Implemented Product Changes at MesoWest (full summary available here)

States

Click on a State to access weather observations



States CWAs Text Only

Observations and Summaries

Region UTAH

Product Surface Weather Maps Go

University of Utah Department of Atmospheric Sciences

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For Questions or Comments about this page or MesoWest contact atmos-mesowest@lists.utah.edu

CA-04-1181

ATTACHMENT 10

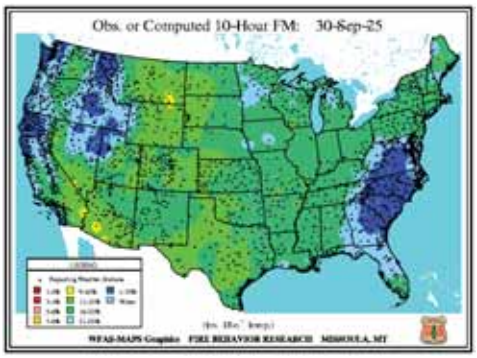
National Centers for Environmental Information, National Oceanic and Atmospheric Administration, Dead Fuel Moisture, available at https://www.ncei.noaa.gov/access/monitoring/dyk/deadfuelmoisture.

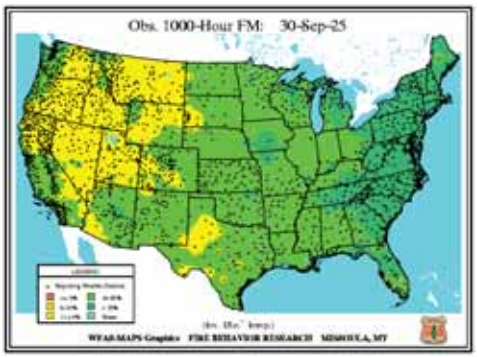
Index

All A B C D E F G H L M N P R S T U W

aching **Dead Fuel Moisture** Definition of Drought Drought Indicators Drc

Dead Fuel Moisture





The fuel moisture index is a tool that is widely used to understand the fire potential for locations across the country. Fuel moisture is a measure of the amount of water in a fuel (vegetation) available to a fire, and is expressed as a percent of the dry weight of that specific fuel. For example, if a fuel were totally dry, the fuel moisture content would be zero percent. Fuel moisture is dependent upon both environmental conditions (such as weather, local topography, and length of day) and vegetation characteristics. When fuel moisture content is high, fires do not ignite readily, or at all, because heat energy has to be used to evaporate and drive water from the plant before it can burn. When the fuel moisture content is low, fires start easily and will spread rapidly - all of the heat energy goes directly into the burning flame itself. When the fuel moisture content is less than 30 percent, that fuel is essentially considered to be dead. Dead fuels respond solely to current environmental conditions and are critical in determining fire potential. The dead fuel moisture threshold (10–hour, 100–hour, or 1,000–hour), called a time lag, is based upon how long it would take for 2/3 of the dead fuel to respond to atmospheric moisture. Small fuels (less than 1/4 inch in diameter), such as grass, leaves, and mulch respond more quickly to changes in the atmospheric moisture content, and take 10 hours to adjust to moist/dry conditions. Larger fuels lose or gain moisture less rapidly through time. Fuels that are 3 inches to 8 inches in diameter, such as dead fallen trees and brush piles can take up to 1,000 hours to adjust to moist conditions, and are represented by the 1,000–hour dead fuel moisture index.

1,000+ hour fuels do not burn easily, but if they do burn, they will generate extreme heat often causing dangerous fire behavior conditions.

Definition of the Dead Fuel Moisture Time Lag Classes

Time Lag	Fuel Size	Determination
10–hour	0.25 to 1 inch diameter	Computed from observation time temperature, humidity, and cloudiness. Can also be an observed value, from a standard set of fuel sticks that are weighed as part of the fire weather observation.
100–hour	1 to 3 inches diameter	Computed from 24–hour average conditions composed of day length, hours of rain, and daily temperature/humidity ranges.
1000–hour	3 to 8 inches diameter	Computed from a 7–day average conditions composed of day length, hours of rain, and daily temperature/humidity ranges.

Check out the Wildand Fire Assessment System for additional information.

CA-04-1184

ATTACHMENT 11

Liberty's Revised 2020 Wildfire Mitigation Plan, February 28, 2020



Liberty Utilities (CalPeco Electric) LLC (U 933-E)

Revised 2020 Wildfire Mitigation Plan

February 28, 2020

CA-04-1186

2020 Wildfire Mitigation Plan

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Plan Overview

Liberty CalPeco's 2020 WMP is a comprehensive plan that incorporates lessons learned from Liberty CalPeco's 2019 efforts, the plans of the other California electric utilities, and guidance from the Commission. As shown in the table below, Liberty CalPeco's WMP includes approximately $40 million in capital investments covering all aspects of the WMP, including inspection plans, system hardening, operational practices, and situational awareness.

Liberty CalPeco WMP Capital Forecast
$(000)

Program/Project	Category	2020	2021	2022	Total
System Survey/Inventory	Asset Management & Inspections	$ 6,000	$ -	$ -	$ 6,000
Tree Attachment Removal Program	Grid Design & System Hardening	600	600	600	1,800
LIDAR Technology	Asset Management & Inspections	250	300	300	850
Covered Conductor Program	Grid Design & System Hardening	3,198	8,337	9,734	21,269
Fuse Replacement Program	Grid Design & System Hardening	1,544	1,544	1,544	4,632
Wire Upgrade Program (Open-Wire & Gray Wire)	Grid Design & System Hardening	150	250	350	750
Sagehen Microgrid	Grid Design & System Hardening	616	-	-	616
Automatic Reclosers and Fast-Curve Setting	Grid Operations & Protocols	360	540	360	1,260
Transportation & Equipment	Asset Management & Inspections	254	98	-	352
Weather Station Installations	Situational Awareness & Forecasting	300	300	15	615
Fire Potential Index	Situational Awareness & Forecasting	70	10	10	90
Distribution Fault Anticipation	Situational Awareness & Forecasting	-	706	162	868
Emerging Programs	Situational Awareness and Forecating	200	200	200	600
Total		$ 13,542	$ 12,885	$ 13,275	$ 39,702

Key projects and programs include a system survey and inventory project, the Sagehen microgrid, and various system hardening programs. Liberty CalPeco plans to undertake a complete system survey in 2020 that will create an asset inventory database documenting the location and condition of every overhead distribution asset in Liberty CalPeco's service territory. This database will provide a complete look at the system and enable Liberty CalPeco to identify and mitigate hazards at a programmatic level on a system-wide basis.

The Sagehen project will install a microgrid pilot project at Sagehen near Truckee, CA. The microgrid will include solar panels and battery storage to serve UC Berkeley's Sagehen research facility that is served by a three mile line that runs through a high-fire area. The cost of the Sagehen project is significantly less than the cost to harden the distribution line serving this single customer. The microgrid will allow Liberty CalPeco to de-energize the line during the fire season.

Liberty CalPeco's WMP also includes a ramping up of the system hardening projects included in its 2019 WMP, including covered conductors, fuse replacements, and tree attachment removals. The 2020 WMP also includes various programs to improve situational awareness, including installing additional weather stations and distribution fault anticipation monitoring sensors.

1. Persons responsible for executing the WMP

Provide an accounting of the responsibilities of the responsible person(s) executing the plan, including:

1. Executive level with overall responsibility
2. Program owners specific to each component of the plan

Ensure that the plan components described in (2) include an accounting for each of the WMP sections and subsections.

Description	Name	Title
1. Executive level with overall responsibility	Chris Alario	President, California
2. Program owners specific to each component of the plan	Eliot Jones	Sr. Manager, Wildfire Prevention
1 Persons responsible for executing the WMP	Eliot Jones	Sr. Manager, Wildfire Prevention
1.1 Verification	Chris Alario	President, California
2 Metrics and underlying data	Eliot Jones	Sr. Manager, Wildfire Prevention
2.1 Lessons learned: how tracking metrics on the 2019 plan has informed the 2020 plan	Eliot Jones	Sr. Manager, Wildfire Prevention
2.2 Recent performance on progress metrics, last 5 years	Eliot Jones	Sr. Manager, Wildfire Prevention
2.3 Recent performance on outcome metrics, annual and normalized for weather, last 5 years	Eliot Jones	Sr. Manager, Wildfire Prevention
2.4 Description of additional metrics	Eliot Jones	Sr. Manager, Wildfire Prevention
2.5 Description of program targets	Eliot Jones	Sr. Manager, Wildfire Prevention
2.6 Detailed information supporting outcome metrics	Eliot Jones	Sr. Manager, Wildfire Prevention
2.7 Mapping recent, modelled, and baseline conditions	Todd Gee	Manager, Operations Compliance
3 Baseline ignition probability and wildfire risk exposure	Eliot Jones	Sr. Manager, Wildfire Prevention
3.1 Recent weather patterns, last 5 years	Eliot Jones	Sr. Manager, Wildfire Prevention
3.2 Recent drivers of ignition probability, last 5 years	Jeremy Vanyi	Engineer IV
3.3 Recent use of PSPS, last 5 years	Eliot Jones	Sr. Manager, Wildfire Prevention
3.4 Baseline state of equipment and wildfire and PSPS event risk reduction plans	Todd Gee	Manager, Operations Compliance
3.4.1 Current baseline state of service territory and utility equipment	Todd Gee	Manager, Operations Compliance
3.4.2 Planned additions, removal, and upgrade of utility equipment by end of 3-year plan term	Todd Gee	Manager, Operations Compliance
3.4.3 Status quo ignition probability drivers by service territory	Eliot Jones	Sr. Manager, Wildfire Prevention
4 Inputs to the plan and directional vision for wildfire risk exposure	Eliot Jones	Sr. Manager, Wildfire Prevention
4.1 The objectives of the plan	Eliot Jones	Sr. Manager, Wildfire Prevention
4.2 Understanding major trends impacting ignition probability and wildfire consequence	Eliot Jones	Sr. Manager, Wildfire Prevention
4.2.1 Service territory fire threat evaluation and ignition risk trends	Eliot Jones	Sr. Manager, Wildfire Prevention
4.3 Change in ignition probability drivers	Eliot Jones	Sr. Manager, Wildfire Prevention
4.4 Directional vision for necessity of PSPS	Eliot Jones	Sr. Manager, Wildfire Prevention
5 Wildfire mitigation strategy and programs for 2019 and for each year of the 3-year WMP term	Eliot Jones	Sr. Manager, Wildfire Prevention
5.1 Wildfire mitigation strategy	Eliot Jones	Sr. Manager, Wildfire Prevention
5.2 Wildfire Mitigation Plan implementation	Eliot Jones	Sr. Manager, Wildfire Prevention
5.3 Detailed wildfire mitigation programs	Eliot Jones	Sr. Manager, Wildfire Prevention
5.3.1 Risk assessment and mapping	Greg Campbel	Sr. Analyst, Rates and Regulatory Affairs
5.3.2 Situational awareness and forecasting	Eliot Jones	Sr. Manager, Wildfire Prevention
5.3.3 Grid design and system hardening	Blaine Ladd	Manager, Substations
5.3.4 Asset management and inspections	Blaine Ladd	Manager, Substations
5.3.5 Vegetation management and inspections	Eliot Jones	Sr. Manager, Wildfire Prevention
5.3.6 Grid operations and protocols	Blaine Ladd	Manager, Substations
5.3.7 Data governance	Eliot Jones	Sr. Manager, Wildfire Prevention
5.3.8 Resource allocation methodology	Greg Campbel	Sr. Analyst, Rates and Regulatory Affairs
5.3.9 Emergency planning and preparedness	Eliot Jones	Sr. Manager, Wildfire Prevention
5.3.10 Stakeholder cooperation and community engagement	Kurt Althof	Program Manager, Communications and Media Relations
5.3.11 Definitions of initiative activities by category	Eliot Jones	Sr. Manager, Wildfire Prevention
5.4 Methodology for enterprise-wide safety risk and wildfire-related risk assessment	Greg Campbel	Sr. Analyst, Rates and Regulatory Affairs
5.5 Planning for workforce and other limited resources	Eliot Jones	Sr. Manager, Wildfire Prevention
5.6 Expected outcomes of 3-year plan	Eliot Jones	Sr. Manager, Wildfire Prevention
5.6.1 Planned utility infrastructure construction and upgrades	Eliot Jones	Sr. Manager, Wildfire Prevention
5.6.2 Protocols on Public Safety Power Shut-off	Eliot Jones	Sr. Manager, Wildfire Prevention
6 Utility GIS attachments	Eliot Jones	Sr. Manager, Wildfire Prevention
6.1 Recent weather patterns	Todd Gee	Manager, Operations Compliance
6.2 Recent drivers of ignition probability	Todd Gee	Manager, Operations Compliance
6.3 Recent use of PSPS	Todd Gee	Manager, Operations Compliance
6.4 Current baseline state of service territory and utility equipment	Todd Gee	Manager, Operations Compliance
6.5 Location of planned utility equipment additions or removal	Todd Gee	Manager, Operations Compliance
6.6 Planned 2020 WMP initiative activity by end-2022	Todd Gee	Manager, Operations Compliance

1.1 Verification

I am an officer of the applicant limited liability company herein and am authorized to make this verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 28, 2020 at Downey, California.

Chris Alario
President, California

2. Metrics and Underlying Data

2.1. Lessons learned from 2019 WMP

Major themes of lessons learned from Liberty CalPeco's 2019 WMP include resource constraints limiting the implementation of the plan, external constraints related to construction planning and proper execution, lack of established data metrics, and the need to develop and coordinate plans with public safety partners.

Other Lessons Learned since filing the 2019 WMP are listed below:

- A system-wide asset inventory is necessary to facilitate data tracking on maintenance, inspections, and replacements at the location/circuit level. Inspection and ignition driver data is tracked in paper forms and the data needs to be consolidated and analyzed for consistency and data integrity.
- Due to resource constraints in 2019, Liberty CalPeco only implemented a few WMP programs with attainable and measurable targets. The 2020 plan incorporates long-term plans with established accounting and tracking capabilities to identify at-risk assets of the electric system. Data records associated with this software can be easily reviewed and compiled for subsequent evaluation, giving more direct access to all of the electrical assets and hazardous surrounding vegetation. Constraints in 2019 included workforce and material shortages and siting issues.
- Liberty CalPeco did not rely heavily on performance against metrics implemented in the 2019 WMP to inform its 2020 WMP initiatives. This 2020 WMP primarily consists of a complete and comprehensive evaluation of resource capabilities and system-wide assets to reduce overall wildfire risks based on mitigating programs outlined in section 5.3 that relied on lessons learned from last year, review of other California utilities WMPs and guidance from the Commission.
- Going forward, Liberty CalPeco plans to front-load the design, permitting, and material orders for its programs to optimally prepare for work each year.
- As discussed later in this plan, Liberty CalPeco needs to increase staffing in key areas to execute the programs contained in the 2020 WMP. Liberty CalPeco is staffing a new Wildfire Mitigation group to manage its WMP. Liberty CalPeco is also focused on enhancing emergency management with new personnel and engaging with public safety partners on communication and coordination plans for PSPS events and wildfire threats. Plans for 2020 also include revamping the utility's data collection practices to better align with the ongoing information required by the Wildfire Safety Division ("WSD") and other parties.
- Liberty CalPeco has also reviewed its successful project targets for the 2019 year. Deploying the iRestore Responder application for inspections and future response needs has been a successful initiative to prepare for emergency events and identify at-risk elements of the electric system. Data records associated with this software can be easily reviewed and compiled for subsequent evaluation, giving more direct visibility to all of the electrical assets and hazardous surrounding vegetation. Liberty CalPeco also received authorization from the United States Department of Agriculture Forest Service to begin activities related to its Forest Resiliency Corridor initiative, which aims to reduce the risk of wildland fires caused by vegetation contact with electrical equipment leading to

landscape resilience and critical infrastructure safety. This joint effort for fuels management and treatment conveys Liberty CalPeco's prioritized strategy to develop collaborative initiatives with key fire and public safety partners.

2.2. Recent performance on progress metrics

Table 1: Recent performance metrics, last 5 years

#	Progress metric name	Annual performance					Unit(s)	Comments
		2015	2016	2017	2018	2019		
1	Grid condition findings from inspection	Level 1 = 0 Level 2 = 0 Level 3 = every .39 miles	Level 1 = 0 Level 2 = every 1.5 miles Level 3 = every .45 miles	Level 1 = every 90.34 miles Level 2 = every 29.61 miles Level 3 = every .42 miles	Level 1 = 0 Level 2 = every 21.19 miles Level 3 = every .42 miles	Level 1 = 0 Level 2 = every 4.72 miles Level 3 = every .26 miles	Number of Level 1, 2, and 3 findings per mile of circuit in HFTD, and per total miles of circuit for each of the following inspection types: 1. Patrol inspections 2. Detailed inspections 3. Other inspection types	Liberty CalPeco's inspection data is still in paper format so location by HFTD is difficult to compile. The overwhleming majority of Liberty Calpeco's facilities are classified as HFTD with only small sections being Non-HFTD (7.7% of facilities can be classifed as such). For the purpose of this exercise it is assumed all detailed inspections occurred in HFTD areas. Liberty CalPeco is only able to provide unit data for Detailed Inspections at this time but is putting mechanisms in place to better capture Patrol and Other Inspection types.
2	Vegetation clearance findings from inspection	7.07 Trees/Mile	8.61 Trees/Mile	10.12 Trees/Mile	7.71 Trees/Mile	8.17 Trees/Mile	Percentage of right-of-way with noncompliant clearance based on applicable rules and regulations at the time of inspection, as a percentage of all right-of-way inspected	Liberty CalPeco tracks the number of line miles inspected and the number of trees identified with non compliant clearance which can be used to calculate the number of non compliant trees per circuit mile. This is a sound progress metric as defined by WSD in attachment 4. It is unclear how to calculate percentage of non compliant trees as a percentage of all ROW inspected. Owner: Eliot Jones Dataset: Attachment 1 Table 1 Q2 - Veg Non Compliance Data
3	Extent of grid modularization					1. HFTD: Sec devices / mi = (1946 devices/1922 mi) = 1.01 devices per mile; Automated control equipment: 28 auto line reclosers, 2 motor operated switches = 30 auto devices all in HFTD; 2. Non-HFTD = 28 devices/134 mi = .21 devices per mile;	Number of sectionalizing devices per circuit mile plus number of automated grid control equipment in: 1. HFTD 2. Non-HFTD	Air switches and reclosers. 2019 data only. Doesn't specify just primary/secondary or u/g vs. o/h, so included all for line miles and devices. - Blaine Ladd
4	Data collection and reporting	N/A	N/A	N/A	N/A	____% (Assuming this question was intended to indicate the completeness of the 2020 WMP submission)	Percent of data requested in SDR and WMP collected in initial submission	Eliot Jones

2.3. Recent performance on outcome metrics, annual and normalized for weather

Table 2: Recent performance on outcomes metrics, last 5 years

Metric type	#	Outcome metric name	Annual performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
1. Near misses	1.a.	Number of all events (such as unplanned outages, faults, conventional blown fuses, etc.) that could result in ignition, by type according to utility-provided list (total)	99	111	137	115	278	Number per year	Included all overhead outages. Underground outages related to terminators and vehicle contact with padmounted equipment were included.
	1.b.	Number of all events (such as unplanned outages, faults, conventional blown fuses, etc.) that could result in ignition, by type according to utility-provided list (normalized)	0.038	0.262	0.124	0.039	0.342	Number per RFW circuit mile day per year	
	1.c.	Number of wires down (total)	5	10	3	4	5	Number of wires down per year	Wire down events unrelated to vegetation contact.
	1.d.	Number of wires down (normalized)	0.002	0.024	0.003	0.001	0.006	Number per RFW circuit mile day per year	
2. Utility inspection findings	2.a.	Number of Level 1 findings that could increase the probability of ignition discovered per circuit mile inspected	-	-	3	-	-	Average number of Level 1 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	These are the most severe violations and consist of broken crossarms, leaning/broken poles, broken insulators, etc. Liberty CalPeco believes all of these conditions are likely to increase the probability of ignition and provided a total instead of an average as requested.
	2.b.	Number of Level 2 findings that could increase the probability of ignition discovered per circuit mile inspected	-	98	14	8	43	Average number of Level 2 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	These are the moderate violations and consist of damaged crossarms, damaged poles, cracked insulators, etc. Liberty CalPeco believes all of these conditions are likely to increase the probability of ignition and provided a total instead of an average as requested.
	2.c.	Number of Level 3 findings that could increase the probability of ignition discovered per circuit mile inspected	-	-	-	-	-	Average number of Level 3 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	These are low level violations such as missing high voltage signs, guy guards, ground molding, etc., and are very unlikely to increase the probability of ignition.

Table 2: Recent performance on outcomes metrics, last 5 years (Continued)

Metric type	#	Outcome metric name	Annual performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
3. Customer hours of PSPS and other outages	3.a.	Customer hours of planned outages including PSPS (total)	Unknown	5,124	7,025	31,470	113,282	Total customer hours of planned outages per year	Planned outages were not tracked with this level of detail prior to 2016.
	3.b.	Customer hours of planned outages including PSPS (normalized)	Unknown	12.08	6.36	10.74	139.3	Total customer hours of planned outages per RFW circuit mile day per year	
	3.c.	Customer hours of unplanned outages, not including PSPS (total)	112,599	111,988	133,267	75,720	246,866	Total customer hours of unplanned outages per year	
	3.d.	Customer hours of unplanned outages, not including PSPS (normalized)	43.28	264.01	120.67	25.85	303.57	Total customer hours of unplanned outages per RFW circuit mile day per year	
	3.e.	Increase in System Average Interruption Duration Index (SAIDI)	-137.98	-18.16	26.22	-66.33	216.16	Change in minutes compared to the previous year	
4. Utility ignited wildfire fatalities	4.a.	Fatalities due to utility-ignited wildfire (total)	-	-	-	-	-	Number of fatalities per year	
	4.b.	Fatalities due to utility-ignited wildfire (normalized)	-	-	-	-	-	Number of fatalities per RFW circuit mile day per year	
5. Accidental deaths resulting from utility wildfire mitigation initiatives	5.a.	Deaths due to utility wildfire mitigation activities (total)	-	-	-	-	-	Number of fatalities per year	
6. OSHA-reportable injuries from utility wildfire mitigation initiatives	6.a.	OSHA-reportable injuries due to utility wildfire mitigation activities (total)	-	-	-	-	-	Number of OSHA-reportable injuries per year	
	6.b.	OSHA-reportable injuries due to utility wildfire mitigation activities (normalized)	-	-	-	-	-	Number of OSHA-reportable injuries per year per 1000 line miles of grid	
7. Value of assets destroyed by utility- ignited wildfire, listed by asset type	7.a.	Value of assets destroyed by utility-ignited wildfire (total)	-	$315,649.02	-	-	$9,855.29	Dollars of damage or destruction per year	Total cost of rebuild. For 2016, see attached doc 8800-0216-0148 Job Assets. For 2019 see attached doc 8800-0219-0433 Job Assets.
	7.b.	Value of assets destroyed by utility-ignited wildfire (normalized)	-	$744.14	-	-	$12.12	Dollars of damage or destruction per RFW circuit mile day per year	Need the RFW circuit mile day per year.

Table 2: Recent performance on outcomes metrics, last 5 years (Continued)

Metric type	#	Outcome metric name	Annual performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
8. Structures damaged or destroyed by utility- ignited wildfire	8.a.	Number of structures destroyed by utility-ignited wildfire (total)	-	18 poles	-	-	-	Number of structures destroyed per year	Number of utility poles only. No homes damaged.
	8.b.	Number of structures destroyed by utility-ignited wildfire (normalized)	-	0.042	-	-	-	Number of structures destroyed per RFW circuit mile day per year	
9. Acreage burned by utility-ignited wildfire	9.a.	Acreage burned by utility-ignited wildfire (total)	10.25	196	-	-	0.5	Acres burned per year	
	9.b.	Acreage burned by utility-ignited wildfire (normalized)	0.0039402	0.46206799	-	-	0.0006148	Acres burned per RFW circuit mile day per year	
10. Number of utility wildfire ignitions	10.a.	Number of ignitions (total) according to existing ignition data reporting requirement	2	1	-	-	1	Number per year	
	10.b.	Number of ignitions (normalized)	0.001	0.002	-	-	0.001	Number per RFW circuit mile day per year	
	10.c.	Number of ignitions in HFTD (subtotal)	2	1	-	-	1	Number in HFTD per year	
	10.c.i.	Number of ignitions in HFTD Zone 1	-	-	-	-	-	Number in HFTD Zone 1 per year	
	10.c.ii.	Number of ignitions in HFTD Tier 2	2	1	-	-	1	Number in HFTD Tier 2 per year	
	10.c.iii.	Number of ignitions in HFTD Tier 3	-	-	-	-	-	Number in HFTD Tier 3 per year	
	10.d.	Number of ignitions in HFTD (subtotal, normalized)	0.001	0.002	-	-	0.001	Number in HFTD per RFW circuit mile day per year	
	10.d.i.	Number of ignitions in HFTD Zone 1 (normalized)	-	-	-	-	-	Number in HFTD Zone 1 per RFW circuit mile day per year	
	10.d.ii.	Number of ignitions in HFTD Tier 2 (normalized)	0.0007688	0.00235749	-	-	0.0012297	Number in HFTD Tier 2 per RFW circuit mile day per year	
	10.d.iii.	Number of ignitions in HFTD Tier 3 (normalized)	-	-	-	-	-	Number in HFTD Tier 3 per RFW circuit mile day per year	
	10.e.	Number of ignitions in non-HFTD (subtotal)	-	-	-	-	-	Number in non-HFTD per year	
	10.f.	Number of ignitions in non-HFTD(normalized)	-	-	-	-	-	Number in non-HFTD per RFW circuit mile day per year	
11. Critical infrastructure impacted	11.a.	Critical infrastructure impacted by PSPS	-	-	-	-	-	Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per year	single PSPS event in 2018 did not impact any critical infrastructure
	11.b.	Critical infrastructure impacted by PSPS (normalized)	-	-	-	-	-	Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per year hour multiplied by hours offline per RFW circuit mile day per year	single PSPS event in 2018 did not impact any critical infrastructure

Near miss data includes outages that could have resulted in an ignition. Liberty CalPeco excluded outages that occurred in January and February of 2017 due to the historic snowfall and known weather conditions, which included several extreme atmospheric rivers. No other exclusions were made because snow accumulation in the other years did not warrant the elimination of possible ignition events.

2.4. Description of additional metrics

Liberty CalPeco has not identified additional metrics beyond the performance metrics provided in Tables 1 and 2.

2.5. Description of program targets

Table 4: 2019 WMP program targets

Program target	2019 performance	Units	Underlying assumptions	Third-party validation
High-Speed Clearing (Automatic Reclosers and Fast-Curve Sensitive Relay Settings). Program target was to install 6 automatic reclosers with "fire season" settings in 2019.	Installed six new or upgraded vacuum reclosers with SCADA controls with "fire season" settings. Continued installation of new relays that allow for remote setting changes to reduce spark potential during fire season.	Number of reclosers installed	Remote monitoring of system assets promotes faster outage response. Supervisory controls will provide the settings necessary to reduce electrical igniton, while also helping to mitigate power outages.	Purchase orders and receipts for relay and recloser equipment, work orders, job design, field verification of installation.
Improve situational awareness and determination of local conditions.	Contracted Reax Engineering to develop fire weather forecasting and monitoring webtool. The system allows for advanced notification of elevated fire risk conditions as well as monitoring and visualization of regional weather conditions.		Improved situational awareness results in inproved PSPS decision making.	Quote, purchase order, access to fire monitoring website, fire weather notification emails and text messages.
Fuse replacement program. Replace 60 fuses per month starting at approval date of 2019 WMP.	Replaced 250 expulsion fuses in HFTD Tier 3 areas with current limiting, non-expulsion fuses.	Number of fuses installed	Energy and spark potential at faulted locations is mitigated by non-expulsion fuses.	Quote for material, purchase order, fuse installation tracking spreadhseet, field verification of installation.
Installation of 2.7 miles of covered conductor in HFTD Tier 2 areas.	Deisgned and permitted 2.7 miles of covered conductor in HFTD Tier 2 areas. Construction not yet complete.	Miles of covered conductor installed	Mitigate contact of igniton source by covering the wire.	Quote for material, purchase order, job designs.
Install of 13 weather stations in 2019-2020 to support weather forecasting and monitoring efforts.	10 weather stations installed.	Weather stations installed	Improved situational awareness results in inproved PSPS decision making.	Quote for material, purchase order, field verification of installation.
Routine Vegetation Maintenance - Increase vegetation management budget from $2.5 million to $4 million to allow for additional contractor staffing to support additional tree inspections, trimming, and removal.	Increased number of trees worked from 2018 to 2019 by 39% and number of trees inspected by 12%.	Percent increase in number of trees worked and inspected	Increase in number of trees inspected will result in decrease in non-compliant trees, tree related outages, and potential ignitions.	Work orders, work tracking spreadsheets, verification of identification and trimmed trees.
Elevated Weather Events Operations.	Activation of "fire mode" settings during fire season.	Number of devices with fire season settings activated. Including substation breakers and reclosers	Elimination of reclosing operations reduces potential ignition events.	Physical fire season tags, SCADA records of "fire mode" activation.
Perform On-Ground Routine Inspections and Equipment Asset Inspections.	GO 165 inspections completed.	Number of devices and locations inspected.	Completed inspections result in detection of non-compliant items and decrease in potential ignition events.	GO165 inspection records stored.

Table 4: 2019 WMP program targets (Continued)

Program target	2019 performance	Units	Underlying assumptions	Third-party validation
Perform Vegetation Risk Inspections.	Increased number of trees inspected by 12%	% increase in # of trees inspected	Increase in number of trees inspected will result in decrease in non-compliant trees, tree related outages, and potential ignitions.	Tree inspection records, vegetation contractor invoices.
Perform pole loading calculations and replacement on new conductor or pole replacement projects.	Performed pole loading calculations on all replaced poles or poles where attachments / new equipment was added.	Number of pole loading calculations completed	Determine if structural integrity of the pole is within calculated threshold.	Pole loading calculation files (O-Calc) stored with each project folder.
Substation Design Hardening.	Awaiting approval of Brockway substation removal in 2019 GRC. Replacement of OCB's under substation equipment replacement program. Continuing to evaluate substation design hardening opportunites.		Hardened design of substation leads to less equipment failure and decrease in potential ignitions.	Design drawings for Brockway removal and replacement of OCB's. Meeting notes. Field verification of replaced breakers.
Tree Attachment Removal.	35 poles were set to remove at least 35 tree attachments.	Number of tree attachments removed per year.	Decrease in number of tree attachements results in decrease in potential ignitions.	Tree attachment removal job folders.
Tree Mortality Removal Project.	Removed 1539 dying trees.	Number of Trees removed	Removal of dying trees in or adjacent to right of way decreases potential ignitions.	Work orders, work tracking spreadsheets, invoices.
Forest Resiliency Corridor Development.	Grant application denied, no FRC projects were implemented, obtained categorical exclusion from USFS to streamline program implementation for future FRC projects.	Number of acres treated	Expanded vegetation management and fuel reduction in the forest reduces ignition source and minimizes fire propagation .	Work orders.
PSPS events.	No events in 2019.	Number of PSPS events	De-energization of power lines under elevated fire risk conditions results in decreased potential ignitions.	PSPS event reports.
Post-incident recovery, restoration, and remediation.	Did not need to enact procedures related to de-energization or emergency disaster relief proceedings.	Number of events	Post-incident recovery, restoration and remediation allows for expedited recovery and power restoration following emergencies.	Documentation of training, program elements, comprehensive emergency plans, exercises, debriefing, corrective action and evaluations for due diligence, training, and regulatory compliance.

2.6. Detailed information supporting outcome metrics

Table 5: Accidental deaths due to wildfire mitigation initiatives, last 5 years

Activity	Victim															Total
	Full-time employee					Contractor					Member of public					
Year	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	
Inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utility fuel management	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 6: OSHA-reportable injuries due to utility wildfire mitigation initiatives, last 5 years

Activity	Victim															Total
	Full-time employee					Contractor					Member of public					
Year	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	
Inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utility fuel management	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

As shown in Table 7, Liberty CalPeco monitors various data points to evaluate the probability of an ignition event in its service territory. As found in Liberty CalPeco's Fire Prevention Plan ("FPP"), data that the company monitors includes Red Flag Warning ("RFW") notifications, notifications from its predictive software tool Reax, wind gust information from the National Weather Service ("NWS") and information from the company's weather stations. Liberty CalPeco is developing a Fire Potential Index ("FPI") methodology to comprehensively assess fire risk that utilizes several data points to guide decisions on what type of operation and maintenance field work is appropriate at a given time. The FPI forecasting application is anticipated to capture data from situational awareness tools and seven-day projections and to calculate a fire ranking that aligns with a "Normal," "Elevated," or "Extreme" fire potential.

Liberty CalPeco is developing a comprehensive risk-based decision-making ("RBDM") framework that will include modeled predictive drivers and consequences for utility-caused fire ignitions. Using its incident reporting tool, the outage management system ("OMS") Responder, Liberty CalPeco will be able to identify reported incidents, which are the foundation of identifying potential ignition-causing events. By carefully evaluating its reported ignition-risk event logs and near misses, Liberty CalPeco will be able to identify drivers that caused the event. Supplementing its own data, Liberty CalPeco will utilize peer utility and nationally available data as it relates to predictive drivers and impacts of consequences of a utility-caused wildfire. Integration of weather data from Reax, NWS, FPI, and weather station data are examples of inputs that will be modeled in the RBDM framework.

Liberty CalPeco will follow the methodology utilized by the larger California IOUs in the Risk Assessment and Mitigation Phase ("RAMP")/Safety Model Assessment Proceeding ("S-MAP") proceedings and guidance for Small and Multi-Jurisdictional Utilities ("SMJU") Voluntary Agreement in D.19-04-020 to develop its RBDM framework. Liberty CalPeco's RBDM framework will provide Liberty CalPeco with a more quantitative, probabilistic modeling approach to evaluate wildfire risks in the future.

Table 7: Methodology for potential impact of ignitions

List of all data inputs used in impact simulation	Sources of data inputs	Data selection and treatment	Assumptions, including SME input	Equation(s), functions, or other algorithms used to	Output type(s), e.g., wind speed model	Comments
Vegetation characteristics	https://landfire.gov		LANDFIRE provides best available landscape-level fuels information including disturbances through 2016.			
Topography	https://landfire.gov					
Structure density / building footprints	2010 US Census data and Microsoft building footprints dataset https://github.com/microsoft/USBuildingFootprints		Census-based metrics provide structure density at the census-block level but highly granular building footprints provide more accurate strucutre location/density data			
Fire weather (historical)	Historical surface Wx observations and archived weather forecast/reanalysis dataincluding CPUC Fire Map 1 10-year climatology					
Fire history	https://frap.fire.ca.gov/mapping/gis-data/		Past fire history of a region influences the state of vegetation and provides insight into local fire risk from ignitions from nearby locations.			
Tree mortality	"https://www.arcgis.com/apps/MapJournal/index.html?appid=0098db792f5d48bbbc82515c3e0e7abf"		Tree mortality, which may change year to year, can increase surface fuel loads and ingition probability due to hazard trees contacting overhead electrical utilities.			
Live fuel moisture	Field sampling					
Fire weather (forecast)	"High Resolution Rapid Refresh (HRRR) North American Mesoscale Forecast System (NAM) Global Forecast System (GFS)"					

2.7. Mapping recent, modelled, and baseline conditions

Table 8: Map file requirements for recent and modelled conditions, last 5 years

Table 8 was recorded in Liberty CalPeco's GIS map files.

Table 9: Map file requirements for baseline condition for 2020

Table 9 was recorded in Liberty CalPeco's GIS map files.

