2022
Wildfire Mitigation Plan

May 6, 2022

PacifiCorp

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ACRONYMS

ACS	American Community Survey
AFN	Access and functional needs
ANSI	American National Standards Institute
CPUC	California Public Utilities Commission
DFA	Distribution fault anticipation
ECC	Emergency Coordination Center
EFR	Elevated fire risk
ERC	Energy release component
FPI	Fire potential index
GACC	Geographic Area Coordination Center
GHG	Greenhouse gas
GO 95	California General Order 95
GRC	General rate case
HWW	High Wind Warning
HFTD	High fire threat district
IOU	Investor-owned utility
IR	Infrared
iUTI	Integrated utility threat index
LRAM	Localized Risk Assessment Model
MARS	Multi-attribute risk score
MAVF	Multi-attribute value function
NLCD	National Land Cover Database
NWS	National Weather Service
PDZ	Power de-energization zone
PSPS	Public Safety Power Shutoff
QA/QC	Quality assurance/quality control
RAMP	Risk assessment mitigation phase
RF	Radio frequency
RSE	Risk-spend efficiency
S-MAP	Safety model and assessment proceeding
SCADA	Supervisory control and data acquisition
SME	Subject matter expert
TCC	Time current characteristic
WFA-E	Wildfire Analyst-Enterprise
WMP	Wildfire mitigation plan
WRF	Weather research and forecast
WRRM	Wildfire Risk Reduction Model
WSAB	Wildfire Safety Advisory Board
WUI	Wildland-urban interface
ZOP	Zone of protection

EXECUTIVE SUMMARY

Despite years of focus on wildfire prevention, particularly in California, wildfires continue to impact communities at a more substantial rate than previously recorded. This has exacerbated the costs of wildfire in terms of both loss of human life and property damage. While electric utilities have always needed to mitigate against the potential of wildfire, the continuing growth of the wildland-urban interface (WUI), climate change and a host of other variables require even greater focus to prevent wildfires.

For decades the California Public Utility Commission (CPUC or Commission) has worked to address the specific risks created by the operation of an electric grid through regulations and programs, with even more substantial and targeted efforts over the past several years. PacifiCorp, which does business as Pacific Power in California, has been an active participant as these efforts have evolved. The CPUC first initiated a decade-long fire safety rulemaking in 2008. The first phase of this rulemaking focused on immediate measures in the highest fire risk area, in the seven counties of southern California. Thereafter, rules (codified in General Orders [GO] 95, 165 and 166) having a longer timeline for implementation were developed to reduce the risk of fire ignition caused by overhead utility systems. These rules culminated at approximately the same time the state was experiencing widespread drought, and the company was directed to identify and implement actions, including these new rules, to address wildfire risk on its system. As a result, a Fire Prevention Plan and a Drought Mitigation Plan were prepared and implemented starting in 2014.

In early 2018, as the multi-phase rulemaking concluded, the state of California experienced catastrophic wildfires in both northern and southern California, spurring greater efforts to augment the Drought Mitigation and Fire Prevention plans. In response to Senate Bill (SB) 901, California took a comprehensive approach to mitigating wildfires while also working to create a more resilient electric grid. A key element of SB 901, Public Utilities Code § 8386 and resolutions WSD-002, WSD-005 and WSD-011, is the requirement for all electric utilities to develop and implement Wildfire Mitigation Plans (WMP or Plan). These WMPs were first filed and approved in 2019, while in 2020 the plans were bolstered with process changes developed by the nascent Wildfire Safety Division (WSD).

Starting in 2020, WMPs are to be filed in a three-year cycle, with annual updates until the planning period terminates. The Plan builds on the company's previous filings, in addition to incorporating substantial changes based on stakeholder feedback and input gained through the WSD review process. The 2021 Update seeks to fill gaps identified in the 2020 WMP and address feedback on the company's Remedial Compliance Plan (RCP) filing and Quarterly Updates. Each of the improvements in this Update represents another incremental step towards identification of wildfire risk, strategic identification of options available to mitigate the risk and prioritization and rationalization for each of these mitigation measures.

The first WMPs were developed and filed pursuant to SB 901 in the Commission's

Rulemaking (R.) 18-10-007. Following approval of the 2019 WMPs and the filing and conditional approval of the 2020 WMP, RCP and Quarterly Report, the company has continued to engage with stakeholders, regulators including the Commission, WSD, public safety partners, fire science experts and other utilities and utility experts, to improve and refine its mitigation and planning process. The end goal of these efforts is to improve wildfire resilience and safety for our customers and the broader public using the most appropriate, timely and cost-effective mitigation measures.

Where possible, this update outlines successes and areas where improvements have been made, as well as areas still ripe for improvement. PacifiCorp has continued to improve upon current and legacy datasets to bolster the accessibility of the data provided and, as analytical methods and discoveries emerge, has rapidly incorporated them into the plan to yield better outcomes. PacifiCorp remains fully committed to the continued development and improvement of the company's risk-based decision-making framework; it should be noted, however, that PacifiCorp does not have the risk assessment mitigation phase (RAMP)/Safety model and assessment proceeding (S-MAP) requirements from proceeding R.20-07-013, as the three larger IOUs have. The company has leveraged lessons learned from its experience and the experience of other utilities, guidance from the Commission's initiatives, and engineering and operational best practices to evolve its approach to managing wildfire risk. This experience includes years of experience implementing safety and reliability risk mitigation programs. As a result, many of the initiatives and programs identified in this plan are an extension or augmentation of scope for already existing programs (e.g., the company's vegetation maintenance inspection and correction programs). This experience was also leveraged with historical data when new programs or activities were necessary (e.g., installation of covered conductor).

To date, PacifiCorp has been able to achieve substantial success through implementation of its plans. Key objectives for 2022 include continued implementation of baseline programs, initiation of new programs such as expulsion fuse replacements and installation of fault indicators, development of new technology pilots in the areas of distribution inspections and wildfire detection, and significant investment and advancement of situational awareness through procurement and implementation of several Technosylva modules. These key investments will advance the maturity of multiple initiatives, including risk mapping, the development of a quantitative risk-spend efficiency (RSE), resource allocation, and operational decision-making. Obtaining Technosylva tools will also allow for more precision in the application of mitigation efforts, such as Public Safety Power Shutoff (PSPS). PacifiCorp also plans to implement two pilot programs, a wildfire detection pilot for enhanced situational awareness and an enhanced overhang reduction pilot.

INTRODUCTION

The California Public Utilities Commission (CPUC) guidance in Decision (D.)19-05-036 included substantive and procedural requirements for future Wildfire Mitigation Plans (WMP) based on lessons learned during the first WMP (2019) evaluation and established an expectation for improvement in the WMPs each year. As such, the Office of Energy Infrastructure Safety (Energy Safety), formerly the CPUC's Wildfire Safety Division, has matured the guidelines and reporting requirements for each WMP and WMP Update.

Overview of WMP Guideline Improvements During the 3-year Plan Cycle (2020 – 2022)

- ***2020 WMP Guideline Improvements*** *– The 2020 WMP submission and review process included substantial changes from earlier guidance, which streamlined the structure and consistency in data submissions, requested additional supporting data earlier in the WMP process, and utilized a more structured and consistent approach to evaluating the WMPs. The 2020 WMPs were the base year in a three-year cycle from 2020-2022.*

- ***2021 WMP Guideline Improvements*** *– The 2021 Guidelines were updated based on several guiding principles from lessons learned, comments from stakeholders, and input from the Wildfire Safety Advisory Board (WSAB) during the 2020 WMP evaluation period. This feedback informed the development of four key elements for the 2021 WMP submission and review process:*

  1. *Frontloaded data collection. Process revisions for this element extended the timeframe for Energy Safety and stakeholder review of relevant utility[1] data in advance of the WMP submission and review period, while also reducing the need for follow-up data requests. In addition, with these revisions, utilities submit some data through Quarterly Reports prior to the development of the annual WMP.*
  2. *Standardized templates for utility WMP submission. The 2021 Guidelines included additional templates to facilitate WMP evaluations and comparisons across utility WMPs and identify relevant supporting information. The guidelines also introduced standardization for narrative sections and additional sub-headings. A specific data schema and automated calculation checklist also now standardize Quarterly Reports.*

[1] The term "utility" is used interchangeably with "electrical corporation."

3. *Systematized qualitative evaluation. The guidelines established an assessment framework to increase objectivity, consistency and efficiency of WMP evaluations.*

4. *Tracked utility progress towards wildfire and Public Safety Power Shutoff (PSPS) risk reduction. The 2021 Guidelines provided instructions and guidance for the first annual WMP Updates to the initial three-year plans submitted by the Utilities in 2020. The 2021 WMP Updates highlighted the progress each utility made since 2020.*

- ***2022 WMP Guideline Improvements** – In a similar spirit of continuous improvement, the 2022 WMP Update Guidelines (2022 Guidelines) include new requirements and updates based on lessons learned and comments received from various stakeholder groups (e.g., the public, utilities, WSAB, and Energy Safety staff) during the 2021 WMP evaluation period. As 2022 is the final year of the 3-year plan cycle (2020 – 2022), the 2022 Guidelines primarily correct errors, address omissions, and inconsistencies, and incorporate minor improvements to structure, process, and data reporting elements. Changes are minimal to enable comparison across 2020-2022 WMPs and are as set forth below.*

Naming Convention

To improve the administrative management of WMP submissions, the electronic file names for the WMPs and associated document/data submissions must follow the standardized electronic naming convention illustrated in Table 1 below. The electronic file name(s) must include, in order, the naming convention identified in each column (without quotation marks), with an underscore between the character string of each column. See examples below.

Table 1: Electronic file naming convention with examples

Date Submitted (Year- Month-Day)	***Utility Abbreviated Name***	***Document Year***	***Document Type***	***Revision Number***
"2022-02-05"	• *"PGE" (Pacific Gas & Electric Company)* • *"SDGE" (San Diego Gas & Electric)* • *"SCE" (Southern California Edison)* • *"BVES" (Bear Valley Electrical Services)* • *"LU" (Liberty Utility)* • *"PC" (PacifiCorp)* • *"HWT" (Horizon West)* • *"TBC" (Trans Bay Cable)*	*"2022"*	• *"WMP" (Wildfire Mitigation Plan)* • *"WMP-Update" (Wildfire Mitigation Plan Update)* • *"Survey" (Maturity Model Survey)* • *"Metrics" (Performance Metrics Data)* • *"RNR" (Revision Notice Response)* • *"DSSR" (Data Schema Status Report)* • *"COR" (Change Order Report)* • *"PR" (Progress Report)* • *"QDR" (Quarterly Data Report)* • *"QIU" (Quarter Initiative Update)*	• *R0 (First Version)* • *R1 (Revision 1)* • *R2 (Revision 2)*

Examples:

- ***First Version of a WMP Submission:*** *"2022-02-05_PGE_2022_WMP-Update_R0", which refers to the PG&E 2022 WMP Update submitted on Feb 05, 2022, first version*
- ***Updated submission in response to Energy Safety Revision Notices:*** *"2022-06-05_HW_22_RNR_R1", which refers to the Horizon West Revision Notice Response submitted on June 5, 2022, revision 1*
- ***Maturity Model submission:*** *"2022-04-05_TBC_2022_Survey_R0", which refers to the Trans Bay Cable 2022 Maturity Model Survey submitted on April 5, 2022, first version*
- ***Quarter 2 Report data submission:*** *"2022-05-05_LU_2022_Q2-data_R0", which refers to the Liberty Utility 2022 Quarter 2 Report data submitted on May 5, 2022, first version*

***WMP** Structure*

The structure and organization of the 2022 WMP Updates must follow the eight sections and appendix indicated in Table 2 below.

Table 2: Structure of2022 WMP update

Section # and Title	***General Content***
Section 1 *– Persons responsible forexecuting the plan*	*Contact information for responsible executives, program owners, and experts*
Section 2 *– Adherence to statutoryrequirements*	*Checklist for each requirement with associated section and page number for where a requirement is addressed in the WMP*
Section 3 *– Actuals and planned spending*	*Cost summary tables and impacts toratepayers*
Section 4 *– Lessons learned and risk trends*	*1, 3, and 10-year investor-owned utility (IOU) outlook, projected trends in wildfire risk, research reports and proposals, and model and metric calculation methodologies*
Section 5 *– Inputs to the plan and directional vision*	*Goals, objectives, program targets, and worker qualifications*
Section 6 *– Metrics and underlying data*	*Placeholder for quarterly submissions of WMP metrics. To be filled in by data from prior submissions and Quarterly Data Reports (QDR)*
Section 7 *– Mitigation initiatives*	*Reporting of initiative progress, expenditures,and Risk-Spend Efficiency (RSE)*
Section 8 *– Public Safety Power Shutoff*	*PSPS narrative and data, including customer impact and cost*
Section 9 *– Appendix*	*Citations to relevant statutes, Commission directives, proceedings and orders, and detailed discovery log.*

General Instructions

The following subsection provides detailed instructions for preparing the 2022 WMP Update.

Narratives

Each section of the WMP is required to include narrative responses. The narrative responses must provide qualitative descriptions and explanations of the requested information, supported with a variety of visual aids (e.g., maps, summary tables, informatics, diagrams, flow charts, photographs, sample calculations/equations) and other supporting documentation to facilitate communication and substantiation of concepts and strategies. Each narrative must be clear, concise, and include a high-level bulleted summary of key takeaways for the respective section (where appropriate). WMP Updates must be limited in duplication of narratives across different sections.

Cross-Referencing

The WMP Update must include cross-referencing and hyperlinks to minimize duplication of narratives and provide quick referencing to other relevant sections. All figures and tables must incorporate the use of captions with associated references in the main body of the WMP using hyperlinks. PDFs must incorporate the use of electronic bookmarks for all sections, main headings, and sub-headings.

Quantitative Responses

Use the template tables for reporting quantitative data according to the instructions provided in the respective sections. If a table includes comment boxes, the comment boxes may be extended as needed. Some tables, such as those in Section 3, require reporting directly in the WMP alongside the narrative content. Quarterly Data Reports (QDR) must include the required data in a separate spreadsheet document following the standard format in Attachment 3. Completely fill out the data tables including both existing and updated data. Each section must include a narrative identifying updated tables.

Protocols for Inaccessible Data/Information

If any portion of the WMP requires information that the utility cannot collect and/or is not obtainable from peer utilities, the utility is required to work with federal-, state-, and local- agencies, stakeholders, or partners to obtain the necessary information. When requested information is not collected by any stakeholder, then the utility must identify these circumstances and provide a description of an alternative source of information or proxy that most closely fits the original requirement. The WMP shall clearly cite the source(s) of the data used in lieu of the required data.

For example, by the WMP submission deadline, a utility may not have a full accounting of the value of property destroyed by utility-related ignitions each year due to ongoing investigation into the cause of one or more wildfires within its service territory. In this example, the utility is required to indicate: 1) the known sum of the value of property determined by the relevant fire Authorities Having Jurisdiction (AHJs) to have been destroyed by utility-related ignitions in that year, even if this summation is incomplete, and 2) a list of the wildfires in that year, and an estimation of the value of property destroyed by each wildfire, for which utility facilities are being investigated as potential sources of ignition but for which the cause is still undetermined. The utility is required to cite all data sources used in the calculations.

Finally, the utility is required to provide a plan for improving its data collection and/or cooperation with partners for collecting the required information, including a timeline for implementation. If any of the requested information is confidential, the utility is required to submit two versions to Energy Safety – one that includes all the requested information and a second that redacts the confidential information.

GENERAL GLOSSARY OF DEFINED TERMS

Term	*Definition*
10-hour dead fuel moisture content	*Moisture content of small dead vegetation (e.g.., grass, leaves, which burn quickly but not intensely), which can respond to changes in atmospheric moisture content within 10 hours.*
Access and functional needs (AFN) populations	*Per Public Utilities Code (Pub. Util. Code) § 8593.3 and D.19-05-042, individuals who have developmental or intellectual disabilities, physical disabilities, chronic conditions, injuries, limited English proficiency or who are non-English speaking, older adults, children, people living in institutionalized settings, or those who are low income, homeless, or transportation disadvantaged, including, but not limited to, those who are dependent on public transit or those who are pregnant.*
Authority Having Jurisdiction	*AHJ, party with assigned responsibility, depending on location and circumstance.*
Asset (utility)	*Electric lines, equipment, or supporting hardware.*
At-risk species	*Species of vegetation that have an elevated risk of (1) coming into contact with powerlines, (2) causing an outage or ignition, and/or (3) easily ignitable and within close enough proximity to potential arcing, sparks and/or other utility equipment thermal failures. "At-risk species" must be a function of species-specific characteristics including growth rate, failure rate of limbs, trunk, and/or roots (as compared to other species), height at maturity, flammability, vulnerability to disease or insects, etc.*
Baseline (ignition probability, maturity)	*A measure, typically of the current state, which establishes a starting point for comparison with measures from other states.*
Carbon dioxide equivalent	*Tons of greenhouse gases (GHG) emitted, multiplied by the global warming potential relative to carbon dioxide.*
Circuit mile	*The total length in miles of separate circuits regardless of the number of conductors used per circuit*
Contractor	*Any individual in the temporary and/or indirect employ of the utility whose limited hours and/or time-bound term of employment are not considered as "full-time" for tax and/or any other purposes.*

Critical facilities and infrastructure	*For brevity in the WMP, "critical facilitates and infrastructure" may be shortened to "critical infrastructure" and/or "critical facilities" throughout the WMP. Critical facilities and infrastructure are defined in accordance with the definition adopted in D.19-05-042 and modified in D.20-05- 051: those facilities and infrastructure that are essential to the public safety and that require additional assistance and advance planning to ensure resiliency during de-energization events. Namely:*
	• *Emergency Services Sector*
	  ○ *Police Stations*
	  ○ *Fire Station*
	  ○ *Emergency Operations Centers*
	  ○ *Public safety answering points*
	• *Government Facilities Sector*
	  ○ *Schools*
	  ○ *Jails and prisons*
	• *Healthcare and Public Health Sector*
	  ○ *Public Health Departments*
	  ○ *Medical facilities, including hospitals, skilled nursing facilities, nursing homes, blood banks, health care facilities, dialysis centers and hospice facilities (excluding doctor offices and other non- essential medical facilities)*

Term	*Definition*

	• *Energy Sector*
	  ○ *Public and private utility facilities vital to maintaining or restoring normal service, including, but not limited to, interconnected publicly owned utilities and electric cooperatives*
	• *Water and Wastewater Systems Sector*
	  ○ *Facilities associated with the provision of drinking water or processing of wastewater including facilities used to pump, divert, transport, store, treat and deliver water or wastewater*
	• *Communications Sector*
	  ○ *Communication carrier infrastructure including selective routers, central offices, head ends,*
	  ○ *cellular switches, remote terminals and cellular sites*
	• *Chemical Sector*
	  ○ *Facilities associated with the provision of manufacturing, maintaining, or distributing hazardous materials and chemicals (including Category N-Customers as defined in D.01-06-085)*
	• *Transportation Sector*
	  ○ *Facilities associated with automobile, rail, aviation, major public transportation, and maritime transportation for civilian and military purposes*

Customer hours	*Total number of customers, multiplied by the average number of hours (e.g.., of power outage).*
Data cleaning	*Calibrating raw data to remove errors (including typographical and numerical mistakes).*
Dead fuel moisture content	*Moisture content of dead vegetation, which responds solely to current environmental conditions and is critical in determining fire potential.*
Detailed inspection	*In accordance with GO 165, an inspection where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.*
Enhanced inspection	*Inspection whose frequency and thoroughness exceeds the requirements of the detailed inspection, particularly if driven by risk calculations.*
Enterprise system	*A centralized information system that ensures data may be shared throughout all functional levels and management hierarchies of an organization, as needed.*
Evacuation impact	*Number of people evacuated, with the duration for which they are evacuated, from homes and businesses, due to wildfires.*
Evacuation zone	*Areas designated by CAL FIRE and local fire agency evacuation orders, to include both "voluntary" and "mandatory" in addition to other orders such as "precautionary" and "immediate threat".*
Fire Season	*The time of year that wildfires are most likely to take place for a given geographic region due to historical weather conditions, vegetative characteristics and impacts of climate change. Goals and targets which have milestones related to the onset, duration, or end of "fire season" or "height of fire season" must be accompanied with calendar dates.*
Frequently de-energized circuit	*A circuit which has been de-energized pursuant to a de- energization event to mitigate the risk of wildfire three or more times in a calendar year.*
Fuel density	*Mass of fuel (vegetation) per area which could combust in a wildfire.*

Term	Definition
Fuel management	*Removing thinning, or otherwise altering vegetation to reduce the potential rate of propagation or intensity of wildfires.*
Fuel moisture content	*Amount of moisture in each mass of fuel (vegetation), measured as a percentage of its dry weight.*
Full-time employee	*Any individual in the ongoing and/or direct employ of the utility whose hours and/or term of employment are considered as "full-time" for tax and/or any other purposes.*
GO 95 nonconformance	*Condition of a utility asset that does not meet standards established by General Order 95.*
Greenhouse gas (GHG) emissions	*Health and Safety Code 38505 identifies seven greenhouse gases that ARB is responsible to monitor and regulate to reduce emissions: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF3).*
Grid hardening	*Actions (such as equipment upgrades, maintenance, and planning for more resilient infrastructure) taken in response to the risk of undesirable events (such as outages) or undesirable conditions of the electrical system to reduce or mitigate those events and conditions, informed by an assessment of the relevant risk drivers or factors.*
Grid topology	*General design of an electric grid, whether looped or radial, with consequences for reliability and ability to support de- energization (e.g., being able to deliver electricity from an additional source).*
Hazard tree	*A tree that has a structural defect that makes it likely to fail in whole or in part.*
High Fire Threat District (HFTD)	*Per D.17-01-009, areas of the State designated by the Office of Energy Infrastructure Safety and CAL FIRE to have elevated wildfire risk, indicating where each utility must take additional action (per GO 95, GO 165, and GO 166) to mitigate wildfire risk.*
Highly rural region	*In accordance with 38 CFR 17.701, "highly rural" must be defined as those areas with a population of less than 7 persons per square mile. For the purposes of the WMP, "area" must be defined as census tracts.*
High Wind Warning (HWW)	*Level of wind risk from weather conditions, as declared by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings.2*
HWW overhead (OH) Circuit Mile Day	*Sum of overhead circuit miles of utility grid subject to High Wind Warnings (HWW, as defined by the NWS) each day within a given time, calculated as the number of overhead circuit miles that are under an HWW multiplied by the number of days those miles are under said HWW. For example, if 100 overhead circuit miles are under an HWW for 1 day, and 10 of those miles are under HWW for an additional day, then the total HWW OH circuit mile days would be 110.*
Ignition probability	*The relative possibility that an ignition will occur, probability is quantified as a number between 0% and 100% (where 0% indicates impossibility and 100% indicates certainty). The higher the probability of an event, the more certainty there is that the event will occur. (Often informally referred to as likelihood or chance).*

[2] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml

Term	Definition
Ignition-related deficiency	*Any condition which may result in ignition or has previously resulted in ignition, even if not during the past five years.*
Impact/consequence of ignitions	*The effect or outcome of a wildfire ignition upon objectives, which may be expressed by terms including, although not limited to, maintaining health, and safety, ensuring reliability, and minimizing economic and/or environmental damage.*
Initiative	*Measure or activity proposed or in process designed to reduce the consequences and/or probability of wildfire or PSPS.*
Inspection protocol	*Documented procedures to be followed to validate that a piece of equipment is in good condition and expected to operate safely and effectively.*
Invasive species	*A species that is: 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.*
Level 1 finding	*In accordance with GO 95, an immediate safety and/or reliability risk with high probability for significant impact.*
Level 2 finding	*In accordance with GO 95, a variable (non-immediate high to low) safety and/or reliability risk.*
Level 3 finding	*In accordance with GO 95, an acceptable safety and/or reliability risk.*
Life expectancy	*Anticipated years that a piece of equipment can be expected to meet safety and performance requirements.*
Limited English proficiency (LEP)	*Populations with limited English working proficiency based on the International Language Roundtable scale.*
Line miles	*The number of miles of transmission and/or distribution line. Differs from circuit miles because individual circuits, such as the two circuits of a double-circuit line, are not counted separately in circuit miles but are counted as separate total miles of line.*
Live fuel moisture content	*Moisture content within living vegetation, which can retain water longer than dead fuel.*
Lost energy	*Energy that would have been delivered if not for an outage.*
Major roads	*Interstate highways, U.S. highways, state and county routes.*
Match drop simulation	*Wildfire simulation method that takes an arbitrary ignition and forecasts propagation and consequence/impact.*
Medical baseline customers	*Residential customers with qualifying medical conditions and/or depend on power for qualifying medical devices for certain medical needs. For example, customers that have specific heating and cooling or mobility needs.*
Member of the public	*Any individual not employed by the utility.*
Multi-attribute value function	*Risk calculation methodology introduced during CPUC's S- MAP and RAMP proceedings.*
Near miss	*Previously used to define an event with probability of ignition. Redefined under "Risk event."*
Need for PSPS	*When the utility's criteria for utilizing PSPS are met.*

Term	Definition
Noncompliant clearance	*Rights-of-way whose vegetation is not trimmed in accordance with the requirements of GO 95.*
Outages of the type that could ignite a wildfire	*Outages that, in the judgement of the utility, could have ignited a wildfire.*
Outcome metrics	*Measurements of the performance of the utility and its service territory in terms of both leading and lagging indicators of wildfire, PSPS, and other consequences of wildfire risk, including the potential unintended consequences of wildfire mitigation work, such as acreage burned by utility-related ignitions.*
Overcapacity	*When the energy transmitted by utility equipment exceeds that of its nameplate capacity.*
Patrol inspection	*In accordance with GO 165, a simple visual inspection of applicable utility equipment and structures that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out during other company business.*
Percentile conditions	*Top X% of a particular set (e.g.., wind speed), based on a historical data set with sufficient detail. For example, "Top 95 percentile wind speeds in the last 5 years" would refer to the 5% of avg daily wind speeds recorded by each weather station. If 1,000 weather stations recorded average daily wind speeds over 10 days, then the 95th percentile wind speed would be the top 5% of weather station-days. In this example, there will be 10 days each with 1,000 weather station reports and a total of 10,000 weather station-days, so 50 observations will be in the top 5%. The lowest wind speed in this top 5% would be the "95th percentile wind speed".*
Planned outage	*Electric outage announced ahead of time by the utility.*
Preventive maintenance (PM)	*The practice of maintaining equipment on a regular schedule, based on risk, elapsed time, run-time meter readings, or number of operations. The intent of PM is to "prevent" maintenance problems or failures before they take place by following routine and comprehensive maintenance procedures. The goal is to achieve fewer, shorter, and more predictable outages.*
Priority essential services	*Critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies.*
Program targets	*Quantifiable measurements of activity identified in WMPs and subsequent updates used to show progress towards reaching the objectives.*
Progress metrics	*Measurements that track how much utility wildfire mitigation activity has changed the conditions of utility wildfire risk exposure or utility ability to manage wildfire risk exposure, in terms of leading indicators of ignition probability and wildfire consequences.*
Property	*Private and public property, buildings and structures, infrastructure, and other items of value that are destroyed by wildfire, including both third-party property and utility assets.*
PSPS event	*Defined as the time from the first public safety partner notified of a planned public safety de-energization to the final customer re-energized.*
PSPS risk	*The potential for the occurrence of a PSPS event expressed in terms of a combination of various outcomes of the event and their associated probabilities.*

Term	Definition
PSPS weather	*Weather that exceeds a utility's risk threshold for initiating a PSPS.*
Red Flag Warning (RFW)	*Level of wildfire risk from weather conditions, as declared by the NWS. For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings.3*
RFW OH Circuit Mile Day	*Sum of overhead circuit miles of utility grid subject to Red Flag Warning each day within a given time, calculated as the number of overhead circuit miles that are under an RFW multiplied by the number of days those miles are under said RFW. For example, if 100 overhead circuit miles are under an RFW for 1 day, and 10 of those miles are under RFW for an additional day, then the total RFW OH circuit mile days would be 110.*
Risk event	*An event with probability of ignition, including wires down, contacts with objects, line slap, events with evidence of heat generation, and other events that cause sparking or have the potential to cause ignition. The following risk events all qualify as risk events:* *Ignitions* *Outages not caused by vegetation* *Vegetation-caused outages* *Wire-down events* *Faults* *Other risk events with potential to cause ignitions*
Risk event simulation	*Simulation of what the consequence would have been of an ignition had it occurred.*
Risk-spend efficiency (RSE)	*An estimate of the cost-effectiveness of initiatives, calculated by dividing the mitigation risk reduction benefit by the mitigation cost estimate based on the full set of risk reduction benefits estimated from the incurred costs. For ongoing initiatives, the RSE can be calculated by determining the "marginal benefit" of additional spending in the ongoing initiative. For example, the RSE of an ongoing initiative could be calculated by dividing the mitigation risk reduction benefit from a 5% increase in spend by the cost associated with a 5% increase in spend*
Rule	*Section of public utility code requiring a particular activity or establishing a particular threshold.*
Run-to-failure	*A maintenance approach that replaces equipment only when it fails.*
Rural region	*In accordance with GO 165, "rural" must be defined as those areas with a population of less than 1,000 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" must be defined as census tracts.*
Safety hazard	*A condition that poses a significant threat to human life or property.*
Simulated wildfire	*Propagation and impact/consequence of a wildfire ignited at a particular point ('match drop'), as simulated by fire spread software.*
Slash	*Branches or limbs less than four inches in diameter, and bark and split products debris left on the ground because of utility vegetation management. This definition is consistent with Public Resources Code Section 4525.7.*

[3] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml

Term	Definition
Span	*The space between adjacent supporting poles or structures on a circuit consisting of electric lines and equipment. "Span level" refers to asset-scale granularity.*
System Average Interruption Duration Index (SAIDI)	*System-wide total number of minutes per year of sustained outage per customer served.*
Third-party contact	*Contact between a piece of electrical equipment and another object, whether natural (tree branch) or human (vehicle).*
Time to expected failure	*Time remaining on the life expectancy of a piece of equipment.*
Top 30% of proprietary fire potential index (FPI)	*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).*
Tree with strike potential / danger tree	*A tree within or adjacent to the utility right- of-way that has a structural defect or lean that makes it likely to fail in whole or in part and contact electrical equipment or facilities.*[4]
Unplanned outage	*Electric outage that occurs with no advance notice from the utility (e.g.., blackout).*
Urban region	*In accordance with GO 165, "urban" must be defined as those areas with a population of more than 1,000 persons per square mile as determined by the United States Bureau of the Census.*
Utility-related ignition	*Ignitions involving utility infrastructure or employees, including all ignitions determined by AHJ investigation to originate from utility infrastructure.*
Vegetation management	*Trimming, removal, and other remediations of vegetation used to maintain utility ROW and reduce the risk of outages, ignitions, and other disruption and danger.*
Vegetation risk index	*Risk index indicating the probability of vegetation- caused outages and/or ignitions along a particular circuit, based on the vegetation species, density, height, growth rate, etc.*
Weather normalization	*Adjusting metrics based on relative weather risk factors or indices*
Wildfire impact/ consequence	*The effect or outcome of a wildfire affecting objectives, which may be expressed, by terms including, although not limited to health, safety, reliability, economic and/or environmental damage.*
Wildfire risk	*The potential for the occurrence of a wildfire event expressed in terms of ignition probability, wildfire impact/consequence.*
Wildfire-only WMP programs	*Activities, practices, and strategies that are only necessitated by wildfire risk, unrelated to or beyond that required by minimum reliability and/or safety requirements. Such programs are not indicated or in common use in areas where wildfire risk is minimal (e.g., territory with no vegetation or fuel) or under conditions where wildfires are unlikely to ignite or spread (e.g., when rain is falling).*

[4] "Danger tree" is more specifically defined in California Code of Regulation Title 14 § 895.1.

Term	*Definition*
Wildland-urban interface (WUI)	*A geographical area identified by the state as a "Fire Hazard Severity Zone", or other areas designated by the enforcing agency to be a significant risk from wildfires, established pursuant to Title 24, Part 2, Chapter 7A.*
Wire down	*Instance where an electric transmission or distribution conductor is broken and falls from its intended position to rest on the ground or a foreign object.*

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1

PERSONS RESPONSIBLE FOR EXECUTING THE WMP

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*

Title, credentials, and components of responsible person(s) must be released publicly, but other contact information may be provided in a redacted file attached to the WMP submission.

Executive-level owner with overall responsibility

- *Name and title:*
- *Email:*
- *Phone number:*

Program owners specific to each section of the plan

Note: A program owner may own multiple sections, and multiple components across sections, but each section must have a program owner accountable.

Executive-level owner with overall responsibility

- Name and title: Allen Berreth, Vice President of Transmission and Distribution Operations
- Email: Allen.Berreth@Pacificorp.com
- Phone number: 503-813-6205

Program owners specific to each section of the plan

Section 1: Persons responsible for executing the plan

Program owner

- Name and title: Megan Buckner, Director of Wildfire Program Delivery
- Email: Megan.Buckner@PacifiCorp.com
- Phone number: 503-813-5209
- Component: entire section

Section 2: Adherence to statutory requirements

Program owner

- Name and title: Megan Buckner, Director of Wildfire Program Delivery
- Email: Megan.Buckner@PacifiCorp.com
- Phone number: 503-813-5209
- Component: entire section

Section 3: Actuals and planned spending

Program owner

- Name and title: Scott Liedtke, Director of Operational Performance Management
- Email: Scott.Liedtke@PacifiCorp.com
- Phone number: 503-813-6220
- Component: entire section

Program owner

- Name and title: Jeff Keyser, Director of Investment Delivery
- Email: Jeff.Keyser@PacifiCorp.com
- Phone number: 541-776-5494
- Component: entire section

Section 4: Lessons learned and risk trends

Program owner

- Name and title: Amy McCluskey, Managing Director of Asset Management and Wildfire Safety
- Email: Amy.McCluskey@PacifiCorp.com
- Phone number: 503-813-5493
- Component: entire section

Section 5: Inputs to the plan and directional vision

Program owner

- Name and title: Amy McCluskey, Managing Director of Asset Management and Wildfire Safety
- Email: Amy.McCluskey@PacifiCorp.com
- Phone number: 503-813-5493
- Component: entire section

Section 6: Metrics and underlying data

Program owner

- Name and title: Megan Buckner, Director of Wildfire Program Delivery

- Email: Megan.Buckner@PacifiCorp.com
- Phone number: 503-813-5209
- Component: entire section

Section 7: Mitigation initiatives

Program owner

- Name and title: Amy McCluskey, Managing Director of Asset Management and Wildfire Safety
- Email: Amy.McCluskey@PacifiCorp.com
- Phone number: 503-813-5493
- Component: entire section

- Name and title: Steve Vanderburg, Manager of Meteorology and Emergency Management
- Email: Steven.Vanderburg@PacifiCorp.com
- Phone number: 503-251-5180
- Component: Situational Awareness and Forecasting

- Name and title: Kevin Schiedler, Wildfire Mitigation Delivery Director
- Email: Kevin.Schiedler@PacifiCorp.com
- Phone number: 503-813-5595
- Component: Grid Hardening and System Hardening

- Name and title: Jon Connelly, Director of Asset Management
- Email: Jonathan.Connelly@PacifiCorp.com
- Phone number: 503-813-6152
- Component: Asset Management and Inspection

Section 8: Public Safety Power Shutoff

Program owner

- Name and title: Erik Brookhouse, Vice President of System Operations
- Email: Erik.Brookhouse@PacifiCorp.com
- Phone number: 503-251-5153
- Component: entire section

Section 9: Appendix

Program owner

- Name and title: Megan Buckner, Director of Wildfire Program Delivery
- Email: Megan.Buckner@PacifiCorp.com
- Phone number: 503-813-5209
- Component: entire section

1.1 VERIFICATION

Complete the following verification for the WMP submission:

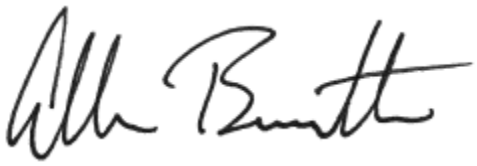
(See Rule 1.11)

(Where Applicant is a Corporation)

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 May 6th at Portland, Oregon



Allen Berreth, Vice President of Transmission & Distribution Operations

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2

ADHERENCE TO STATUTORY REQUIREMENTS

2 ADHERENCE TO STATUTORY REQUIREMENTS

Section 2 comprises a "checklist" of the Pub. Util. Code § 8386 © requirements and subparts. The utility is required to both affirm that the WMP addresses each requirement AND cite the section and page number where statutory compliance is demonstrated fully. Citations are required to use cross-referencing with hyperlinks. ***Note: Energy Safety reserves the right to automatically reject a WMP that does not provide substantiation for statutory compliance or does not provide citations to appropriate sections of the WMP.***

Table 2.1: Illustrative checklist provides an exemplar for the minimum acceptable level of information and citation for the statutory check list.

Table 2.1: Illustrative checklist

Requirement	Description	WMP Section & Page Number
2	The objectives of the plan	Section 4.1, pg. 13
11	Protocols for the de-energization of the electrical corporation's transmission infrastructure, etc.	Section 5 overview, pg. 30-31

Table 2.2: Statutory compliance matrix provides the full list of statutory requirements. A table like Table 2-2 is required with the appropriate citation for each requirement. If multiple WMP sections address a specific requirement, then references to all relevant sections with a brief indication of information provided in each section must be provided. The table must include each section reference separated by semi-colon (e.g., Section 5, pg. 30-32; (workforce); Section 7, pg. 43 (mutual assistance)) where appropriate, and associated hyperlinks to the referenced section.

Table 2.2: Statutory compliance matrix

Requirement	Description	WMP Section &Page Number
1	An accounting of the responsibilities of person(s) responsible for executing the plan	Section 1, pg. 17-20
2	The objectives of the plan	Section 5, pg. 110-127
3	A description of the preventive strategies and programs to be adopted by the electrical corporation to minimize the risk of itselectrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks	Section 7.3 pg.149-230

Requirement	Description	WMP Section &Page Number
4	A description of the metrics the electrical corporation plans to use to evaluate the plan's performance and the assumptions that underlie the use of those metrics	Section 6, pg. 128-132
5	A discussion of how the application of previously identified metrics to previous plan performances has informed the plan	Section 4.1, pg. 31-34
6	Protocols for disabling reclosers and de-energizing portions of the electrical distribution system that consider the associated impacts on public safety. As part of these protocols, each electrical corporation shall include protocols related to mitigating the public safety impacts of disabling reclosers and de-energizing portions of the electrical distribution system that consider the impacts on all the aspects listed in PU Code 8386c	Section 7.3.6.1, pg. 207 Section 7.3.6.2, pg. 208-209 Section 8.2, pg. 235-237
7	Appropriate and feasible procedures for notifying a customer who may be impacted by the de-energizing of electrical lines, including procedures for those customers receiving a medical baseline allowance as described in paragraph (6). The procedures shall direct notification to all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential de-energization for a given event	Sections 7.3.10.1, pg.225; 7.3.9; pg. 217; 8.2; pg. 235
8	Identification of circuits that have frequently been de-energized pursuant to a de-energization event to mitigate the risk of wildfire and the measures taken, or planned to be taken, by the electrical corporation to reduce the need for, and impact of, future de-energization of those circuits, including, but not limited to, the estimated annual decline in circuit de- energization and de-energization impact on customers, and replacing, hardening, or undergrounding any portion of the circuit or of upstream transmission or distribution lines	Section 8.6 pg. 242
9	Plans for vegetation management	Section 7.3.5, pg.182
10	Plans for inspections of the electrical corporation's electrical infrastructure	Section 7.3.4 pg. 171
11	Protocols for the de-energization of the electrical corporation's transmission infrastructure, for instances when the de-energization may impact customers who, or entities that, are dependent upon the infrastructure	Section 8.2, pg. 235-237
12	A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the electrical corporation's service territory, including all relevant wildfire risk and risk mitigation information that is part of the Safety Model Assessment Proceeding and the Risk Assessment Mitigation Phase filings	Section 4.3 pg. 45-46
13	A description of how the plan accounts for the wildfire risk identified in the electrical corporation's Risk Assessment Mitigation Phase filing	N/A – As an SMJU, PacifiCorp did not file a RAMP. General risk assessment models used are described in Section 4.5.1, pg. 31
14	A description of the actions the electrical corporation will take to ensure its system will achieve the highest level of safety, reliability, and resiliency, and to ensure that its system is prepared for a major event, including hardening and modernizing its infrastructure with improved engineering, system design, standards, equipment, and facilities, such as undergrounding, insulation of distribution wires, and pole replacement	Section 7.3.3, pg. 161

Requirement	Description	WMP Section &Page Number
15	A description of where and how the electrical corporation considered undergrounding electrical distribution lines within those areas of its service territory identified to have the highest wildfire risk in a commission fire threat map	Section 9.4. pg. 256 Section 7.3.3.3, pg. 161
16	A showing that the electrical corporation has an adequately sized and trained workforce to promptly restore service after a major event, considering employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered contracts with the electrical corporation	Section 5.4.4, pg. 124
17	Identification of any geographic area in the electrical corporation's service territory that is a higher wildfire threat than is currently identified in a commission fire threat map, and where the commission must consider expanding the HFTD based on new information or changes in the environment	Section 4.2.1, pg. 38-45
18	A methodology for identifying and presenting enterprise-wide safety risk and wildfire-related risk that is consistent with the methodology used by other electrical corporations unless the commission determines otherwise	Section 7.3.1, pg. 150
19	A description of how the plan is consistent with the electrical corporation's disaster and emergency preparedness plan prepared pursuant to Section 768.6, including plans to restore service and community outreach	Section 7.3.9.4, pg. 222
20	A statement of how the electrical corporation will restore service after a wildfire	Section 7.3.9, pg. 217
21	Protocols for compliance with requirements adopted by the commission regarding activities to support customers during and after a wildfire, outage reporting, support for low-income customers, billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, repair processing and timing, access to electrical corporation representatives, and emergency communications	Section 7.3.9.3, pg. 219
22	A description of the processes and procedures the electrical corporation will use to do the following: Monitor and audit the implementation of the plan. Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies. Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.	Section 7.2, pg. 144-148

3

ACTUALS AND PLANNED SPENDING FOR MITIGATION PLAN

3 ACTUALS AND PLANNED SPENDING FOR MITIGATION PLAN

3.1 SUMMARY OF WMP INITIATIVE EXPENDITURES

Table 3.1 Summary of WMP expenditures – Total summarizes the projected costs (in thousands of US $) per year over the three-year WMP cycle, including actual expenditures for past years. In Table 3.1-2, break out projected costs per category of mitigations, over the three-year WMP plan cycle. In reporting "planned" expenditure, use data from the corresponding year's WMP or WMP Update (i.e., 2020 planned expenditure must use 2020 WMP data). The financials represented in the summary tables below equal the aggregate spending listed in the mitigations financial tables reported quarterly. Nothing in this document is required to be construed as a statement that costs listed are approved or deemed reasonable if the WMP is approved, denied, or otherwise acted upon.

Table 3.1 Summary of WMP expenditures – Total (WMP Table 3.1-1)

Year	Spend in thousands of $USD
2020 Planned	$25,011
2020 Actual	$19,416
2020 Difference	$5,595
2021 Planned	$33,375
2021 Actual	$33,098
2021 Difference	$277
2022 Planned	$96,819
2020-22 Planned (with 2020 and 2021 Actual)	$149,333

Table 3.2. Summary of WMP expenditures by category (WMP Table 3.1-2)

WMP Category	2020			2021			2022	2020-2022 Planned (w/ 2020 and 2021 Actuals)
	Planned	Actual	Change	Planned	Actual	Change	Planned	
Risk and Mapping	$25	$186	($161)	$186	$188	($2)	$186	$1,348
Situational Awareness	$278	$1,209	($931)	$462	$1,197	($735)	$3,313	$5,719
Grid Design and System Hardening	$15,403	$8,788	$6,615	$25,035	$23,882	$1,153	$79,263	$32,670
Asset Management and Inspections	$1,219	$803	$416	$848	$919	($71)	$974	$80,985
Vegetation Management	$5,783	$6,999	($1,216)	$6,561	$6,639	($78)	$12,413	$26,051
Grid Operations	$2,000	$0	$2,000	$0	$0	$0	$0	$0
Data Governance	$25	$186	($161)	$210	$215	($5)	$400	$801
Resource Allocation	$278	$1,209	($931)	$0	$0	$0	$0	$1,209
Emergency Planning	$0	$0	$0	$0	$0	$0	$210	$210
Stakeholder Cooperation and Community Engagement	$0	$36	($36)	$73	$58	$15	$60	$154
Total	$25,011	$19,416	$5,595	$33,375	$33,098	$277	$96,819	$149,333

3.2 SUMMARY OF RATEPAYER IMPACT

For each of the years in Table 3.3 WMP electricity cost increase to ratepayers, report the actual and projected cost increases to ratepayers due to utility-related ignitions and wildfire mitigation activities engaged. For past years, account for all expenditures incurred in that year due to utility-related ignitions and wildfire mitigation activities. Below the table, describe the methodology behind the calculations.

Table 3.3 WMP electricity cost increase to ratepayers (WMP Table 3.2-1)

Outcome Metric Name	Annual Performance						Unit(s)
	Actual					Projected	
	2017	2018	2019	2020	2021	2022	
Increase in electric costs to ratepayer due to utility-related ignitions. (Total)	0	0	0	0	0	0	Dollar value of average monthly rate increase attributable to utility-related ignitions per year.
Increase in electric costs to ratepayer due to wildfire mitigation activities (total)	0	0	0	0	0	0	Dollar value of average monthly rate increase attributable to WMPs per year.

As the period of Table 3.3 ends in 2022, PacifiCorp does not have any cost increases to customers to report. In the company's 2023 General Rate Case, PacifiCorp is proposing an increase due to incremental wildfire mitigation spending. Pending this proceeding, PacifiCorp anticipates the effective date of this proposed increase will be January 1, 2023, thus the impact to customers will not begin until 2023. As such projected costs and impacts become available, PacifiCorp will provide this information, presumably in the company's 2023 WMP.

4

LESSONS LEARNED AND RISK TRENDS

4 LESSONS LEARNED AND RISK TRENDS

4.1 LESSONS LEARNED: HOW TRACKING METRICS ON THE 2020 AND 2021 PLANS INFORMED THE 2022 PLAN UPDATE

Describe how the utility's plan has evolved since the 2020 WMP and 2021 WMP Update submissions. Outline any major themes and lessons learned from the 2020 and 2021 plans, and subsequent implementation of the initiatives. Focus on how utility performance against the metrics used has informed the 2022 WMP Update. Include an overview map of the utility's service territory. If any of the lessons learned are derived from data, include visual/graphical representations of this/these lesson(s) learned.

PacifiCorp's wildfire mitigation efforts have continued to develop and evolve across all categories since the submission of the 2020 WMP and 2021 WMP Update. Program modifications are made based on customer feedback acquired through surveys, internal analysis and subject matter expertise, external industry collaboration and benchmarking, and feedback from stakeholders and regulators such as the Office of Energy Infrastructure Safety (OEIS). The subsections that follow address these modifications by category. The company's particular areas of focus in 2022 include enhancing data analytics and modeling capabilities, evaluating technologies and efficacy studies to assess wildfire mitigation strategies and PSPS risk, and enhancing PSPS preparedness.

4.1.1 Risk assessment and mapping

PacifiCorp continues to develop and mature models to better understand ignition probability, wildfire risk, and estimations of wildfire consequences along electric lines and equipment. The enhanced understanding and more predictive modeling methods better inform operational decision-making at PacifiCorp.

As an example, during 2021, PacifiCorp learned:

- Developing the Localized Risk Assessment Model (LRAM) with increasing granularity and accuracy advances risk-modeling capabilities. Improvements have been centered around weather granularity, automation of the tool refresh for current forecasts and improvement in specific (pilot) locations with vegetation satellite imagery of canopy density.

4.1.2 Situational awareness

Informed situational awareness is the cornerstone of any operational response to wildfire risk.

For example, during 2021, PacifiCorp learned:

- To have additional time to prepare, plan and execute a PSPS event is important to PSPS success. With the 48-hour forecast available in 2021, there was only a short time to plan and send notifications as per CPUC Resolution ESRB-8.[5]
    - To have data infrastructure and processing redundancy is relevant for added risk modeling tool reliability.
    - To explore the use of Technosylva modeling capabilities, with meteorology team help, and inform future decision-making processes during PSPS events after the full rollout of the software has been completed.
    - Risk-modeling automation can enable more real-time updates and facilitates what-if scenario planning.
    - Portable weather stations, which can be quickly installed at the first sign of concerning weather trends, provide detailed insight into remote areas without the delay required for permanent installations.

4.1.3 Grid design and system hardening

PacifiCorp continues to analyze its electric system to develop longer-term strategies that consider the changing climate and increasing wildfire risk, with a continued focus on mitigating PSPS impacts to customers.

During 2021, PacifiCorp learned:

- Hardening measures reduce system faults over time; this recognition was guided by Grid Design and System Hardening research studies (see Section 4.4.2 Research Findings on page 51).
- Accelerated remedies for expulsion fuse replacement are a relevant factor in system hardening; these remedies were implemented in the HFTD.
- The ability to underground certain areas can rely heavily on effective alignment with landowners.

4.1.4 Asset management inspections

PacifiCorp will continue to enhance its distribution and transmission inspection programs to identify potential issues not visible by traditional ground inspections where terrain or other constraints may limit the ability to perform a detailed ground inspection or where infrared (IR) inspections identify issues not seen during standard inspections.

[5] Updates to S-MAP are currently in deliberation under proceeding R. 20-07-013 – Order Instituting Rulemaking to Further Develop a Risk-based Decision-making Framework for Electric and Gas Utilities.

In 2021, PacifiCorp learned:

- Continued identification of conditions through IR inspections year over year highlights the effectiveness and supports continued implementation on an annual basis.
- Clear identification of fire risk conditions can facilitate prioritization and accelerated correction, consistent with or ahead of General Order timeline requirements.

4.1.5 Vegetation management and inspections

PacifiCorp will continue to enhance vegetation management programs.

In 2021, PacifiCorp learned:

- Identification of separate vegetation-related conditions expedites work completion.
- Performing environmental desktop prescreening expedites approval of vegetation management programs on federally managed land.

4.1.6 Grid operations and protocols

PacifiCorp continued to use alternative work practices in the HFTD during elevated fire risk weather conditions.

In 2021, PacifiCorp learned:

- Separate wildfire mitigation spend tracking enhances work tracking and reporting capabilities.

4.1.7 Data governance

PacifiCorp continued to build out and integrate various systems and data sources to support the WMP metrics tables and the GIS schema with the source systems of record.

In 2021, PacifiCorp learned:

- Internal stakeholder collaboration improves enterprise data governance awareness, policies, processes, and training.
- Development of documentation standards for metric and GIS schema logic promotes auditability of the data.
- A Central Repository reporting strategy that leverages common data sources to meet WMP nonspatial and GIS spatial reporting requirements can improve data reporting quality.