3. Baseline ignition probability and wildfire risk exposure

3.1. Recent weather patterns

Table 10: Recent weather patterns, last 5 years

Weather Measurement	2015	2016	2017	2018	2019	5-year historical average	Unit(s)
Red Flag Warning Days	2,601	424	1,104	2,930	813	1,575	RFW circuit mile days per year
Days rated at the top 30% of proprietary fire potential index or similar fire risk index measure	4,792	10,154	12,296	17,027	19,811	12,816	Circuit mile days where proprietary measure rated above top 30% threshold per year
95th percentile wind conditions	19,938	55,059	78,355	96,396	116,492	73,248	Circuit mile days with wind gusts over 95th percentile historical (meaning the prior 10 years, 2005-2014) conditions per year
99th percentile wind conditions	3,546	15,607	20,689	24,455	28,127	18,485	Circuit mile days with wind gusts over 99th percentile historical (meaning the prior 10 years, 2005-2014) conditions per year

3.2. Recent drivers of ignition probability

Table 11: Key recent drivers of ignition probability, last 5 years

Incident type by ignition probability driver		Near misses tracked (y/n)?	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	All types of object contact	N	37	27	34	19	60	35	2.7%	3.7%	0.0%	0.0%	0.0%	1.1%	1.0	1.0	-	-	-	0.4
	Animal contact	Y	13	3	9	2	20	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
	Balloon contact	N	-	-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
	Veg. contact	Y	21	17	15	14	35	20	0.0%	5.9%	0.0%	0.0%	0.0%	1.0%	-	1.0	-	-	-	0.2
	Vehicle contact	Y	3	7	10	3	5	6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
All types of equipment / facility failure	All types	N	43	38	51	44	79	51	2.3%	0.0%	0.0%	0.0%	1.3%	0.8%	1.0	-	-	-	1.0	0.4
	Capacitor bank failure	N	-	-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
	Conductor failure—all	N	2	10	4	4	8	6	0.0%	0.0%	0.0%	0.0%	12.5%	3.6%	-	-	-	-	1.0	0.2
	Conductor failure— wires down	Y	2	10	3	4	5	5	0.0%	0.0%	0.0%	0.0%	20.0%	4.2%	-	-	-	-	1.0	0.2
	Fuse failure—all	Y	33	21	34	30	50	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
	Fuse failure—convention al blown fuse	Y	33	21	34	30	50	34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
	Lightning arrestor failure	Y	3	1	4	1	5	3	33.3%	0.0%	0.0%	0.0%	0.0%	6.7%	1.0	-	-	-	-	0.2
	Switch failure	N	-	-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
	Transformer failure	Y	5	6	9	9	16	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
Wire-to-wire contact / contamination		Y	11	24	4	6	45	18	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-	-
Other		Y	29	21	6	36	85	35	3.4%	0.0%	0.0%	0.0%	0.0%	0.6%	1.0	-	-	-	-	0.2

3.3. Recent use of PSPS

Table 12: Recent use of PSP, last 5 years

PSPS characteristic	2015	2016	2017	2018	2019	Unit(s)
Frequency of PSPS events (total)	-	-	-	1.0000	-	Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability, per year
Frequency of PSPS events (normalized)	-	-	-	0.0003	-	Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof in order to reduce ignition probability, per RFW circuit mile day per year
Scope of PSPS events (total)	-	-	-	1.0000	-	Circuit-events, measured in number of events multiplied by number of circuits de-energized per year. Less than one full circuit de-energized during PSPS, rounding up to 1
Scope of PSPS events (normalized)	-	-	-	0.0003	-	Circuit-events, measured in number of events multiplied by number of circuits targeted for de- energization per RFW circuit mile day per year
Duration of PSPS events (total)	-	-	-	90.0000	-	Customer hours per year
Duration of PSPS events (normalized)	-	-	-	0.0310	-	Customer hours per RFW circuit mile day per year
Other						

3.4. Baseline state of equipment and wildfire and PSPS event risk reduction plans

3.4.1. Current baseline state of service territory and utility equipment

Table 13: Current baseline state of service territory and equipment

Land use	Characteristic tracked	In non- HFTD	In HFTD Tier 2	In HFTD Tier 3
In urban areas	Circuit miles	91.94	743.61	73.21
	Circuit miles in WUI	104.89	1,415.30	116.18
	Number of critical facilities	-	-	-
	Number of critical facilities in WUI	-	-	-
	Number of customers	3,147	26,052	1,857
	Number of customers in WUI	3,406	40,012	2,817
	Number of customers belonging to access and functional needs populations	41	142	14
	Number of customers belonging to access and functional needs populations in WUI	44	185	20
	Circuit miles of overhead transmission lines	0.54	0.51	-
	Circuit miles of overhead transmission lines in WUI	0.68	3.82	0.03
	Circuit miles of overhead distribution lines	62.64	572.21	68.86
	Circuit miles of overhead distribution lines in WUI	72.45	1,001.10	107.54
	Number of substations	-	1	-
	Number of substations in WUI	1	6	-

Table 13: Current baseline state of service territory and equipment (Continued)

Land use	Characteristic tracked	In non- HFTD	In HFTD Tier 2	In HFTD Tier 3
In rural areas	Circuit miles	12.95	671.68	42.97
	Circuit miles in WUI	104.89	1,415.30	116.18
	Number of critical facilities	-	-	-
	Number of critical facilities in WUI	-	-	-
	Number of customers	259	13,960	960
	Number of customers in WUI	3,406	40,012	2,817
	Number of customers belonging to access and functional needs populations	3	43	6
	Number of customers belonging to access and functional needs populations in WUI	44	185	20
	Circuit miles of overhead transmission lines	0.14	3.32	0.03
	Circuit miles of overhead transmission lines in WUI	0.68	3.82	0.03
	Circuit miles of overhead distribution lines	9.81	428.89	38.68
	Circuit miles of overhead distribution lines in WUI	72.45	1,001.10	107.54
	Number of substations	1	5	-
	Number of substations in WUI	1	6	-
In highly rural areas	Circuit miles	28.86	370.52	19.40
	Circuit miles in WUI	104.89	1,415.30	116.18
	Number of critical facilities	-	-	-
	Number of critical facilities in WUI	-	-	-
	Number of customers	308	2,237	145
	Number of customers in WUI	3,406	40,012	2,817
	Number of customers belonging to access and functional needs populations	2	3	4
	Number of customers belonging to access and functional needs populations in WUI	44	185	20
	Circuit miles of overhead transmission lines	0.23	12.28	2.32
	Circuit miles of overhead transmission lines in WUI	0.68	3.82	0.03
	Circuit miles of overhead distribution lines	23.90	264.31	15.61
	Circuit miles of overhead distribution lines in WUI	72.45	1,001.10	107.54
	Number of substations	1	4	1
	Number of substations in WUI	1	6	-

Table 14: Summary data on weather stations

Weather station count type	Current count	Unit(s)
Number of weather stations (total)	10	Total number located in service territory and operated by utility
Number of weather stations (normalized)	0.005	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory (2,055 circuit miles)
Number of weather stations in non- HFTD (total)	1	Total number located in non-HFTD service territory and operated by utility
Number of weather stations in non-HFTD (normalized)	0.007	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory (134 circuit miles)
Number of weather stations in HFTD Zone 1 (total)	-	Total number located in HFTD Zone 1 service territory and operated by utility
Number of weather stations in HFTD Zone 1 (normalized)	-	Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory
Number of weather stations in HFTD Tier 2 (total)	8	Total number located in HFTD Tier 2 service territory and operated by utility
Number of weather stations in HFTD Tier 2 (normalized)	0.004	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory (1,786 circuit miles)
Number of weather stations in HFTD Tier 3 (total)	1	Total number located in HFTD Tier 3 service territory and operated by utility
Number of weather stations in HFTD Tier 3 (normalized)	0.007	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory (136 circuit miles)

Table 15: Summary data on fault indicators

Fault indicator count type	Current count	Unit(s)
Number of fault indicators (total)	239	Total number located in service territory and operated by utility
Number of fault indicators (normalized)	0.116	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory (2,055 circuit miles)
Number of fault indicators in non-HFTD (total)	6	Total number located in non-HFTD service territory and operated by utility
Number of fault indicators in non-HFTD (normalized)	0.003	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory (134 circuit miles)
Number of fault indicators in HFTD Zone 1 (total)	-	Total number located in HFTD Zone 1 service territory and operated by utility
Number of fault indicators in HFTD Zone 1 (normalized)	-	Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory
Number of fault indicators in HFTD Tier 2 (total)	228	Total number located in HFTD Tier 2 service territory and operated by utility
Number of fault indicators in HFTD Tier 2 (normalized)	0.128	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory (1,786 cicuit miles)
Number of fault indicators in HFTD Tier 3 (total)	5	Total number located in HFTD Tier 3 service territory and operated by utility
Number of fault indicators in HFTD Tier 3 (normalized)	0.037	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory (136 circuit miles)

3.4.2. Planned additions, removal, and upgrade by end of 3-year plan term

Table 16: Location of planned utility equipment additions or removal

Land use	Characteristic tracked	Changes by end-2022			
		In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
In urban areas	Circuit miles of overhead transmission lines	-	-	-	-
	Circuit miles of overhead distribution lines	-	-	2.564	0.127
	Circuit miles of overhead transmission lines in WUI	-	-	-	-
	Circuit miles of overhead distribution lines in WUI	0.004	-	9.569	0.668
	Number of substations	-	-	1.000	-
	Number of substations in WUI	-	-	1.000	-
	Number of weather stations	-	-	-	-
	Number of weather stations in WUI	-	-	-	-
In rural areas	Circuit miles of overhead transmission lines	-	-	-	-
	Circuit miles of overhead distribution lines	0.004	-	7.005	0.541
	Circuit miles of overhead transmission lines in WUI	-	-	-	-
	Circuit miles of overhead distribution lines in WUI	0.004	-	9.569	0.668
	Number of substations	-	-	2.000	-
	Number of substations in WUI	-	-	2.000	-
	Number of weather stations	-	-	-	-
	Number of weather stations in WUI	-	-	-	-
In highly rural areas	Circuit miles of overhead transmission lines	-	-	-	-
	Circuit miles of overhead distribution lines	0.031	-	12.648	5.366
	Circuit miles of overhead transmission lines in WUI	-	-	-	-
	Circuit miles of overhead distribution lines in WUI	0.004	-	9.569	0.668
	Number of substations	-	-	1.000	-
	Number of substations in WUI	-	-	1.000	-
	Number of weather stations	-	-	-	-
	Number of weather stations in WUI	-	-	-	-

Table 17: Location of planned utility infrastructure upgrades

Land use	Characteristic tracked	In non-HFTD			In HFTD Zone 1			In HFTD Tier 2			In HFTD Tier 3		
		2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
Total circuit miles planned for hardening each year, all types and locations		-	-	0.036	-	-	-	5.857	10.697	5.663	-	-	6.034
Total number of substations planned for hardening each year, all locations		-	-	-	-	-	-	4.000	2.000	1.000	-	-	-
In urban areas	Circuit miles planned for grid hardening of overhead transmission lines	-	-	-	-	-	-	-	-	-	-	-	-
	Circuit miles of overhead transmission lines in WUI to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Circuit miles of overhead distribution lines to harden	-	-	-	-	-	-	0.738	0.787	1.039	-	-	0.127
	Circuit miles of overhead distribution lines in WUI to harden	-	-	0.004	-	-	-	2.733	5.030	1.806	-	-	0.668
	Circuit miles of overhead transmission lines in WUI to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Number of substations to harden	-	-	-	-	-	-	1.000	-	-	-	-	-
	Number of substations in WUI to harden	-	-	-	-	-	-	1.000	-	-	-	-	-
In rural areas	Circuit miles of overhead transmission lines to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Circuit miles of overhead transmission lines in WUI to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Circuit miles of overhead distribution lines to harden	-	-	0.004	-	-	-	1.995	4.243	0.768	-	-	0.541
	Circuit miles of overhead distribution lines in WUI to harden	-	-	0.004	-	-	-	2.733	5.030	1.806	-	-	0.668
	Circuit miles of overhead transmission lines in WUI to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Number of substations to harden	-	-	-	-	-	-	-	2.000	-	-	-	-
	Number of substations in WUI to harden	-	-	-	-	-	-	-	2.000	-	-	-	-
In highly rural areas	Circuit miles of overhead transmission lines to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Circuit miles of overhead transmission lines in WUI to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Circuit miles of overhead distribution lines to harden	-	-	0.031	-	-	-	3.124	5.667	3.857	-	-	5.366
	Circuit miles of overhead distribution lines in WUI to harden	-	-	0.004	-	-	-	2.733	5.030	1.806	-	-	0.668
	Circuit miles of overhead transmission lines in WUI to harden	-	-	-	-	-	-	-	-	-	-	-	-
	Number of substations to harden	-	-	-	-	-	-	-	-	1.000	-	-	-
	Number of substations in WUI to harden	-	-	-	-	-	-	-	-	1.000	-	-	-

3.4.3. Status quo ignition probability drivers by service territory

Table 18: Key drivers of ignition probability

Ignition probability drivers		Number of incidents per year (according to 5-year historical average)	Average likelihood of ignition per	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
Contact from object	All types of object contact	35	1.1%	0.4	-	-	0.4	-
	Animal contact	9	0.0%	-	-	-	-	-
	Balloon contact	-	-	-	-	-	-	-
	Vegetation contact	20	1.0%	0.2	-	-	0.2	-
	Vehicle contact	6	0.0%	-	-	-	-	-
All types of equipment / facility failure	All types	51	0.8%	0.4	-	-	0.4	-
	Capacitor bank failure	-	-	-	-	-	-	-
	Conductor failure— all	6	3.6%	0.2	-	-	0.2	-
	Conductor failure—wires down	5	4.2%	0.2	-	-	0.2	-
	Fuse failure—all	34	0.0%	-	-	-	-	-
	Fuse	34	0.0%	-	-	-	-	-
	Lightning arrestor failure	3	6.7%	0.2	-	-	0.2	-
	Switch failure	-	-	-	-	-	-	-
	Transformer failure	9	0.0%	-	-	-	-	-
Wire-to-wire contact / contamination		18	0.0%	-	-	-	-	-
Other *		35	0.6%	0.2	-	-	-	-

4. Inputs to the plan and directional vision for wildfire risk exposure

Liberty CalPeco's WMP incorporates both short-term and long-term strategies to mitigate wildfire risks. The short-term plan includes development of resiliency corridors during PSPS events, operational awareness, and conservative work practices during high fire threat weather. The long-term plan includes extensive system hardening, increased operational awareness, and conservative, clearly defined work practices.

4.1. The objectives of the plan

Liberty CalPeco plans to execute the following initiatives:

4.1.1. Before the upcoming wildfire season

- Asset Survey – Liberty CalPeco plans to issue an RFP for a complete system-wide assessment and asset inventory. Liberty CalPeco will partner with iRestore to create an asset inventory database that houses results from the system-wide survey along with detailed inspections documenting the condition of each overhead distribution asset in its service territory. The asset inventory will provide a complete look at the system and enable Liberty CalPeco to understand, identify, and remove hazards at a programmatic level on a system-wide basis.
- WF Risk Analysis and Assessment – Liberty CalPeco will expand and refine its current wildfire risk analysis and initial assessments to prioritize WMP initiatives expected for the remainder of 2020 and will reevaluate annually for budget planning. Because of the age of the system, Liberty CalPeco does not have a complete inventory of system components. Once the asset survey is complete, Liberty CalPeco will utilize this data in future WMPs.

4.1.2. Before the next annual update

- Update dataset using iRestore mobile application to get real-time asset data, responder data, GIS, asset inventory in one centralized location. Use this to track asset life cycle using maintenance/replacement work in HFTDs.
- Implement new operational procedures discussed in section 5.3 and train employees/contract crews of new work requirements during RFW days or high fire risk conditions.
- Continue to implement system hardening initiatives detailed in section 5.3 and incorporate possible new programs that arise following the system survey.
- Continue development of resiliency corridors to prepare for a PSPS event.
- Hire additional staff required to implement the 2020 WMP.

4.1.3. Within the next 3 years

- Continue multi-year system hardening initiatives (overhead line replacements and substation upgrades), improve situational awareness with additional weather station installations, fire potential index, distribution fault anticipation, and emerging technology pilot programs.

4.1.4. Within the next 10 years

- Achieve significant progress on system hardening and situational awareness programs, minimizing the need for PSPS events.
- Complete resiliency corridors, enabling critical infrastructure to remain in power during a PSPS event in most regions of the service territory.
- Address critical issues identified in the system survey and asset inventory.
- Deploy emerging technology programs.

4.2. Understanding major trends impacting ignition probability and wildfire consequence

A. Describe how the utility monitors and accounts for the contribution of weather to ignition probability

In order to objectively compare and evaluate wildfire risk mitigation strategies, Liberty CalPeco utilizes its current ERM methodology to identify inherent risk, residual risk, existing controls, and future mitigation efforts after determining the likelihood and impact of wildfire risk in the Liberty CalPeco service territory. Liberty CalPeco is diligently working toward a RBDM framework that incorporates elements of the Commission's S-MAP/RAMP proceedings, as well as adopting the Commission's recommendations toward a probabilistic modeling methodology with MARS/MAVF scoring. Liberty CalPeco will also adhere to the RBDM requirements from D.19-04-020.

Liberty CalPeco utilizes REAX Engineering to help monitor fuel moisture content. Field sampling of wildland fuels will be conducted in key areas identified through a joint review from REAX and Liberty CalPeco. The fuel moisture condition data will provide insight into potential fire behavior and facilitate calculations of the National Fire Danger Rating System fuel indices (specifically the Energy Release Component of reported information). Energy Release Component ("ERC") is a key index calculated from Remote Automated Weather Station ("RAWS") observations as part of the US National Fire Danger Rating System ("NFDRS"). The physical meaning of an ERC value is 4% of the energy per unit area that would be released during a fire in units of BTU/square foot. In other words, multiplying an ERC value by 25 gives the number of BTUs per square foot that would be released in a fire, e.g., an ERC of 10 corresponds to 250 BTU per square foot. ERC depends on live and dead fuel loading by size class (as characterized by an NFDRS fuel model) as well as fuel moisture content of live and dead fuels. In forested areas, ERC values are usually calculated for NFDRS fuel model G which includes a heavy loading of 1,000-hour fuels (dead fuels between 3 and 8 inches in diameter). Consequently, ERC for fuel model G (or ERC(G) for short) is therefore quite sensitive to 1,000-hour fuel moisture values.[1]

In addition to depending on fuel loading/fuel model, ERC varies daily due to changes in moisture content of both live and dead fuels, which are in turn dependent on antecedent precipitation, relative humidity, and temperature. ERC is a "build up" index that, in the western United States, typically peaks during summer months and drops off after rains return and temperatures drop. Figure 1, below, shows an example seasonal variation of ERC. Since ERC depends on fuel loading/fuel model at each RAWS station, absolute ERC values are commonly converted to percentiles to facilitate comparison of seasonal ERC trends between RAWS stations with different fuel models. Conversion of an absolute ERC value to a percentile ERC value is accomplished by analyzing historical weather station observations using software developed by the USDA Forest Service known as Fire Family Plus. This will be based upon actual field observations and disseminated through the Wildland Fire Assessment System (WFAS) to report field conditions.

During the 2019 fire season, field sampling was conducted by REAX Engineering and Spatial Informatics Group. Typically, fuel moistures are sampled on a bi-weekly basis (an interval of 10-14 days). Sampling also occurred after heavy rain events. For this and ongoing efforts, Greenleaf Manzanita and Snowbrush Ceanothus will be prioritized for observations with Sagebrush targeted when neither Manzanita nor Snowbrush are present.

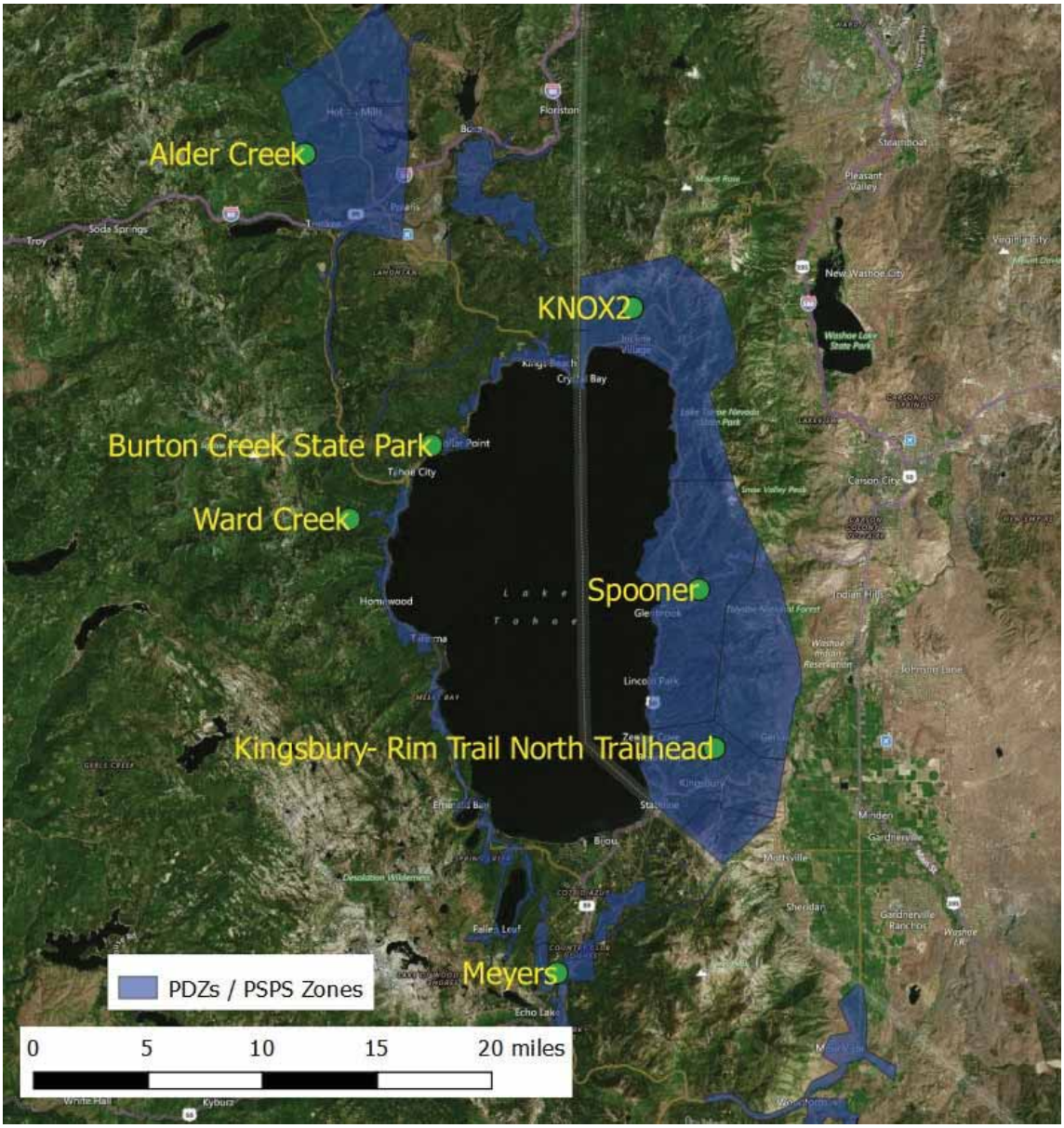
Sampling occurred at the following locations:

1. Alder Creek (NV Energy Truckee PDZ)
2. Knox 2 RAWS (NV Energy Incline PDZ)
3. Spooner Summit (NV Energy Glenbrook PDZ)
4. Kingsbury / Tahoe Rim Trail North (NV Energy Roundhill PDZ)
5. Meyers / Baron RAWS (Liberty CalPeco south shore PSPS zones)
6. Ward Creek (Liberty CalPeco west and north shore PSPS zones)

[1] REAX Engineering. Liberty CalPeco De-Energization Thresholds. August 20, 2019.

7. Burton Creek State Park (Liberty CalPeco west and north shore PSPS zones)

Figure 1: Fuel Moisture Sampling Locations in Greater Lake Tahoe Area



Source: REAX Engineering, 2019

Sampling protocol

To the extent possible, sampling follows recommendations in the U.S. Forest Service fuel moisture collection and equipment guide.[2]

[2] Zahn, S. and Henson, C., "A Synthesis of Fuel Moisture Collection Methods and Equipment – A Desk Guide," US Department of Agriculture Forest Service, National Technology & Development Program, May 2011.

Drying, reporting, and calculations
Samples will be weighed in the field, dried in a lab oven at 100 °C for 24 hours, and then weighed again to calculate moisture content. The resulting moisture content values will then be used to calculate ERC using Fuel Model G. Since this calculation gives values with units of BTU/square foot, a Fire Family Plus climatology analysis of the nearest NFDRS weather station will be used to convert ERC values in BTU/square foot to percentiles.

The three FPI Risk conditions are defined as:

Extreme Fire Risk –Extreme Fire Risk is defined as periods of significant risk of wildfires and the associated ignition risks within Tier 2 or 3 of the HFTD. All operations and maintenance (O&M) activities have stipulations and significant fire mitigation activities are required. The Extreme Fire Risk status is indicated as "red."
Elevated Fire Risk –High Fire Risk is defined as periods of increasing risk of wildfires and associated ignition risks within Tier 2 or 3 of the HFTD. Many O&M activities have stipulations and additional fire mitigation activities are required. The Elevated Fire Risk status is indicated as "yellow."
Normal Fire Risk –Normal Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are not elevated but still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The Normal Fire Risk status is the default operational state and the FPI is indicated as "green."
As presented in Liberty CalPeco's Fire Prevention Plan, filed on October 30, 2019 in its annual General Order 166 filing, methodologies for forecasting and monitoring fire weather conditions as well as triggered operational practice modes are outlined below:

ASSESSMENT METHODOLOGY

Liberty/Reax Fire Forecast – Reax is a predictive tool that captures three main methods of fire weather condition measurement: Energy Release Component (ERC), wind gusts, and the Fosberg Fire Weather Index (FFWI). CalPeco will issue proactive patrols and inspection procedures during applicable work if a triggered scenario is revealed through the predictive software tool. When the Reax tool predicts potential fire weather conditions, the Manager-in-Charge or designee will refer to the tiered risk categories in this Plan and initiate operational protocols based on the determined rating.

1) Red Flag Warnings - Fire Weather Zone Boundaries were compared to CalPeco's service territory and it was identified that the territory spans portions of three different Zones. The applicable Zones include Zone 271, Zone 272 and Zone 273, which CalPeco will monitor. Historical data for the past ten years' RFWs within each of these zones was collected for each occurrence so that wind data could be collected an evaluated for each identified RFW. During Red Flag Events, CalPeco will monitor wind gusts at the peak elevation located at Bliss State Park using the link below or other available data. CalPeco has identified 46 Public Safety Power Shut-off (PSPS) zones that are based on isolation points within certain circuits or areas. After receiving a forecast from each of the zones through Reax, and if the ERC, wind, and FFWI are forecasted to come within 80%, 90%, or 100% of the thresholds for de-energization, a PSPS will be enacted upon reaching, or just before,

100%. During a PSPS event, noncritical operational work will be suspended to focus efforts on current conditions and proactive patrols after de-energizing and when restoring power. CalPeco leans on the guidelines provided by the CPUC through R. 18-12-005, which is an open proceeding to examine utilities' PSPS processes among other issues. CalPeco will provide updated protocols for internal PSPS practices in the 2020 version of its Wildfire Mitigation Plan.

2) CalPeco Design Standards - The CalPeco facilities design standards were reviewed by an engineer to evaluate the minimum standard for wind loading design. The design standard utilizes the criteria specified in G.O. 95 Section IV. However, it is known that this is a minimum design standard and that facilities are often oversized for a variety of reasons. CalPeco will review applicable wind loading design standards, monitor regulatory changes to standard design requirements, and update standards for minimum wind loading design criteria as deemed prudent.

3) Wind Data - NWS Remote Automatic Weather Stations were mapped for the area within 25 miles of the CalPeco service territory. For each RFW, wind gust data from the NWS site is monitored. The station automatically records the maximum instantaneous gust over the past hour and wind speed averages are taken by the stations over a ten-minute period. Because it is not possible to discern if gusts lasted three-seconds or more, it is assumed that all maximum gusts met the three-second criteria to guard against underestimating the fire threat.

   In addition to fire weather and fuels data from the NWS and United States Department of Agriculture National Fire Danger Rating System, CalPeco tracks instantaneous meteorological conditions received from the ten weather stations in the service territory. CalPeco also proposes to install 20 additional weather stations during 2020. The server data capturing meteorological conditions will serve as a principle variable underlying the development of the FPI. Until the FPI developed and adopted by CalPeco, operational designations for fire ratings will be derived from the meteorological data expressed above.

4) Mapping - Tiers 2 and 3 of the HFTD are overlaid on the CalPeco service territory map. All CalPeco facilities are mapped without underground facilities which are not subject to the Plan requirements. Operational work within Tier 2 and 3 of the HFTD or as a response to issued RFWs are subject to more stringent fire safety requirements, as described in this Plan. The attached map complies with G.O. 95 Rule 21.2-D.

5) Fire Potential Index (FPI) – The FPI is used as means to develop guidelines for Utility and Contractor operations and maintenance crews to follow under CalPeco defined categories of wildfire risk. The Wildfire Prevention Department is responsible for determining and communicating the FPI on a daily basis. The Wildfire Prevention Department will assure that the current status of the FPI is posted on the Company Intranet and will communicate the status to the Manager in charge. The FPI rating framework is in development.

B. Describe how the utility monitors and accounts for fuel conditions to ignition probability

Fuel moisture conditions during fire season in 2019 were monitored by in-situ fuel moisture content sampling conducted at four sites within Liberty's service territory. The focus of sampling was live and 1000-hr fuels because fuel moisture models are less accurate for those fuel types than for 1-hr, 10-hr, and 100-hr fuels. Live and 1000-hr fuels were sampled approximately weekly from mid-July through mid-November. Live samples were predominantly manzanita or sagebrush. For live fuels, fuel moisture contents of approximately 60% is considered critical for sagebrush, and ~80% for manzanita. 1000-hr fuels were minimum 3" diameter samples from dead-and-downed branches or trunks of various species. Sampling is anticipated to begin in late May / early June and end in late Fall for the upcoming 2020 year, with the understanding the start and end dates are dependent on numerous climatological factors.

Moisture content results were reported in percentages and used to calculate Energy Release Component (ERC) for NFDRS Fuel Model G which has a high correlation with wildland fire occurrence and size. ERC values (in units of BTU/square foot) were converted to percentile based on long-term historical ERC values and climatology. ERC percentiles are used to quantify intermediate to long-term drying.

4.2.1 Service territory fire-threat evaluation and ignition risk trends

Liberty CalPeco has not performed any cursory or comprehensive study in 2019 to determine whether expansion of the HFTD tiers are necessary. Since Liberty CalPeco's territory comprises of mainly Tier 2 and some Tier 3 of the HFTD, enhanced operational practices that include fire-threat conditions/stipulations are considered as part of general business practice due to the unique mountainous terrain. The decision to redesign the tiers to modify the boundaries of where Tier 2 and 3 intersect is not considered to be appropriate at this time. Liberty CalPeco likewise did not meet trigger thresholds to initiate a PSPS event during the 2019 fire season, leading to the understanding that the Commission has suitably mapped the fire threat profile for the service territory at this time.

Upon implementing the full system asset survey project, Liberty CalPeco will consider evaluating terrain conditions as it relates to the underlying risk drivers of the HFTD tiers. The utility will also consider re-evaluating this determination in future WMP filings.

Table 19: Macro trends impacting ignition probability and/or wildfire consequence

Rank	Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10	Comments
1	Change in ignition probability and estimated wildfire consequence due to climate change	Reduction in live and dead fuel moisture values relative to the historical baseline correlate with increased fire severity. Tree mortality induced by climate change may increase ignitions associated with trees contacting powerlines. Hotter summers, with drought conditions and more extremenity in the winter.
5	Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles	Tree mortality induced by disturbances such as bark beetles may increase ignitions associated with trees contacting powerlines. The relationship between tree mortality and fire behavior is not clear and remains an active research area. Vegetation such as cheatgrass has taken over native grasslands and is highly flammible.
2	Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture	100+ years of fire suppression and exclusion have contributed to higher fuel loading. This results in a shift from frequent, low intensity fires that benefit the landscape to periodic, intense fires that have negative effects.
7	Population changes (including Access and Functional Needs population) that could be impacted by utility ignition	This macro trend was interpreted to refer to aging population and individuals with limited mobility and/or cognitive impairments and how they could be impacted by utility-caused ignitions. Due to relatively scarce urban populations, this is not viewed as a major driver of fire consequence in Liberty's service territory.
8	Population changes in HFTD that could be impacted by utility ignition	Future demographic trends are unknown, thus this is not considered a major driver of fire consequence in Liberty's service territory.
6	Population changes in WUI that could be impacted by utility ignition	Structures in Wildland Urban Interface or Intermix are more vulnerable to fire losses than those in urbanized areas. As more structures are built in WUI/Intermix areas fire losses from all causes, not just utility ignitions, may increase.
3	Utility infrastructure location in HFTD vs non-HFTD	As additional utility infrastructure is added to HFTD areas to serve new development, ignition probability may increase due to the presence of utilities in areas that previously had no utility infrastructure. This increase in ignition probabilty may be partially offset by improved real-time monitoring of circuits and fire prevention measures such as proactive de-energization.
4	Utility infrastructure location in urban vs rural vs highly rural areas	As more structures are built in rural and highly rural areas that are connected to the grid, increased presence of utilities in areas that previously contained no utilities may increase ignition probability. This increase in ignition probability may be partially offset by improved real-time monitoring of circuits and other fire prevention measures such as proactive de-energization.

4.3. Change in ignition probability drivers

Liberty CalPeco experienced over 7,000 events over the past five years, none of which caused significant fires.[3] The number of incidents reported in the Liberty CalPeco service territory remained constant from 2015-2018 at about 110. In 2019, the company experienced 269 reported incidents, as shown in Table 11 above. The trend was driven mostly by sharp increases in vegetation contact, animal contact, fuse failures, wire-to-wire contact, and other reported incidents.

In order to address the challenges faced in 2020, Liberty CalPeco plans to front-load the design and permitting of seasonally constrained upgrades to prepare for the working months to the greatest extent possible. As a result, the number of reported incidents is anticipated to decrease as system upgrades increase.

While 94% of Liberty CalPeco's overhead lines are in a HFTD, the spread of fire is often suppressed by the cold weather and snow, which is prevalent in Liberty CalPeco's service territory. Additionally, as system hardening measures continue to be implemented, Liberty CalPeco expects the probability of ignition from events to decrease.

4.4. Directional vision for necessity of PSPS

Liberty CalPeco's PSPS program will be influenced in the future by PSPS events and lessons learned through its responses to those events. Much of the regulatory framework in place today was not in place during Liberty CalPeco's 2018 event. In 2019, Liberty CalPeco did not initiate a PSPS, but it did initiate the processes and ultimately determined a PSPS event was unnecessary. The PSPS framework has helped Liberty CalPeco develop better decision-making processes and communication plans. Liberty CalPeco does not analyze future quantitative impacts of the number of customers and circuits affected by PSPS events. The protocols and thresholds used to determine if power will be shutoff are detailed in the Fire Prevention Plan submitted in Liberty CalPeco's annual G.O. 166 compliance report. Additionally, since the WUI designation is new in this 2020 WMP, Liberty CalPeco does not have a set process as it relates to the PSPS program and serving customers in urban, rural, and highly rural areas. Moving forward, Liberty CalPeco will study possible differences in approaches to the PSPS protocol across the customer classes in the WUI designation.

[3] The referenced events include outage and non-outage events.

2019 Public Safety Power Shutoff ("PSPS") Near Miss Lessons Learned	
Steering Committee	Bright red line threshold is clear, but as we approach, is there room to define cusp thresholds and potential action items?
Operations	More patrols if there is a forecast threshold exceeds.
Dispatch and Control	New Hampshire Dispatch and Control – indications staffing could be a challenge.
Communications	One agency notification was missed Disjointed systems (Responder, Everbridge, GIS, etc.)
Administration	Logistics, admin requirements are significant and difficult for team lead and other core members to manage in addition to executing the PSPS. Overlap in roles between emergency management and PSPS requirements
Documentation & Records Management	Explore establishing a role dedicated to documentation and records management

Table 20 – Anticipated characteristics of PSPS use over next 10 years

At this time, Liberty CalPeco has insufficient recent experience with PSPS events in its own service territory to feel confident ranking the characteristic of PSPS events anticipated to change the most and have the greatest impact on reliability over the next ten years.

5. Wildfire Mitigation Strategy and Programs for 2019

5.1 Wildfire mitigation strategy

5.1.A

The threat of a wildfire in the Liberty CalPeco service territory is a risk the company and its parent companies take very seriously. Providing its customers safe and reliable service is paramount. The devastating consequences of wildfires include loss of service, property, and even life. The wildfire risk mitigation programs discussed in the Liberty CalPeco WMP are explicitly designed to keep its customers and surrounding populations safe.

In order to objectively compare and evaluate wildfire risk mitigation strategies, the company utilizes its current Enterprise Risk Management ("ERM") methodology to identify inherent risk, residual risk, existing controls, and future mitigation efforts after determining the likelihood and impact of wildfire risk in the Liberty CalPeco service territory. The company is developing a Risk-Based Decision Making ("RBDM") framework that incorporates elements of the IOU S-MAP/RAMP proceedings, as well as adopting the Commission's recommendations toward a probabilistic modeling methodology with MARS/MAVF scoring.

Furthermore, to evaluate the risk associated with wildfire events, Liberty CalPeco will isolate the risk of wildfire separate from other safety and reliability risk events. Preventing the loss of any life due to wildfire is of the utmost importance. Specific measures must be implemented to mitigate the driving forces behind ignitions in the Liberty CalPeco service territory. Therefore, when comparing wildfire risk to other safety/reliability risks, wildfires should be evaluated and modeled as a standalone risk.

1) **Before upcoming wildfire season –** The Company is working to complete a draft of the RBDM framework to bolster its ability to evaluate, model, and mitigate ignition events in its service territory. At this stage, the end of the evaluation phase of the RBDM should be taking place.
2) **Before the next annual update –** Liberty CalPeco expects its RBDM framework to be complete and useful before the next annual update.
3) **Within the next 3 years –** Within the next three years, Liberty CalPeco expects to enhance its RBDM framework through the addition of more resources, technological upgrades, richer data sets for modeling purposes, and generally more experience to refine its risk models as they relate to wildfires.
4) **Within the next 10 years –** Liberty CalPeco expects to continuously build upon its developed risk models to evaluate wildfire risk and expects to take advantage of all possible technologies available.

5.1.B

Please see the discussion included in Section 2.1 for the major themes of lessons learned from the 2019 WMP and how this shaped the development of Liberty CalPeco's 2020 WMP. The table below shows a summary of Liberty CalPeco's WMP initiatives by the wildfire mitigation categories presented in Section 5.3.

Item #	Wildfire Mitigation Category	WMP Initiative	Recorded	Forecast			
			2019	2020	2021	2022	Total
1	Situational Awareness	Advanced Weather Monitoring and Weather Stations	199,297	300,000	300,000	15,000	814,297
2	Situational Awareness	Continuous Monitoring Sensors	-	-	706,000	162,000	868,000
3	Situational Awareness	Fire Potential Index	-	70,000	10,000	10,000	90,000
4	Situational Awareness	ALERTTahoe	-	80,000	80,000	80,000	240,000
		Subtotal	**199,297**	**450,000**	**1,096,000**	**267,000**	**2,012,297**
5	Grid Design & System Hardening	Covered Conductor Installation	550,000	3,198,000	8,337,000	9,734,000	21,819,000
6	Grid Design & System Hardening	Distribution Pole Replacement	300,000	-	-	-	300,000
7	Grid Design & System Hardening	Expulsion Fuse Replacement	170,000	1,544,000	1,544,000	1,544,000	4,802,000
8	Grid Design & System Hardening	Grid Topology Improvements	-	616,000	-	-	616,000
9	Grid Design & System Hardening	Install System Automation Equipment	-	360,000	540,000	360,000	1,260,000
10	Grid Design & System Hardening	Pole Loading Infrastructure Hardening	550,000	1,515,000	2,820,000	3,535,000	8,420,000
11	Grid Design & System Hardening	Undergrounding Overhead Lines (Rule 20A)	-	1,757,500	6,100,000	-	7,857,500
12	Grid Design & System Hardening	Tree Attachment Removal	244,148	600,000	600,000	600,000	2,044,148
13	Grid Design & System Hardening	Wire Upgrade Program	-	150,000	250,000	350,000	750,000
14	Grid Design & System Hardening	Repairs and G.O. 165 Outcome from System Survey	-	3,500,000	-	-	3,500,000
		Subtotal	**1,814,148**	**13,240,500**	**20,191,000**	**16,123,000**	**51,368,648**
15	Asset Management and Inspections	Detailed Inspections - Asset Survey and GIS Update	-	6,000,000	-	-	6,000,000
16	Asset Management and Inspections	Improvements of Inspections	-	890,000	360,000	260,000	1,510,000
17	Asset Management and Inspections	Intrusive Pole Inspections	13,044	118,554	145,308	80,887	357,793
18	Asset Management and Inspections	LiDAR Inspections of Electic Lines and Equipment	-	250,000	300,000	300,000	850,000
		Subtotal	**13,044**	**7,258,554**	**805,308**	**640,887**	**8,717,793**
19	Vegetation Management	Additional Efforts to Manage Community and Environmental Impacts	-	660,000	660,000	660,000	1,980,000
20	Vegetation Management	Detailed Inspections of Vegetation around Lines and Equipment	450,000	610,000	556,000	570,000	2,186,000
21	Vegetation Management	Fuel Management and Reduction of "Slash"	-	2,000,000	2,500,000	2,500,000	7,000,000
22	Vegetation Management	Other Discretionary Inspection of Vegetation around Lines and Equipment	-	50,000	50,000	50,000	150,000
23	Vegetation Management	Other Vegetation Management	-	400,000	400,000	400,000	1,200,000
24	Vegetation Management	Patrol Inspections of Vegetation around Lines and Equipment	260,000	300,000	300,000	300,000	1,160,000
25	Vegetation Management	QA/QC of Inspections	-	250,000	250,000	250,000	750,000
26	Vegetation Management	Remediation of at-risk-Species	4,504,905	4,500,000	4,500,000	5,000,000	18,504,905
		Subtotal	**5,214,905**	**8,770,000**	**9,216,000**	**9,730,000**	**32,930,905**
27	Data Governance	Centrailized Repository for Data	-	465,000	415,000	365,000	1,245,000
28	Data Governance	Collaborative Research on Utility Ignition/Wildfire	-	200,000	-	-	200,000
		Subtotal	**-**	**665,000**	**415,000**	**365,000**	**1,445,000**
29	Emergency Planning and Preparedness	Adequate and Trained Workforce	-	**240,000**	**240,000**	**240,000**	**720,000**
30	Stakeholder Cooperation and Community Engagement	Community Engagement	-	**75,000**	-	-	**75,000**
		GRAND TOTAL	**7,241,394**	**30,699,054**	**31,963,308**	**27,365,887**	**97,269,643**

5.1.C

Liberty CalPeco is concerned about limited resources over the next three to five years. The company is already short-staffed in field personnel. Liberty CalPeco has historically had retention issues with the high cost of living in the Lake Tahoe region and the long commutes to affordable housing in the area.

Liberty CalPeco plans to supplement its staff with qualified contractors as much as possible, but even this has been difficult recently because, with the surplus of fire hardening work throughout California, many contractors "follow the money." Nevertheless, to the extent possible, Liberty CalPeco will aggressively pursue its Wildfire Mitigation Plan using resources, both internal and external, to their maximum potential.

In addition to labor resource constraints, Liberty CalPeco expects the high demand for wildfire hardened materials (*e.g.*, covered conductor, non-expulsion fuses, exempt hardware, etc.) will result in long material lead times.

Liberty CalPeco does not anticipate that these resource challenges will change over the next three years.

5.1.D

Liberty CalPeco has included several new technologies and innovations in its three-year WMP. This will impact resources, but Liberty CalPeco plans to use outside resources for help in many of these areas:

- Substation rebuilds – Liberty CalPeco plans to decommission or rebuild 3 substations (Brockway, Stateline, and Squaw Valley) over the next three years (2020-2022).[4] This includes fire hardening and new technologies implemented. Old, aging wooden bus structure and oil filled equipment will be replaced with steel bus, gas or vacuum breakers, and FR3 oil filled equipment (such as transformers and voltage regulators).
- Microgrid pilot project – Liberty CalPeco plans to implement a microgrid pilot project at Sagehen near Truckee, CA in 2020-2021. The technology will be solar with battery storage to feed a single customer (Cal Berkley's Sagehen research facility). Initially, the customer will stay "plugged in" to the grid but would eventually be planned to disconnect from the grid entirely and three miles of overhead line is planned for removal
- Non-expulsion fuses and electronic fuse replacements – Liberty CalPeco has already begun replacing many of its expulsion fuses as included in its approved 2019 WMP at a rate of approximately 60 fuses per month over nine years. Liberty CalPeco has also implemented a pilot program to install electronic dropout reclosers at various locations where non-expulsion fusing is difficult to coordinate.
- Distribution Fault Anticipation (DFA) – Liberty CalPeco plans to embark on a collaborative research project with Texas A&M to evaluate this emerging technology (as directed by the CPUC in D.19-05-040). Initial program will be to implement DFA on 10 feeders in 2020-2021.
- Auto-reclosers – Liberty CalPeco plans to continue replacing older line reclosers and installing new reclosers at ideal locations throughout its territory. Many of these will roll into use as part of Liberty CalPeco's distribution automation program.
- Emerging technologies (high impedance fault detection, rapid earth fault current limiting) – Liberty CalPeco will consider implementing these technologies based upon further research and cost effectiveness.

5.2 Wildfire mitigation plan implementation

5.2.A

Liberty CalPeco plans to identify and track costs associated with each major WMP initiative. Unique identifiers will be assigned to each specific WMP initiative for tracking purposes. When job orders are created for capital projects or programs, an operations analyst will track costs and develop methods for tracking all metrics and data related to wildfire mitigation. The reports created will be used by management to plan for WMP work activities, to measure performance of the WMP over time, and to make informed WMP risk-based decision making. After conducting the system-wide asset survey, Liberty CalPeco will have an updated GIS containing a

[4] Liberty CalPeco plans to spend $17.4 million for the substation rebuilds.

database that houses all the asset data by geographic coordinates. Going forward, Liberty CalPeco can utilize this information to develop risk mapping and to prioritize WMP work initiatives based on wildfire risk.

5.2.B

Achieving a robust, all-encompassing approach to mitigate wildfire risk from the utility is the primary objective of aggregating respective plans, protocols, and strategies into the WMP. Staff responsible for assigned mitigation areas have the role of vetting current procedures and recommending changes or enhancements to build upon initiatives that result in unfavorable risk spend efficiency. If regulatory changes, emerging technologies, external constraints, resource adequacy limitations, or other unforeseen circumstances yield deficiencies within the WMP, Liberty CalPeco will report in subsequent filings identified remediation solutions. The VP of Operations, or his designee, will be responsible for spearheading discussions about correcting deficiencies when updating the WMP in each comprehensive filing.

5.2.C

Liberty CalPeco inspects and repairs facilities in accordance with G.O. 165. Any issues found impacting safety and reliability are addressed as outlined in G.O. 165. Liberty CalPeco constantly evaluates its facilities while performing other activities, such as outage patrols, new business planning, engineering studies, pole replacements, and related field work. Monitoring the effectiveness of inspection practices will occur through ongoing tracking and annually review of findings resulting from internal process. As part of the full system asset survey, the conditions of each piece of equipment or hardware will be visually inspected and accounted for more efficient grid hardening efforts in the future. Because this activity will be performed in part by contracted support, Liberty CalPeco will provide escort personnel to assist in appropriately identifying assets and to provide expert knowledge of Liberty CalPeco's system.

The VP of Operations, or his designee, will review concerns found during routine field work and equipment and line inspections. Additionally, the Wildfire Prevention personnel will record equipment and line corrections or deficiencies for WMP effectiveness evaluation, as these responsibilities were formally established during the 2019 wildfire season. Liberty CalPeco will use this information to assess inspection procedure effectiveness. Annually, Liberty CalPeco will review inspection records, identify deficiencies, and determine corrective actions. An internal report will be provided to the utility's leadership in deliberation of future strategies to strengthen the utility's wildfire prevention priorities in 2020. Related strategies that mitigate wildfire risk will be identified and proposed in the next iteration of the WMP.

Aggregating this data will guide future decision-making regarding wildfire mitigation strategy with the goal of reducing incidents and system-wide hazards.

5.2.D

To manage data collection requests, the utility will direct and train staff to track and regularly verify recorded data and to update respective metrics for future WMP filings and data requests.

Liberty CalPeco uses several software applications to normalize different data sets to present a uniform scaled unit that can be measured across another variable data point. Generally, this activity occurs through statistical and forecast models through spreadsheets, as well as ArcGIS

mapping computations. The mapping platform allows for this process to occur through visualized data points, lines, rasters, and polygons built upon multiple layers involving unique calculations. These activities are performed on a project-need basis or routinely in an effort to draw comparisons of varying datasets. Liberty CalPeco relies on its recordkeeping practices to influence its risk-based decision-making activities related to utility capital investments.

The two tables below describe areas crucial to wildfire mitigation data collection, where that information is stored, the value of its assessment in wildfire risk reduction, and the metadata and data dictionary to explain each article/attribute collected. Pursuant to R. 18-10-007, Liberty CalPeco filed its Data Collection for WMPs Report to the CPUC on July 30, 2019.[5] This report identifies the mechanisms and types of data that are regularly tracked by the utility at the time of reporting.

Data and Map Product Catalogue

Data Collection Area	Data/Map Products	Software/File Type & Storage	Access / Responsible Group	Description	Assessment Value
Vegetation Management	Vegetation Management System Tree Inventory	Software Database	Internal system access / Vegetation Management Department	Captures and records results of vegetation inspections, work status, and completed tree crew work.	Capturing the results of vegetation inspections can lead to a better understanding of the trends that are developing on Liberty CalPeco's system. By capturing the type of work needed, Liberty CalPeco can determine timelines for frequency of inspections and tree work needed. The tree work completed allows Liberty CalPeco to determine the effectiveness of the work type and allows for integration with

[5] *"Data Collection for WMPs Report"*

					the GIS system to geospatially view inspections and tree work activities.
Outage Tracking	Outage Log	Report from Outage Management System	Internal OMS / System Operations Group	Collects incidents detailing the duration, weather conditions, cause, and impacted facilities associated with each outage event.	Fire Incident Data collection is annually updated by the CPUC Safety Enforcement Division (SED) and is an approved reporting method. This supports the underlying data.
Infrastructure/ Operations	Substation Inspections	Record-keeping Application	Internal paper and electronic records / Engineering & Operations Group	Records substation inspections.	Regular, detailed inspections will help identify repairs and reduce the risk of substation equipment failures.
Infrastructure/ Operations	Mobile Mapping	GIS Application	Smart phone device for vendor database application / Field Crew & Operations Personnel	Provides field personnel with a view to the GIS system.	Mobile mapping will provide field personnel with maps of the system and equipment in fire threat areas.
Infrastructure/ Operations	Pole Test and Treat	Excel Workbook	Physical and electronic forms and / Field Operations	Inspects and tests poles on an annual basis.	Identification of damaged or failing infrastructure that is then scheduled for replacement or repair will help structural integrity of facilities, which reduces fire risk.
Infrastructure/ Operations	Covered Wire Pilot Program	GIS Database	Physical and electronic forms	Tracks covered conductor as	This program will allow for tracking of covered conductor

			translated into map products / Field Operations & GIS Specialists	it is installed in the field in the GIS.	installations. Covered conductor is shown to reduce potential ignitions and arc events.
Infrastructure/ Operations	G.O. 165 Inspection Program	Excel Workbook	Physical and electronic forms and / Field Operations & Engineering	Inspects distribution and transmission lines per CPUC requirement.	Regular, detailed inspections of facilities will identify required repairs, which should reduce the risk of equipment failures and potential ignition events.
Infrastructure/ Operations	Expulsion Limiting Fuse Locations	GIS Database	Physical and electronic forms translated into map products / Field Operations & GIS Specialists	Tracks conventional fuse replacements in GIS system	Installation of new fuses throughout the system designed will minimize ignition events. As replacements are done, they can be compared to other areas that do not have the same type of fuses to measure effectiveness.
Situational Awareness/ Weather Conditions	Weather Station Database	Database, Web Map	Internal weather data feed / GIS Specialists & Operations	Displays current conditions at each location.	The information is utilized when making PSPS events as well as provides operations current weather conditions at a given location.
Situational Awareness/ Weather Conditions	Weather Station Locations	GIS Database	GIS map application / GIS Specialists	Provides GIS locations for each weather station and the associated facilities.	This gives operations exact locations of weather stations and current weather details.

Data Dictionary

Data Product	Field ID/Metadata	Description
Outage Log	Incident ID	Associated incident ID for tracking
	Substation	Substation from which the circuit is sourced
	FederID	ID of circuit
	Address	Location of incident
	Customer count	Number of customers impacted
	Cause	Cause of incident
	Equipment	Type of equipment and relevant notes
	Outage time	Time outage was logged
	Restoration time	Time outage was restored
Substation Inspections	Substation	Name of substation inspected
	Date	Time and date stamp of inspection
	Equipment ID	Type of equipment and relevant notes
	Pass/Fail	Whether equipment passes or fails inspection
Mobile Mapping	Metadata	A base map that contains service territory, locations of lines and facilities, HFTD tiers
Pole Test and Treat	Inspect_Date	Date of inspection
	POLENUMBER	Facility ID of pole
	Species	Type of wood pole
	VISUAL	Whether a visual inspection occurred
	SOUNDBORE	Whether a sound and bore test occurred
	Height	Height of pole
	ORIGGLCIRC	Original circumference of pole
Covered Wire Pilot Program	Install date	Date installed
	Conductor type	Information about conductor type and materials
	Voltage	Voltage of wire
G.O. 165 Inspection Program	Metadata	Dataset that contains tracking and information around the G.O. 165 inspections and relevant maintenance programs
Expulsion Limiting Fuse Locations	Pole number	Associated pole
	Fuse type	Type of fuse
	Voltage	Voltage of equipment

	Manufacturer	Name of equipment manufacturer
Weather Station Database	Metadata	Database that stores meteorological measurements, such as temperature, wind chill, heat index, dew point, altitude, humidity, wind speed, wind gusts, barometer pressure
Weather Station Locations	Metadata	Locations of weather stations and associated equipment
Vegetation Management System Tree Inventory	Tree number	Unique identifier for a single tree or group of trees with similar location /characteristics
	Circuit	Circuit where the tree is located
	Ownership type	Owner of the tree
	Pole ID	Pole number/span the tree
	Tree species	Common name of the tree species
	Tree hazard(s)	Tree condition/reason for work needed
	Trim type	Type of work needed
	INSP date	Date the tree was inspected
	Clearance	The distance the vegetation is prescribed to be removed from the nearest conductor
	Status	Status of the tree work order (e.g., pending, permissioned, completed, etc.)
	Crew type	Type of equipment and personnel needed to complete the work
	Date completed	Date the work was completed
Pole Clearing Data	DateInsAndCleared	Date the pole was inspected and cleared
	CircuitNameNumber	Circuit associated with the pole
	Pole ID	Pole number
	Subject hardware	Type of hardware on the pole that requires the pole to be cleared
	Comments	Comments related to the work

5.3 Detailed wildfire mitigation programs

5.3.1 Risk assessment and mapping

Liberty CalPeco plans to implement a risk mapping tool using Hexagon Smart M.Apps, which will provide the utility with the ability to do dynamic analysis on its incident reporting overlaying various maps of the utility's service territory. The software allows for filtering by many informational characters, including, but not limited to, outage cause, date, number of customers affected, location, and circuit. Liberty CalPeco intends to incorporate the analytical capabilities of Smart M.Apps into the WMP and RBDM framework programs. The software will also be able to show ignition probability by circuit.

5.3.1.1 Risk mapping model

The inclusion of climate/weather driven risk mapping, initiative mapping, and PSPS risk-reduction impact are all initiatives the company will implement by the next wildfire season and in its next GRC as part of the company's RBDM framework. Monte Carlo simulation analysis will also be included as part of the quantitative modeling phase. Before the next annual update, Liberty CalPeco expects that the data modeling and evaluation methods will build upon what was in place at the time of the 2020 wildfire season. In the next three years, the company will utilize the best technology available to mitigate wildfire risk.

Project Timeline:

- Before the upcoming wildfire season – status quo.
- Before the next annual update – develop risk map.
- Within the next three years – evaluate risk map, make changes, review data.
- Within the next 10 years – evaluate risk map, make changes, review data.

5.3.2 Situational awareness and forecasting

Liberty CalPeco sees the need to enhance its situational awareness and forecasting tools to enable the company to better predict the potential for a wildfire impacting our service territory and surrounding areas by monitoring, assessing, and predicting various weather conditions. The Fire Potential Index, described below, is a key predictive operating and assessment tool, that once implemented will allow Liberty CalPeco to forecast fire threat up to 7 days in advance. Installing weather stations with fuel moisture and precipitation sensors allows for more accurate fuel moisture and ERC calculations. In addition, installing Distribution Fault Anticipation (DFA) monitoring sensors at key system locations to identify potential line failure events that could ignite wildfires is crucial for Liberty CalPeco to continue to explore these new and emerging technologies to better detect wildfires and reduce overall wildfire risk. Partnering (retaining services) with Reax Engineering to develop a weather monitoring tool to monitor elevated fire risk has allowed Liberty CalPeco to plan for, and potentially execute, PSPS events.

5.3.2.1 Advanced weather monitoring and weather stations

Liberty CalPeco deployed 10 weather stations in 2019 and plans to deploy 40 additional stations through 2021. All stations will be installed with fuel moisture and precipitation sensors. The new sensors will allow for automated Energy Release Component (ERC) calculations to be compared with existing fuel moisture sampling. Weather stations help to evaluate and forecast the need for PSPS events during elevated fire risk conditions. Additionally, in 2019, Liberty CalPeco contracted Reax Engineering to develop a weather monitoring and notification tool to warn of potential elevated fire risk.

Figure 2 below, shows locations of existing and proposed weather stations.

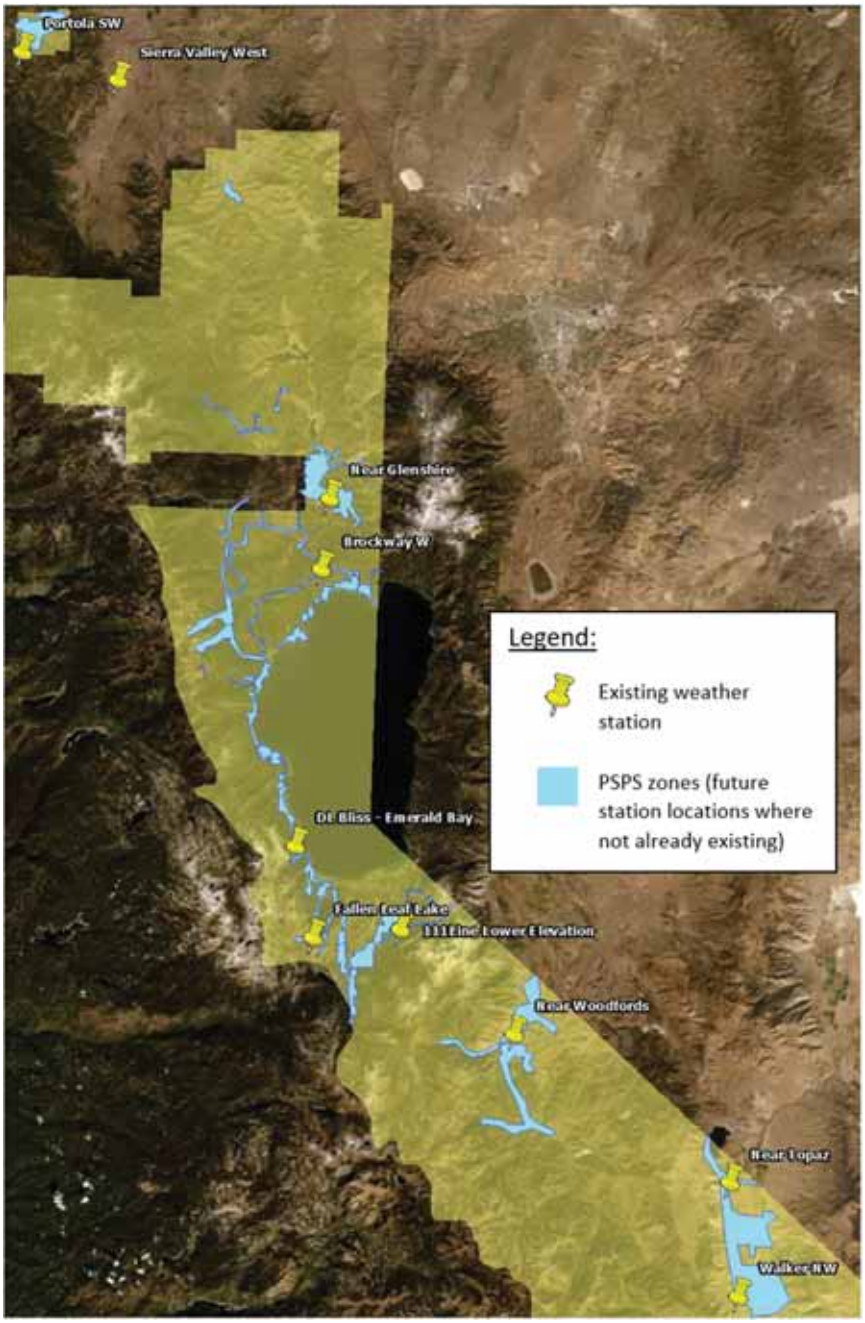
Program Timeline:

- **Before the upcoming wildfire season** – Order material and prepare for installation of weather stations as soon as conditions permit.
- **Before the next annual update** – Install 20 weather stations.
- **Within the next 3 years** – Install up to 20 additional weather stations through 2021.
- **Within the next 10 years** – Continue to maintain weather network.

Table 22: Advanced weather monitoring and weather stations

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Advanced weather monitoring and weather stations	2019 plan	148,720	2,055	72	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing	2019 WMP	WMP memorandum account	Exceeding	N/A	2019 Plan included installation of 13 weather stations. Considers all line miles as treated since entire service territory is in scope. Line miles provided by GIS dept.
	2019 actual	199,297	2,055	97	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing	2019 WMP	WMP memorandum account	Exceeding	N/A	Installation of 10 weather stations and development of advanced weather monitoring tool by Reax Engineering. Considers all line miles as treated since entire service territory is in scope. Line miles provided by GIS dept.
	2020	300,000	2,055	146	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing		WMP memorandum account	Exceeding	N/A	Installation of 20 new weather stations. Considers all line miles as treated since entire service territory is in scope. Line miles provided by GIS dept.
	2021	300,000	2,055	146	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing		WMP memorandum account	Exceeding	N/A	Installation of 20 new weather stations. Considers all line miles as treated since entire service territory is in scope. Line miles provided by GIS dept.
	2022	15,000	2,055	7	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing		WMP memorandum account	Exceeding	N/A	Installation or upkeep of stations. Considers all line miles as treated since entire service territory is in scope. Line miles provided by GIS dept.
	2020-2022 plan total	615,000												

Figure 2: Locations of Existing and Proposed Weather Stations



5.3.2.2a Continuous monitoring sensors – distribution fault anticipation

Liberty CalPeco is considering a collaborative research initiative with Texas A&M University called Distribution Fault Anticipation ("DFA"). This technology uses real-time electric waveforms to detect anomalies on the system that have a high potential of ignition (*e.g.*, arcing connections). The DFA technology was recently presented at the Wildfire Technology Innovation Summit. Liberty CalPeco intends to pilot DFA technology on 10 distribution feeders in HFTD Tier 2 and Tier 3 areas. The expectation is that DFA technology will be able to continuously identify incipient line failure events that may be undetectable by traditional inspection methods.

Program Timeline:

- **Before the upcoming wildfire season –** Continue to investigate DFA, define contractual obligations and pricing.
- **Before the next annual update –** Make provisions for deployment of DFA.
- **Within the next 3 years –** Deploy DFA on 10 feeders.
- **Within the next 10 years –** Continue to monitor viability of DFA and potentially expand to include more feeders.

Table 22a: Continuous monitoring sensors

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Continuous monitoring sensors	2019 plan													
	2019 actual													
	2020													
	2021	706,000	313	2,256	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	Distribution fault anticipation (DFA) at Stateline, Northstar, Tahoe City. All OH miles out of those 3 subs.
	2022	162,000	313	518	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	Distribution fault anticipation (DFA) at Stateline, Northstar, Tahoe City. All OH miles out of those 3 subs.
	2020-2022 plan total	868,000												

5.3.2.2b Continuous monitoring sensors – ALERTWildfire cameras

Liberty CalPeco is proposing to work with ALERTWildfire to support the local ALERTTahoe wildfire camera network. ALERTWildfire deploys pan-tilt-zoom (PTZ) cameras monitoring high fire risk areas to allow for discovery of ignition events and support fire resources throughout a wildfire event. ALERTWidlfire's first project, ALERTTahoe provided camera coverage for the majority of Liberty CalPeco's service territory. Liberty CalPeco plans to partner with ALERTWildfire to update and maintain the cameras in the Lake Tahoe area to provide camera control to Liberty CalPeco. See alertwildfire.org/about for more information.

Program Timeline:

- **Before the upcoming wildfire season** – Partner with ALERTWildfire to maintain ALERTTahoe camera network.
- **Before the next annual update** – Evaluate replacement of cameras with higher resolution models.
- **Within the next 3 – 10 years** – Continue to support ALERTTahoe camera network through maintenance or addition of cameras.

Table 22b: Continuous monitoring sensors – ALERTTahoe Cameras

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Continuous monitoring sensors	2019 plan													
	2019 actual													
	2020	80,000	2,055	39	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	Liberty CalPeco to maintain 8 cameras that are part of the ALERTTahoe camera network.
	2021	80,000	2,055	39	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	
	2022	80,000	2,055	39	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	
	2020-2022 plan total	240,000												

5.3.2.3 Fault indicators for detecting faults on electric lines and equipment

Liberty CalPeco uses fault indicators to detect and shorten outages. There is no plan to expand the use of fault indicators as a wildfire mitigation initiative. Liberty CalPeco will continue to look into line monitoring technologies and their potential ability to mitigate wildfire risk.

Program Timeline:

- **Before the upcoming wildfire season** – No current program plans.
- **Before the next annual update** – Research new line monitoring technologies and their potential ability to mitigate wildfire risk.
- **Within the next 3 – 10 years** – Implement new line monitoring technologies if applicable.

5.3.2.4 Forecast of a fire index, fire potential risk, or similar

The Fire Potential Index (FPI) is a comprehensive assessment tool developed by San Diego Gas and Electric (SDG&E) for operational decision making to reduce fire threats and risks. The tool converts environmental, statistical, and scientific data into an easily understood forecast of short-term fire threat for the utility's service territory. The FPI forecasts up to seven days of fire threat potential.

Threshold values for each ranking were determined through evaluation of historical fire incidents and typical seasonal values. Using FPI allows for more precise predictions of fire risk for a specific geographic area and may provide hourly danger ratings that could be forecasted and used to guide which work activities can be conducted on specific days. The development of the FPI will include the following:

1. Develop an FPI methodology for Liberty CalPeco's service territory based on SDG&E and PG&E methodologies. Factors considered include climatological, geographical, and fuel source conifer and timber understory fuels in Liberty CalPeco's service territory. The FPI calculation includes fuel moisture (both dead and live), "green-up" factor, ambient temperature, relative humidity, and Fosberg Fire Weather Index, among other factors. This work will establish the number of FPI classes as well as the fuel and weather criteria that delineate FPI classes.
2. Identify FPI zones / polygons. Several FPI zones will be developed to capture approximately homogeneous fuels, weather, and topography within each zone. The number of zones and their extent will be developed at project execution and will encompass all of Liberty CalPeco's service territory.
3. Establish Fire Potential Index (FPI) thresholds for each FPI zone based on historical weather analyses.
4. Extend existing proactive de-energization monitoring and operational support tool to include seven-day FPI calculation by zone.
5. Continue monitoring PSPS and FPI weather analytics systems

Program Timeline:

- **Before the upcoming wildfire season** – Implement fully functional FPI.
- **Before the next annual update** – Refine use of FPI to aid operational decision-making.

- **Within the next 3 years –** Continue to evaluate use cases for FPI.
- **Within the next 10 years –** Continue use of FPI to inform operational decisions.

Table 22: Forecast of a fire risk index, fire potential index, or similar

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Forecast of a fire risk index, fire potential index, or similar	2019 plan													
	2019 actual													
	2020	70,000	2,055	34	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	FPI under development by Reax as of Jan. 2020. Considers all line miles as treated since entire service territory is in scope. Line miles provided by GIS dept.
	2021	10,000	2,055	5	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	
	2022	10,000	2,055	5	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	
	2020-2022 plan total	90,000												

5.3.2.5 Personnel monitoring areas of lines and equipment in elevated fire risk conditions

Liberty CalPeco has defined new working procedures for elevated fire risk conditions under a recent update to the FPP. The new working procedures include Liberty CalPeco or contracted personnel monitoring areas of electric lines and equipment in elevated fire risk conditions. However, the anticipated cost of these working procedures is dependent on the number of elevated fire risk days and other variable factors that are unknown at this point.

Program Timeline:

- **Before the upcoming wildfire season** – Train and retain internal or contracted resources on the policies regarding need to monitor areas of electric lines in elevated fire risk conditions.
- **Before the next annual update** – Continue to monitor electric lines and equipment in elevated fire risk conditions.
- **Within the next 3-10 years –** Continue to monitor electric lines and equipment in elevated fire risk conditions.

5.3.2.6 Weather forecasting and estimating impacts on electric lines and equipment

Liberty CalPeco consulted Reax Engineering to develop an operational support tool inclusive of weather forecasting functionality. Part of the scope of Reax's weather monitoring project included weather forecasting costs that are reflected in in total in the Advanced Monitoring and Weather Station table in Section 5.3.2.1. Liberty CalPeco may work with Reax or other consultants to estimate impacts of weather conditions on electric equipment but costs are unknown at this point.

Program Timeline:

- **Before the upcoming wildfire season –** Continue use of weather forecasting tool and evaluate options to estimate weather impacts on electric lines and equipment in Liberty CalPeco's service territory.
- **Before the next annual update –** Potentially develop tool to estimate weather impacts on electric lines and equipment primarily used for risk analysis. Continued use of existing weather forecasting tools.
- **Within the next 3-10 years** – Plans will be dependent upon whether new tool above is developed.

5.3.3 Grid design and system hardening

Liberty CalPeco's efforts toward Grid Design and System Hardening include various programs in this section, but covered conductor and an effort to identify and replace non-exempt hardware (per CalFire) are the most significant of these programs. The tables below summarize the current inspection and maintenance and/or replacement programs initiated by G.O. 165, G.O. 174, and the new WMP initiatives related to strengthening Liberty CalPeco's electric grid.

Existing WMP-related Initiatives (in Base GRC Rates)

	WMP Initiative	Compliance-Driven and/or GRC program	Table Reference
1.	Capacitor Maintenance/Replacement	G.O. 165	1
2.	Circuit Breaker Maintenance/Replacement	G.O. 174	2
3.	Crossarm Maintenance/Replacement	G.O. 165	5
4.	Pole Replacements	G.O. 165	6
5.	Covered Conductor Program	(Topaz and 7300 line in GRC)	3
6.	Transformers Maintenance/Replacement	G.O. 165	14
7.	UG lines	Rule 20A	16

New WMP Initiatives (WMP Memo Account)

	WMP Initiative	Table Reference
1	Expulsion Fuse Replacement	7
2	Other Covered Conductor projects (non-GRC)	3
3	Grid Topology Improvements – Sagehen	8
4	Install System Automation Equipment	9
5	Pole Loading Assessment Program	13
6	Other Corrective Actions – Wire Upgrade Program, Tree Attachment Removal, Repairs from Asset Survey	18

Describe utility approach to the following categories of maintenance of transmission lines, distribution lines, and equipment, respectively:

1. Liberty CalPeco's maintenance programs and protocols are driven by its inspection programs, which meet requirements as outlined in General Orders 165 and 174. Liberty CalPeco performs detailed inspections on approximately 20% of the system and visually patrols the system on an annual basis utilizing the operations department staff. All substations have detailed inspections completed on an annual basis.
   In addition, when planning new projects, all existing equipment impacted within the project scope is evaluated for upgrade or replacement during the design process. The Planning and Engineering departments manage a handful of programs that target areas of the system for improvements or upgrades.

2. Non-routine maintenance:
   a. Liberty CalPeco tracks this type of work through paper forms. Outage reporting, maintenance, and repair activities that are performed during emergency work are turned into Planning and Engineering for evaluation and updating of asset records.
   b. Items identified needing repair or maintenance through inspections are turned into the Planning and Engineering departments for further evaluation. Other field activities or customer reports that identify issues are also tracked and addressed by the Planning and Engineering departments.

Discuss proactive replacement programs versus run-to-failure models for each group, including:

1. The general maintenance approach is that all distribution and transmission equipment fall under a run-to-failure model. However, Liberty CalPeco does have some proactive programs to replace aging facilities such as the North Lake

Tahoe transmission loop replacement project, pole replacements due to intrusive or visual pole inspections, covered conductor replacement program, submersible transformers, areas of bad underground and known hazards such as copper wire on primary and replacing live front transformers.

2. These programs are driven by utilizing metrics from SAIDI/SAIFI circuit reports or address environmental and/or safety concerns, as is the case for submersible and live front transformers. Another effort is underway to replace aging substation equipment, including oil circuit breakers, transformers, and regulators based on dissolved gas analysis (DGA) and replacing old wooden structures at substations in an effort to reduce wildfire hazards.
3. These programs are based on information obtained through inspections, outage data or operational knowledge of the system. In addition to these programs, Liberty CalPeco is performing a complete system inventory under the Enhanced Detailed Visual Inspection initiative. This should help determine new opportunities for potential proactive maintenance programs by identifying areas with aging hardware, out dated or missing equipment, conventional fuses, lightning arrestors, etc.
4. Liberty CalPeco utilizes inspection data, engineering evaluations, manufacturer guidelines, and collaboration between departments to determine the need and prioritization of these programs.

5.3.3.1 Capacitor maintenance and replacement program

Liberty CalPeco has no defined capacitor maintenance program. Maintenance is performed on an as-needed basis per inspections or as turned in by field personnel. Capacitor banks have historically been exempt equipment per CalFire, so maintenance on them has been a low priority to date. Liberty CalPeco plans to reassess its capacitor maintenance program and determine risk/cost benefit in the coming years.

Program Timeline:

- **Before the upcoming wildfire season and before the next annual update –** Continue maintenance as needed pursuant to G.O. 165 inspections and as turned in by field personnel. No identified program changes.
- **Within the next 3** years – Evaluate current inspection program and inventory of capacitors and evaluate risk benefit of capacitor maintenance program. Evaluate effectiveness of non-expulsion fusing with capacitor banks.
- **Within the next 10** years – If deemed beneficial, implement capacitor maintenance program. If deemed effective, replace all non-expulsion fusing and non-exempt hardware.

5.3.3.2 Circuit breaker maintenance and installation

Liberty CalPeco has no defined breaker maintenance program aside from as needed pursuant to G.O. 174 inspections. Liberty CalPeco intends to replace all oil circuit breakers with either gas or vacuum circuit breakers to reduce fire risk and improve reliability. Replacing oil circuit breakers with gas or vacuum greatly reduces the wildfire risk associated with this equipment. This, coupled with replacement of wood structures at

substations, will alleviate any fire risk at the substation level. Liberty plans to have a breaker maintenance program in place by end of 2020.