4.1.8 Resource allocation methodology

PacifiCorp has developed programs and tools to help with resource allocation across business units and asset classes for various risks.

In 2021, PacifiCorp learned:

- To collaborate with other utilities through workshops regarding the development and implementation of PacifiCorp's initial risk-spend-efficiency (RSE) framework.

4.1.9 Emergency planning and preparedness

In 2021, PacifiCorp enhanced its emergency preparedness plan in collaboration with key internal business units and external public safety partners. PacifiCorp meets at least annually with state, county and local emergency management agencies such as CalFire, California Office of Emergency Services, county offices of emergency services, community and other organizations, public health authorities, local law enforcement and fire jurisdictions and other interested parties. Through these meeting, PacifiCorp gathers inputs from the community and adjusts plans as needed.

In 2021, PacifiCorp learned:

- Using workflow process tools improves the efficiency of notifications with public safety and other state partners.

4.1.10 Stakeholder cooperation and community engagement

PacifiCorp understands the important role all stakeholders play in achieving wildfire prevention and mitigation.

In 2021, PacifiCorp increased its lines of communication and learned:

- Direct engagement with tribal leaders helps the company target generators to tribal members with the most need. Refer to Section 7.3.10 Stakeholder Cooperation on page 225 and Section 7.3.10.1 Community Engagement on page 225 for additional details on stakeholder cooperation and community engagement initiatives.

- Providing ice at community resource centers supports residents who can pick up ice to keep the food in their fridges cold during an outage.

4.2 UNDERSTANDING MAJOR TRENDS IMPACTING IGNITION PROBABILITYAND 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)[6] and Risk Assessment Mitigation Phase (RAMP), highlighting changes since the 2020 WMP and 2021 Update. 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 othervariables 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.*

PacifiCorp leverages information developed by the large investor-owned utilities (IOU) and uses principles of the International Standardization Organization's "Risk Management – Principles and Guidelines" (ISO 31000:2019) to develop the company's risk-based decision-making framework outlined in Figure 4.1.

[6] Updates to S-MAP are currently in deliberation under proceeding R. 20-07-013 – Order Instituting Rulemaking to Further Develop a Risk-based Decision-making Framework for Electric and Gas Utilities.

Figure 4.1 Risk-based decision-making framework

This methodology included an assessment of the company's top categorical equipment risks including, substation transformer failure, substation circuit breaker failure, overhead distribution conductor failure and relay misoperation. In a parallel activity, risks were evaluated against various maintenance and investment programs, including risks related to wildfire within its service territory, and benefits of these programs estimated. Nonetheless, due to the similar but differently constructed process, including RSE, as portrayed within this report may not be appropriately compared to other utility plans and results. Where possible, the intended approach and underlying rationale for the incorporation into future decision-making will be outlined, furthering the company's development toward the longer-term RAMP/S-MAP structure which is anticipated to be addressed in the future proceeding R.20-07-013.

PacifiCorp does not yet have a quantitative risk methodology adopted in the S-MAP and is continuing to review the IOU risk-modeling progress for the future development of RAMP and S-MAP.

A. PacifiCorp monitors and accounts for the contribution of weather and ignition probability an estimated wildfire consequence and its decision-making using situational awareness modeling tools such as WFA-E and WRF, combined with the subject matter expert (SME) meteorologist on staff. At this time PacifiCorp does not currently have a formal combined index, such as the Fire Potential Index (FPI) used by other companies, however development is in progress that aligns with the information learned through workshops. To better understand the weather's contribution to wildfire risk and consequence, PacifiCorp is taking a two-pronged approach that leverages big data analytics as well as existing wildfire modeling technologies.

   Big Data Analytics — PacifiCorp is actively creating a 30-year, 2 km-resolution, hourly

WRF reanalysis of weather variables and fire weather indices across much of the western United States. Once complete, this data will be correlated with historical fire occurrence and consequence to improve the company's weather-related thresholds with respect to wildfire risk. Further, the data will be correlated with historical power outages to build and train machine-learning models to better predict weather-related system impacts. Output from PacifiCorp's operational WRF model will be ingested daily by the company's machine-learning models and GIS tools to forecast and map the intersection of fire weather and outage related risks across its service territory.

Wildfire Modeling — PacifiCorp is investing in Technosylva's WFA-E suite of products to enhance its ability to identify distribution circuits and transmission lines that pose a risk of catastrophic wildfire due to current and forecast conditions. In many ways, WFA-E negates the need for a separate FPI as it directly models wildfire potential and consequence across the landscape daily. That said, PacifiCorp will be using Technosylva's products and SMEs to help create an FPI to complement the WFA-E suite of products. This work will leverage the results of the historical reanalysis and associated data analysis mentioned previously.

B. As was the case with assessing weather-related wildfire risks, PacifiCorp is leveraging big data analytics as well as existing wildfire modeling technologies to understand the fuel's contribution to wildfire risk and consequence.

PacifiCorp relies on a combination of sources including observations and forecasts from the local Geographic Area Coordination Center (GACC), PacifiCorp's in-house WRF model, and Technosylva's WFA-E. This includes one-hour dead fuel moisture, 10-hour dead fuel moisture, 100-hour dead fuel moisture, 1000-hour dead fuel moisture and Energy Release Component (ERC). Dead fuel moisture is expressed as a percent of oven dry weight. Raw ERC values are reported in BTUs per square foot; however, ERC is typically expressed as a percentile relative to the known local climatology. Other fuels considerations include herbaceous and woody live fuel moisture, regional vegetation mortality events and greenness of the seasonal grasses.

Big Data Analytics — In addition to weather variables and fire weather indices, the 30-year reanalysis mentioned previously will also include one-hour dead fuel moisture, 10-hour dead fuel moisture, 100-hour dead fuel moisture, 1000-hour dead fuel moisture and ERC. This data will be correlated with historical fire occurrence to improve the company's fuels-related thresholds with respect to wildfire risk. This data will also be integrated with Technosylva's WFA-E.

Wildfire Modeling — As was stated earlier, PacifiCorp is investing in Technosylva's WFA-E suite of products to enhance its ability to identify distribution circuits and transmission lines that pose a risk of catastrophic wildfire due to current and forecast conditions. This includes all relevant fuels information needed to accurately assess wildfire potential and consequence for both short-term forecasts and long-term planning.

Lastly, PacifiCorp owns and operates a network of weather stations that provide 10-minute observations of temperature, humidity, wind speed, wind direction and wind gusts. Some weather stations also have sensors that report 10-hour dead fuel moisture and fuel temperature. Weather stations are calibrated annually before wildfire season to ensure accuracy of the data throughout fire season.

4.2.1 Service territory fire threat evaluation and ignition risk trends

Present a map of the highest risk areas identified within the current High Fire Threat District (HFTD) tiers of the utility's service territory as a figure in the WMP. Discuss fire threat evaluation of the service territory to determine whether a modification to the HFTD is warranted (i.e., expansion beyond existing Tier 2 and Tier 3 areas). If the utility believes there are areas in its service territory that are not currently included in the HFTD but require prioritization for mitigation efforts, then the utility is required to provide a process outlining the formal steps necessary to have those areas considered for recognition in the CPUC-defined HFTD.[7] *Include a discussion of any fire threat assessment of its service territory performed by the electrical corporation, highlighting any changes since prior WMP submissions. In the event that the utility'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 by the CPUC's Fire Threat Map and High Fire Threat District designations), the utility is required to identify those areas for potential HFTD modification, based on the new information or environmental changes, showing the differences on a map in the WMP. To the extent this identification relies upon a meteorological or climatological study, a thorough explanation and copy of the study must be included as an Appendix to the WMP.*

List, describe, and map geospatially (where geospatial mapping is applicable) any macro trends impacting ignition probability and estimated wildfire consequence within utility service territory, highlighting any changes since the 2021 WMP Update:

1. *Change in ignition probability and estimated wildfire consequence due to climate change*
2. *Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles*
3. *Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture*
4. *Population changes (including Access and Functional Needs population) that could be impacted by utility ignition*
5. *Population changes in HFTD that could be impacted by utility ignition*
6. *Population changes in WUI that could be impacted by utility ignition*
7. *Utility infrastructure location in HFTD vs non-HFTD*
8. *Utility infrastructure location in urban vs rural vs highly rural areas*

[7] As there is no formal or standard process for modifying the HFTD maps defined by the CPUC, Utilities may utilize a similar approach adopted by SCE during the 2019 WMP review process described in D.19-05-038, p. 53. For this process, in August 2019 SCE submitted a petition to modify D.17-12-024 to recognize SCE-identified HFRA as HFTD Tier 2 areas.

PacifiCorp is constantly monitoring areas for significant change in ignition risk drivers that may result in a change to fire threat for a specified area. At this time, PacifiCorp has not identified any areas where an HFTD expansion is warranted and maintains the previously established HFTD map (see Figure 4.2 through Figure 4.5).

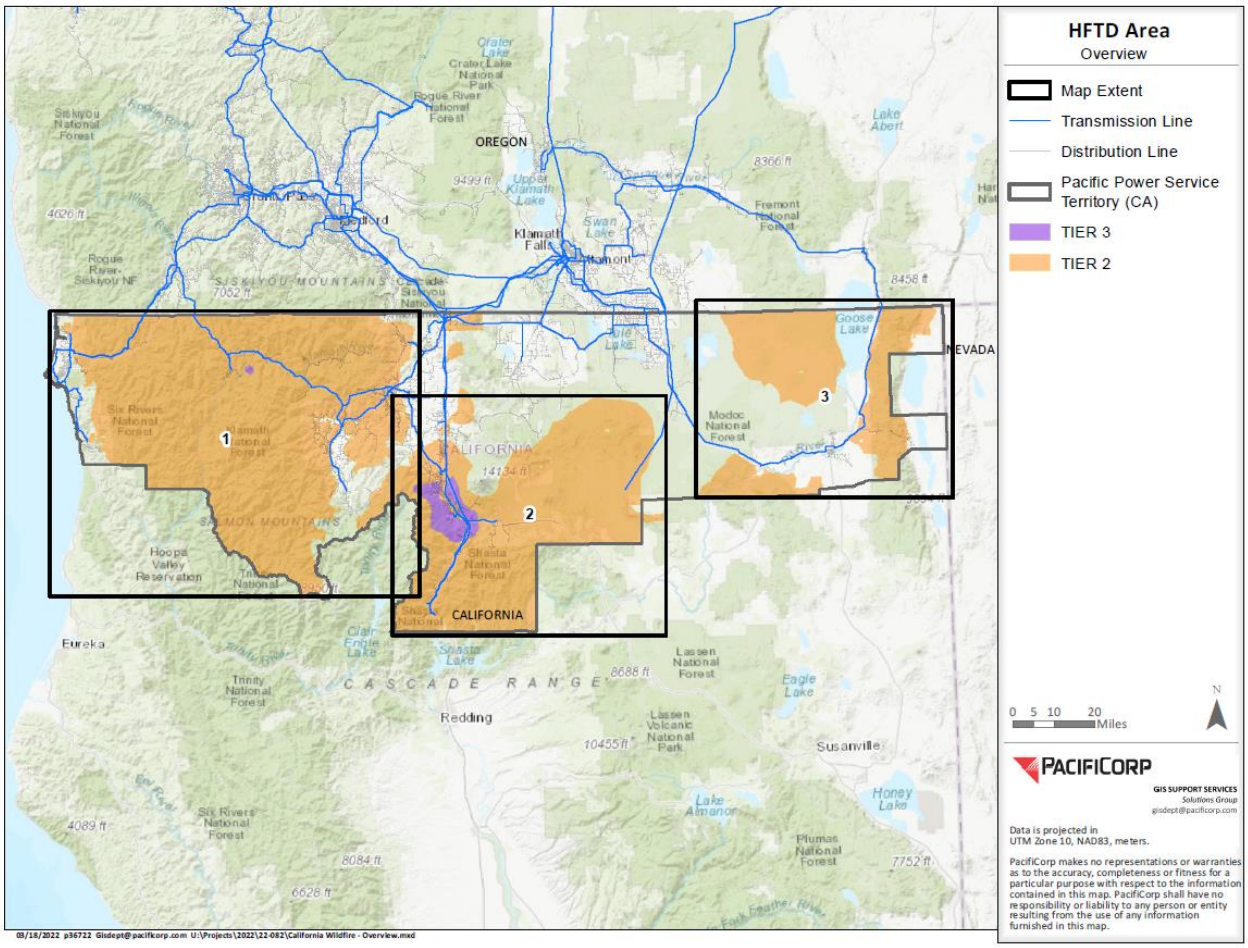

Figure 4.2 HFTD area

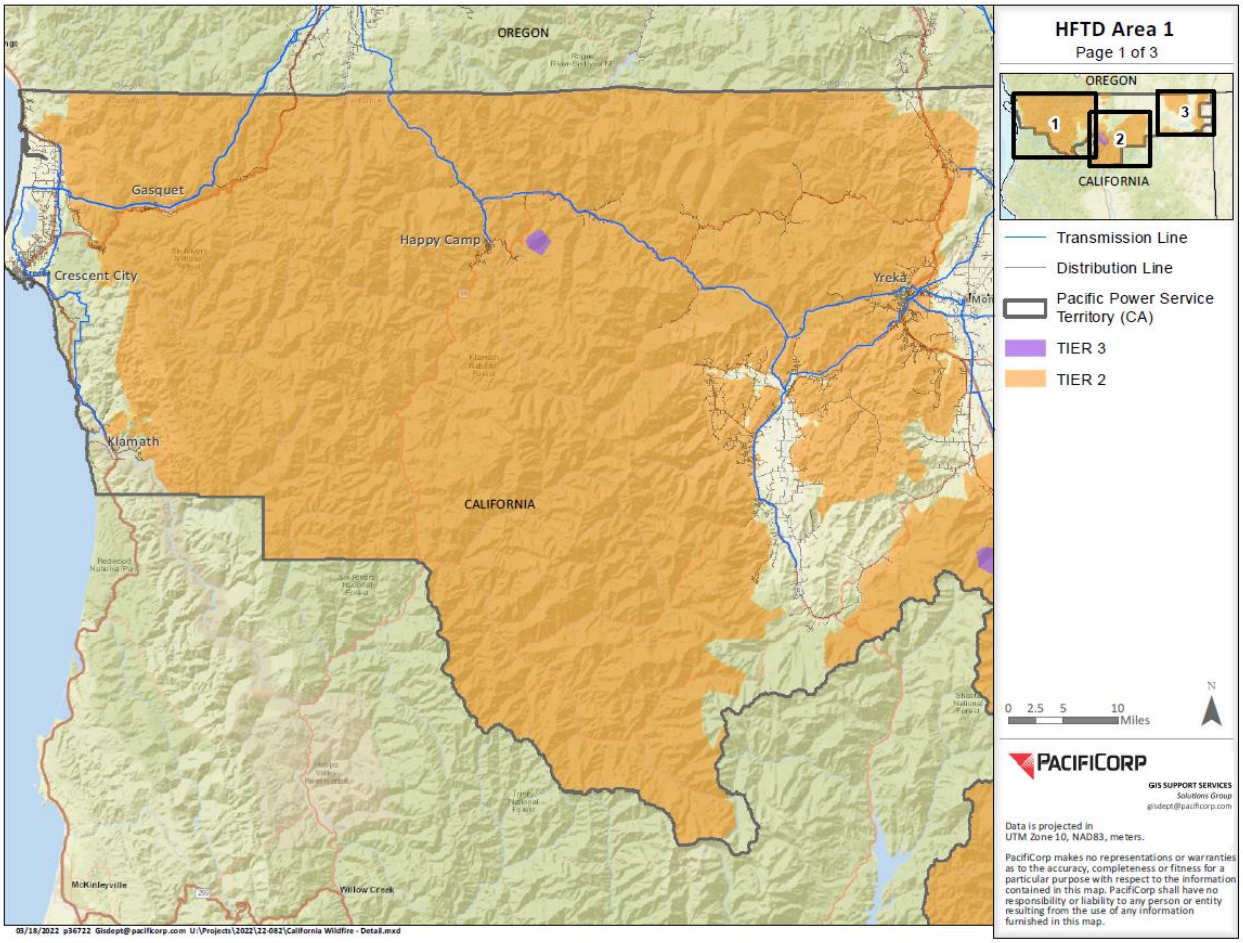

Figure 4.3 HFTD area 1

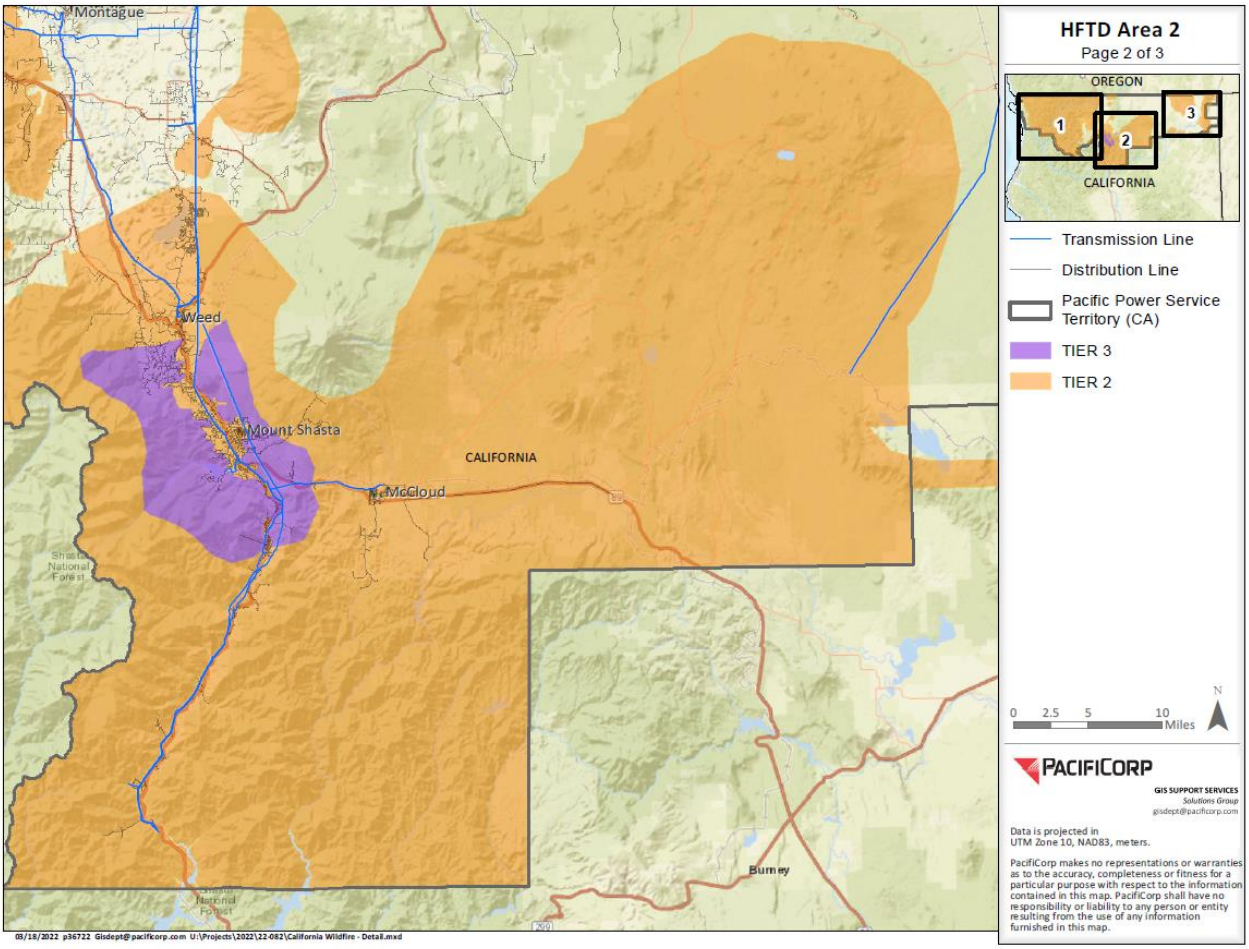

Figure 4.4 HFTD area 2

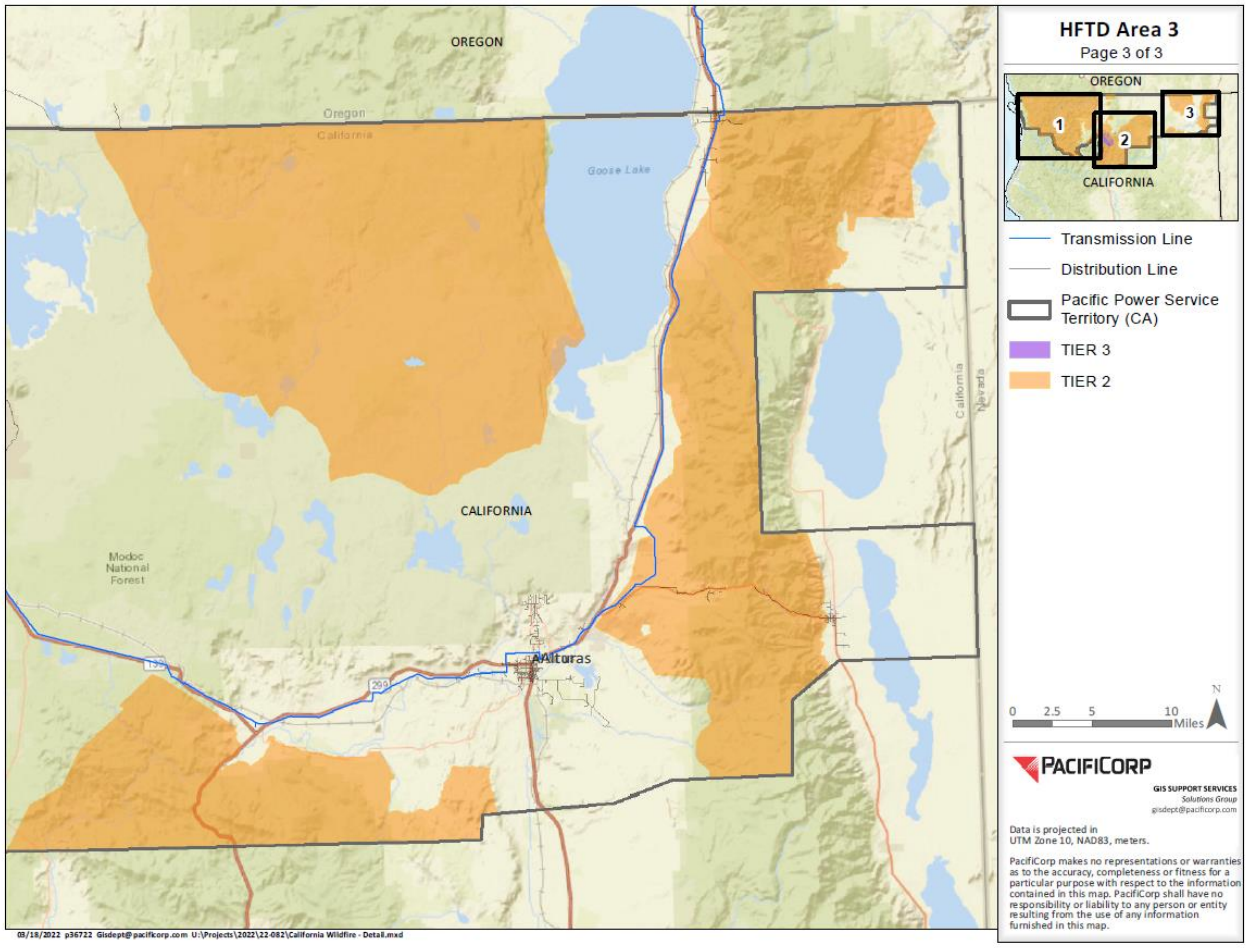

Figure 4.5 HFTD area 3

1. **Change in ignition probability and estimated wildfire consequence due to climate change**

   In 2021, PacifiCorp focused on developing a quantifiable consideration of climate change to address short-term planning gaps. Through this effort, the company engaged climate change experts through the California Energy Commission's Pyregence Project and used materials prepared by the Fourth Climate Change Assessment[8] through CalAdapt to assess climate change. Through this research, PacifiCorp found that fire-affecting climate change — particularly the effect of drying — impacts the company's service territory evenly. Therefore, areas that are higher risk today, such as the HFTD, would continue to be higher risk. Climate models also suggest there may be some decreases in fire weather (e.g., wind gusts). The company will continue analyzing this information and incorporating it into company models.

[8] Pierce, David W., et al. *Climate, Drought, and Sea Level Rise Scenarios for California's Fourth Climate Change Assessment: A Report for California's Fourth Climate Change Assessment*. California Energy Commission, 2018.

This research addresses short-term planning gaps, including a lack climate change-related measurements as they relate to wildfire risk in the company's service territory.

2. **Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles**

   During the period of extreme drought in the company's northern California service territory, from 2014-2017, the company was experiencing substantial impacts from bark beetle invasion, damaging vegetation, for which it conducted hazard tree removal. At this time such invasive species do not appear to be on the rise, however, as noted above, to the extent that extreme drying becomes more normal, the tendency for invasive species such as bark beetle to damage vegetation increases. The company will be watchful of any erosion in tree health due to such impacts and may consider inclusion of these patterns into its risk assessment model.

3. **Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture**

   Since the 2021 WMP update, there have been no significant changes in macrotrends of drivers such as fuel density and moisture. However, PacifiCorp is investing significantly in data and modeling tools to enhance situational awareness capabilities and assess ignition probability and estimated wildfire consequence at a more granular level.

4. **Population changes (including Access and Functional Needs population) that could beimpacted by utility ignition**

   The region the company serves is not a high growth area and no patterns suggesting greater AFN population percentages are anticipated by the company, which could impact areas needing additional support during periods of elevated fire risk.

5. **Population changes in HFTD that could be impacted by utility ignition**

   The company serves a sparse area, much of which is federal, state or tribal lands, which were deemed part of the elevated fire threat areas. While these areas generally are not developed, any changes to their usage could result in expansion of the company's network into areas that are designated HFTD and potentially impact the ratio of elevated fire risk areas the company serves. At this time 41% of its California assets are designated in the HFTD. Additional buildout in those areas would change the ratio and potentially require realignment of mitigation measures and resources. Shown in Table 4.1 is quantitative analysis supporting these conclusions.

- Tract level American Community Survey (ACS) five-year population estimates show a general decline in population within PacifiCorp's California service territory between the 2010 census and 2017. Population began increasing again in 2018 and

2019, but ACS estimates for 2019 are still 3.5% below 2010 population levels for the northernmost areas of California.

- Population changes in the HFTD follow the overall trends of the area. Population estimates for 2019 are roughly 3% below the 2010 population for the HFTD as a whole and roughly 2% below 2010 for the Tier 3 areas.
- Based on these trends, it is unlikely that major population increases will occur inside the HFTD regions of PacifiCorp's service territory.

Table 4.1 Population changes in the high fire threat districts

Data Source	Area	2010	2015	2017	2019
Census and ACS 5-year Tract Est.	Tracts Overlapping PC Territory	89,868	87,455	86,336	86,663
Census and FCC Block Est.	All HFTD	46,247	44,548	44,931	44,745
	Tier 3	4,735	4,499	4,685	4,631

6. Population changes in WUI that could be impacted by utility ignition

The company's service area generally has limited growth and much of it is infill. Limited growth of projects that increase the WUI are expected, based on information the company has from local stakeholders.

ACS estimates are not available at the block level used to determine WUI classifications, but FCC population estimates at the block level also show population decreases in PacifiCorp territory's wildland intermix and interface areas. Population levels estimates from 2019 are roughly 7% below 2010 levels in wildland intermix areas, and roughly 3% below 2010 levels in WUI areas. Populations in WUI areas also decreased between 2017 and 2019, despite modest gains in Northern California more generally. Further, there are zero interface blocks with a population increase of more than 10. Only one intermix block, located in Del Norte County, had a population increase of more than 10 between 2010 and 2019.

Based on these trends, it is unlikely that major population increases will occur inside the WUI regions of PacifiCorp's service territory. See Table 4.2.

Table 4.2 Population changes in WUI that could be impacted by utility ignition

Data Source	Area	2010	2015	2017	2019
Census and ACS 5-year Tract Est.	Tracts Overlapping PC Territory	89,868	87,455	86,336	86,663
Census and FCC Block Est.	Wildland Urban Intermix	22,548	20,918	20,958	20,910
	Wildland Urban Interface	42,115	41,054	41,025	40,942

7. Utility infrastructure location in HFTD versus non-HFTD

When analyzing utility infrastructure location macrotrends, PacifiCorp evaluated if there were any programs to relocate, add or remove a significant amount of utility infrastructure. During this review it was determined that there were no significant updates to the utility infrastructure located inside the HFTD or outside the HFTD.

8. Utility infrastructure location in urban versus rural versus highly rural areas

PacifiCorp does not have any significant infrastructure location changes.

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 three-year term of the WMP, highlighting any changes since the 2021 WMP Update. 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 an ignition or not) 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 risk events, and description of events (including vegetation and equipment condition).

Substantial efforts in inspection, vegetation management and situational awareness have occurred and will continue to unfold over the next 10 years. Over the three-year period of the WMP (2020-2022) PacifiCorp has not seen a change in the categories of ignition risk drivers, in that no new drivers have been identified and no drivers have been removed. Much of the three-year term of the WMP has been developing the framework necessary to properly quantify risk in a way that aligns with other utility processes and initiating risk reduction initiatives such as those described in the grid hardening initiatives (Section 7.3.3 on page 161). To this end, PacifiCorp has not had the opportunity to observe a significant change in ignition

risk drivers. During 2022, PacifiCorp has committed to installing a significant portion of the grid hardening plan, after which the company can begin to gather data for evaluating the impact to ignition risk drivers. See Figure 4.6 for overlapping climate change, mitigation initiatives and PSPS risk.

The expectation is that grid hardening initiatives will impact the company's evaluation of risk through situational awareness thresholds by making the system more tolerant of elevated fire risk. Additionally, it is the expectation that ignitions due to ignition drivers such as contact by object will decrease over time as a result of grid hardening initiatives.

Wildfire consequence, which is generally driven by factors such as population, population location, wind speed, wind direction, overall dryness, and time to response, is not typically reduced or impacted by utility-related activities. However, PacifiCorp's initiatives, such as situational awareness, aim to better characterize dynamic risk and inform quick action to control risk, limit consequences, and mitigate escalation where possible. Additionally, in this 2022 WMP update, PacifiCorp is proposing a Wildfire Detection initiative that is expected to reduce the time until fire awareness.

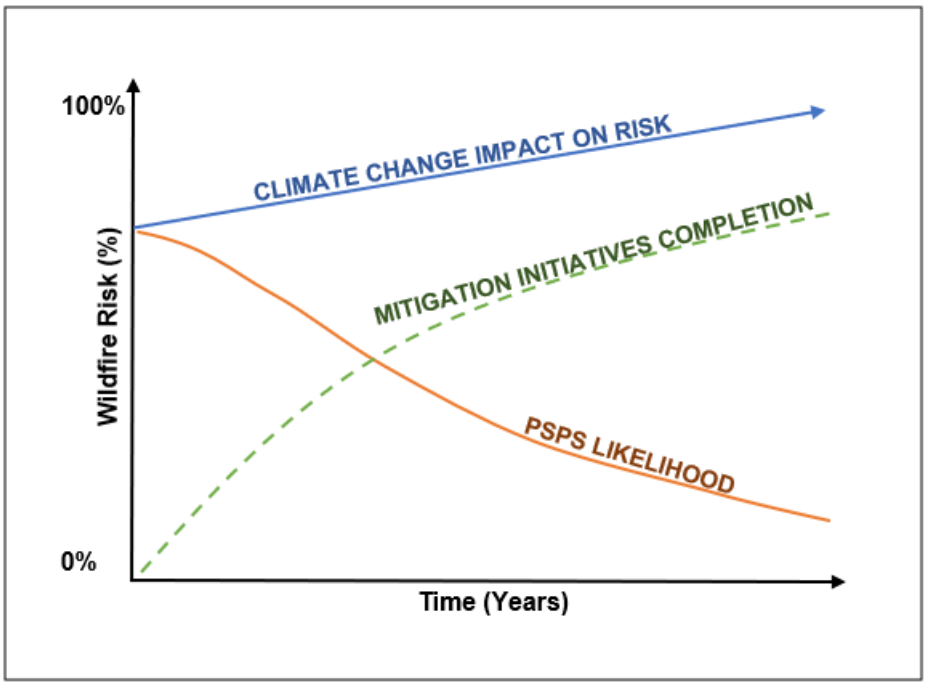

Figure 4.6 Climate change, mitigation initiatives and PSPS

Since the 2021 update, there have been no significant updates to the methodology for determining ignition probability from events, PacifiCorp employs the same process it has used since 2020 with refinement in the data inputs. Please refer to Section 4.3 of PacifiCorp's 2021 WMP for historical reference.

4.4 RESEARCH PROPOSALS AND FINDINGS

Report all utility-sponsored research proposals, findings from ongoing studies and findings from studies completed in 2020 and 2021 relevant to wildfire and Public Safety Power Shutoff(PSPS) mitigations.

4.4.1 Research Proposals

Report proposals for future utility-sponsored studies relevant to wildfire and PSPS mitigation. Organize proposals under the following structure:

1. ***Purpose of research*** *– brief summary of context and goals of research*
2. ***Relevant terms*** *- Definitions of relevant terms (e.g., defining "enhanced vegetation management" for research on enhanced vegetation management)*
3. ***Data elements*** *- Details of data elements used for analysis, including scope and granularity of data in time and location (i.e., date range, reporting frequency and spatial granularity for each data element, see example table below)*
4. ***Methodology*** *- Methodology for analysis, including list of analyses to perform; section must include statistical models, equations, etc. behind analyses*
5. ***Timeline*** *- Project timeline and reporting frequency to the Office of Energy Infrastructure Safety*

Example table reporting data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
Ignitions from contact with vegetation in non-enhanced vegetation areas	2014 – 2021+ (ongoing)	Per ignition	Lat/long per ignition	Date, hour of ignition (estimated)	-
Ignitions from contact with vegetation in enhanced vegetation areas	2019 – 2021+ (ongoing)	Per ignition	Lat/long per ignition	Date, hour of ignition (estimated)	-

4.4.1 Research proposals

4.4.1.1 Wildfire Detection Pilot

Purpose of research

A wildfire detection network including equipment elements like cameras and smoke detectors, can assist fire agencies serving in the HFTD respond more quickly to ignition events. Additionally, with improved wildfire location awareness, PacifiCorp can respond quickly to support wildfire-reactive protocols. In 2021, PacifiCorp initiated an ongoing pilot in the company's Utah service territory where 14 ALERT wildfire cameras were installed to validate the technology. Additionally, PacifiCorp has partnered with forest agencies in Oregon to mount cameras on utility infrastructure. PacifiCorp plans to expand on this experience and initiate a pilot to its California service territory, using the lessons learned from the 2021 Alert Wildfire Camera installations in Utah. This pilot seeks to identify technology that can reliably and cost-effectively be used for wildfire detection.

Relevant terms

There are no specific, uncommon terms associated with the wildfire detection pilot.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
Event Video / Data Logs	2023-2025	Per ignition	Lat/lon per ignition	Date, hour of ignition (estimated)

Methodology

In terms of a data set, it will take some time to gather enough data to validate/invalidate the benefits of wildfire detection equipment types. PacifiCorp will evaluate how long it takes to respond to an ignition that is discovered by new wildfire detection equipment versus how long it takes to respond to an ignition discovered by another detection method.

Timeline

2022 — Plan wildfire detection program.

2023 — Complete installation of wildfire detection equipment.

2024 — Gather data.

2025 — Review preliminary results.

4.4.1.2 Enhanced Overhang Reduction Pilot

Purpose of research

The purpose of this enhanced vegetation management activity is to reduce the amount of vegetation and/or limbs overhanging high-voltage power lines and decrease the potential of wildfire ignitions due to vegetation and conductor contact. Current post clearances required by CPUC GO 95 are a minimum of 12 feet. In PacifiCorp's 2019 Standard Operating Procedures (version 6.1.2.) current specification clearance for overhanging limbs is 12 feet for slow-growing trees and 14 feet of clearance for moderate to fast-growing trees. Dead or defective limbs are also being identified to comply with the 2021 CAL FIRE Power Line Fire Prevention Field Guide, (Hazard Trees/Vegetation Clearance section). The purpose of this new effort is to determine efficacy of ground-to-sky pruning. Trees pruned during this effort would have increased overhang clearance, greater than the minimum CPUC required post-clearances, to achieve an anticipated outcome of reducing the potential of overhanging limbs dropping and contacting energized bare conductors. Due to the increased amount of crown removed to achieve increased overhang clearance, the subject trees would be evaluated within one year of work to assess tree health. PacifiCorp uses a Level 1 Assessment, as defined in ANSI A 300 (Part 9), to detect potential dieback, decay or other defects that can be associated with removing more than one third of the crown. PacifiCorp may also conduct additional monitoring as needed in subsequent years based on results and consider alternatives.

Relevant terms

ANSI A 300 Level 1 Assessment — This is a limited visual assessment of an individual tree or population of trees. It can be performed as a drive-by assessment in the case of many trees.

Data elements

Data elements may include:

- Tree location (latitude and longitude)
- Species
- Height
- Diameter at breast height (DBH)
- Date pruned

- Assessment notes (health of tree at time of pruning and subsequent assessment)
- Distance from conductor
- Estimated crown reduction

Methodology

Sections of power lines to be selected will be in HFTD Tier 2 and/or Tier 3 where there is a variety of coniferous and hardwood species. Plots will be completed in areas with noninsulated conductor to reduce ignition where primary bare wire is present. Horizontal construction with multiple phases (two-phase or three-phase) will also be prioritized.

Timeline

2022 — Potential plot areas will be identified after planned vegetation management activities have been conducted on Tier 2 and Tier 3 distribution circuits throughout the calendar year.

2023 — Enhanced overhang reduction work is targeted for implementation and completion.

2023 Post Work — Audit overhang mitigation work will be done to ensure compliance with specifications.

2024 — Tree health will be evaluated to determine the effect of crown removal. Trees will be assessed for dieback or other defects.

2025 — Preliminary results will be reviewed.

4.4.2 Research findings

Report findings from ongoing and completed studies relevant to wildfire and PSPS mitigation. Organize findings reports under the following structure:

1. ***Purpose of research*** *– Brief summary of context and goals of research*
2. ***Relevant terms*** *- Definitions of relevant terms (e.g., defining "enhanced vegetation management" for research on enhanced vegetation management)*
3. ***Data elements*** *- Details of data elements used for analysis, including scope and granularity of data in time and location (i.e., date range, reporting frequency and spatial granularity for each data element, see example table above)*
4. ***Methodology*** *- Methodology for analysis, including list of analyses to perform; section must include statistical models, equations, etc. behind analyses*
5. ***Timeline*** *- Project timeline and reporting frequency to the Office of Energy Infrastructure Safety. Include any changes to timeline since last update*
6. ***Results and discussion*** *– Findings and discussion based on findings, highlighting new results and changes to conclusions since last update*
7. ***Follow-up planned*** *– Follow up research or action planned as a result of the research*

Ongoing pilots

4.4.2.1 Distributed Fault Anticipation Pilot

Purpose of research

PacifiCorp is piloting the use of distribution fault anticipation (DFA) technology with Texas A&M University. The DFA devices are continuously monitoring to detect, classify and alert when high or low current fault conditions are measured. The alerts preemptively identify equipment along distribution circuits that could cause an outage.

Relevant terms

DFA — Distribution fault anticipation; this technology, which was initially tested at Texas A&M University in 2015, provides situational awareness of potential outages by measuring high and low current fault conditions on distribution circuits. Alerts from the DFA devices are communicated through cellular networks preemptively.

SCADA — Supervisory Control and Data Acquisition, which is in reference to the real time data collected by PacifiCorp's energy management system.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
DFA EVENT	Nov 2021-	Once	Distribution	1/100s

Report	Present		circuit	
Amps	Nov 2021 - Present	Continuous	Distribution circuit	1/100s
Voltage	Nov 2021 - Present	Continuous	Distribution circuit	1/100s
Circuit Line Miles	Installation Date	Once	0.01mi	Single Measurement
Wind Speed	Once	Per Event	MPH	Single Measurement
Wind Direction	Once	Per Event	Cardinal or intercardinal direction	Single Measurement
AVG Temperature	Once	Per Event	°C	Single Measurement
Humidity	Once	Per Event	%	Single Measurement

Methodology

PacifiCorp plans to install a sample of DFA devices on distribution circuits located within the HFTD with SCADA. Circuits with SCADA capability were selected so that the DFA data could be compared to SCADA events data. The comparison of these two sources will determine the effectiveness and cost associated with using this technology.

Timeline

Q4 2021 — DFA installation and data gathering initiated.

Q1 2023 — Complete DFA installation (approximately four circuits).

Q4 2023 — Collect a minimum of 12 months of data per device; evaluate program for expansion outside of the pilot.

Results and discussion

Since the first two DFA devices were installed in Q4 of 2021, two potential events were detected uniquely by DFA — the events were not identified by other SCADA equipment. One of the two events required an immediate correction on a jumper located at the capacitor bank. The second event classified a potential failure on a clamp or switch but could not be quickly located and has yet to be confirmed; a methodology is being created on how to locate the identified failure on the 126-mile circuit. The DFA provided insight into an issue that was not detectable with other equipment.

Follow-up planned

Currently, there are too few results to make a recommendation about the DFA technology. PacifiCorp is continuing to analyze the events generated by the DFA devices. If the pilot is successful, PacifiCorp will look to install DFA when replacing substation/circuit relays where there's a cellular or strong communication network connection.

4.4.2.2 Vegetation Management Data Analytics Pilot

Purpose of research

PacifiCorp has used publicly available vegetation data to estimate the amount of tree canopy near company equipment to inform risk management and improve situational awareness. PacifiCorp has evaluated several forms of canopy census approaches, including using public data sources, assessing LiDAR and analyzing satellite data. At this time, these data sets have yet to be operationalized in a manner that reduces or optimizes vegetation inspections (2021 WMP Pilot 3: LiDAR Vegetation Inspection), however they have proven helpful in supporting long-term risk assessment and to a lesser degree short-term situational awareness. The company's canopy census pilot used satellite imagery trained with available LiDAR to produce vegetation and strike tree maps over large areas.

Relevant terms

National Land Cover Database — The National Land Cover Database (NLCD) is a U.S. Geological Service-based resource that provides nationwide data on land cover and land cover change at a 30 meter resolution. The database is designed to provide cyclical updates of United States land cover and associated changes.

Salo — The vendor, Salo Sciences uses an AI model trained on satellite and LiDAR data to create high-resolution maps of vegetation characteristics.

Tree canopy — The branches, leaves or other foliage that form the upper layer of a plant community.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
NLCD Canopy Cover Raster	2016	3-5 years	30m	One year	
Historic Vegetation Outages	2000-present	Daily	by isolation point, ~200m	outage timestamp, ~1 minute	
Salo Canopy Cover Raster	2020	1 year	10 m	One year	Augmenting 30m canopy cover where available
Historic Vegetation Maintenance	2000-present	Weekly	By circuit	weekly	

Methodology

A tree canopy census near PacifiCorp equipment was created by sampling the

NLCD Canopy Cover raster data at the per pixel area, 30 meter resolution. A point layer was then clustered to avoid oversampling at circuit branch points and aggregated according to circuit and subcircuit zones, specifically reconciled to ZOPs. As the Salo Sciences satellite/AI data was added, this process was replicated, with 10 meter resolution, again for each ZOP.

Timeline

2020 — Began pilot.

2021 — Initial proof of concepts was completed.

2022 — Plan the next project phase focusing on prior burn areas and augmenting canopy census data.

2023 — Evaluate the program for expansion or completion.

Results and discussion

Comparison of vegetation area to outages and vegetation maintenance costs showed weak correlations. The dataset was somewhat predictive of vegetation trimming costs, but with large margins of error. The comparison model is limited by the lack of spatial granularity in historic vegetation maintenance and outage records. As new vegetation maintenance records are established with high spatial accuracy, the dataset can be reassessed for its predictive power.

Attempts to use the NLCD Canopy Cover and LANDFIRE data layers for this purpose highlighted some of their inherent limitations: low update frequency, the 30-meter spatial resolution is too high to capture smaller tree stands, and heavy use of masking in some locations. Together, these limitations result in a systematic bias that underestimates tree coverage, with larger discrepancies occurring near roads or in developed areas.

However, satellite imagery was found to produce very usable data. Such data, however, need to be evaluated against two different use cases. First, in evaluating canopy density (to recognize proximity of vegetation to ZOPs for risk estimation), high confidence in canopy density was achieved, radically improving on publicly available data sources, but without the high costs associated with LiDAR. Second, when determining strike tree risk, results very similar to LiDAR were achieved at substantially lower cost and faster delivery.

LiDAR may be an important element to capture targeted areas of risk in future exercises, while satellite data appears to hold promise for systemic and periodic characterization of risk.

Follow-up planned

PacifiCorp is expanding upon this satellite canopy census by augmenting areas of interest studied during 2021, focused primarily on recently burned areas as well as other locales where vegetation outage history coincides with elevated fire threat.

4.4.2.3 Radio Frequency/ Handheld Infrared Pilot

Purpose of research

This pilot uses new radio frequency (RF) and IR tools to support ground-level visual inspections on distribution lines and equipment. The new tools are capturing information that can be used for condition identification that could be missed through the normal visual inspection. PacifiCorp has had success in the enhanced aerial IR inspection program discussed in Section 7.3.4.4 on page 172 and the expectation is these tools will yield similar results for inspectors in the field.

Relevant terms

DoForm — Internal digital form for tracking inspections.

Infrared (IR) — wavelength emitted when objects are heated.

Radio Frequency (RF) — radio waves at certain frequencies.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
Ambient Temperature	2020-present	Per Inspection	Degree Celsius	Date of Inspection
Observation Point Temperature	2020-present	Per Inspection	Degree Celsius	Date of Inspection
Conductor Temperature (Left & Right)	2020-present	Per Inspection	Degree Celsius	Date of Inspection
Nearest Pole Temperature	2020-present	Per Inspection	Degree Celsius	Date of Inspection

Methodology

Lines are selected based on historical records that suggest a high occurrence of splices. Line patrolmen perform the ground-level inspection of the identified lines, gathering specific measurements at key points along the line, including all poles and any splices within spans. The inspection data is uploaded and available through electronic forms.

Timeline

2021 — Completed field personnel training with equipment.

2022 — IR inspections to occur in selected regions of California.

2023 — Expand areas of inspection.

Results and discussion

The RF data collection proved to be an inefficient and an unreliable technology for inspection program purposes at this time. Different weather environments, angle of data collections, and multiple attempts produced unreliable, differing and inaccurate conditions reported.

However, IR inspections have had success in detecting leakage current in aerial inspections. PacifiCorp expects that further use of handheld IR devices will produce similar results that would otherwise be undetected through a normal visual inspection. Early detection of latent conditions will result in avoided fault operations that have a direct impact on ignition probability.

Follow-up planned

Depending on the pilot's results, PacifiCorp may engage in further studies regarding applications on the distribution network.

4.4.2.4 LiDAR Pole Loading Assessment Pilot

Purpose of research

This pilot focuses on reviewing a new technology to expedite the review of pole loading using LiDAR and automated 3D evaluation software. LiDAR data can be gathered via drone or helicopter to provide 3D files on transmission assets. These 3D files can then be used in combination with pole loading assessment software to automate the pole load calculations, expediting the completion of pole load calculations on entire circuits.

Relevant terms

LiDAR — Light detection and ranging.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
LiDAR Point Cloud Data (X, Y, Z)	2019	Once	10 cm	Single date
Pole Locations	2019	Once	0.5 m	Single date
Pole Lean	2019	Once	0.5 m	Single date

Methodology

Lines are identified based on the fire risk, historic fault rates, inspection results and joint-use records that might indicate a pole too weak for its loaded equipment. The lines are then flown with LiDAR and the LiDAR data incorporated into PLS-CADD, a strength modeling program. Varying loading scenarios are modeled on the poles and pole lines to evaluate pole performance; Based on the modeling results, replacements or strengthening would be considered. In 2019 the LiDAR data collected was used to test the accuracy of LiDAR data in pole loading analysis.

Timeline

2019 — Flew test line.

2022 — Evaluate program for expansion or completion.

Results and discussion

This pilot resulted in the recommendation that 187 poles in the HFTD be replaced as a proactive measure to align with existing design and construction standards that may not have been in place during initial line construction. These poles were not an imminent threat and were not as high priority as other poles with Conditions that require more rapid replacement consistent with the California general orders. Additionally, due to the location of these poles within the HFTD, these poles were already in scope for evaluation as a part of the covered conductor projects. Therefore, these efforts are being combined to improve cost effectiveness and the proactive pole replacement is occurring concurrently with covered conductors. If the LiDAR assessment had identified 187 poles for replacement separately from an already occurring replacement, it would have cost approximately $2.2 million to replace all poles. While an equipment upgrade is a proactive action to prevent equipment failures, there is no indication that this work offers significant risk reduction, therefore it is recommended to not continue this pilot at this time.

Follow-up planned

Consistent with other initiatives, PacifiCorp plans to complete the replacement of the 187 poles identified through the pilot and conclude this pilot for the 2020-2022 WMP term.

Completed pilots

4.4.2.5 Advanced Weather Station Modeling and Weather Stations Pilot

Purpose of research

This pilot focuses on exploring of the benefits of remote automatic weather system (RAWS) stations versus micro weather stations (MWS). Additionally, this pilot sought to create a methodology to systematically identify areas with limited data in our weather station network and in the National Interagency Fire Center's (NIFC) datasets. The company is installing multiple RAWS stations, to participate in the RAWS weather network and to calibrate RAWS stations with previously deployed micro stations. Participation in the RAWS weather network may enhance coordination with public safety partners and utility situational awareness. Improved situational awareness may support modifications of system operations in response to risk periods that are weather dependent. Calibration between public and private weather systems may improve correlation between weather systems and their sensitivities to specific patterns, notably improving coordination between NIFC and the U.S. Forest Service (USFS) and utility situational awareness.

Relevant terms

GREATER — Company-designed mapping software used for risk mapping.

Micro weather station (MWS) — An MWS is a low-cost, small, portable, self-contained, wireless sensor that can detect precise meteorological data.

National Interagency Fire Center (NIFC) — The NIFC is a federal government agency that coordinates national resource mobilization for wildland fire and other U.S. fire incidents.

Remote Automatic Weather System (RAWS) — A network of automated weather stations run by the USFS and Bureau of Land Management (BLM) and monitored by the NIFC, mainly to observe potential wildfire conditions.