Program Timeline:

- **Current Program** – Liberty CalPeco has no defined breaker maintenance program aside from as needed pursuant to G.O. 174 inspections. Liberty CalPeco intends to replace all oil circuit breakers with either gas or vacuum circuit breakers to reduce fire risk and improve reliability.
- **Before the upcoming wildfire season** – Continue maintenance as needed pursuant to G.O. 174 inspections and as turned in by field personnel. Proceed with breaker replacements.
- **Before the next annual update** – Continue maintenance as needed pursuant to G.O. 174 inspections and as turned in by field personnel. Proceed with breaker replacements.
- **Within the next 10 years** – Breaker maintenance program established and running. All OCBs replaced.

5.3.3.3 Covered conductor installation

Liberty CalPeco follows the covered conductor program as stated in the Wildfire Mitigation Plan, which is the reconductoring of bare electrical lines in various locations in Liberty CalPeco's Tier 2 and Tier 3 HFTD. Several factors drive the ability to begin reconductoring. These factors include: (1) receipt of the construction permit by regulatory authorities, (2) availability of material, (3) resources to perform the work, and (4) line clearance (maintaining reliability). Liberty CalPeco began reconductoring in 2019 as the first two projects were prioritized based on the ability to receive the construction permit in the same year.

Liberty CalPeco intends to replace all overhead primary conductor with covered conductor, given that its service territory is in Tier 2 or 3 Wildfire Threat areas. Liberty CalPeco has not yet developed a methodology to accurately track the effectiveness of the covered conductor, but, generally, installing covered conductor greatly reduces the wildfire risk associated with primary overhead conductor. Alternatives considered were rebuilds with open air conductor and undergrounding lines. Some underground sections are being designed pursuant to Rule 20. However additional underground projects may be evaluated in the future if they will greatly reduce risk in a particular area and are deemed cost-effective. Open air conductor was rejected due to limited risk mitigation.

Program Timeline:

- **Before the upcoming wildfire season -** Continue with covered conductor installation already in progress.
- **Before the next annual update –** Continue with covered conductor installation already in progress.
- **Within the next 3 years** – Continue to increase the amount of covered conductor installation.
- **Within the next 10 years –** Continue to increase the amount of covered conductor installation.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Covered Conductor Installation	2019 plan	700,000	3	255,474	All types of object contact, conductor failure - all.	Unknown	Unknown	Unknown	Existing	WMP Approval	N/A	In compliance	N/A	Estimated $614,000 per mile, plus $15,000 per pole, estimated 50% of poles needing to be replaced.
	2019 actual	550,000	-	-	All types of object contact, conductor failure - all.	Unknown	Unknown	Unknown	Existing	WMP Approval	N/A	In compliance	N/A	20 poles installed, no conductor.
	2020	3,198,000	5	609,143	All types of object contact, conductor failure - all.	Unknown	Unknown	Unknown	Existing		N/A	In compliance	N/A	
	2021	8,337,000	11	775,535	All types of object contact, conductor failure - all.	Unknown	Unknown	Unknown	Existing		N/A	In compliance	N/A	
	2022	9,734,000	10	995,297	All types of object contact, conductor failure - all.	Unknown	Unknown	Unknown	Existing		N/A	In compliance	N/A	Includes the 60kV 640 transmission line.
	2020-2022 plan total	21,269,000												

5.3.3.4 Covered conductor maintenance

As covered conductor is installed, field personnel will review the condition of the covered conductor to evaluate the need for a maintenance program. At a minimum, conductor will be visually inspected during routine G.O. 165 inspections.

5.3.3.5 Crossarm maintenance, repair, and replacement

Liberty CalPeco has no defined crossarm maintenance program aside from as needed pursuant to G.O. 165 inspections. Liberty CalPeco performs maintenance on an as needed basis per inspections or as turned in by field personnel.

5.3.3.6 Distribution pole replacement and reinforcement, including with composite poles

Liberty CalPeco has a pole test and treatment program, pursuant to G.O. 165. This program inspects and treats all poles in a 10-year cycle. All poles are treated with a wood preservative and then inspected for structural integrity. If a pole needs to be reinforced, a steel stub is scheduled for installation at the bottom of the pole. If a pole cannot be steel-reinforced due to deterioration, then it is scheduled for replacement, pursuant to G.O. 165, to reduce fire risk and to improve reliability. Liberty CalPeco has not yet developed methodology to accurately track the effectiveness of pole testing and treating. Pole replacements that occur out of this program are capital expenditures that go through appropriate approval channels. No alternatives to this program are being considered.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Distribution pole replacement and reinforcement, including with composite poles	2019 plan	45,000	12	3,750	All types of equipment / facility failure	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	See attached intrusive dist pole inspection schedule.
	2019 actual	300,000	12	25,000	All types of equipment / facility failure	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2020	Unknown	Unknown	Unknown	All types of equipment / facility failure	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2021	Unknown	Unknown	Unknown	All types of equipment / facility failure	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2022	Unknown	Unknown	Unknown	All types of equipment / facility failure	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2020-2022 plan total													

Current intrusive pole testing program involves testing all poles on a 10-year cycle.
Poles are replaced on an as needed basis per inspections or as turned in by field personnel.

5.3.3.7 Expulsion fuse replacement

Liberty CalPeco has started its expulsion fuse replacement program with a plan of fully implementing by 2026. This includes changing all of its current expulsion fuses to non-expulsion fuse types or electronic devices. This will alleviate spark hazards associated with its current expulsion fuse types (a non-exempt hardware per CalFire). The first priority is to replace all transformer fusing. In the coming years, the larger tap/lateral fusing will be replaced with non-expulsion type or electronic fault interrupters in order to coordinate with the downstream transformer fusing and upstream line reclosers or substation breakers. Liberty CalPeco plans to track ignition events going forward with an expectation that ignitions due to expulsion fusing will be completely alleviated by 2026.

Program Timeline:

- **Current Program** – Liberty CalPeco is focused on replacing expulsion fuses with non-expulsion "Fault Tamers' at all overhead transformer locations.
- **Before the upcoming wildfire season** – Continue with transformer fuse replacements. Pilot dropout recloser program initiated. Start addressing non-exempt hardware at each location where fuses are changed out
- **Before the next annual update** – Continue with transformer fuse replacements. Pilot dropout recloser program underway. Continue addressing non-exempt hardware at each location where fuses are changed out.

- **Within the next 3 years** – Expand the fuse replacement program to all lateral and any mainline fuses. Target all fuses within 6-year program (started in 2019).
- **Within the next 10 years** – All expulsion fuses replaced with non-expulsion fuses or electronic device (such as dropout reclosers).

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Expulsion fuse replacement	2019 plan	721,550	2,055	351	Fuse failure - conventional blown fuse	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	N/A	
	2019 actual	170,000	2,055	83	Fuse failure - conventional blown fuse	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	N/A	
	2020	1,544,000	2,055	751	Fuse failure - conventional blown fuse	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	N/A	
	2021	1,544,000	2,055	751	Fuse failure - conventional blown fuse	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	N/A	
	2022	1,544,000	2,055	751	Fuse failure - conventional blown fuse	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	N/A	
	2020-2022 plan total	4,632,000												

5.3.3.8 Grid topology improvements to mitigate or reduce PSPS events

Liberty CalPeco's grid topology efforts primarily reside in its Rule 20 undergrounding program. The Sagehen microgrid project would also qualify as a grid topology improvement to reduce PSPS because the customer would have generation onsite. Rule 20 projects are ongoing. The Sagehen project is a 2020 effort to add solar with battery backup at a small research facility in Liberty CalPeco's Tier 2 area. The project will initially allow the customer to remain with power while the three-mile line feeding through high fire threat area is de-energized for the fire season. The long-term plan is to eventually remove the line completely and allow the customer to be offline. The underground projects are included in other efforts in this section, so costs are not included here. Only costs for the Sagehen microgrid are shown in the below table.

Program Timeline:

- **Current Program** – Include Rule 20 underground programs and identify the Sagehen project as a pilot program to improve grid topology.
- **Before the upcoming wildfire season** – Get Sagehen project online as pilot microgrid.
- **Before the next annual update** – Evaluate Sagehen if complete or complete Sagehen if delayed by permitting.
- **Within the next 3-10 years** – Evaluate risk/cost benefit of microgrid projects and plan others if cost-effective.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Grid topology improvements to mitigate or reduce PSPS events	2019 plan													Installation of Sagehen Microgrid
	2019 actual													
	2020	616,000	4	154,000	All types of object contact, All typse of equpment/facility failure.	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	N/A	
	2021	-	-	-										
	2022	-	-	-										
	2020-2022 plan total	616,000												

5.3.3.9 Installation of system automation equipment

Liberty CalPeco plans to continue replacing older reclosers and line air switches with new recloser technology with a focus on moving toward a robust Distribution Automation Control (DAC) scheme. These are being strategically placed for better sectionalization of lines during switching and PSPS events, but also in an effort to bring DAC into play in the next three years. The goal of DAC is to have an automated switching control in place, working in parallel with the current SCADA system, to keep as many customers in service as possible during a system event. Liberty CalPeco will prioritize more populated areas in its territory and will also prioritize devices with notorious issues, replacing them with newer, more reliable equipment. The resulting benefits include improved reliability, smaller PSPS zones affecting fewer customers, faster remote switching ability via SCADA, and reduced outage times.

- **Current Program** – Liberty CalPeco is replacing many older recloser types for improved reliability and adding SCADA control. Many older air switches/motor operated switches are also being targeted for replacement.
- **Before the upcoming wildfire season** – Continue with recloser installs already in progress.
- **Before the next annual update** – Continue with recloser installs already in progress.
- **Within the next 3 years –** Install reclosers at a rate of four per year. Implement Distribution Automation Control system.
- **Within the next 10 years** – Continue replacements/new installs as deemed necessary. Operate fully implemented Distribution Automation Control system.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Automatic recloser operations	2019 plan	440,000	2,055	214	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing	2019 WMP	WMP memorandum account	In compliance	N/A	Reclosers are put on one shot during fire season for wildfire prevention.
	2019 actual	-	2,055	-	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing	2019 WMP	WMP memorandum account	In compliance	N/A	Reclosers are put on one shot during fire season for wildfire prevention.
	2020	360,000	2,055	175	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing		WMP memorandum account	In compliance	N/A	Reclosers are put on one shot during fire season for wildfire prevention.
	2021	540,000	2,055	263	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing		WMP memorandum account	In compliance	N/A	Reclosers are put on one shot during fire season for wildfire prevention.
	2022	360,000	2,055	175	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	Existing		WMP memorandum account	In compliance	N/A	Reclosers are put on one shot during fire season for wildfire prevention.
	2020-2022 plan total	1,260,000												

5.3.3.10 Maintenance, repair, and replacement of connectors, including hotline clamps

Liberty CalPeco has no program to replace any pole hardware other than on an emergency or urgent repair basis. Liberty CalPeco plans to inventory its entire service territory with an emphasis on poles with non-exempt hardware (per CalFire), open wire secondary, cracked grey wire secondary, and copper primary conductor sections. Liberty CalPeco will then replace all of this hardwire/wire on a reasonable timeline. Benefits will include fewer ignitions (with a drive to zero).

Program Timeline:

- **Current Program** – Liberty CalPeco has no program in place for maintenance, repair, and replacement of connectors except as needed in urgent or emergency situations.

- **Before the upcoming wildfire season** – Complete system inventory and include in GIS.
- **Before the next annual update** – Complete system inventory and include in GIS. Repair critical issues discovered in inventory.
- **Within the next 3 years** – Identify areas of maintenance needed in HFTD Tier 3 and complete replacements of non-exempt hardware in Tier 3 fire threat areas.
- **Within the next 10 years** – Identify areas of maintenance needed in HFTD Tier 2 and 3 and complete replacements of non-exempt hardware in Tier 2 and 3 fire threat areas.

5.3.3.11 Mitigation of impact on customers and other residents affected during PSPS event

None.

5.3.3.12 Other corrective actions

See 5.3.3.18 – Other.

5.3.3.13 Pole loading infrastructure hardening and replacement program

Liberty CalPeco does not have a Pole Loading Assessment program but does pole loading calculations on all poles that are being replaced or have an increase in loading from proposed new attachments, pursuant to G.O. 95. Pole loading calculations are completed on all poles as part of the covered conductor installation program in the WMP to remove the possibility of pole failures for improved system reliability.

Program Timeline:

- **Current Program** – As part of the efforts outlined in 5.3.3.3, Liberty CalPeco is performing pole loading calculations as well as pole health evaluation to determine the strength and weight-bearing ability to support covered wire.
- **Before the upcoming wildfire season** – Continue pole loading calculations as part of covered conductor program.
- **Before the next annual update** – Continue pole loading calculations as part of covered conductor program.
- **Within the next 3 years –** – Continue pole loading calculations as part of covered conductor program.
- **Within the next 10 years** – Continue pole loading calculations as part of covered conductor program.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
13. Pole loading infrastructure hardening and replacement program based on pole loading assesment program	2019 plan	930,000	3	339,416	All types of object contact, All typse of equpment/facility failure.	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	Following covered conductor plan.
	2019 actual	550,000	1	550,000	All types of object contact, All typse of equpment/facility failure.	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2020	1,515,000	5	288,571	All types of object contact, All typse of equpment/facility failure.	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2021	2,820,000	11	262,326	All types of object contact, All typse of equpment/facility failure.	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2022	3,535,000	10	361,452	All types of object contact, All typse of equpment/facility failure.	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2020-2022 plan total	7,870,000												

5.3.3.14 Transformers maintenance and replacement

Liberty CalPeco has no defined distribution transformer maintenance and replacement program. Annual DGA analysis is completed on substation transformers and replacement projects are planned, if necessary, as informed by testing. Liberty CalPeco performs maintenance and replacement as needed basis per inspections (DGA and G.O. 165) or as turned in by field personnel. If transformer maintenance requests increase during G.O. 95 inspections or as turned in by field personnel, then Liberty CalPeco may reevaluate the need for a separate program beyond the G.O. 165 inspection program.

Program Timeline:

- **Current Program** – Liberty CalPeco has no defined distribution transformer maintenance program. Maintenance and transformer replacement are performed on an as-needed basis per inspections, DGA analysis, or as turned in by field personnel.
- **Before the upcoming wildfire season** – Continue maintenance as needed per inspections and as turned in by field personnel.
- **Before the next annual update** – Continue maintenance as needed per inspections and as turned in by field personnel.
- **Within the next 3 years** – Continue maintenance as needed per inspections and as turned in by field personnel.

- **Within the next 10 years** – Continue maintenance as needed per inspections and as turned in by field personnel.

5.3.3.16 Undergrounding of electric lines and/or equipment

Liberty CalPeco has no defined program to underground electric lines and/or equipment aside from the Rule 20 program. If undergrounding electric lines and/or equipment outside of the Rule 20 program becomes necessary, then Liberty CalPeco may reevaluate the need for a separate program.

Program Timeline:

- **Current Program** – Work with counties and cities to prioritize areas that qualify to be undergrounded pursuant to Rule 20.
- **Before the upcoming wildfire season** – Continue to underground pursuant to Rule 20.
- **Before the next annual update** – Continue to underground pursuant to Rule 20.
- **Within the next 3-10 years -** Evaluate the ability to expand the Rule 20 program to include undergrounding for wildfire mitigation

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Undergrounding electric lines and/or equipment	2019 plan	-	-	-										
	2019 actual	-	-	-										
	2020	1,757,500	4	481,507	Overhead Primary Conductor	Unknown	Unknown	Non-Exempt Hardware	Existing	Rule 20 Program	N/A	In compliance	Rule 20	
	2021	6,100,000	1	4,880,000	Overhead Primary Conductor	Unknown	Unknown	Non-Exempt Hardware	Existing	Rule 20 Program	N/A	In compliance	Rule 20	
	2022	-	-	-										
	2020-2022 plan total	7,857,500												

5.3.3.17 Updates to grid topology to minimize risk of ignition in HFTDs

See discussion in 5.3.3.8.

5.3.3.18 Other / not listed

Tree Attachment Removal

Current Program: Out of convenience, prior utilities attached secondary and service conductors to trees, so as to avoid new pole installations. Liberty CalPeco's Tree Attachment Removal program will install poles to remove these tree attachments and attach to utility owned poles.[6] Poles are installed on an as needed basis per customer request to remove a service from a dead tree, scheduled by the customer for removal, or as turned in by field personnel that have identified a tree as dead or dying and a pole installation request is made to Engineering.

[6] Advice Letter No. 133-E, Report on Possible Wildfire Mitigation Plan Off Ramps, including Tree Attachment Removal as a necessary modification to Liberty CalPeco's 2019 Wildfire Mitigation Plan.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Other Corrective Action - Tree Attachment Removal	2019 plan	200,000	2,055	97	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown						
	2019 actual	244,148	2,055	-	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown						
	2020	600,000	2,055	292	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP Memo Account	In compliance	GO165	Following covered conductor plan.
	2021	600,000	2,055	292	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP Memo Account	In compliance	GO165	
	2022	600,000	2,055	292	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP Memo Account	In compliance	GO165	
	2020-2022 plan total	1,800,000												

Wire Upgrade Program

Open Wire Secondary Replacement:

In the past there was a construction standard that allowed for the installation of open wire secondary. Open wire secondary uses three or four bare conductors spread out on a cross arm to extend secondary voltage from pole to pole. The current construction standard requires the installation of a triplex or quadraplex conductor, which is three or four insulated conductors wrapped together. The open wire secondary replacement program was created to replace all open wire secondary with covered triplex or quadraplex conductor throughout the service territory to reduce potential vegetation contacts as part of the WMP.

Grey Wire Replacement:

In the past, there was a quadraplex and triplex secondary and service conductor that used a grey insulation for protection on it. Liberty CalPeco field personnel have discovered that this grey insulation, overtime, in some cases, has begun to develop small cracks and fractures that have led to the insulation actually falling off, leaving gaps and exposing the conductor to the elements, without any protection. With the insulation falling off, in small sections, the triplex or quadraplex bare conductor creates, not only a safety issue, but also a potential to cause wildfires due to the energized conductor shorting and falling to the ground. The Grey Wire replacement program was created to replace all grey wire secondary and service conductor throughout the service territory to reduce the risk of a wildfire as part of the WMP.

Overhead Asset Repairs from Asset Survey/GIS Update

As a result of the system-wide asset survey and GIS update, Liberty CalPeco estimates a portion of the assets from G.O. 165 review will require repairs and replacements of overhead assets.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Other Corrective Actions - Repairs and GO 165 Outcomes from Asset Survey/GIS Update	2019 plan													
	2019 actual													
	2020	3,500,000	2,055	1,703	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	Estimated Repairs/Replacements resulting from System-wide survey of all assets
	2021	-	-	-										
	2022	-	-	-										
	2020-2022 plan total	3,500,000												

5.3.4 Asset management and inspections

Liberty CalPeco's maintenance programs and protocols are almost entirely driven by its inspection of distribution and transmission lines, which meet schedule requirements as outlined in G.O. 165 and G.O. 174. In addition, when planning new projects, Liberty CalPeco evaluates all existing equipment impacted within the project scope for upgrade or replacement during the design process. The repair and/or replacement of equipment is initiated by field personnel through detailed inspections, visual patrols, or other work activities, and is then evaluated by either the planning or engineering department, depending on equipment type. All repair timelines are in accordance with G.O. 95 and 128 standards.

All distribution and transmission equipment fall under a run-to-failure approach with one exception being substations and the equipment therein. Substation breakers are maintained and tested by the Substation Department.

Liberty CalPeco does not have an "enhanced inspection" program. However, with the implementation of iRestore, the company will be able to plan and prioritize inspections and maintenance efforts using risk-based decision-making.

5.3.4.1&2 Detailed inspections of distribution and transmission electric lines and equipment

Liberty CalPeco's inspection program meets the minimum requirements as outlined in G.O. 165. The detailed inspections are carried out by Liberty CalPeco personnel and involve careful examination of assets. When issues are found, they are then evaluated by the planning and engineering departments for a final decision or work plan for repair or replacement.

Program Timeline:

- **Current Program** – Continue with G.O. 165 inspections.
- **Before the next annual update –** Convert the G.O. 165 inspection program from a paper format to electronic. Perform system-wide inventory of system and G.O. 165 inspections of all overhead distribution assets.
- **Within the next 3-10 years** - Evaluate how new technologies such as LiDAR and drones can be incorporated to improve the efficiency and accuracy of distribution line inspection. Continue to evaluate new technologies that will improve how inspection data is collected and move to a more predictive maintenance program rather than reactive.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Asset Survey/GIS Update	2019 plan													
	2019 actual													
	2020	6,000,000	2,055	2,920	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	Conduct System-wide survey of all assets
	2021	-	-	-										
	2022	-	-	-										
	2020-2022 plan total	6,000,000												

5.3.4.3 Improvements of inspections

Liberty CalPeco's inspection program is done manually with paper maps and paper forms. However, Liberty CalPeco will modernize its inspection programs with the iRestore mobile asset inspection application. This new mobile solution, to be deployed on phones and tablets, will streamline inspections and data collection for all assets. It should also improve the tracking of repairs generated when facilities are identified to need them. A database will house all inspection information, which improve tracking and reporting of the inspection and subsequent repair cycles.

Program Timeline:

- **Before the upcoming wildfire season** - Begin development of new inspection application to be deployed on mobile devices.
- **Before the next annual update** - Complete testing of new inspection application, fully deploy app to operations work force.
- **Within the next 3 years** - Invest in mobile technology to support inspections such as more accurate GPS, up to date devices and software, etc. Also look to new technologies to improve inspections such as drones and LiDAR. Design programs for tracking emergency maintenance activities.
- **Within the next 10 years** - Continue to invest in technology that will support all manner of inspections. Evaluate overall staffing levels to ensure inspections do not fall out of compliance.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Improvement of inspections	2019 plan													
	2019 actual													
	2020	890,000	2,055	433.1	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	Roll out of iRestore application, hire 3 inspectors to comply with GO 165 requirements, 2 inspector trucks, 1 wildfire coordinator vehicle
	2021	360,000	2,055	175.2	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	Add 1 additional inspector truck
	2022	260,000	2,055	126.5	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	
	2020-2022 plan total	1,510,000												

5.3.4.4&5 Infrared inspections of distribution and transmission electric lines and equipment

Liberty CalPeco has not yet decided whether to incorporate infrared inspections of distribution lines. Liberty CalPeco will evaluate adding infrared inspections of distribution lines. If deemed beneficial, increase inspection program scheduling and/or inspection procedures.

5.3.4.6 Intrusive pole inspections

Liberty CalPeco's intrusive pole inspection program is on a 10-year inspection cycle and performed by contractors. Wood poles that have previously passed intrusive inspections are also on the 10-year inspection cycle, which exceed the G.O. 165 requirement of 20 years. At a minimum, all poles are visually inspected and, when intrusive inspections are needed, they are excavated around the base of the pole and may include a sound-and-bore test. Poles are also treated with preservative paste or liquid at this time. Weakened poles are either reinforced or replaced based on shell thickness measurements.

Program Timeline:

- **Before the upcoming wildfire season** - No changes to existing program.
- **Before the next annual update -** Liberty CalPeco will evaluate the benefit of performing intrusive inspections internally versus using contractors.
- **Within the next 3-10 years -** Liberty CalPeco will adapt its plan to new technology and/or new regulations.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Intrusive pole inspections	2019 plan													
	2019 actual	13,044	12	1,087	Unknown	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	Line miles to treated based on invoices from this program.
	2020	118,554	68	1,743	Unknown	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	Forecast based on number of poles planned to be treated
	2021	145,308	104	1,397	Unknown	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2022	80,887	98	825	Unknown	Unknown	Unknown	Unknown	Existing	GO165	N/A	In compliance	GO165	
	2020-2022 plan total	344,749												

5.3.4.7&8 LiDAR inspections of distribution and transmission electric lines and equipment

Liberty CalPeco does not utilize LiDAR for distribution line inspections at this time.

Program Timeline:

- **Before the upcoming wildfire season** - Develop criteria for LiDAR pilot project to evaluate how Liberty CalPeco will develop use cases for LiDAR inspections.
- **Before the next annual update** - Execute the LiDAR pilot and evaluate data collected.
- **Within the next 3 years** - If the LiDAR pilot project is proven to aid wildfire mitigation efforts, incorporate LiDAR into inspection programs.
- **Within the next 10 years** - Liberty CalPeco will evaluate developing an in-house program versus using contractors to perform LiDAR inspections.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
LiDAR inspections of distribution and transmission electric lines and equipment	2019 plan													Distribution and transmission LiDAR projects would be one project, not separate.
	2019 actual													
	2020	250,000	2,055	122	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	
	2021	300,000	2,055	146	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	
	2022	300,000	2,055	146	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	In compliance	GO165	
	2020-2022 plan total	850,000												

5.3.4.9&10 Other inspections on distribution and transmission electric lines and equipment

Liberty CalPeco does not have any other discretionary inspection programs for distribution electric lines at this time. After any outage, planned or otherwise, the impacted lines are patrolled and visually inspected. Any issues found will be corrected or reported as appropriate.

Program Timeline:

- **Before the upcoming wildfire season** - No changes
- **Before the next annual update -** Liberty CalPeco will have programs and enterprise business systems in place to track these type of non-routine inspections.
- **Within the next 3-10 years -** Liberty CalPeco will evaluate new inspection initiatives that might support or enhance existing inspection programs.

5.3.4.11&12 Patrol inspections of distribution and transmission electric lines and equipment

Liberty CalPeco performs annual patrols of all distribution lines in Tier 2 areas and every 6 months for those lines in Tier 3 by vehicle or helicopter as terrain allows.

Program Timeline:

- **Before the upcoming wildfire season** - No changes.
- **Before the next annual update -** No changes.
- **Within the next 3 years -** Evaluate the use of drone technology to enhance efficiency of patrol inspections.
- **Within the next 10 years** - Continue to evaluate technology that will assist with inspections.

5.3.4.13 Pole loading assessment program to determine safety factor

As part of the efforts outlined in 5.3.3.3 (Covered Conductor), Liberty CalPeco is performing pole loading calculations as well as pole health evaluation to determine the strength and weight baring ability to support covered wire.

See 5.3.3.13 Pole Loading Infrastructure Hardening and Replacement Program for estimated program costs.

Liberty CalPeco plans to integrate the iRestore software to improve efficiencies in getting the pole information found in the field into the pole loading analysis software for pole replacements for the covered conductor program.

5.3.4.14 Quality assurance / quality control of inspections

Liberty CalPeco personnel audit some inspection records, but there is no established program for tracking and recording them. See Section 5.3.5 for Vegetation Management Quality Assurance/Quality Control inspections.

Program Timeline:

- **Before the upcoming wildfire season** - Liberty CalPeco will establish a program for Quality Assurance/Quality Control of equipment inspections, contingent on ability to hire resource in time.
- **Before the next annual update -** Liberty CalPeco will implement a Quality Assurance/Quality Control for all types of line and substation inspections.

- **Within the next 3 years -** Liberty CalPeco will have new enterprise business systems in place that will enable more robust tracking mechanisms such as integrated workforce management systems with built in quality checks.
- **Within the next 10 years** - Liberty CalPeco will evaluate having independent or third-party audits of inspections to further validate inspection data and records.

5.3.4.15 Substation inspections

Liberty CalPeco performs substation inspections pursuant to its G.O. 174 plan. Substation inspections maintain public and worker safety, and regulatory compliance by staying in conformance with G.O. 174. It also identifies equipment needing maintenance and/or testing in accordance with prudent utility practice. Liberty CalPeco also maintains and tests relays in accordance with our protocols and in order to maintain compliance with NERC requirements.

Program Timeline:

- **Before the upcoming wildfire season** - Continue substation inspections in accordance with its G.O. 174 plan
- **Before the next annual update -** Continue substation inspections in accordance with its G.O. 174 plan
- **Within the next 3 years -** Evaluate current inspection program and inventory of substation equipment and evaluate risk/cost benefit of increased inspection program
- **Within the next 10 years** - If deemed beneficial, increase inspection program scheduling and/or inspection procedures

5.3.5 Vegetation management and inspections

1. **Address how the electrical corporation has collaborated with local land managers to leverage opportunities for fuel treatment activities and fire break creation, and compliance with other local, state, and federal forestry and timber regulations.**

   Liberty CalPeco is actively engaged with local land managers to explore opportunities for fuel treatment activities and fire break creation that will assist with mutual long-term management goals and will comply with state and federal forestry regulations. In 2019, Liberty CalPeco, along with its partners the California State Parks, the Lake Tahoe Basin Management Unit (LTBMU), the Tahoe National Forest, the California Tahoe Conservancy and the Tahoe Fire and Fuels Team applied for a California Climate Investment (CCI) grant to conduct comprehensive multi-jurisdictional forest resilience and fuel reduction treatments surrounding critical community infrastructure on the California side of the Lake Tahoe Basin (Basin). Ultimately, the grant was not funded, however, this Resilience Corridor Project represents a collaborative effort between federal, state and local agencies to conduct comprehensive multi-jurisdictional forest resiliency and fuels reduction treatments that aim to 1) create resilience corridors, 2) aid in resource surveys in support of future efforts, and 3) assist in conducting forest management research

along with investigating innovative technology opportunities. In October, the project was approved and granted a categorical exclusion from documentation in an Environmental Assessment or Environmental Impact Statement as it meets the criteria outlined in the Water Infrastructure Improvement for the Nation Act of 2016, streamlining vegetation management efforts in these areas. Liberty CalPeco plans to implement the first Forest Resilience Corridor project in 2020.

Also in 2020, Liberty CalPeco will host working groups with SME's, local and state agencies to understand the greatest needs in improving fuel reduction practices. Any further efforts developed in the working groups that reduce fire risk will be developed into a scope of work for the coming year and will become a part of a more comprehensive fuel reduction effort within the Vegetation Management Plan.

2. **Discuss how the electrical corporation identifies and determines which vegetation is at risk of ignition from utility electric lines and equipment.**

Liberty CalPeco identifies and determines which vegetation is at risk of ignition through the implementation of inspection and maintenance programs to ensure compliance with all applicable laws and regulations pertaining to vegetation and electrical conductors.

Liberty CalPeco performs Routine Vegetation Maintenance inspections of entire circuits to prescribe trimming and removal of vegetation as a safeguard against grow-ins or fall-ins and to conform to required laws and regulations. Liberty CalPeco intends to perform such maintenance inspections and subsequent tree work once every three years per circuit. In prescribing trimming or removal the following factors are considered: 1) The potential for vegetation to grow and/or encroach within the minimum allowed distances to the facilities within the cycle. 2) The potential for vegetation to structurally fail into the facilities within the cycle. Additional site conditions and factors are considered in prescribing tree work such as length of span, line sag, planned maintenance cycles, location of vegetation within the span, species type, species characteristics, vegetation growth rate, arboricultural practices, environmental characteristics of the site, local climate, and elevation.

In addition to routine cycle maintenance which is structured around a three year maintenance cycle, it has been determined necessary to perform additional inspections to help ensure electrical safety and reliability. Due to the nature of the increasing tree mortality within the service territory, Liberty CalPeco has implemented a program to inspect for dead and dying trees throughout its entire system by performing an accelerated inspection of the circuits under the Catastrophic Event Memorandum Account (CEMA).

Liberty CalPeco proposes to implement four additional program initiatives in its 2020 WMP that will enhance its wildfire mitigation efforts:

Tier 3 Inspections:

Liberty CalPeco operates approximately 50 miles of overhead conductor in Tier 3 in the High Fire-Threat District. Liberty CalPeco plans to inspect its overhead system within

Tier 3 of the High Fire-Threat District on an annual basis to prescribe any pruning or removals necessary to obtain compliance with regulation requirements.

Fuel Reduction/Wood Management Program:

In addition to planned Forest Resilience Corridor efforts, Liberty CalPeco recognizes the need for additional fuel reduction and wood management throughout the service territory. Vegetation left behind from clearing activities (i.e. logs, bole wood, and large branches), if left untreated, becomes an increasingly dry fuel source adjacent to power lines and an infestation risk to remaining trees by forest insects. Recently cut material, especially logs and large branches, provide ideal conditions for tree-damaging insects to breed and increase their populations. When the adult insects emerge from this material, they attack live trees in greater numbers. This can increase the number of dead trees, branches, and tops, amplifying the need for clearing activities and increasing long-term maintenance costs.

Cutting down hazardous trees and clearing limbs away from power lines ensures compliance and reduces ignition risk by eliminating strike and grow-in potential, but it does not address the fuel load that results from these activities. In the event of a fire, dead, dry fuel left behind by vegetation management activities will contribute to the intensity and rate of spread of the fire. There is also a risk of the fuel becoming ignited by power lines during wire-down, blown fuse, and other equipment failure events. Added benefits of reducing fuel load near powerlines is the protection of the powerlines from wildfire and increased effectiveness of suppression activities, regardless of the ignitions cause.

Liberty CalPeco's local and state agency partners (CAL Fire, Tahoe Regional Planning Agency, California Tahoe Conservancy, Tahoe Fire and Fuels Team, US Forest Service, and local fire agencies) have been highly supportive partners and have increased their emphasis on the need to reduce forest fuel load that results from power line vegetation management. Liberty CalPeco intends to work closely with these partners to develop best practices for an effective fuels management program that reduces both fire ignition risk and fire spread potential, while benefitting our local community and the environment.

Forest Resilience Corridor: See section 5.3.5.1 for details regarding this program.

Quality Assurance/Quality Control Program: Liberty CalPeco audits all vegetation inspection work as part of the review and permitting process for trees located on local, federal, and state agency land. Work quality is assessed for accuracy of the work order and for correct identification of tree work. Work corrections are made in the field and reviewed with the contractor. While Liberty CalPeco's existing process is able to identify issues and implement corrective action, it lacks the internal resources to implement an industry best practice Quality Assurance/Quality Control program. Liberty CalPeco has recognized the need and will develop a formal Quality Assurance/Quality Control audit program for vegetation management activities that use a third party contractor to ensure quality of work.

3. **Describe how (i.e., criteria, data, protocols, studies, etc.) the utility made the determination to trim any vegetation beyond required clearances in G.O. 95.** Liberty CalPeco has adopted and incorporated General Order 95, Appendix E recommended clearances at time of trimming in its vegetation management plan. Minimum clearance, at time of trim, is 12 feet for distribution lines (up to 60kV) and is 30 feet for 120kV lines. Liberty CalPeco does not have power lines operating in the 72kV-110kV category. Liberty CalPeco considers more than just line operating voltage when determining appropriate clearance and will obtain greater clearances as needed to ensure compliance until the next scheduled maintenance. The consideration to obtain greater clearances will be based on multiple factors, including: length of span, line sag, planned maintenance cycles, location of vegetation within the span, species type, species characteristics, vegetation growth rate, arboricultural practices, local climate, and elevation.

4. **Describe utility plan to mitigate identified trees with strike potential, including information about how (i.e., criteria, protocols, data, statutes, etc.) the electrical corporation identifies and defines "hazard trees" and "trees with strike potential" based on height and feasible path to strike powerlines or equipment. Describe utility plan to identify reliability/at-risk tree species to trim or remove, where feasible, per location-specific criteria.**

   Liberty CalPeco complies with G.O. 95 Rule 35, by removing trees when "dead, rotten or diseased trees or dead, rotten or diseased portions of otherwise healthy trees overhang or lean toward and may fall into a span of supply or communication lines." Additionally, Liberty CalPeco complies with Public Resources Code 4293 by removing "Dead tree, old decadent or rotten trees, trees weakened by decay or disease and trees or portions thereof that are leaning toward the line which may contact the line from the side or may fall on the line." Hazard trees are identified through vegetation inspection programs and are evaluated best practices derived from the *CalFire Power Line Fire Prevention Field Guide*, The *USFS Region 5 Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region*, and *ANSI A300 Standards (Part 9) – Tree Risk Assessment.*

   "Trees with strike potential" are trees or parts of trees that have the potential to contact the electrical facilities if they were to fail. Assessing strike potential begins with determining if the tree is tall enough to reach the electrical facilities. Tree height is measured using forestry devices such as a line tape and clinometer, or laser rangefinder/hypsometer. If a tree, or part of a tree, is tall enough to reach an electrical facility, it must also have a path to the target. Direction of fall (slope, lean, etc.) and protection (trees or other objects blocking the path) are also considered when determining the strike potential of a tree.

   Liberty CalPeco's inspection process accounts for species growth and failure characteristics when determining if trees require remediation. Understanding species characteristics combined with local environmental conditions leads to the determination of whether a tree should be trimmed, removed, or left alone. Liberty CalPeco categorizes the growth potential of trees as slow, medium, and fast growing trees and are trimmed accordingly based on their growth potential. Trees with slow

to medium growth potential are trimmed a minimum of 12 feet from the power line, while trees with fast growth potential are trimmed 15 feet or greater. In addition to growth rate and grow-in potential, species failure potential is also considered when identifying at-risk species. All trees are susceptible to structural defects, disease, and environmental conditions, and one of the factors for determining failure potential is based on how individual species react to those conditions. A structural defect, like a forked top, may be considered moderate to high risk of failure in some species, while the same defect may be considered low risk in others. Liberty CalPeco is in the process of developing a tree failure database that will use tree related outage data to explore other opportunities for targeting reliability/at-risk species and how to treat them.