Zone of Protection (ZOP) — A ZOP is a module, i.e., subsection of a circuit with control, either programmatically, automatically or manually. Figure 4.16 shows the ZOPs of a portion of a circuit beginning at the black dot, representing the substation's circuit breaker.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
RAWS	1/2021	Hourly	Lat/lon per weather station	1min
Micro station	2019-12/2021	10mins	Lat/lon per weather station	1min

Methodology

PacifiCorp leveraged the LRAM (see Section 4.5.1.4 on page 81) to site future weather stations in an objective and quantified manner. Using the LRAM, the company calculated a combined risk score for each ZOP; this risk score summarizes many aspects of wildfire risk including but not limited to fire weather history, fuel density, tree canopy cover, outage history, ignition history and arc energy calculations. The second step in this pilot was to obtain the locations of all RAWS, NWS, and PacifiCorp weather stations throughout our service territory and bring them together to create a combined risk score dataset from the LRAM. For each ZOP, we identified the nearest weather station and calculated the distance and difference in elevations to obtain a situational awareness score. Finally, PacifiCorp combined the situational awareness score with the combined risk score to create a risk blindness score. Using a map in GREATER to understand the blindness of the risk scores, the company identified locations with both low situational awareness and a high combined risk score; these locations are optimal for future micro weather stations.

Timeline

2019 — Installed micro weather stations as part of standard initiative.

2021 — Installed RAWS.

2022 — Evaluate RAWS for expansion or end of pilot.

Results and discussion

RAWS offer the installation benefit of providing data in locations that are not bucket truck accessible.

RAWS data is only provided once every day, as compared to micro weather stations, which provide data every 10 minutes. The granularity of the micro station data is better.

Follow-up planned

Due to the greater sensor capability, PacifiCorp plans to use MWS primarily and only plans to use RAWS where MWS could not be installed.

4.4.2.6 Fault Detection Line Monitoring Pilot

Purpose of research

This pilot explored the use of continuous monitoring sensors, including both line sensors and station relays, for fault identification and detection. It was determined to be a key element in advanced protection and operations, particularly supporting improved situational awareness.

Relevant terms

LineScope — Three-phase power monitoring system for use on circuits up to 138 kV.

Relay — An electrical device, typically incorporating an electromagnet or within a solid-state device, which is activated by a current or signal in one circuit to open or close another circuit.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
Relay Setting Element	since 2020	as needed	by protective zone	time during which setting was active (HH:MM)
Relay Event Record	since 2020	as needed	by protective zone	quarter cycles
Fault Analysis for Relay Event	TBD	as needed	by protective zone	quarter cycles
Outage Record	2003-present	as occurs	by protective zone	microseconds

Methodology

Lines and stations and their priorities were selected based upon their coincidence to fire risk, length of line (percentage in fire risk tier), consideration of whether distribution facilities were associated with PSPS areas, historic records of fault events with unknown locations and the impact to customer reliability when fault events occur. If communications technologies were not proximate to either line end, a smaller set of technology options exist.

Timeline

2021 — Completed most installations of transmission relays with fault detecting

relays) or line sensor piloting (LineScope).

2022 — Complete installations and evaluate program for expansion or completion.

Results and discussion

The primary benefit with fault detection devices that have been placed, is that they provide directionality when patrols are dispatched to locate faults. However, no widespread metrics have been created yet — due to the recent nature of the installations. When evaluating the use of this technology as a less expensive alternative to upgrading the protection devices on a line, the technology has been determined to not provide as much benefit as upgraded protection devices, which can more quickly address a fault.

Follow-up planned

While PacifiCorp experienced some benefits using this technology (fault directionality), when performing a cost-benefit analysis, the benefits of upgrading protection devices outweighed the benefits of the piloted technology. Therefore, PacifiCorp does not plan to prioritize the installation of future LineScope devices.

4.4.2.7 Vegetation Management Database Pilot

Purpose of research

PacifiCorp's historic vegetation records often lacked spatial granularity and were not centralized. The new vegetation management database allows vegetation management records to be centralized and incorporates GPS locations from field work.

Relevant terms

There are no uncommon, relevant terms for this subsection.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
Vegetation Work Records	2020-Present	Daily	10m	Daily

Methodology

Record templates are created by vegetation management and new work records are entered by contractors and staff foresters in the field on company-provided tablets. The database storing these records is maintained by a vendor with access and download options provided to PacifiCorp personnel.

Timeline

2020 —Initiated record system.

2021— Made additional refinements.

2022 —Evaluate for a standard program.

Results and discussion

Data generated by this system has been used for reporting purposes. Additional incorporation of these records into various vegetation analyses is anticipated as the volume of records increases.

Follow-up planned

This new system has been successfully implemented by field crews and is part of their standard processes.

4.4.2.8 Sophisticated Program Control Settings Pilot

Purpose of research

This pilot evaluates the optimal approaches in using sensitive and sophisticated device settings to reduce wildfire risk (and improve reliability). Devices, including relays, reclosers and fuses, all have methods by which they are programmed to operate in response to a fault condition. If there is limited coordination between devices, it can increase the probability of equipment damage, or delayed device operations which create and extend an ignition risk.

Relevant terms

Elevated Fire Risk (EFR) settings — EFR settings on reclosers can be used by PacifiCorp to address high wildfire risk situations.

Fast trip — An advanced protection capability that can be part of a setting profile, for example, setting profiles can be normal (fast trip followed by reclosing attempts), elevated risk (fast trip followed by single reclose attempt after sufficient time to limit persistence of heat).

Fault — Abnormal electrical current that if not interrupted within a certain time may damage the electrical system which is experiencing the abnormal current.

Protective zone — Part of the electrical system which is protected by a certain protective scheme established by the electrical system equipment (breakers, relays, etc.).

Relay — An electrical device, typically incorporating an electromagnet or within a solid-state device, which is activated by a current or signal in one circuit to open or close another circuit.

Relay event record — An electronic log recording a subset of values such as the date, time, recording interval, and pre-defined categories (voltage, amperage, etc.) when specific thresholds are out of programmed boundaries.

Setting group — A predetermined quantity of independent system protective settings contained within a defined group used by programmable devices such as substation relay or field recloser device.

Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity
Relay Setting Element	since 2020	as needed	by protective zone	time during which setting was active (HH:MM)
Relay Event Record	since 2020	as needed	by protective zone	quarter cycles

Methodology

As new relays and reclosers are set they are evaluated for their coincidence to elevated fire risk areas. In areas where this risk exists, remote (grid operations) device control and communications equipment upgrades to increase communication speeds between coordinating devices are planned for installation. For all installations, independent of fire risk area, the option for advanced settings, including high impedance fault relays will be deployed.

Timeline

2020 — Began to install reclosers and relays.

2021 — Used alternative recloser settings during elevated wildfire risk.

2022 — Evaluate use across the company.

Results and discussion

Based on field reports during the 2021 fire season, PacifiCorp observed benefits in the use of EFR settings on reclosers including a reduction of ignition potential through operation.

Follow-up planned

This program supported a reduction in ignition potential through elevated wildfire events therefore it is in the process of being implemented throughout the company where the potential for elevated fire risk exists.

4.5 MODEL AND METRIC CALCULATION METHODOLOGIES

4.5.1 Additional models for ignition probability, wildfire and PSPS risk

Each utility is required to report details on the models and methodologies used to determine ignition probability, wildfire risk, and PSPS risk. This must include the following for each model – a list of all inputs, details of data elements used in the analysis, modeling assumptions and methodologies, input from Subject Matter Experts (SMEs), model verification and validation (e.g., equation(s), functions, algorithms or other validation studies), model uncertainty and accuracy, output (e.g., windspeed model) and applications of model in WMP (e.g., in selection of mitigations, decision-making).

The narrative for each model must be organized using the headings described below. A concise summary of the model(s) must be provided in the main body of the WMP in this section, with additional detail provided for each model in an appendix.

1. ***Purpose of model*** *– Brief summary of context and goals of model*

2. ***Relevant terms*** *– Definitions of relevant terms (e.g., defining "enhanced vegetation management" for a model on vegetation-related ignitions)*

3. ***Data elements*** *– Details of data elements used for analysis. Including at minimum the following:*

    a. *Scope and granularity (or, resolution) of data in time and location (i.e., date range, spatial granularity for each data element, see example table above).*
    b. *Explain the frequency of data updates.*
    c. *Sources of data. Explain in detail measurement approaches.*
    d. *Explain in detail approaches used to verify data quality.*
    e. *Characteristics of the data (field definitions / schema, uncertainties, acquisition frequency).*
    f. *Describe any processes used to modify the data (such as adjusting vegetative fuel models for wildfire spread based on prior history and vegetation growth).*

4. ***Modeling assumptions and limitations*** *– Details of each modeling assumption, its technical basis, and the resulting limitations of the model.*

5. *Modeling methodology – Details of the modeling methodology. Including at minimum the following:*

    a. *Model equations and functions*
    b. *Any additional input from Subject Matter Experts (SME) input*
    c. *Any statistical analysis or additional algorithms used to obtain output*
    d. *Details on the automation process for automated models.*

6. ***Model uncertainty*** *– Details of the uncertainty associated with the model. This must include uncertainty related to the fundamental formulation of the model as well as due to uncertainty in model input parameters.*

7. ***Model verification and validation*** *– Details of the efforts undertaken to verify and validate the model performance. Including at minimum the following:*
   a. *Documentation describing the verification basis of the model, demonstrating that the software is correctly solving the equations described in the technical approach.*
   b. *Documentation describing the validation basis of the model, demonstrating the extent to which model predictions agree with real-world observations.*

8. ***Modeling frequency*** *– Details on how often the model is run (for example, quarterly to support risk planning versus daily to support on-going risk assessments).*

9. ***Timeline for model development*** *– Model initiation and development progress over time. If updated in last WMP, provide update to changes since prior report.*

10. ***Application and results*** *– Explain where the model has been applied, how it has informed decisions, and any metrics or information on model accuracy and effectiveness collected in the prior year.*

11. ***Key improvements from working group*** *– For each model, describe changes which have been implemented as a result of wildfire risk modeling working group discussions. Provide a high-level summary of recommendations from the wildfire risk modeling working group.*

4.5.1.1 Wildfire Analyst-Enterprise (WFA-E)

1. Purpose of model – Brief summary of context and goals of model

PacifiCorp recently began procuring Technosylva's Wildfire Analyst-Enterprise (WFA-E) to take advantage of already established modeling software in use at other utilities and fire agencies to support real-time operations and long-term planning. While still in development for full operational use at PacifiCorp, the WFA-E modeling solution includes a suite of wildfire risk analysis products, including FireCast, FireSim and the Wildfire Risk Reduction Model (WRRM).

FireCast leverages Technosylva's fire spread prediction modeling capabilities through integration with PacifiCorp's Weather Research and Forecast (WRF) model to derive daily territory-wide and utility asset wildfire risk ratings. This information is critical to operations throughout fire season and especially on the days leading up to an extreme fire weather event and potential PSPS. FireSim provides on-demand capability to simulate the potential spread and consequence of a reported fire, which critically supports decision-making for real-time operations and infrastructure protection. FireSim can also simulate the potential consequence of fires that were prevented due to operational actions such as PSPS. WRRM combines millions of fire behavior simulations with proprietary asset data to quantify risk from each asset and calculate potential risk reduction for wildfire hardening projects. PacifiCorp's goal for WFA-E is

to leverage cutting-edge fire science technology to better anticipate, prepare for, respond to, and recover from extreme fire weather events and long-term wildfire risk. This includes PSPS decision-making and the prioritization of fire-hardening projects.

While PacifiCorp has already procured FireCast and FireSim, the WRRM component of Technosylva is planned for procurement in 2022. With this suite of modeling tools, PacifiCorp can begin developing an aggregate index, such as the Fire Potential Index (FPI) used at other utilities, to drive activity changes based on elevated weather conditions and exceeded thresholds. The FPI will mature with time as the models evolve and as additional risk modeling guidelines are created by regulators. PacifiCorp anticipates that the procurement of Technosylva, which aligns with the general risk modeling methodology used by other utilities, will better prepare the company for the 2023 WMP guidelines — where updated risk modeling guidelines are anticipated, based on participation in the OEIS-hosted Wildfire Mitigation Risk Modelling workshop monthly series.

2. Relevant terms

Asset A — Specific feature on the electric utility infrastructure network such as a pole, conductor, capacitor, transformer, or fuse.

Asset class — A grouping of assets based on their characteristics, such as material type, size, orage, that reflects a specific likelihood for equipment failure and wildfire ignition.

Asset Index — A six-digit number used to delineate asset classes.

Burn probability — The probability of a wildfire burning into an area, sometimes referred to as a wildfire threat. Burn probability is the combination of numerous individual fire growth potential simulations to create an overall fire growth potential map using electrical assets as possible ignition sources.

Conditional impacts — The mean wildfire impact given that an equipment-related wildfire occurs at a specific location (also referred to as conditional risk). Conditional impacts are combined with ignition rate and wind factor characteristics to calculate the expected impacts. They are calculated for each asset and can be summed to quantify the conditional impacts for a specific hardening project.

Downfire — The location of a HVRA within the fireplain (fire growth from a specific ignition location)

Expected impacts — The mean annual equipment-related wildfire impact after incorporating the likelihood of equipment failure and subsequent wildfire (also referred to as expected risk). This is a primary output of the WRRM model. It is calculated for each asset and can be summed to quantify the expected impacts for a specific hardening project.

Exposure — The placement of a Highly Valued Resources and Asset (HVRA) in a hazardous environment. For example, building a home within a flammable landscape.

Fireplain —The calculated, estimated area of a fire's spread if it is ignited at a particular location. A fireplain represents the spread area commonly referred to as Time of Arrival, a raster representation of the fire spread, while Fire Perimeters is the vector format representation of the fire spread.

GIS assets — The GIS database of assets used as the source of potential ignitions for the WRRM.

Hardening projects — A series of projects that may occur to change, repair, replace, or affect asset equipment. The intent of these projects is to "harden" the equipment so that it is more durable and less likely to fail. A project is a series of activities that may be combined under a single work order or field visit for planning, budgeting, and/or administrative management.

Highly Valued Resources and Asset (HVRA) — Resources and assets such as structures/homes or environmentally sensitive areas.

Ignition likelihood — The probability of an asset to start a fire ignition based on equipment failure or external weather conditions.

Replacement asset — The new asset class used to replace an existing asset class. Replacement assets have lower equipment failure rates and ignition rates than existing assets.

Risk reduction — The expected risk over a 20-year planning horizon for an asset. This is the primary WRRM model output to quantify risk reduction for an asset replacement. Risk reduction values are summed for assets in specific hardening projects to provide an overall risk reduction for that project.

Susceptibility — A measure of how easily an HVRA is damaged by wildfires of different types and intensities.

Values-at-risk — A general term that is commonly used to describe the HVRA and the risk assigned to them.

Vulnerability — A combination of exposure and susceptibility, Vulnerability is the measure of potential (sometimes called conditional) impacts to HVRA from wildfires of different intensities.

Wildfire hazard — A physical situation with potential for causing damage to resource or assets. Wildfire hazard is measured by two main factors: burn probability and intensity.

Wildfire risk— Overall measure of the possibility for loss or harm caused by wildfire. Wildfire riskis a product of wildfire hazard and vulnerability.

3. **Data elements – Details of data elements used for analysis. Including at minimum the following:**

Data Element	Scope	Spatial Granularity	Temporal Granularity	Collection Period	Collection Frequency	Data Sources
FuelMoisture Data	Vegetation and fuel data cross PacifiCorp territory	2 km	Hourly	Daily	Daily	PacifiCorp WRF and Technosylva
Weather Forecast	Temperature, dewpoint, humidity, windspeed & gust, wind direction, etc. at the surface and aloft	2 km	Hourly	Daily	Daily	PacifiCorp WRF
Real-time Weather Observations	Weather provided from weather stations and other sources across the region which may impact PacifiCorp service territory.	Varies	Ranges from 10 minutes to 1 hour	Daily	Daily	Utility mesonets, ASOS, & RAWS
Historical Fires	Across PacifiCorp territory.	n/a	annual	All recorded	annual	Fire agencies
Fire behavior analysis	n/a	n/a	n/a	n/a	n/a	Provided by vendor
Fire Simulation modeling	n/a	n/a	n/a	n/a	n/a	Provided by vendor
PacifiCorp Distribution/Transmission assets	n/a	n/a	n/a	n/a	n/a	PacifiCorp GIS
Subjective 'values at risk' parameters	n/a	n/a	n/a	n/a	n/a	Provided by vendor

4. **Modeling assumptions and limitations – Details of each modeling assumption, its technical basis, and the resulting limitations of the model.**

- The WRRM model does not include system information such as outages, equipment failures, electric system conditions, or wildfire mitigation initiatives. PacifiCorp plans to incorporate the dynamic outage data as a separate model evolution after the 2023 Risk Modeling Guidelines are updated.

5. **Modeling methodology – Details of the modeling methodology. Including at minimum the following:**

WFA-E consists of three wildfire risk analysis products: FireCast, FireSim and WRRM. WFA-E combines PacifiCorp's daily WRF forecast and 30-year reanalysis data with Technosylva's proprietary wildfire spread model to calculate wildfire behavior, risk and consequence metrics.

Once fully operational, FireCast will ingest PacifiCorp's operational WRF data, then use Technosylva's wildfire spread model to perform millions of wildfire simulations daily across the service territory over a 96-hour forecast horizon. The results of the simulations are used to calculate both territory wide and asset level wildfire risk at three-hour time intervals across the forecast period.

FireSim ingests PacifiCorp's operational WRF data then uses Technosylva's wildfire spread model to perform on-demand wildfire simulations at locations of interest (see Figure 4.7). The user defines the time and length of each simulation.

WRRM was built on the quantitative risk model, developed between San Diego Gas & Electric (SDG&E) and Technosylva, that associates wildfire hazards with the location of electric distribution overhead assets. Development started with fire growth simulations that would identify both fire growth potential and vulnerability of impacted structures at each simulated fire location inside the service territory.

Technosylva will provide key data inputs, such as surface and canopy fuels, topography, and climate data, and perform thousands of simulations for each potential ignition location in a Monte Carlo approach,[9] a random sampling simulation methodology that helps solve deterministic problems, to identify the total fire growth potential for that location (see Figure 4.7).

[9] Monte Carlo is a term for a broad set of computational algorithms that rely on repeated random sampling to obtain numerical results.

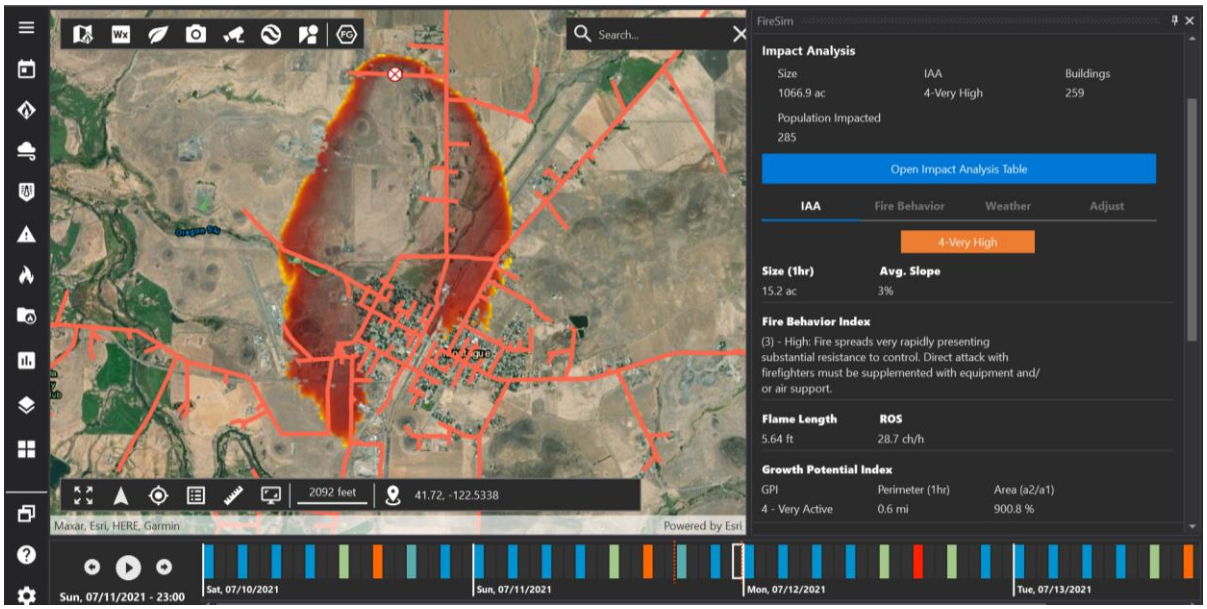

Figure 4.7 Wildfire growth simulation example

Once the fire growth potential for a location is determined, the geospatial simulation is overlaid with property and parcel information relating to the surrounding community to identify potentially impacted structures. Identifying the susceptibility of each structure type to a wildfire (i.e., residences, commercial spaces, parking lots) can be used to estimate a value of impacted square footage or structure damage if an ignition were to occur. This mean value of impacted structure damage generates the conditional impact value for that given location. Figure 4.8 shows wildfire growth simulation and structure values; Figure 4.9 displays the resulting fireplain from a simulation (left diagram). The right diagram shows structure values adjusted by percent loss associated with the fireplain from a wildfire simulation.

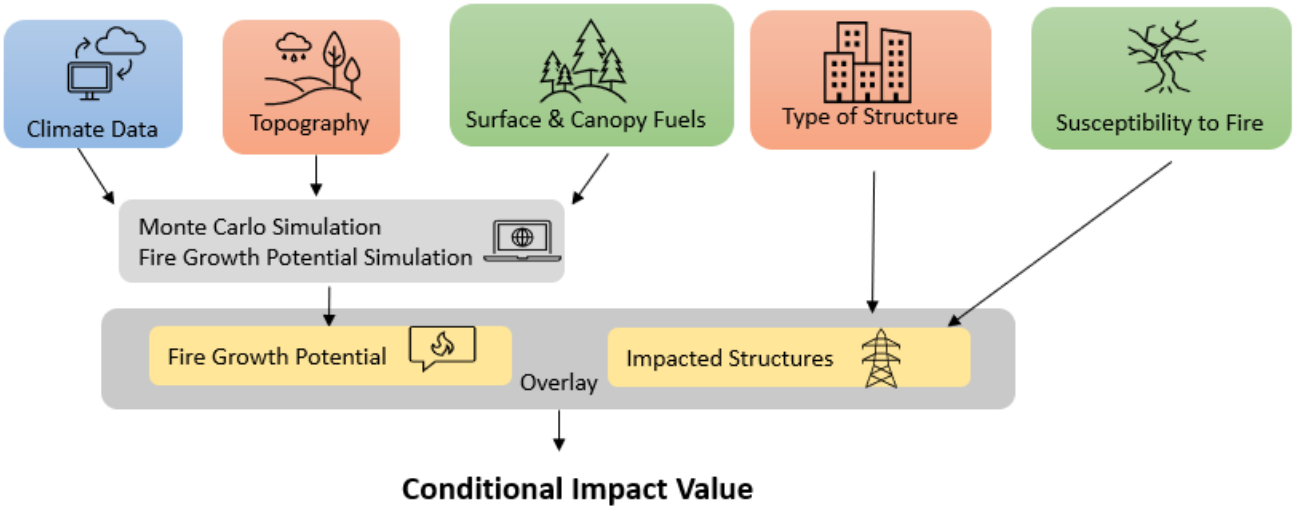

Figure 4.8 Wildfire growth simulation and structure values

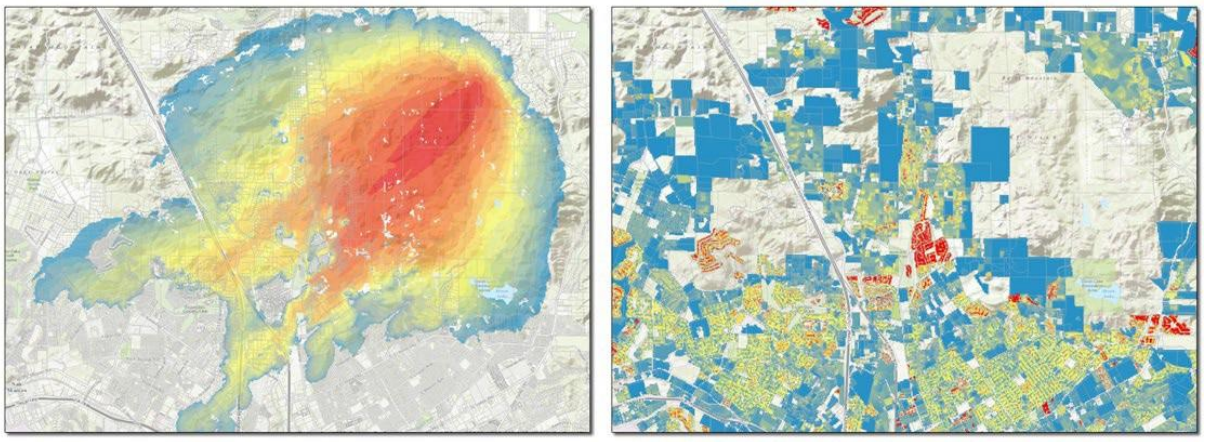

Figure 4.9 Fireplain simulation results

Once the conditional impact is determined, assets associated with the area are assigned an ignition likelihood. This ignition likelihood is the combination of asset failure rate and the ratio for when those failures might result in an ignition (see Figure 4.10).

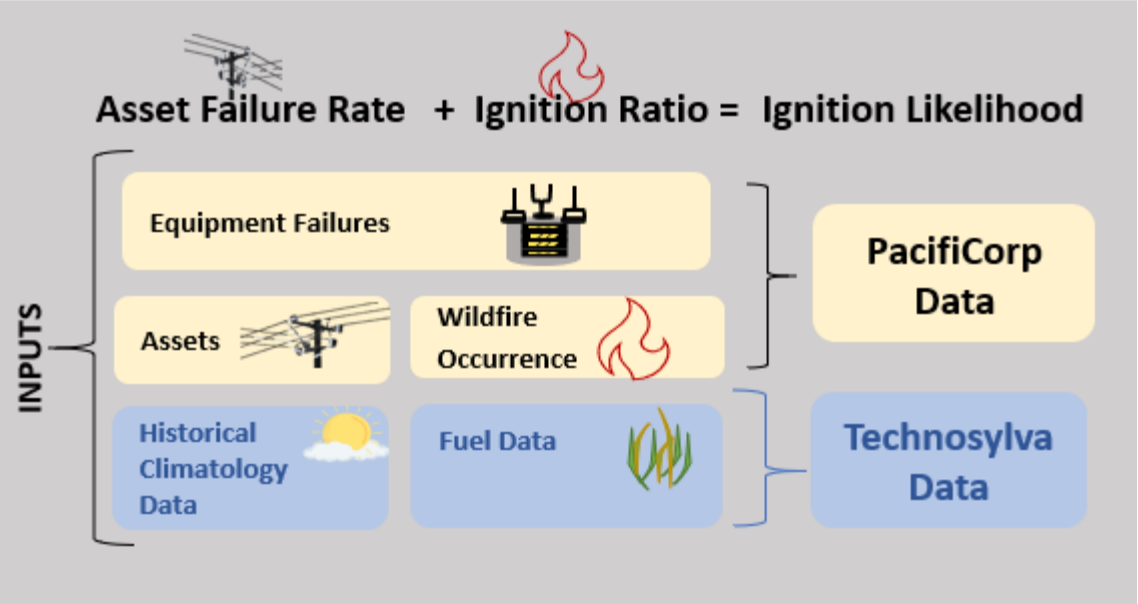

Figure 4.10 Ignition likelihood

As an initial step to demonstrate value, PacifiCorp provided some asset data to Technosylva, who, using a framework similar to that used by other utilities, modeled the number of historic failures and equipment ignitions. Equipment attributes in the GIS asset information were then categorized into the necessary bins to build the asset classes with each developed equipment failure rate and ignition ratio. Once an asset was identified as belonging to a specific asset class, the associated equipment failure rate and ignition ratio was assigned and combined to generate the ignition likelihood.

PacifiCorp plans to invest in the Technosylva model component in 2022, which will assign ignition likelihoods to all assets across the overhead distribution network and provide a combined number of predicted equipment failures and ignitions for comparison with historic records, including the locations of prior fire history. Then this data will be used to calibrate the failure rates and ignitions across the model to achieve a realistic result and relative ranking of where assets of concern exist in the electric distribution network.

When conditional impact and ignition likelihood are determined for each asset at each location, it is possible to calculate the overall expected impact of an equipment-related ignition. The expected impact accounts for the mean annual equipment-related wildfire impact after incorporating the data and methods discussed.

6. **Model uncertainty**

   The GIS data used in this model is captured via as-built drawings and reviewed according to set protocols according to the electric GIS production team standards. This data does not reflect ongoing switching or temporary configurations.

7. **Model verification and validation**

   Once implemented, WRRM data delivery will include GIS feature classes, which are visually inspected in a map environment when they are received to ensure the data results coincide with known conditions around the service territory.

8. **Modeling frequency**

   See the Data Elements Table in #3 for model frequency and data refresh rates.

9. **Timeline for model development**

   PacifiCorp did not actively participate in the model development of WFA-E. Instead, PacifiCorp plans to procure version 2.0, which includes updated GIS information, more granular asset data and enhanced GIS asset query functions to assist in project creation.

10. **Application and results**

    The WRRM and subsequent data tables are useful in identifying and prioritizing operational programs such as recloser settings and alternative work protocols.

11. **Key improvements from working group**

    Wildfire Risk Modeling working group discussions are underway. Direct improvements from the discussions have not yet been determined, but PacifiCorp anticipates incorporating recommendations or best practices learned through this collaboration into the evolution of the company's risk modeling suite. Additionally, PacifiCorp is already leveraging the benefits of general industry and industry partner collaboration through the incorporation of Technosylva into the company's risk modeling framework.

4.5.1.2 Contemporary fire weather risk model

1. **Purpose of model**

   The purpose of the fire weather risk model is to create a normalized relative ranking for the fire weather risk at a ZOP level, using recent historical gridded outputs. The main goal is to use the High Resolution Rapid Refresh (HRRR) model (3-km resolution)

to identify zones that have a high frequency of specific weather events such as strong winds and frequent droughts. The company then combines the weather component with the fuel density as quantified by the LANDFIRE 2020 remap to identify locations that have a coincidence of frequent fire weather and abundant fuel to sustain large wildfires.

2. **Relevant terms**

LANDFIRE —The LANDFIRE program provides 20+ national geospatial layers (e.g., vegetation, fuel, disturbance, etc.), databases and ecological models that are available to the public for the United States and insular areas.

Module — Subsection of a circuit.

Zones of Protection — A ZOP is a module, i.e., subsection of a circuit with control, either programmatically, automatically or manually Figure 4.16 shows the ZOPs of a portion of a circuit beginning at the black dot, representing the substation's circuit breaker.

3. **Data elements**

This layer is the combination of HRRR weather data going back to 2016 and the LANDFIRE 2020 Fuel Characteristic Classification System Fuelbeds (FCCS) dataset.

4. **Modeling assumptions and limitations**

Climatology can generally be inferred with limited measured assets, i.e., weather stations; models can be used to gauge local climate patterns.

5. **Modeling methodology**

PacifiCorp uses a combination of weather stations and hourly 3-km data to obtain localized and accurate weather history (see Figure 4.11) at the ZOP level, such as hourly wind speed, wind gusts, precipitation, relative humidity and temperatures going back to 2016. This data is then used in the following methodology to determine

Contemporary Fire Weather Risk (also called Fire Weather Risk).

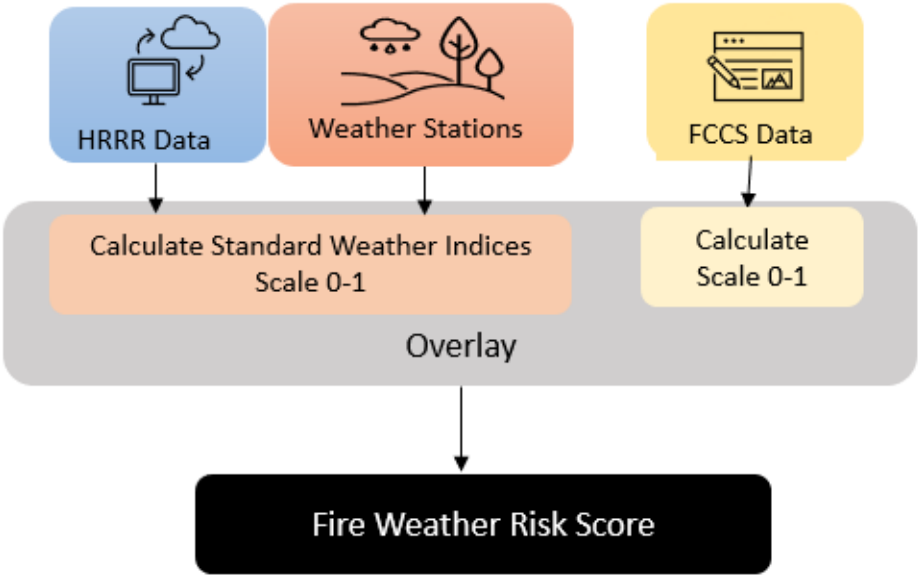

Figure 4.11 Fire weather risk

A step-by-step characterization of our methodology follows:

- Take the sum of the weather indices during the wildfire season at each location normalized by the number of years.
- Apply a min-max scaling to put the exposure measures onto the same 0-1 scale.
- Obtain fuel density measures by overlaying the ZOP shapefile over the Total Available Fuel sublayer from the FCCS and mapping it to a 0-1 scale.
- Combine the weather and fuel scores to get the final Fire Weather Risk Score using a simple linear combination of each subscore multiplied by its own respective coefficient shown as:

$$Fire\ Weather\ Risk\ Score = \sum_{i}^{Layers} x_i c_i$$

Where: x_i is the relative ranking between 0-1 for each sublayer and c_i is the respective chosen coefficient for each variable. After a few iterations we settled on the weather variables having a coefficient of 1 and the fuel component having a coefficient of 2 (weather variables carry 60% of the weight; fuel carries 40%).

6. **Model uncertainty**

   The data inputs to this model come from weather stations, and there can be uncertainty regarding the validity of that data. Therefore, weather station data is monitored by SMEs for anomalies and calibrated annually prior to wildfire season.

7. **Model verification and validation**

   Calibration using company and external weather sources to gauge local terrain impacts.

8. **Modeling frequency**

   The Fire Weather Risk layer is updated after each wildfire season is concluded. The metrics are calculated on a per year basis and used to identify trends across service territory as they emerge.

9. **Timeline for model development**

   This model was created in 2019 and is planned to be updated with 30yr WRF data in 2023.

10. **Application and results**

    The Fire Weather Risk Score can be used independently to identify ZOPs with a high frequency of fire weather coincident with dense fuel. Additionally, this Fire Weather Risk Score is a key element of LRAM (for more on LRAM, see Section 4.5.1.4 on page 81). The weather components of this risk score are a factor that is reviewed to determine the necessity of a PSPS event. Consequently, the Fire Weather Risk score can also be thought of as the relative frequency of weather conditions that necessitate a PSPS event.

11. **Key improvements from working group**

    In 2023, PacifiCorp plans to incorporate the 30-year WRF data described in Section 7.3.2.4 on page 156.

4.5.1.3 Available probabilistic arc energy risk model

1. **Purpose of model**

   The Available Probabilistic Arc Energy Risk model uses distribution system model simulations to arrive at arc energy values for studied locations. Higher arc energy from short-circuit events is associated with an increased risk of ignition. Arc energy is calculated from the available fault current (amps) and the time required for a

protective device to clear the fault event. Available fault current varies across the system due to circuit topology, length, and materials used. Line sections, and ultimately ZOPs and circuits, were scored based on arc energy values and line length (exposure). The score is a gauge of relative ignition risk and can identify locations where system improvements can be proposed to reduce said ignition risk.

2. Relevant terms

Arc flash analysis — Any of several engineering methods (IEEE 1584, NFPA-70E, CSA Z462, Lee Method, Wilkins Method) used to analyze electrical safety in power systems. The methods typically use heat transfer models, heat flux calculations and/or prescribed tables to assess risk level and help determine adequate safety procedures. A variety of parameters, including source impedance, equipment type, equipment location and clearing device are used to calculate total energy from an arc associated with a short circuit event.

CYME model — A software representation of a given power system, where simulations can be run to gain insight on system capability and behavior.

Load current — The current (Amperes) normally flowing through an energized power system to deliver power.

Protective device details — The applicable TCC curves for a protective device, together with logic-based settings.

Short circuit event — An occasion when one or more components of an electrical system contact one or more circuit return paths. Commonly used for arc flash analysis: a phase conductor contacting earth or system neutral. The result is typically a current value higher than load current.

Time current characteristic (TCC) — The specified relationship between applied current and operating time for a protective device such as a fuse, recloser or relay-controlled breaker. TCCs are often represented visually by curves for the purpose of studying device coordination, or for developing new settings. For example, a 100 Amp T-speed fuse will take more time to operate for a given current magnitude than will a 25 Amp T-speed fuse.

3. Data elements

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
CYME v9.0 distribution system model	2020	Collected once in 2020, held constant throughout analysis	Lat/lon for each node in the model	Not used	The system model includes source, line and protective device details (type, material, ratings, settings, etc.).

4. **Modeling assumptions and limitations**

   Requires accurate conductor registry in TCC/arc flash models

5. **Modeling methodology**

   A pilot simulation evaluated short-circuit scenarios where 5 Ohms of impedance was assumed for all short-circuit events, and applied voltage at the low end of ANSI A range (95% nominal). These values were chosen to represent an event whose arc energy was reasonably high. Simulating voltage higher than 95% nominal, or with fault impedance lower than 5 Ohms, generally results in faster clearing times and may result in lower total arc energy. A higher impedance value would generally result in slower clearing times and might result in higher total arc energy. The pilot results used relative, not absolute, arc energy value for final scores.

   For each protective device, downstream overhead lines in its ZOP were evaluated for composite scoring by arc flash results and line length (See Figure 4.12 for a schematic of available probabilistic arc energy risk.). That score was also aggregated to the circuit level. The result is a metric that helps the company focus on arc energy high-risk areas for remediation, and that can be used as a component within a more comprehensive score that accounts for risk from other categories.

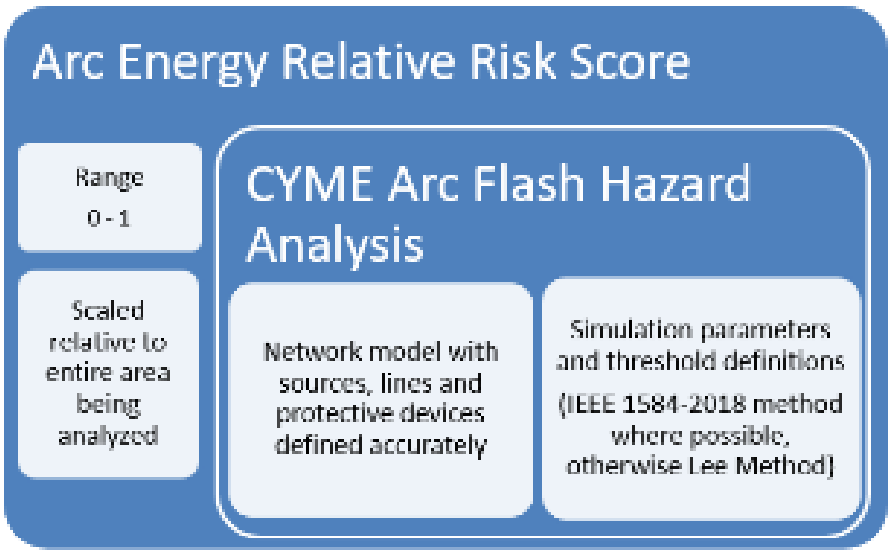

Figure 4.12 Available probabilistic arc energy risk

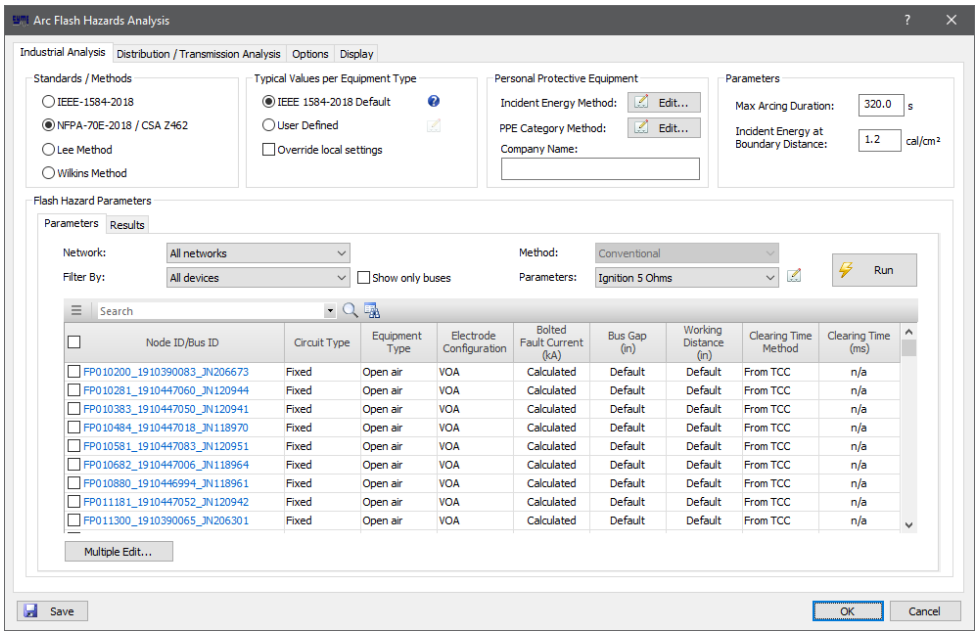

Figure 4.13 Example CYME arc flash analysis input

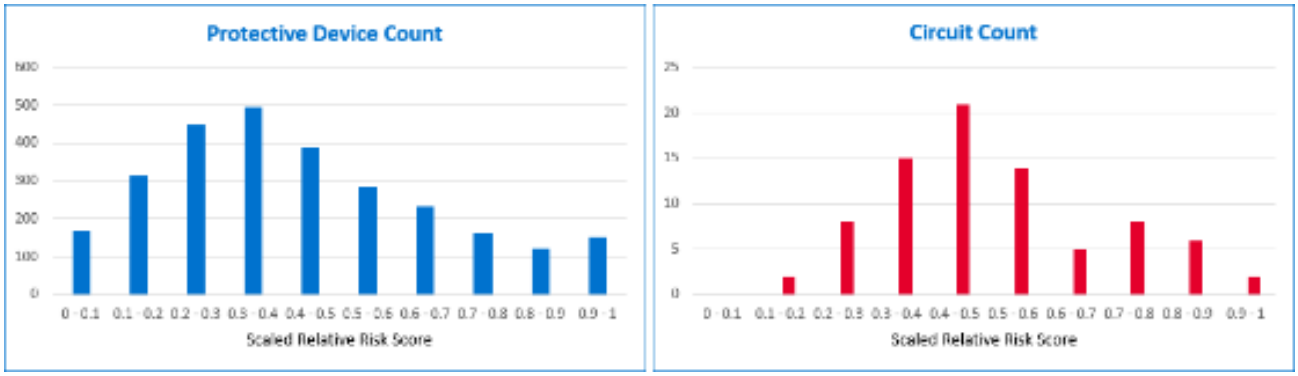

Figure 4.14 Summary of arc energy risk scores (scaled to the range 0-1)

6. Model uncertainty

One of the model's inputs is line equipment. There can be a small time gap after the device is installed and before the model has accounted for it. Hence the model is updated frequently.

7. Model verification and validation

Quality checked by central engineering SMEs.

8. Modeling frequency

Available inputs to the model are updated once per week.

9. **Timeline for model development**

PacifiCorp completed the pilot in PSPS areas described in the WMP. Based on a review of the pilot results and system records, certain equipment has been updated. PacifiCorp expanded the pilot to other HFTD during 2020, with long-term adoption intended over the next five years, including incorporation as a standard aspect of cyclical study processes.

10. **Application and results**

The pilot results identified locations where the potential fault (based on the similarity to modeled configurations) reflected a higher risk of damaged conductors or ignition. PacifiCorp used the modeling results to identify locations where there was a higher risk of ignition from a fault condition to support system network changes to preempt such a risk condition.

11. **Key improvements from working group**

Current improvements to CYME do not include any adjustments to the model framework described in this section. Improvements planned include data import and processing improvements to streamline processes.

4.5.1.4 Localized Risk Assessment Model

The LRAM is an overarching model structure that incorporates other models, as well as a set of inputs and outputs. A simple schematic of LRAM looks like this (Figure 4.15):

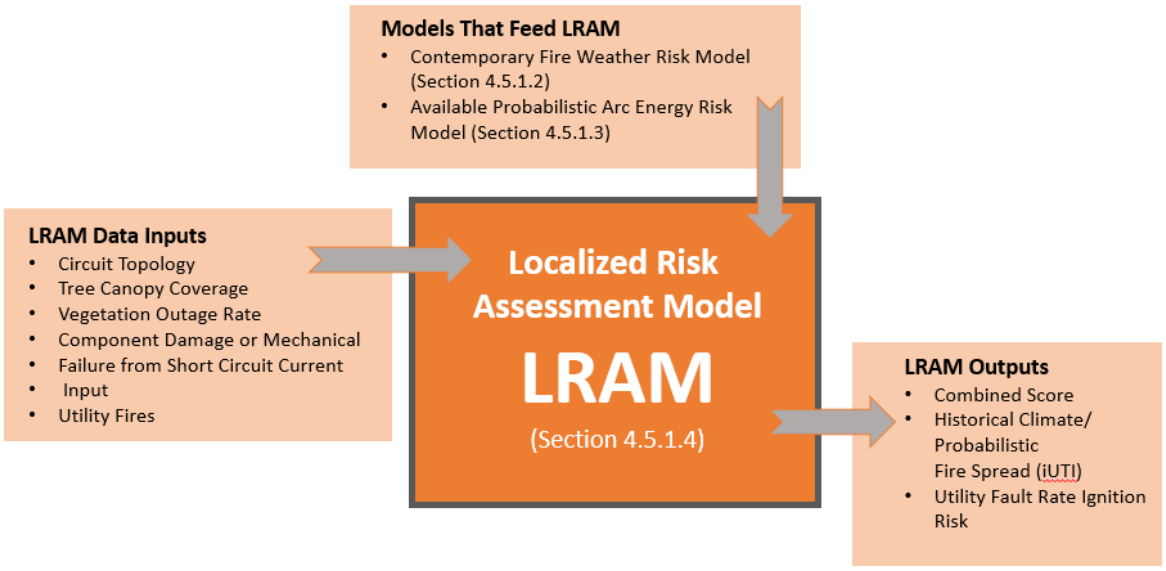

Figure 4.15 LRAM inputs and outputs

1. **Purpose of the model - model and metric calculation**

   From its 2020 Remedial Compliance Program (RCP) filing[10], the company outlined its road map for fire risk modeling, a deterministic method that relied on the HFTD in addition to company-developed climate risk drivers / historic fire risk and outage event analyses. That groundwork set the stage for model goals: establish a risk evaluation that could be utilized to scope Wildfire Mitigation initiatives and prioritize work based on potential for risk reduction.

2. **Relevant terms**

   13 Anderson Fire Behavior Fuel Model — These original 13 standard fire behavior fuel models serve as input to Rothermel's surface fire behavior and spread model. The model represents distinct distributions of fuel loading found among surface fuel components (live and dead), size classes, and fuel types. The fuel models are described by the most common fire-carrying fuel type (grass, brush, timber litter, or slash), loading and surface area-to-volume ratio by size class and component, fuelbed depth, and moisture of extinction.

   Arc flash analysis — Any of several engineering methods (IEEE 1584, NFPA-70E, CSA Z462, Lee Method, Wilkins Method) used to analyze electrical safety in power systems. The methods typically use heat transfer models, heat flux calculations and/or prescribed tables to assess risk level and help determine adequate safety procedures. A variety of parameters, including source impedance, equipment type, equipment location and clearing device are used to calculate total energy from an arc associated with a short-circuit event.

   Conductor damage — The material properties of overhead bare conductors include melting point, temperature coefficient, hardness and tensile strength. When performing engineering analysis on various sizes of copper, aluminum and steel conductors, these properties can be modeled in a 2D damage curve, where the axes are current and time (TCC). This curve can be used to show the duration in time that a conductor can sustain a given current without degradation of its material properties (softening, etc.). Beyond this duration, the conductor is said to have incurred damage.

   CYME model — A software representation of a given power system, where simulations can be run to gain insight on system capability and behavior.

[10] https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/About_Us/Organization/Divisions/WSD/R.18-10-007%20PacifiCorp%20Remedial%20Compliance%20Plan%20(7-27-20).pdf

Dispatch DoForm/Risk Save — An internal form created at the onset of a fire risk event.

ELMFire — Eulerian Level set Model of Fire spread - is an open-source geospatial model intended for simulating wildland fire.

High resolution rapid refresh (HRRR) — A NOAA, real-time 3-km resolved weather forecasting model updated hourly.

Load current — The current (Amperes) normally flowing through an energized power system to deliver power.

Point layer — GIS layer consisting of individual points with location information and vegetation attributes (point layer: raster data, gridded at 20 meters).

PowerMap — Company mapping system.

PROSPER — Outage record database.

Protective device details — The applicable TCC curves for a protective device, together with logic-based settings.

Short circuit event — An occasion when one or more components of an electrical system contact one or more circuit return paths. Commonly used for arc flash analysis: a phase conductor contacting earth or system neutral. The result is typically a current value higher than load current.

Source details — A numerical representation of impedance, typically at the head of a circuit or substation, of the upstream configuration and equivalent impedance to all connected current contributors (e.g., generation). A low impedance suggests that generation is relatively close and available fault current is relatively high.

Time current characteristic (TCC) — The specified relationship between applied current and operating time for a protective device such as a fuse, recloser or relay-controlled breaker. TCCs are often represented visually by curves for the purpose of studying device coordination, or for developing new settings. For example, a 100 Amp T-speed fuse will take more time to operate for a given current magnitude than will a 25 Amp T-speed fuse.

Zone of Protection (ZOP) — A ZOP is a module, i.e., subsection of a circuit with control, either programmatically, automatically or manually. Figure 4.16 shows the ZOPs of a portion of a circuit beginning at the black dot, representing the substation's circuit breaker. The ZOP is the smaller granule against which any location risk should be considered. Generally speaking, a ZOP goes from a protective device, like a circuit

breaker, to the next protective device(s), such as line recloser or a fuse. Integration of all risks, combined mathematically, using rationalized weighting factors provide rankings for each ZOP that can be used to prioritize efforts for wildfire mitigation actions.