5. **Include a discussion of how the utility's overall vegetation management initiatives address risks that may arise from trimming or removing trees, including but not limited to erosion, wind, flooding, etc.**

   Vegetation management activities are necessary to protect the environment by ensuring that fires are not ignited by vegetation coming into contact with electrical equipment. Liberty CalPeco is committed to carrying out vegetation management in an environmentally responsible manner, while supporting the principles of ecologically sustainable development. Liberty CalPeco's vegetation management plan includes resource protection measures that are designed to comply with regulations adopted by State, Federal, and Local Government agencies. Implementing best practices for water quality, terrestrial wildlife, sensitive and rare plants, non-native invasive plant management, and hazardous spill control help to address environmental concerns that may arise from vegetation management activities.

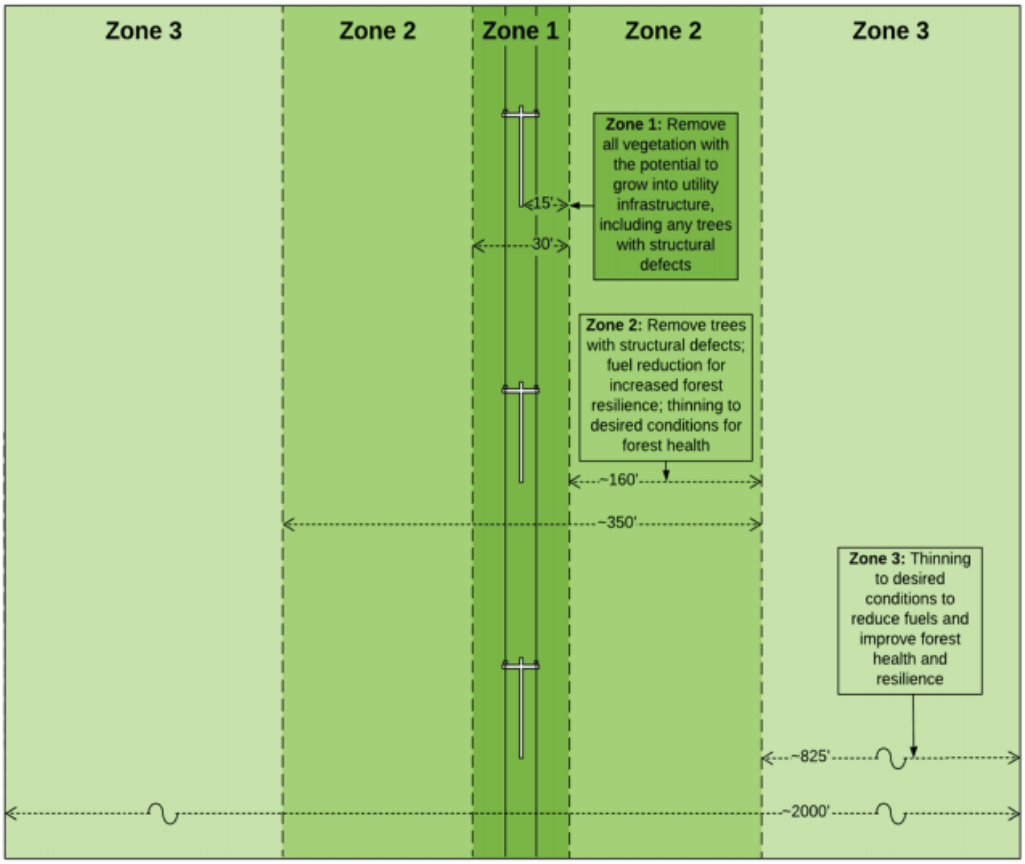
5.3.5.1 Additional efforts to manage community and environmental impacts

Liberty CalPeco is committed to carrying out vegetation management work in an environmentally responsible manner while supporting the principals of ecologically sustainable development. Liberty CalPeco strives to adhere to all regulations and policies as adopted by state, local, and federal agencies. Liberty CalPeco has not developed an initiative around additional efforts to manage community and environmental impacts.

The Forest Resilience Corridor Project is a comprehensive multi-jurisdictional effort in forest resiliency and fuels reduction surrounding critical community infrastructure. The proposed project area is on approximately (~) 7,600 acres of lands managed by the Lake Tahoe Basin Management Unit (LTBMU) and the Tahoe National Forest (Tahoe NF). The project comprises roughly 55 miles of Liberty CalPeco power lines, with ~54 miles on the LTBMU and one mile on the Tahoe NF. Liberty CalPeco plans to implement the first Forest Resilience Corridor project in 2020. Further information about the Forest Resilience Corridor Project can be found at: https://www.fs.usda.gov/nfs/11558/www/nepa/111291_FSPLT3_4880627.pdf.

Vegetation Treatment Zones:
There are three treatments zones that the Resilience Corridor Project will enact around the power lines (Figure 2):

- Zone 1 (up to 15’ each side of power line, ~200 acres): vegetation, including shrubs ≥ 18” high, with potential to grow into utility infrastructure will be removed, along with defect trees.
- Zone 2 (up to 175’ each side of power line, ~2,200 acres): trees with structural defects with the potential to strike utility infrastructure will be removed; fuels will be reduced to improve forest resilience to fire, insect, disease, and drought; and, thinning to desired conditions will improve forest health and resilience. The target average stand density is 60 BAF (basal area factor) with a range of 40-80 BAF. For trees less than 10” in diameter in the understory, a minimum of 10 tree per acre will be retained.
- Zone 3 (up to ~1000’ each side of power line, ~5,200 acres): reducing fuel loads and thinning the forest to desired conditions will improve forest health and resilience to disturbance. The target average stand density is 100 BAF, with a range of 80-120 BAF. For trees less than 10” in diameter in the understory, a minimum of 10 trees per acre will be retained. Liberty CalPeco will not perform work in zone 3.



Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Additional efforts to manage community and environmental impacts	2019 plan													
	2019 actual													
	2020	660,000	14	47,143	Vegetation Contact	Unknown	Unknown	Unknown	Existing	WMP Approval		Exceeding	N/A	
	2021	660,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	Existing	WMP Approval		Exceeding	N/A	
	2022	660,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	Existing	WMP Approval		Exceeding	N/A	
	2020-2022 plan total	1,980,000												

- **Before the upcoming wildfire season** – Develop plan with USFS for implementation of first Forest Resilience Corridor project along Liberty CalPeco's 625 (60kV) power line.
- **Before the next annual update** – Complete 625 FRC project and describe effectiveness of the program in the next annual update.
- **Within the next 3 years** – Coordinate with stakeholders to implement plan and determine schedule for upcoming projects.

5.3.5.2&3 Detailed inspections of vegetation around distribution and transmission electric lines and equipment

Liberty CalPeco performs Routine Vegetation Maintenance through detailed inspections of entire circuits to prescribe trimming and removal of vegetation as a safeguard against grow-ins or fall-ins and to conform to required laws and regulations. Liberty CalPeco intends to perform such inspections and work once every three years per circuit. In prescribing trimming or removal, the following factors are considered: 1) The potential for vegetation to grow and/or encroach within the minimum allowed distances to the facilities within the cycle. 2) The potential for vegetation to structurally fail into the facilities within the cycle. Additional site conditions and factors are considered in prescribing tree work such as length of span, line sag, planned maintenance cycles, location of vegetation within the span, species type, species characteristics, vegetation growth rate, arboricultural practices, environmental characteristics of the site, local climate, and elevation.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Detailed inspections of vegetation around distribution electric lines and equipment	2019 plan	500,000	200	2,500/mile	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC		Exceeding	GO 95 Rule 35; PRC 4293	
	2019 actual	450,000	170	2,647/mile	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC		Exceeding	GO 95 Rule 35; PRC 4294	
	2020	610,000	230	2,652/mile	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC		Exceeding	GO 95 Rule 35; PRC 4295	
	2021	556,000	210	2,650/mile	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC		Exceeding	GO 95 Rule 35; PRC 4296	
	2022	570,000	215	2,651/mile	Vegetation Contact	Unknown	Unknown	Unknown				Exceeding	GO 95 Rule 35; PRC 4297	
	2020-2022 plan total	1,736,000												

Detailed inspections and Routine Vegetation Maintenance is continuous and ongoing.

5.3.5.4 Emergency response vegetation management due to red flag warning or other urgent conditions

Liberty CalPeco responds to vegetation management emergencies as they are discovered by field reports from personnel, first responders, and reports from the general public. During red flag warnings or other urgent conditions, tree crews are available to respond to emergency situations as they arise. For the upcoming fire season and the years that follow, Liberty CalPeco will examine best practices established by other utilities to determine whether there is a need for enhanced emergency vegetation management response during red flag warnings.

Before the upcoming wildfire season – Liberty CalPeco's 2019 Fire Prevention Plan has established new operating guidelines and work restrictions depending on the forecasted fire danger using a proprietary Fire Potential Index (FPI). The FPI is in development, and will be ready for implementation for the upcoming wildfire season. By restricting work activities during extreme weather events and increasing patrols, there will be more field observations and potential for additional vegetation management work.
Before the next annual update – Liberty CalPeco will compare its current practices with the best practices established by other utilities and determine if there is a need to enhance the approach to emergency vegetation management during red flag warnings. If a need for greater response is identified, Liberty CalPeco will incorporate this approach in the 2021 WMP.
Before the next 3 to 10 Years – Implement emergency response plans that mitigate fire risk.

5.3.5.5 Fuel management and reduction of "slash" from vegetation management activities

Liberty CalPeco's current practice for slash and debris removal are based on historic industry practices. Only slash measuring less than 4" diameter is treated as follows:

- Residential Areas Accessible by Roads – Slash will be chipped. Chips may be hauled off site to a different location or may be broadcasted back onto the site.
- Rural or Forested Areas not Accessible by Roads – Slash will be lopped and scattered in a non-continuous manner outside of the utility right-of-way; or slash will be lopped and scattered as to ensure that the vertical height is not more than 18" above the ground.

Wood greater than 4" diameter is not removed from the work location unless required under certain government authorizations. Slash treatment is the responsibility of Liberty CalPeco's contractors and is included in the costs of performing tree work, and costs for slash treatment are not tracked separately. As described at the beginning of section 5.3.5, Liberty CalPeco has recognized the need to evaluate the current fuel management approach and develop a new methodology for fuels treatment that aligns more closely with joint goals of agency partners and the local community to ensure that vegetation management fuel load is treated in a manner that reduces both fire ignition risk and the potential for increased fire intensity.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Fuel management and reduction of "slash" from vegetation management activities	2019 plan													
	2019 actual													
	2020	2,000,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	New		WMP memorandum account	Exceeding		
	2021	2,500,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	New		WMP memorandum account	Exceeding		
	2022	2,500,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	New		WMP memorandum account	Exceeding		
	2020-2022 plan total	7,000,000												

Before the upcoming wildfire season – Liberty CalPeco plans to continue to work with the local and state agency land managers, as well as the local community to develop new standards for fuel reduction and slash treatment. Liberty CalPeco will host workshops with subject matter experts from these agencies to assist in the development of a fuel reduction and wood removal program that will reduce fire risk and benefit the local community and surrounding forest.

Before the next annual update – Liberty CalPeco intends to complete the program scope of work and justification and will begin to implement the new fuel reduction practices prior to the 2021 annual WMP update.

Within the next 3 years – Monitor program success and continue to work with stakeholders to update best practices. Continue to improve efficiency of the program.

5.3.5.6 Improvement of inspections

Liberty CalPeco frequently reviews inspection protocols and procedures with its contractors and make adjustments accordingly. Every three years Liberty CalPeco has a third party assessment of the vegetation management program which analyzes vegetation management protocols, production, resource allocation, cycle length, workload, compliance, and other aspects of the program. The report validates aspects of the program and provides recommendations for improvements to align with industry best practice. By having work load, production, and cycle length examined, Liberty CalPeco can determine the need for improvements in its inspection protocols.

Before the upcoming wildfire season – Liberty CalPeco will work to select a qualified third party to perform the vegetation management system assessment which will be completed in the fall of 2020.
Before the next annual update – Liberty CalPeco will evaluate the results of the system assessment and detail any inspection improvements and will describe any improvements in the next annual update.
Between 3 and 10 years – Continue to evaluate inspection programs and examine results of the next system assessment.

5.3.5.7&8 LiDAR inspections of vegetation management

Liberty CalPeco has not used LiDAR to perform vegetation inspections along electric lines. As described in section 5.3.4.7, Liberty CalPeco is exploring use cases for LiDAR inspections and will develop pilot projects that help to determine if LiDAR is more efficient and cost effective than traditional inspection methods.

5.3.5.9&10 Other vegetation management

Liberty CalPeco operates approximately 50 miles of overhead distribution and transmission in Tier 3 in the High Fire-Threat District. Liberty CalPeco plans to implement annual vegetation inspections for the overhead distribution system within Tier 3 of the High Fire-Threat District to prescribe any pruning or removals necessary to obtain compliance with regulation requirements.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Other Vegetation Management	2019 plan													
	2019 actual													
	2020	400,000	50	8,000	Vegetation Contact	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account		GO 95 Rule 35; PRC 4293	
	2021	400,000	50	8,000	Vegetation Contact	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account		GO 95 Rule 35; PRC 4293	
	2022	400,000	50	8,000	Vegetation Contact	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account		GO 95 Rule 35; PRC 4293	
	2020-2022 plan total	1,200,000												

Before the upcoming wildfire season – Liberty CalPeco will work to draft the Tier 3 Inspections to align with the already established inspection programs (Routine Maintenance & CEMA) to be able to begin inspections in 2020.

Before the next annual update – Liberty CalPeco will have completed the first cycle inspection of the Tier 3 Inspections and will have data to report on.

Within the next 3 years – Continue to implement enhanced inspections on an as needed basis and look for opportunities to implement additional enhanced inspections.

Within the next 10 years – Continue to implement enhanced inspections on an as needed basis and look for opportunities to implement additional enhanced inspections.

5.3.5.11&12 Patrol inspections of vegetation

Liberty CalPeco's current Vegetation Management Plan is structured around a three-year maintenance cycle. Due to the nature of the increasing tree mortality within the service territory, Liberty CalPeco has identified the need to inspect for dead and

dying trees throughout its entire system by performing an accelerated inspection of the circuits under the Catastrophic Event Memorandum Account (CEMA). Liberty CalPeco's electric distribution facilities are surveyed consisting of a Level 1 inspection, involving a basic visual ground inspection of trees or populations of trees to identify dead and dying trees. Additionally, contractor shall inspect for imminent hazards, G.O. 95 Rule 35 or PRC 4293 compliance infractions.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Patrol inspections of vegetation around distribution electric lines and equipment	2019 plan													
	2019 actual	260,000	132	1,970	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC				
	2020	300,000	150	2,000	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC				
	2021	300,000	150	2,000	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC				
	2022	300,000	150	2,000	Vegetation Contact	Unknown	Unknown	Unknown						
	2020-2022 plan total	900,000												

CEMA patrol inspections are continuous and ongoing.

5.3.5.13 Quality assurance/quality control of inspections

Liberty CalPeco audits all vegetation inspection work as part of the review and permitting process for trees located on local, federal, and state agency land. Work quality is assessed for accuracy of the work order and for correct identification of tree work. Work corrections are made in the field and reviewed with the contractor. While Liberty CalPeco's existing process is able to identify issues and implement corrective action, it lacks the internal resources to implement an industry best practice Quality Assurance/Quality Control program. Liberty CalPeco has recognized the need and will develop a formal Quality Assurance/Quality Control audit program for vegetation management activities that use a third party contractor to ensure quality of work.

Before the upcoming wildfire season: Begin to draft framework for Quality Assurance/Quality Control formal program Issue Requests for Proposals.

Before the next annual update: Implement formal third party Quality Assurance/Quality Control program and report on progress for next annual update.

Between 3 and 10 years: Evaluate findings and program results to determine if changes are needed for vegetation management program.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
QA/QC of Inspections	2019 plan													
	2019 actual													
	2020	250,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	New		WMP memorandum account			
	2021	250,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	New		WMP memorandum account			
	2022	250,000	Unknown	Unknown	Vegetation Contact	Unknown	Unknown	Unknown	New		WMP memorandum account			
	2020-2022 plan total	750,000												

5.3.5.14 Recruiting and training of vegetation management personnel

Liberty CalPeco contracts with a third party company that specializes in utility arboriculture and provides utility arborists or pre-inspectors to conduct vegetation inspections along CalPeco powerlines. Under direction from the Vegetation Program Manager, it is the contract pre-inspection company's responsibility to recruit, train and provide qualified personnel to meet contractual requirements and to perform the scope of work agreed upon. Additionally, Liberty CalPeco contracts qualified line clearance tree crews to perform work prescribed by the pre-inspection company on the Liberty CalPeco system. It is the contract tree company's responsibility to recruit, train and provide qualified personnel to meet contractual requirements and to perform the scope of work agreed upon. Liberty CalPeco employs vegetation management staff under supervision to the Vegetation Program Management to assist in management of the contractors, workload and the program as a whole.

5.3.5.15 Remediation of at-risk species

Liberty CalPeco's inspection process accounts for species growth and failure characteristics when determining if trees require remediation. Understanding species characteristics combined with local environmental conditions leads to the determination of whether a tree should be trimmed, removed, or left alone. Liberty CalPeco categorizes the growth potential of trees as slow, medium, and fast growing trees and are trimmed accordingly for their growth potential. In addition to growth rate and grow-in potential, species failure potential is also considered when identifying at-risk species. All trees are susceptible to structural defects, disease, and environmental conditions, and one of the factors for determining failure potential is based on how individual species react to those conditions. A structural defect, like a forked top, may be considered moderate to high risk of failure in some species, while the same defect may be considered low risk in others. Liberty CalPeco is in the process of developing a tree failure database that will use tree related outage data to explore other opportunities for targeting reliability/at-risk species and how to treat them.

Before the upcoming wildfire season: Begin to develop a tree failure database to track system reliability and species failure characteristics.

Before the next annual update: Implement outage investigations and tree failure database to be able to compile data for system reliability and identifying at-risk-species.

Within the next 3 years: Begin implementing remediation tactics based off gathered data. Ongoing research, database development and reliability/species failure analysis.

Within the next 10 years: Ongoing research, database development and reliability/species failure analysis. Further develop and adjust remediation tactics for at-risk-species and areas.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	If new: What proceeding has Existing: account Memorandum	In / exceeding compliance with	Cite associated rule	Comments
Remediation of at-risk-species	2019 plan												
	2019 actual	4,504,905	268	16,809	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC	GO 95 Rule 35; PRC 4293		
	2020	4,500,000	380	11,842	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC	GO 95 Rule 35; PRC 4293		
	2021	4,500,000	360	12,500	Vegetation Contact	Unknown	Unknown	Unknown	Existing	2019 GRC	GO 95 Rule 35; PRC 4293		
	2022	5,000,000	365	13,699	Vegetation Contact	Unknown	Unknown	Unknown	Existing		GO 95 Rule 35; PRC 4293		
	2020-2022 plan total	14,000,000											

5.3.5.16 Removal and remediation of trees with strike potential

Liberty CalPeco complies with G.O. 95 Rule 35, by removing trees when "dead, rotten or diseased trees or dead, rotten or diseased portions of otherwise healthy trees overhang or lean toward and may fall into a span of supply or communication lines." Additionally, Liberty CalPeco complies with Public Resources Code 4293 by removing "Dead tree, old decadent or rotten trees, trees weakened by decay or disease and trees or portions thereof that are leaning toward the line which may contact the line from the side or may fall on the line." Hazard trees are identified through vegetation inspection programs and are evaluated by best practices derived from the CalFire Power Line Fire Prevention Field Guide, The USFS Region 5 Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region, and ANSI A300 Standards (Part 9) – Tree Risk Assessment.

"Trees with strike potential" are trees or parts of trees that have the potential to contact the electrical facilities if they were to fail. Assessing strike potential begins with determining if the tree is tall enough to reach the electrical facilities. Tree height is measured using forestry devices such as a line tape and clinometer, or laser rangefinder/hypsometer. If a tree, or part of a tree, is tall enough to reach an electrical facility, it must also have a path to the target. Direction of fall (slope, lean, etc.) and protection (trees or other objects blocking the path) are also considered when determining the strike potential of a tree. Costs summarized in the table below include all tree work performed under Liberty CalPeco's routine, off-cycle, and CEMA programs. There is no way to separate costs between trees that were removed for strike potential from trees that were pruned for line clearance.

> **Before the upcoming wildfire season:** Removal and remediation of trees with strike potential is continuous and ongoing through Routine Vegetation Maintenance and CEMA programs in accordance with required laws and regulations.

5.3.5.17 Substation inspections

See discussion on Substation Inspections in Section 5.3.4.15.

5.3.5.18 Substation vegetation management

Within the substation footprint, the ground is kept clear from vegetation on an as-needed basis using herbicide, pre-emergent and hand treatment.

5.3.5.19 Vegetation inventory system

Liberty CalPeco manages tree work inventories and workloads through the Vegetation Management System (VMS) database. The VMS tracks circuit inspections, notification and tree work progress, provides work orders, notification letters and report generating functions, retains historical inspection and tree work data, and also has a variety of query options to specify select tree inventories as needed (i.e. routine circuit work on Federal lands for a specific inspection year or a random sample for quality control or assurance audits). Trees are inventoried if that specific tree is requiring remediation for the current inspection, therefore a new tree is only added to the inventory in VMS if it is being listed for tree work. Every tree inventoried on the system is assigned its own Tree Identification Number. If a tree that has been worked in the past requires work again,

that specific tree record is updated to create a new work order and inspection record for the current inspection taking place but the unique Tree ID Number for that tree does not change. The past work orders and inspection records for that tree are retained. During the inspection process, trees not requiring work are not inventoried and/or updated. Photographs, Tree Work Authorization Forms and other documents associated with specific trees can be linked to the tree records through local network drives. Each individual tree is also assigned a status drop down in order to track notifications, project progress, and tree work completion. Upon receipt of a signed and completed work requests, an individual tree records status is changed to a completed status.

Before the upcoming wildfire season: Liberty CalPeco vegetation management plans to continue discussing improvements in tracking overall circuit work. Liberty CalPeco plans to continue discussions to implement dashboard screen to better track overall circuit progress and status.

Liberty CalPeco will continue to make improvements to the vegetation inventory system as needed to improve process efficiencies and meet reporting requirements

5.3.5.20 Vegetation management to achieve clearances

Liberty CalPeco has adopted and incorporated General Order 95, Appendix E recommended clearances at time of trimming in its vegetation management plan. Minimum clearance, at time of trim, is 12 feet for distribution lines (up to 60kV) and is 30 feet for 120kV lines. Liberty CalPeco does not have power lines operating in the 72kV-110kV category. Liberty CalPeco considers more than just line operating voltage when determining appropriate clearance and will obtain greater clearances as needed to ensure compliance until the next scheduled maintenance. The consideration to obtain greater clearances will be based on multiple factors, including: length of span, line sag, planned maintenance cycles, location of vegetation within the span, species type, species characteristics, vegetation growth rate, arboricultural practices, local climate, and elevation. Costs associated with pruning to achieve appropriate clearance are combined in the table under section 5.3.5.16. Liberty CalPeco does not have a way of separating costs between these initiatives across multiple programs.

Before the upcoming wildfire season: Liberty CalPeco has adopted and incorporated General Order 95, Appendix E recommended clearances at time of trimming in its vegetation management plan. Liberty CalPeco plans to continue to develop a formalized Quality Control and Quality Assurance auditing system to ensure proper clearances are being achieved and compliance is met.

Before the next annual update: Implement a formalized Quality Control and Quality Assurance auditing system to ensure proper clearances are being achieved at time of trimming.

Within the next 3 years: Continue to monitor Quality Assurance and Quality Control results. Determine effectiveness of clearances achieved on successive cycle patrols. Establish more accurate circuit forecasting.

Within the next 10 years: Continue to monitor Quality Assurance and Quality Control results. Determine effectiveness of clearances achieved on successive cycle patrols. Establish more accurate circuit forecasting.

5.3.6 Grid operations and protocols

Liberty CalPeco's efforts toward Grid Operations and Protocols include various programs included in this section and focus on an effort for a flexible system in the event of an emergency. Improved and emerging technology (as discussed in the Situational Awareness and Collaborative Research sections) will greatly enhance the ability to detect, but especially to predictively anticipate ignition events before an event actually happens. Grid hardening efforts and automatic recloser installations and enhancements should minimize the impact of PSPS events and allow for more rapid restoration after these events. See below for a summary of the current inspection and maintenance and/or replacement programs initiated by G.O. 165 and G.O. 174 and the new WMP initiatives related to strengthening Liberty CalPeco's electric grid. Liberty CalPeco is also working toward better training for field personnel during elevated fire risk and evaluating the cost/benefit of added resources to accompany crews during high fire threat conditions as defined in our Fire Prevention Plan.

5.3.6.1 Automatic recloser operations

Liberty CalPeco plans to continue replacing older reclosers and line air switches with new recloser technology. The reclosers will be placed strategically to allow for better sectionalizing of overhead lines during switching and PSPS events, but also in an effort to bring Distribution Automation Control into play within the next 3 years. In addition, fire season settings are implemented on all line reclosers in the area. Priority work efforts are focused on the more populated areas in Liberty CalPeco's territory for the recloser planned installs and also to devices with notorious issues (e.g. Form 6 recloser controls). The benefit to customers comes with better reliability, smaller PSPS zones affecting less customers, and distribution automation control reducing outage times.

Liberty CalPeco is focused on replacing many older recloser types at existing locations for improved reliability and adding SCADA control. Also, many older air switches/motor operated switches are being targeted for replacement.

Program Timeline:

- **Before the upcoming wildfire season** – Continue with recloser installs already in progress.
- **Before the next annual update** – Continue with recloser installs already in progress
- **Within the next 3 years** – Install reclosers at a rate of 4 per year, implement Distribution Automation Control system.
- **Within the next 10 years** – Continue replacements/new installs as deemed necessary. Distribution Automation Control system in operation

5.3.6.2 Crew-accompanying ignition prevention and suppression resources and services

Liberty CalPeco does not have dedicated fire suppression personnel on staff. On elevated fire risk days, a member from each working crew is assigned as the Fire Safety Monitor to ensure fire prevention operational protocols are being followed. During extreme fire

risk days, work activities are extremely limited. If work must be performed, a dedicated Fire Safety Leader is assigned to the crew and assumes responsibility for Fire Prevention activities. See Fire Prevention Plan for more details.

Program Timeline:

- **Before the upcoming wildfire season**: Continue with resources in place.
- **Before the next annual update**: Perform cost/benefit analysis to determine the potential risk mitigated by using contracted fire prevention resources during fire season.
- **Within the next 3 years**: Evaluate effectiveness of resources/services and continue or discontinue as appropriate.
- **Within the next 10 years**: Evaluate effectiveness of resources/services and continue or discontinue as appropriate.

5.3.6.3 Personnel work procedures and training in conditions of elevated fire risk

See the attached Liberty CalPeco FPP.

5.3.6.4 Protocols for PSPS re-energization

Liberty CalPeco plans to re-energize customers as quickly and efficiently as possible once deemed safe to do so based on current and future predicted weather forecasts. In PSPS zones, crews will energize mainline first, with lateral fuses and devices open. All overhead line will be inspected prior to re-energization, be it by foot, vehicle, or air. Essentially whatever resources are available and deemed an efficient method to patrol and ensure public and worker safety.

Program Timeline:

- **Before the upcoming wildfire season**: PSPS re-energization plan in place as part of WMP.
- **Before the next annual update**: PSPS re-energization plan in place as part of WMP.
- **Within the next 3 years**: Evaluate effectiveness of re-energization plan and make continuous improvement.
- **Within the next 10 years**: Evaluate effectiveness of re-energization plan and make continuous improvement

5.3.6.5 PSPS events and mitigation of PSPS impacts

Efforts to mitigate impacts of PSPS events are underway and include covered conductor, resiliency corridors of covered conductor, undergrounding of overhead conductor, public outreach and education, coordination with emergency partners to limit impact to customers, and efforts to notify early and minimize outages to our medical baseline customers. These initiatives are all accounted for in various sections of the WMP.

5.3.6.6 Stationed and on-call ignition prevention and suppression resources and services

Liberty CalPeco is evaluating the cost/risk/benefit of stationing additional resources strategically during fire threat days. There is not any additional resources used for this

purpose beyond what crews have on the jobsite. No current program beyond what crews have with them on the jobsite ('Indian cans' and fire extinguishers).

Program Timeline:

- **Before the upcoming wildfire season**: Evaluate cost/risk/benefit of having additional resources on hand.
- **Before the next annual update**: Evaluate cost/risk/benefit of having additional resources on hand.
- **Within the next 3 years**: Continue evaluation and add necessary resources if deemed appropriate.
- **Within the next 10 years**: Continue evaluation and add necessary resources if deemed appropriate.

5.3.7. Data governance

5.3.7.1 Centralized repository for data

Liberty CalPeco will have a dedicated location to wildfire risk in its SharePoint platform which will allow storage, processing, and utilization of data. The wildfire risk SharePoint location is a large subset of the overall RBDM SharePoint dedicated location. The data repository initiative is already underway, and will be useful by this upcoming fire season. Going forward the data repository will be organized, managed, and maintained effectively.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Data Governance	2019 plan													
	2019 actual													
	2020	465,000	2,055	226.3	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	Data Requirements for WMP Delivery, Risk Analysis/Data Management, Operations Analyst
	2021	415,000	2,055	201.9	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	Data Requirements for WMP Delivery, Risk Analysis/Data Management, Operations Analyst
	2022	365,000	2,055	177.6	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	Data Requirements for WMP Delivery, Risk Analysis/Data Management, Operations Analyst
	2020-2022 plan total	1,245,000												

5.3.7.2 Collaborative research on utility ignition and/or wildfire

Liberty CalPeco collaborates or plans to collaborate with several academic and professional institutions on wildfire research. The collaborative programs are as follows:

ALERTWildfire: Liberty CalPeco is proposing to work with ALERTWildfire to support the local ALERTTahoe wildfire camera network. ALERTWildfire deploys pan-tilt-zoom (PTZ) cameras monitoring high fire risk areas to allow for discovery of ignition events and support fire resources throughout a wildfire event. ALERTWidlfire's first project, ALERTTahoe provided camera coverage for the majority of Liberty CalPeco's service territory. Liberty CalPeco plans to partner with ALERTWildfire to update the cameras in the Lake Tahoe area to provide camera control to Liberty CalPeco. See alertwildfire.org/about for more information. Projected costs for ALERTWildfire are represented in Section 5.3.2.2.

University of Nevada Reno (UNR), High Impedance Fault Detection: Liberty CalPeco is proposing to partner with the University of Nevada Reno to study high impedance faults in Liberty CalPeco's service territory. From UNR's proposal: "In order to reduce the risk of fire and public safety hazard resulting from protection system failure to accurately identify and clear

high impedance faults (HIF) in the Tahoe area, a modern HIF detection system must be designed and implemented in the Tahoe area. A sponsored collaborative study with the University of Nevada, Reno (UNR) will assess state-of-the-art relay technologies in a simulated environment and produce a suite of new protection system options for the Tahoe area."

Texas A&M Distribution Fault Anticipation: – Developed by Texas A&M and presented at the Wildfire Technology Innovation Summit, Distribution Fault Anticipation (DFA) is a technology that anticipates potential line failure events that have the potential to ignite wildfires. Liberty CalPeco plans to deploy DFA on 10 distribution feeders originating in HFTD Tier 2 and Tier 3 areas. Projected costs for DFA are represented in Section 5.3.2.2.

Program Timeline:

- **Before the upcoming wildfire season**, partner with ALERTWildfire and UNR.
- **Before the next annual update**, finalize studies / programs with ALERTWildfire and UNR.
- **Within the next 3 years**, Deploy Texas A&M DFA and continue to evaluate partnerships with academic and professional institutions.
- **Within the next 10 years**, continue to evaluate partnerships with academic and professional institutions.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Collaborative Research- HIFD	2019 plan													
	2019 actual													
	2020	200,000	157	1,274	All types of contact, all types of equipment failure	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	Exceeding	N/A	Relays capable of HIFD to be installed along Tahoe City 7300 circuit.
	2021													
	2022													
	2020-2022 plan total	200,000												

5.3.7.3 Documentation and disclosure of wildfire-related data and algorithms

Liberty CalPeco will document and disclose in entirety its process to evaluate wildfire risk in its service territory. Through a combination of its internal resources and external consultants, wildfire risk will be addressed comprehensively as a large subset of Liberty CalPeco's overall risk profile in its RBDM framework. An additional data expert position will be added to Liberty CalPeco's team to bolster its analytical capability before the next annual report. Forecasting and stress testing are features of the wildfire risk evaluation models. In the next three years, Liberty CalPeco expects to dedicate more resources towards its enterprise risk program as needed, and take advantage of new information and analytical technology as it becomes available

5.3.7.4 Tracking and analysis of near miss data

Near miss tracking data is being tracked in the company's outage management system, Responder. Additionally, Liberty CalPeco utilizes its Smart M.Apps tool which allows the company to track its reported incidents by location, date, time duration, equipment in question, and outage cause, overlaid on a variety of maps such as HFTD areas. Before the next annual filing, Liberty CalPeco expects its wildfire-related data and mapping overlays to increase in quality. Within the next three years, the company will take advantage of all available technologies and capabilities which would improve or build upon its current Smart M.Apps tool.

5.3.8 Resource allocation methodology

As defined in the Commission's Decision D.19-04-020 Voluntary Agreement, Liberty CalPeco is required to file its risk-based decision-making ("RBDM") framework in its upcoming General Rate Case ("GRC") filing. Liberty CalPeco expects its GRC to be filed in the early part of 2021. Additionally, the company continues to improve its data collection methods, analytical capability, and robustness of its enterprise risk management ("ERM") program to satisfy the requirements as stated in the Voluntary Agreement for Small and Multi-Jurisdictional Utilities ("SMJU's").

The threat of a wildfire in the Liberty CalPeco service territory is a risk the company and its parent companies take very seriously. Providing its customers safe and reliable service are paramount objectives of the company. The devastating consequences of wildfires include loss of service, property, and in some cases, life. The wildfire risk mitigation programs discussed within the Liberty CalPeco WMP are explicitly designed to keep its customers and surrounding populations safe.

In order to objectively compare and evaluate wildfire risk mitigation strategies, the company utilizes its current ERM methodology to identify inherent risk, residual risk, existing controls, and future mitigation efforts after determining the likelihood and impact of wildfire risk in the Liberty CalPeco service territory. The company is diligently working towards a RBDM framework which incorporates elements of the IOU S-MAP/RAMP proceedings, as well as adopting the Commission's recommendations towards a probabilistic modeling methodology with Multi-Attribute Risk Score ("MARS")/Multi-Attribute Value Function ("MAVF") scoring.

The company's ERM methodology at a high-level resembled many of its other peer utility ERM methodologies before their submittal of the enhanced RBDM frameworks contained in their GRC filings. As ordered by the Commission, Liberty CalPeco will have its enhanced RBDM framework completed and used to evaluate, compare, and make risk-informed investment decisions by its next GRC filing.

Current Method	Planned Method
Qualitative, detailed descriptions of risk analysis.	Introduction of bow-tie analysis of drivers-event-consequences.
Likelihood Score SME-reliant.	Introduction of data-driven probabilistic calculations from internal, peer utility, national, and academic data sources.
Utilization of Heat Map with Linear Scaling.	Introduction of MARS/MVAP quantitative scoring based on calculations introduced in IOU S-MAP/RAMP proceedings; Assumptions are rarely linear.
Linear Likelihood vs. Impact product calculations	Introduction of scenario-based modeling techniques for high & low-impact analysis.
Existing Controls and Planned Mitigations.	Include two alternative proposals for mitigations.

In order to best implement these enhancements into its planned RBDM framework, Liberty CalPeco will leverage its technical internal resources supplemented by outside consultants in order to achieve its goals of meeting and striving to exceed Commission requirements.

5.3.9 Emergency planning and preparedness

1. The emergency preparedness and response plans described in the WMP comply with Public Utilities Code Section 768.6 and 8386.[7,8] Specifically, the WMP complies with the following mandates:

    - Sharing elements of vested interest of the WMP and emergency response plan with relevant cities and counties to provide input and feedback.
    - Direction to routinely update and improve the WMP.
    - Accounting of responsibilities of persons responsible for executing the WMP.
    - Appropriate and feasible procedures for notifying customers that may be impacted.
    - Plans to prepare for and restore service, including workforce mobilization.
    - Plans for community outreach and public awareness before, during, and after a wildfire.

[7] FindLaw, California Code – PUC 768.6, https://codes.findlaw.com/ca/public-utilities-code/puc-sect-768-6.html.

[8] FindLaw, California Code – PUC 8386, https://codes.findlaw.com/ca/public-utilities-code/puc-sect-8386.html.

- Emergency communications that include plans to translate messages into the top three languages in California, based on census data.
- Protocols for compliance with Commission reporting guidelines.

5.3.9.a Plans to prepare for and restore service, including workforce mobilization (including mutual aid and contractors) and prepositioning equipment and employees

5.3.9.a Narrative:

Workforce Mobilization

Liberty CalPeco has addressed limitations in resource sufficiency through mutual aid agreements. Mutual assistance entities include NV Energy, Western Energy Institute Mutual Assistance Roster, and the California Utilities Emergency Association.