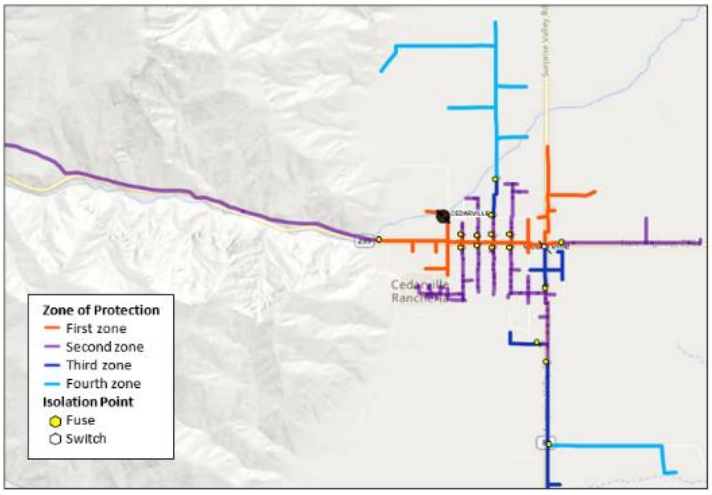

Figure 4.16 Example of a Zone of Protection

3. Data elements

Table 4.3 LRAM data elements

Data Element	Level of Granularity (a)	Frequency (b)	Data sources (c)	Data quality verification (d)	Data characteristics (e)	Data modification and/or future improvements (f)
Circuit Topology	Spatially, approximate 10' accuracy	Data is refreshed and maintained daily.	GIS Point and line features	Review by engineering team.	PacifiCorp base data containing spatial locations, facility and equipment details (e.g., conductor types, spacing, equipment). This data is managed and mapped by the GIS department, which updates records based on field personnel work orders. The data is used to apply model area findings to specific facilities.	Better locational precision; more hardware detail in GIS.
Contemporary Fire Weather Risk	See Section 4.5.1.2 on page 74					
Utility Fires	GPS accuracy from field resource	data records are reviewed monthly. The model initiation and development progress over time.	Dispatch log, PROSPER outage records, risk save event forms, equipment location and asset details, in addition to event response personnel details and environmental drivers at the time of the event.	Quality checked by risk, operations and engineering SMEs.	Data from dispatch logs, PROSPER outage records, risk save event forms, equipment location and asset details, event response personnel details and environmental drivers at the time of the event are combined to create a recorded dataset of utility-caused fires. A detailed data source review consolidates the data into a single source. Data location is based on GIS equipment location at the time of the incident. When reviewed with other fire-risk influencers, this information can help determine potential trends and will help to determine where addition system and equipment risks, which can drive facility locations upgrades and placements for protective equipment See Figure 4.20.	Centralized database with information augmented by risk event investigation team.
Available Arc Energy and Short Circuit Ignition Likelihood	See Section 4.5.1.3 on page 77.					

Data Element	Level of Granularity (a)	Frequency (b)	Data sources (c)	Data quality verification (d)	Data characteristics (e)	Data modification and/or future improvements (f)
Tree Canopy Coverage	30 m granularity	Data analysis will be refreshed based on updates to the NLCD Canopy Cover Layer (anticipated at 3 to 5-year intervals. Major changes to PacifiCorp asset locations would require a refresh in analysis.	NLCD Tree Canopy coverage and internal distribution GIS data. NLCD data has 30m2 resolution and extracted data layers maintain that resolution.	Comparison to historic vegetation outages and historic vegetation maintenance records.	A point layer created from distribution line GIS files with 30m spacing, clustered to avoid oversampling at line intersections. Data is extracted from the NLCD Tree Canopy Cover raster layer at each point, aggregated per circuit or subcircuit segment to provide distribution functions and statistical values for the tree canopy cover along each segment. Limitations from the NLCD data resolution and techniques result in lower accuracies in developed areas.	Augmenting NLCD cover data with higher resolution datasets in developed areas.
Historic Climate/ Probabilistic Fire Spread (iUTI)	30 m pixels rendered on circuit topology	Data analysis will be refreshed based on updates to LANDFIRE dataset. In addition, major changes to PacifiCorp asset locations would require a refresh in analysis.	LANDFIRE fuel data, 13 Anderson fuel models, weather re-analysis data.	Review by stakeholders/fire professionals.	Use of historic fire weather days to simulate current fire spread using random ignitions, modeling probability of spread with current vegetation and existing terrain. Randomly ignited cells model volume of acres burned from modeled ignitions accumulated for each 20 m grid. SMEs draw inferences re elevated areas, upon which iUTI was founded. This gridded raster dataset was overlaid on circuit ZOPs and length-weighted for the ZOP iUTI score.	Better integration of contemporary fuel situation; utility focus on ignitions rather than agnostic to source.

Data Element	Level of Granularity (a)	Frequency (b)	Data sources (c)	Data quality verification (d)	Data characteristics (e)	Data modification and/or future improvements (f)
Vegetation Outage Rate	Reconciles outage events to auto isolation point/ZOP; granularity in certain areas of model may not be particularly precise	Historic vegetation outages have been incorporated into the risk model in late 2020 and will continue to be updated periodically.	Historic outage records and circuit information.	Subject matter expertise.	Determined by counting the outages per ZOP and normalizing by length and time. The general framework is very flexible: an outage rate can be extracted for any outage type (car hit pole, animal contact, etc.) across all ZOPs. Vegetation outage frequencies normalized by line length have been incorporated into the risk model.	Reconciliation of tree canopy/vegetation performance would result in greater accuracy with causal relationship.
Utility Fault Rate Ignition Risk	Reconciles outage events to auto-isolation point/zones of protection; granularity in certain areas of model may not be particularly precise	Annually	The historical outage data is housed in PROSPER and joined with additional facility and asset data.	Quality checked by central engineering SMEs.	Data provides areas of concern and hot spots when historical events occurred as broken down by cause category. This models high risk outage areas and helps with prioritization. All records are reviewed based on the company's process for recording and categorizing outage events. The data for qualifying events is correlated and analyzed consistent with methods developed in response to the CPUC's Wildfire Safety Division's Wildfire Mitigation Plan Template requirements. Outage causes are captured to support segmentation. Certain unrecorded equipment type may be inferred. Changes in circuit topology and environmental impacts can yield substantially different incident rates. Submodule changes can result in substantial variations in ignition risk over time and may not be easily back-cast for comparison purposes, see Figure 4.17.	Finer detail on locations of damaged equipment when risk events occur, i.e., which span was the location at which vegetation contact occurred?
Component Damage or Mechanical Failure from Short Circuit Current	Device clearing time analysis overlaid on circuit topology	PacifiCorp completed the pilot CYME analysis for bare overhead	CYME v9.0 distribution system model, collected in 2020 and held constant throughout	Quality checked by local engineering SMEs.	Identify distribution system components where high current flow and/or heat from a short circuit event is predicted to damage overhead components based on simulation results. The metric will initially be associated with spans of overhead conductor and their protective devices. Simulations will be performed, at least, in CYME.	Cyclic process to validate modeling and performance as part of annual readiness check.

Data Element	Level of Granularity (a)	Frequency (b)	Data sources (c)	Data quality verification (d)	Data characteristics (e)	Data modification and/or future improvements (f)
		conductors in its California service territory in 2021. The yes/no output is not expected to be combined directly with other measures for composite risk scoring but may be used to prioritize improvements related to the composite scores. Over the next five years the conductor analysis is intended to be incorporated as a standard aspect of cyclical study processes in California.	the analysis. With a spatial granularity of Lat/long for each node in the module. This system model includes source, line and protective device details		Available short circuit current magnitude can be estimated by CYME as can time for a device to clear a given fault. The pilot simulation evaluated short circuit scenarios where 10 Ohms of impedance was assumed for all short circuit events, and applied voltage at the high end of ANIS A range (105% nominal). These parameters were found to better represent worst case damage than the 95% nominal voltage scenario. This metric will be measured as a simple yes or no – is the component likely to sustain damage from the fault events studied? Mitigation will be pursued for areas where the result is "yes." See Figure 4.18.	

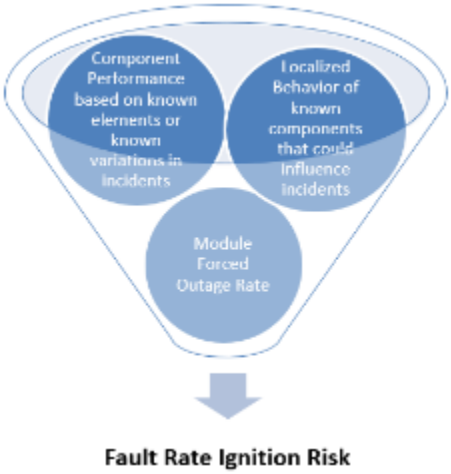

Figure 4.17 Fault rate ignition risk process

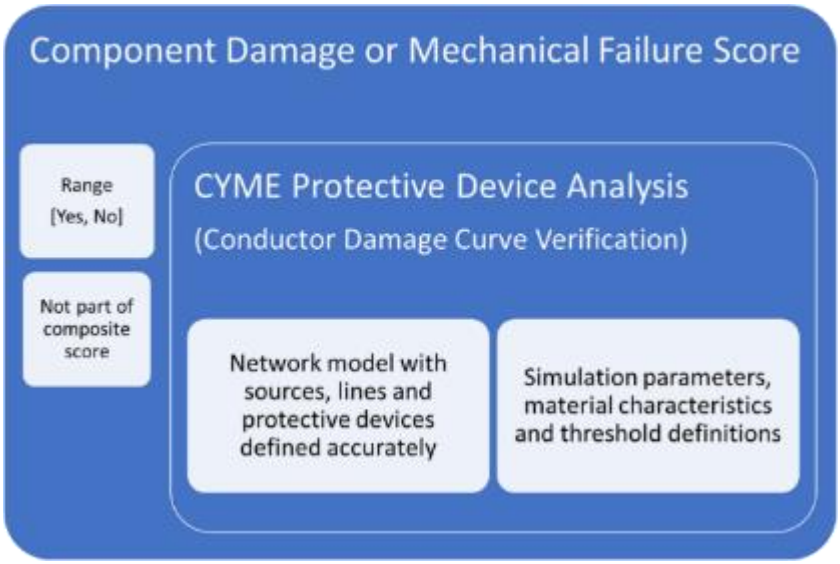

Figure 4.18 Component damage or mechanical failure from short circuit current methodology

4. Modeling assumptions and limitations

General LRAM modeling assumptions and limitations

- The model is not dynamic, it's static and continuously being updated.
- It does not incorporate recent weather, only looks at historical weather trends over time.

- It is based on the number of customers, not on property/property value which better ensures customer equity.

Input/Output element-specific assumptions and limitations

- Circuit topology — Conductor types, spacing, etc. are accurate.
- Historic climate/ probabilistic fire spread (iUTI) — Locations where climate has favored fire spread will continue to favor fire spread.
- Tree canopy coverage — Position errors are random and can be removed through statistical sampling. Techniques used by the NLCD base layer are consistent and accurate. Higher tree canopy density correlates to more trees and more risk.
- Vegetation outage rate — Outages with reference to outages (whether by sustaining or contributory causes) may not be as accurate as ideal; weather-influenced outages may mistake vegetation impactions.
- Utility fault rate ignition risk — Historic fault rates and locations have relationship to future risk events; circuit topology from year to year is relatively stable to enable translating history forward onto zonal expectations.
- Component damage or mechanical failure from short circuit current — Requires accurate source and conductor representation in Protective Device Analysis models.
- Utility fires — Requires manual reporting processes instituted since 2019.

5. **Modeling methodology including detailed construct of the model elements**

The LRAM modeling uses a combination of input layers, which provide a combined risk score at a ZOP level. The construct of the model and the ancillary data layers are detailed in Figure 4.19, as is the cycle for routine update and reassessment of model elements. Should any model elements fail their quality tests (each of which is separately identified), they would be appraised for alternate methods to incorporate the fundamental attributes they provide to the model output, and any substitution will be reported in future WMPs. Further, should additional data layers be identified and incorporated into wildfire risk assessment, the model elements for that layer will be outlined and model validation methods identified.

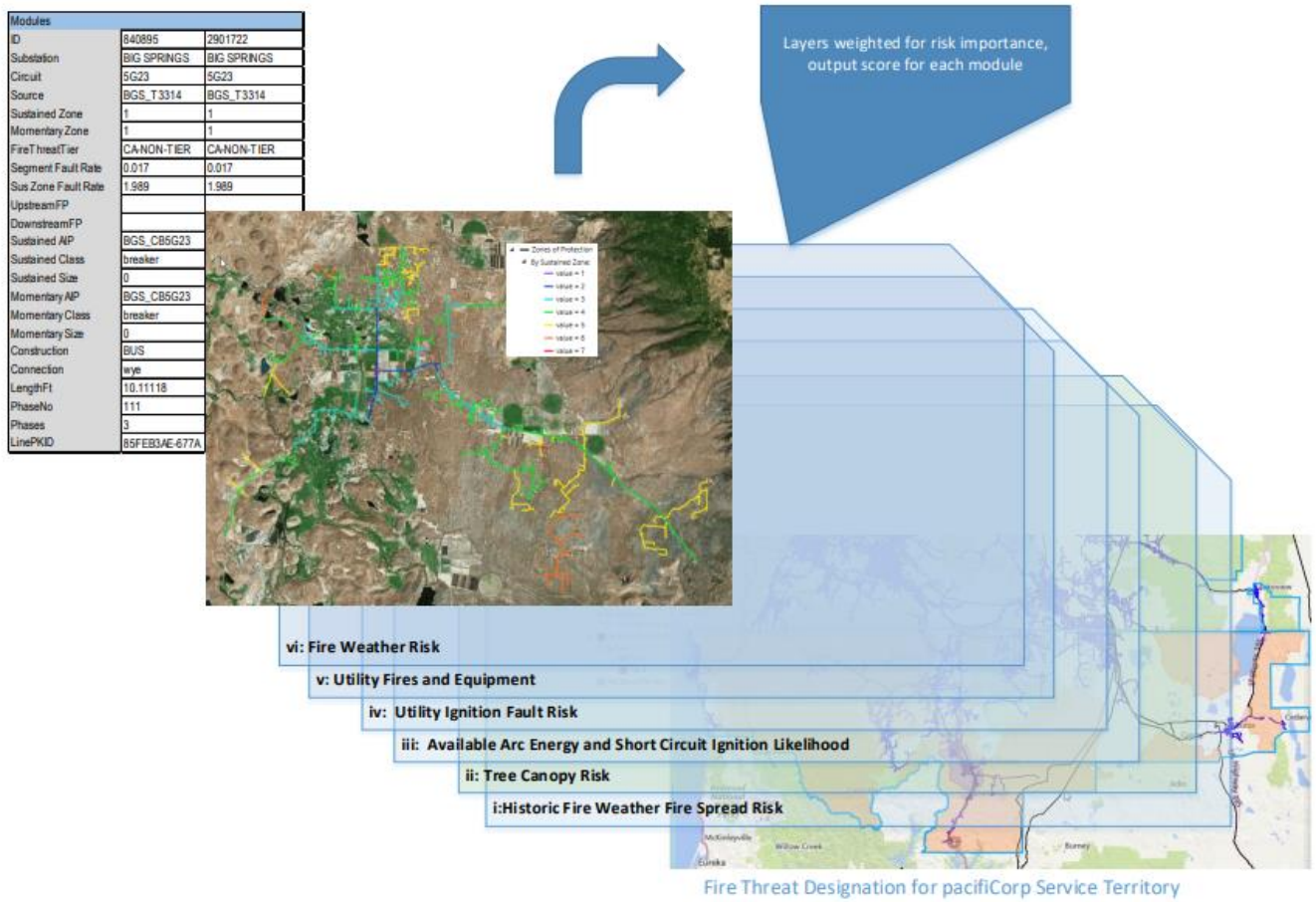

Figure 4.19 LRAM input layers

The combination of all layers if what PacifiCorp refers to as a composite "combined score," to reflect the total risk of a utility-related ignition occurring because of a ZOP fault. The combined score helps PacifiCorp target mitigation programs to the highest risk portions of PacifiCorp's grid. A variety of related factors mean that a higher combined score may not mean that a higher-scoring module will receive priority over a lower-risk-scored module. For example, it might not make sense to prioritize a module for certain types of mitigation in one year if the same module was scheduled for conversion to covered conductor in the following year.

Additionally, the combined score can be combined with a PSPS impact layer. Each module's relative PSPS impact is considered separately in terms of downstream customer counts (DCC). Factors in a DCC risk assessment include impacts of module de-energization on:

- Total number of customers impacted
- The number/type of critical facilities, including an assessment of backup generation capabilities

- The number/type of AFN customers, including an assessment of backup generation capabilities
- The economic impact to commercial customers

In each case, the number of customers is the sum of those customers directly served by the module as well as all downstream customers.

The PSPS impact layer reflects community impacts and helps PacifiCorp prioritize mitigation efforts. Mitigation activities that reduce the wildfire risk associated with a module can justify strategies to minimize the module's PSPS impact by either reducing PSPS likelihood or eliminating the module from PSPS consideration. Consequently, PacifiCorp's fire risk modeling strategy serves as a refreshable, quantifiable foundation for multiple fire-risk influencers within any ZOP.

6. LRAM uncertainty

PacifiCorp does not have the large history data set for outages and ignitions. The history is key to reducing the margin of error in any calculations related to risk reduction evaluations.

As the company can add more projects, time and operating experience it expects to improve these estimates.

7. LRAM verification and validation

Upon completion of the detailed LRAM framework the company conducted stress testing for the weight of each input. It chose "boundary condition" locations, specifically circuits within three areas it served having various fuel, fire weather, equipment characteristics and outage rates and performed comparisons of the model results. The company determined that only the Probabilistic Arc Energy should be weighed at a lower value because utility adjustments to arc energy are responses to relatively low frequency fault events; giving them equal weight with fire weather and fuel improperly tips the scale.

Evolution of the model toward S-MAP and RAMP products such as RSE. PacifiCorp intends to leverage the LRAM to deliver mitigation quantification to produce risk spend efficiencies.

As the company has responded to the deficiencies noted by the OEIS, it outlined the need to demonstrate the application of its LRAM to 1) reconcile its network's fire risk against the currently designated HFTD, 2) to evaluate and amend priorities for mitigation efforts currently on its multi-year plan, 3) to ensure that mitigations were properly aligned for any fire risks the model might detect, 4) to select the logical extent to which mitigation is conducted throughout its network, 5) to quantify the potential

impacts to customers served from portions of the network with elevated fire risk, 6) to evaluate credible impacts from climate change, and 7) to estimate the changes in fire risk as its mitigations are completed. Certain of these areas are still under development (such as future ignition risks as mitigations are completed), however many are now complete and detailed below.

1) Reconciling HFTD Tier with final score

In Figure 4.20 the company displays material applying its LRAM results at the ZOP and aggregated to the circuit served to broadly categorize the ranges of combined scores currently designated as Tier 3, Tier 2 and Non-Tier. This is displayed through a histogram of the final combined risk score for each ZOP and colored by its HFTD tier designation. The distribution of scores contrasted to the tier designation enables identification of locations that should either be moved from Non-tier to Tier 2 or Tier 2 locations to Tier 3. Using the histogram, the company evaluated the combined score threshold and observed that combined scores of below 0.55 separates Non-Tier and above 0.70 separates Tier 3 from Tier 2.

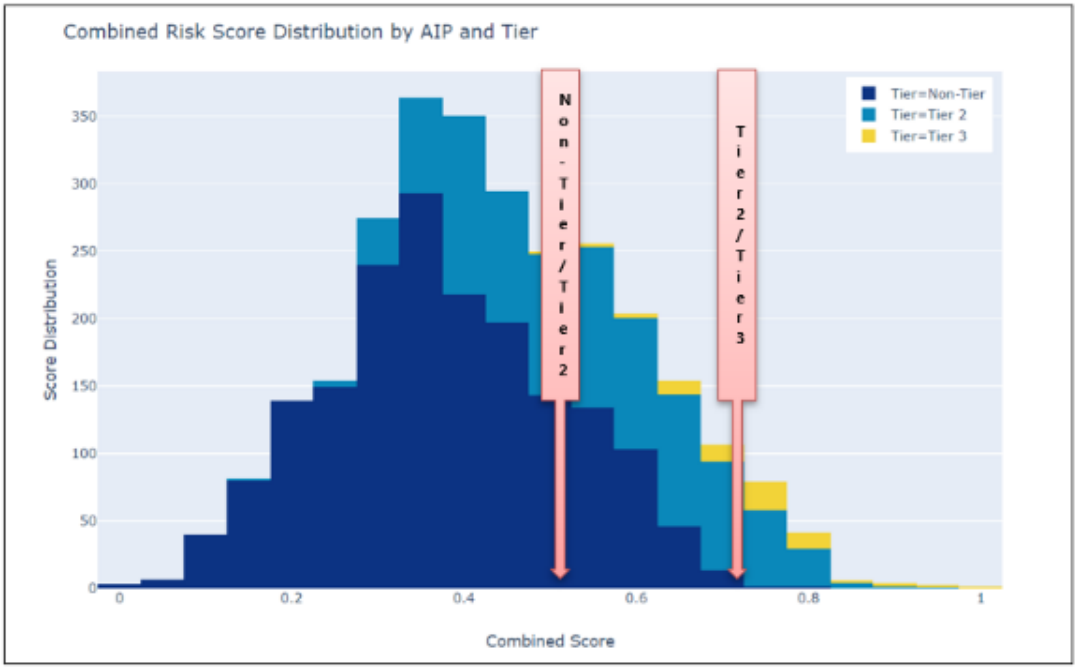

Figure 4.20 Distribution of the Combined Risk Score among the ZOP in California
The two arrows demonstrate where we see choose risk boundaries between Non-Tier/Tier 1 and Tier 1/Tier 2

2) Comparing to prioritization efforts

The next order of model usage focuses on the assessment and modification, where appropriate, of circuit priorities. Originally, the company used the HFTD Tier designation and the customer impacts from PSPS as criteria to establish mitigation

priorities. With LRAM, PacifiCorp can calibrate mitigation priorities at a finer level and with more risk elements consideration. Now each ZOP and circuit has a combined fire risk and PacifiCorp can begin to systematically prioritize future grid upgrades relative to those high-risk areas, particularly with respect to the use of covered conductor.

3) Circuitwide versus targeted efforts

LRAM also allows for evaluating specific ZOPs within circuits, particularly those outside the HFTD, but of substantial combined risk level to warrant targeted mitigation efforts. These specific ZOP, regardless of HFTD classification are shown in Figure 4.21. Each circuit is represented by a data series on the x-axis and the combined score for each ZOP is on the y-axis with every point representing a specific ZOP (colored by tier). While often the combined score may be appraised at the circuit level as a single unit, the graphic below allows for each circuit's ZOPs to be evaluated for their range of combined risk. Circuits with wide variations are candidates for zonal corrections, while those circuits with generally high zones are best addressed as a combined unit for fire risk mitigation.

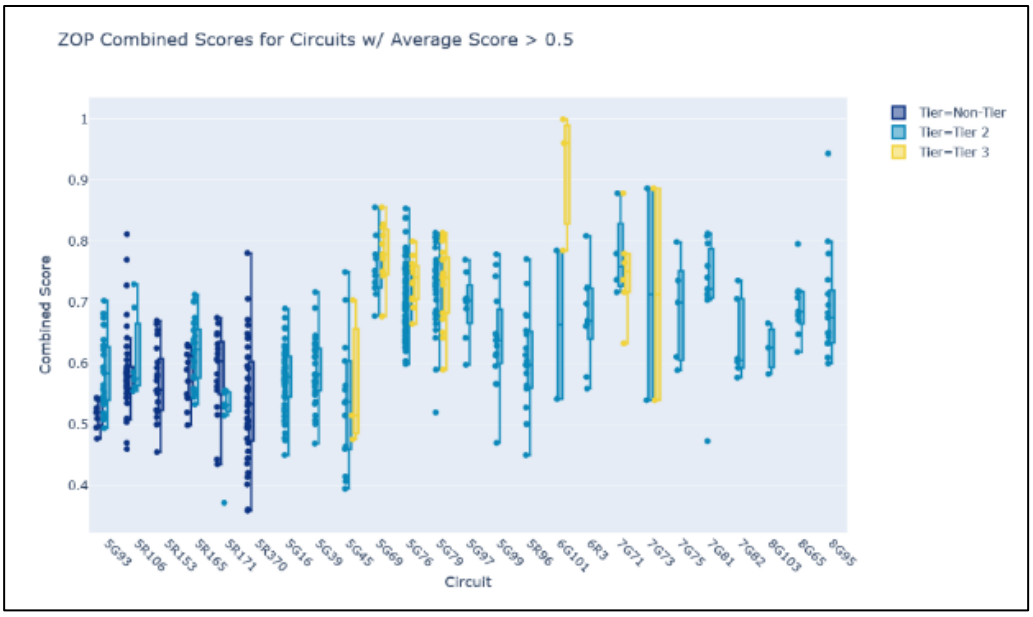

Figure 4.21 Box plot for the combined score of each circuit
colored by HFTD designation
where each point is the score for a specific ZOP

Circuits with a relatively low combined risk score, with outlier ZOP, highlight the necessity for targeted alternative mitigation techniques that are often part of the company's general reliability planning, including protective device coordination, equipment inspection, vegetation inspection, etc.

The tables below identify the extensive methodologies, programs, and techniques PacifiCorp uses to mitigate ignition risks.

Table 4.4 Identified methodologies, programs, and techniques PacifiCorp uses to mitigate ignition risks by fault response

Ignition Risk Driver		Fault Response							
		Coordinate protective equipment	Replace legacy protective equipment	Additional protective equipment	Current Limiting Fusing / Devices	Incipient Fault Detection	Fault Detection Enhancement	Fault Investigation	Proactive or Quickly Reactive Fault Response
Model or Legacy Risk Driver		**Arc Energy/Conductor Damage**							
Contact from object	Animal contact	x		x	x	x		x	
	Balloon contact	x		x	x	x		x	
	Other	x		x	x	x	x	x	
	Unknown	x		x			x		x
	Veg. contact	x	x	x	x	x		x	
	Vehicle contact	x		x			x		
Contamination		x	x		x	x	x	x	x
Equipment / Facility failure	Conductor	x	x		x			x	
	Crossarm					x	x	x	x
	Fuse	x	x		x	x		x	x
	Insulator					x		x	x
	Lightning arrestor					x		x	
	Other					x			
	Pole					x	x	x	x
	Sectionalizer	x	x		x	x		x	x
	Connectors					x		x	x
	Switch					x		x	
	Transformer								
	Voltage regulator					x		x	x
Normal Operation		x	x	x	x	x			
Other		x	x		x	x			
Unknown		x	x		x	x			
Vandalism/Theft									
Wire-to-wire contact		x		x				x	
Contact from 3rd party								x	

Table 4.5 Identified methodologies, programs, and techniques PacifiCorp uses to mitigate ignition risks by inspection maintenance and vegetation management

Ignition Risk Driver		Inspection/Maintenance					Vegetation Management				
		Reliability-Centered Inspection & Correction	Leakage Current Monitoring Pilot	RF/IR/ Resistance Detection of Connectors	Enhanced Inspection	Legacy Equipment Replacement	Vegetation Management	EVM	Radial Pole Clearing	Targeted Tree Removal	Veg Patrols
Model or Legacy Risk Driver		**Equipment Failure**					**Vegetation/Equipment Failure**				
Contact from object	Animal contact								x		
	Balloon contact								x		
	Other								x		
	Unknown	x		x	x	x			x		
	Veg. contact					x	x	x	x	x	x
	Vehicle contact								x		
Contamination		x	x	x	x	x			x		
Equipment / Facility failure	Conductor	x			x	x					
	Crossarm	x		x							
	Fuse	x	x		x	x			x		
	Insulator	x		x		x			x		
	Lightning arrestor		x			x					
	Other										
	Pole	x		x	x						
	Sectionalizer					x					
	Connectors	x			x	x			x		
	Switch	x				x					
	Transformer										
	Voltage regulator										
Normal Operation						x	x	x			
Other						x	x	x			
Unknown						x	x	x	x		
Vandalism/Theft											
Wire-to-wire contact						x					
Contact from 3rd party											

Table 4.6 Identified methodologies, programs, and techniques PacifiCorp uses to mitigate ignition risks by asset hardening

Ignition Risk Driver		Asset Hardening														
		Covered Conductor	Underground Conversion	Enhance theft / vandalism resilience	Neutral Extension / Grounding System	Enhance Insulation (BIL)	Pole relocation	Visibility enhancement	Pole protection	Animal guarding	Spread construction	Create Animal Habitat/Bird Poles	Interset Structures	Midspan spacers	Contractor & Public Education	Damage Prevention Programs
Model or Legacy Risk Driver		**Gust/Fire Weather/General Outage**						**Vehicle Contact**		**Animal Contact**			**Wire to Wire Contact**		**Third Party Interference**	
Contact from **object**	Animal contact	x	x			x				x	x					
	Balloon contact	x	x								x					
	Other	x	x													
	Unknown	x	x			x										
	Veg. contact	x	x									x	x	x		
	Vehicle contact	x	x				x	x	x						x	x
Contamination		x				x					x					x
Equipment / Facility failure	Conductor	x	x									x	x	x		x
	Crossarm	x				x			x						x	x
	Fuse					x										x
	Insulator					x										x
	Lightning arrestor															x
	Other															x
	Pole	x				x			x						x	x
	Sectionalizer															x
	Connectors															x
	Switch															x
	Transformer															x
	Voltage regulator															x
Normal Operation		x	x		x			x								x
Other		x	x		x			x								
Unknown		x	x		x			x								
Vandalism/Theft		x	x	x											x	
Wire-to-wire contact		x	x			x	x				x	x	x	x	x	
Contact from 3rd party		x													x	x

8. LRAM modeling frequency

Each of the data elements that make up LRAM have their own frequencies. These are most simply explained in Table 4.3 but are re-presented here:

Circuit topology — Data is refreshed and maintained daily.

Historic climate/ probabilistic fire spread (iUTI) — Data analysis will be refreshed based on updates to LANDFIRE dataset. In addition, major changes to PacifiCorp asset locations would require a refresh in analysis.

Tree canopy coverage — Data analysis will be refreshed based on updates to the NLCD Canopy Cover Layer, which is anticipated at three to five-year intervals.

Vegetation outage rate — Periodic updates.

Utility fault rate ignition risk — Annually.

Utility fires — Data records are reviewed monthly.

9. LRAM timeline for model development

PacifiCorp expects to continuously improve the LRAM as the individual layers are updated or new layers are added. The company will also archive and evaluate the model annually — updating all the layers at that time. The annual reevaluation also establishes a baseline. The company plans to compare future to archived LRAM scores. This current-versus-future comparison illuminates model and network improvements and enables quantification of grid modernization efforts on utility risks for specific elements such as outage rates (risk events), arc energy calculations, and utility-caused ignitions. The annual baseline will also allow long-term climate monitoring (measured through the weather components of the Fire Weather Risk Layer). The company will then be able to combine these identified climate trends with California's 4th Climate Change Assessment for an informed view of the macro climate trends in PacifiCorp's service territory, which will support effective planning and prioritization.

Risk Modeling Refresh Process	
Annually	Evaluate the risk influencers to be quantified for the upcoming period
Annually	Develop the method for calculating the influencer for each risk influencer
Annually	Establish weighting for each influencer relative to some identified objective
Annually	Calculate module scoring for the combined influencers
Annually	Stress test the results against objective criteria
Annually	Modify calculation or weighting as necessary
Annually	Finalize the rating/ranking for each module
Annually	Compare against prioritization efforts for WMP, including PSPS operations
Annually	Modify prioritization where appropriate
Annually	Communicate the results of the risk scoring method
Annually	Archive results with appropriate version details
Ongoing	Review other risk influencers for inclusion in future assessment periods

Figure 4.22 LRAM annual refresh process summary

10. LRAM application and results

The LRAM application and results are best understood on a data element basis. The application and results for each of the nine data elements are described below:

Circuit topology — The data is used to apply model area findings to specific facilities.

Historic climate/ probabilistic fire spread (iUTI) — Historic fire spread, as a proxy for long-term fire spread risk has been integrated into the model.

Tree canopy coverage — The tree canopy coverage layer has been integrated into the fire risk model. The model results have also been incorporated into vegetation trimming cost forecasts. Layer validation efforts compared coverage to historic vegetation outages and historic vegetation maintenance records. These showed weak, but non-negligible, correlations. Limitations from the NLCD data resolution and techniques result in lower accuracies in developed areas.

Vegetation outage rate — Vegetation outage frequencies normalized by line length have been incorporated into the risk model.

Utility fault rate ignition risk — This dataset forms the basis for module fault rate/outage type/component factors. Implement wildfire mitigation strategy in areas where outage history, causes and equipment result in elevated outage ignition risks and shown in the below graphic.

Component damage or mechanical failure from short circuit current — The results of the pilot were used to identify locations where the potential fault (based on the similarity to modeled configurations) created a risk of damaged bare overhead

conductor. Use of this information allows for system network changes to preempt such a risk condition.

Utility fires — Implement wildfire mitigation strategy in areas where at risk equipment exists. The information can be used to determine any trends which may occur when analyzed with additional fire risk influencers. This data will help to determine where addition system and equipment risk exist to drive facility locations upgrades and placements for protective equipment.

11. LRAM key improvements from the working group

LRAM includes inputs from company utility ignition history. The history is used as a flag for the ZOP. The company is evaluating how to extend this limited dataset. Any new risks, layers, and model modifications will be reported in future WMP updates.

As noted previously, the company intends to extend the LRAM to calculate risk spend efficiencies. Using the methodology for assessment of risk event reduction, noted above, and with developed ignition probabilities, the company will be positioned to calculate the effectiveness of its mitigation measures, while it continues to refine costs of mitigation measures, which serve as a direct input also to the calculations. PacifiCorp will also look to leverage Technosylva's WRRM model to expand upon existing capabilities of LRAM and further evaluate RSE and long-term planning.

Additionally, as the requirements of the SMJUs evolve, the company anticipates integrating categorical risks from assets, as was provided in its 2018 general rate case (GRC) and further described in the 2023 GRC.

Key improvements for LRAM can also be understood on a data element basis. The key improvements for each of the nine data elements are described below:

Circuit topology — Better locational precision; more hardware detail in GIS.

Historic climate/ probabilistic fire spread (iUTI) — Better integration of contemporary fuel situation; utility focus on ignitions rather than agnostic to source.

Tree canopy coverage — Augmenting NLCD cover data with higher resolution datasets in developed areas.

Vegetation outage rate — Reconciliation of tree canopy/vegetation performance would result in greater accuracy with causal relationship.

Utility fault rate ignition risk — Finer detail on locations of damaged equipment when risk events occur, i.e., which span was the location at which vegetation contact occurred?

Component damage or mechanical failure from short circuit current — Cyclic process to validate modeling and performance as part of annual readiness check.

Utility fires — Centralized database with information augmented by risk event investigation team.

4.5.2 Calculation of key metrics

Report details on the calculation of the metrics below. For each metric, a standard definition is provided with statute cited where relevant. The utility must follow the definition provided and detail the procedure they used to calculate the metric values aligned with these definitions. The utility must cite all data sources used in calculating the metrics below. In addition, the utility must include GIS layers showing Red Flag Warning (RFW) frequency and High Wind Warning (HWW) frequency (use data from the previous 5 years, 2016-2021), as well as GIS layers for distribution of Access Functional Need (AFN) customers, and urban/rural/highly rural customers, and disadvantaged communities[11] in its service territory.

1. ***Red Flag Warning overhead circuit mile days*** *– Detail the steps to calculate the annual number of red flag warning (RFW) overhead (OH) circuit mile days. Calculate as the number of circuit miles that are under an RFW multiplied by the number of days those miles are under said RFW. Refer to the NWS Red Flag Warnings. For historical NWS RFW data, refer to the Iowa State University archive of NWS watch / warnings.[12] Detail the steps used to determine if an overhead circuit mile is under an RFW, providing an example of how the RFW OH circuit mile days are calculated for a RFW that occurred within the utility service territory over the last five years.*

2. ***High Wind Warning overhead circuit mile days*** *– Detail the steps used to calculate the annual number of High Wind Warning (HWW) overhead circuit mile days. Calculate as the number of OH circuit miles that are under an HWW multiplied by the number of days those miles are under said HWW. Refer to High Wind Warnings as issued by the NWS. For historical NWS data, refer to the Iowa State University archive of NWS watch / warnings.[13] Detail the steps used to determine if an OH circuit mile is under an HWW, providing an example of how the OH HWW circuit mile days are calculated for a HWW that occurred within the utility service territory over the last five years.*

3. ***Access and Functional Needs population*** *– Detail the steps to calculate the annual number of customers that are considered part of the Access and Functional Needs (AFN) population. Defined in Government Code § 8593.3 and D.19-05-042 as individuals who have developmental or intellectual disabilities, physical disabilities, chronic conditions, injuries, limited English proficiency or who are non-English speaking,[14] older adults,*

[11] Energy Safety recommends using CalEnviroScreen and Senate Bill 535 to identify disadvantaged communities.
[12] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml
[13] https://mesonet.agron.iastate.edu/request/gis/watchwarn.
[14] Guidance on calculating number of households with limited or no English proficiency can be found in D.20-04-003

children, people living in institutionalized settings, or those who are low income, homeless, or transportation disadvantaged, including, but not limited to, those who are dependent on public transit or those who are pregnant.

4. ***Wildland-Urban Interface*** *– Detail the steps to calculate the annual number of circuit miles and customers in wildland-urban interface (WUI) territory. WUI is defined as the area where houses exist at more than 1 housing unit per 40 acres and (1) wildland vegetation covers more than 50% of the land area (intermix WUI) or (2) wildland vegetation covers less than 50% of the land area, but a large area (over 1,235 acres) covered with more than 75% wildland vegetation is within 1.5 mi (interface WUI) (Radeloff et al, 2005).*[15]

5. ***Urban, rural, and highly rural*** *– Detail the steps for calculating the number of customers and circuit miles in utility territory that are in highly rural, rural, and urban regions for each year. Use the following definitions for classifying an area highly rural/rural/urban (also referenced in glossary):*

   a. *Highly rural – In accordance with 38 CFR 17.701, "highly rural" must be defined as those areas with a population of less than 7 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" must be defined as census tracts.*

   b. *Rural – In accordance with GO 165, "rural" must be defined as those areas with a population of less than 1,000 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" must be defined as census tracts.*

   c. *Urban – In accordance with GO 165, "urban" must be defined as those areas with a population of more than 1,000 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" must be defined as census tracts.*

Population density numbers are calculated using the American Community Survey (ACS) 1-year estimates on population density by census tract for each corresponding year (2016 ACS 1-year estimate for 2016 metrics, 2017 ACS 1-year estimate for 2017 metrics, etc.). For years with no ACS 1-year estimate available, use the 1-year estimate immediately before the missing year (e.g., use 2019 estimate if 2020 estimate is not yet published, etc.)

1. **Key metric: Red Flag Warnings**

First the shapefiles for the Red Flag Warnings (RFW) are obtained from the Iowa State University archive of NWS watches and warnings, see example in Figure 4.23. Next an intersection between the distribution and transmission assets in California and Tier 2, Tier 3, Zone 1 and non-HFTD boundaries. Then, for each RFW and HFTD

[15] Paper can be found here - https://www.fs.fed.us/pnw/pubs/journals/pnw_2005_radeloff001.pdf with the latest WUI map (form 2010) found here - http://silvis.forest.wisc.edu/data/wui-change/

combination and designation the sum of the line lengths within the affected area are calculated for each warning's duration. Finally, the duration and the length of lines within each warning are multiplied to calculate the mile-days metric. These results were summarized in Figure 4.23.

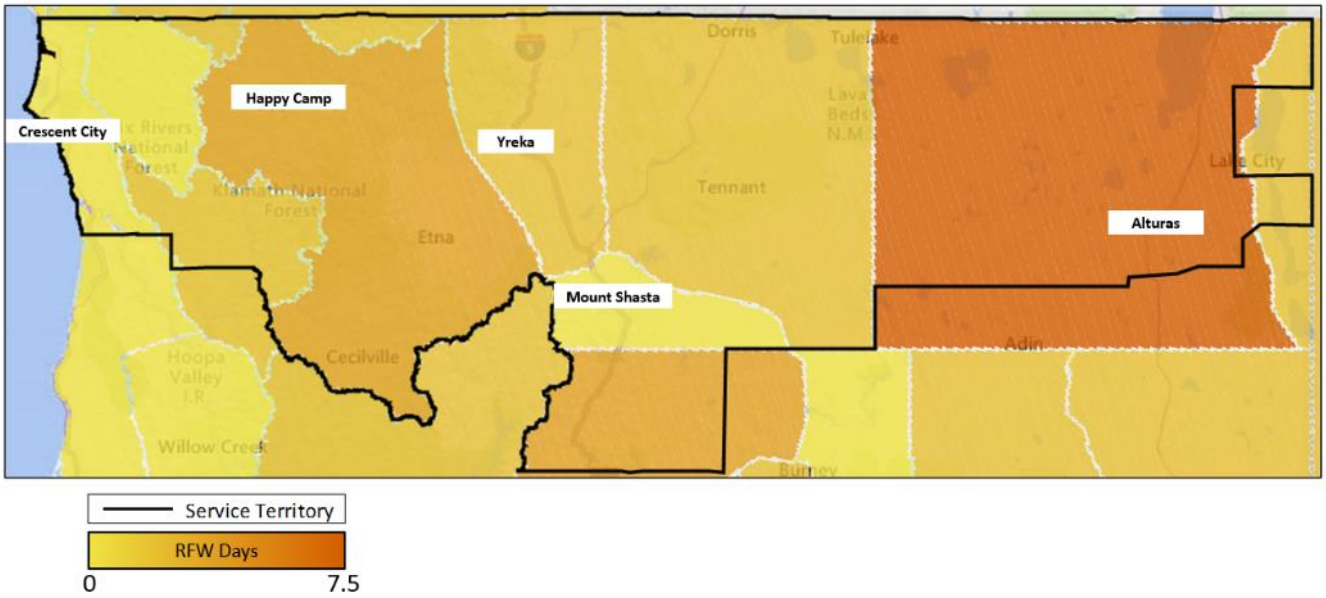

Figure 4.23 Red Flag Warning days, example

1. **Key metric: High Wind Warnings overhead circuit mile days**

First the shapefiles for the High Wind Warnings (HWW) are obtained from the Iowa State University archive of NWS watches and warnings, see example in Figure 4.24. Next an intersection between the distribution and transmission assets in California and Tier 2, Tier 3, Zone 1 and non-HFTD boundaries. Then, for each HWW and HFTD combination and designation the sum of the line lengths within the affected area are calculated for each warning's duration. Finally, the duration and the length of lines within each warning are multiplied to calculate the mile-days metric. These results were summarized. A GIS layer of this metric is attached as GIS Attachment 1 – HWW.

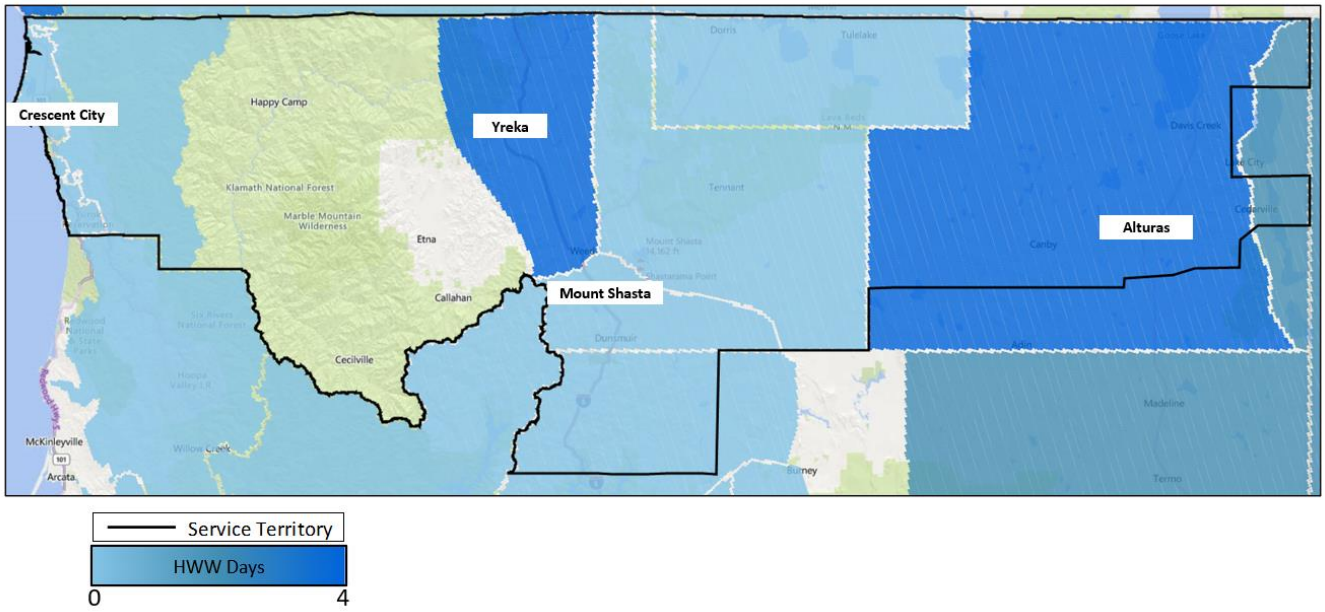

Figure 4.24 High Wind Warning days, example

2. Key metric: Access and Functional Needs population

In the 2022 Annual Access and Functional Needs Plan of PacifiCorp published on February 1, 2021, PacifiCorp fully defines the AFN metric and group:

> Leveraging *the FEMA Comprehensive Preparedness Guide 6 Step Process PacifiCorp along with the IOUs and SMJUs partnered collaboratively with the AFN Core Planning Team and have worked to engage the whole community and develop an overarching Statewide approach that meet the diverse needs of the individuals with AFN. Access and Functional Needs is defined by the California Government Code §8593.3 as: "individuals who have developmental disabilities, physical disabilities, chronic conditions, injuries, limited English proficiencies, who are non-English speakers, older adults, children, people living in institutional settings, or those who are low income, homeless, or transportation disadvantaged, including but not limited to, those who are dependent on public transit and those who are pregnant*.

PacifiCorp has provided the following map, Figure 4.25, of customers who meet the aforementioned criteria and have applied to the program.

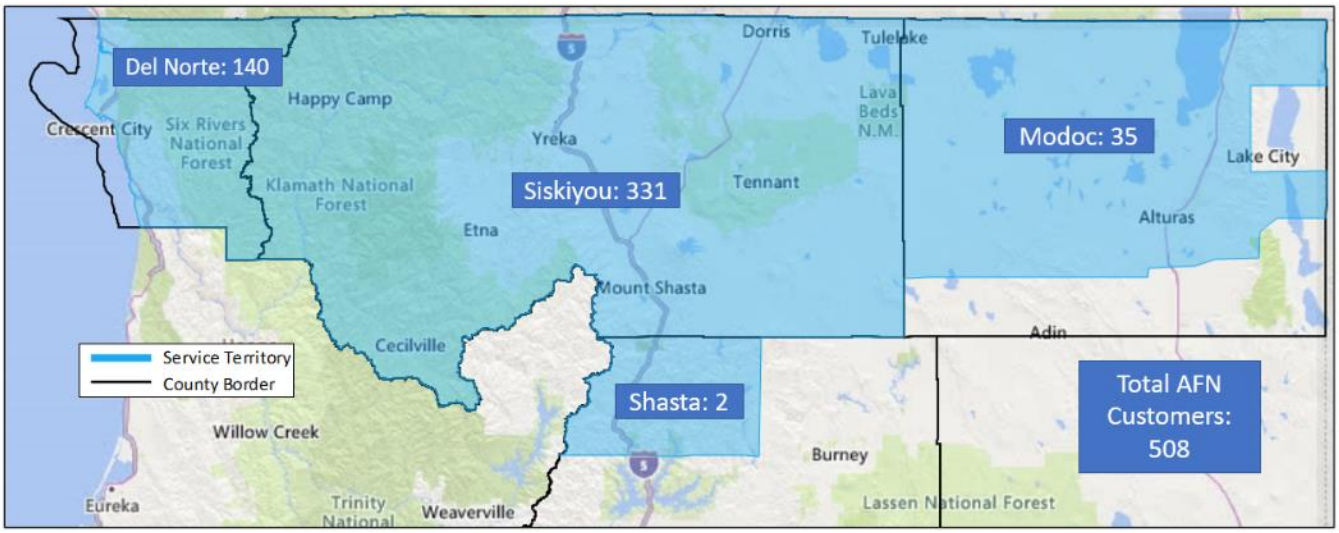

Figure 4.25 Access and Functional Needs population

3. **Key metric: Wildland-Urban Interface**

WUI is defined as the area where houses exist at more than one housing unit per 40 acres and where (1) wildland vegetation covers more than 50% of the land area (intermix WUI), or (2) wildland vegetation covers less than 50% of the land area, but a large area (over 1,235acres) covered with more than 75% wildland vegetation is within 1.5 mi (interface WUI) (Radeloff et al, 2005).[16]

4. **Key metric: Urban, rural, and highly rural**

- Highly rural – In accordance with 38 CFR 17.701, "highly rural" is defined as those areas with a population of less than seven persons per square mile as determined by the U.S. Bureau of the Census. For the purposes of the WMP, "area" must be defined as census tracts.

- Rural – In accordance with GO 165, "rural" must be defined as those areas with a population of less than 1,000 persons per square mile as determined by the U.S. Bureau of the Census. For the purposes of the WMP, "area" must be defined as census tracts.

- Urban – In accordance with GO 165, "urban" must be defined as those areas with a population of more than 1,000 persons per square mile as determined by the U.S. Bureau of the Census. For the purposes of theWMP, "area" must be defined as

[16] Paper can be found here - https://www.fs.fed.us/pnw/pubs/journals/pnw_2005_radeloff001.pdf with the latestWUI map (form 2010) found here - http://silvis.forest.wisc.edu/data/wui-change/

census tracts.

- Population density numbers (see Figure 4.26) are calculated using the ACS one-year estimates on population density by census tract for each corresponding year (2016 ACS one-year estimate for 2016 metrics, 2017 ACS 1-year estimate for 2017 metrics, etc.). For years with no ACS one-year estimate available, use the one-year estimate immediately before the missing year (e.g., use 2019 estimate if 2020 estimate is not yet published, etc.)

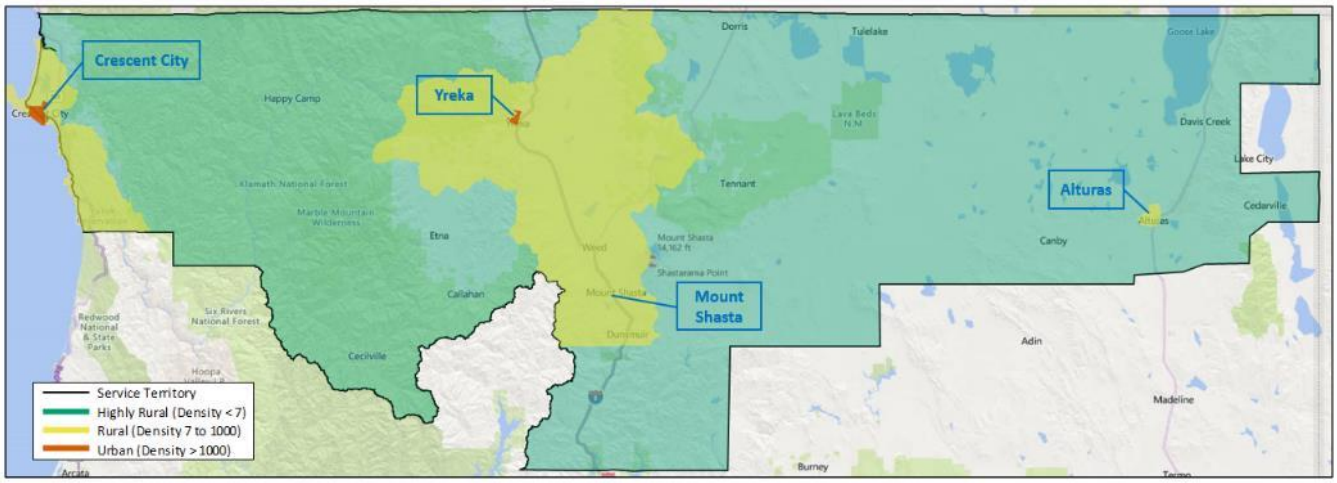

Figure 4.26 Population density[17]

4.6 PROGRESS REPORTING ON KEY AREAS OF IMPROVEMENT

Report progress on all key areas of improvement identified in Section 1.3 of the utility's 2021Action Statement. Provide a summary table of the actions taken to address these key areas and report on progress made over the year. Summarize the progress in a table using a high-level bullet point list of key actions, strategies, schedule, timeline for completion, quantifiable performance-metrics, measurable targets, etc. The table must also include a cross-referenced link to a more detailed narrative and substantiation of progress in an Appendix. The summary table must follow the format illustrated in Table 4.6-1.

Table 4.7 Progress on key areas of improvement and remedies, 2021 (WMP Table 4.6-1)

Utility-#	Issue title	Summary of Progress
PC-1	Failure to follow format for Section 7.3.b, subparts 1-5 of 2021 WMP	PacifiCorp has fully complied with the updated 2022 WMP guidelines; see Section 7.3 on page 149.

[17] Highly rural, Rural and Urban in this document are calculated as per the definition provided in the 2022 WMP Guidelines, and not as per GO 165.

Utility-#	Issue title	Summary of Progress
	Guidelines	
PC-2	Lack of consistency in approach to wildfire risk modeling across utilities	PacifiCorp is currently participating in the monthly Wildfire Risk Modelling Working Group coordinated by OEIS to work towards understanding similarities and differences between the California utility plans. At the conclusion of these workshops in Q3 of 2022, OEIS has planned to provide updated guidelines to support consistency in the approach of wildfire risk modelling across the utilities. In the workplan guidelines provided by OEIS, OEIS acknowledges that the working group may not be able to resolve the approach to wildfire risk modelling prior to the 2022 WMP updates and that the working group will continue after this update. See Section 4.5.1 on page 65, Section 7.3.1 on page 150, and Section 7.3.8.3 on page 216 for more information on PacifiCorp's modeling efforts and evolution.
PC-3	GIS and nonspatial data discrepancy	As reported in the Action Statement Progress Report submitted on November 1, 2021, PacifiCorp has provided clarification on the discrepancy as well as a methodology for the improvement of QA/QC processes in the future. GIS GDB files that are submitted can be difficult to check, since only a few resources in the company can open and navigate GDB files. Therefore, PacifiCorp has initiated a mandatory walk-through review meeting between GIS and key internal stakeholders to check data submitted and connections are correct. Additionally, to continue supporting this effort, PacifiCorp is planning to recruit an additional program manager. This is further described in Section 7.3.7.1 on page 212.
PC-4	Limited evidence to support the effectiveness of covered conductor	PacifiCorp has been participating in Covered Conductor effectiveness workstream where the utilities prepared a joint response to this issue/remedy. Please refer to Attachment 2, Covered Conductor Effectiveness Joint Utility Response
PC-5	Reconductoring projects not prioritized based on wildfire risk	PacifiCorp has provided a response to this in the Action Statement Progress Report submitted on November 1, 2021. See Section 7.3.3.3 on page 161 for additional reconductoring prioritization information.
PC-6	No separate process for replacing expulsion fuses and tracking progress	As a result of this issue, PacifiCorp included in the 2021 Change Order submitted on November 1, 2021, an update which included a separate process for replacing expulsion fuses. Additionally, PacifiCorp has provided a response to this in the Action Statement Progress Report submitted on November 1, 2021. See Section 7.3.3.7 on page 164 for more information on this new program.
PC-7	Limited explanation for how initiatives reduce PSPS impacts	In addition to the response provided in the Action Statement Progress Report submitted on November 1, 2021, PacifiCorp has included two new initiatives in the 2021 Change Order to further reduce the impact of PSPS impacts. The two new initiatives in the change order directly reduce PSPS impacts by providing free portable batteries to Medical Baseline Customers and providing a generator rebate program. See Section 7.3.3.11 on page 168.
PC-8	Lack of details on automatic recloser settings	PacifiCorp has provided a response to this in the Action Statement Progress Report submitted on November 1, 2021. For additional information, see Section 7.3.6.1 on page 207 and Section 7.3.6.2 on page 208.
PC-9	Inadequate justification of initiative-selection process	PacifiCorp has provided a response to this in the Action Statement Progress Report submitted on November 1, 2021. This is also described in Section 7.3.8.1 on page 214.
PC-10	Inadequate approach to PSPS	PacifiCorp has provided a response to this in the Action Statement Progress Report submitted on November 1, 2021. See Section 8.3, page 237 for more information.

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5

INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WMP

5 INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WMP

5.1 GOAL OF WILDFIRE MITIGATION PLAN

The goal of the WMPs are shared across Energy Safety and all utilities: Documented reductions in the number of ignitions caused by utility actions or equipment and minimization of the societal consequences (with specific consideration to the impact on AFN populations and marginalized communities) of both wildfires and the mitigations employed to reduce them, including PSPS.

The following subsections report utility-specific objectives and program targets towards the WMP goal. No utility response is required for Section 5.1.

5.2 THE OBJECTIVES OF THE PLAN

Objectives are unique to the utility and reflect the 1, 3, and 10-year projections of progress towards WMP goals. Objectives are determined by the portfolio of mitigation strategies proposed in the WMP. The objectives of the plan must, at a minimum, be consistent with the requirements of California Pub. Util. Code §8386(a) – Each electrical corporation shall construct, maintain, and operate its electrical linesand equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.

Describe utility WMP objectives, categorized by each of the following timeframes, highlighting changes since the prior WMP:

1. *Before the next Annual WMP Update*
2. *Within the next 3 years*
3. *Within the next 10 years – long-term planning beyond the 3-year cycle*

Table 5.1 PacifiCorp's one, three and ten-year objectives

Category	Before the Next Annual WMP Update	Within the next three years	Within the next 10 years
Risk Assessment and Mapping	• Continue implementation of Technosylva's WFA-E Modeling Suite. • Begin implementation of WRRM module for project identification. • Develop all season risk assessment capability. • Identify and develop plan to augment or update tools based on revised OEIS risk modeling guidance.	• PacifiCorp anticipates the updated CA WMP Guidelines, based on collaborative workshops, will provide a guide for adjusted risk-mapping to better align across California utilities. • Based on the workshops, PacifiCorp anticipates a significant shift in risk mapping based on these updated guidelines.	• Risk-map updates occur on an update cycle and occur as routine edits. • New technology is evaluated and potentially incorporated into risk mapping processes.
Situational Awareness and Forecasting	• Complete installations of additional weather stations with 100% correlation for HFTD circuits. • Substantially progress 2023 annual weather station calibration in anticipation of the 2023 fire season. • Begin implementation of wildfire detection pilot project. • Implement semi-automated process to validate weather station data leveraging multiple sources. • Operationalize situational awareness with a visual, configurable map to support decision making.	• Operate a fully established, weather station network. • Weather station correlation for 100% of circuits in CA (inside and outside of HFTD). • Implement a fully automated process to validate weather station data via multiple sources. • Complete wildfire detection pilot and advance technologies based on findings. • Continue improving dynamic situational awareness and risk visualization to support decision-making.	• Work towards using AI and machine learning to create a more automated weather forecasting system. • Have a complete weather station network developed. • As new technology becomes available evaluate and potentially incorporate it into situational awareness processes.
Grid Design and System Hardening	• Continue execution of grid hardening plans. • Reprioritize work as needed based on the evolution of risk modeling. • Evaluate scope beyond PSPS zone mitigation. • Evaluate risk-based, strategic undergrounding and feasibility. • Evaluate expansion of the generator rebate and free portable battery program.	• Complete all grid hardening scope to mitigate existing PSPS zones. • Begin risk-based grid hardening beyond PSPS zones, most likely within Tier 2 locations. • Expand risk-based, strategic undergrounding where feasible and appropriate. • Complete DFA pilot project and inform systemwide potential applications. • Improve remote operability of equipment through substation SCADA and line communication backbone upgrades as a part for the installation of system automation initiative.	• Risk-based deployment of grid hardening complete. • Broader deployment of DFA (pending pilot project results). • Significantly improved remote operability of equipment through substation SCADA and line communications backbone upgrades as a part of the installation of system automation initiative.
Asset Management and	• Complete all CY2022 planned inspections and progress the CY2023 planned asset	• Pending the results of the pilot project, full incorporation of IR technology into distribution detailed inspections.	• Pilot new inspection technology as it becomes available and potentially incorporate this new technology into asset

Category	Before the Next Annual WMP Update	Within the next three years	Within the next 10 years
Inspections	inspections. • Complete the planned IR inspections of transmission lines. • Begin implementation of the distribution IR inspection pilot project.	• Continue planned inspection programs.	management and inspections programs and practices.
Vegetation Management and Inspections	• Continue progressing programs (annual patrols, routine cycle work and annual pole clearing). • Continue to gather an inventory of vegetation work completed based on most recent inspections to inform vegetation management planning. • Incorporate the use of a vegetation density and height "heat map" as a tool (LRAM) to inform prioritization and scheduling of vegetation management activities. • Use a mobile data management software to manage and confirm work completed by subcontractors.	• Continue progressing programs (annual patrols, routine cycle work and annual pole clearing). • Implement Enhanced Overhang Reduction pilot project. • Continue to implement use of and improve mobile data management software capabilities regarding work identification, release, and tracking. • Enhance QA/QC program.	• Continue progressing programs (annual patrols, routine cycle work and annual pole clearing). • Pilot new technology as it becomes available and potentially incorporate this new technology into vegetation management programs and practices or augment current practices.
Grid Operations and Operating Protocols	• Improve processes to better track elevated wildfire risk protocols and activities. • Enhance protocols for post-outage restoration and patrols during time periods of elevated risk. • Continue to use augmented work practices. • Continue use of EFR settings and protocols and incorporate any updates as needed before the 2023 fire season.	• Leverage enhanced remote operability based on grid hardening upgrades to SCADA and communication backbones. • Have a more mature process with few false positive forecast predictions, increased communication completion of PSPS events and quick response to forecasts.	• Continue to leverage enhanced remote operability based on grid hardening upgrades to SCADA and communications backbones.
Data Governance	• Develop additional documentation to support decision making and reporting. • Continue expanding data reporting capabilities. • Continuing quarterly data reporting to meet compliance requirements. • Increase documentation around fire-related data, algorithms, analysis, and data processes.	• Improve thoroughness of documentation, including decision-making, data processing and data analysis. • Continue expanding data reporting capabilities. • Continuing quarterly data reporting to meet compliance requirements.	• Data processes and documentation centrally located. • Data practices consistent across multiple business units. • Full data reporting capabilities. • Continuing quarterly data reporting to meet compliance requirements.

Category	Before the Next Annual WMP Update	Within the next three years	Within the next 10 years
Resource Allocation Methodology	• Develop implementation plan to incorporate new OEIS RSE requirements into modeling and tools by 2024. • Fully implement WRRM model, including RSE calculations. • Update and include RSE calculations in the 2024 WMP Update. • Continue evaluating organizational needs to support WMP implementation.	• Update RSE values to align with the new 2023 OEIS Guidelines. • Improve RSE calculation granularity. • Leverage RSE to evaluate grid hardening scope outside of the PSPS zones. • Evaluate a framework to assess new technologies or pilot projects in terms of RSE.	• Use RSE to evaluate initiatives throughout service territory.
Emergency Planning and Preparedness	• Continued use of tabletop exercises to prepare for emergencies and PSPS events. • Continued evolution and enhancement of the Public Safety Partner Portal. • Incorporate 2022 fire season lessons learned into 2023 protocols. • Continue offering customer support programs during emergencies, such as bill adjustments, extended payment plans, and suspension of disconnection and nonpayment fees.	• Continued use of tabletop exercises to prepare for emergencies and PSPS events. • Incorporate feedback and industry best practices into emergency management practices.	• Continued use of tabletop exercises to prepare for emergencies and PSPS events. • Incorporate feedback and industry best practices into emergency management practices.
Stakeholder Cooperation and Community Engagement	• Continue improvements to internal and external customer and community facing forecast of PSPS status (website). • Continue partnering with public safety partners in communities throughout California regarding wildfire and PSPS preparedness. • Continue collaborating with industry experts and other utilities through working groups and consortiums. • Complete post season wildfire mitigation survey.	• Continue improvements to internal and external customer and community facing forecast of PSPS status (website). • Enhance customer outreach based on survey feedback and industry best practices.	• Continue improvements to internal and external customer and community facing forecast of PSPS status (website). • Enhance customer outreach based on survey feedback and industry best practices.

5.3 PLAN PROGRAM TARGETS

Program targets are quantifiable measurements of activity identified in WMPs and subsequent updates used to show progress towards reaching the objectives.

List and describe all program targets the electrical corporation uses to track utility WMP implementation and utility performance over the last five years. For all program targets, list the 2019 to 2021 performance, a numeric target value that is the projected target for end of year 2022 and 2023, units on the metrics reported, the assumptions that underlie the use of those metrics, update frequency, and how the performance reported could be validated by third parties outside each 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 targeted preventive strategy and program.

Pub. Util. Code Section 8386.3(c)(5) requires a utility to notify Energy Safety "after it completes a substantial portion of the vegetation management (VM) requirements in its wildfire mitigation plan." To ensure compliance with this statue, the utility is required to populate Table 5.3-1 with VM program targets that the utility can determine when it has completed a "substantial portion"[18] and that Energy Safety can subsequently audit. Energy Safety has provided some required, standardized VM targets below. It is expected that the utilities provide additional VM targets beyond those required. The identification of other VM targets and units for those targets (e.g., for inspections, customer outreach, enhanced vegetation management, etc.) are at the discretion of the utility.

Additionally, in Table 5.3-1, utilities must populate the column "Target%/ Top-Risk%" for each 2022 performance target related to initiatives in the following categories: Grid design and system hardening; Asset management and inspections; and Vegetation management and inspections. This column allows utilities to identify the percentage of the target that will occur in the highest risk areas. For example, if a utility targets conducting 85% of its vegetation management program in the top 20% of its risk-areas, it should input "85/20" in this column. In the "Notes" column, utilities must provide definitions and sources for each of the "Top-Risk%" values provided. In the given example above, an acceptable response would be: "The top 20% of risk areas used for this target relate to the circuit segment risk rankings from [Utility Company's] Wildfire Risk Model outputs, as described in [hyperlink to Section XX] of the 2022 WMP Update."

[18] Energy Safety intends to define "substantial portion" in its forthcoming Compliance guidelines. This definition may be included in the Final version of the 2022 WMP Update Guidelines.

Table 5.2 List and description of program targets, last five years (WMP Table 5.3-1)

Table 5.2 list and description of program targets, last 5 years Program target	2019		2020		2021		2022		Units	Audited by third-party (Y/N)	Notes (Including definitions and sources for Top-Risk%)
	Target	Perf.	Projected	Perf.	Projected	Perf.	Projected	Target % / Top-Risk%			
Advanced weather monitoring and weather stations	N/A	10	10	2	21	21	50	T3: 2%/3% T2: 46%/38% Non HFTD: 52%/59%	# of weather monitors and weather stations		-
Continuous monitoring sensors	N/A	0	4	0	22	2	2	T3: 0%/3% T2: 100%/38% Non HFTD: 0%/59%	# of sensors		-
Fault indicators for detecting faults on electric lines and equipment	N/A	N/A	N/A	0	0	0	500	T3: 11%/3% T2: 51%/38% Non HFTD: 20%/59%	# of fault indicators		The remaining 18% of fault indicators will be decided in the field as they are found and replaced for 2022.
Covered conductor installation	N/A	0	38	1.4	81.22	20	112	T3: 23%/3% T2: 77%/38% Non HFTD: 0%/59%	# of miles		
Distribution pole replacement and reinforcement, including with composite	N/A	0	39	29	128	87	2020	T3: 23%/3% T2: 77%/38% Non HFTD: 0%/59%	# of poles		

Table 5.2 list and description of program targets, last 5 years Program target	2019		2020		2021		2022		Units	Audited by third-party (Y/N)	Notes (Including definitions and sources for Top-Risk%)
	Target	Perf.	Projected	Perf.	Projected	Perf.	Projected	Target % / Top-Risk%			
poles											
Expulsion fuse replacement	N/A	N/A	N/A	0	0	0	2269	T3: TBD/3% T2: TBD/38% Non HFTD: TBD/59%	# of expulsion fuses		Expulsion fuse locations are determined as they are found needing to be replaced as part of a circuit-by-circuit engineering review.
Installation of system automation equipment	N/A	10	31	28	27	31	51	T3: 2%/3% T2: 53%/38% Non HFTD: 45%/59%	# of installations		
Detailed inspections of distribution electric lines and equipment	N/A	473	605	10155	9213	9217	8777	T3: 4%/3% T2: 57%/38% Non HFTD: 39%/59%	# of inspections		
Patrol inspections of distribution electric lines and equipment	2002	2002	1941	46281	50603	50667	46338	T3: 2%/3% T2: 41%/38% Non HFTD: 57%/59%	# of inspections		100% of Tier 3 and Tier 2 distribution facilities are inspected annually as part of this program. The numerator of this calculation accounts for the % of total inspections within each area and not the percentage of that area which is inspected within the year.

Table 5.2 list and description of program targets, last 5 years Program target	2019		2020		2021		2022		Units	Audited by third-party (Y/N)	Notes (Including definitions and sources for Top-Risk%)
	Target	Perf.	Projected	Perf.	Projected	Perf.	Projected	Target % / Top-Risk%			
Patrol inspections of transmission electric lines and equipment	681	681	657	1654	98	12418	12367	T3: 4%/3% T2: 44%/38% Non HFTD: 48%/59%	# of inspections		100% of Tier 3 and Tier 2 distribution facilities are inspected annually as part of this program. The numerator of this calculation accounts for the % of total inspections within each area and not the percentage of that area which is inspected within the year.
Substation inspections	444	439	444	444	444	438	444	T3: 4%/3% T2: 42%/38% Non HFTD: 54%/59%	# of inspections		
Detailed inspections of transmission electric lines and equipment	62	62	122	1188	666	1439	2545	T3: 10%/3% T2: 67%/38% Non HFTD: 23%/59%	# of inspections		
Infrared inspections of transmission electric lines and equipment	784	1246	232	866	700	700	700	T3: 3%/3% T2: 46%/38% Non HFTD: 51%/59%	# of miles		The current IR inspection program is on Transmission lines only.
Intrusive pole inspections	92	92	150	3208	2668	4692	4759	T3: 0%/3% T2: 21%/38% Non HFTD: 76%/59%	# of inspections		Distribution Pole Test and Treat (PTT) is on a 20-year cycle while Transmission PTT is on a 10-year cycle. Due to the cycle timing and the small percentage of PacifiCorp

Table 5.2 list and description of program targets, last 5 years Program target	2019		2020		2021		2022		Units	Audited by third-party (Y/N)	Notes (Including definitions and sources for Top-Risk%)
	Target	Perf.	Projected	Perf.	Projected	Perf.	Projected	Target % / Top-Risk%			
											service territory, there is likely to be some years with no T3 structures are inspected as part of the PTT program.
Patrol inspections of vegetation around distribution electric lines and equipment	N/A	N/A	N/A	784	1369	1167	1007	T3: 1%/3% T2: 59%/38% Non HFTD: 40%/59%	# of miles		100% of Tier 3 and Tier 2 circuits have a vegetation management inspection completed annually. The numerator of this calculation accounts for the % of total patrol inspections within each area however does not account for detail inspections that are scheduled to be completed prior to the height of the fire season as part of routine cycle maintenance.
Patrol inspections of vegetation around transmission electric lines and equipment	N/A	N/A	N/A	323	348	354	163	T3: 0%/3% T2: 42%/38% Non HFTD: 58%/59%	# of miles		Patrol inspections of transmission lines take place in years in which routine maintenance work is not scheduled, generally every other year. Due to timing or routine maintenance and the small percentage of PacifiCorp service territory, there is likely to be some years with no T3 structures are inspected as part of this program.

Table 5.2 list and description of program targets, last 5 years Program target	2019		2020		2021		2022		Units	Audited by third-party (Y/N)	Notes (Including definitions and sources for Top-Risk%)
	Target	Perf.	Projected	Perf.	Projected	Perf.	Projected	Target % / Top-Risk%			
Quality assurance / quality control of vegetation management	N/A	N/A	N/A	1107	1717	1383	1169	T3: 1%/3% T2: 57%/38% Non HFTD: 42%/59%	# of miles		
Detailed inspections and management practices for vegetation clearances around distribution electrical lines and equipment	N/A	825	825	909	1380	1376	1158	T3: 3%/3% T2: 34.3%/38 % Non HFTD: 65.4%/59 %	# of miles		
Vegetation management to achieve clearances around electric lines and equipment	N/A	3195	3195	0	0	1513	1169	T3: 1%/3% T2: 57%/38% Non HFTD: 42%/59%	# of miles		
Detailed inspections and management practices for vegetation clearances around transmission	N/A	345	345	185	181	181	354	T3: 20%/3% T2: 54%/38% Non HFTD: 26%/59%	# of miles		

Table 5.2 list and description of program targets, last 5 years Program target	2019		2020		2021		2022		Units	Audited by third-party (Y/N)	Notes (Including definitions and sources for Top-Risk%)
	Target	Perf.	Projected	Perf.	Projected	Perf.	Projected	Target % / Top-Risk%			
electrical lines and equipment											
Fuel management (including all wood management) and management of “slash” from vegetation management activities	N/A	N/A	N/A	2164	3047	2872	3047	T3: 2%/3% T2: 37%/38% Non HFTD: 61%/59%	# of activities		

5.4 PLANNING FOR WORKFORCE AND OTHER LIMITED RESOURCES

Report on worker qualifications and training practices regarding wildfire and PSPS mitigation for workers in the following target roles:

1. *Vegetation inspections*
2. *Vegetation management projects*
3. *Asset inspections*
4. *Grid hardening*
5. *Risk event inspection*

For each of the target roles listed above:

1. *List all worker titles relevant to target role (target roles listed above)*
2. *For each worker title, list and explain minimum qualifications with an emphasis on qualifications relevant to wildfire and PSPS mitigation. Note if the job requirements include the following:*
   a. *Going beyond a basic knowledge of General Order 95 requirements to performrelevant types of inspections or activities in the target role*
   b. *Being a "Qualified Electrical Worker" (QEW) and define what certifications, qualifications, experience, etc. is required to be a QEW for the target role forthe utility.*
   c. *Include special certification requirements such as being an International Society of Arboriculture (ISA) Certified Arborist with specialty certification as a Utility Specialist*
3. *Report percentage of Full Time Employees (FTEs) in target role with specific job title*
4. *Provide a summarized report detailing the overall percentage of FTEs with qualifications listed in (2) for each of the target roles.*
5. *Report plans to improve qualifications of workers relevant to wildfire and PSPS mitigation. The utility must explain how they are developing more robustoutreach and onboarding training programs for new electric workers to identify hazards that could ignite wildfires.*

5.4.1 Target role: Vegetation inspections

PacifiCorp conducts inspections and/or patrols to identify vegetation maintenance that must be performed to align with the company's Transmission and Distribution Vegetation Management Program Standard Operating Procedures (Vegetation SOP).

Table 5.3 and Table 5.4 present PacifiCorp worker and contractor titles in target roles active in PacifiCorp's California service territory, their minimum qualifications, FTE percentages by title in target roles and percentages by high-interest qualification. PacifiCorp's plans to improve worker qualifications follow these tables.

Table 5.3 PacifiCorp-conducted vegetation inspections – target roles and qualifications

Worker Titles	Minimum Qualifications relevant to wildfire and PSPS mitigation	FTE Percent by Target Role	FTE Percent by High-Interest Qualification
Senior Utility Forester	ISA Arborists; See below	50%	100%
Utility Forester	ISA Arborists; See below	50%	100%

Senior utility foresters and utility foresters must be International Society of Arboriculture (ISA) Certified Arborists with an added Utility Specialist certification. Both senior utility and utility foresters must: perform post-work audits to meet PacifiCorp's program standards (e.g., conductor-to-line clearance specifications) along distribution rights-of-way; investigate vegetation-related outages; identify work required, and review work conducted along transmission rights-of-way.

Table 5.4 Contractor-conducted vegetation inspections – target roles and qualifications

Worker Titles	Minimum Qualifications relevant to wildfire and PSPS mitigation	FTE Percent by Target Role	FTE Percent by High-Interest Qualification
Pre-Listers	See below	44%	25%
General Foreperson	See below	56%	60%

PacifiCorp hires contractors to help implement the vegetation management program, including pre-listers and general forepersons.

Pre-listers conduct patrols and/or inspections to identify vegetation work needed to meet PacifiCorp program standards; they also conduct post-audit inspections. At a minimum, they must have a current ISA Arborist certification or the ability to obtain one within six months of their hire date.

General forepersons serve as front-line managers for PacifiCorp's independent contractors. Like senior utility foresters and utility foresters, they must be ISA Certified Arborists with an added Utility Specialist certification.

Plans to improve qualifications of workers relevant to wildfire and PSPS mitigation

PacifiCorp strives for continuous improvement. Utility and senior utility foresters are encouraged to get ISA Board Certified Master Arborist credentials and tree risk assessment certifications. They are also encouraged to participate in arboriculture-related seminars/conferences and complete other related certifications from accredited institutions. PacifiCorp utility and senior utility foresters provide training, hold regular performance-related discussions with pre-listers and other contractor positions to review expectations and job requirements, identify areas for improvement, ensure work consistency, and review post-audit findings. PacifiCorp helps contractors lacking ISA certifications to obtain them; PacifiCorp will continue to require these certifications.

PacifiCorp also provides environmental awareness training to company employees and contractors. This training minimizes potential harm to sensitive environments and increases general understanding of environmental considerations.

5.4.2 Target role: Vegetation management projects

PacifiCorp seeks to collaborate with communities and agencies in implementing projects with defined scopes that promote wildfire resiliency — for example, projects that reduce fuels or establish fire breaks in and around power line rights-of-way.

The same worker titles, qualifications and additional information provided in Section 5.4.1 on page 121 is applicable.

5.4.3 Target role: Asset inspections

PacifiCorp field inspection specialists and field inspectors conduct asset inspections. Table 5.5 describes their minimum qualifications and their FTE percent by both target role and high-interest qualification. Descriptions of their work follow the table. PacifiCorp plans to improve worker qualifications follow these descriptions.

Table 5.5 Asset inspections – target roles and qualifications

Worker Titles	Minimum Qualifications relevant to wildfire and PSPS mitigation	FTE Percent by TargetRole	FTE Percent by High- Interest Qualification
Field Inspection Specialist	See Below	50%	n/a
Field Inspector	See Below	50%	n/a

Field inspection specialists evaluate and document inspection data on overhead (distribution, transmission, communications, municipality and private ownership) and underground facilities. Inspections include, but are not limited to, pole attachment inspections, bird damage assessments, condition verification, pole plating, pole stub removal assessments, pole attachment transfer requests, ground-line pole testing and visual/safety inspections. These specialists are familiar with the National Electric Safety Code and PacifiCorp construction standards and can apply their knowledge to recommend appropriate corrective actions.

They use measuring sticks and wheels, binoculars and handheld electronic devices to gather data. Field inspection specialists also work with maps, data sheets, work requests and engineered drawings.

In addition to field inspection specialists, PacifiCorp contracts with field inspectors to perform either Visual Assurance or full, Detailed inspections, including cyclical pole testing. These inspectors are trained to identify all code compliance conditions (NESC and GO 95). Their work is comprehensive without regard to the type of risk (public safety, worker safety, reliability, fire threat, etc.).

Plans to improve qualifications of workers relevant to wildfire and PSPS mitigation

Field inspection support annual refresher training incorporates changes or focus areas related to the wildfire mitigation plan efforts. This ensures all inspectors are aware of new equipment and the related construction standards. Additional elements of this annual training, which include a focus on wildfire mitigation and continuous improvement, appear in Section 7.3.4.14 on page 178.

5.4.4 Target role: Grid hardening

PacifiCorp's grid hardening initiatives generally involve retrofitting overhead lines and substation components with more fire-resilient materials, including covered conductor, non-wooden poles, relays/reclosers and advanced communication devices. PacifiCorp employees and contractors work on and around these new devices as either part of planned maintenance and inspections or emergency response efforts. Table 5.6 describes the front-line workers that maintain or repair equipment associated with grid hardening. Brief job descriptions and company plans to improve worker qualifications follow the table.

Table 5.6 Grid hardening – target roles and qualifications

Worker Titles	Minimum Qualifications relevantto wildfire and PSPS Mitigation	FTE Percent by Target Role	FTE Percent by High-Interest Qualification
Journeyman/Lineman	Qualified Electrical Worker (See Below)	88%	100%
Highline Patrolman	Qualified Electrical Worker (See Below)	4%	100%
Technician	Qualified Electrical Worker (See Below)	8%	100%

Journeyman/lineman perform routine maintenance of overhead and underground facilities, poles and wires and respond to emergency outages or PSPS events. PacifiCorp journeyman/linemen are qualified electrical workers. They must have: (1) working experience as a lineman or (2) and graduated from a sanctioned apprenticeship program. They also need to pass a pre-hire physical assessment. Skills and abilities required by this job are normally acquired through job-related high school courses and the lineman apprenticeship program.

Highline transmission patrolmen are journeyman lineman who patrol, inspect and ensure assigned transmission lines are properly maintained. PacifiCorp highline transmission patrolmen understand: (1) equipment, tools, techniques and methods used in the construction, installation, maintenance and repair of overhead line facilities, roads, trails and rights-of-way; (2) stresses, strains and rigging; safety regulations (3) capabilities and limitations of insulator washing equipment; (4) transmission overhead circuitry and switching. The knowledge, skills, and abilities required for this job are comparable with those acquired through a high school education, supplemented by technical study and extensive training and experience as a journeyman, patrolman or lineman. Additionally, highline patrolman have

been trained to use detection equipment that locates static or voltage leakage during visual inspection patrols.

Meter Relay Technicians perform routine maintenance of protection and control devices and advise on emergency response operations. Meter relay techs have a working knowledge of company substation protection and control schemes. They may also install, maintain, adjust, test, troubleshoot and repair substation protection and control equipment, which includes but is not limited to apparatus, meters, relays, controls and remote control equipment.

Plans to improve qualifications of workers relevant to wildfire and PSPS mitigation

Beginning in 2019, PacifiCorp's training program included an annual review of operating practices that reduce wildfire risk during routine work and a review that confirms fire mitigation / suppression tools are available before fire season. This refresher training occurs annually. It has successfully raised awareness of PSPS events, wildfire risk, and how procedures must adapt to that risk.

While effective, this training has been procedural. Full incorporation of grid hardening into PacifiCorp's formal training program is an area of planned improvement. Specifically, this improvement will enhance existing programs, ensuring workers are properly trained to work around materials such as covered conductor, non-wooden poles, and advanced protection and control devices.

5.4.5 Target role: Risk event inspections

At this time PacifiCorp hasn't developed a specific work force dedicated to risk event inspections. Rather, this role has been fulfilled by a combination of field inspectors, field engineers, foresters and journeymen linemen who pass the baton through the risk event inspection process. The minimum qualifications, FTE percentages by title and qualification, and plans to improve qualifications are discussed for each of these titles in sections 5.4.1 through 5.4.3 on pages 121–123.

5.4.5.1 Utility approach

PacifiCorp has developed operational "watchlist" items that notify operational team members that specific follow-up actions are needed. This internal watchlist tool, commonly referred to as the frequent interrupters requiring evaluation tool, notifies employees on the following business day that an investigation needs to be completed. The watchlist triggers can be modified based on a variety of conditions the company can change, for example, vegetation outages are notified to foresters the day after a tree caused outage is completed.

5.4.5.2 Summary of achievements

PacifiCorp has successfully trained and began to use this tool in their field.

5.4.5.3 Challenges

The company is evaluating whether additional steps should be taken to ensure that all relevant investigations are completed.

6

PERFORMANCE METRICS AND UNDERLYING DATA

6 PERFORMANCE METRICS AND UNDERLYING DATA

Instructions: Section to be populated from Quarterly Reports. Tables to be populated are listed below for reference.

NOTE: Report updates to projected metrics that are now actuals (e.g., projected 2021 spend will be replaced with actual unless otherwise noted). If an actual is substantially different from the projected (>10% difference), highlight the corresponding metric in light green.

6.1 RECENT PERFORMANCE ON PROGRESS METRICS, LAST SEVEN YEARS

Instructions for Table 1 of Attachment 3:

In the attached spreadsheet document, report performance on the following metrics within the utility's service territory over the past seven years as needed to correct previously reported data. Where the utility does not collect its own data on a given metric, each utility is required to 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.

This table has been provided in Table 1 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.2 RECENT PERFORMANCE ON OUTCOME METRICS, ANNUAL AND NORMALIZED FOR WEATHER, LAST SEVEN YEARS

Instructions for Table 2: of Attachment 3:

In the attached spreadsheet document, report performance on the following metrics within the utility's service territory over the past seven years as needed to correct previously reported data. Risk events and utility-related ignitions are normalized by wind warning status (RFW & HWW). Where the utility does not collect its own data on a given metric, the utility is required to 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.

This table has been provided in Table 2 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.3 DESCRIPTION OF ADDITIONAL METRICS

Instructions for Table 3: of Attachment 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 seven 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.

This table has been provided in Table 3 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.4 DETAILED INFORMATION SUPPORTING OUTCOME METRICS

Enclose detailed information as requested for the metrics below.

Instructions for Table 4: of Attachment 3:

In the attached spreadsheet document, report numbers of fatalities attributed to any utility wildfire mitigation initiatives, as listed in the utility's previous or current WMP filings or otherwise, according to the type of activity in column one, and by the victim's relationship to the utility (i.e., full-time employee, contractor, of member of the general public), for each of the last seven years as needed to correct previously reported data. For fatalities caused by initiatives 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 initiative.

This table has been provided in Table 4 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

Instructions for Table 5 of Attachment 3:

In the attached spreadsheet document, report numbers of OSHA-reportable injuries attributed to any utility wildfire mitigation initiatives, as listed in the utility's previous or current WMP filings or otherwise, according to the type of activity in column one, and by the victim's relationship to the utility (i.e., full-time employee, contractor, of member of the general public), for each of the last seven years as needed to correct previously -reported data. 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) must be included, even if those incidents are not reported to OSHA due to the identity of the victims.

For OSHA-reportable injuries caused by initiatives 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.

This table has been provided in Table 5 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.5 MAPPING RECENT, MODELED, AND BASELINE CONDITIONS

The utility must provide underlying data for recent conditions (over the last five years) of the utility's service territory in a downloadable shapefile GIS format, following the spatial reporting schema attachment[19]. All data is reported quarterly, this is a placeholder for quarterly spatial data.

This spatial data has been provided in the Q1 quarterly filing submitted on May 2, 2022.

6.6 RECENT WEATHER PATTERNS, LAST SEVEN YEARS

Instructions for Table 6 of Attachment 3:

In the attached spreadsheet document, report weather measurements based upon the duration and scope of NWS Red Flag Warnings, High wind warnings and upon proprietary Fire Potential Index (or other similar fire risk potential measure if used) for each year. Calculate and report 5-year historical average as needed to correct previously reported data.

[19] https://energysafety.ca.gov/wp-content/uploads/energy-safety-gis-data-reporting-standard_version2.1_09072021_final.pdf

This table has been provided in Table 6 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.7 RECENT AND PROJECTED DRIVERS OF OUTAGES AND IGNITION PROBABILITY

Instructions for Table 7.1 and Table 7.2 of Attachment 3:

(Table 7.1) In the attached spreadsheet document, report recent drivers of outages according to whether or not risk events 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 seven years as needed to correct previously reported data. 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 2021 ignition data compiled by the WMP deadline is required to indicate in the 2021 columns that said information is incomplete. (Table 7.2) Similar to Table 7.1, but for ignition probability by line type and HFTD status, according to if ignitions are tracked.

This table has been provided in Table 7.1 and 7.2 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.8 BASELINE STATE OF EQUIPMENT AND WILDFIRE AND PSPS EVENT RISK REDUCTION PLANS

6.8.1 Current baseline state of service territory and utility equipment

Instructions for Table 8: of Attachment 3:

***In** the attached spreadsheet document, 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, weather stations, 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) as needed to correct previously reported data.*

The totals of the cells for each category of information (e.g., "circuit miles (including WUI and non-WUI)") would be equal to the overall service territory total (e.g., total circuit miles). For example, 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.

This table has been provided in Table 8 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

6.8.2 Additions, removal, and upgrade of utility equipment by end of three-year plan term

Instructions for Table 9 of Attachment 3:

In the attached spreadsheet document, input summary information of plans and actuals for additions or removals of utility equipment as needed to correct previously reported data. Report net additions using positive numbers and net removals and undergrounding using negative numbers for circuit miles and numbers of substations. Report changes planned or actualized for that year – for example, if 10 net overhead circuit miles are added in 2020, then report "10" for 2020. If 20 net overhead circuit miles are planned for addition by 2022, with 15 being added by 2021 and 5 more added by 2022, then report "15" for 2022 and "5" for 2021. Do not report cumulative change across years. In this case, do not report "20" for 2022, but instead the number planned to be added for just that year, which is "5".

This table has been provided in Table 9 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

Instructions for Table 10: of Attachment 3:

Referring to the program targets discussed above, report plans and actuals for hardening upgrades in detail in the attached spreadsheet document. Report in terms of number of circuit miles or stations to be upgraded for each year, assuming complete implementation of wildfire mitigation activities, for HFTD and non-HFTD service territory for circuit miles of overhead transmission lines, circuit miles of overhead distribution lines, circuit miles of overhead transmission lines located in Wildland-Urban Interface (WUI), circuit miles of overhead distribution lines in WUI, number of substations, number of substations in WUI, number of weather stations and number of weather stations in WUI as needed to correct previously reported data.

If updating previously reported data, separately include a list of the hardening initiatives included in the calculations for the table.

This table has been provided in Table 10 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx, in the Q1 quarterly filing submitted on May 2, 2022.

7

MITIGATION INITIATIVES

7 MITIGATION INITIATIVES

7.1 WILDFIRE MITIGATION STRATEGY

Describe organization-wide wildfire mitigation strategy and goals for each of the following time periods, highlighting changes since the prior WMP:

1. *By June 1 of current year*
2. *By September 1 of current year*
3. *Before the next Annual WMP Update*
4. *Within the next 3 years*
5. *Within the next 10 years*

The description of utility wildfire mitigation strategy must:

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 mitigatethese 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. *Discuss how risk modeling outcomes are used to inform decision-making processes andused to prioritize mitigation activities. Provide detailed descriptions including clear evaluation criteria[20] and visual aids (such as flow charts or decision trees). Provide an appendix (including use of relevant visual aids) with specific examples demonstrating how risk modeling outcomes are used in prioritizing circuit segments and selecting mitigation measures.*

C. *Include a summary of achievements of major investments and implementation of wildfire mitigation initiatives over the past year, lessons learned, changed circumstances during the 2020-2022 WMP plan cycle, and corresponding adjustment in priorities for the current year. Organize summaries of initiatives by the wildfire mitigation categories listed in Section 7.3.*

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

E. *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. Include utility research listed above in Section 4.4.*

[20] "Evaluation criteria" should include all points of considerations including any thresholds and weights thatmay affect the outcome of their decision, as well as a descriptor of how it is evaluated (i.e., given a risk score, using SME expertise to determine that score, using a formula).

F. *Provide a GIS layer[21] map showing generalized wildfire risk (e.g., MAVF) data should be as granular as possible.*
G. *Provide GIS[22] layers for the following grid hardening initiatives: covered conductor installation;[23] undergrounding of electrical lines and/or equipment; and removal of electrical lines. Features must have the following attributes: state of hardening, type of hardening where known (i.e., undergrounding, covered conductors, or removal), and expected completion date. Provide as much detail as possible (circuit segment, circuit- level, etc.). The layers must include the following:*
    a. *Hardening planned for 2022*
    b. *Hardening planned for 2023*
    c. *Hardening planned for 2024*
H. *Provide static (either in text or in an appendix), high-level maps of the areas where the utility will be prioritizing Grid Design and System Harding initiatives for 2022, 2023, and by 2032.*
I. *Provide a GIS layer for planned Asset Management and Inspections in 2022. Features must include the following attributes: type, timingand prioritization of asset inspection. Inspection types must follow the same types described in Section 7.3.4, Asset Management and Inspections, and as applicable, should not be limited to patrols and detailed inspections.*
J. *Provide a GIS layer illustrating where enhanced clearances (12 feet or more)were achieved in 2020 and 2021 and where the utility plans to achieve enhanced clearances in 2022. Feature attributes must include clearance distances greater than or equal to 12 feet, if such data is available, either in ranges or as discrete integers (e.g., 12-15 feet, 15-20 feet, etc. OR 12, 13, 14, 15, etc.).*

[21] GIS data that has corresponding feature classes in the most current version of Energy Safety GIS Data Reporting Standard will utilize the format for submission. GIS data that does not have corresponding feature classes shall be submitted in an ESRI compliant GDB and include a data dictionary as part of the metadata.

[22] Energy Safety acknowledges potential security concerns regarding aggregating and presenting critical electrical infrastructure in map form. Utilities may provide maps or GIS layers required by these Guidelines as confidential attachments when necessary.

[23] For a definition of "covered conductor installation" see Section 9 of Attachment 2.

Table 7.1 describes the wildfire mitigation strategy by June 1 of current year and by September 1 of current year. For Annual initiative targets, please see in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

Table 7.1 June 1 and September 1 current year wildfire mitigation strategy

Category	By June 1 of this year	By September 1 of this year
Risk Assessment and Mapping	• Begin implementation of Technosylva's WFA-E tools.	• Continue implementation of Technosylva's WFA-E tools. • Identify potential impacts to tools based on revised OEIS guidance / requirements for risk assessment and modeling.
Situational Awareness	• Integrate newly installed weather stations into the situational awareness model. • Complete annual calibration of existing weather stations to ensure functionality. • Perform verification and validation of forecast vs. actual fire weather data from 2021 to improve forward looking forecast.	• Complete installation of additional weather stations. • Substantially advance the company's risk modeling capabilities and inform prioritization of work in 2022-2023. • Begin plan development for wildfire detection pilot project for execution in 2023.
Grid Hardening	• Reprioritize programs needed before the next fire season and annual update based on the evolution of risk modeling to ensure inclusion in the CY2023-2025 execution plan. • Continue progressing grid hardening construction projects such as installation of covered conductor and system automation equipment for advanced protection and control. • Continue gathering continuous monitoring, DFA data for pilot. • Continue expansion of the free-portable battery program to mitigate the impact of PSPS.	• Review and finalize the 2023-2025 grid hardening scope for inclusion in the 2023 WMP. • Plan corrective work identified through the pole loading infrastructure hardening program. • Construct and commission additional transmission and distribution system automation devices. • Continue construction of covered conductor installation.
Asset Management	• Complete the CY2022 planned inspections within the HFTD. • Complete transmission line IR inspections scheduled in Q2 targeting peak loading or near peak loading conditions.	• Continue asset inspections and corrections in compliance with GO 95 and GO 165. • Prepare to implement distribution IR inspection pilot.
Vegetation Management	• Conduct annual readiness patrols in Tier 3 where cycle work is not planned.	• Conduct annual readiness patrols in the HFTD where cycle work is not planned.

Category	By June 1 of this year	By September 1 of this year
Grid Operations and Protocols	• Review existing operating protocols and ensure preparedness for 2022 fire season. • Continue evolving protocols to better track elevated wildfire risk protocols.	• Review 2022 fire season operating protocols and evaluate areas for improvement in 2023.
Data Governance	• Recruit and hire an additional program manager to manage and delivery complex GIS datasets for reporting. • Complete Q1 Quarterly Reports.	• Complete Q2 Quarterly Reports. • Continue expanding data reporting capability.
Resource Allocation Methodology	• Complete initial RSE evaluation at the initiative level. • Continue participating in OEIS led workshops and utility working groups to evolve RSE calculations.	• Begin implementation of Technosylva's WRRM model to support RSE calculations. • Develop plan to incorporate revised OEIS guidance / requirements for RSE calculations.
Emergency Planning and Preparedness	• Perform tabletop exercises in preparation for the 2022 fire season. • Stand up a Public Safety Partner portal with critical infrastructure information.	• Advance the Public Safety Partner Portal capabilities. • Plan to incorporate 2022 fire season lessons learned.
Stakeholder Cooperation and Community Engagement	• Continue partnering with public safety partners in communities throughout California regarding wildfire and PSPS preparedness. • Update the PSPS website to include the Spanish translation. • Conduct quarterly Wildfire Safety Advisory Board meetings to inform PSPS planning and protocols. • Conduct Wildfire Mitigation and PSPS Planning Webinar.	• Continue improvements to internal and external customer and community facing forecast of PSPS status (website). • Continue partnering with public safety partners in communities throughout California regarding wildfire and PSPS preparedness.

The wildfire mitigation strategy for the end of this year, three years and 10 years can be found in Section 5.2 on page 110.

A. Utility's Approach to Managing Wildfire Risk

PacifiCorp manages wildfire risk through the implementation of its WMP mitigation measures to influence ignition probability as described in Section 4.2 beginning on page 35. This section includes more detailed information regarding these ignition probability drivers as well as what mitigation activities are implemented to mitigate wildfire risk. Further details can be found in

Table 4.4 on page 95, Table 4.5 on page 96, and Table 4.6 on page 97, which include detailed mapping of methodologies, programs, and techniques to mitigate that various ignition risk drivers.

At this time, PacifiCorp does not make a specific distinction between programs that manage safety and reliability risks and those that manage wildfire risk; safety and reliability risks are strongly related to wildfire risk. Many of the risk drivers can be the same, such as faults or outages, and many can be different, such as climbing hazards identified near a pole. All PacifiCorp initiatives mitigate at least one of these types of risks and often more than one. An example of this can be found in any of the asset inspection subsections included in Section 7.3.4 beginning on page 171. These subsections describe how PacifiCorp's traditional inspection and correction programs maintain regulatory compliance and manage routine operational risk; they also mitigate wildfire risk by identifying and correcting conditions which, if uncorrected, could result in an outage or ignite a fire. Therefore, PacifiCorp's inspection programs mitigate all three types or risk: safety, reliability and wildfire.

While all company programs are required to properly mitigate risk, the incremental programs proposed through PacifiCorp's WMP process are specifically designed to mitigate wildfire risk; they incrementally reduce safety and reliability risk differently than traditional programs, which focused more on reliability and safety first, with additional benefits in terms of wildfire risk mitigation. When reviewing the initiatives, programs that were included in the company's 2019 GRC reflect the traditional programs designed to reduce safety and reliability risk with incremental benefits to wildfire risk mitigation, while newly proposed programs in the WMP represent programs specifically designed to reduce wildfire risk.

B. Mitigation Activity Decision-Making Process

Figure 7.1 depicts PacifiCorp's general decision-making processes related to selecting initiatives and prioritizing mitigation activities. This process, which is very high level and generally aligns with processes at other utilities, includes: evaluation, identification, selection, scope development and deployment. While the flowchart doesn't clearly indicate it, any step in the process can "kick back" a mitigation program to previous step. For example, if engineering design discovers unplanned cost or scope creep, the program may be reverted to the *selection phase*.

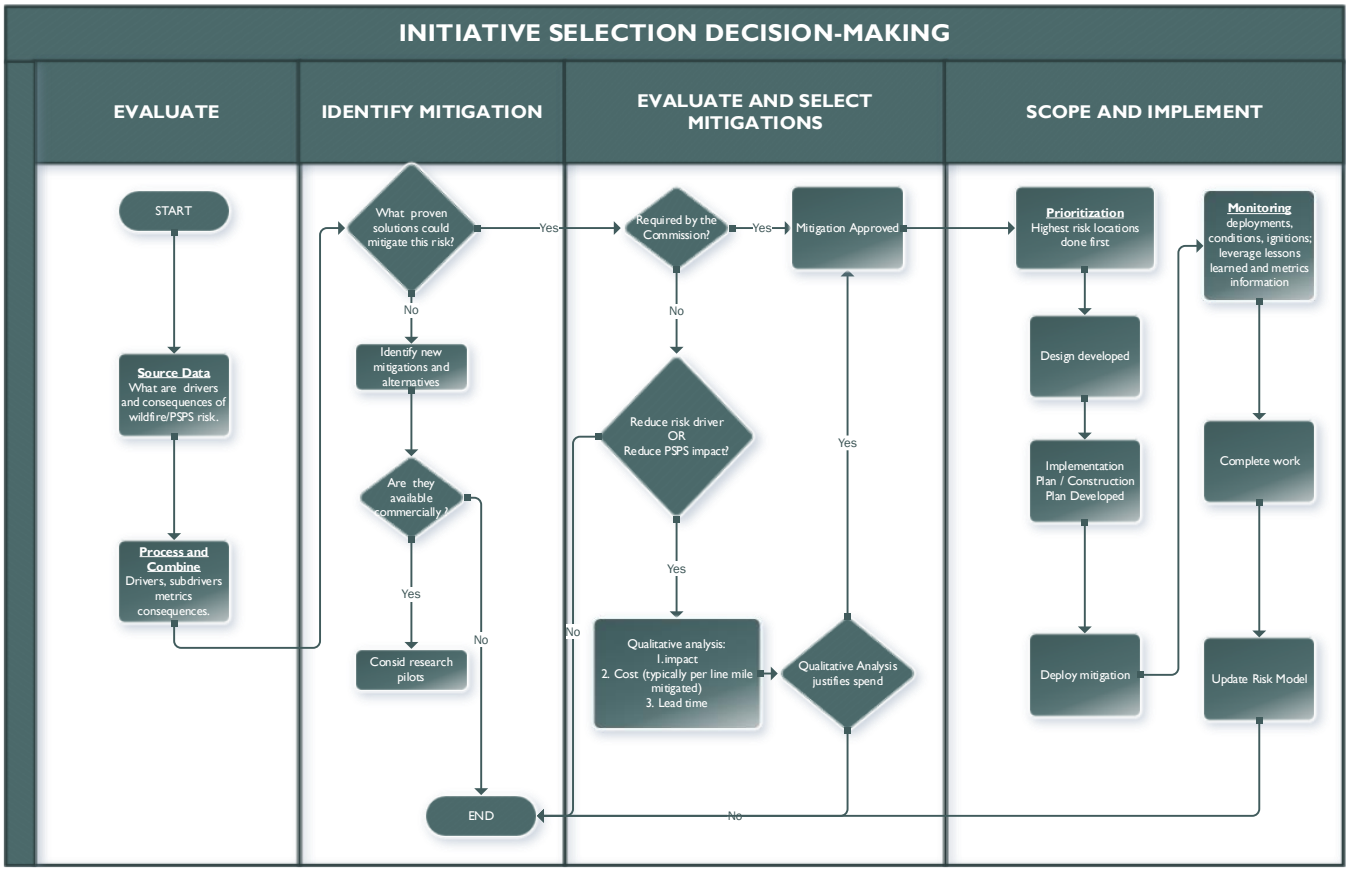

Figure 7.1 Initiative selection decision-making flowchart

Step 1: Evaluation

PacifiCorp begins the initiative decision-making process by identifying trends in risk events. Risk events are identified using the company's outage data, which is aligned with IEEE 1366 and IEEE 1782 and has been mapped to risk drivers based on outage cause categories. After the risk drivers are categorized, PacifiCorp used the outage data to quantify the frequency of each risk driver, as presented in Figure 7.2.