The Incident Commander has responsibility for mobilizing resources, contracting for additional assistance and supplies, and calling for assistance from neighboring utilities through Mutual Aid Agreements. The Incident Commander will also direct the requests for additional internal and external resources. The Incident Commander must approve the use of Mutual Aid.

Depending upon the timeline in preparing for, and responding to, a particular emergency event, Liberty CalPeco's EOC members will determine immediate needs if they require additional support outside of utility personnel. The type, size, and duration of an emergency event will determine, in varying degrees, the amount of resources required to respond to the event. Resource requests may include trade and non-trade personnel to assist in safety stand-by, damage assessment, planning or liaison activities, or materials and equipment necessary to facilitate restoration of utilities.

Activation levels for emergency/disaster response designated as such based on a five-level scale. For Level 1 events, considered to be catastrophic in impact, emergency support will be required from external resources and public safety partners.

Level		Description	Action
5	Small Impact Event (Localized Response Condition)	Minor disruption of operating systems, business systems, or electric service that can be managed with existing resources at the local or department level.	Normal activity, daily internal crew assignments
4	Moderate Impact Event (Heightened Alert)	An event that maximizes the resources and management capability of the local region and may require additional resources and support.	Possible crew transfer between areas; utility contractor crews (overhead line and tree) limited to normal daily complement.
3	Serious Impact Event (Enhanced Support)	A disaster or major emergency that may affect several areas of our electric system and may require the services of all operations personnel.	Regional or System ICS may be initiated and Regional EOC's may be opened. All available operations personnel are utilized. Utility contractor, mutual aid Assistance, tree crews, and support functions such as logistics will be used as needed.
2	Major Impact Event (Comprehensive Support)	A disaster or major emergency that affects several areas of our electric system and requires the services of all operations personnel.	Regional or System ICS will be initiated. All available operations personnel are utilized. Utility contractor, mutual aid assistance, tree crews, and support functions such as logistics will be used as needed.
1	Catastrophic Impact Event (Emergency Support)	A disaster or major emergency requiring a corporate response to minimize corporate risk. This level requires policy guidance, strategic planning, and coordination of internal and external resources, internal communication and coordination, dissemination of public information.	Regional and/or system ICS will be initiated. All available operations personnel are utilized. Utility contractor, mutual aid assistance, tree crews, and support functions such as logistics will be used as needed.

Response Coordination

Liberty CalPeco will respond to immediate life safety concerns as the top priority. Once a hazardous situation is reported, immediate response will be provided by line crews, trouble man, inspectors or other trained personnel to assess and mitigate risk.

i. All field response employees shall undergo safety training aligned with their respective roles.
ii. All electrical switching and reporting shall be managed by the appropriate controlling parties to enhance employee and public safety.
iii. Liberty CalPeco will provide regular public information, typically in the form of media messages or alerts, regarding unsafe or hazardous areas or conditions that the public should be informed about.
iv. In the event of an area emergency that is life or property threatening, the Emergency Alert System ("EAS") shall be enabled through the local or county Emergency Management or Public Safety office. Liberty CalPeco will advise the emergency management agencies when such alert is essential.
v. Public safety agencies will be utilized, as necessary, for traffic control and perimeter safety until qualified personnel arrive to clear the hazard situation. Agencies will be used, if necessary, to control public disturbances and establish safety controls for the public.
vi. Employees will be monitored for appropriate meal breaks, hours worked, and safety compliance; when emergencies are expected to last more than 24 hours. Shifts will be established to cover work, and employees will be given appropriate rest periods.
vii. Weather and road conditions will be are monitored for worsening conditions so that workers are not stranded at remote work locations.
viii. Work may be curtailed until safe work conditions prevail.

Damage Assessment

During an emergency, company crews, linemen, troublemen, electric inspectors, utility designers and/or engineers will be first called for damage assessment. All damage will be recorded by the teams on circuit maps using standardized symbols. To the extent practicable, downed or damaged facilities shall be isolated, secured, and warnings applied utilizing cones, warning tape, or other barriers or warnings. Restoration of service will occur upon addressing the results of any damage and remediation needs.

Restoration

Service restoration is unique to each emergency and restoration prioritization is influenced by a number of factors including safety, accessibility, availability of repair parts, availability of personnel, etc. This element of the plan identifies general restoration prioritization guidelines but allows for the Incident Commander, or designee, to alter priorities according to the circumstances of the emergency and in coordination with essential load customers and government agencies.

Restoration Guidelines include:

i. Restore radial transmission and substations;

ii. Restore distribution circuits with essential customers such as health care facilities, utilities, public safety, governmental facilities, and lifeline customers;
iii. Restore circuits with the greatest number of customers;
iv. Restore primary taps, followed by secondary lines;
v. Restore individual services which are accessible and serviceable;
vi. Restore essential customers.

Below is the priority list of essential customers. Priority assumes circuits, equipment, and services are accessible and repairable.

1. Health Care Facilities
    a. Primary Care Hospitals
2. Utility Services/Districts
    a. Public Utility Districts
    b. Telecommunications
    c. Water/Water Treatment
    d. Pipeline
3. Public safety agencies
    a. Public Safety Dispatch Centers
    b. Law enforcement facilities/holding facilities
    c. Fire operations facilities
    d. Transportation equipment and facilities
4. Government facilities
5. Green Cross/Life Line

5.3.9.b Emergency communications, including community outreach, public awareness, and communications efforts before, during, and after a wildfire in English, Spanish, and the top three primary languages used in California other than English or Spanish, as determined by United States Census data.

Liberty CalPeco provides available notification and communications material in English and will do so in Spanish in 2020. Liberty CalPeco does not translate to additional languages but welcomes community engagement to ensure a standard scheme of notifications are provided to Chinese, Tagalog, and Vietnamese speaking populations as necessary.

5.3.9.c Showing that the utility has an adequate and trained workforce to promptly restore service after a major event, taking into account mutual aid and contractors.

Liberty CalPeco employees participate in Emergency Management Plan training annually. They are trained and refreshed on the roles and responsibilities of each functional area in support of the ICS at the company level or the Incident Commander at the regional level. In addition, emergency response exercises are designed so employees can practice using the WMP as a test of its effectiveness. The utility participates in regional exercises to train employees and exercise the Emergency Management Plan. Liberty CalPeco plans to engage identified stakeholders in a coordinated effort to cohesively develop individual communication and emergency response plans between potentially affected jurisdictions and public safety partners in 2020. Part of this effort will include acquiring a list of available resources to participate in mutual aid agreements

for emergency response. As part of its resource adequacy plan, Liberty CalPeco expects to hire an Emergency Manager in 2020 to oversee all related emergency response activities and public safety partnership engagements.

2. Customer support in emergencies
   The protocols listed below reflect Liberty CalPeco's customer protection measures during and after a wildfire incident or PSPS event.[9]
   a. Outage Reporting: Administrative staff personnel will work to create an internal code within the Outage Management System to identify outages related to wildfires.
   b. Support for Low Income Customers: Low-income, or CARE, customers will be offered Special Payment Arrangements resulting from a fire-related outage, if necessary.
   c. Billing Adjustments: Billing will be suspended until power is restored to the customer.
   d. Deposit Waivers: Liberty CalPeco will waive deposits for customers who need to rebuild due to a wildfire.
   e. Extended Payment Plans: In the event the customer has suffered a tremendous loss (e.g., property or home) due to wildfires, special consideration would be granted for payment extension.
   f. Suspension of Disconnection and Nonpayment Fees: Collection activities due to nonpayment will be suspended for wildfire-impacted neighborhoods.
   g. Repair Processing and Timing: Timing for repair procedures will be determined based upon the severity of wildfire impact. During emergencies, Liberty CalPeco will expedite repair processing as incidents are recorded and resources are available. Mutual aid programs will be engaged, if necessary, in conjunction with the Corporate Emergency Response Plan. Liberty CalPeco will follow up with electrical contractors regarding execution of remediation efforts. Estimated restoration and repair times will be communicated to the affected customer group and when activities are completed.
   • h. Access to utility representatives: If Liberty CalPeco's offices are not impacted by fire, operations will resume, and customer service representatives and managers will be available to assist with customer concerns. However, if offices are affected by fire, nearby offices as well as corporate support will be available to customers. Liberty CalPeco also proposes to address concerns and common questions through an "open house" with the public.

3. Liberty CalPeco is in close coordination with Cal OES, county OES, and local public safety partners ("PSP"), including but not limited to: fire departments, Sheriff's offices, police, and highway patrol. All PSP are on our early notification list and will be communicated with as early as possible in the event of an impending PSPS or other power related emergency. However, due to the fact that we are a small utility with low

[9] Resolutions M-4833 and M-4835 guide utilities to implement procedures to protect customers in the event of pronounced states of emergency. Liberty CalPeco will adhere to decisions finalized in R.18-03-011. The Commission has established requirements that guide electric utilities to develop response efforts to wildfire-impacted communities.

staffing levels we would not likely be able to staff a utility employee in each county OES office during an event. As an alternative we would invite county OES participation in our EOC.

It is well known and understood that we have a significant population of Spanish speakers throughout our service territory. We follow the same best practices as our local school districts with regards to language accommodations and preferences. School districts routinely communicate in English and Spanish only in their public communications and outreach.

5.3.9.1 Adequate and trained workforce for service restoration

Liberty CalPeco has identified the need to hire additional in-house staff to better prepare the company and community in the event of an emergency.
Fire Prevention Coordinator – Oversees fire prevention initiatives and will serve as company liaison for first responders and public safety partners. Ensures training and preparedness is provided to employees and contractors. Oversees compliance of fire prevention policies and regulations. This position will be related to most initiatives but can be mentioned in under coordination with fire suppression agencies, emergency response, and stakeholder engagement/outreach.
Fire Operations Specialist – Will assist Fire Prevention Coordinator by providing training and implementation of fire prevention policies. Will conduct safety audits on field crews and ensure daily fire conditions are communicated within the organization. Will assist with community outreach related to wildfire mitigation initiatives and assist with emergency preparedness and PSPS training.

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Adequate Workforce	2019 plan													
	2019 actual													
	2020	240,000	2,055	117	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	Hire Fire Prevention Coordinator and Fire Operations Specialist
	2021	240,000	2,055	117	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	Hire Fire Prevention Coordinator and Fire Operations Specialist
	2022	240,000	2,055	117	Unknown	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	Hire Fire Prevention Coordinator and Fire Operations Specialist
	2020-2022 plan total	720,000												

5.3.9.2 Community outreach, public awareness, and communications efforts

Efforts include:

- Community workshops – Spring and early summer annually in the following communities: Coleville/Walker, Markleeville, South Lake Tahoe, North Lake Tahoe, Truckee/Glenshire, Loyalton, and Portola. Workshops would be annual events.
- Public Safety Partner workshops – Liberty CalPeco hosts and participates in public safety partner workshops, meetings and strategy sessions year round. Topics ranging from primary emergency contacts, protocols, and operations are discussed to promote seamless cooperation and communication.
- Website information – The Wildfire Mitigation section of the website provides information about the Liberty CalPeco's wildfire mitigation program, PSPS, etc. Information is available year round on the website
- Direct Customer Emails – Emails are sent to our customer data base in the spring through the end of fire season on various wildfire mitigation and PSPS topics. Email topics are designed to inform, educate, and engage customers around our mitigation efforts and PSPS program.

- Informational videos – Videos have been created on various wildfire mitigation and PSPS topics. Video topics are designed to inform, educate, and engage customers around our mitigation efforts and PSPS program. These videos are used on social media, websites, and customer emails in the spring and through fire season
- Social media posts - Social media posts are made in the spring and through the end of fire season on various wildfire mitigation and PSPS topics. Social media topics are designed to inform, educate, and engage customers around our mitigation efforts and PSPS program.
- Collateral distribution – Brochures on wildfire mitigation and PSPS have been created and are available year round in our customer lobbies, public events, and through public safety partners.
- Community service group presentations – primarily during the spring and through fire season staff provides presentations covering the wildfire mitigation and PSPS program
- Government and chamber of commerce presentations – primarily during the spring and through fire season staff provides presentations covering the wildfire mitigation and PSPS program
- Community guest speaking engagements – primarily during the spring and through fire season staff provides presentations covering the wildfire mitigation and PSPS program
- Trained frontline staff to engage and educate on customer calls – Front line staff is trained to respond to questions about the wildfire mitigation and PSPS program year round.

5.3.9.3 Customer support in emergencies

First Liberty CalPeco continues to improve its information distribution to keep public safety partners, customers, and visitors well informed during any emergency involving electric service. Information is the most important resource enabling quality decision making and situational understanding during an emergency.

Secondly, we continue to work with regional partners such as city governments, public utility districts, fire departments, and county emergency services to identify locations that are available for cooling/warming/charging services, central information locations and more.

Third, Liberty is prepared to staff its call center 24/7 during significant emergencies to provide information and help direct customers to services and facilities.

5.3.9.4 Disaster and emergency preparedness plan

In accordance with G.O. 166, Liberty CalPeco has a Company Emergency Management Plan (CEMP) that outlines the policies and procedures for disaster and emergency events. The CEMP is undergoing an internal review for improvement, and an Emergency Manager position is being created to oversee the plan going forward. In addition to

annual reviews, Liberty CalPeco will continuously look for opportunities to improve the plan, collaborate with local agencies, communities and other stakeholders to maintain protocols and satisfy requirements.

5.3.9.5 Preparedness and planning for service restoration

As outlined in the CEMP pursuant to G.O. 166, Liberty CalPeco is developing a PSPS plan that will supplement and enhance those protocols for preparedness and service restoration in the event of a disaster or emergency. Liberty CalPeco will review the plan annually to bolster its preparedness plan to meet compliance standards for service restoration.

5.3.9.6 Protocols in place to learn from wildfire events

Any major wildfire event caused by Liberty CalPeco would be considered an emergency situation, and activation of the CEMP would be in place. Post-incident lessons learned meetings and documentation would be generated and circulated, and any emergency preparedness improvements would be shared in training sessions with key personnel in the company.

5.3.10 Stakeholder cooperation and community engagement

5.3.10.1 Community engagement

Liberty CalPeco is plans to collaborate with community stakeholders such critical services providers, telecommunication companies, and government agencies, in a two-phase stakeholder engagement initiative focusing on its WMP. The outreach is proposed in two phases:

Phase 1 – Engage Expert Working Group During Plan Development. Phase 1 includes outreach to a portfolio of experts that participated a series of three Expert Working Group meetings to inform future actions related to the WMP to assure input and future coordination from those with insight related to critical and key services. The Expert Working Group can identify gaps in any key areas of the WMP, further develop key objectives of the plan, and advise on additional details of plan sections for inclusion in future WMP and suggest content for public outreach.

Phase 2 – Public Outreach for Plan Review. Phase 2 includes a series of public outreach sessions to be held at key locations based on population densities and areas identified with infrastructure that could potentially be impacted by wildfires. Experts may participate to orient and inform the public, gather and respond to specific questions, and generally opine on key areas of the WMP.

The outreach initiative will facilitate more informed implementation of WMP targets and will develop outward-facing partnerships for continued activities. Formalized outreach enhances expert and community collaboration in support of the WMP in an open discussion forum. Structured outreach reflects the community-based touchpoint based on

Liberty CalPeco's desire to formalize collaboration and coordination activities to enhance WMP effectiveness and promote public safety.

In 2020, Liberty CalPeco plans to host community workshops in the following locations:

- Portola
- Loyalton
- Truckee/Glenshire
- Kings Beach
- Tahoe City
- South Lake Tahoe
- Coleville/Walker
- Markleeville Community Speaking Engagements
- Tahoe City/North Tahoe Breakfast Club keynote speaker
- Others TBD

Initiative activity	Year	Total per-initiative spend	Line miles to be treated	Spend/ treated line mile	Ignition probability drivers targeted	Risk reduction	Risk-spend efficiency	Other risk drivers addressed	Existing/ new	Existing: What proceeding has reviewed program	If new: Memorandum account	In / exceeding compliance with regulations	Cite associated rule	Comments
Community Engagement	2019 plan													
	2019 actual													
	2020	75,000	2,055	36	N/A	Unknown	Unknown	Unknown	New	N/A	WMP memorandum account	N/A	N/A	
	2021													
	2022													
	2020-2022 plan total	75,000												

5.3.10.2 Cooperation and best practice sharing with agencies outside CA

Liberty CalPeco continues to cooperate and share best practices with agencies outside California. Because of Liberty CalPeco's proximity to Nevada, there are several collaborative efforts between NV Energy and Liberty CalPeco. For example, Liberty CalPeco and NV Energy share weather data and fuel sampling resources in order to reduce costs of these respective programs to customers. Further, NV Energy and Liberty CalPeco hold recurring meetings to share updates to system hardening programs and to discuss local staffing and resources and other wildfire mitigation-related activities.

Additionally, Liberty CalPeco is a member of the Western Energy Institute's (WEI) Western Region Mutual Assistance Group (WRMAG), which is a collaboration of western utilities that provide mutual assistance for emergency relief.

5.3.10.3 Cooperation with suppression agencies

Cooperation with suppression agencies in the Liberty CalPeco territory is covered in the CEMP. Annual tabletop exercises are held to discuss coordination with these agencies, and lessons learned are documented and dispersed.

5.3.10.4 Forest service and fuel reduction cooperation and joint roadmap

See Vegetation Management discussion in Section 5.3.5.

5.4 Methodology for enterprise-wide safety risk and wildfire-related risk assessment

Starting with its next GRC application,[10] Liberty CalPeco will begin using the risk-based decision-making ("RBDM") framework authorized by the Commission in D.19-04-020. Additionally, the company continues to improve its data collection methods, analytical capability, and robustness of its enterprise risk management ("ERM") program to satisfy the requirements included in D.19-04-020.

In order to objectively compare and evaluate wildfire risk mitigation strategies, Liberty CalPeco utilizes its current ERM methodology to identify inherent risk, residual risk, existing controls, and future mitigation efforts after determining the likelihood and impact of wildfire risk in the Liberty CalPeco service territory. Liberty CalPeco is diligently working towards a RBDM framework that incorporates elements of the IOU S-MAP/RAMP proceedings, as well as adopting the Commission's recommendations towards a probabilistic modeling methodology with MARS/MAVF scoring.

Liberty CalPeco's current ERM methodology resembles many of the ERM methodologies utilized by peer utilities prior to their submittal of enhanced RBDM frameworks in recent GRC filings. As ordered by the Commission, Liberty CalPeco's RBDM framework will be completed and used to evaluate, compare, and make risk-informed investment decisions going forward.

Current Method	Planned Method
Qualitative, detailed descriptions of risk analysis.	Introduction of bow-tie analysis of drivers-event-consequences.
Likelihood Score SME-reliant.	Introduction of data-driven probabilistic calculations from internal, peer utility, national, and academic data sources.
Utilization of Heat Map with Linear Scaling.	Introduction of MARS/MVAP quantitative scoring based on calculations introduced in IOU S-MAP/RAMP proceedings; Assumptions are rarely linear.
Linear Likelihood vs. Impact product calculations	Introduction of scenario-based modeling techniques for high & low-impact analysis.
Existing Controls and Planned Mitigations.	Include two alternative proposals for mitigations.

The table above compares Liberty CalPeco's current and future methodologies for identifying and mitigating risk. Liberty CalPeco will leverage its technical internal resources, supplemented by outside consultants, to meet Commission requirements for RBDM.

5.5 Planning for workforce and other limited resources

Liberty CalPeco requires adequate staffing in order to fully implement its WMP. As stated previously in Section 5.1, retaining and attracting new employees has been a challenge because of the high cost of living in Lake Tahoe. Nevertheless, Liberty CalPeco plans to hire ten additional employees this year to create a wildfire mitigation team. This new team includes three inspectors, two fire operations personnel, one project manager, an

[10] Scheduled to be submitted in the first quarter of 2021.

environmental specialist, and three support staff. Below is a brief description of Liberty CalPeco's staffing needs:

- Inspectors – Inspects overhead lines and equipment to comply with G.O. 165 requirements.
- Fire Prevention Coordinator – Oversees fire prevention initiatives and will serve as company liaison for first responders and public safety partners. Ensures training and preparedness is provided to employees and contractors. Oversees compliance of fire prevention policies and regulations. This position will be related to most initiatives but can be mentioned in under coordination with fire suppression agencies, emergency response, stakeholder engagement/outreach.
- Fire Operations Specialist – Assists Fire Prevention Coordinator by providing training and implementation of fire prevention policies. Will conduct safety audits on field crews and ensure daily fire conditions are communicated within the organization. Will assist with community outreach related to wildfire mitigation initiatives and assist with emergency preparedness and PSPS training.
- Project Manager – Manages schedule and progress of WMP project implementation.
- Sr. Accountant – Tracks costs and sets up jobs to account for WMP initiatives.
- Capital Administrator – Takes the lead on tracking WMP capital job progress. Helps schedule jobs, ensure appropriate inventory, and closes jobs when complete.

5.6 Expected outcomes of 3-year plan

5.6.1 Planned utility infrastructure construction and upgrades

Liberty CalPeco is in the process of fully assessing the potential outcomes of current risk drivers on its system. Once an RBDM framework has been implemented, Liberty CalPeco will also be able to forecast the impact of planned capital replacements and upgrades.

5.6.2 Protocols on public safety power shut-off

5.6.2.1 Strategy to minimize public safety risk during high wildfire risk conditions

Liberty CalPeco is developing best practices to establish safeguards for customers, and the public, during PSPS events. In addition, Liberty CalPeco is investigating potential opportunities to provide mobile generation, enhanced communication devices, charging stations, battery storage for medical baseline customers, and other necessary customer facilities for PSPS events.

Liberty CalPeco's strategies to improve public safety during high wildfire risk conditions include:

ix. Providing all field response employees with safety training aligned with their respective roles.
x. Managing all electrical switching and reporting with appropriate controlling parties to enhance employee and public safety.
xi. Providing regular public information, typically in the form of media messages or alerts, regarding unsafe or hazardous areas or conditions.
xii. Utilizing the Emergency Alert System ("EAS") through the local or county Emergency Management or Public Safety office in the event of an area

emergency that is life or property threatening. Liberty CalPeco will advise the emergency management agencies when such alert is necessary.

xiii. Partnering with public safety agencies, as necessary, for traffic control and perimeter safety until qualified personnel arrive to clear the hazard situation.

5.6.2.2 Outline of tactical and strategic decision-making protocol for initiating a PSPS

Liberty CalPeco utilizes weather stations throughout its service territory and collaborates with a fire and weather scientific consultant, the National Weather Service ("NWS") in Reno, Nevada, and local fire officials, to monitor local weather conditions and evaluate when a PSPS should be initiated. The initiation of PSPS events are influenced by the following factors:

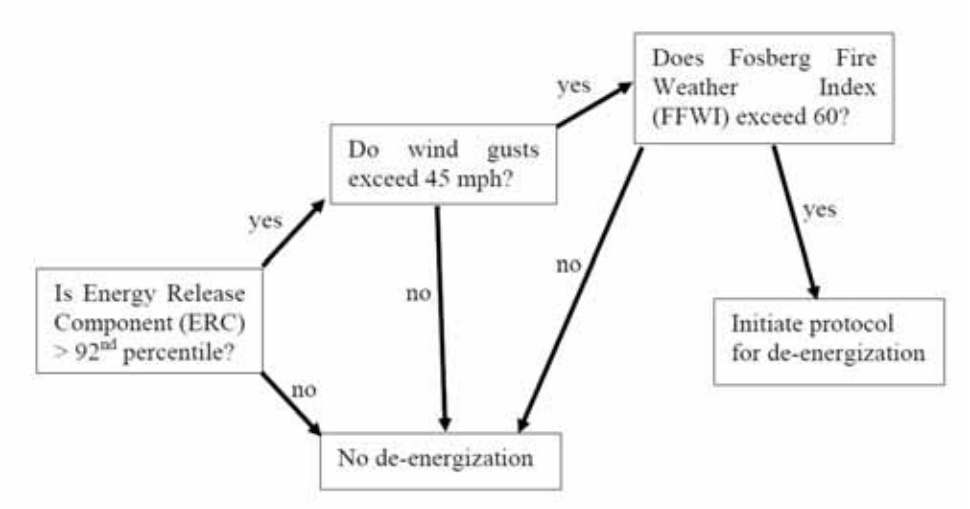
- Red Flag Warnings – Issued by the NWS to alert of the onset, or possible onset, of critical weather or dry conditions that would lead to swift increases in wildfire activity.
- Low Humidity Levels – Potential fuels are more likely to ignite when water vapor levels are low.
- Forecast Sustained Winds & Gusts – High winds can strengthen fuel embers causing fires to ignite. Winds also can blow embers from lower fire risk areas into high risk areas, increasing the potential of wildfires.
- Dry Fuel Conditions – Trees and other vegetation act as fuel for wildfires. Fuels with low moisture levels easily ignite and can spread rapidly.

In a case where the NWS reports three-second gusts greater than 50 mph, Liberty CalPeco will check the location of those speeds, and areas where those speeds would peak, for the proximity of service equipment. If the gusts are near service equipment, the equipment is assessed to see if it is scheduled for repair. Liberty CalPeco then monitors humidity and temperature levels to evaluate fuel conditions and forest susceptibility to fire for those areas. If an area is identified to be at risk of causing a wildfire, Liberty CalPeco will first attempt to de-energize that line so that load at the end of the line can continue to be served. In the event that load has to be dropped, Liberty CalPeco will attempt to minimize the lost load and customer disruption.

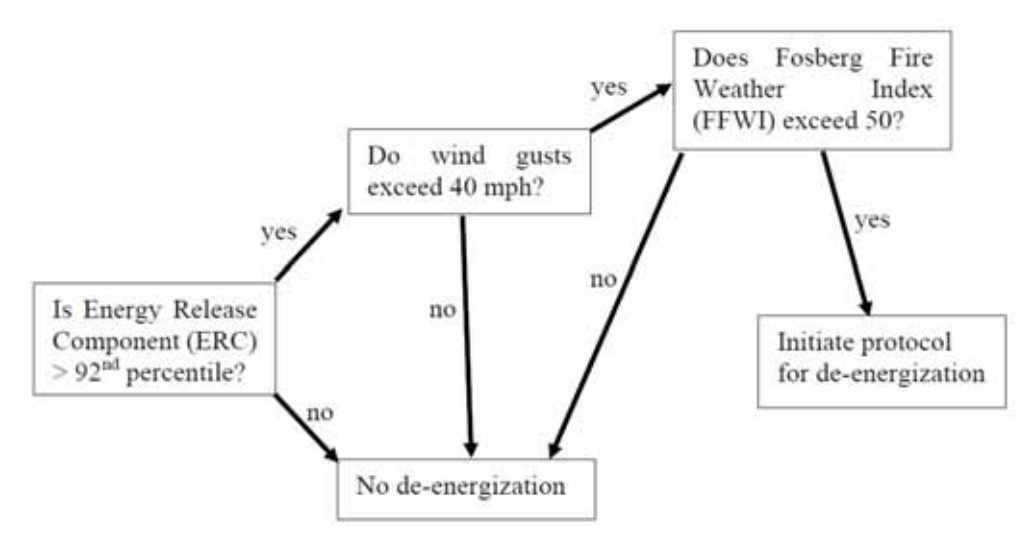
Liberty CalPeco employs two de-energization decision trees, one for the Topaz and Muller 1296 r3 PSPS zones, and another for all other zones. In each case, the following three criteria are evaluated simultaneously to test whether any exceed the defined threshold. The three criteria include:

- Observed Energy Release Component ("ERC")
- Observed wind gust
- Observed Fosberg Fire Weather Index ("FFWI")

The figure below represents the de-energization decision tree for Topaz and Muller 1296 r3 PSPS zones.



The figure below represents the de-energization decision tree for all other zones.



5.6.2.3 Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol.

Once Liberty CalPeco has confirmed that conditions have subsided to the point that an energized grid does not pose a wildfire threat, the utility will begin the process of re-energizing power lines.

Once a decision to re-energize has been made, Liberty CalPeco will:

- Patrol affected circuits prior to re-energization.
- Inform all media and partners of the successful conclusion of the de-energization event and provide an update when power has been restored.
- Inform all customers impacted by the de-energization event that power has been restored via Everbridge (email, voice, and/or text).
- Post the time of power restoration(s) on the Liberty CalPeco website and social media at the conclusion of the de-energization event.

- Follow up with media and partners to facilitate effective communication and to determine if additional steps or efforts would be beneficial in the future.
- Provide a report to the Director of the Safety and Enforcement Division no later than 10 business days after the conclusion of the PSPS event that includes (i) an explanation of the decision to shut off power; (ii) all factors considered in the decision to shut off power, including wind speed, temperature, humidity, and moisture in the vicinity of the de-energized circuits; (iii) the time, place, and duration of the shut-off event; (iv) the number of affected customers, broken down by residential, medical baseline, commercial/industrial, and other; (v) any wind-related damage to overhead power-line facilities in the areas where power is shut off; (vi) a description of the notice to customers and any other mitigation provided; and (vii) any other matters the utility believes are relevant to the Commission's assessment of the reasonableness of Liberty CalPeco's decision to shut off power.

Prior to re-energization, Liberty CalPeco will inspect all de-energized circuits to facilitate safe operation when energized and that identified corrective actions are addressed and hazards are cleared. Once the de-energized circuits have been patrolled, immediate corrections implemented, and the fire threat has subsided, Liberty CalPeco will re-energize the line.

The process used to re-energize lines will be updated to conform to changes mandated in Commission proceeding R.18-12-005.

5.6.2.4 Company standards relative to customer communications

Advanced Notice

Liberty CalPeco will work to provide as much advanced notification as prudent to customers that may be affected by a PSPS event, and Liberty CalPeco plans to provide even more advanced warning of a PSPS event to public safety partners, local utilities, and critical infrastructure, before a PSPS event is imminent. In order to avoid desensitization of the public, advanced notice to customers will be provided in a shorter timeframe and only when a PSPS event is likely. Under these considerations, Liberty CalPeco has developed the following notification guidelines:

- Up to eight days in advance – cities, counties, emergency services (public safety partners), regional utilities, cell tower operators, and critical facilities.
- Up to 72 hours in advance – medical baseline or medically sensitive patients, and cities, counties, emergency services (public safety partners), regional utilities, cell tower operators, and critical facilities.
- Up to 48 hours in advance – all affected or potentially affected customers, public safety partners, CPUC, and the media.
- Up to 24 hours in advance – all affected or potentially affected customers, public safety partners, CPUC and the media.
- Immediately before de-energization – all affected or potentially affected customers, public safety partners, CPUC and the media.
- During the PSPS Event – all affected or potentially affected customers, public safety partners, CPUC, and the media.
- At the conclusion of the PSPS Event – all affected or potentially affected customers, public safety partners, CPUC, and the media.

List of Priority Entities / Critical Facilities

1. Health Care Facilities
    a) Primary Care Hospitals
2. Utility Services/Districts
    a) Public Utility Districts
    b) Telecommunications
    c) Water/Water Treatment
    d) Pipeline
3. Public safety agencies
    a) Public Safety Dispatch Centers
    b) Law enforcement facilities/holding facilities
    c) Fire operations facilities
    d) Transportation equipment and facilities
4. Government facilities
5. Green Cross/Life Line

Notification Responsibility

Liberty CalPeco will lead the communication effort and outreach of PSPS events. Liberty CalPeco will be clear with its public safety partners when the information is intended to be public. When notifications are intended to be public, Liberty CalPeco will provide clear messaging and request that each partner and media outlet assist in the distribution of the same information and messaging. To this point, Liberty CalPeco has embarked on a system-wide outreach and awareness campaign to help customers and partners understand and prepare for a PSPS event.

Stakeholder Group	Description
Customers	· Any person, organization, or critical facility receiving electricity from Liberty CalPeco
Local Government / Critical Agencies	· Primary Care Hospitals · Public Utility Districts (Truckee Donner, South Tahoe) · Counties (Alpine, El Dorado, Mono, Nevada, Placer, Plumas, Sierra) · Cities/Towns (Portola, South Lake Tahoe, Truckee) · Telecommunications Water/Water Treatment Public Safety Dispatch Centers · Law enforcement/holding facilities · Local tribal governmental agencies · Fire operations facilities · Transportation equipment and facilities · Local Emergency Planning Committees · CAL FIRE · California Department of Transportation · USFS · Sierra Front Wildfire Cooperators · CPUC SED
Mutual Assistance Agreements	· NV Energy · Western Energy Institute Mutual Assistance Roster · California Utilities Emergency Association
Commission	· Utility Safety Branch · Energy Branch · Energy Division · Office of Emergency Services Warning Center · Others, as requested

5.6.2.5 Protocols for mitigating the public safety impacts of these protocols

Liberty CalPeco provides ongoing public electric safety courses and information so that the public will be prepared when an emergency event occurs. These programs are provided year-round to all levels of schools, business, service clubs and also trade shows and expositions. Additionally, Liberty CalPeco routinely provides electric safety training to local and regional law enforcement, fire, county and state transportation, and other emergency response agencies. Public Safety Training is the responsibility of all.

During an emergency event, Liberty CalPeco may utilize stand-by personnel, trained in general electrical safety, to observe and report hazardous conditions and assist in perimeter safety around identified hazards due to unsafe conditions until qualified electric personnel arrive.

Personnel safety is identified as a key element within Liberty CalPeco's Emergency Response Plan. Electric trade personnel, including ground person, helpers, apprentices, journeyman lineman, trouble men, and inspectors are provided the highest level of safety and skills training to perform in both daily and emergency situations. Only trained personnel may perform safety sensitive functions including switching, de-energizing, overhead and underground operations, repairing and assessing damage.

To improve employee and public safety, the design, installation and operation of equipment and automatic protection schemes for transmission and substation equipment must remain in place. Employees follow procedures in accordance with OSHA 1910.269 regulations. Non-trade personnel that are mobilized to assist with emergency repair (metering, meter reading, construction, etc.) are trained in general electric safety before assisting in emergency field response.

Liberty CalPeco will respond to immediate life safety concerns as its top priority. Once a hazardous situation is reported, immediate response will be provided by line crews, trouble men, inspectors or other trained personnel to assess and mitigate risk.

i. All field response employees shall undergo safety training aligned with their respective roles.
ii. All electrical switching and reporting shall be managed by the appropriate controlling parties to enhance employee and public safety.
iii. Liberty CalPeco will provide regular public information, typically in the form of media messages or alerts, regarding unsafe or hazardous areas or conditions that the public should be informed about.
iv. In the event of an area emergency that is life or property threatening, the EAS shall be enabled through the local or county Emergency Management or Public Safety office. Liberty CalPeco will advise the emergency management agencies when such alert is essential.
v. Public safety agencies will be utilized, as necessary, for traffic control and perimeter safety until qualified personnel arrive to clear the hazard situation. Agencies will be used, if necessary, to control public disturbances and establish safety controls for the public.
vi. Employees will be monitored for appropriate meal breaks, hours worked, and safety compliance; when emergencies are expected to last more than 24 hours. Shifts will be established to cover work, and employees will be given appropriate rest periods.
vii. Weather and road conditions will be are monitored for worsening conditions so that workers are not stranded at remote work locations.
viii. Work may be curtailed until safe work conditions prevail.

Ongoing Emergency Response Planning

Leaning on the experienced of other utilities and PSPS reports, Liberty CalPeco is working to align its emergency response and operational protocols to those of first responders and public safety partners in its service territory. As part of its ongoing emergency response planning activities, Liberty CalPeco will conduct stakeholder outreach sessions to gain feedback on the WMP and related activities. The outreach is proposed in two phases:

- Phase 1 – Engage Expert Working Group During Plan Development. Phase 1 includes outreach to a group of experts to participate in a series of three Expert Working Group meetings to inform future actions related to the WMP to assure input and future coordination from those with insight related to critical and key services. The Expert Working Group can identify gaps in any key areas of the plan, further develop key objectives of the plan, and suggest additional content for inclusion in future WMPs and suggest content for public outreach.
- Phase 2 – Public Outreach for Plan Review. Phase 2 includes a series of Public Outreach sessions held at key locations, based on population densities and areas identified with infrastructure, which could potentially be impacted by wildfires. Experts may participate to orient and inform the public, gather and respond to specific questions, and generally opine on key areas of the plan.

This outreach activity will aid in the implementation of plan targets and development of outward-facing partnerships for continued activities. The formalized outreach will enhance expert and community collaboration in support of the WMP in an open discussion forum. A structured outreach reflects the community-based touchpoint based on Liberty CalPeco's desire to formalize collaboration and coordination activities to enhance WMP effectiveness and promote public safety.

Attachment

Liberty CalPeco's Fire Prevention Plan for Overhead Electric Facilities

Fire Prevention Plan for Overhead Electric Facilities

REVISION HISTORY

The Liberty Utilities (CalPeco Electric), LLC (U 933-E) (Liberty CalPeco) Wildfire Prevention Department (Department) updated the Fire Prevention Plan (FPP or Plan) October 2019.[1] The Department will oversee the execution of required training for Liberty CalPeco personnel and contractors prior to the 2020 fire season.

PURPOSE

In 2017 and 2018, California experienced some of the most destructive wildfires in its history. The combination of drought, extreme winds and build-up of dry vegetation contributed to increased wildland fires. The wildfire season and associated forest fire risk factors have increased due to warmer spring and summer temperatures, reduced snowpack, and earlier spring snowmelt, leading to higher levels of dry fuels. Liberty CalPeco recognizes that the operations, maintenance and construction on the electric grid, and characteristics of associated equipment may present an ignition risk. Our goal is to develop reasonable and actionable plans to mitigate ignition risks, be prepared to suppress small fires, keep our employees safe while working in wildland areas and provide general fire safety precautions for field operations.

Liberty CalPeco developed this Plan in compliance with Ordering Paragraph 3 of California Public Utilities Commission (CPUC) Decision (D.) 12-01-032 and the revisions of D.17-12-024 pursuant to General Order (GO) 166 Standard 11 and information specified in GO 166 Standard 1, Part E as applicable to Liberty CalPeco's service territory (See Attachment 1). The FPP identifies operational protocols for Liberty CalPeco overhead facilities that lie within Tiers 2 and 3 of the High Fire-Threat District (HFTD) Map adopted by the CPUC on January 19, 2018. The Plan delineates operational pathways in working with electrical assets and overhead facilities that may pose a fire ignition threat under notification of rated fire watch conditions.

The FPP establishes procedures to be followed by the utility for facilities in Tier 2 or 3 of the HFTD or during the Fire Precautionary Period, which is considered to be sustained by the Department of Forestry and Fire Protection (CAL FIRE). Due to the high alpine climate of Liberty CalPeco's electric service territory, late fall and winter months present a seasonal swing of reduced risk due to snow conditions as compared to spring and summer months. Liberty CalPeco personnel operate with consideration of stringent fire safety requirements for high risk areas and conditions. Currently, a combination of Red Flag Warning (RFW) notifications, interpretations from the Reax predictive tool, and information gathered from Liberty CalPeco weather stations will help determine avenues and countermeasures to mitigate the threat of utility-caused fire ignitions during

[1] Navigant Consulting, Inc., a Guidehouse company (Navigant) assisted Liberty CalPeco in preparing this report for filing, based on the information the utility provided. The information presented in this report represents Navigant's professional judgment based on the information available at the time this report was prepared with Liberty CalPeco's overall decision-making. Navigant is not responsible for the reader's use of, or reliance upon, the Plan, or any decisions based on the Plan. NAVIGANT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED. Readers of this Plan are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the Plan, or the data, information, recommendations, and opinions contained in the report.

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periods of "Normal," "Elevated," and "Extreme" fire ratings. (*See* Fire Potential Index.) These procedures include practices for field operations and maintenance (O&M) activities in applicable areas and conditions.

The FPP establishes procedures and routine operational practices that:

1) Provide employees and contractors an understanding of the enacted processes and procedures that will improve reliable and safe operation of overhead electric facilities in high-risk areas or under fire weather conditions;
2) Establish Liberty CalPeco standards of equipment and vehicle use and operations during fire risk seasons and work near potential ignition sources;
3) Determine work restrictions during cautionary periods issued by internal meteorological and predictive tools and RFWs, as designated by the National Weather Service (NWS);
4) Outline the operational and communication procedures when working adjacent to or immediately after a fire ignition within the service territory;
5) Present the future use of the Fire Potential Index (FPI) as it relates to additional risk measurements that may be warranted and discerning the appropriate operational procedures for field activities; and
6) Introduce general fire safety considerations and precautions for performing work in high risk areas and/or during high risk weather periods.

DEFINITIONS

Activity: Specific operation of a piece of equipment, such as a chainsaw or tractor.

Baseline Fire Tools: Items available to field personnel to prevent and quickly suppress small ignitions for a designated worksite. These tools include but are not limited to:

Fire Box: Container available at the worksite containing fire suppression equipment and additional as deemed appropriate for the performed activity.
Indian Can: Canister containing fire suppressant material.
Shovel: Rounded tip with a length of approximately 48 inches.
Wildland McLeod tool: Fire hand tool used for raking and scraping.

Fire Potential Index: Ranking system that aligns predetermined operational practices with elevated risks restrictions due to the threat of potential ignition. Liberty CalPeco has identified three tiers of risk: normal fire risk, elevated fire risk, and extreme fire risk. The Fire Potential Index tool is currently being developed and will be updated in the next revision cycle of the FPP.

Fire Safety Leader: Designated field supervisor or crew member who has a dedicated role for fire safety requirement oversight during extreme fire risk working conditions.

Fire Safety Monitor: Designated field supervisor or crew member responsible for fire safety requirement oversight during Elevated Fire Risk working conditions.

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Manager in Charge: Non-represented employee designated by Liberty CalPeco to implement this policy during normal hours of operation.

Mechanical Operations: Any activity that requires the use of motorized power equipment.

On-call Supervisor: Employee designated by Liberty CalPeco to implement this policy in the absence of the Manager in Charge.

Operating Area: Property on which active operations, including transportation, are to be conducted. The area within 100 feet of the traveled surface of roads is generally considered part of the Operating Area, whether or not it is included in the rights-of-way or easements.

Red Flag Warning (RFW): The National Weather Service will typically declare a RFW within a zone when wind gusts exceed 30 miles per hour (mph), and the relative humidity is less than 20 percent for more than three hours. Other factors considered include timber conditions and forecasts for weather elements, such as dry lightning. Typically, the RFW is issued for a specified period.

ASSESSMENT METHODOLOGY

Liberty CalPeco pursued a structured approach to determining whether an FPP was required for Liberty CalPeco facilities under the Rulemaking (R.) 08-11-005, as described in the final decision. The approach utilized the information collected to identify specific facilities that meet the Plan criteria for inclusion in the FPP. This Plan is sufficient for most routine work activities. In the event a project-specific fire plan is deemed necessary, the Project Manager, or Project Manager's designee, will coordinate with field crew to frame additional criteria. The assessment methodology for the FPP is described below.

1) Liberty/Reax Fire Forecast: Reax is a predictive tool that captures three main methods of fire weather condition measurement: Energy Release Component (ERC), wind gusts, and the Fosberg Fire Weather Index (FFWI). Liberty CalPeco will issue proactive patrols and inspection procedures during applicable work if a triggered scenario is revealed through the predictive software tool. When the Reax tool predicts potential fire weather conditions, the Manager in Charge or designee will refer to the tiered risk categories in this Plan and initiate operational protocols based on the determined rating.

2) Red Flag Warnings: Fire Weather Zone Boundaries were compared to Liberty CalPeco's service territory, and it was identified that the territory spans portions of three different zones. Liberty CalPeco will monitor the applicable zones 271, Zone 272, and Zone 273. Historical data for the past 10 years' RFWs within each of these zones was collected for each occurrence, so that wind data could be collected and evaluated for each identified RFW.[2]

[2] Alerts may be monitored using the links below and Liberty CalPeco will make best efforts to subscribe to automatic alert notifications: http://inws.wrh.noaa.gov/page/faq and https://inws.wrh.noaa.gov/alerts.

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During Red Flag Events, Liberty CalPeco will monitor wind gusts at the peak elevation located at Bliss State Park using the link below or other available data.[3]

Liberty CalPeco has identified 46 Public Safety Power Shut-off (PSPS) zones that are based on isolation points within certain circuits or areas. If Reax forecasts for these zones that the ERC, wind, and FFWI will come within 80%, 90%, or 100% of the thresholds for de-energization, Liberty CalPeco will enact a PSPS upon or just before reaching 100%. During a PSPS event, Liberty CalPeco will suspend noncritical operational work to focus efforts on current conditions and proactive patrols after de-energizing and when restoring power. Liberty CalPeco adheres to the guidelines provided in R. 18-12-005, an open proceeding that prescribes utilities' PSPS processes, among other issues. Liberty CalPeco will provide updated protocols for internal PSPS practices in the 2020 version of its Wildfire Mitigation Plan.

3) Liberty CalPeco Design Standards: An engineer examined the Liberty CalPeco facilities design standards to evaluate the minimum standard for wind loading design. The design standard utilizes the criteria specified in GO 95 Section IV. However, this is a minimum design standard, and facilities are often oversized for a variety of reasons. Liberty CalPeco will review applicable wind loading design standards, monitor regulatory changes to standard design requirements, and update standards for minimum wind loading design criteria as deemed prudent.

4) Wind Data: NWS Remote Automatic Weather Stations were mapped for the area within 25 miles of the Liberty CalPeco service territory. Wind gust data from the NWS site is monitored for each RFQ. The station automatically records the maximum instantaneous gust over the past hour, while wind speed averages are recorded by the stations over 10-minute periods. Because it is not possible to discern if gusts lasted three seconds or more, it is assumed that all maximum gusts meet the three-second criteria to guard against underestimating a fire threat.

   In addition to fire weather and fuels data from the NWS and United States Department of Agriculture National Fire Danger Rating System, Liberty CalPeco tracks instantaneous meteorological conditions received from the 10 weather stations in the service territory. Liberty CalPeco also proposes to install 20 additional weather stations during 2020. The server data capturing meteorological conditions will serve as a principle variable underlying the development of the FPI. Until the FPI is developed and adopted by Liberty CalPeco, operational designations for fire ratings will be derived from the meteorological data expressed above.

5) Mapping: Tiers 2 and 3 of the HFTD are overlaid on the Liberty CalPeco service territory map. All Liberty CalPeco facilities are mapped without underground facilities, which are not subject to the Plan requirements. Operational work within Tier 2 and 3 of the HFTD or in response to issued RFWs are subject to more stringent fire safety requirements, as described in this Plan. The

[3] Bliss State Park: https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCDLB

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attached map complies with GO 95 Rule 21.2-D.

6) Fire Potential Index (FPI): The FPI is used as means to develop guidelines for utility and contractor operations and maintenance crews to follow under Liberty CalPeco's defined categories of wildfire risk. The Wildfire Prevention Department is responsible for determining and communicating the FPI on a daily basis. The current status of the FPI will be posted on the Liberty CalPeco intranet and will communicate the status to the Manager in Charge. The FPI rating framework is currently in development.

FIRE POTENTIAL INDEX

Liberty CalPeco is currently developing a FPI methodology that comprehensively assesses the fire risk utilizing several data points to influence operation and maintenance decisions related field work. The FPI forecasting application is anticipated to capture data from situational awareness tools and seven-day projections and will then present a fire ranking that aligns with a "Normal," "Elevated," and "Extreme" fire potential. The FPI is scheduled for completion in 2020 and will be included in the FPP for the next filing cycle.

The three FPI Risk conditions are defined as follows:

Extreme Fire Risk: As determined by the Wildfire Prevention Department, Extreme Fire Risk is defined as periods of significant risk of wildfires and the associated ignition risks within Tier 2 or 3 of the HFTD. All O&M activities have stipulations, and significant fire mitigation activities are required. The Extreme Fire Risk status is indicated as "red."

Elevated Fire Risk: As determined by the Wildfire Prevention Department, High Fire Risk is defined as periods of increasing risk of wildfires and associated ignition risks within Tier 2 or 3 of the HFTD. Many O&M activities have stipulations and additional fire mitigation activities are required. The Elevated Fire Risk status is indicated as "yellow."

Normal Fire Risk: As determined by the Wildfire Prevention Department, Normal Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are not elevated but still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The Normal Fire Risk status is the default operational state and the FPI is indicated as "green."

PROCEDURE

General Safety Instructions for Utility and Contractor Crews

- **General Fire Awareness:** During the execution of work activities and use of company equipment and

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vehicles, all operating personnel must be actively aware and consider actions that may reduce fire risks and personal exposure.

  - Activities such as idling a vehicle near brush, grassland, or at-risk vegetation is prohibited, and drivers should always perform a perimeter check after exiting the vehicle and inspect underneath for potential fuel risk.
  - The Fire Safety Monitor/Leader should remain alert of crew vehicles traveling over low vegetation or brush.
  - Smoking is only permitted in site-specific designated areas or within a 10' clearance of any vegetation or grass.
  - When possible during days with high temperatures and low humidity, wet down adjacent vegetation when performing work with equipment that may spark or has an exposed exhaust system.
  - Consider the need to disable reclosers on potentially impacted equipment or de-energize circuits within the operating area to prevent potential sparks.

- **Safety Briefings:** When assigned to work within wildland areas, the tailboard safety briefing shall include review of the following:
  - 1. The current daily FPI Rating;
  - 2. Job site-specific fire risks;
  - 3. Elimination of tasks that pose an elevated fire risk;
  - 4. Actions to reduce personal exposure; and
  - 5. Any other possible fire risk mitigation actions.
- **Fire Safety Tools Responsibility:** The crew leader must check the availability and condition of the baseline fire tools during the daily truck safety inspection and make fire suppression equipment readily accessible near operating areas.
- **Tailboard Fire Briefings**: If, during the execution of work, the job site-specific fire risks are elevated, the crew leader shall stop work and hold a tailboard meeting to discuss revised actions. If warranted by elevated jobsite risk conditions, the crew leader may elect to declare the next highest level of Fire Potential Index Rating for the job site.
- **Fire Reporting and Actions:**
  - All fires must be reported to dispatch and follow appropriate incident reporting requirements to the CPUC Safety Enforcement Division (SED).
  - If the work crew cannot quickly extinguish a minor fire or rapidly accelerating fire conditions are encountered, the crew leader shall immediately report the situation to dispatch and relocate the crew, equipment, and materials to a safe location.

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Safety Instructions for Working Under Extreme Risk Index Conditions

When working under Extreme Risk Index conditions, the crew leader shall designate a crew member as a Fire Safety Leader. The Fire Safety Leader will not be assigned any job site tasks and will be assigned the specific duties of fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew. Liberty CalPeco will utilize alerts from Reax to determine if a proactive patrol of electrical equipment and vegetation clearances is warranted. Liberty CalPeco will activate proactive fire patrols if it receives a 90% or 100% alert from Reax.

Operating Procedures – Extreme Risk Index Conditions

As a general rule, all work should be suspended during Extreme Risk Index conditions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	**Paved roads or bare improved roads**	**Allowed**
	Off-road and unimproved roads	**Permitted for performance of only those activities that reduce wildfire risks and/or restore customer outages**
Facility Inspections and Patrols	**Driving and climbing inspections of poles, equipment, vegetation and security**	**Assign a Fire Safety Leader**
Overhead Line Corrective Maintenance and Repairs	**Replacement and/or installation of splices, fuses, lightning arrestors, and insulators**	**Perform only those activities that reduce wildfire risks and/or restore customer outages; assign a Fire Safety Leader**
Pole Setting and Removal	**Paved roads or bare improved roads**	**Not allowed**
	Off-road and unimproved roads	**Not allowed**
Replacing and Stringing Conductor	**Paved roads or bare improved roads**	**Not allowed**
	Off-road and unimproved roads	**Not allowed**
Vegetation Management Near Poles and Towers	**Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control**	**Not allowed**
T&D Overhead Line Vegetation Management	**Minor maintenance tree trimming and associated branch removals using buckets and/or hand tools to maintain company clearance standards**	**Perform only those activities that reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Leader**
	Cycle trimming using buckets and/or hand tools to maintain company clearance standards	**Not allowed**
Reciprocating Construction Equipment	**Truck mounted compressors and/or generators**	**Assign a Fire Safety Leader**
	Non-truck mounted compressors and/or generators	**Not allowed**
	Welders and grinders	**Not allowed**
Blasting	**Blasting of rock with explosives**	**Not allowed**

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Safety Instructions for Working Under Elevated Risk Index Conditions

When working under Elevated Risk Index conditions, the crew leader shall designate a crew member as a Fire Safety Monitor. In addition to the assigned work duties at the job site, the Fire Safety Monitor is responsible for fire risk awareness and prevention, detecting and extinguishing minor fires, and placing the baseline fire tools in a location that is easily accessible by the work crew.

Operating Procedures - Elevated Risk Index Conditions

As a general rule, work may be limited during Elevated Risk Index conditions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	**Paved roads or bare improved roads**	**Allowed**
	Off-road and unimproved roads	**Permitted for performance of only those activities allowed under High Risk Conditions**
Facility Inspections and Patrols	**Driving and climbing inspections of poles, equipment, vegetation and security**	**Assign a Fire Safety Monitor**
Overhead Line Corrective Maintenance and Repairs	**Replacement and/or installation of splices, fuses, lightning arrestors and insulators**	**Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor**
Pole Setting and Removal	**Paved roads or bare improved roads**	**Assign a Fire Safety Monitor**
	Off-road and unimproved roads	**Not allowed**
Replacing and Stringing Conductor	**Paved roads or bare improved roads**	**Assign a Fire Safety Monitor**
	Off-road and unimproved roads	**Not allowed**
Vegetation Management Near Poles and Towers	**Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control**	**Not allowed**
T&D Overhead Line Vegetation Management	**Minor maintenance tree trimming using buckets and/or hand tools to maintain company clearance standards**	**Perform only those activities which reduce wildfire risks and/or restore Customer outages; assign a Fire Safety Monitor**
	Cycle trimming and associated tree/branch removals using buckets and/or hand tools to maintain company clearance standards	**Not allowed**
Reciprocating Construction Equip.	**Truck-mounted compressors and/or generators**	**Assign a Fire Safety Monitor**
	Non-truck-mounted compressors and/or generators	**Not allowed**
	Welders and grinders	**Not allowed**
Blasting	**Blasting of rock with explosives**	**Not allowed**

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Safety Instructions for Working Under Normal Risk Index Conditions

When working under Normal Risk Fire Index conditions, workers should still maintain high awareness of the fire risk and safety hazards within the operating area.

Operating Procedures - Normal Risk Index Rating

As a general rule, work can proceed during Normal Risk Index conditions following General Safety Instructions		
Activity	**Description**	**Stipulations**
Travel with Company Trucks and Vehicles	**Paved roads or bare improved roads**	**No restrictions**
	Off-road and unimproved roads	**No restrictions**
Facility Inspections and Patrols	**Driving and climbing inspections of poles, equipment, vegetation and security**	**No restrictions**
Overhead Line Corrective Maintenance and Repairs	**Replacement and/or installation of splices, fuses, lightning arrestors and insulators**	**No restrictions**
Pole Setting and Removal	**Paved roads or bare improved roads**	**No restrictions**
	Off-road and unimproved roads	**No restrictions**
Replacing and Stringing Conductor	**Paved roads or bare improved roads**	**No restrictions**
	Off-road and unimproved roads	**No restrictions**
Vegetation Management Near Poles and Towers	**Use of powered hand tools (chainsaws and weed eaters) to clear low-lying vegetation and noxious and invasive plant control**	**Follow safety instructions for working under High Risk Index conditions**
T&D Overhead Line Vegetation Management	**Minor maintenance tree trimming using buckets and/or hand tools to maintain company clearance standards**	**No restrictions**
	Cycle trimming and associated tree/branch removals using buckets and/or hand tools to maintain company clearance standards	**No restrictions**
Reciprocating Construction Equipment	**Truck mounted compressors and/or generators**	**No restrictions**
	Non-truck mounted compressors and/or generators	**Assign a Fire Safety Monitor**
	Welders and grinders	**Assign a Fire Safety Monitor**
Blasting	**Blasting of rock with explosives**	**Truck must have permit with restrictions; assign a Fire Safety Monitor**

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ACTIVE FIRE SAFETY PRECAUTIONS

Liberty CalPeco values safety as a core competency of field and hot work performed in high risk areas. For all contractors and utility personnel, these precautions exist for critical work performed within Tiers 2 and 3 of the HTFD under threat of wildland fire. If a small fire ignites and rapid suppression is not achieved by field personnel, field crew are directed to stop work, retreat to a safe area adjacent to the work site, immediately call upon dispatch services, and alert nearby fire and impacted agencies and entities.

All contractors and utility personnel working adjacent to active wildland fires should consider the following:

- Use Personal Protective Equipment (P.P.E.) when working within or adjacent to and uncontrolled fire perimeter if required at the determination of the Fire Safety Leader or designee.
- Maintain communication lines through operational protocols when a fire ignites,. This includes correspondence made with office and dispatch centers, local law and fire agencies, customers, and impacted jurisdictions, if any.[4] The Incident Commander (IC), once designated, should coordinate and effectuate these activities.
- Take increased precaution when driving near flames or in smoky conditions. Road obstructions may pose a risk, and drivers and crew should have a general awareness of nearby access and evacuation routes.
- Determine if de-energizing any potentially impacted electrical assets or those that pose a risk to spreading the active wildland fire is necessary. Field crew should adhere to Liberty CalPeco PSPS procedures where applicable.
- Designate an Emergency Operations Center and adhere to the Incident Command Structure led by an IC to oversee response, fire exhaustion, and recovery efforts.
- Perform any routine investigations after fire suppression. Report incident data to SED and execute necessary reporting procedures as part of Liberty CalPeco business practices.

ATTACHMENTS

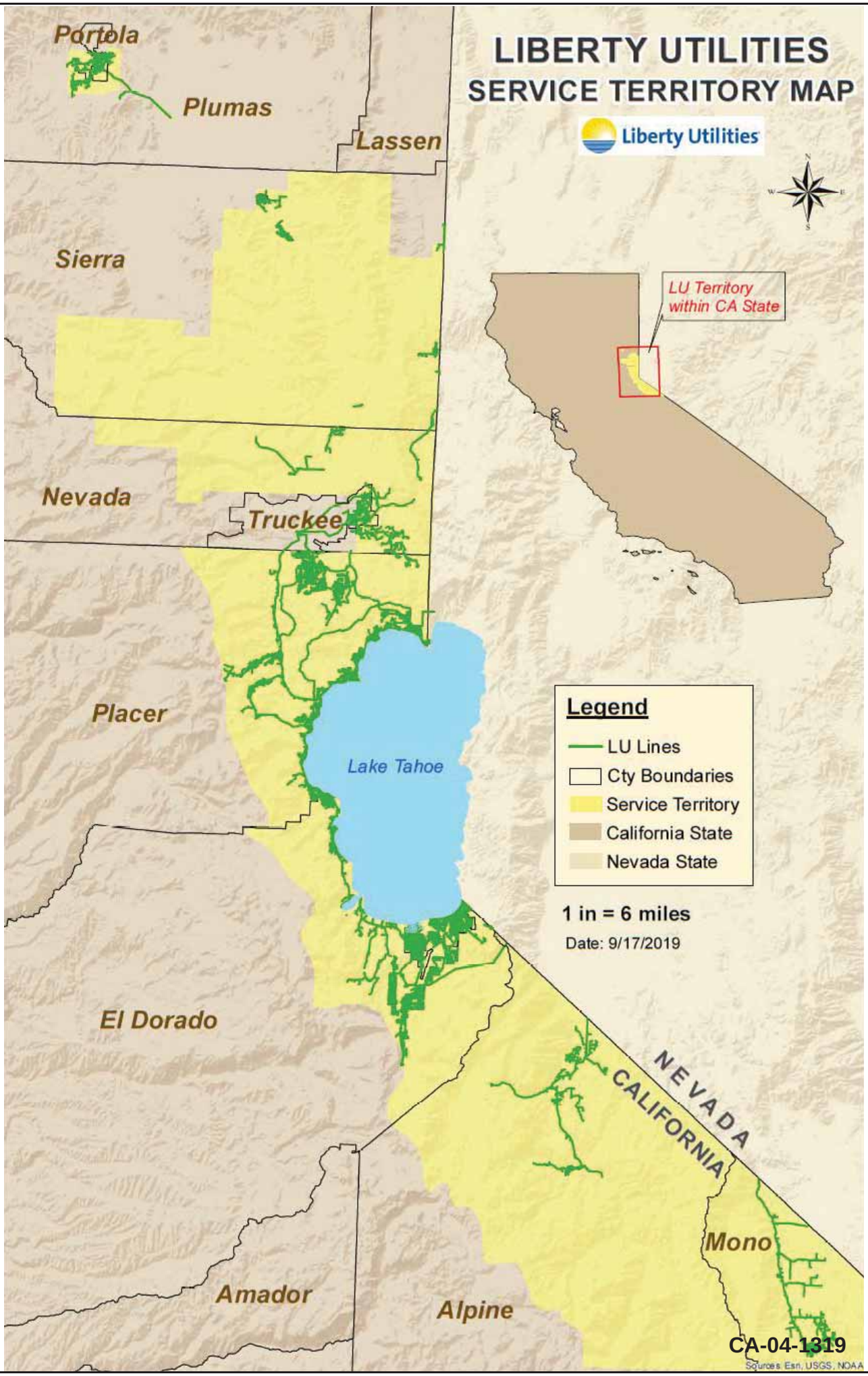
1) Attachment 1- Liberty CalPeco service territory map

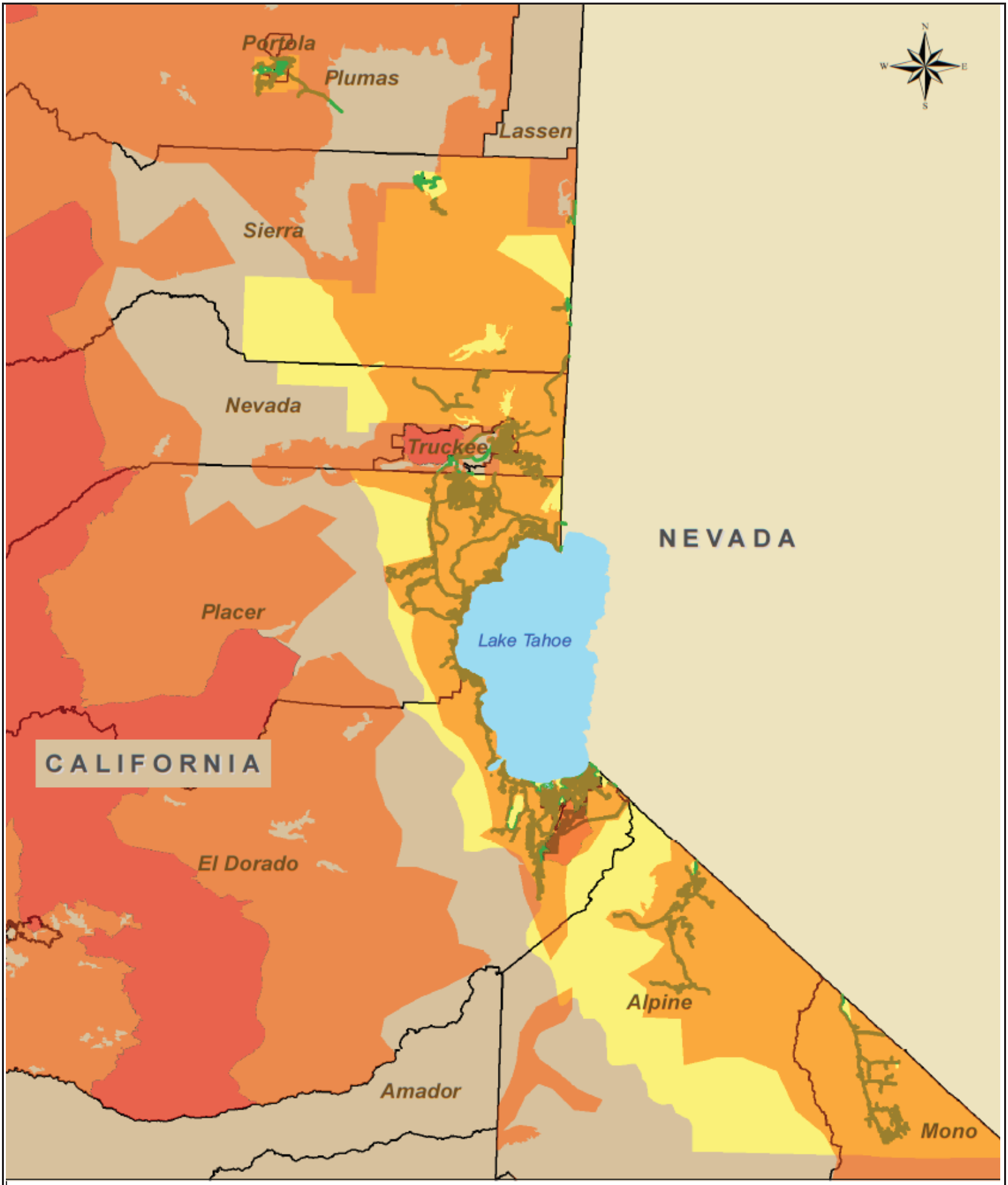
2) Attachment 2- Liberty CalPeco service territory overlaid with the HFTD

[4] Notifications to customers during and post-fire suppression should occur in English and Spanish.

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LIBERTY UTILITIES
SERVICE TERRITORY MAP
Liberty Utilities
Portola
Plumas
Lassen
Sierra
Nevada
Truckee
Placer
Lake Tahoe
El Dorado
Amador
Alpine
Mono
NEVADA
CALIFORNIA
LU Territory within CA State
Legend
LU Lines
Cty Boundaries
Service Territory
California State
Nevada State
1 in = 6 miles
Date: 9/17/2019
CA-04-1319
Sources: Esri, USGS, NOAA



Legend

- LU Lines
- California
- Nevada
- Service Territory
- Tier 2 Fire Threat
- Tier 3 Fire Threat

HIGH FIRE THREAT WITHIN LIBERTY UTILITIES SERVICE TERRITORY

Date: 6/27/2019

1 in = 11 miles

Liberty Utilities
701 National Ave
Tahoe, CA 96148

CA-04-1320

ATTACHMENT 12

Liberty response to data request CalAdvocates-LIB-A2506017-006, August 21, 2025 and excerpt of internal attachment

Liberty Utilities (CalPeco Electric) LLC

A.25-06-017
WEMA

The Public Advocates Office

Data Request No.:	CalAdvocates-LIB-A2506017-006
Requesting Party:	Public Advocates Office
Originator:	Herman Eng, Herman.Eng@cpuc.ca.gov
cc:	Aaron Louie, Aaron.Louie@cpuc.ca.gov
	Patrick Huber, Patrick.Huber@cpuc.ca.gov
Date Received:	August 21, 2025
Due Date:	September 5, 2025

Question 1

Please provide a GIS file geodatabase (.gdb) with spatial data for the following:

(a) Line feature layer for Liberty's distribution circuits for November 17, 2020, including the Topaz 1261 circuit with attribute information as requested in Wildfire Mitigation Plan data guidelines (such as circuit name);

(b) Line feature layer for Liberty's transmission circuits; and

(c) Polygon feature layer for National Weather Service (NWS) zones overlapping Liberty's service territory for November 17, 2020.

Response to Question 1:

Please refer to attachment *CalAdvocates-LIB-A250617-006-Q1.zip* for data requested in subparts (a)-(c).

Question 2

Please provide the latitude and longitude coordinates (in decimal degrees to at least 5 decimal places) for the following:

(a) West Pole (Pole 266731) at the origin area;

(b) East Pole (Pole 40288) at the origin area; and

(c) Topaz 1261 R2 recloser.

Response to Question 2:

Liberty understands the term "origin area" to refer to the area where the Mountain View Fire ignited on November 17, 2020 as described in *Liberty-02: Ignition* and *Liberty-03: Prudence of Operations*.

(a) West Pole (Pole 266731): 38.513000, -119.467520

(b) East Pole (Pole 40288): 38.512970, -119.466580

(c) Topaz 1261 R2 Recloser: 38.540520, -119.497830

Question 3

Please provide an Excel file that identifies each Liberty weather station as of November 17, 2020, including the six on the Topaz circuit area as described in *Liberty-03 - Prudence of Operations*, with the following information:

a) Unique ID number or identifier;
b) Name;
c) Latitude (in decimal degrees to 5 decimal places);
d) Longitude (in decimal degrees to 5 decimal places);
e) Installation date;
f) Last inspection date;
g) Last maintenance date;
h) Year of removal (for any weather stations that were eventually removed);
i) The types of data the weather station collected (e.g., wind speed, humidity);
j) How often the weather station collected data;
k) Whether Liberty had a means to receive data automatically or whether the data required a manual pull;
l) Whether the weather station was successfully communicating data as of November 17, 2020;
m) If the weather station was not successfully communicating data, explain why;
n) Which circuit(s) did Liberty use that weather station's data for; and
o) Whether Liberty used the weather station to monitor conditions for Liberty's PSPS events

prior to November 17, 2020.

Response to Question 3:

Liberty objects to this Question as vague and ambiguous as to subpart (o). Subject to and without waiving these objections, Liberty responds as follows: Liberty understands subpart (o) as asking whether Liberty used data from the weather stations to inform its PSPS

decision-making, as of November 17, 2020. As referenced in *Liberty-03: Prudence of Operations*, Part VI.B.1, data from these weather stations provided inputs to Liberty's FPI tool and forecast models behind Liberty's PSPS predictive tool. Localized weather data from Liberty's stations also helped to validate and improve the accuracy of those tools and models. In the event of a PSPS activation, live weather station observations, along with data from field observers, would guide the ultimate decision to de-energize. For information requested in subparts (a)-(n), please refer to attachment *CalAdvocates-LIB-A2506017-006-Q3.xlsx*.

Question 4

Please provide an Excel file that lists all Red Flag Warning (RFW) notifications from 2016-2020 that affected the Topaz 1261 circuit. Each event should be a row. The file should have the following columns:

(a) NWS forecast zone;

(b) RFW Start Date and Time;

(c) RFW End Date and Time;

(d) Total Duration (in minutes);

(e) Name or Identifier of the nearest wind measurement station to the West or East Poles;
- West Pole (Pole 266731): 38.513000, -119.467520
- East Pole (Pole 40288): 38.512970, -119.466580

(f) Latitude (in decimal degrees to 5 decimal places) of this nearest wind measurement station;

(g) Longitude (in decimal degrees to 5 decimal places) of this nearest wind measurement station;

(h) Maximum sustained wind speed recorded at this wind measurement station; and

(i) Maximum gust wind speed recorded at this wind measurement station.

Response to Question 4:

Liberty objects to this Question as overbroad and burdensome to the extent it seeks information not maintained in the ordinary course of business. Subject to and without waiving these objections, Liberty responds as follows:

For information requested in subparts (a)-(i), please refer to attachment *TZP_2016_2020_RFW Data.xlsx*. The nearest weather station that recorded data for the entire time period requested by this Question is Walker RAWS station. Liberty is thus providing data requested in subparts (h) and (i) from this station. As indicated in the attachment *CalAdvocates-LIB-A2506017-006-Q3.xlsx*, the Liberty weather stations nearest to the West and East Poles went into service on May 31, 2019 (LIB-3106/LIB06) and October 20, 2020 (LIB-3130/LIB26) and do not have data for the whole time period requested. Data from all three weather stations are publicly available via

MesoWest: https://mesowest.utah.edu/. Data from the two Liberty weather stations are also publicly available from Western Weather Group: https://liberty.westernweathergroup.com/search.