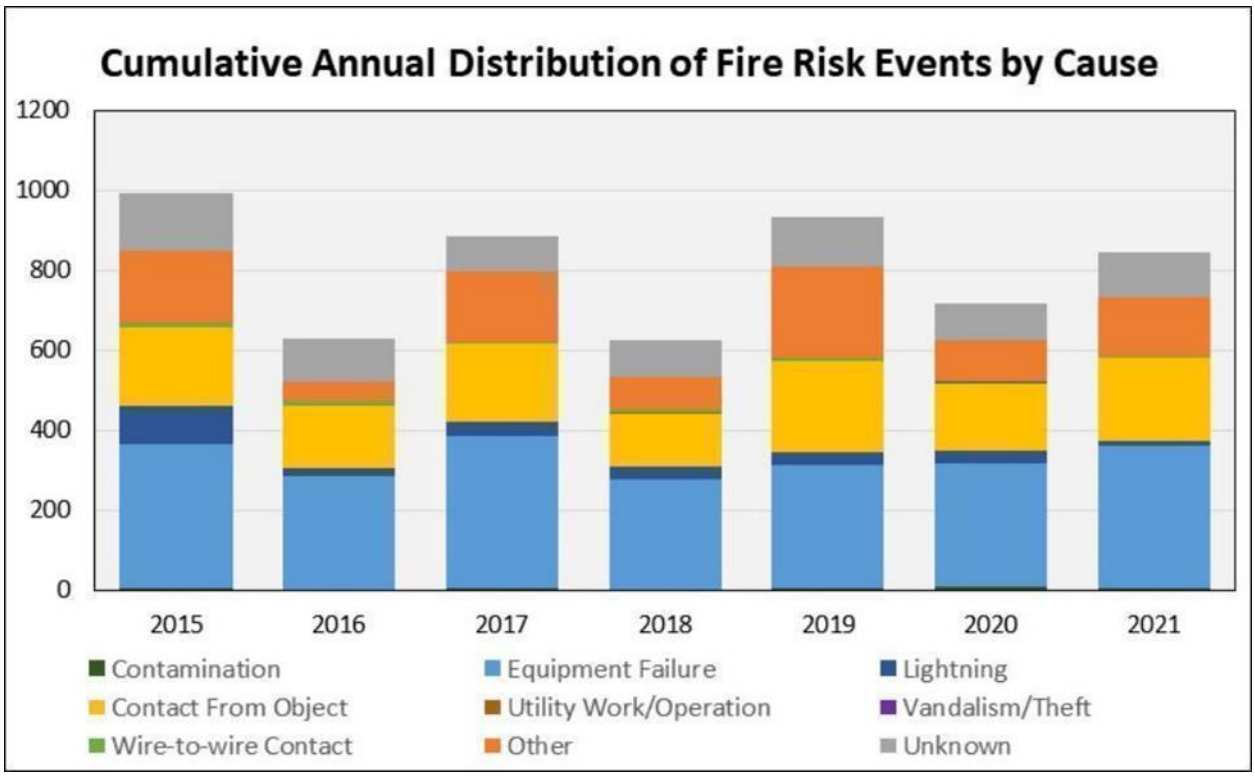

Figure 7.2 Cumulative annual distribution of fire risk events by cause

From this data, it was observed that priority should be placed on initiatives that address the most commonly occurring risk drivers.

Step 2: Identify Mitigations

To identify mitigations, an evaluation of current industry practices and new technology is performed. As other utility wildfire mitigation plans become available, PacifiCorp reviews them for pilot results and initiative progression, which supply valuable information on proven industry solutions. Additionally, PacifiCorp has developed relationships with other utilities across multiple states; these relationships facilitate discussions about industry practices and learning from each other. Proven solutions are then evaluated for selection as a mitigation program.

Step 3: Evaluating and Selecting

Mitigations are evaluated for implementation based on the following criteria:

- Commission or *regulatory requirements*
- Wildfire Risk impact
- Customer impact

- Ease of implementation

Programs approved by upper management then progress to be scoped and deployed.

Step 4: Scoping and Implementation

Program scoping can vary greatly depending on the type of program. Generally, PacifiCorp reviews the type of ignition risk factor the program is planned to address, reviews other simultaneous programs and prioritizes how the work is sequenced to address higher risk locations first. Addressing wildfire risks in PacifiCorp's Tier 3 and Tier 2 areas is a higher priority than addressing the risk in non-HFTD areas. After program prioritization, the program moves to the design stage, which can vary depending on the project. For grid hardening programs, this stage includes developing a formal engineering design (for vegetation management this is the step where the plan is developed). Following the design step, the detailed implementation plan is developed and the mitigation is initiated. Before, throughout the implementation of, and after completion of the program, a variety of metrics are collected and recorded. Metrics vary, depending on the specific program, and can include installation dates, completion dates, conditions, ignitions reported and / or outages reported. This data is all gathered with the plan that it can be incorporated into future revisions of risk modeling.

C. Summary of Changed Circumstances and Adjustment to Priorities

A summary of major investments can be found in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx. Additional information regarding major accomplishments is included in Section 5.3 starting on page 114. Lessons learned associated with the various initiatives has been reported in Section 4.1 on page 31.

Table 7.2 Programs and their modifications based on changing circumstances and priorities

Category	Changed Circumstances (2020-2022)	Adjustment to Priorities
Risk Mapping	Pivoting to Technosylva	Prioritizing RSE
Situational Awareness	• Built and implemented an in-house WRF model; daily WRF output ingested by the company's geospatial analysis application, GREATER. • Created of situational awareness website for internal and external consumption of weather station observations and forecast data. • Completed five years of a 30-year WRF reanalysis of historical weather conditions. • Piloted Technosylva's Wildfire Analyst-Enterprise in 2021. • Created a meteorology program with five full-time staff meteorologists to provide daily weather briefings and decision support.	• Expansion of Situational Awareness initiatives beyond weather stations to include the creation of an impacts-based forecasting system and web-based displays. • Increasing the density and pace of new weather station installations across the HFTD.

Category	Changed Circumstances (2020-2022)	Adjustment to Priorities
Grid Design and System Hardening	Obtained materials, began completing engineering design work and began installing in the field.	Covered conductor prioritization has remained the same.
Asset Management and Inspections	N/A	N/A
Vegetation Management and Inspections	Completed roll out and implementation of mobile data management software and continue to improve data collection process.	The changed circumstance has not resulted in an adjustment to priorities, but rather increased capabilities to track and execute work to accomplish goals.
Grid Operations and protocols	Identified a need for separate tracking of patrols related to elevated risk situations.	N/A
Data Governance	Development of Wildfire Safety team	N/A
Resource Allocation Methodology	N/A	Prioritizing RSE
Emergency Planning and Preparedness	N/A	N/A
Stakeholder Cooperation and Community Engagement	N/A	N/A

D. Resource challenges

PacifiCorp has encountered challenges related to limited field resources, particularly as it related to construction activities. The business plans to address these challenges through the hiring on additional contractors, as described in Section 9.3 starting on page 255.

Additionally, sufficient resources are needed to support plan development, monitoring and control. In 2021, PacifiCorp began planning to meet these unique challenges and established a wildfire safety department as described in Section 7.2 on page 144. An additional FTE is also being added, as reported in the 2021 Change Order submitted on November 1, 2022, to support data management and reporting. Further changes over the next three years are expected as the new 2023 guidelines are evaluated. PacifiCorp plans to further evaluate resources at that time.

E. Technology Evolution and Transformation

The company anticipates that it will continue piloting and researching new technologies with a focus on how these new technologies can transform existing initiatives or inform the need for new initiatives. This is further described in Section 4.4.1 on page 48 and imbedded in the wildfire mitigation strategy goals discussed in this section.

New technologies can provide information that isn't already available with current equipment or methods. For example, enhanced inspections view the equipment through IR allowing for information to be gathered that can't be detected visually. The weather stations that have been installed have allowed for weather modeling within the HFTD and the territory, which

has informed real-time operational decisions. PacifiCorp recognizes that it is vital to continue to learn about and evaluate new technologies and innovations over the next three years.

As new technologies and innovations become available, PacifiCorp plans to evaluate them for piloting or full implementation. It is anticipated that new technologies will add additional insight into the conditions or operational practices for the equipment in the service territory. The data gained will be interpreted in a way that a systematic approach of actions can follow the information gained.

F. GIS layer map showing generalized wildfire risk

A GIS layer map showing generalized wildfire risk, as per LRAM, has been provided in Attachment 1: GIS Wildfire Risk.

G. GIS layer showing grid hardening initiatives

Covered conductor installation undergrounding of electrical lines and/or equipment and removal of electrical lines has been provided in Attachment 2, which includes GIS Layer Covered Conductor, Covered Conductor 2022 and Covered Conductor 2023. These attachments provide grid hardening planned for 2022 and 2023.

Plans for grid hardening beyond 2023 are planned to be scoped in the future based on the 2023 WMP Guidelines and updated risk planning methodologies. Within the GIS layers, all hardening efforts are "in progress" and expected to be completed within the year of the designated file. GIS layers include the circuit ID. All work scoped is for covered conductor except for circuit 5G79, which is planned to be undergrounded.

H. Static high-level maps

Generally, grid hardening initiative work in 2022 and 2023 is prioritized in the HFTD areas (see Figure 4.2 for a map of the HFTD). Upon completion of these areas, PacifiCorp plans to address the next highest risk areas for grid hardening work.

I. GIS layer for planned asset management and inspections, 2022

PacifiCorp has provided, in Attachment 3: GIS Layer Inspections, a GIS layer for planned asset management and inspections in 2022. This layer includes the planned inspection date and inspection type (IR inspections, PTT, detail or visual). Work is prioritized based on the initiative prioritization in Section 7.3.4 starting on page 171, which describes the asset management and inspection program.

J. GIS layer illustrating enhanced clearances

Attachment 5 provides a map of where PacifiCorp plans to perform vegetation management work in 2022. Additionally, Attachment 4 provides a map of where vegetation management work was completed in 2020 and 2021.

7.2 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. *Ensure that across audits, initiatives, monitoring, and identifying deficiencies, the utility will report in a format that matches across WMPs, Quarterly Reports, Quarterly Advice Letters,[24] and annual compliance assessment.*

A. Monitoring, auditing, quality assurance, quality control

PacifiCorp's WMP reflects a broad and thorough wildfire mitigation approach to meet the heightened risk and growing impact to communities in the company's California service territory. As a result, the plan contains many elements and touches nearly every department in the company. In recognition of this significant effort, PacifiCorp developed a new department, commonly referred to as Wildfire Safety. This new department consists of thirteen full-time employees, is led by a Managing Director, and includes both a project management office, focused on delivery of line rebuilds and system hardening, and a program delivery team, responsible for overall plan development, monitoring, and implementation. The overall organization is depicted below in Figure 7.3.

[24] General Rule for filing Advice Letters is available in General Order 96-B: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M023/K381/23381302.PDF

Figure 7.3 PacifiCorp's newly formed wildfire safety department

While the broader Wildfire Safety team is tasked with supporting all types of wildfire mitigation initiatives and strategies across the company's entire service territory, a key function of Wildfire Safety Program Delivery team is to develop, implement, monitor, and improve the company's Wildfire Protection Plan in Oregon. It is the responsibility of Wildfire Safety Program Delivery to coordinate with other internal departments such as Asset Management, Vegetation Management, Field Operations, and Emergency Management to ensure all aspects of the plan are delivered. While utilities have always needed to work to prevent wildfire sparked by an electric facility, this extensive approach reflects a new way for PacifiCorp to tackle this elevated risk.

As is true with any plan or program, monitoring plan implementation is just as critical as the plan elements itself. PacifiCorp combines company processes, tools, and site work to monitor program activities; individual departments are responsible for delivering specific portions of the plan. A few key management areas include local operations, emergency management, construction activity, and non-construction programs such as inspections and maintenance.

The emergency management department ensures an annual preparedness review of ongoing tasks and processes such as Wildfire Prevention Practices for operations employees and PSPS processes. Part of this annual review includes desktop exercises and after-event reports for lessons learned that can inform and improve plans. This is further described in Section 7.3.9 starting on page 217.

To facilitate WMP construction projects (generally reflected in the system hardening programs) PacifiCorp established a wildfire mitigation project management office. This office monitors all aspects of construction (engineering, permitting, standards, estimating, materials, and post-audit quality assurance) to ensure the plan deliverables are achieved. PacifiCorp uses company processes, tools, and site work to monitor these activities. For example, weekly coordination meetings are held and costs and progress are tracked and monitored monthly. Additionally, internal engineering audits and verifies all contracted design work to ensure projects meet the necessary scope as well as company and industry standards.

Other aspects of the WMP are overseen by existing program offices such as vegetation management, asset management, and corporate communications. These offices collect all pertinent information (inspection records, etc.) to ensure compliance. All collected data is maintained in the company's corporate enterprise systems. Details regarding program oversight and management are included in the detailed program elements.

While individual departments can monitor individual elements of the company's WMP, PacifiCorp has identified a gap: the WMP lacks a clear plan and process to monitor collective implementation. This gap became more obvious during 2020 plan implementation due to both the increase in reporting requirements and frequency as well a heightened need for coordination between departments to ensure programs reflect the WMP's overall strategy and vision.

PacifiCorp is continually evaluating methods it can employ to ensure greater structure within the PMO to ensure that proper delivery, monitoring and auditing practices are put in place.

B. Deficiencies

Plan deficiencies are generally identified through self-audits, after-action reviews and progress updates. As described above, each department can monitor progress and identify deficiencies. For example, emergency management conducts after-action reviews that include, as a component, action items to close gaps that were found. Audits conducted following asset inspections include detailed reports on findings that are then added to annual inspector training.

One area currently identified for improvement at PacifiCorp and identified by the OEIS is data governance. PacifiCorp has been working diligently to improve data delivery consistent with the GIS Data Schema requirements published by the OEIS. To date, the company has been able to deliver a substantial portion of the asset data, PSPS event data and risk event data in the format requested.

However, improving data governance requires retrieving and translating nonspatial data into GIS format. Like monitoring and auditing the WMP, the evolution of the company's GIS data capability touches many departments and requires an intense amount of input and coordination. While individual departments may have policies, processes and procedures to manage key operations data, PacifiCorp does not have a single, overarching data governance plan. However, the company recognized the need to develop a plan to close this gap, which will continue to be reported in quarterly updates.

Another area identified for improvement, has been the installation of covered conductor in the field, which has been slow to complete on target, and is likely to continue missing targets for the year, despite ample planning and prioritization of current resources. To address this, the business strategy has shifted to fundamentally increase resources using a Construction Management contractor, as described in Section 9.3 on page 255, and PacifiCorp plans to

award the contract at the beginning of 2023.

C. Inspections

The effectiveness of these programs at reducing operating risk — which includes wildfire risk — relies on inspection quality and proper interpretation of findings. PacifiCorp monitors inspections through its quality assurance and quality control (QA/QC) program. This program generally includes desktop and field audits designed to identify gaps in the inspection programs and inspector capabilities. QA/QC also includes corrections that increase inspection accuracy and reliability, which is critical to ensure effectiveness and to support risk reduction.

To perform QA/QC of inspections, PacifiCorp uses a combination of process controls, software tools, company policy and physical record checking to quickly identify inaccuracies for corrections, evaluations, root cause analyses and system improvements. These activities provide a cost-effective way to minimize inaccurate of unreliable inspection results. Inspection results are reviewed continuously to confirm that inspections in the HFTD are meeting acceptable standards of performance.

The main components of this program, including enhancements to mitigate wildfire risk, are:

- Physical audits of at least 5% of planned facility inspections with a focus on fire threats and Tier 2 and Tier 3 prioritization
- Software controls that prohibit freeform Condition assignment, allowing for result controls, minimizing the amount of human error possible
- Quarterly review of already audited results as a secondary check
- Annual inspector training to address audit findings and improve inspection reliability and accuracy

Additional details about these components, program management, cost, evolution and new enhancements to reduce wildfire risk in recognition of PC-4 are included in Section 7.3.4 starting on page 171.

D. Reporting format

PacifiCorp has taken OEIS guidance and begun matching its current programs to older named programs, as requested in earlier updates. Where programs have been realigned, the company has referred to the older program name as well as the current name. This realignment is still evolving. As the company and stakeholders evaluate its plan and become familiar with the programs, how the programs are evolving and aligning with stakeholder directions will become clearer.

7.3 DETAILED WILDFIRE MITIGATION INITIATIVES

In this section, describe how specific wildfire and PSPS mitigation initiatives execute the strategy set out in Section 5. The initiatives are divided into 10 categories, with each providing a space for narrative descriptions of the utility's initiatives. 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*

It is not necessary for a utility to have every initiative listed under each category.

Financial data on mitigation initiatives

Report actual and projected WMP expenditure, as well as the risk-spend-efficiency (RSE), for each initiative by HFTD tier (territory-wide, non-HFTD, HFTD zone 1, HFTD tier 2, HFTD tier 3) in Table 12. of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx. For each item in this category, provide relevant maps within the report or appendices.

Detailed information on mitigation initiatives

Report detailed information for each initiative. For each initiative, organize details under the following headings:

2. ***Risk to be mitigated** / problem to be addressed*
2. ***Initiative selection** ("why" engage in initiative) – include reference to and description of a risk informed analysis and/or risk model on empirical (or projected) impact of initiative in comparison to alternatives and demonstrate that outcomes of risk model are being prioritized*
3. ***Region prioritization** ("where" to engage initiative) – include reference to a risk informed analysis in allocation of initiative (e.g., veg clearance is done for trees tagged as "high-risk") and demonstrate that high-risk areas are being prioritized*
4. ***Progress on initiative** since the last WMP submission and plans, targets, and/or goals for the current year*
5. ***Future improvements to initiative** - include known future plans (beyond the current year) and new/novel strategies the utility may implement in the next 5 years (e.g., references to and strategies from pilot projects and research detailed in Section 4.4).*

7.3.1 Risk assessment and mapping

7.3.1.1 A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment

1. **Risk to be mitigated**

   In Section 4.5, starting on page 65, PacifiCorp explained its evolution toward a comprehensive risk modeling approach that supports evaluating a variety of fire risks in the context of its network overlaid on the appropriate land features. This risk modeling approach also allows for estimating the impacts of various mitigation measures on future fire risks. As it unfolded that approach, it created a single modeling tool through its LRAM that addresses utility ignition, climate risks (historic, current and forecast) and the impacts of fire spread. As result, PacifiCorp consolidated all aspects of the risk assessment mapping (sections 7.3.1.1 and 7.3.1.3, starting on page 150) into this initiative, Section 7.3.1.1, which serves as an enabling technology and foundational element upon which to rationalize the risks, costs and benefits for a variety of mitigation approaches designed to result in improvements in utility fire risk.

2. **Initiative selection**

   In its review of PacifiCorp's application of established HFTD, OEIS and other stakeholders provided feedback on the lack of RSE methods underlying the identification and prioritization of mitigation activities. The company heeded this feedback and took prompt action to begin building out its capability to model a variety of inputs that could inform its risk identification on both a short- and long-term basis. The company has previously reminded OEIS that its obligations through S-MAP and RAMP are still in development in R.18-10-007. To move its WMP forward, the company leapfrogged its risk modeling ahead; it will align LRAM with non-fire elements later, as necessary consistent with rulemaking. For the OEIS definition of this initiative, Risk Mapping and Assessment, see Appendix 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp designed the LRAM to be broadly extended throughout its electrical network. It used Tier 3 areas for prioritizing and validating of its model, Tier 2 are subject to PSPS due to local climatology and a Non-Tier area.

4. **Progress on initiative**

   The company has materially delivered Phase 1 of its LRAM.

5. **Future improvements to initiative**

   The company outlined several areas planned for further development, including the

incorporation of variable impact of certain equipment or components on localized wildfire risk.

7.3.1.2 Climate-driven risk map and modeling based on various relevant weather scenarios

See Section 7.3.1.1 on page 150. Climate-driven risk map and modeling, as well as ignition probability mapping have been incorporated into the summarized risk map described in that section.

7.3.1.3 Ignition probability mapping showing the probability of ignition along the electric lines and equipment

See Section 7.3.1.1 on page 150. Climate-driven risk map and modeling, as well as ignition probability mapping have been incorporated into the summarized risk map described in that section.

7.3.2 Situational awareness and forecasting

7.3.2.1 Advanced weather monitoring and weather stations

1. **Risk to be mitigated / problem to be addressed**

A key component of wildfire risk mitigation is making informed decisions during dynamic weather situations that could impact power infrastructure. Dynamic weather situations require quality data, communicated remotely across the service territory. While there is some publicly available weather data, it can have gaps and/or not be recorded with the sensitivity needed to make more accurate forecasts. Therefore, PacifiCorp began to develop its own weather network to address these gaps and to provide reliable, accurate weather data to support better forecasting and more informed decision-making.

2. **Initiative selection**

In its evaluation to establish a cost-benefit analysis to support its weather network expansion, the company found itself unable to find a way to quantifying the proper level of weather station density; however, PacifiCorp plans to keep working to identify weather station circuit density. PacifiCorp's focus has been on establishing a network of weather stations to provide situational awareness for each circuit in the HFTD by the end of 2022.

The alternative to establishing a weather station network, is to use generalized public weather data, which has been available for many years. Additionally, public weather data can be less reliable or less frequently calibrated than company-owned and collected data. Therefore, PacifiCorp began to develop a weather station network.

For the OEIS definition of the advanced weather monitoring initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

PacifiCorp outlined its process to begin building out its weather network in its September 9, 2020, Quarterly Report filing. Because of the importance of localized, real-time weather data to any PSPS program, PacifiCorp's main priority in 2019 was locating weather stations in and around defined proactive de-energization zones. The company engaged REAX to advise on the best placement of stations, considering topography and climate trends. After the target locations were established, PacifiCorp reviewed those locations with the NWS office in Medford, Oregon (which supports Siskiyou County, California for much of its weather forecasting). All data collected by these stations is communicated into MesoWest (operated by the University of Utah), which aggregates all climate data and makes it publicly available, on a 10-minute refresh.

In 2020, PacifiCorp focused on better coverage across its whole service territory and near populated communities bordering Tier 2 areas. PacifiCorp expanded the system to establish a more macro understanding across its service territory, including outside the PSPS areas. Also in 2020, the company used distance and elevation change from a particular circuit ZOP to the closest weather stations in the area to find data gaps that would help determine locations for weather station placement. Thereafter, the company engaged weather experts, including those at the NWS and Pyregence Project participants, and fire response professionals, including at the BLM and the NIFC, to consider the proposed locations. The company integrated the BLM's RAWS network (by installing RAWS stations throughout California, Oregon and Washington). The weather station network expansion will increase PacifiCorp's general situational awareness, improve risk modeling efforts in those areas, and as suggested by the OEIS, improve understanding of how weather systems move across the entire territory. In 2020, the company used the LRAM to identify areas where climate-driven fire risk and utility equipment risks resulted in elevated combined scores; the company then calculated distances to available weather stations, using elevation and absolute measurements to score those areas with greater risk but limited weather information. Finally, its new meteorologists calibrated those locations to refine target locations.

In 2021 and continuing into 2022, the meteorological team began placing weather stations in locations with forecast gaps. Sometimes an extreme weather pattern will originate outside the high-risk areas; the earlier the forecast is able to capture data related to that event, the better forecast we have. This guiding principle helped the PacifiCorp meteorologists identify best new weather station locations.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

PacifiCorp has continued to develop the weather station network based on informed placement recommendations from the meteorology forecasters who develop the situational awareness reports. Additionally, PacifiCorp has initiated the plan to establish the weather station network density and systematic methodology for placement.

As described in Section 4.4.2.7 on page 61, PacifiCorp piloted the use of different types of weather stations. Due to the greater sensor capability, PacifiCorp plans to use MWS primarily and only plans to use RAWS where MWS could not be installed.

Additionally, this year PacifiCorp plans to initiate planning for a wildfire detection pilot (see Section 4.4.1.1 on page 48).

5. **Future improvements to initiative**

While PacifiCorp has piloted multiple weather station types, and implemented weather stations along HFTD circuits, additionally improvements to this initiative include further expansion of weather station placement via the methodology that is planned to be developed in 2022.

7.3.2.2 Continuous monitoring sensors

7.3.2.2.1 Distribution Fault Anticipation

1. **Risk to be mitigated / problem to be addressed**

As discussed in Section 4.2.1, starting on page 38, utility ignition risks are correlated with fault events. Fault events occur due to some form of contact, equipment failure or damage or other short circuit event occurring on the system. Monitoring of waveforms can identify an incipient condition, allowing pre-emptive action to potentially avoid a fault event.

2. **Initiative selection**

DFA equipment (see Section 4.4.2.1 on page 51) serves as a continuous monitoring tool that applies machine-learning processes. While the company continues to look for opportunities to improve its inspection process, there are situations that may not be detectable, even using some of the newly adopted tools that are part of the enhanced inspection program. DFA is anticipated to provide a full-time monitoring function to complement routine patrol and equipment inspection.

3. **Region prioritization**

The company began development of a DFA pilot program in 2019; DFA devices were commissioned on two of the highest priority circuits in 2021. As the opportunity arises to use this technology at locations, particularly those having

high combined fire risk scores where the substation equipment lends itself to placement of the DFA devices and where communication networks exist, the company will extend the application of this pilot technology.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp completed the installation of DFA devices on two circuits outside of the Weed substation (5G45 and 5G83). Two additional circuits out of Lassen substation (5G77 and 5G79) had DFA devices installed during 2021 covering PacifiCorp's Weed and Mt. Shasta service areas. The goal is to record data as per the DFA pilot (see Section 4.4.2.1 on page 51).

5. **Future improvements to initiative**

   PacifiCorp plans to evaluate the results of the pilot before making a recommendation on the next steps of the initiative.

7.3.2.2.2 Wildfire Cameras

1. **Risk to be mitigated / problem to be addressed**

   As discussed in Section 7.3.2.1 on page 151, a key component of wildfire risk mitigation is making informed decisions during dynamic weather situations that could impact power infrastructure. While the more granular weather station information discussed in Section 7.3.2.1 on page 151 is valuable it cannot provide an actual view of the situation on the ground. In the WSD-017 OEIS Action Statement expressed concern that PacifiCorp was not collecting data on active wildfires in the area. PacifiCorp plans to investigate the development of a wildfire detection network to mitigate this data gap through the wildfire detection pilot program (see Section 4.4.1.1 on page 48).

2. **Initiative selection**

   The wildfire detection pilot (Section 4.4.1.1 on page 48) will address the OEIS recommendation to incorporate HD camera deployment and fire detection technology for ignition recognition.

3. **Region prioritization**

   In 2022, PacifiCorp plans to develop a new Wildfire Detection program, consisting of wildfire cameras and smoke detectors, strategically placed in remote locations of the HFTD where there are no other wildfire detection capabilities.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

This year PacifiCorp plans to initiate planning for a wildfire detection pilot (see Section 4.4.1.1 on page 48) that will include the use of HD cameras.

5. **Future improvements to initiative**

   PacifiCorp plans to evaluate the results of the pilot before making a recommendation on the next steps of the initiative.

7.3.2.3 Fault indicators for detecting faults on electric lines and equipment

1. **Risk to be mitigated / problem to be addressed**

   Based on heightened risk during fire season, PacifiCorp may deploy alternate relay settings that incorporate more sensitive fault detection and isolation capabilities. Alternative settings may include the disabling of reclosing. Use of alternate settings, however, can result in more frequent outages on a given circuit. And longer patrols can extend the duration of outages. Consequently, circuits can experience more frequent and longer outages, especially where traditional equipment and technology cannot pinpoint fault locations. Therefore, this initiative was developed to mitigate the potential impact to customers associated with other wildfire mitigation tactics by facilitating faster restoration through the implementation of communicating fault circuit indicators (CFCI) and fault circuit indicators.

2. **Initiative selection**

   While alternate settings can be an effective strategy to reduce the risk of wildfire, PacifiCorp recognizes the disruption of outages on customers and communities. Therefore, PacifiCorp introduced a new initiative to install CFCIs on circuits where more sensitive settings may be deployed during periods of heightened risk in the 2021 Change Order submitted on November 1, 2021, and provided in attachment 8. These CFCI devices sense faults and communicate these results back to PacifiCorp's central grid operations center. When placed strategically along circuits, the results can be used to help pinpoint fault locations and target operations response and patrols, reducing restoration times and mitigating the impact to customers. Because of their impact in reducing the amount of time required to patrol lines when a device with reclosing functionality opens, CFCI devices facilitate the use of more sensitive fire settings. For the OEIS definition of the fault indicators initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   CFCIs are installed in more remote areas, with an installation priority for those fault indicators located in the HFTD.

4. **Progress on initiative since the last WMP submission and plans, targets, and/or goals for the current year**

PacifiCorp developed this initiative in 2021 and plans to install CFCIs in 2022.

5. **Future improvements to initiative**

Continued exploration of the use of intelligent electric devices is part of the company's approach to grid design and system hardening (Section 4.1.3 starting on page 32).

7.3.2.4 Forecast of a fire risk index, fire potential index, or similar

1. **Risk to be mitigated / problem to be addressed**

Generalized public weather data is and has been available for many years and limited company data is also available. However, in particularly dynamic situations that pose an increased wildfire risk, this data is insufficient and not reliable enough to fully understand localized ignition risks, particularly in rural locations. As such, data limitations present challenges for making localized emergency management decisions, like whether to initiate a PSPS. Additionally, data alone is not enough to understand and evaluate risk. Data must be aggregated, evaluated and applied locally to the electrical system and surrounding areas to inform decision-making, which is the objective of this initiative.

2. **Initiative selection**

Implementation of impact-based forecast software solutions will position PacifiCorp to take better informed actions in advance of severe weather. This will help the company to reduce restoration times and increase reliability, while reducing the risk of wildfire. The solutions PacifiCorp chose for implementing this initiative will greatly improve its ability to prepare for and respond to extreme fire weather events. Data from these forecasting systems will also be integrated with existing utility data and advanced wildfire models to manage real-time fire risk, prioritize fire-hardening infrastructure projects, and quantify the risk reduction of PacifiCorp's wildfire mitigation efforts throughout its California service territory. For the OEIS definition of this initiative see Section 9.1 starting on page 244.

3. **Region prioritization**

HFTDs have been prioritized for implementation of the impact-based software solutions described in this section. For example, these areas were prioritized over others for initial implementation of Technosylva's wildfire modeling software solutions (described below).

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

High performance computing clusters (HPCC) — PacifiCorp built and implemented two custom, fully redundant HPCCs that became operational in November 2021. They

run an operational weather forecast model and will create a high resolution, 30-year historical record of weather across PacifiCorp's California service territory by 2023. Because the system is fully redundant, it will not go down when it is needed most; namely, in emergency situations.

Operational weather forecast model — PacifiCorp is building a high-resolution WRF model that:

- Provides twice-daily high-resolution forecasts across a 96-hour time horizon and generates greater than one terabyte of weather forecast data daily
- Makes limited data publicly available through PacifiCorp's situational awareness websites
- Began computing a 30-year, high-resolution, hourly reanalysis of weather and fuels across PacifiCorp's California service territory, which is expected to be complete by year-end 2022

Wildfire modeling —PacifiCorp partially implemented Technosylva's WFA-E software package to model daily wildfire consequence in its California service territory HFTD from July 1, 2021, through December 31, 2021. It produced millions of daily wildfire simulations throughout the highest fire risk areas. A post-season analysis is currently underway to evaluate improvement of operational decisions made during the pilot project.

By year-end 2022, PacifiCorp plans to implement the full suite of Technosylva's WFA-E software throughout its California service territory. (See discussion in Section 4.5.1.1. on page 66) FireCast will provide indicators of risks to all assets based on a thorough assessment of initial attack conditions in fire spread simulations. FireSim will produce fire spread simulations that will give PacifiCorp a more comprehensive ability to identify destructive fires. Technosylva's WRRM software will integrate with PacifiCorp's climatology data to provide a comprehensive analysis of risk to all assets in its service territory. Finally, the WRF model described above will work in tandem with FireCast and FireSim to provide a detailed map of weather and fire information. Taken together, all the information produced by these applications will drive operational decisions, like whether to initiate a PSPS, and prioritization of vegetation management, grid-hardening, and asset management projects/maintenance work.

Situational awareness websites — In 2021, PacifiCorp built situational awareness websites for use by its employees, customers and public safety partners. These websites integrate real-time observations with weather forecast data to monitor real-time trends, highlight when conditions become extreme, and provide an internal PSPS dashboard for real-time decision-making during PSPS events. Ongoing enhancements to these sites are expected to take place through 2022.

5. **Future improvements to initiative**

LRAM — PacifiCorp's LRAM enables more refined understanding of the unique risk profile at each ZOP, which informs long- and short-term wildfire mitigation strategies. This planning model currently uses HRRR data, which is a historical five-year set of data. After the WRF model is completed, LRAM can be updated to include a more encompassing 30-year set of historical weather data.

Operational weather forecast model — Integration of the WRF models into Technosylva is critical to meeting the 48–72-hour CPUC PSPS customer communication requirements.

Results of the 30-year weather data reanalysis will ultimately serve as a foundation for an all-weather outage prediction model that will provide PacifiCorp with the information it needs to forecast the number of outages that may occur in each ZOP. Beginning in 2023, these machine-learning models will support improved PSPS decision-making. Further improvements are anticipated through 2026. In 2024, the operational WRFs will provide probabilistic forecasts that address the inherent uncertainty of single, deterministic forecasts to answer questions like:

Wildfire modeling — Beyond 2022, PacifiCorp expects that Technosylva will continue to provide ongoing ad hoc support, enhancements, and customization to continue to meet PacifiCorp's needs.

Situational awareness websites — Beyond 2022, PacifiCorp expects to continue its partnership with StormGeo to provide ongoing enhancements to its existing situational awareness websites.

7.3.2.5 Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions

PacifiCorp trains and deploys personnel when there is elevated fire risk, activating "watches" or "activations" depending on how much fire climatology indicates elevated fire risk. These personnel go on readiness patrols and may modify system protection settings and monitor the network during the elevated fire risk period.

1. **Risk to be mitigated**

As discussed in Section 4.2.1 starting on page 38, utility ignition risks are tied to fault events. Fault events are more likely when it is very windy. High winds that occur when it is also dry can lead to ignitions that spread. This initiative focuses on providing a local, real-time risk assessment to inform decision-making and mitigate the potential for a fault event and subsequent ignition.

2. **Initiative selection**

To mitigate the risk associated with the potential increased fault event rate during weather events, personnel are deployed to the field during high-risk situations to participate in 'watches.' For the OEIS definition of this personnel monitoring initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp personnel are deployed throughout the service territory based on company situational awareness and local operations experience, with a priority for HFTD-designated areas.

4. **Progress on initiative**

   Personnel have previously been trained on the process and protocols for monitoring during elevated fire risk conditions, however PacifiCorp has limited experience with this type of patrol compared to other California utilities. In 2021, PacifiCorp observed a need for greater accounting of these activities. In 2022, PacifiCorp plans to initiate a separate tracking mechanism so field personnel can document spend and activities for wildfire mitigation patrols, separate from other activities. This will help PacifiCorp better report on activities and identify future room for improvement.

5. **Future improvements to initiative**

   In 2022, PacifiCorp will gather information to drive future improvements to this initiative. The company is considering the use of phone/tablet applications, like other California utilities, to reduce reporting times.

7.3.2.6 Weather forecasting and estimating impacts on electric lines and equipment

The ability to gather, interpret and translate data into an assessment of utility-specific risk and to inform decision-making is key component of PacifiCorp's situational awareness. To support this effort, PacifiCorp has created a meteorology department (Figure 7.4) within the company's broader emergency management department. This new team consists of four experienced professionals and one manager.

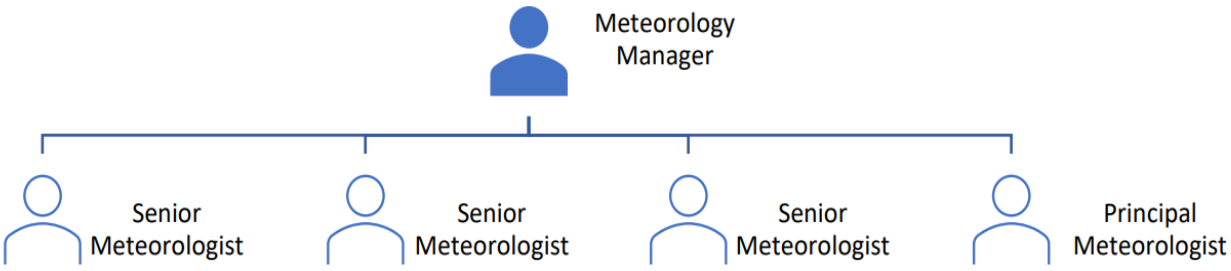

Figure 7.4 Meteorology team

1. **Risk to be mitigated / problem to be addressed**

   This initiative is foundational to inform other key initiatives such as Section 7.3.6.2 Protective Equipment and Device Settings on page 208, and Section 7.3.6.4 Personnel Work Procedures and Training on page 210 by providing for a team of personnel to develop tools, manage datasets, and evaluate risk throughout the year. It is represented separately as an initiative here for transparency and tracking purposes but mitigates the same risk as these other, linked initiatives.

2. **Initiative selection**

   Current artificial intelligence models cannot accurately predict weather behavior; there is still a need for human review by personnel, such as meteorologists, to review modeling reports models and use their expertise to inform and improve the company's situational awareness. The meteorology team supplements the company's longer-term risk analysis with real-time risk assessment and forecasting, identifies and closes forecasting data gaps, manages day-to-day risks, and recommends changes to operational protocols during periods of elevated risk as depicted in Figure 7.5. For the OEIS definition of the weather forecasting initiative, see Section 9.1 starting on page 244.

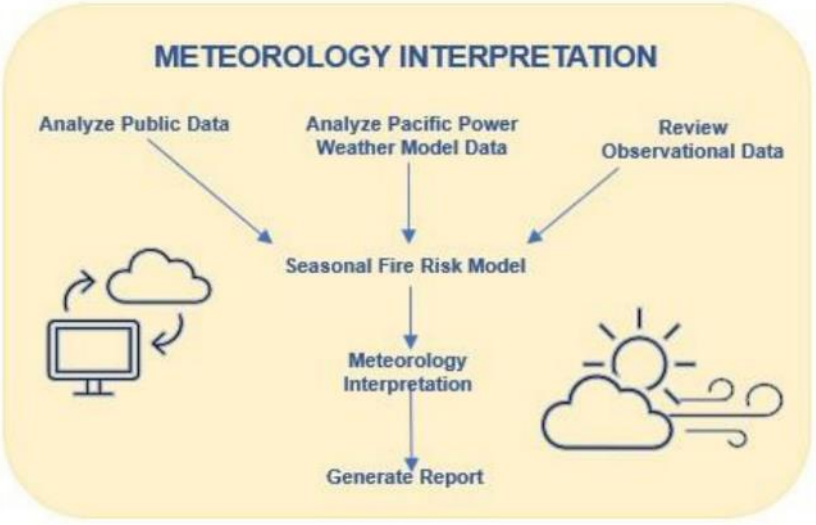

Figure 7.5 Meteorology Interpretation

3. **Region prioritization**

   Meteorologists inform on weather forecasts for PacifiCorp's entire service territory with a focus on HFTD areas.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals**

for the current year

Since the last submission of the WMP, PacifiCorp has developed a meteorology team that consists of one meteorologist manager and four meteorologists.

5. **Future improvements to initiative**

PacifiCorp plans to further develop this team and expand it if necessary.

7.3.3 Grid design and system hardening

7.3.3.1 Capacitor maintenance and replacement program

See sections 7.3.4.1 and 7.3.4.2 on pages 171-172, which include maintenance of overhead distribution and transmission lines. Capacitor maintenance and replacement are included as a part of these maintenance programs.

7.3.3.2 Circuit breaker maintenance and installation to de-energize lines upon detecting a fault

See Sections 7.3.4.15 on page 181, which include maintenance of overhead distribution and transmission lines. Circuit breaker maintenance and installation to de-energize lines upon detecting a fault are included as a part of these maintenance programs.

7.3.3.3 Covered conductor installation

1. **Risk to be mitigated / problem to be addressed**

PacifiCorp overhead distribution equipment and lines are designed to meet current compliance requirements. However, under certain conditions, such as high wind speeds, these lines can become more vulnerable to the "contact by object" risk drivers. PacifiCorp plans to address this risk through a line rebuild program, more commonly referred to as the installation of covered conductor in the WMP.

2. **Initiative selection**

PacifiCorp's line rebuild program includes deployment of the following main techniques:

Reconductor with covered conductor: Specialized overhead covered conductors can be constructed with additional shielding and enhanced insulating properties to aid in wildfire mitigation. Covered conductor is less susceptible to incidental contact with foreign objects, such as branches or Mylar balloons. While covered conductor does not prevent incidental contact from occurring, it reduces the potential that incidental contact will result in a fault event, thereby reducing the wildfire risk. For the OEIS

definition of the covered conductor installation initiative, see Section 9.1 starting on page 244.

Pole replacement: PacifiCorp included pole replacement with the covered conductor projects as an efficient use of resources. In some cases, poles need to be replaced to accommodate the additional weight of covered conductor; replacing wooden poles with stronger nonwooden solutions such as fiberglass or steel also increases grid resiliency and eliminates the need to return later. This approach also ensures that pole replacements are prioritized effectively. This proposed change will provide the additional clarity and transparency sought in the WSD-017 OEIS Action Statement.

Undergrounding: While an underground design does not eliminate every ignition potential (i.e., because of aboveground junctions), it is the most effective strategy for reducing the risk of any utility-related ignition. Unfortunately, the cost of underground construction often makes it difficult to apply on a widespread basis. Therefore, PacifiCorp evaluates the potential to convert overhead lines to underground lines for rebuild projects on a project-by-project basis. Through the design process, each individual project is assessed to determine whether sections of the rebuild should be completed with underground construction. For example, a more remote, heavily forested location with few customer connections could be an ideal candidate for undergrounding. PacifiCorp will also learn from other utilities that may be using undergrounding more broadly as a wildfire mitigation tactic. Where implemented, the use of undergrounding will be reported for transparency under Section 7.3.3.16 on page 171.

Small Diameter Copper Replacement: Small diameter copper and iron conductors coordinate with devices and line equipment under normal operating conditions and standard protection and control schemes to identify and isolate faults. However, this small diameter conductor is often not able to be compatible with the upstream fusing and relay settings required for fault detection programs, in particular those contemplated in sections of PacifiCorp's plan, creating an arc energy risk under fault conditions. Specifically, under certain fault conditions, the small diameter conductor with fail before the protection scheme is able to operate. As PacifiCorp's advanced fault detection programs reduce wildfire risk, the company's small diameter copper and iron conductor replacement program is viewed as a necessary element of these programs, thereby reducing wildfire risk. Through the line rebuild design process, small diameter copper shall be replaced.

3. **Region prioritization**

Covered conductor was prioritized using LRAM, as depicted in Figure 7.6 below

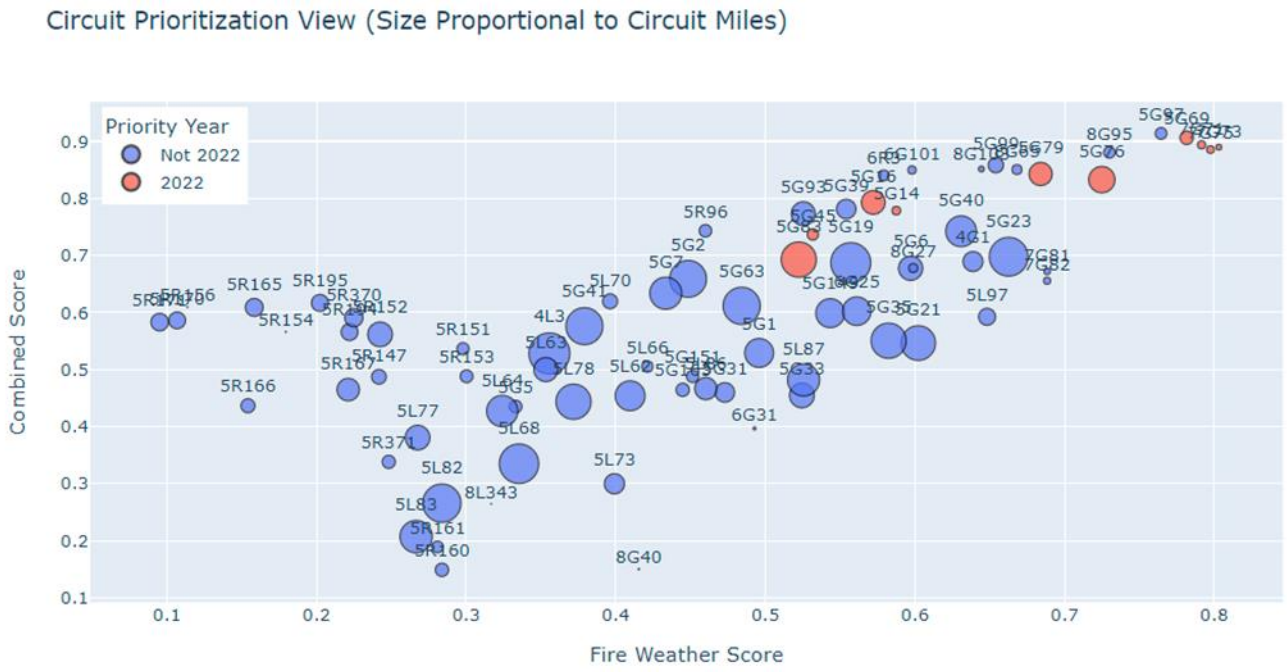

Figure 7.6 Pre-LRAM priority is shown by color using the projected year of construction

The climate risk is shown on the x-axis, the combined score (which integrates utility ignition risk with fire climate risk) is shown on the y-axis

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp has progressed past the initial plan and development phase; as part of the implementation phase, covered conductor installation has begun. In 2022, PacifiCorp plans to ramp up the installation of covered conductor, based on lessons learned from 2021.

5. **Future improvements to initiative**

   PacifiCorp plans to complete the current covered conductor plan and then explore the expansion of the initiative outside of the highest fire-risk areas. For additional information on covered conductor installation see Section 9.3 on page 255.

7.3.3.4 Covered conductor maintenance

1. **Risk to be mitigated / problem to be addressed**

   This initiative addresses the risk drivers associated with equipment failure or contact by object.

2. **Initiative selection**

In its WSD-017 OEIS Action Statement, OEIS recommended that PacifiCorp enhance current operations to provide maintenance to covered conductor. For the OEIS definition of the covered conductor maintenance initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   The prioritization of this initiative shall align with the Section 7.3.4.1 on page 171 detailed inspections of distribution electric lines.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp plans to initiate this effort as an element of the detailed inspections of distribution electric lines, Section 7.3.4.1 on page 171. The goal of this is to update the company's inspection methodology and condition assessment criteria to ensure adequate inclusion of covered conductor. PacifiCorp will also update field inspection service training materials to include covered conductor by 2023.

5. **Future improvements to initiative.**

   Covered conductor maintenance will become a standard part of inspections; no additional future improvements are anticipated at this time.

7.3.3.5 Crossarm maintenance, repair and replacement

See sections 7.3.4.1 and 7.3.4.2 on pages 171-172, which include maintenance of overhead distribution and transmission lines. Crossarm maintenance, repair and replacement are included as a part of these maintenance programs.

7.3.3.6 Distribution pole replacement and reinforcement, including with composite poles

See Section 7.3.3.3 on page 161 on covered conductor installation for additional information about distribution pole replacement and reinforcement. Targets and progress on this initiative will be tracked through this initiative, 7.3.3.6, however spend will roll up into the Line Rebuild Program described in Section 7.3.3.3 on page 161.

7.3.3.7 Expulsion fuse replacement

1. **Risk to be mitigated / problem to be addressed**

   This initiative is to mitigate the equipment facility failure risk driver associated with fuses.

2. **Initiative selection**

   In the 2021 WMP, PacifiCorp planned to replace expulsion with non-expulsion fuses

concurrently with other grid hardening programs, namely the covered conductor initiative. In basic terms, this approach was driven by efficiency considerations, to save on labor cost by completing all work at one time. Thus, this approach did not expedite expulsion fuse replacements. As described in the Change Order Report, PacifiCorp is both (a) expediting the replacement of expulsion fuses on lines where covered conductor installation is planned and (b) expanding the expulsion fuse replacement program to circuits in the HFTD where installation of covered conductor is not currently planned. For the OEIS definition of the expulsion fuse initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp plans to replace all expulsion fuses located in HFTD Tier 3 and Tier 2 as part of a multi-year effort; this is a new program, developed based on feedback received in the WSD-017 OEIS Action Statement. This risk-informed strategy will fully address the risk ignition probability due to expulsion fuses in the HFTDs.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   Since the last WMP submission, PacifiCorp implemented a separate expulsion fuse replacement program, as described in the Change Order Report.

5. **Future improvements to initiative**

   When all expulsion fuses in the prioritized areas have been replaced, PacifiCorp plans to evaluate additional replacements, such as those outside of the HFTD, based on risk.

7.3.3.8 Grid topology improvements to mitigate or reduce PSPS events

1. **Risk to be mitigated**

   Generally, this initiative is to mitigate the risk associated with PSPS to reduce the scale and scope of a PSPS using line segmentation such as through the use of microgrids.

2. **Initiative selection**

   As many of the communities that PacifiCorp serves are within the HFTD and PSPS zones, it is challenging to reduce any possibility of PSPS events through grid topology improvements alone. Grid topology improvements to reduce PSPS events focus on evaluating and improving existing circuitry as opposed to complete relocation of assets. Therefore, the existing grid hardening initiatives mitigate or reduce PSPS events as a function or reducing wildfire risk. For the OEIS definition of the grid topology initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

Generally, the existing grid hardening initiatives prioritize the HFTD.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   While PacifiCorp only implemented one PSPS event in the state of California during the 2021 fire season, PacifiCorp monitored elevated risk all year. When risky conditions appeared, the company was vigilant while still maintaining the ability to implement a PSPS event. During these times, PacifiCorp learned that efficiently and effectively implementing a PSPS event in a way that keeps customer and community impacts as low as practical is about being flexible, understanding the system, and making informed decisions based on accurate information to take appropriate action in the moment.

   PacifiCorp anticipates that the planned asset hardening projects provide the system flexibility and that as weather patterns and specific risks change, the company will be able to implement reactive switching or isolation points during an event. Reactive switching and isolation points allow the company to use a switch, for example, to turn power off for only 10 customers rather than 100, minimizing customer impact.

5. **Future improvements to initiative**

   PacifiCorp has completed reactive switching plans for the PDZ and continues to look at other areas for the future development of plans outside the PDZ. At this time, no specific scope or budget has been set aside for this program.

7.3.3.9 Installation of system automation equipment

1. **Risk to be mitigated / problem to be addressed**

   Various risks can be mitigated by shutting off power to segments of the system. System automation equipment allows for this power shut off to happen very quickly, reducing the fire potential and happen for a short period of time, allowing for power to be restored more quickly.

2. **Initiative selection**

   PacifiCorp interprets system automation equipment to mean all equipment, schemes, engineering and processes to facilitate advanced detection and coordination on the company's distribution circuits. For the OEIS definition of the system automation initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp's installation of system hardening wildfire mitigation program includes the deployment of distribution and transmission protection and control schemes and

equipment, such as relays, circuit breakers, reclosers and communications equipment, to enhance fault detection capabilities, reduce fault isolation time, improve fault location and record availability, and speed up restoration efforts. Equipment that is electrically connected to the HFTD has been prioritized.

4. **Progress on initiative**

   PacifiCorp is currently implementing the field installations of this equipment and progress against targets has been reported in quarterly filings as well as the 2022-05-02_PC_2022_Q1-QDR_R1.xlsx of this filing.

5. **Future improvements to initiative**

   PacifiCorp will continue to monitor new technology developments for solutions which may provide a better alternative to the reclosers and relays selected in this program.

7.3.3.10 Maintenance, repair, and replacement of connectors, including hotline clamps

1. **Risk to be mitigated / problem to be addressed**

   This initiative addresses the risk drivers associated with equipment failure or contact by object due to unmaintained equipment.

2. **Initiative selection**

   This initiative describes the repair and replacement of connectors as they are identified during the Line Rebuild program. For the OEIS definition of this maintenance initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   Connector repair is prioritized in conjunction with the company's covered conductor and detailed distribution line inspection programs, see sections 7.3.3.3 on page 161 and 7.3.4.1 on page 171.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   Since the last WMP, PacifiCorp updated this narrative to better describe the methodologies that PacifiCorp uses to perform this work and better describe the initiative to address recommendations in the OEIS Evaluation of 2021 Wildfire Mitigation Plan Update for PacifiCorp.

5. **Future improvements to initiative**

   Currently, PacifiCorp is completing the proactive replacement of connectors along the

Line Rebuild Program. As PacifiCorp progresses other initiatives, connectors will be evaluated for concurrent work.

7.3.3.11 Mitigation of impact on customers and other residents affected during PSPS event

7.3.3.11.1 Free portable battery program

1. **Risk to be mitigated / problem to be addressed**

   PSPS events are implemented as a last resort during high fire-risk situations; they supplement — not replace — existing wildfire mitigation strategies. To minimize the impact of PSPS events on medical baseline customers, PacifiCorp implemented a program to provide backup batteries at no cost to its customers who depend on medical equipment powered by electricity.

2. **Initiative selection**

   This initiative was prioritized in response to Decision 21-06-034, to "*Provide support for customers that rely on electricity to maintain necessary life functions, including durable medical equipment and assistive technology*'. For the OEIS definition of this mitigation initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   The first phase of the free portable battery program focused delivery of batteries to PacifiCorp's medical baseline customers located in HFTD Tier 2 and Tier 3 areas. In its next phase, PacifiCorp expanded outreach to all medical baseline customers in its California service territory.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp delivered 34 batteries to 28 qualifying registered medical baseline customers within PSPS areas by December 31, 2021. On January 5, 2022, the program was expanded to include medical baseline customers in remaining areas of PacifiCorp's California service territory; the goal of the program's next phase is to deliver batteries to 50 customers by May 31, 2022.

5. **Future improvements to initiative.**

   PacifiCorp is conducting research into program sustainability; future improvements may include a battery replacement program as portable battery systems age and expire.

7.3.3.11.2 Generator rebate program

1. **Risk to be mitigated / problem to be addressed**

   PSPS events are implemented as a last resort during high fire-risk situations; they supplement — not replace — existing wildfire mitigation strategies. PacifiCorp's generator rebate program sought to mitigate the risk customers face during an outage.

2. **Initiative selection**

   This initiative was prioritized in response to the CPUC's current PSPS guidelines "*to ensure utilities continually improve planning, preparation and access to resources during PSPS events.*"

3. **Region prioritization**

   Under this new program, customers located in HFTD Tier 2 and Tier 3 areas who purchase a qualified generator and/or portable power station will be eligible to receive a rebate of up to $200. Customers registered in either the CARE or Medical Baseline programs run by PacifiCorp and required by the state of California will be eligible for an additional $200 in rebates, or a total of $400; rebates cannot exceed the total purchase price of the qualified product.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp began offering this new rebate in 2021. PacifiCorp is working to increase awareness of the programs in place to lessen the impact of PSPS events.

5. **Future improvements to initiative**

   PacifiCorp is continuously learning from other utilities and plans to explore the costs and benefits of expanded offerings.

7.3.3.12 Other corrective action

See Section 7.3.3.3, page 161, on covered conductor installation for additional information about other corrective actions such as small diameter copper replacement. Targets and progress on this initiative will be tracked through this initiative, 7.3.3.12, however spend will roll up into the Line Rebuild Program described in Section 7.3.3.3, page 161.

7.3.3.13 Pole loading infrastructure hardening and replacement program based on pole loading assessment program

1. **Risk to be mitigated**

Older installations may not meet current design and strength standards for new construction. Lower strength margins pose wildfire risk as these lines may become susceptible to extreme weather events. However, modeling and evaluating the strength of older installations can be difficult because relevant information like exact pole height, diameter, lean, and attachment height and characteristics, may not be available.

2. **Initiative selection**

LiDAR data, which allows for highly accurate 3D depictions of pole assets, can replace existing models and assumptions allowing PacifiCorp to identify real-time loading concerns for poles already in-service. This enhanced analysis can also help recommend and prioritize corrective work such as pole or insulator replacements and pole reinforcement. For the OEIS definition of the pole loading initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

PacifiCorp has piloted the use of LiDAR to create structural models for calculating pole leading capacity four miles of 1978-vintage transmission line and 19 miles of a 1920/1950-vintage transmission line located within the HFTD.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

Detailed progress on this program is further described in Section 4.4.2.4 on page 56.

5. **Future improvements to initiative**

Currently, PacifiCorp does not plan to continue this pilot due to the large cost and minimal benefit to risk reduction. More information can also be found in Section 4.4.2.4 on page 56.

7.3.3.14 Transformer maintenance and replacement

See sections 7.3.4.1 and 7.3.4.2 on pages 171-172, which include maintenance of overhead distribution and transmission lines. Transformer maintenance and replacement are included as a part of these maintenance programs.

7.3.3.15 Transmission tower maintenance and replacement

See sections 7.3.4.1 and 7.3.4.2 on pages 171-172, which include maintenance of overhead distribution and transmission lines. Transmission tower maintenance and replacement are included as a part of these maintenance programs.

7.3.3.16 Undergrounding of electric lines and/or equipment

See Section 7.3.3.3, page 161, on covered conductor installation for additional information about undergrounding electric lines and/or equipment. Targets and progress on this initiative will be tracked through this initiative, 7.3.3.16, however spend will roll up into the Line Rebuild Program described in Section 7.3.3.3 (page 161).

7.3.3.17 Updates to grid topology to minimize risk of ignition in HFTDs

At this time, PacifiCorp does not have any specific grid design and system hardening programs focused on updates to grid topology intended to minimize risk of HFTD ignition that are not included in other programs.

7.3.4 Asset management and inspections

7.3.4.1 Detailed inspections of distribution electric lines and equipment

PacifiCorp's detailed inspections of distribution electric lines and equipment is a critical program required to maintain regulatory compliance with California GO 165 and 95. These inspections also mitigate some wildfire risk by identifying and correcting conditions which, if uncorrected could potentially ignite a fire. Table 1 in Attachment 2.3 includes a more extensive breakdown of conditions identified.

1. **Risk to be mitigated / problem to be addressed**

This initiative addresses the risk drivers associated with equipment failure and addresses the compliance requirements from GO 165.

2. **Initiative selection**

PacifiCorp's detailed inspection program, which includes a careful visual inspection accomplished by visiting each structure, as well as inspecting spans between structures, is the company's most appropriate initiative related to the inspection of overhead distribution lines. The program identifies potential nonconformance with the NESC or other applicable state requirements such as California general orders, nonconformance with PacifiCorp construction standards, infringement by other utilities or individuals, defects, potential safety hazards, and deterioration of the facilities that need to be corrected to maintain reliable and safe service. For the OEIS definition of this detailed inspection initiative, see Section 9.1 starting on page 244.

During an evaluation, an inspector documents potential violations and noteworthy observations — including potential fire threats — by assigning a condition code and priority level. The priority levels align with GO 95, Rule 18; the conditions codes are specifically designed to predetermine fire threat as well as other types of conditions.

In a typical year, PacifiCorp performs approximately 13,000 detailed inspections of electric distribution facilities and has historically identified approximately 7,000 conditions that require corrective action.

PacifiCorp defines a fire risk condition as having at least moderate potential impact to safety or reliability. As a result, the company assigns a condition code priority level A or B to these fire risk conditions; priority level A conditions must be addressed within 30 days. Therefore, accelerated correction timeframes for fire risk conditions that include specific rules based on geographic wildfire risk location cannot apply to C conditions.

3. **Region prioritization**

   During a given calendar year, PacifiCorp prioritizes inspections of facilities located within the HFTD to occur earlier in the year, specifically Tier 3 areas. While all required inspections are completed within the prescribed cycle, the intent of this prioritization is to inspect facilities located in the highest fire threat areas prior to fire season where the risk is the greatest.

4. **Progress on initiative**

   PacifiCorp will continue to complete inspections on a cycle and continue to comply with GO 165. Actual performance for 2021 and targets for 2022 for this initiative are provided in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

5. **Future improvements to initiative**

   PacifiCorp plans to continue this effective detailed inspection of lines at the same pace and aligned with current compliance requirements.

7.3.4.2 Detailed inspections of transmission electric lines and equipment

See Section 7.3.4.1, page 171, on Detailed Inspections of Distribution Electric Lines and Equipment for additional information. Targets and progress on this initiative will be tracked through this initiative, 7.3.4.2.

7.3.4.3 Improvement of inspections

At this time, PacifiCorp does not have any additional improvement of inspection programs other than the ones described by other initiatives and pilot programs.

7.3.4.4 Infrared inspections of distribution electric lines and equipment

1. **Risk to be mitigated / problem to be addressed**

   Certain issues with electrical connections and equipment cannot be seen during

traditional inspections. Connections are difficult to fully assess from the ground or air as it is not possible to visually see the electrical flow. If connections look secure but are not truly tight, the electrical flow may all follow one path resulting in potential premature failure of a connection. Left undetected, these issues could cause an equipment failure.

2. **Initiative selection**

   This initiative was selected for development in the RF and Handheld IR pilot (see Section 4.4.2.3 on page 55) due to the success of the transmission IR inspection initiate to identify Conditions for correction. For the OEIS definition of this IR inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   The region for the pilot is described in RF and Handheld IR pilot (see Section 4.4.2.3 on page 55) and represents a portion of the HFTD with some ease-of-deployment criteria.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   In 2021, the handheld IR vendor held a training with PacifiCorp field personnel likely to work with the equipment. The company's 2022 goal will modify this initiative by developing the specific action plan for the field to begin collecting information.

5. **Future improvements to initiative**

   PacifiCorp plans to continue the pilot for this program in a small, select area to determine the best methodology for inspecting and collecting the resulting condition information for correction. The results of this pilot will inform the future full distribution IR program.

7.3.4.5 Infrared inspections of transmission electric lines and equipment

1. **Risk to be mitigated / problem to be addressed**

   The purpose of PacifiCorp's IR inspection program on overhead transmission lines is to reduce ignition probability associated with equipment failure using enhanced detection tools which can identify hot spots not detectable through visual inspections. Hot spots on power lines and equipment can be indicative of loose connections, deterioration and/or potential future fault locations. Therefore, identification and removal of hot spots on high-risk overhead transmission lines can prevent further deterioration, reduce the potential for equipment failure and faults, and reduce ignition probability related to equipment failure.

2. **Initiative selection**

   PacifiCorp has implemented the enhanced transmission line inspection program with a focus on proactive identification and prevention of equipment failures. The inspections are performed annually using a helicopter on all overhead transmission lines in the state of California. The frequency of the inspections is informed by prudent utility practices using a risk-based approach to identify intervals. The risk-based approach involves flying the lines during peak loading when the equipment is under the highest potential stress increasing the probability of finding issues via an infrared inspection. For the OEIS definition of this transmission IR inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   This program flies all California transmission lines, with prioritization set by the technological need to fly during peak load times.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   Enhanced IR inspection has identified 10 issues since the initial pilot was presented in 2019. Those benefits turned the IR inspection into an initiative covering 700 line miles of transmission lines within the state of California including all the lines within the HFTD region. The inspections identified two issues in 2021 with each corrective action reducing the ignition risk probability from equipment failure. Moving forward the lines will be inspected annually during the peak loading intervals with refinements made to the number of intervals determined. Reports found have been implemented into the standard work processes allowing for quick planning and resolution of issues discovered.

5. **Future improvements to initiative**

   Future improvements involve simplifying the peak loading intervals to inspect the lines with the most overlapping peak intervals. Simplifying the number of intervals determined streamlines the inspection process by capturing more of the lines during a single inspection timeframe and reduces the helicopter costs to fly the lines.

7.3.4.6 Intrusive pole inspections

1. **Risk to be mitigated / problem to be addressed**

   PacifiCorp's intrusive pole inspection program, which may include pole-sounding, inspection hole drilling and excavation tests, is designed to identify decay, wear or woodpecker damage, assess the condition of wood poles and identify the need for any treatment, repair or replacement. Like other inspection programs, intrusive

inspections mitigate some wildfire risk by identifying and correcting conditions. In this case, the inspections identify poles for replacement or reinforcement to prevent potential structural failure of a pole that could lead to a potential wire down event and ignition risk.

2. **Initiative selection**

   PacifiCorp's existing intrusive pole inspection program is the initiative most closely aligned with this document subsection. The existing program initiative may include pole-sounding, inspection hole drilling, and excavation tests. It identifies decay, wear or woodpecker damage; assesses wood pole conditions; and identifies the need for any treatment, repair or replacement. While PacifiCorp's intrusive testing can be performed as a standalone inspection, it is most often performed with a detailed inspection described in Sections 7.3.4.1 and 7.3.4.2 on page 171. For the OEIS definition of this intrusive pole inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp's intrusive poles inspections are performed consistent with the cycle prescribed in California GO 165.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   In 2021, PacifiCorp continued implementing intrusive inspections in California. In a given year, PacifiCorp consistently observes between a 2% and 4% reject rate across its entire service territory through the intrusive pole inspection program. These findings demonstrate the value that the inspection provides through the identification of corrective work. Additionally, when poles are located within a Tier 3 or Tier 2 area, pole replacements and/or reinforcement is performed on an accelerated schedule to reduce wildfire risk.

5. **Future improvements to initiative**

   PacifiCorp plans to continue this effective intrusive pole inspection initiative at the same pace over the next five years.

7.3.4.7 LiDAR inspections of distribution electric lines and equipment

Currently, PacifiCorp does not intend to initiate LiDAR inspections of distribution electric lines and equipment. Generally, LiDAR has proven to be a more expensive method of line inspection. LiDAR inspection work, as noted in Section 7.3.4.8 on page 176 is being done on transmission lines.

7.3.4.8 LiDAR inspections of transmission electric lines and equipment

6. **Risk to be mitigated / problem to be addressed**

   LiDAR inspections provide measurements that can be analyzed to identify safety concerns with equipment when analyzed against current engineering standards. The LiDAR data collection allows for accurate, 3) depictions of assets measured. The results can identify poles with loading concerns allowing for corrective work to be performed.

7. **Initiative selection**

   The lines identified with LiDAR were based upon the fire risk, historic fault rates, and inspection results that might indicate potential for weakened poles. The lines were flown with LiDAR and the data incorporated into PLS-CADD, which is a strength modeling program. For the OEIS definition of this LiDAR inspection initiative, see Section 9.1 starting on page 244.

8. **Region prioritization**

   LiDAR inspections took place on lines with higher fault rates that had an increased fire risk potential.

9. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year.**

   The program identified multiple poles that would need to be replaced. The poles identified have been scheduled to be replaced as part of the reconductoring initiative or other endeavors. LiDAR inspection is an expensive means compared to the risks that it can mitigate. PacifiCorp has not historically experienced pole failures in its California service territory.

10. **Future improvements to initiative**

    At this time, PacifiCorp does not intend to pursue this initiative further.

7.3.4.9 Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations

At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionary inspection of distribution lines not included in other programs.

7.3.4.10 Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations

At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionary inspection of distribution lines not included in other programs.

7.3.4.11 Patrol inspections of distribution electric lines and equipment

1. **Risk to be mitigated / problem to be addressed**

Inspections of distribution facilities are designed to reduce wildfire risk by identifying and correcting conditions prior to equipment failure.

2. **Initiative selection**

PacifiCorp's existing patrol inspection program involves viewing each facility from a location with reasonable site lines. The inspection identifies damage or defects to the distribution system, or other potential hazards or right-of-way encroachments that may endanger the public or adversely affect the integrity of the electric system, including items that could potentially cause a spark.

PacifiCorp's patrol inspections of electric lines and equipment is a critical program in maintaining compliance with California GO 165 and 95. PacifiCorp's patrol inspection program is also critical to reducing wildfire risk through the identification of conditions. Additionally, the identification of any conditions during a patrol inspection demonstrates that this program provides broad value. For the OEIS definition of this patrol inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritized**

During a given calendar year, PacifiCorp prioritizes inspections of facilities located within the HFTD to occur earlier in the year, specifically Tier 3 areas. While all required inspections are completed within the prescribed cycle, the intent of this prioritization is to inspect facilities located in the highest fire threat areas prior to fire season where the risk is the greatest.

4. **Progress on initiative**

PacifiCorp plans to continue this effective distribution patrol inspection initiative as per policy, 2021 actuals and 2022 planned numbers can be found in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

5. **Future improvements to initiative**

PacifiCorp plans to continue this effective patrol inspection initiative at the same pace over the next five years.

7.3.4.12 Patrol inspections of transmission electric lines and equipment

See Section 7.3.4.11, page 177, on Patrol Inspections of Distribution Electric Lines and Equipment for additional information. Targets and progress on this initiative will be tracked through this initiative, 7.3.4.12.

7.3.4.13 Pole loading assessment program to determine safety factor

At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on pole loading assessment as a way of determining safety factors which is not included in other programs.

7.3.4.14 Quality assurance / quality control of inspections

1. **Risk to be mitigated**

Inspection quality assurance and quality control (QA/QC) at PacifiCorp aims to ensure this effectiveness. PacifiCorp QA/QC generally includes desktop and field audits designed to identify gaps in the inspection programs, inspector capability, and corrective actions, thereby increasing inspection result accuracy and reliability.

2. **Initiative selection**

To perform QA/QC of inspections, PacifiCorp uses a combination of process controls, software tools, company policy, and physical record checking to quickly identify inaccuracies for corrective action, evaluation, root cause analysis and system improvements. Engaging in these initiatives is a cost-effective means to minimize the risk that inspection results are inaccurate or unreliable. For the OEIS definition of this QA/QC initiative, see Section 9.1 starting on page 244.

Inspection results are reviewed continuously to confirm that inspections in the HFTD are meeting acceptable standards of performance.

PacifiCorp's main QA/QC components, including enhancements to mitigate wildfire risk, are:

- Physical audits of at least 5% of planned inspections of facilities with a focus fire threats and Tier 2 and Tier 3 prioritization

- Software controls that prohibit freeform condition assignment, allowing for result controls, minimizing the amount of human error capable

- A quarterly review of already audited results as a secondary check, including desktop audits

- Annual training with inspectors to address audit findings and improve inspection reliability and accuracy

These components are described in more detail below, including any program enhancements, costs, and evolution consistent with feedback from the OEIS and PC-4.

Physical Audits

PacifiCorp's QA/QC physical audits are conducted on a random selection of inspected facilities, where corrections due to inspection results are prioritized by GO 95 priority levels, including expedited correction timelines for conditions classified as a fire risk and in the Tier 2 and Tier 3 districts.

PacifiCorp emphasizes audits in wildfire risk areas by prioritizing Tier 2 and Tier 3 regions for inspection in the first half of the year. This means these regions go through the QA/QC process first. After a physical audit is done, the audit results are compared with the original inspection results to see if they conform to the set condition reporting criteria, data entry, and work performance in accordance with company specifications. Nonconforming results are sent to the inspection contractor for reinspection along with the required reinspection timeline.

Software Controls

In recent years, PacifiCorp began using cellphones and tablets to make inspection records and findings. A renewed focus on inspection QA/QC in 2020 led to the enhancement of the inspection programs and structure along with added software controls to ensure inspections and findings are recorded consistently with internal procedures. Nonconforming results are denied. For example, if the inspection program is designed to only allow either an A or B priority assigned to a certain type of finding, an inspector can't enter a C Priority. This ensures that findings are not accidentally mischaracterized with a lower priority level.

Quarterly Desktop Reviews

Two macro-level desktop audits were conducted quarterly; one desktop audit was conducted by the field inspection support group (standard process as per PacifiCorp internal policy) and another was conducted by a cross-functional team of asset management, work planning and operational performance management. The cross-functional team desktop audit prioritized review of "fire risk" conditions and conditions in Tier 2 and Tier 3 regions for QA/QC and correction.

To support these ongoing reviews, a new internal tool was developed to evaluate inspection results, automatically isolate open fire risk conditions in plots, facilitate quick data export, provide insight about trends, and drive a deeper understanding of the fire risk conditions.

Historically, desktop reviews consisted of all open conditions generally grouped together without specific focus areas. The new tool automatically identifies potential misalignment with internal procedures, including alignment with fire risk priorities and types. Initial rollout of this new tool proved useful and, as part of the 2021 plan, desktop review of inspection results continued to use this tool and grow to review inspection results within 30 days of input. This will ensure that potential mismatches or mischaracterization of conditions and risk can be immediately addressed. This new quick QA/QC response is projected to address issues while they are fresh in the minds of inspectors, drive continuous improvement and learning opportunities, increase record accuracy and inspection result reliability.

PacifiCorp intends to continue quarterly desktop reviews, which typically include a deep dive into trends and risk.

Annual Training

PacifiCorp field inspection support conducts annual field inspector training in January. This training includes technical content such as NESC code or California General Order requirements as well as program content, such as how to record findings, assess priorities, ensure effectiveness of an inspection, and facilitate corrective action. In January 2022, this training included additional content regarding fire risks and broader participation from asset management to ensure alignment in content and priorities. While this training covers PacifiCorp's total service territory, the training did include focused on the specific Tier 2 and Tier 3 planned inspections in California and the potential challenges and risks associated with the HFTD. PacifiCorp intends to continue to grow this training with a focus on wildfire mitigation and incorporate lessons learned through the other QA/QC components to foster continuous improvement.

3. **Region prioritization**

As previously described, PacifiCorp emphasizes audits in wildfire risk areas by prioritizing Tier 2 and Tier 3 regions for inspection in the first half of the year, which also leads to these regions going through the QA/QC process first. Additionally, an increase of audits within Tier 2 and Tier 3 has scaled with the increased volume of inspections within Tier 2 and Tier 3.

4. **Progress on initiative**

For the 2021 inspection cycle, approximately $36k was spent on physical audits, desktop audits and updating inspector training. The entirety of the 2021 fulfilled QA/QC inspection plan included all of California, including the Tier 2 and Tier 3 fire risk areas. PacifiCorp has included initiative specific progress and spending in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

5. **Future improvements to initiative**

In 2022, PacifiCorp plans to incrementally improve the QA/QC of inspection results by evaluating audit results at the end of the year, identifying gaps or misalignments, conducting a root cause analysis of how to best address issues and correcting them (typically through the annual inspector training in January). At the end of 2022, PacifiCorp will evaluate if additional spend is needed or if gaps can be addressed with revised inspector training.

As part of PacifiCorp's dedication to heightened focus on wildfire mitigation, there are plans for the QA/QC of inspection results to include evaluating methodologies that further speed up fire risk region QA/QC through prioritization of field audits in Tier 2 and Tier 3 regions.

7.3.4.15 Substation inspections

1. **Risk to be mitigated**

While differently located than overhead equipment, misoperation of substation equipment has the potential to create an arc. Additionally, substation equipment, such as circuit breakers, are critical components of protection and control schemes and normal system operations. Like other inspection programs, substation inspections, which assess both the substation security and key equipment condition, identify potential correction work or maintenance needed. This corrective work and maintenance prevents equipment misoperation that could negatively impact system operation and protection and control schemes in place or result in an ignition risk.

2. **Initiative selection**

PacifiCorp's standard substation inspection initiative best addresses the subsection of this plan. These inspections are considered standard operations; they provide incremental reduction to wildfire risk. Table 7.3 describes the types and frequency of inspections performed as a part of this program and planned frequency for each. For the OEIS definition of this substation inspection initiative, see Section 9.1 starting on page 244.

Table 7.3 Types of substation inspections performed as a part of this program and planned frequency for each

Type of Inspection	Voltage Class	Frequency
Substation Inspection(including IR)	Bulk Transmission	Annual (12 months)
	Other Transmission	Annual (12 months)
	Distribution	Biennial (24 months)
Substation & SecurityInspection[25]	Bulk Transmission	Monthly
	Other Transmission	At least 8 times per year
	Distribution	At least 8 times per year

3. **Region prioritization**

   PacifiCorp performs substation inspections on a routine basis consistent with California General Order 174 requirements. As a part of this program, qualified personnel inspect PacifiCorp's substations in California monthly. These inspections include the assessment of physical safety, security, and performance of substation components, including fencing, grounding, and major equipment, as well as the performance of minor housekeeping tasks to ensure safe and reliable service.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   Substations are inspected eight times per year. Over the course of 2022, the goal is to complete 444 inspections.

5. **Future improvements**

   PacifiCorp plans to continue this substation inspection initiative at the same pace over the next five years.

7.3.5 Vegetation management and inspections

PacifiCorp's vegetation management program is modeled on industry best practices, including systematic maintenance, scientifically based pruning to maintain safe vegetation to conductor clearances, tree removal (both incompatible species and hazard trees), tree replacement, cover-type conversion, herbicide use, tree growth regulator applications, and the use of specialized tools and equipment. PacifiCorp contracts with vegetation management service providers to perform this work.

The program is designed to identify and correct vegetation conditions that are inconsistent with distinct distribution and transmission specifications in the company's Vegetation Management Standard Operating Procedures (SOP). Correcting these

[25] On average, substation and security inspections are typically performed on all substations monthly. However, internal policies require that non bulk transmission substations are to be inspections at least 8 times per year.

conditions minimizes and/or eliminates safety and reliability risks posed by trees and other incompatible vegetation that could encroach upon or grow near power lines. The overall objective of the vegetation management program is to minimize vegetation-related faults, including any faults that could be a source of fire ignition. PacifiCorp's vegetation management program is compliant with GO 95, Rule 35, and is described in detail in the Vegetation SOP.

Vegetation management conducted in or adjacent to distribution circuit corridors is mainly cyclical. In areas located outside of the HFTD, vegetation management work circuit is currently conducted every two years; full clearance work is done on a four-year cycle, with interim work at the two-year mark between each cycle. In the HFTD, certain vegetation management work is conducted annually, including an annual vegetation inspection. Where scheduled program work has not been completed before the fire season, an incremental patrol is conducted to identify and correct potential wildfire ignition risks. See Section 7.3.4.11 on page 177.

Vegetation management conducted on or near transmission line corridors focuses on maintaining extended clearances. Work also attempts to employ industry practices, such as integrated vegetation management (IVM) where practicable, to promote cover-type conversion, thereby preventing any future incompatible vegetation growth disrupting clearances. Transmission lines generally have broader rights-of-way, which allows PacifiCorp to generally maintain clearances well over the Minimum Vegetation Clearance Distance (MVCD) required in Table 2 of FAC-003-04. Vegetation maintenance activities are scheduled on an as-needed basis, dependent on results of regular inspections and specific local conditions.

Integral to vegetation management activities for distribution and transmission is the identification and removal of hazard trees. In addition, consistent with California Public Resource Code (PRC) § 4292, PacifiCorp addresses vegetation adjacent to "subject" poles in state-regulated areas to further reduce wildfire ignition risks and increase wildfire resiliency. When appropriate, bare-ground herbicide treatments are used to keep the 10-foot cylinder clear of vegetation. Vegetation management crews working in fire-prone areas are required to adhere to fire restrictions and to receive training related to fire prevention and suppression.

Through implementing the vegetation management program, wildfire ignition risk of vegetation to energized conductor contact is minimized.

7.3.5.1 Additional efforts to manage community and environmental impacts

As part of PacifiCorp's vegetation management program, PacifiCorp representatives and contractors interact with members of the community daily. PacifiCorp has processes in place to manage, minimize, or avoid community and environmental impacts.

1. **Risk to be mitigated**

   Vegetation management activities may result in impacts on communities and/or the environment where work is conducted. Impacts may be expressed in both the planning and implementation phases of the work. Implementation of vegetation management activities may require obtaining approvals from authorizing agencies at the local, state and federal levels, and stakeholders including concerned customers or communities that may result in inefficiencies or delays.

2. **Initiative selection**

   Coordination with authorizing agencies and customers is a critical component to successfully delivering a compliant vegetation management program. PacifiCorp strives to conduct vegetation management actions while maintaining environmental compliance and customer relations. PacifiCorp wants customers and authorizing agencies to be informed of its vegetation management program. For the OEIS definition of this community and environmental impact initiative, see Section 9.1 starting on page 244.

   Customers are typically notified, as a courtesy, at least five business days in advance of vegetation management work. Notification includes personal notification, door hangers, mail and consent forms. These forms of notification also facilitate customer questions, concerns and requests for further coordination in executing the work. When a tree is identified to be removed or herbicide or growth regulators are to be used, PacifiCorp makes reasonable attempts to obtain customer consent and has a robust escalation process. The goal is to find resolution between the customer and the company. If this coordination is unsuccessful, PacifiCorp will determine course in conducting the required work.

   Through this customer interaction, PacifiCorp takes opportunities to provide or discuss educational materials regarding tree-power line conflicts and planting the right tree in the right place. This coordination minimizes impacts to the community. Where larger-scale projects are planned that will have community impacts, PacifiCorp coordinates with leadership at the state and local levels, including cities, counties and neighborhood associations or groups, such as fire safe councils. Additional forms of notifications may also be used, such as automated callouts to customers, letters, social media, and other news media outlets to inform community member of planned activities. Where work will take place on municipal, county, state or federal properties, the appropriate authorizing officer or agency representative is notified.

   PacifiCorp routinely collaborates with local land managers in obtaining permits, scheduling work, and addressing issues as they arise. PacifiCorp works closely with various local offices of federal agencies to ensure there are approval processes in place for vegetation management work, including hazard tree removals. Annual meetings

are held with agencies where applicable, to enhance communication, discuss scope of work, and identify permit requirements and potential environmental impacts of scheduled vegetation management work.

To minimize environmental impacts and impacts to other sensitive resources, PacifiCorp conducts environmental reviews (biological and cultural) of vegetation management activities where warranted. To facilitate these reviews, minimize the timeframe to acquire agency approvals and ensure consistent implementation of process between PacifiCorp and federal land managing agencies, PacifiCorp continues to develop its Operations and Maintenance Plans (O&M Plan) in accordance with passage of legislation by the United States Congress; Section 211 of the Omnibus Appropriations Act of 2018 amended Title V of the Federal Land Policy and Management Act, which established a formal procedure for submission and approval of vegetation management plans, with an emphasis on standardized, consistent plans and minimizing the need for case-by-case approvals for hazard tree removal, pending implementation procedures to be established by applicable land managing agencies.

O&M Plan(s) establish agreed-upon agency review times of proposed maintenance activities based on activity type and presence or absence of sensitive resources that may be impacted. Even with an established O&M Plan, depending on the scope of the activity and potential for environmental impacts, agency approval timeframes may be prolonged and take several months or longer. The O&M Plan outlines PacifiCorp measures implemented for the protection of sensitive resources based on maintenance activity type, including vegetation management activities. The O&M Plan also includes PacifiCorp and land management agency roles and responsibilities in supporting PacifiCorp's rapid response to correct conditions identified in a timely manner. Development of these plans also supports company outreach to land managing agencies to inform and educate them on utility practices.

3. Region prioritization

Implementation of initiatives described above, including current process to notify communities of vegetation management activities, takes place where work is planned and is focused in areas where significant vegetation management work is needed (e.g., efforts to remove fire-impacted trees/hazard trees). Notification and coordination are also focused with customers and organizations that have previously requested advanced notice and increased coordination.

To manage environmental compliance PacifiCorp prioritizes environmental reviews and agency coordination based on project schedule considering agency review and permitting timelines. Projects are reviewed and packaged together where feasible to streamline review and coordination with authorizing agencies.

4. **Progress on initiative**

PacifiCorp's vegetation management department works closely with PacifiCorp's environmental, right-of-way, and legal departments to minimize and manage community and environmental impacts.

Developing O&M Plans is a multi-year effort. PacifiCorp is currently coordinating with the Klamath National Forest (KNF) to develop an O&M Plan. The O&M Plan with the KNF was targeted for completion in 2021 and is now undergoing final reviews by the KNF and other agency stakeholders; and is planned to be finalized in 2022. PacifiCorp has initiated discussions with the Region 5 of the USFS to develop strategy for developing O&M Plans for the remaining forests within PacifiCorp's California service territory. PacifiCorp continues to implement process improvements (standardized biological and cultural reviews) for environmentally screening and evaluating projects to manage environmental compliance and streamline agency reviews.

5. **Future improvements to initiative**

PacifiCorp will continue to seek opportunities to enhance community relations and manage community expectations. PacifiCorp will continue to engage with other land managing agencies within its service territory in 2022 to initiate O&M Plan development, including process improvements. In 2021, PacifiCorp hired additional staff as part of a non-wildfire mitigation compliance requirement, to oversee development and long-term implementation of O&M Plans and associated environmental screening process. In 2022, PacifiCorp plans to explore other opportunities, such as use of letters, to notify customers along a distribution circuit of upcoming vegetation management work.

7.3.5.2 Detailed inspections and management practices for vegetation clearances around distribution electrical lines and equipment

As part of the vegetation management program, PacifiCorp conducts inspections of all distribution lines that are scheduled as part of routine vegetation management maintenance.

1. **Risk to be mitigated**

Trees and other vegetation growing under or near power lines within striking distance of conductors and electrical equipment, can create safety, service reliability and ignition risks.

2. **Initiative selection**

As part of vegetation program maintenance, PacifiCorp conducts inspections of vegetation around distribution lines and equipment to identify imminent threats or

hazards and vegetation conditions that do not meet PacifiCorp's program standards/specifications. These pre-work inspections are typically conducted within weeks to one to two months by contractors before the scheduled program work. Inspectors/pre-listers use tablets to record vegetation conditions to be corrected. For the OEIS definition of this distribution inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp's service territory in California is divided into three districts. The distribution lines are inspected and managed at the circuit level. PacifiCorp senior utility foresters prioritize scheduling inspections and subsequent corrective work considering the HFTD, efficient workload distribution, weather conditions and resource availability.

4. **Progress on initiative**

   In 2021, PacifiCorp completed rollout of the electronic planning and tracking system. PacifiCorp conducted inspection and corrective work of 909 miles of distribution line that were scheduled for routine cycle and interim maintenance within our service territory in California, which resulted in pruning over 19,000 trees and removal of over 2,800 trees. PacifiCorp has included initiative specific progress and spending in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

5. **Future improvements to initiative**

   As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections may be improved by either change to scope, tools, frequency or correction timeframes.

   PacifiCorp will continue to use its electronic planning and tracking system by incorporating all vegetation management activities in California and will continue to identify improvements to the system. PacifiCorp will also continue to investigate and evaluate other technologies to improve distribution inspections.

7.3.5.3 Detailed inspections and management practices for vegetation clearances around transmission electrical lines and equipment

See Section 7.3.5.2, page 186, on Detailed Inspections and Management Practices for Vegetation Clearances Around Distribution Electrical Lines and Equipment for additional information. Targets and progress on this initiative will be tracked through this initiative, 7.3.5.3.

7.3.5.4 Emergency response vegetation management due to red flag warning or other urgent weather conditions

1. **Risk to be mitigated**

   Weather conditions, such as heat and/or high winds have the potential to generate and spread wildfire when an ignition occurs.

2. **Initiative selection**

   While PacifiCorp is committed to executing the company's planned vegetation management programs, circumstances may still arise where, due to unexpected conditions such as weather, additional risk can be mitigated through supplemental vegetation inspections and corrective work. PacifiCorp does not have emergency response vegetation management actions specific to RFW, however, does adhere with local requirements and restrictions to mitigate ignition risk. During RFWs, PacifiCorp may move resources to work in other areas that are not impacted by the RFW or are outside of the HFTD, where feasible. Vegetation management personnel also follow local guidance and requirements as they pertain to fire restrictions, such as work hours, using a fire watch following work and using equipment that minimize potential to cause sparks. For the OEIS definition of this emergency response initiative, see Section 9.1 starting on page 244.

   PacifiCorp also has emergency response protocols associated with PSPS events. At times of elevated risk, PacifiCorp vegetation management may perform patrols to identify and address potential ignition risks due to vegetation and inform PSPS decision making. These patrols, typically referred to as PSPS alert patrols, may be performed throughout the weather event and/or PSPS event.

3. **Region prioritization**

   Emergency response vegetation management associated with potential PSPS events, is focused in proactive de-energization zones where the weather event is occurring. Patrols are also initiated and prioritized based on risk and situational awareness.

4. **Progress on initiative**

   In 2021 vegetation management conducted PSPS alert patrols during one weather event. PacifiCorp also improved implementation of PSPS patrols through use of its mobile data management software. When PSPS vegetation management patrols are conducted, a separate project within the mobile data management software is created specific to the potential PSPS or weather event. This allows for patrol findings to be separate from routine maintenance or other wildfire mitigation actions that may be implemented on the circuit(s) being patrolled under a PSPS event.

5. **Future improvements to initiative**

PacifiCorp will continue performing risk-based PSPS patrols in 2022 and leverage the new data management software process.

7.3.5.5 Fuel management (including all wood management) and management of "slash" from vegetation management activities

PacifiCorp manages slash through a combination of chipping, lop and scatter and hauling off site.

1. **Risk to be mitigated**

The completion of both planned and emergency vegetation management work can, in some instances, create smaller vegetation materials such as brush, tree limbs or shrubs less than 6 inches in diameter, a byproduct also referred to as "slash." The presence of slash from vegetation management activities can contribute to the overall fuel availability along a utility right-of-way.

Similarly, vegetation growing at the base of poles can contribute to fuel loading.

2. **Initiative selection**

PacifiCorp conducts fuel management through removal of slash from the tree canopy, chipping debris where accessible, and removes (recycles where practicable) slash in developed areas unless the property owner indicates otherwise. In rural, off-road areas PacifiCorp uses a lop and scatter and chipping practice to reduce the volume of available fuel within the right-of-way and adheres with land managing agency requirements. For the OEIS definition of this fuel management initiative, see Section 9.1 starting on page 244.

An integral component of PacifiCorp's vegetation program that influences fuel management and reduction of slash are the appropriate use of herbicide and tree-growth regulators as part of IVM. By preventing and/or inhibiting undesirable vegetation growth, the volume of slash can be further reduced. PacifiCorp uses herbicides and tree-growth regulators, where approved by the property owner or land managing agency in targeted areas.

PacifiCorp also annually conducts pole clearing, removal of vegetation around subject poles which further reduces fuel volume.

3. **Region prioritization**

Slash management is conducted throughout PacifiCorp's service territory and Expanded pole clearing activities take place in the LRA.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

In 2021, PacifiCorp implemented slash management in accordance with the company's Vegetation SOP and through expanded pole clearing. PacifiCorp conducted vegetation clearing of 2,164 poles outside of SRA (CAL FIRE state-regulated areas), which is incremental to mandated pole clearing activity. In 2022, PacifiCorp plans to clear vegetation at 3,047 poles under the expanded pole clearing project.

In addition, PacifiCorp partners with communities and/or agencies to implement fuel reduction projects. In 2020, PacifiCorp partnered with the Shasta Trinity National Forest on a fuel reduction and highway safety enhancement project. PacifiCorp contractors removed trees adjacent to a transmission right-of-way, which parallels the highway. PacifiCorp also mowed vegetation within the right-of-way to further reduce fuel loading. This work was in conjunction with the forest service while they removed additional trees near the highway for the goals of fuel reduction and decreasing shade for highway safety. In 2022, PacifiCorp will continue to seek opportunities to partner with communities and/or agencies to support fuel reduction projects. In addition, PacifiCorp continued to implement IVM to promote compatible low-growing vegetation to minimize ignition risks, slash management and expanded pole clearing activities.

PacifiCorp vegetation management has expanded pole clearing to include Local Responsibility Area (LRA) subject equipment poles located in the HFTD in additional to its existing program in compliance with regulations of clearing State Responsibility Area (SRA) subject poles.

Expanded pole clearing involves the removal of all vegetation within a 10-foot radius cylinder of clear space around a subject pole and the application of herbicides to prevent any vegetation regrowth (unless prohibited by law or the property owner), see Figure 7.7 below.[26]

[26] Illustration of pole-clearing requirements (California Department of Forestry & Fire Protection 2008, Figure 3, PRC 4292, 14 CCR 1254, Fire Break Clearance Requirement Around Poles and Towers

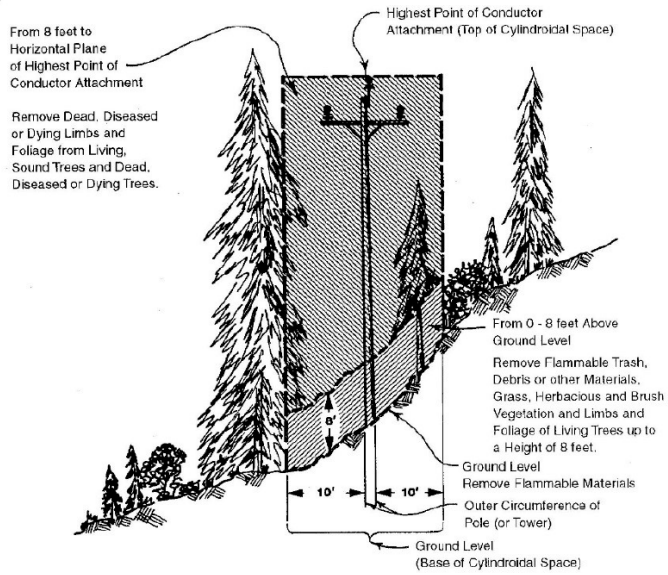

Figure 7.7 Pole clearing

This strategy is distinct from additional clearance and removal activities and requirements because it is not designed to prevent contact between vegetation and a power line. Instead, like "slash management," pole clearing reduces the risk of fire ignition if sparks are emitted from electrical equipment. PacifiCorp intends to implement pole clearing on wildland vegetation in the HFTD around poles that have fuses, air switches, clamps or other devices that could create sparks.

After a pole has been cleared, a spark falling within the 10-foot radius would be much less likely to ignite a fire.

5. Future improvements to initiative

PacifiCorp will continue to seek opportunities to responsibly expand use of herbicide and tree growth regulators as a component to IVM through the development of O&M plans and agreements with land managing agencies to reduce slash and promote low-growing, right-of-way compatible species.

PacifiCorp will track this activity electronically to develop an inventory of poles to be cleared. The inventory will allow the company to efficiently manage an expanded pole clearing project.

7.3.5.6 Improvement of inspections

1. **Risk to be mitigated**

   Vegetation may grow more quickly than expected and may encroach on conductor clearances; vegetation that needs to be pruned per the company Vegetation SOP or addressed on some other way may not be appropriately identified.

2. **Initiative selection**

   PacifiCorp has initiated incremental inspections before the height of the fire season, see Section 7.3.4.11 on page 177. In addition, PacifiCorp conducts post-audit inspections of completed work and addresses any conditions that do not meet the vegetation program standards/specifications; see Section 7.3.4.14 on page 178. For the OEIS definition of this inspection improvement initiative, see Section 9.1 starting on page 244.

   These audits serve as quality control and provide opportunities for PacifiCorp senior utility and utility foresters to engage with the vegetation management contractors — opening discussions about the required specifications and working to improve inspections.

3. **Region prioritization**

   Audits and contractor coordination/reviews are conducted throughout PacifiCorp's service territory.

4. **Progress on initiative**

   In 2021, PacifiCorp foresters increased engagement with vegetation management contractors by establishing recurring meetings to discuss inspection and vegetation management quality and execution. PacifiCorp foresters also provide training to inspectors as discussed in Section 5.4.3 starting on page 123.

   PacifiCorp continues to seek opportunities for improving inspection quality and using technology to improve inspections and identify changes that may be needed. In 2021, inspections improved through an electronic planning and tracking system. See Section 7.3.5.18 on page 203.

   Historically, PacifiCorp tracked vegetation management activities at the local level, generally relying on paper forms, maps, documents and local knowledge. To move toward improved transparency, efficiency and data analytics, PacifiCorp incorporated the use of a work planning and tracking system. Inspectors use tablets to document vegetation maintenance activity requirements by location (for example, parcel or parcels). This information is then available to maintenance contractors, which allows for improved planning and documentation. Once the work is done, it is recorded in

the field via tablets used by tree crews. Post-audits are then conducted, and findings identified. This increased connectivity between inspector/pre-lister, vegetation management crews and post-auditor (PacifiCorp foresters or designated third-party contractor) results in greater communication and ability to identify recurring issues with inspections and the execution of the work. This also allows for additional granularity in reporting, records retention, and contractor performance.

5. **Future improvements to initiative**

In 2020 PacifiCorp completed initial rollout and implementation of the planning and tracking system and will continue to use and improve this system to allow for increased data collection and accuracy, analysis, and efficiencies. PacifiCorp will continue to investigate use of other technologies such as LiDAR to augment inspections.

7.3.5.7 Remote sensing inspections of vegetation around distribution electric lines and equipment

1. **Risk to be mitigated**

Vegetation contact can occur due to tree growth, tree limbs falling or blowing into lines, or uprooted trees falling into lines. Vegetation pruning or removals mitigate these contact risks; remote sensing inspections potentially identify where mitigation should be performed and quantify the relative risk for vegetation issues between areas.

2. **Initiative selection**

PacifiCorp has previously investigated using LiDAR around vegetation and is currently evaluating remote inspection via satellite imagery and AI models. Satellite imagery combined with modeling has the potential to be more cost-effective over larger areas than LiDAR inspections. For the OEIS definition of this remote sensing initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

Regions were selected to provide a mix of vegetation and terrain type for initial assessment, by areas with available comparison data, and further prioritized based on fire risk. At the time of the initiative, the most recent available satellite imagery was from the summer of 2020. Regions with significant burning after that date were, therefore, excluded from the initial phase.

4. **Progress on initiative**

PacifiCorp evaluated several forms of technology pilots to support and streamline vegetation inspection processes. At this time, the technology has not resulted in

reduced visits; it has, however, proven viable for other pilot efforts outlined in the company's WMP, as outlined in Section 4.4.2.2 on page 53. The company recently completed a pilot using satellite imagery trained with LiDAR data to produce vegetation and strike tree maps. Assessment showed high accuracy on strike tree locations, with significant cost savings over LiDAR. Vegetation height and canopy coverage maps have higher resolution and less masking than publicly available data, resulting in more accurate and extensive tree capture.

5. **Future improvements to initiative**

PacifiCorp will have some additional short-term work in 2022, and then will evaluate the expansion of this initiative for 2023 onward. The expanded plans include satellite imagery-derived vegetation maps to cover the remaining HFTD tiers, areas with 2020 burn damage, and locations with large gaps in publicly available data. Future LiDAR initiatives may be conducted if use cases warrant more targeted information than can be generated by satellite imagery and AI models alone, and if they offer business value in terms of risk management, situational awareness or reduced vegetation management or facility inspection costs.

7.3.5.8 Remote sensing inspections of vegetation around transmission electric lines and equipment

See Section 7.3.5.7, page 193, on Remote sensing inspections of vegetation around distribution electric lines and equipment for additional information. Targets and progress on this initiative will be tracked through this initiative, 7.3.5.8.

7.3.5.9 Other discretionary inspections of vegetation around distribution electric lines and equipment beyond inspections mandated by rules and regulations

At this time, PacifiCorp does not have any specific vegetation management and inspection wildfire mitigation programs focused on other discretionary inspections of vegetation that grows around distribution lines.

7.3.5.10 Other discretionary inspections of vegetation around transmission electric lines and equipment beyond inspections mandated by rules and regulations

At this time, PacifiCorp does not have any specific vegetation management and inspection wildfire mitigation programs focused on other discretionary inspection of vegetation that grows around transmission lines.

7.3.5.11 Patrol inspections of vegetation around distribution electric lines and equipment

1. **Risk to be mitigated**

   Risk of wildfire ignition is greater during certain times of the year, such as the height of the fire season, considering weather conditions.

2. **Initiative selection**

   To further reduce wildfire risk in the HFTD, PacifiCorp vegetation management implemented annual vegetation patrols incremental to scheduled program routine maintenance on lines within the HFTD. Correction work is subsequently conducted based on those inspection results. For the OEIS definition of this patrol inspection initiative, see Section 9.1 starting on page 244.