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3101	GLS7600-Walden	39.3314	-120.073873	5/1/2019	5/1/2019	5/1/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	GLS7600	See narrative response
LIB-3102	TAH7300-DL Bliss	38.975618	-120.100287	5/2/2019	5/2/2019	5/2/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TAH7300	See narrative response
LIB-3103	MUL1296-Woodfords	38.782655	-119.817875	5/17/2019	5/17/2019	5/17/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MUL1296	See narrative response
LIB-3105	TPZ1261–Park Ranch	38.641208	-119.520245	5/20/2019	5/20/2019	5/20/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TAH1261	See narrative response
LIB-3106	TPZ1261-Walker	38.533929	-119.504175	5/31/2019	5/31/2019	5/31/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TPZ1261	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3104	BKY4201-Summit	39.261201	-120.07203	6/10/2019	6/10/2019	6/10/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	BKY4201	See narrative response
LIB-3108	111Line-Columbine Trail	38.890622	-119.959667	6/10/2019	6/10/2019	6/10/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	111 Line	See narrative response
LIB-3109	POR31- Iron Horse	39.77898	-120.502853	6/17/2019	6/17/2019	6/17/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	POR31	See narrative response
LIB-3110	619 Line-Sierra Valley West	39.759316	-120.374116	6/24/2019	6/24/2019	6/24/2019	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	619 Line	See narrative response
LIB-3107	Meyers3400-Uplands	38.895633	-120.037454	4/30/2020	4/30/2020	4/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3400	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3111	SQV8200-Squaw Valley	39.198471	-120.230336	7/27/2020	7/27/2020	7/27/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	SQV8200	See narrative response
LIB-3128	7201-Alpine Meadows	39.181695	-120.221456	7/30/2020	7/30/2020	7/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	SQV7201	See narrative response
LIB-3121	7400-Glenshire	39.352082	-120.097467	8/21/2020	8/21/2020	8/21/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	GLS7400	See narrative response
LIB-3124	Washoe204-Fariad	39.449832	-120.009825	8/27/2020	8/27/2020	8/27/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	WSH204	See narrative response
LIB-3115	Hobart Sub	39.399213	-120.149933	9/11/2020	9/11/2020	9/11/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	HOB7700	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3120	TAH7300-Homewood	39.085796	-120.161076	9/14/2020	9/14/2020	9/14/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TAH7300	See narrative response
LIB-3125	MEY3400-Camp Richardson	38.934039	-120.047506	9/14/2020	9/14/2020	9/14/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3400	See narrative response
LIB-3126	MEY3500-STPD Office	38.921807	-119.970729	9/14/2020	9/14/2020	9/14/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3500	See narrative response
LIB-3117	TRK7202-Cabin Tree	39.292012	-120.215211	9/16/2020	9/16/2020	9/16/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TRK7202	See narrative response
LIB-3123	WSH201-Floriston	39.4048	-120.025474	10/5/2020	10/5/2020	10/5/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	WSH201	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3112	CEM41-Garage Pit Rd	39.675089	-120.221981	10/9/2020	10/9/2020	10/9/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	CEM41	See narrative response
LIB-3116	SRB51-Smithneck Rd	39.643493	-120.21375	10/9/2020	10/9/2020	10/9/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	SRB51	See narrative response
LIB-3113	CAL204-Dog Valley	39.52486	-120.004442	10/16/2020	10/16/2020	10/16/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	CAL204	See narrative response
LIB-3118	Muller1296-Emigrant Trail	38.819952	-119.779508	10/17/2020	10/17/2020	10/17/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MUL1296	See narrative response
LIB-3127	621Line-I-80 Gravel Pit	39.369637	-120.11362	10/20/2020	10/20/2020	10/20/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	621 Line	See narrative response

Station_Co	Station_Na	Latitude	Longitude	Date_Install	Last Inspected	Last Maintained	Removed	Data Collected	Data collection interval	Automatic or Manual data pull	Communicating as of 11/17/2020	Why not communicating as of 11/17/2020	Circuit	Used to monitor conditions for PSPS events prior to 11/17/2020
LIB-3130	TPZ1261-Eastside Lane	38.521953	-119.456098	10/20/2020	10/20/2020	10/20/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TPZ1261	See narrative response
LIB-3122	MEY3300-Grass Lake Road	38.803324	-120.015564	10/30/2020	10/30/2020	10/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MEY3300	See narrative response
LIB-3129	MUL1296-Markleeville	38.694666	-119.780667	10/30/2020	10/30/2020	10/30/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	MUL1296	See narrative response
LIB-3114	TRUCKEE7203 - Northstar Golf Course	39.300652	-120.115562	11/2/2020	11/2/2020	11/2/2020	N/A	•Dew Point (°F) •Fuel Moisture (%) •Precipitation (in) •Relative Humidity (%) •Soil Moisture (%) •Soil Temperature (°F) •Temperature (°F) •Wind Direction (°) •Wind Gust (mph) •Wind Speed (mph)	10 minutes	Automatic	Yes	N/A	TRK7203	See narrative response

ATTACHMENT 13

Liberty's 2020 Wildfire Mitigation Plan Annual Report on Compliance, March 31, 2021

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018).	Rulemaking 18-10-007 (filed October 25, 2018)

LIBERTY UTILITIES (CALPECO ELECTRIC) LLC'S (U 933-E) 2020 WILDFIRE MITIGATION PLAN ANNUAL REPORT ON COMPLIANCE

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BEFORE THE PUBLIC UTILITIES COMMISSION

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LIBERTY UTILITIES (CALPECO ELECTRIC) LLC'S (U 933-E) 2020 WILDFIRE MITIGATION PLAN ANNUAL REPORT ON COMPLIANCE

Pursuant to the Wildfire Safety Division ("WSD") Compliance Operational Protocols issued on February 16, 2021, associated with Rulemaking ("R.") 18-10-007, Liberty Utilities ("CalPeco Electric") LLC ("Liberty") hereby files this Annual Report on Compliance ("ARC") regarding Liberty's 2020 Wildfire Mitigation Plan ("2020 WMP"). This ARC follows the guidance in Table 4 (Section 2) of the WSD Compliance Operational Protocols.

I. ASSESSMENT OF LIBERTY'S 2020 WMP INITIATIVES

WSD Guidance: Submit an assessment of whether Liberty met the risk reduction intent by implementing all of their approved WMP initiatives, i.e., the degree to which initiative activities have reduced ignition probabilities. If Liberty fails to achieve the intended risk reduction, EC shall provide a detailed explanation of why and a reference to where associated corrective actions are incorporated into their most recently submitted WMP.

A. Overall 2020 WMP

In accordance with Cal. Pub. Util. Code § 8386(a), Liberty constructs, maintains, and operates its electric system in a manner that minimizes the risk of catastrophic wildfire posed by its electric power lines and equipment. Liberty's overarching WMP goal is to prevent and mitigate the risk of wildfires caused by utility equipment. In 2020, Liberty continued to identify ways to enhance its wildfire prevention

and mitigation efforts through enhancing or expanding existing programs and developing and implementing new programs. Liberty's overall progress in 2020 implementing its WMP met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences (with specific consideration to the impact on Access and Functional Needs populations and marginalized communities) of both wildfires and the mitigations employed to reduce them, including Public Safety Power Shutoff ("PSPS") events.

B. Risk Assessment and Mapping

Liberty's progress in 2020 related to the Risk Assessment and Mapping WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

In 2020, Liberty advanced from no risk model or mapping capabilities to a first-generation wildfire risk model and fire risk mapping tools that cover Liberty's entire service area. The establishment of Liberty's risk mapping and wildfire risk models will allow the company to incorporate objective, quantitative analysis into its decision-making regarding all wildfire risk drivers.

C. Situational Awareness and Forecasting

Liberty's progress in 2020 related to the Situational Awareness and Forecasting WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

Specifically, Liberty accomplished the following related to Situational Awareness and Forecasting WMP initiatives in 2020:

- Installed 19 weather stations equipped with fuel moisture sensors in and across High Fire Threat Districts. Prioritization was given to installations based on Reax risk mapping designated high wildfire areas. Liberty's advanced weather monitoring program improves situational awareness by providing weather information to operations and allows for the

safe operation of the electric grid during extreme weather events. Continuation of this program reduces the likelihood of avoidable customer outages and probability of ignitions risk with continuous weather monitoring. Enhanced real-time weather monitoring data provides an important tool to help Liberty plan for operating activities during such extreme events. In 2020, Liberty installed 19 out of 20 targeted weather stations, bringing the total number of weather stations to 29. Fuel moisture sensors were also added to weather stations installed in 2020 and retrofitted to several of the locations installed in 2019. Fuel moisture sensors can help to validate fuel moisture conditions, which is crucial to accurately predict wildfire risk in local areas. The data from these weather stations provides much needed support for Liberty's PSPS and FPI tools.

- Liberty installed SCADA controls to four additional reclosers, deployed Tripsavers to one feeder, and is finalizing the implementation of the ALERTWildfire camera network partnership. The primary benefit of continuous monitoring sensors is to enhance visibility of the system and system reliability. The ability to quickly determine fault and outage locations allows dispatchers to quickly deploy resources to evaluate and resolve system issues. Another benefit of continuous monitoring systems is providing a faster response to an ignition event. Aclara sensors (SCADA controls) record continuous line disturbances, which can be analyzed and repaired before an issue leads to an ignition. Tripsavers are an effective tool during high fire threat days with their one-shot (fire mode) capability. AlertWildfire cameras provide opportunity for early detection of ignitions and provide opportunity to view areas where a fault may have occurred. The AlertWildfire Camera network has grown significantly throughout California and other western states in large part due to partnerships with electric utilities. Over the last few years, these cameras have

proven their value and have become an integral part of fire detection and monitoring during fire season in California. With more cameras, improving technology, and more partnerships, the capabilities of the AlertWildfire network will continue to improve on an already successful platform.

- Liberty developed and implemented its Fire Potential Index ("FPI") assessment tool in late 2020. Liberty's FPI is a comprehensive assessment tool designed to heighten awareness of daily forecast fire conditions to aid in operational decision making. FPI converts environmental, statistical, and scientific data into an easily understood forecast of short-term fire threat for Liberty's service territory. FPI forecasts up to seven days of fire threat potential. Liberty uses FPI for fire threat awareness and operational decision making. The FPI provides a seven-day fire risk condition forecast for 11 geographic zones within the service territory. FPI condition forecasts include five risk conditions (Low, Moderate, High, Very High, and Extreme) that are used as a means to determine operating procedures, by zone, depending on the forecast fire risk. FPI condition forecasts are communicated to field staff on a daily basis to inform operational decisions when work restrictions are in place due to fire risk. Prior to the development of FPI, Liberty did not have any specialized fire risk prediction tools, which meant less overall awareness of day-to-day fire risk. There are 11 FPI zones, covering Liberty's entire service territory, with individual fire risk forecasts for each zone. This forecasting granularity provides a better understanding of the overall fire risk throughout the service area and allows for better decision-making in scheduling work by zone. FPI was developed for Liberty's service territory based on SDG&E and Pacific Gas & Electric Company ("PG&E") methodologies. Factors considered include climatological, geographical, and fuel source

conifer and timber understory fuels in Liberty's service territory. FPI calculations include fuel moisture (both dead and live), "green-up" factor, ambient temperature, relative humidity, Fosberg Fire Weather Index, and Burning Index, among other factors. This work led to the establishment of the number of FPI classes as well as the fuel and weather criteria that delineate FPI classes.

D. Grid Design and System Hardening

Liberty's progress in 2020 related to the Grid Design and System Hardening WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

In 2020, Liberty conducted a system-wide inventory of all overhead assets that included enhanced G.O. 165 inspections. From this survey, Liberty now has a third-party assessment of the entire overhead system that can be used to develop programs to proactively replace its aging infrastructure. This information, although in its early development, will be used to measure future wildfire risk reductions.

Grid hardening efforts also include replacing overhead lines with covered conductor to protect high fire risk areas during volatile weather events and building resiliency corridors. Liberty's overall resiliency program is still in its conceptual phase, but initial plans also include installation of microgrids in targeted high fire risk areas. The combination of covered conductor installations, resiliency corridors, and microgrids will greatly reduce impacts and frequency of PSPS events and service interruptions.

E. Asset Management and Inspections

Liberty's progress in 2020 related to the Asset Management and Inspections WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

As mentioned above related to Grid Design and System Hardening WMP initiatives, in 2020, Liberty utilized a contractor to perform a system-wide survey of overhead system assets to collect a

complete list of equipment attached to poles and to perform detailed visual inspections. Data, including pictures and GPS coordinates, was collected via hand-held devices to be utilized for improving accuracy of the GIS. Liberty purchased licenses for the Fulcrum mobile application to transition from paper-based to electronic inspection records. The system-wide survey data has generated a significant number of G.O. 95-related repairs that Liberty is working to complete. The survey also revealed that not all field changes had been tracked in an accurate or timely manner and that improvements to those processes need to be made so the system maintains a high level of accuracy.

F. Vegetation Management and Inspections

Liberty's progress in 2020 related to the Vegetation Management and Inspections WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

Liberty's vegetation management program made tremendous progress toward achieving program targets in 2020. In addition to maintaining growth in its existing initiatives, Liberty piloted and implemented new vegetation management and inspection initiatives to continue to enhance its contribution to wildfire mitigation efforts. Key achievements include:

- Implementing the first Forest Resilience Corridors project in cooperation with the USFS on parts of the Lake Tahoe Basin Management Unit and Tahoe National Forest;
- Performing supplemental vegetation risk inspection and mitigation of all overhead lines in Liberty's Tier 3 High Fire Threat District;
- Beginning the implementation of fuel management projects and biomass removal; and
- Piloting the use of LiDAR to perform vegetation inspections along approximately half of overhead electric lines.

G. Grid Operations and Operating Protocols

Liberty's progress in 2020 related to the Grid Operations and Operating Protocols WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

In 2020, Liberty developed and implemented PSPS operations and communications protocols. These protocols, in combination with the development of the FPI and PSPS forecasting tools have helped to inform day-to-day operational decision-making. Liberty's newly developed FPI has been incorporated into its Fire Prevention Plan, which details work procedures that must be followed based on fire risk conditions. The plan is utilized daily during fire season to inform operational decisions. Developing PSPS protocols, holding table top exercises, and training for PSPS events helped Liberty prepare for potential future PSPS events.

H. Data Governance

Liberty's progress in 2020 related to the Data Governance WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

The System Survey asset inventory completed in 2020 provides the basis of a fully functioning asset management system that can be used for prioritizing future work based on Reax mapping and level findings. Design and testing of cloud-based forms for data collection was implemented for this purpose in addition to the establishment of the wildfire risk SharePoint dedicated location and utilization of other visual mapping applications. Utilization of digitally distributed field collection forms in 2020 allowed Liberty to collect, store and analyze more System Survey results than in the previous five years combined. This moved Liberty closer to total digital systems adoption for surveys and is providing a means of responding to infractions with increased speed, volume, and improved accuracy. During this process, Liberty recognized that training initiatives, increased integration of data sources, and workflow

advancement would assist Liberty to further leverage data governance upgrades and adoption of new technologies. Furthermore, the ability to maximize high quality business information based on key performance measures at Liberty promotes continual process improvement, change management, and more technology-based awareness/skills programs.

I. Resource Allocation Methodology

Liberty's progress in 2020 related to the Resource Allocation Methodology WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

Liberty has not developed its first generation wildfire risk model in the same framework as the larger IOUs. While Liberty certainly faces limitations in terms of data and resources, the company has spent the past year forming a team of analysts and a consultant to establish risk modeling capabilities. The wildfire risk model finished its development only shortly before Liberty's 2021 WMP Update filing. However, Liberty was able to incorporate its risk mapping information into its G.O.95 inspection targets as well as use information from that initiative to inform decisions at a high-level. The Liberty RBDM modeling team has laid the foundation for quantitative analysis to be used in forward-looking capital and O&M decision-making.

J. Emergency Planning and Preparedness

Liberty's progress in 2020 related to the Emergency Planning and Preparedness WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

In 2020, Liberty achieved the following related to Emergency Planning and Preparedness WMP initiatives:

- Filled the key positions of Emergency Manager and Fire Protection Specialist in early 2020. The Emergency Manager oversees all emergency response-related activities and

public safety partnership engagements. The Fire Protection Specialist oversees fire prevention initiatives, serving as the company liaison for first responders, and public safety partners, and coordinating training for all employees and contractors.

- Liberty developed comprehensive operations and communications PSPS playbooks that detail operational and communications protocols to be undertaken in each of the five stages of response to extreme wildfire threat conditions, including de-energization and re-energization.
- Liberty hosted 29 meetings with public safety partners to provide details on Liberty's wildfire mitigation, PSPS preparedness, and community outreach efforts.
- Liberty held nine regional PSPS workshops and three PSPS tabletop exercises.
- Liberty hosted seven regional virtual town halls to provide a localized update on wildfire safety work happening in respective communities.
- Liberty conducted training and updated personnel work procedures in conditions of elevated fire risk for field personnel.
- Liberty executed comprehensive wildfire safety and PSPS preparedness outreach, using lessons learned and feedback received from other IOUs, customers, the Commission, and other stakeholders. Liberty also conducts community outreach to educate public safety partners, customers, and the general public on aspects of its wildfire mitigation practices, such as vegetation management and system hardening, and the role they play in helping to reduce wildfire risks in their communities.
- Liberty made improvements and conducted training in the office and field related to existing personnel work procedures in conditions of elevated fire risk.

K. Stakeholder Cooperation and Community Engagement

Liberty's progress in 2020 related to the Stakeholder Cooperation and Community Engagement WMP initiatives met the risk reduction intent of its 2020 WMP to reduce ignition probabilities and minimize the societal consequences of both wildfires and mitigations employed to reduce them.

In 2020, Liberty expanded its public education and outreach efforts associated with its WMP. Safety and resiliency communications were part of Liberty's territory-wide public education campaign. These communications focused on personal preparedness and community resiliency. Additionally, Liberty:

- Hosted 29 meetings with public safety partners to share information related to Liberty's wildfire mitigation efforts, PSPS preparedness, and community outreach;
- Held nine regional PSPS workshops and three PSPS tabletop exercises;
- Hosted seven regional virtual town halls to provide a localized update on wildfire safety work happening in respective communities;
- Placed 112 posts on Liberty's social media channels;
- Sent three bill inserts and direct mailers to customers; and
- Conducted three customer e-mail outreach campaigns.

II. 2020 WMP CHANGE ORDERS AND OTHER OPERATIONAL CHANGES

WSD Guidance: Submit a full and complete listing of all change orders and any other operational changes, such as initiative location changes, made to WMP initiatives, with an explanation of why the changes were necessary, and an assessment of whether the changes achieved the same risk reduction intent.

A. Change Orders

Liberty did not file any change orders in 2020 for its 2020 WMP.

B. Operational Changes

In 2020, Liberty contracted with Reax Engineering ("Reax") to conduct a comprehensive fire spread and consequence model. Reax began its fire mapping analysis in May 2020 and the study was completed in September 2020. The study resulted in a fire risk mapping tool to be utilized as the baseline for Liberty's wildfire risk assessment. Reax identified and designated wildfire risk areas in regionalized "polygons" that were mapped with an overlay of Liberty's overhead distribution lines. The designated high Reax wildfire areas are used by operations and engineering for planning of wildfire mitigation work. The Reax mapping will meet the risk reduction intent of Liberty's 2020 WMP because it will inform the work to be performed to reduce wildfire risk and will prioritize efforts within each major category.

III. 2020 WMP INITIATIVE SPEND

WSD Guidance: Submit descriptions of all planned WMP initiative spend vs. actual WMP initiative spend and an explanation of any differentials between the planned and actual spends.

A. Planned 2020 WMP Initiative Spend vs. Actual 2020 WMP Initiative Spend

Table 1: Planned 2020 WMP Initiative Spend vs. Actual 2020 WMP Initiative Spend

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.1.1	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	$0	$67,465	Costs were planned for 7.3.7.1.
7.3.1.2	Climate-driven risk map and modelling based on various relevant weather scenarios	$0	$0	-
7.3.1.3	Ignition probability mapping showing the probability of ignition along the electric lines and equipment	$0	$0	-
7.3.1.4	Initiative mapping and estimation of wildfire and PSPS risk-reduction impact	$0	$0	-
7.3.1.5	Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment	$0	$0	-
7.3.2.1	Advanced weather monitoring and weather stations	$300,000	$242,879	One less station installed; contingency not met.
7.3.2.2	Continuous monitoring sensors	$80,000	$158,125	Accelerated DFA timeline.

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.2.3	Fault indicators for detecting faults on electric lines and equipment	$0	$0	-
7.3.2.4	Forecast of a fire risk index, fire potential index, or similar	$70,000	$44,313	Actual costs were less than originally anticipated.
7.3.2.5	Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions	$0	$0	-
7.3.2.6	Weather forecasting and estimating impacts on electric lines and equipment	$0	$0	-
7.3.3.1	Capacitor maintenance and replacement program	$0	$0	-
7.3.3.2	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	$0	$0	-
7.3.3.3	Covered conductor installation	$3,198,000	$7,820,185	More covered conductor completed than originally planned. Design costs and amount of pole replacements were higher than anticipated.
7.3.3.4	Covered conductor maintenance	$0	$0	-
7.3.3.5	Crossarm maintenance, repair, and replacement	$0	$94,572	2020 actual costs were incorrectly categorized here. They should be captured under section 7.3.3.12.
7.3.3.6	Distribution pole replacement and reinforcement, including with composite poles	$0	$3,651,519	Costs were not originally forecast for pole replacement, however, inspection results warranted pole replacements.
7.3.3.7	Expulsion fuse replacement	$1,544,000	$737,939	Cost incurred in late 2020 but not paid until early 2021.
7.3.3.8	Grid topology improvements to mitigate or reduce PSPS events	$616,000	$671,872	Actual costs were slightly higher than originally anticipated.
7.3.3.9	Installation of system automation equipment	$360,000	$453,588	Estimate for four reclosers based on historical spend; actual costs were higher due to factors such as availability of materials.

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.3.10	Maintenance, repair, and replacement of connectors, including hotline clamps	$0	$0	-
7.3.3.11	Mitigation of impact on customers and other residents affected during PSPS event	$0	$0	-
7.3.3.12	Other corrective action	$750,000	$1,372,552	More work was performed than originally planned.
7.3.3.13	Pole loading infrastructure hardening and replacement program based on pole loading assessment program	$1,515,000	$0	Projected costs were not incurred.
7.3.3.14	Transformers maintenance and replacement	$0	$0	-
7.3.3.15	Transmission tower maintenance and replacement	$0	$0	-
7.3.3.16	Undergrounding of electric lines and/or equipment	$1,757,500	$522,414	Actual costs were less than originally anticipated; not all project costs were incurred in 2020.
7.3.3.17	Updates to grid topology to minimize risk of ignition in HFTDs	$0	$0	-
7.3.4.1	Detailed inspections of distribution electric lines and equipment	$3,500,000	$837,622	GO 165 repair costs were lower than anticipated and some of the repairs are carrying into 2021.
7.3.4.2	Detailed inspections of transmission electric lines and equipment	$0	$0	-
7.3.4.3	Improvement of inspections	$890,000	$0	Liberty had several software solutions under consideration to improve asset inspections and included the highest figure available at the time of filing. Ultimately, Liberty went with a different solution which meant those dollars were not utilized.
7.3.4.4	Infrared inspections of distribution electric lines and equipment	$0	$0	-
7.3.4.5	Infrared inspections of transmission electric lines and equipment	$0	$0	-

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.4.6	Intrusive pole inspections	$118,554	$10,404	Due to timing difference, some work performed in 2020 was not paid until the first quarter of 2021. The actual spend related to this work is $138,799.14. The $118,554 is only an estimate based on number of structures and cannot account for when poles need remediation which is determined at time of inspection.
7.3.4.7	LiDAR inspections of distribution electric lines and equipment	$250,000	$0	LiDAR was utilized for Vegetation Management but not asset inspections in 2020.
7.3.4.8	LiDAR inspections of transmission electric lines and equipment	$0	$0	-
7.3.4.9	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	$0	$0	-
7.3.4.10	Other discretionary inspection of transmission electric lines and	$6,000,000	$2,994,266	Costs to complete the System Survey were significantly lower than the initial estimate due to competitive bid process.
7.3.4.11	Patrol inspections of distribution electric lines and equipment	$0	$0	-
7.3.4.12	Patrol inspections of transmission electric lines and equipment	$0	$0	-
7.3.4.13	Pole loading assessment program to determine safety factor	$0	$0	-
7.3.4.14	Quality assurance / quality control of inspections	$0	$0	-

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.4.15	Substation inspections	$0	$0	-
7.3.5.1	Additional efforts to manage community and environmental impacts	$660,000	$771,043	More work required than originally anticipated. USFS permitting delays create inefficiencies.
7.3.5.2	Detailed inspections of vegetation around distribution electric lines and equipment	$610,000	$555,763	Actual costs were less than originally anticipated.
7.3.5.3	Detailed inspections of vegetation around transmission electric lines and equipment	$0	$0	-
7.3.5.4	Emergency response vegetation management due to red flag warning or other urgent conditions	$0	$0	-
7.3.5.5	Fuel management and reduction of “slash” from vegetation management activities	$2,000,000	$354,689	Program development took longer than expected and less work was performed than originally anticipated.
7.3.5.6	Improvement of inspections	$0	$0	-
7.3.5.7	LiDAR inspections of vegetation around distribution electric lines and equipment	$0	$369,298	LiDAR inspection was captured under Asset inspections section for 2020. It was more appropriate to capture this project under the vegetation management section.
7.3.5.8	LiDAR inspections of vegetation around transmission electric lines and equipment	$0	$0	-
7.3.5.9	Other discretionary inspections of vegetation around distribution electric lines and equipment	$450,000	$85,139	Work was just performed in the Tier 3 area where inspections took place, therefore costs of inspection and tree work were less.
7.3.5.10	Other discretionary inspections of vegetation around transmission electric lines and equipment	$0	$0	-
7.3.5.11	Patrol inspections of vegetation around distribution electric lines and equipment	$300,000	$420,800	More inspection miles were completed than originally anticipated.

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.5.12	Patrol inspections of vegetation around transmission electric lines and equipment	$0	$0	-
7.3.5.13	Quality assurance / quality control of vegetation inspections	$250,000	$67,033	Program development for QA/QC processes was lower cost than originally anticipated.
7.3.5.14	Recruiting and training of vegetation management personnel	$0	$0	-
7.3.5.15	Remediation of at-risk species	$4,500,000	$7,338,323	Primary driver was increase in tree work costs due to Senate Bill 247.
7.3.5.16	Removal and remediation of trees with strike potential to electric lines and equipment	$0	$2,722,530	The planned cost was captured under initiative number 7.3.5.15 for 2020 and was moved to this section of the 2021 plan for better tracking.
7.3.5.17	Substation inspection	$0	$0	-
7.3.5.18	Substation vegetation management	$0	$0	-
7.3.5.19	Vegetation inventory system	$0	$0	-
7.3.5.20	Vegetation management to achieve clearances around electric lines and equipment	$0	$0	-
7.3.6.1	Automatic recloser operations	$0	$0	-
7.3.6.2	Crew-accompanying ignition prevention and suppression resources and services	$0	$0	-
7.3.6.3	Personnel work procedures and training in conditions of elevated fire risk	$0	$278,576	Labor costs were not originally projected in 2020. However, costs dedicated to this initiative were incurred on fire weather monitoring and proactive line patrols.
7.3.6.4	Protocols for PSPS re-energization	$0	$0	-
7.3.6.5	PSPS events and mitigation of PSPS impacts	$0	$0	-
7.3.6.6	Stationed and on-call ignition prevention and suppression resources and services	$0	$92,731	Costs for two vehicles were not projected for 2020.

2021 WMP Initiative #	Initiative Activity	Planned 2020 Spend	Actual 2020 Spend	Explanation of Differential
7.3.7.1	Centralized repository for data	$465,000	$0	Costs are captured in 7.3.1.1; no other costs incurred.
7.3.7.2	Collaborative research on utility ignition and/or wildfire	$200,000	$1,138	DFA costs were initially projected for this initiative but are captured in 7.3.2.2.
7.3.7.3	Documentation and disclosure of wildfire-related data and algorithms	$0	$0	-
7.3.7.4	Tracking and analysis of near miss data	$0	$0	-
7.3.8.1	Allocation methodology development and application	$0	$0	-
7.3.8.2	Risk reduction scenario development and analysis	$0	$0	-
7.3.8.3	Risk spend efficiency analysis	$0	$0	-
7.3.9.1	Adequate and trained workforce for service restoration	$240,000	$502,233	More labor costs than projected.
7.3.9.2	Community outreach, public awareness, and communications efforts	$0	$0	-
7.3.9.3	Customer support in emergencies	$0	$0	-
7.3.9.4	Disaster and emergency preparedness plan	$0	$0	-
7.3.9.5	Preparedness and planning for service restoration	$0	$0	-
7.3.9.6	Protocols in place to learn from wildfire events	$0	$0	-
7.3.10.1	Community engagement	$75,000	$92,084	Actual costs were slightly higher than originally anticipated.
7.3.10.2	Cooperation and best practice sharing with agencies outside CA	$0	$0	-
7.3.10.3	Cooperation with suppression agencies	$0	$0	-
7.3.10.4	Forest service and fuel reduction cooperation and joint roadmap	$0	$0	-
TOTAL		**$30,699,054**	**$33,331,095**	**-**

IV. 2020 WMP INITIATIVE IMPACT ON PSPS

WSD Guidance: Submit a description of whether the implementation of WMP initiatives changed the threshold(s) for triggering a PSPS event and/or reduced the frequency, scale, scope and duration of PSPS events.

A. 2020 WMP Initiative Impact on PSPS Thresholds

Liberty's PSPS thresholds are currently fixed and do not change based on initiative progress. Liberty anticipates that, as these initiatives progress, more data can be used to evaluate wildfire risk reduction impacts. Liberty may find a different way to combine existing fire and weather based threshold modeling with initiative risk reduction.

B. WMP Initiative Impact on Frequency, Scale, Scope and Duration of PSPS Events

Most WMP initiatives generally support Liberty's vision for mitigating PSPS events and customer impacts resulting from PSPS events. Specifically, the combination of covered conductor installations, resiliency corridors, and microgrids will greatly reduce impacts and frequency of PSPS events and service interruptions.

It is important to note that Liberty, in its history, has had only one PSPS event. Since that event, Liberty has taken many steps to establish its PSPS program through the development of protocols, procedures, and the establishment of PSPS thresholds detailed throughout its 2021 WMP Update. The PSPS work over the last two years, in combination with an anticipated increase in fire weather events (i.e. RFW, longer fire season, high winds, etc.), may lead to more frequent use of PSPS in the next 10 years. Therefore, the information presented in Table 2 below evaluates how implementation of Liberty's 2020 WMP initiatives are anticipated to affect a given PSPS characteristic, rather than whether a PSPS characteristic will increase/decrease in the next 10 years when compared to historic use of PSPS.

Table 2: Anticipated Impact of 2020 WMP Initiatives on PSPS Event Characteristics

PSPS characteristic	Anticipated Impact of 2020 WMP Initiatives	Comments
Number of customers affected by PSPS events (total)	Decrease	In time, grid hardening efforts such as covered conductor, microgrids, and the addition of sectionalizing devices will help to reduce the number of customers affected by PSPS.

PSPS characteristic	Anticipated Impact of 2020 WMP Initiatives	Comments
Number of customers affected by PSPS events (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	In time, grid hardening efforts such as covered conductor, microgrids, and the addition of sectionalizing devices will help to reduce the number of customers affected by PSPS.
Frequency of PSPS events in number of instances where utility operating protocol requires de- energization of a circuit or portion thereof to reduce ignition probability (total)	Decrease	Weather is the primary factor that drives PSPS frequency. In time, grid hardening efforts, such as covered wire and microgrids, will eventually lead to higher thresholds for de-energization, which would potentially reduce the frequency of PSPS events.
Frequency of PSPS events in number of instances where utility operating protocol requires de- energization of a circuit or portion thereof to reduce ignition probability (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	Weather is the primary factor that drives PSPS frequency. In time, grid hardening efforts, such as covered wire and microgrids, will eventually lead to higher thresholds for de-energization, which would potentially reduce the frequency of PSPS events.
Scope of PSPS events in circuit- events, measured in number of events multiplied by number of circuits targeted for de-energization (total)	Decrease	The work that results in reducing impact to customers and the frequency of events will also reduce the scope of PSPS events.
Scope of PSPS events in circuit- events, measured in number of events multiplied by number of circuits targeted for de-energization (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	The work that results in reducing impact to customers and the frequency of events will also reduce the scope of PSPS events.
Duration of PSPS events in customer hours (total)	Decrease	Weather events determine the length of time circuits need to be de-energized. If scope and number of customers are being reduced over time, then re-energization time should decrease which is a factor in the duration of PSPS events.
Duration of PSPS events in customer hours (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	Weather events determine the length of time circuits need to be de-energized. If scope and number of customers are being reduced over time, then re-energization time should decrease which is a factor in the duration of PSPS events.

V. 2020 WMP WSD DEFICIENCIES AND LIBERTY CORRECTIVE ACTIONS

WSD Guidance: Submit a summary of all defects identified by the WSD within the annual compliance period, the corrective actions taken and the completion and/or estimated completion date.

A. 2020 WMP Deficiencies Identified by WSD in 2020

Table 3: 2020 WMP Deficiencies Identified by WSD in 2020

Deficiency Number	Deficiency Title	Corrective Actions Taken	Completion and/or Estimated Completion Date
Guidance-3, Class A	Lack of Risk Modeling to inform Decision-Making	Liberty established an interim risk modeling approach designed to inform management of various risk factors (tree risk, asset risk, wildfire risk, and performance risk) used to profile risk by circuit and target areas of concern. This modeling approach uses quantitative metrics (asset condition, tracking ignition drivers, and tree hazards) that will also be utilized in the RBDM model. Reax developed a fire consequence model to map Liberty's service territory into 33 sections or polygons that displayed similar wildfire risk profiles. Each polygon was assigned a Reax wildfire risk rating of low, moderate, high, or very high wildfire risk. The Reax model simulated the fire spread impact of hundreds of thousands of ignitions along Liberty's overhead lines using historical weather data, layering terrain and topography maps, fire suppression factors, and population/structure density data to analyze and group areas of concern. Mapped polygons were discussed and evaluated with Liberty's wildfire risk team and the report and maps were completed in October 2020. Liberty utilized Reax maps to compare and present to management the differences between current HFTD ratings with Reax ratings. The Reax wildfire consequence fire model assigned a very high fire risk polygon that completely covered the current HFTD 3 area in South Lake Tahoe. In addition to identifying more areas of concern in South Lake Tahoe, the Reax mapping also identified areas in North Lake Tahoe as high wildfire risk and thus expanded Liberty's area of concern. Management is still processing the effects of this new analysis on current operations and is dedicated to incorporating the expanded regions of increased wildfire risk from the Reax study into work practices. The planned initiatives include and reference the Reax study when applied. Liberty utilized PowerBI to import various data sets including the results of the System Survey and tree inspection and work identified layered with the Reax maps to assess asset risk of failure and tree risk on an interim basis. This analysis visually displays for management areas of highest risk of probability of ignition using asset condition factors and tree risk of falling on power lines until remediation work is complete. Liberty has finished its first generation wildfire risk model as of February 2021.	Mapped polygons and the associated report were completed in October 2020. Liberty finished its first generation wildfire risk model as of February 2021.
Guidance-1, Class B	Lack of risk spend efficiency	Liberty built its wildfire risk model with the support of its wildfire engineering consultant. The wildfire risk model resembles those of the larger IOUs, utilizing methods such as MARS/MAVF and RSE.	

Deficiency Number	Deficiency Title	Corrective Actions Taken	Completion and/or Estimated Completion Date
	(RSE) information	The following initiatives have RBDM RSEs in place but have not informed decision-making since their completion in February 2021: • Covered conductor • Undergrounding • Targeted G.O.95 intrusive inspection and remediation (replace/repair schedules) • Enhanced vegetation management • Microgrid • Fuse Expulsion Replacement Program • Distribution fault anticipation technology Other initiatives that were evaluated but did not use or have RBDM RSEs include: • Quality assurance/quality control and tree inventory database efforts were considered more foundational to risk reduction and hard to quantify reductions in ignitions. • Asset management and inspection will use RBDM for only the enhanced inspections and remediation work initiative. • Automatic reclosers and weather stations are currently under evaluation but were not modeled. They were evaluated using subject matter expert judgment about the system and budgeting constraints because many of the decisions were made prior to the RBDM wildfire risk model completion.	
Guidance-4, Class B	Lack of discussion on PSPS impacts	Liberty discusses the impact of WMP Initiatives throughout its 2021 WMP Update. Most WMP initiatives generally support Liberty's vision for mitigating PSPS events and customer impacts resulting from PSPS events. Liberty's PSPS thresholds are currently fixed and do not change based on initiative progress. Liberty anticipates that, as these initiatives progress, more data can be used to evaluate wildfire risk reduction impacts. Liberty may find a different way to combine existing fire and weather based threshold modeling with initiative risk reduction.	Liberty filed its 2021 WMP Update on March 5, 2021.
Guidance-6, Class B	Failure to disaggregate WMP initiatives from standard operations	Liberty completed the WSD Performance Metrics Table 12 with the submission of its 2021 WMP Update and Q4 WMP Quarterly Report. Table 12 includes 2020 spend for each WMP initiative and indicates the Memorandum Account used for new WMP initiatives.	Liberty filed its 2021 WMP Update on March 5, 2021.
Guidance-9, Class B	Insufficient discussion of pilot programs	Liberty calculated RSE's related to four of its pilot programs, Distribution Fault Anticipation (DFA), Light Detection and Ranging ("LiDAR") within the Vegetation Management initiative category, the Sagehen Microgrid project within the Grid Topology improvements initiative, and the Covered Wire program. Liberty presents the RSE's in its 2021 WMP Update as Attachment C: WMP	Liberty filed its 2021 WMP Update on March 5, 2021.

Deficiency Number	Deficiency Title	Corrective Actions Taken	Completion and/or Estimated Completion Date
		Risk Spend Efficiency Calculations, as well as in Table 12 of Attachment A. Liberty also discusses its pilot projects within the detailed initiative description section (7.3) of its 2021 WMP Update.	
Guidance-11, Class B	Lack of detail on plans to address personnel shortages	Liberty discusses the workforce requirements for WMP initiative categories in Section 5.4 of its 2021 WMP Update. Liberty provides the metrics it uses to track the effectiveness of its recruiting programs in Section 4.6 of its 2021 WMP Update. Liberty describes the data that is captured as "applicant source information," and provides the percentage of recruits that were working for another California utility immediately prior to being hired in Section 4.6 of its 2021 WMP Update.	Liberty filed its 2021 WMP Update on March 5, 2021.
LIB-1, Class B	Liberty did not describe methods for tracking effectiveness of its covered conductor initiative	Liberty describes its methods for tracking the effectiveness of its covered conductor initiative in its 2021 WMP Update. Liberty is pursuing a targeted approach for its future covered conductor projects that involves the following steps: identify at-risk wildfire areas, gather and organize risk-related data by circuit and analyze data, develop a plan for each circuit, track performance of covered conductor program by circuit or segment using visualization applications. Liberty's project scope and design for all covered conductor projects includes replacing and installing new overhead assets, in addition to new crossarms, lightning arrestors, fuses, and other hardware. The vegetation management group also inspects the proposed line installation route for all capital jobs to evaluate need for additional tree work.	Liberty filed its 2021 WMP Update on March 5, 2021.
LIB-2, Class B	Liberty reports inspection frequencies that raise concerns about effectiveness	Liberty addresses the WSD concern about inspection frequencies in Section 7.3.5 of its 2021 WMP Update.	Liberty filed its 2021 WMP Update on March 5, 2021.

VI. CONCLUSION

Liberty appreciates this opportunity to provide this 2020 WMP Annual Report on Compliance and looks forward to working with the Commission and other stakeholders to advance Liberty's wildfire mitigation planning efforts.

Respectfully submitted,

/s/ Dan Marsh

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