   In 2019, PacifiCorp implemented a "readiness patrol" of overhead distribution lines initiative in the HFTD. This initiative supports removal and or pruning of vegetation that may pose an ignition risk, such as hazard trees. Before the height of the fire season, PacifiCorp conducts readiness patrols located within HFTD on lines not scheduled for regular maintenance work in that year. Consistent with existing procedures, a Level 1 assessment (ANSI A300 Part 9) is conducted to identify any trees that may have become hazard trees over the course of the past year and target these trees for removal. In addition, inspectors identify for pruning or removal fast-growing vegetation that is likely to violate minimum clearance distances before the end of the current growing season.

   In conjunction with such annual patrols, vegetation management annually completes correction work based on the patrol results.

3. **Region prioritization**

   These patrols are conducted in the HFTD where program cycle work has not been completed or is not scheduled before fire season.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   In 2020, PacifiCorp inspected 1,059 miles of distribution line in the HFTD. Specific targets are provided in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

5. **Future improvements to initiative**

   PacifiCorp will continue investigating use of technology to augment these patrols.

7.3.5.12 Patrol inspections of vegetation around transmission electric lines and equipment

1. **Risk to be mitigated**

   Refer to Section 7.3.5.11 on page 195 for additional inspection details related to risks to be mitigated and initiative selection. For the OEIS definition of this transmission patrol inspection initiative, see Section 9.1 starting on page 244.

2. **Initiative selection**

   PacifiCorp conducts an additional vegetation management inspection of overhead lines in the HFTD. For transmission, this inspection is specific to the segments of line that are within the HFTD.

3. **Region prioritization**

   PacifiCorp conducts an additional vegetation management inspection of overhead lines in the HFTD. For transmission, this inspection is specific to the segments of line that are within the HFTD. Refer to Section 7.3.5.11 on page 195 for additional inspection details.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp has included initiative specific progress and spending in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx.

5. **Future improvements to initiative**

   PacifiCorp will continue investigating use of technology to augment these patrols.

7.3.5.13 Quality assurance / quality control of vegetation management

1. **Risk to be mitigated**

   Vegetation may not be appropriately identified or may not be pruned or removed in accordance with PacifiCorp's Vegetation SOP.

2. **Initiative selection**

   Quality control actions such as audits are critical to ensure vegetation requiring work (pruning and/or removal) is properly identified and the work is subsequently conducted in accordance with vegetation program standards/specifications. An additional definition For the OEIS definition of this QA/QC initiative, see Section 9.1 starting on page 244.

PacifiCorp currently uses internal staff with ISA certifications to conduct post-work audits of routine maintenance, readiness patrol corrective actions, and pole clearing. PacifiCorp also conducts ad hoc tree crew audits or crew visits where a PacifiCorp forester engages with the vegetation management contractor, such as a crew leader, and/or supervisor to review work and/or discuss opportunities for improvement.

PacifiCorp does not formally conduct specific audits of the inspections (vegetation work prescribed by the pre-listers) as an explicit part of the audit program. Instead, audits are conducted after tree work is done. While the audits focus on the execution of the vegetation management actions (e.g., pruning and removals), the post-audits do result in findings that relate to the initial inspection, such as trees needing work that may have been missed by the pre-lister (which ought to also be caught by the work crew). PacifiCorp foresters then address applicable post-audit findings with pre-listers who conducted the inspections.

During post-audits, observations and instruction about corrections are documented in the mobile data management software system, observations are discussed, and feedback is provided to the vegetation management contractor. Like PacifiCorp's other programs, if an exception is identified that poses an imminent safety or reliability risk, the audit will be suspended, the exception addressed through corrective actions, and the crew may be shut down.

3. **Region prioritization**

Post-audits are performed throughout PacifiCorp's service territory on routine maintenance work and incremental work conducted because of readiness patrols, while prioritizing post-audit completion within the HFTD.

4. **Progress on initiative**

In 2019, PacifiCorp hired four utility foresters to conduct post-audits of vegetation management work completed by PacifiCorp's vegetation management contractors. In 2021, PacifiCorp also implemented centralized tracking of post-audit progress.

PacifiCorp has continued to refine its work management process, specifically filing specific, work-related milestone-type documentation including contractor accepted work release, work completed documentation, contractor signed completed work release, post-audit completion and audit findings, or exceptions addressed and corrected. In 2021, PacifiCorp converted a contractor to a full-time employee position to oversee this tracking documentation and to coordinate with vegetation management contractors among other job duties.

Post-audits benefit both PacifiCorp and the vegetation management contractor and are considered a best management practice.

5. **Future improvements to initiative**

   In 2022, PacifiCorp plans to take steps in expanding its QC capabilities by increasing internal staff resources (supervisor and auditors) to conduct post-audits and other QA/QC functions to help improve and achieve desired outcomes of the vegetation management program. PacifiCorp will continue to develop and refine its QA/QC program.

7.3.5.14 Recruiting and training of vegetation management personnel

1. **Risk to be mitigated**

   A fully trained workforce is an important part of any successful wildfire mitigation initiative. Specific to vegetation management, personnel are needed to ensure program work such as inspections or tree trimming is completed properly and on schedule to mitigate the risk of vegetation-related wildfire ignitions and outages.

2. **Initiative selection**

   PacifiCorp continues to work with initiatives related to contractor-based training, internal training, ISA certification and the use of a Vegetation Management Process Checklist. For the OEIS definition of this training and recruitment initiative, see Section 9.1. starting on page 244.

   Vegetation management contractors are responsible for providing a trained and competent workforce to address vegetation along PacifiCorp's transmission and distribution system, in accordance with PacifiCorp's specifications. They also coordinate training with Joint Apprenticeship Training Committees where present. Contractors also provide training on an as-needed basis to their personnel including herbicide use, fire prevention and suppression, general environmental requirements, customer service/communication, safety practices and tree felling procedures. Contractors have fire suppression tools and equipment in place. Contractors also conduct training in a variety of venues including classroom settings, conference calls or during job briefings at the work site. Contractor personnel are required to have ISA certifications and are required to conduct continuing education to maintain such certifications.

   PacifiCorp facilitates annual environmental awareness training of vegetation management contractors focusing on restrictions and requirements related to laws and regulations pertaining to avian species. PacifiCorp provides informal training and discussion on topics including regarding work scope specifications, changes in work scope or PacifiCorp processes, and PacifiCorp's mobile data management system. PacifiCorp also participates in benchmarking discussions with contractors to review expectations, best practices, and opportunities for improvement. Training opportunities also arise during post-work audits conducted by the foresters.

PacifiCorp has developed a Vegetation Management Process Checklist (contained within its SOP) as a guide for both internal and external personnel to serve as a process job-aid.

PacifiCorp's internal vegetation management foresters must maintain arborist and utility specialist ISA certifications, which means foresters receive ongoing training. PacifiCorp also provides annual training to foresters including environmental awareness, wildfire preparedness, prevention and response and safety. PacifiCorp foresters conduct job shadowing or "ride-alongs" to cross-train one another. In addition to this, regularly recurring meetings are held with PacifiCorp foresters to discuss ongoing work, opportunities for improvement, share best practices, etc. PacifiCorp foresters are encouraged through discussions and planning sessions with their supervisor to identify and take vegetation management related courses and certifications such as ISA Tree Risk Assessment Qualification to foster and identify opportunities for professional development.

3. **Region prioritization**

   Training and recruiting practices are implemented and consistent throughout PacifiCorp's California service territory.

4. **Progress on initiative**

   In 2021, PacifiCorp initiated cross-training opportunities for internal vegetation management staff. This includes identifying other internal work groups to discuss or provide training on their work functions as they relate to vegetation management (e.g., training on internal software programs) to increase work process efficiencies and drive continuous improvement.

5. **Future improvements to initiative**

   In 2022, PacifiCorp will provide training and discussion on PacifiCorp's wildfire mitigation plan to both internal and external vegetation management personnel.

7.3.5.15 Identification and remediation of "at-risk species"

1. **Risk to be mitigated**

   Vegetation contact with conductors, whether through grow-in, blow-in, or fall-in creates an ignition and outage risk.

2. **Initiative selection**

   At-risk species, with fast growth rates, can increase the risk of electrical contact. In addition to growth rates, other risk factors — being prone to structural failure (trunk, branch, roots) and environmental factors, such as wind — are considered when

prescribing remedial actions, including discretionary removal. Remediation of at-risk trees is a subset to the company's vegetation management's clearance around electric lines and equipment program. A PacifiCorp vegetation maintenance program objective is to prevent vegetation from growing-into, and contacting, power lines. PacifiCorp has established post-work clearance specifications categorized by tree growth rates (see Section 7.3.5.19) to prevent vegetation-to-conductor contacts. Vegetation inspections categorize growth by species as: slow, moderate, fast (cycle-buster). Within the HFTD, pruning is performed to prevent vegetation from breaching a 4-foot minimum clearance within one year. This may require additional pruning for at-risk species with very fast growth rates. Pre-listers also identify discretionary removals of at-risk species to eliminate ignition risk and need for cyclical pruning. For the OEIS definition of this remediation initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   At-risk species inspection is performed along with other vegetation maintenance inspections. These are performed annually in the HFTD, and in accordance with routine maintenance schedules in other areas.

4. **Progress on initiative and plans for next year**

   PacifiCorp completed vegetation inspection, including at-risk species, of lines within HFTD areas in 2021, and will continue to inspect these areas annually. In late Q4 of 2021, PacifiCorp updated its mobile data management software to collect additional information at the time of inspection, including quantifying the number of "cycle-busters" (trees that may not maintain clearance from conductor for the full cycle).

5. **Future improvements to initiative**

   The company is investigating the use of remote sensing to expand identification of at-risk tree species. PacifiCorp is conducting a pilot study (refer to Section 4.4.2.4 on page 56) using LiDAR, Satellite and publicly available datasets to identify potential clearances encroachments, potential strike trees, and to identify areas with higher risk of vegetation contact and/or greater need for vegetation maintenance work. These pilot studies could be useful in the future in the dentification of high-risk trees, including "cycle-busters" to develop incremental modification to the existing program. Removal and remediation of trees with strike potential to electric lines and equipment

1. **Risk to be mitigated**

   Hazard trees, (dead, dying, diseased, deformed, or unstable) have an increased risk of failure, and therefore a higher strike likelihood. Risks to be mitigated include outages, wildfire ignition, property damage, and safety concerns posed by hazard trees.

2. **Initiative selection**

   PacifiCorp identifies hazard trees based on visual inspection by pre-listers with knowledge of species identification and hazard tree identification/assessment as part of detailed inspections (routine maintenance) and readiness patrols. Identified trees are removed, topped, or pruned to eliminate risk of contact with conductors. For the OEIS definition of this strike tree removal and remediation initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   All areas within PacifiCorp's California service territory are inspected for hazard trees and mitigated during detailed inspections (routine maintenance). In addition, areas within the HFTD are inspected for hazard trees annually as a part of the annual patrols described in sections 7.3.5.11 and 7.3.5.12 on pages 195-196.

4. **Progress on initiative and plans for next year**

   PacifiCorp completed hazard tree inspections in the HFTD in 2021 and will continue to inspect annually, targeting inspections to be completed by the end of August. In late Q4 2021, PacifiCorp updated is mobile data management software to collect additional information during inspections regarding hazard trees. Species and quantity information is now collected; this will better inform tree crews and allow PacifiCorp to better track hazard tree removals versus inventory reduction removals and trends through time.

5. **Future improvements to initiative**

   The company is collecting data on potential strike trees as part of the LiDAR and remote sensing pilots (Section 4.4.2.4 on page 56 and PacifiCorp's 2021 Pilot 3: LiDAR Vegetation Inspection Pilot program). The company is also investigating the use of remote sensing techniques to augment the traditional identification of hazard trees. Additionally, as presented in Section 7.3.5.15 on page 199, PacifiCorp is conducting pilot studies (refer to Section 4.4.2.4 on page 56) using LiDAR and publicly available datasets to identify potential clearances encroachments, potential strike trees, and identify areas with higher risk of vegetation contact and/or greater need for vegetation maintenance work. These pilot studies could include identification of high-risk trees, including tree species, within strike distance to develop a future program incremental to the existing program to address fall-in risk. PacifiCorp is continuing to pursue this tactic through implementation of these pilot studies to support strategic efforts.

   Section 4.4.2.4 on page 56 and PacifiCorp's 2021 Pilot 3: LiDAR Vegetation Inspection Pilot program have shown that both LiDAR and satellite vegetation models can identify trees with strike capability, though not trees with various 'hazard' traits. The

use of remote sensing technologies to identify tree mortality is not yet a mature technology but is under development and may be available in the future.

7.3.5.16 Substation inspections

1. **Risk to be mitigated**

   Vegetation contact with conductors creates an ignition risk, and a risk of fire damage to substation equipment. Substation inspections determine where vegetation may pose a current or future risk to substation equipment.

2. **Initiative selection**

   PacifiCorp performs substation inspections for vegetation along with regular cycle and interim vegetation maintenance. For the OEIS definition of this substation inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   Substation vegetation inspections are performed throughout our service territory as part of regular cycle or interim maintenance.

4. **Progress on initiative**

   PacifiCorp performs regular inspections on all substations. Substations within the HFTD are inspected for vegetation annually and other substations are inspected bi-annually.

5. **Future improvements to initiative**

   PacifiCorp plans to continue implementation of substation vegetation inspections as a part of regular cycle work.

7.3.5.17 Substation vegetation management

1. **Risk to be mitigated**

   Vegetation contact with conductors poses a risk of arcing and of damage to substation equipment. Removal of vegetation encroachments mitigates this risk.

2. **Initiative selection**

   PacifiCorp removes or prunes any vegetation identified in the substation inspection consistent with cycle work. For the OEIS definition of this substation vegetation management initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

Substation vegetation management is performed throughout our service territory.

4. **Progress on initiative**

   PacifiCorp completed substation vegetation removals and overhang trimming for all fire areas in 2021 and will continued to perform annual mitigation.

5. **Future improvements to initiative**

   PacifiCorp plans to continue performing substation vegetation management activities as a part of routine cycle work.

7.3.5.18 Vegetation management system

1. **Risk to be mitigated**

   Vegetation contact risks are primarily mitigated through trimming or removals. Maintaining clear and complete records of vegetation work needed and performed helps ensure thorough and accurate mitigation of vegetation risks throughout the company's service territory. Refer to Section 4.4.2.7 on page 61.

2. **Initiative selection**

   In 2021, PacifiCorp continued its work with a records system introduced in 2020. The system includes GIS data and more detailed records for vegetation work. The same records system was successfully implemented in other states. These records will provide the backbone for the vegetation inventory. For the OEIS definition of this vegetation management system initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp is using one, service territory-wide system of vegetation records management. GIS records will begin accumulating in the new system in specific locations as those areas are due for previously determined vegetation maintenance work, including regular mitigation in the HFTD.

4. **Progress on initiative**

   PacifiCorp began implementing more detailed records system in 2020 and have implemented updates to the forms and information collected for 2022. This record system now includes GIS data and is in use by both PacifiCorp staff and contract workers. The company also began characterizing general vegetation location and volume near assets using publicly available data on tree canopy and more specific information from remote sensing pilot programs. This information provides knowledge of vegetation risks at a system level while more specific data accumulates through ongoing vegetation management field records.

5. **Future improvements to initiative**

PacifiCorp is investigating options to improve vegetation data using remote sensing technologies, particularly as a means for growth forecasting. For example, the pilot project in Section 4.4.2.7 on page 61 was recently completed using Salo Sciences data to detect general growth. However, several years-worth of data for each location must be gathered before growth estimates can be calculated.

7.3.5.19 Vegetation management to achieve clearances around electric lines and equipment

1. **Risk to be mitigated**

Risk of ignition due to contact (grow-in, blow-in and fall-in) of vegetation with energized conductors and equipment.

2. **Initiative selection**

To minimize wildfire risk, PacifiCorp's vegetation management program uses multiple methods to maintain vegetation clearances including identification and removal of hazard trees, line patrols, expanded clearance distances, spatial pruning distinctions, and natural target pruning. For the OEIS definition of this vegetation management clearance initiative, see Section 9.1 starting on page 244.

The company conducts cycle-based maintenance to achieve clearances around electric lines and equipment consistent with Appendix E Guidelines of GO 95, Rule 35. The company identifies and removes hazard trees and conducts patrols of lines in the HFTD where cycle maintenance has not been completed.

PacifiCorp has adopted expanded post-work minimum clearance distances, of at least 12 feet for all distribution lines and at least 20 feet for transmission lines under 115 kV and 30 feet for any transmission lines of 115 – 230 kV.

PacifiCorp also prunes vegetation beyond minimum required clearances in multiple ways. First, PacifiCorp uses increased clearance distances on distribution lines for certain species of trees, depending on tree growth rate. PacifiCorp separates vegetation into three categories: (a) slow-growing; (b) moderate growing; and (c) fast growing. In all cases, PacifiCorp applies the 12-foot minimum clearance for slow-growing species. In certain cases, PacifiCorp applies an increased clearance for moderate growing and fast-growing species.

Second, PacifiCorp integrates spatial concepts to distinguish between (i) side clearances, (ii) under clearances, and (iii) overhang clearances. Recognizing that certain trees grow faster vertically than other trees, it is appropriate to use an increased clearance when moderate- or fast-growing trees are under a conductor. Increasing overhang clearances also reduces the potential for faults due to overhang.

Third, as a practical matter, PacifiCorp will often prune beyond the minimum required distances because of the physical structure of the tree. PacifiCorp uses natural target pruning. Natural targets are the final pruning cut location at a strong point in a tree's disease defense system, which are branch collars and proper laterals. Pruning at natural targets protects the joining trunk or limb. This technique is drawn from ISA Best Management Practices: Tree Pruning.[27]

Through conducting patrols of lines in the HFTD, see Section 7.3.5.11 on page 195, PacifiCorp maintains minimum clearance distances and increases frequency of hazard tree identification and removal. Hazard trees identified during annual inspections are removed or pruned sufficiently to eliminate the hazard. As a result, some hazard trees will be identified and removed earlier than under the regular program (i.e., which would have then occurred during the next regular cycle).

PacifiCorp's existing SOPs require the removal of hazard trees. Consistent with California law, removal is required 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."[28] Furthermore, the SOP encourages removal, when allowed, even when removal is not required under GO 95, Rule 35 or PRC § 4293.

Hazard trees are identified through detailed inspections and patrols by field crews performing work. PacifiCorp uses an initial Level 1 assessment, as defined in ANSI A300 (Part 9). Suspect trees are targeted for removal. In many circumstances, obtaining property owner consent to removal is often part of the process. PacifiCorp goes to great lengths to obtain property owner permission, making repeated and reasoned requests by different representatives of the company.

3. **Region prioritization**

Vegetation management actions are conducted throughout PacifiCorp's service territory.

4. **Progress on initiative**

PacifiCorp conducted vegetation management activities consistent with its Vegetation SOP and this WMP in 2021 and will continue implementing this initiative in 2022.

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[27] (Gilman and Lilly 2002) and A300 (ANSI 2008). (See also Miller, Randall H., 1998. Why Utilities "V-Out" Trees. Arborist News. 7(2):9-16.)

[28] GO 95, Rule 35; see also Public Resources Code § 4293 "Dead trees, 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 shall be felled, cut, or pruned so as to remove such hazard."

5. **Future improvements to initiative**

PacifiCorp will continue to review opportunities to use technology that augments the vegetation management program (such as LiDAR and satellite imagery). In 2022, PacifiCorp will identify a distribution circuit or portion of a distribution circuit to implement enhanced overhang clearances, as indicated in Section 4.4.1 starting on page 48 with the intent to identify resources needed to execute this enhanced practice including equipment, vegetation management crews, increased customer coordination, work management and tracking. Species prone to limb failure would be targeted for enhanced overhang clearances.

7.3.5.20 Vegetation management activities post-fire

1. **Risk to be mitigated**

Trees with sufficient height to strike distribution and transmission electric infrastructure that are impacted by wildfire create an ignition, outage, and safety risk.

2. **Initiative selection**

PacifiCorp foresters and/or vegetation management contractors patrol wildfire-impacted areas adjacent to electrical infrastructure to identify trees impacted by fire within strike distance of electrical infrastructure, determine risk, and determine strategy for mitigating the identified risk. Trees that pose an imminent risk are topped or felled to eliminate the risk as soon as practicable. Depending on the risk identified and considering other factors such as land ownership and environmental concerns, other mitigation efforts to address remaining fire-impacted trees may occur. In all cases, safety is paramount; vegetation post-fire work is done to reduce safety risks to the public and PacifiCorp crews or contractors that may be responding to repair infrastructure damaged or destroyed by fire. For the OEIS definition of this post-fire vegetation management initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

Post-fire vegetation management, including inspection and risk mitigation (topping or felling or fire-impacted trees within strike distance of infrastructure), is conducted throughout PacifiCorp's service territory.

4. **Progress on initiative**

No changes to post-fire inspection and mitigation activities occurred in 2021.

5. **Future improvements to initiative**

Through responding to the catastrophic wildfires of 2020, PacifiCorp identified opportunities for improvement regarding coordination and mitigation strategies. The QA/QC supervisor identified in Section 7.3.5.13 on page 196and planned to be hired

in 2022, will oversee vegetation management response to wildfires in the field and will further develop and refine post-fire response strategies.

7.3.6 Grid operations and protocols

7.3.6.1 Automatic recloser operations

1. **Risk to be mitigated**

   Line protective devices, such as line reclosers, are currently deployed on various transmission and distribution lines throughout PacifiCorp's service territory. When a line trips open due to fault activity, reclosers can be programmed to momentarily open, allow the fault to dissipate, and then reclose to test if the fault is temporary. The reclosing function gives the ability to restore service on a line that has tripped while maintaining the option to open again if the fault persists. In general, recloser operation is beneficial because it reduces the number of sustained outages and improves customer reliability. The reclosing function, however, implicates some degree of ignition risk because additional energy can be released if a fault persists. When a fault is detected on the line, a recloser will trip and reclose based on predetermined settings to re-energize the line. If the fault is temporary in nature and is no longer present upon the reclose operation, the line will re-energize resulting in limited impact to customers. If the fault persists, however, reclosing can, depending on the circumstances, potentially cause arcing or an emission of sparks. Accordingly, a strategic balance between customer reliability and wildfire mitigation is required.

2. **Initiative selection**

   PacifiCorp's reclosing protocols generally apply a "fast trip setting" protocol as per Section 4.4.2.8 on page 62, where multiple reclose attempts are made. The protocols where reclosing is disabled are reserved for only extreme weather events, transmission lines, or certain distribution configurations where EFR settings discussed in Section 7.3.6.2 on page 208 are not compatible with the hardware installed. For the OEIS definition of this automatic recloser initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   Generally PacifiCorp does not disable reclosing seasonally. Instead, reclosing may be disabled based on situational awareness reports during periods of extreme risk, which can happen throughout the company's California service territory. Additionally, PacifiCorp prioritizes other mitigation tactics, such as grid hardening or increased patrols, over recloser disabling where possible, to not overuse the tool and cause unintended impacts to customers.

4. **Progress on initiative since the last WMP submission and plans, targets, and/or goals**

for the current year

In the 2022 updates to the WMP guidelines, OEIS has added a new section, 7.3.6.2 on page 208, which aligns with the protocols.

5. **Future improvements to initiative**

Implementing and continuously improving this program requires advanced investigation of fault events to understand the nature and type of faults and whether this program is properly mitigating these events.

7.3.6.2 Protective equipment and device settings

1. **Risk to be mitigated / problem to be addressed**

In general, a more sensitive setting can reduce the energy released as a result of a fault. At the same time, less sensitive settings, in conjunction with recloser operations, reduce the number of sustained outages and improve service reliability.

2. **Initiative selection**

With protective device settings that result in reduced potential for arcing or emission of sparks, there are likely to be more outages. Again, a strategic balance between customer reliability and wildfire mitigation is required. For the OEIS definition of this protective equipment initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

Operating protocols designate that identified areas with a high risk in the situational awareness forecast may have alternative settings applied to protective device settings.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

This is a relatively new initiative. PacifiCorp plans to continue using EFR settings in situations of high wildfire risk using a more standardized application informed by advancements in situational awareness.

5. **Future improvements to initiative**

PacifiCorp is taking steps to increase situational awareness efforts, such as the installation of CFCIs described in Section 7.3.2.3 on page 155, to support quicker locating of faults and restoration of power. PacifiCorp communications, describing how these settings reduce wildfire risk and impact, are provided to communities such that they are informed. Similar to the implementation of PSPS, PacifiCorp plans for the implementation of EFR aim to find the appropriate balance between mitigating

wildfire risk and providing reliable power to communities and will be applied where appropriate and feasible.

7.3.6.3 Crew-accompanying ignition prevention and suppression resources and services

1. **Risk to be mitigated**

   Utility support of ignition prevention and suppression resources can reduce the potential for wildfires and provide electrical safety support during wildfire.

2. **Initiative selection**

   This initiative includes PacifiCorp personnel accompanying suppression resources in the event of a wildfire as well as personnel carrying fire extinguishers. In the extremely unlikely event that a fire ignition occurs while field crews or other PacifiCorp personnel (collectively "field personnel") are working in the field, such field personnel are equipped with basic tools to extinguish small fires. For the OEIS definition of this ignition prevention and suppression initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   Firefighting equipment resources may be moved into affected areas as needed to support other districts. For example, Medford, Oregon resources are available for use in Yreka, California.

   Table 7.4 lists of resources and their location:

Table 7.4 List of firefighting equipment and locations

Equipment Description	Location
500 gallon water tanker and pump with ¾ inch high pressure hose	Bend
250 gallon water skid-tank on trailer	Grants Pass
500 gallon water trailer, 2 inch hose	Klamath Falls
250 gallon water skid-tank (requires trailer for movement)	Klamath Falls
500 gallon water trailer, 2 inch hose	Medford
250 gallon fire tank and pump (trailer or pickup loaded)	Pendleton
500 gallon water tanker, 3 inch hose, firefighting equipment	Roseburg
250 gallon fire tank and pump *(trailer or pickup loaded)*	Walla Walla
250 gallon fire tank and pump *(trailer or pickup loaded)*	Yakima

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   During the 2021 year, PacifiCorp found the existing level of resources to be adequate therefore, there are no changes to this initiative in 2021 and none are expected to be needed in 2022.

5. **Future improvements to initiative**

   PacifiCorp plans to continue maintaining its own firefighting equipment, listed above, over the next five years.

7.3.6.4 Personnel work procedures and training in conditions of elevated fire risk

1. **Risk to be mitigated / problem to be addressed**

   During fire season, PacifiCorp modifies field operations to further mitigate wildfire risk to reduce the risks associated with ignitions.

2. **Initiative selection**

   During fire season, PacifiCorp field personnel mitigate wildfire risk by using a variety of tactics. Routine work, such as condition correction and outage response, poses some degree of ignition risk, and, in certain circumstances, crews modify their work practices and equipment to decrease this risk. Additionally, field personnel may mitigate wildfire risk through increased patrols, or adjusting reclosers to EFR settings. For the OEIS definition of this personnel work procedure and training initiative, see Section 9.1 starting on page 244.

   Operating Conditions include:

   • Normal Condition: Standard operating protocols

   • Elevated Condition: Specific work activities may require additional mitigation measures to proceed with work, such as operating machinery at low-risk times of day, watering areas prior to work, keeping water tanks on site, etc.

   • Extreme or RFW Condition: Most overhead work is stopped, except where not performing the work would create a greater risk

3. **Region prioritization**

   As a part of the forecast effort and daily meteorology briefings, field operations considers the local weather and geographic conditions that may create an elevated risk of wildfire. These practices reduce the potential of direct or indirect causes of ignition during planned work activities, fault response and outage restoration and can be applied across any portion of the service territory.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   During the 2021 year, PacifiCorp found the existing level of resources to be adequate therefore, there are no changes to this initiative in 2021 and none are expected to be needed in 2022.

5. **Future improvements to initiative**

   PacifiCorp will continue the successful practices established in this initiative.

7.3.6.5 Protocols for PSPS re-energization

PacifiCorp describes its PSPS process, including "all clear" designation to facilitate re-energization in Chapter 8, starting on page 232. It further describes its emergency plans including restoration actions in Section 7.3.9.5 on page 224.

7.3.6.6 PSPS events and mitigation of PSPS impacts

PacifiCorp's mitigation of PSPS impacts is included in the grid design and system hardening wildfire mitigation program focused on mitigation of impact on customers and other residents affected during PSPS event outside of the initiatives described in Section 7.3.3 on page 161. PacifiCorp's additional programs or efforts to mitigate the impact on customers and other residents affected during a PSPS event are described in Section 4.4 starting on page 47.

7.3.6.7 Stationed and on-call ignition prevention and suppression resources and services

1. **Risk to be mitigated**

   Ignitions, under specific conditions can spread quickly and uncontrollably, therefore there is a benefit to having suppression resources available.

2. **Initiative selection**

   PacifiCorp equips field personnel with fire extinguishers such that should an ignition occur, that can safely be suppressed with the extinguisher they have, they will do so. For the OEIS definition of this ignition and suppression resource initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   There is no region prioritization for this initiative.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

During the 2021 year, PacifiCorp found the existing level of resources to be adequate therefore, there are no changes to this initiative in 2021 and none are expected to be needed in 2022.

5. **Future improvements to initiative**

PacifiCorp does not have any planned future improvements for this initiative.

7.3.7 Data governance

7.3.7.1 Centralized repository for data

1. **Risk to be mitigated / problem to be addressed**

Gathering, maintaining and reporting accurate data is important to plan development and evaluation.

2. **Initiative selection**

This initiative is to develop a protocol for data management related to wildfire mitigation initiatives. For the OEIS definition of this centralized repository initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

This protocol has no region prioritization, the same process is used across all data. However, more data pertaining to the HFTD is generally used in evaluating and reporting. Therefore, additional effort is dedicated toward governance of data in the HFTD.

4. **Progress on initiative since the last WMP submission and plans, targets, and/or goals for the current year**

2021 progress is described in the 2021 Change Order filed on November 1, 2021:

Through experience gained in 2021, PacifiCorp learned that this effort requires the extraction and translation of nonspatial data into GIS format. Like monitoring and auditing the WMP, the evolution of the company's GIS data capabilities touches many departments throughout the company and requires an intense amount of input and coordination for all WMP initiatives. For example, data governance touches of initiatives include risk assessment and mapping initiatives in Section 7.3.1 on page 150 (to ensure data is consistent across the various platforms), grid hardening initiatives in Section 7.3.3 on page 161 (to ensure that projects are properly categorized and represented spatially), and vegetation management initiatives in Section 7.3.5 on page 182 (to demonstrate completion of key vegetation management initiatives and monitor compliance).

PacifiCorp had underestimated the resources needed to meet the compliance reporting requirements, which are continuously evolving to meet the needs or regulators and stakeholders.

For 2022, PacifiCorp plans to add resources specifically to manage and deliver complex GIS datasets on a quarterly basis.

5. **Future improvements to initiative**

Incremental improvements to data management are expected to occur over the next five years to further progress towards a more streamlined process. Additionally, PacifiCorp anticipates that the data and reporting requirements will continue evolving which could require additional utility resources and focus in the future.

7.3.7.2 Collaborative research on utility ignition and/or wildfire

PacifiCorp has provided details regarding its collaboration on research projects in Section 4.4.1 starting on page 48. During these activities the company has extracted data appropriate to the organization's needs and made it available in the method best serving their analysis.

7.3.7.3 Documentation and disclosure of wildfire-related data and algorithms

At this time, PacifiCorp does not have any specific wildfire mitigation programs focused on documentation and disclosure of wildfire-related data and algorithms.

7.3.7.4 Tracking and analysis of near-miss data

1. **Risk to be mitigated / problem to be addressed**

Problems and issues that manifest fully are typically easier to track. It is hard to prove a negative. However, near-miss data, which is much easier to overlook, represents valuable, critical experience necessary for fully managing risk.

2. **Initiative selection**

PacifiCorp has used existing resources to produce data that supports its WMPs. Some of these resources are company-owned, some others are external. For the OEIS definition of this near-miss data initiative, see Section 9.1 starting on page 244.

When circumstances have required the development of new databases (such as in the 2019 Decision approving the SMJU WMPs relating to Fire Incident Data Collection Reporting) the company has structured new applications that can be fed as much as possible by existing resources.

3. **Region prioritization**

   This protocol has no region prioritization, the same process is used across all data.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp has continued to record required information into a newly created database developed following the 2019 Decision.

5. **Future improvements to initiative**

   Incremental improvements to data management are expected to occur over the next five years to further progress towards a more streamlined process to improve efficiency.

7.3.8 Resource allocation methodology

7.3.8.1 Allocation methodology development and application

PacifiCorp's resource allocation methodology relies on a general approach, described in Section 7.1.B in which the available resources, outlined and date-specific deliveries and estimated labor (or material) requirements are outlined. To the extent these volumes exceed available capacity (internally and using standard external resources), the company identifies the need for 1) greater prioritization efforts, 2) establishment of nontraditional resource pools, and 3) reassessment of scheduled work. Compliance-based activities are prioritized first, other activities are prioritized based on geographic wildfire Tier (Tier 2 versus Tier 3) and overall availability of materials. Instead of prioritizing a certain type of program, PacifiCorp prioritizes the location of work and groups all potential program aspects applicable at that location into projects. This ensures that all programs on an applicable circuit, line, or combination of circuits and lines are completed at the same time to make efficient use of resources. Where a wildfire mitigation program requires capital funding and construction, PacifiCorp established a Wildfire Project Management Office in 2020 with a dedicated Wildfire Mitigation Delivery Director responsible for managing resources and execution of programs.

1. **Risk to be mitigated / problem to be addressed**

   This initiative addresses the problem associated with needing a consistent methodology for prioritization of wildfire mitigation resources and applying this information to initiative decision-making.

2. **Initiative selection**

   This initiative is foundational to initiative selection and prioritization; therefore, it is required to engage in this activity to describe the "why engage in initiative" for all other initiatives. For the OEIS definition of this allocation initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   This methodology is applied across all wildfire mitigation initiatives across all PacifiCorp territories. Generally, the methodology prioritizes compliance requirements, then work with the greatest risk reduction potential. Work with the greatest risk reduction potential is then prioritized to complete in Tier 3 and Tier 2 HFTD areas first, with consideration for project management to prevent re-do of work and re-visiting of sites.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp has continued to use this general methodology and has attended the related OEIS and IOU workshops to learn from other utilities.

5. **Future improvements to initiative**

   As PacifiCorp matures risk modeling elements, and learns more from other utility practices, there will be updates to this process.

7.3.8.2 Risk reduction scenario development and analysis

1. **Risk to be mitigated / problem to be addressed**

   This initiative addresses the need for a consistent methodology of prioritizing wildfire mitigation resources and informing initiative decision making.

2. **Initiative selection**

   This initiative is foundational to initiative selection and prioritization; therefore, it is required to evaluate the effectiveness of initiatives. This initiative includes the development and implementation of the LRAM, which is discussed in Section 4.5.1.4 starting on page 81. For the OEIS definition of this risk reduction scenario development initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   This methodology is applied across all wildfire mitigation initiatives across PacifiCorp territories. Generally, the methodology prioritizes compliance requirements, then work with the greatest risk reduction. Work with the greatest risk reduction is then prioritized to complete in Tier 3 and Tier 2 HFTD areas first, with consideration for

project management to prevent redo of work and revisiting of sites.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   In PacifiCorp's 2021 Progress Report, submitted to OEIS on November 1, 2021, PacifiCorp describes the plan to evolve LRAM, which has been primarily used to prioritize work within the HFTD. The next phase of LRAM is to use it to evaluate the risk reduction as initiative work is completed this year to see whether the impact of initiatives can be seen in the data.

5. **Future improvements to initiative**

   PacifiCorp is continuously improving risk modeling to better evaluate risk reduction.

7.3.8.3 Risk-spend efficiency analysis – not to include PSPS

1. **Risk to be mitigated / problem to be addressed**

   PacifiCorp recognizes it is important to develop a methodology to estimate the cost-effectiveness of an initiative. An RSE score is calculated by dividing the mitigation risk reduction of an initiative by the mitigation cost and can be applied to evaluate various initiatives.

2. **Initiative selection**

   RSE calculation is a useful tool to assess performance of individual initiatives or to evaluate scope changes of deployed program. It can also compare initiatives based on their effectiveness to mitigate risk. For the OEIS definition of this RSE initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp will prioritize grid hardening activities for RSE calculations since it is important that they are evaluated and performed in a way that reduces risk efficiently in consideration of the capital invested.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp has developed a methodology to calculate RSE and plans to report objective RSE values in 2023 for line rebuilds (covered conductors, and other initiatives, weather stations, and possibly also expulsion fuse replacement).

5. **Future improvements to initiative**

   The methodology for RSE and calculation parameters will be refined throughout 2022. After that, PacifiCorp will add RSE calculations for other initiatives. Additionally,

PacifiCorp plans to continue learning from other utilities through working groups and workshops to refine RSE over time.

7.3.9 Emergency planning and preparedness

7.3.9.1 Adequate and trained workforce for service restoration

Wildfire mitigation refresher training is prioritized for, and provided annually to, applicable field employees within the HFTD. The refresher training includes operating practices that reduce wildfire risk while performing routine work and confirming the availability of fire mitigation/suppression tools before fire season. To ensure enough people are available to work when required, PacifiCorp may draw workers from other parts of its service territory as needed (sometimes crews needed to respond during or restore service after an event can exceed standard local district crew sizes). If an event exceeds the local district's capability to respond, PacifiCorp must have access to additional resources to mitigate or respond to the wildfire event. This potential need for additional resources during an emergency means that PacifiCorp provides the training to all applicable employees that might respond to a wildfire event.

Responding to an emergency involving a wildfire can pose specific challenges. System operators or local emergency response crews may need field operations personnel to gather more extensive information and assess local conditions differently than with other type emergencies or normal operating conditions. Field personnel may also need specialized tools or the ability to monitor and react to changing weather patterns.

PacifiCorp is also a member of mutual assistance agreements with partnering utilities that provide more resources when responding to an event. When an emergency or major event occurs, it is critical that there are enough workers available to rebuild infrastructure and restore service, so the service restoration does not escalate risk. As with performing planned or routine work, PacifiCorp field operations mitigates some wildfire risk by following specific procedures during fire season in heightened fire risk areas.

1. **Risk to be mitigated / problem to be addressed**

   Effective training programs can reduce the wildfire risk by preparing the workforce to perform and fulfill wildfire mitigation initiatives.

2. **Initiative selection**

   Engaging in this initiative sets the groundwork for other initiatives, to ensure that they are fulfilled according to standards and in such a way that reduces wildfire risk. For the OEIS definition of this service restoration training initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   There is no region prioritization for this initiative, it occurs across California.

4. **Progress on initiative since the last WMP submission and plans, targets, and/or goals for the current year**

   This successful initiative will be maintained, and potentially updated/expanded on based on joint utility collaborative efforts.

5. **Future improvements to initiative**

   As part of its emergency management program, PacifiCorp evaluates exercises and actual response events, by identifying issues raised during the event and documenting lessons learned and corrective action plans. The company uses multiple methods to gather exercise and post-action reviews, including participant and observer evaluation forms, remedial action tracking, and incident reviews. PacifiCorp may implement lessons learned in its response and restoration procedures and incorporate them into emergency response documentation. Future initiative improvements hinge on this specific situational feedback and lessons learned.

7.3.9.2 Community outreach, public awareness, and communications efforts

As part of its PSPS program, PacifiCorp has its Plan to Support Populations with Access and Functional Needs During Public Safety Power Shutoffs, which fully describes community outreach and communication efforts taken to identify and contact key community stakeholders. Overall, PacifiCorp's plan includes information that can be heard, watched and read in a variety of ways with the goal of accessibility and understandability.

1. **Risk to be mitigated / problem to be addressed**

   This initiative seeks to reduce the impact to the customer who may experience a de-energization through preparation and awareness.

2. **Initiative selection**

   As a component and last resort of wildfire mitigation, PacifiCorp may de-energize lines, which will always impact customers. PacifiCorp seeks to reduce the impact due to this loss of power by providing wildfire preparedness education to its customer. For the OEIS definition of this community outreach initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   Advertisements related to PSPS preparedness are run in the HFTD. However,

additional community outreach programs, which include a webinar and various other videos, are available across the company's service territory.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp continues to refine and enhance both identification of AFN customers and ongoing communication targeted to reach more AFN customers. While all medical baseline customers are identified as AFN customers, in 2022, PacifiCorp intends to increase outreach to all customers to identify more customers relying on medical equipment and to broaden the scope of customers who self-identify as AFN. Customers will receive communications about the medical baseline rate and a Spanish version of the medical baseline application will be available on the website this year. California Alternate Rates for Energy (CARE) applications are sent to all residential customers. In 2021, PacifiCorp added a check box on the CARE application asking customers to identify as AFN. The check box added an additional 193 AFN customers throughout the service territory and 43 AFN customers in the Power De-Energization Zones (PDZ).

5. **Future improvements to initiative**

   PacifiCorp plans to continually evaluate the community outreach plans and improve it based on feedback from customers, public safety partners, and to align with regulatory requirements.

7.3.9.3 Customer support in emergencies

In reporting outages, PacifiCorp will continue its customer outage management protocols and real-time outage maps to inform customers about the presence and location of outages as well as the estimated restoration plans. While the specifics of the frequency, content, and use of the messaging may change, the overall tools and processes will be the same. Details regarding PacifiCorp's PSPS-specific notifications, tools, messaging, and notifications have been included in Section 8. Additionally, PacifiCorp has the following wildfire emergency-related customer support programs.

Outage reporting — PacifiCorp intends to enhance wildfire mitigation-specific outreach through its customer contact center to provide impacted customers with information regarding service interruptions, restoration efforts, along with relief support by adding to the telephone scripts a high-level overview of customer protections, including directing the caller to the company webpage(s).

Support for low-income customers — PacifiCorp's support for low-income customers program includes the ability to:

- Freeze all standard and high-usage reviews for the CARE program eligibility until

the 12-month period has lapsed, or potentially longer.

- Contact all community outreach contractors and community-based organizations who assist in enrolling hard-to-reach low-income customers, to better inform customers of these eligibility changes.

- Partner with program administrators of the customer-funded emergency assistance program for low-income customers and increase the assistance limit amount for affected customers during the following 12-month period.

Billing adjustments — PacifiCorp can adjust billing, including prorating monthly bill to the date of the emergency or subsequent damage to customer premises and recalibrating energy usage estimates when premises are unoccupied because of a disaster.

Deposit waivers — PacifiCorp can waive deposit and late fee requirements for one year from the declared emergency.

Extended payment plans — Affected customers with existing service or those seeking to establish service at a new residence, who have an old bill, are offered a payment plan with 20% due, with equal installments for the remainder for at least 12 billing cycles with no interest.

Suspension of disconnection and nonpayment fees — PacifiCorp may suspend disconnection for nonpayment and associated fees and eliminate reporting to credit reporting agencies or any collection services for unpaid bills.

Repair processing and timing — Immediately after the emergency, the company assesses the premises of affected customers whose utility service had been disrupted or degraded and, if applicable, the meter is removed.

Access to utility representatives — PacifiCorp will directly contact customers with damaged facilities after the meter is removed from the damaged property and will expedite any work required to reinstate electrical service. Additionally, PacifiCorp will closely coordinate with local agencies to facilitate any permitting requirements and ensure work is completed as quickly as practical.

Community support centers — PacifiCorp has logistical support for deployment of community support centers, if necessary, during a PSPS event. Community support centers will be established upon recommendation of the Unified Command. The center(s) will be open from 8 a.m. to 8 p.m. with the potential to stay open longer based on community needs. The community support center tent (if needed) is approximately 33 feet × 18 feet and can sustain winds of 55 mph gusting to 65 mph. PacifiCorp personnel will staff the center(s) to assist and provide information to community members of Siskiyou County. A community support center location is

established within each PDZ and will provide the ability for the community to have specific needs met.

Services provided include:

- Shelter from environment
- Air conditioning
- Potable water
- Seating and tables
- Restroom facilities
- Refrigeration for medicine and/or baby needs
- Interior and area lighting
- On-site security
- Communications capability such as Wi-fi access, SatPhone, radio, cellular phone etc.
- Televisions
- On-site medical support (EMT-A at a minimum, Paramedic preferred)
- Charging stations for Cell Phones, AM/FM/Weather radios, computers, etc.
- Ice

Locations of CRCs include:

- Happy Camp PDZ – Happy Camp Community Center
- Shasta PDZ - Mt Shasta Community Center
- Weed and Snowbrush PDZ- Weed Community Center
- Dunsmir PDZ - Dunsmuir Community Center

1. **Risk to be mitigated / problem to be addressed**

   During emergencies, such as wildfires, customers could need additional support.

2. **Initiative selection**

   It is a PacifiCorp priority to provide reliable, safe power to its customers, and customer satisfaction is important to maintaining the business. Therefore, PacifiCorp sees the importance of an initiative, such as this one, where the company provides support to customers. For the OEIS definition of this customer support initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp emergency planning programs cover all California service territory except for the community support centers, which are centrally located in the HFTD.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals**

for the current year

PacifiCorp has also implemented a variety of consumer protections and procedures to assist customers when a disaster impacts their communities, consistent with CPUC Rule D.18-03-011. These protections are in addition to routine customer service protections as provided in communicating outages and restoration time estimates as are supported through the company's web portal and customer service organization. Program and protection responses and their duration are determined based on the type, scale, and size of the event of the disaster. Some disasters will warrant greater relief than others. In the case of a larger, vast and far-reaching disaster, it may be reasonable to provide greater relief for a longer duration.

5. **Future improvements to initiative**

At this time, PacifiCorp does not have plans to improve this initiative, however the company is constantly gathering customer feedback and will take lessons learned from experiences and integrate them into future programs and plans.

7.3.9.4 Disaster and emergency preparedness plan

Pacific Power actively monitors real-time weather conditions and tries to provide customers with additional notifications if de-energization is likely. When real-time observations and weather forecasts indicate that the three triggers for "de-energization watch" have been evaluated, and the Wildfire Risk Index is elevated, a de-energization watch protocol is initiated. The protocol includes activation of an Emergency Coordination Center (ECC), communication with local public safety partners, and implementation of additional monitoring activities.

The ECC is staffed by specialized staff who assemble during de-energization warning and implementation to provide critical operations support through the collection and analysis of data. The ECC makes decisions to maintain the safety and reliability of the transmission and distribution system and helps facilitate cross-organization incident coordination. The ECC is led by an ECC Director and has the support of a safety officer, a joint information team, emergency management, meteorology and operational stakeholders representing field operations, system operations, vegetation management, engineering, and other specialties.

When the ECC is activated, PacifiCorp emergency management gathers input from public safety partners to properly characterize and consider impacts to local communities and send notifications to the operators of pre-identified critical facilities, partner utilities, and adjacent local public safety partners. The PacifiCorp customer service team then coordinates through the ECC to confirm customer lists for the area to develop a communication plan for those customers potentially impacted.

Local patrol and inspection of lines during a PSPS watch can include a variety of

methods depending on the accessibility of locations, the reliability of the line, area conditions and other factors. The ECC reviews these factors to determine necessary tasks such as the deployment of crews or remote monitoring by system operations.

Because of the public desire for reliable electric service, together with public safety concerns associated with de-energization, a PSPS is a measure of last resort. Nonetheless, consistent with existing regulations and the general mandate to operate the electrical system safely, the ECC has discretion to determine when a PSPS is appropriate.

The ECC Director considers all available information, including real-time feedback and input from other ECC participants and field operations to determine whether PSPS should be executed. Additionally, the ECC Director may decide to further refine the PSPS areas described above. As a matter of practical reality, the ECC Director cannot know whether a PSPS will prevent a utility-related ignition. If a PSPS is not implemented and an ignition occurs, the ignition itself is not proof that a PSPS should have been implemented. Likewise, if a PSPS is implemented, the event itself does not prove that an ignition that would have otherwise occurred was prevented.

1. **Risk to be mitigated / problem to be addressed**

   When there's a potential for wildfire, it is important to be prepared to respond in an organized and quick manner.

2. **Initiative selection**

   This initiative describes how PacifiCorp prepares for a wildfire emergency. For the OEIS definition of this disaster preparedness initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp has de-energization plans prepared for the areas of the highest risk, designated as the PDZ, however an ECC can be activated in any part of the service territory.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   In 2021, PacifiCorp began to host Practice ECC rounds to improve response times. This year, PacifiCorp plans to continue the Practice ECC, as well as include some important lessons learned from 2021 related to tracking and reporting.

5. **Future improvements to initiative**

   As PacifiCorp gains more experience with the ECC protocols, the program will evolve.

7.3.9.5 Preparedness and planning for service restoration

1. **Risk to be mitigated / problem to be addressed**

   Service restoration after a PSPS poses additional risk as compared to standard service restoration. Extreme fire weather can cause damage to infrastructure during the PSPS event itself while lines are de-energized. Therefore, additional patrols may be required during restoration to mitigate incremental ignition risk that this potential damage can have during re-energization.

2. **Initiative selection**

   This initiative is foundational to PSPS efforts and is not directly connected to risk drivers or other metrics. For the OEIS definition of this service restoration preparedness initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp has prepared plans for service restoration in the PSPS zones, to expedite the steps for service restoration.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp does not have targets related to the initiative other than to implement the PSPS plans which have already been developed.

5. **Future improvements to initiative**

   PacifiCorp plans to continue to review other utilities plans with more de-energization experience for improvements.

7.3.9.6 Protocols in place to learn from wildfire events

Effective response to any event is determined by the ability to implement a controlled incident command structure and to take responsibility for restoration and recovery activities. It is critical that responsible individuals within the incident command system are familiar with their responsibilities and have practice performing those responsibilities. Individuals identified with primary or secondary responsibility within the command center structure complete an annual review of the overall disaster response and recovery plan. These individuals are required to contribute to post-crisis and emergency reporting, outlining any issues or concerns regarding their role and responsibilities.

1. **Risk to be mitigated / problem to be addressed**

   Wildfire events are fast-moving, high-stakes emergency circumstances that

PacifiCorp and its personnel are not called upon to manage on a day-to-day basis. Without established methods to learn from wildfire events, the company and its staff are at a greater risk of missteps based on the need to make quick decisions without routine experience. For the OEIS definition of this wildfire event learning protocol initiative, see Section 9.1 starting on page 244.

2. **Initiative selection**

   PacifiCorp leverages existing systems and processes included in the company's Emergency Response Plan to learn from wildfire events in the same way it learns from any emergency event. Therefore, PacifiCorp does not have a specific program for incorporation of lessons learned that is not already covered in an existing program or through ongoing process improvement.

   That said, PacifiCorp evaluates exercises and actual response incidents by identifying issues raised during the exercise or incident and documenting lessons learned and corrective action plans. Multiple methods are used to gather exercise and post-action reviews, including participant and observer evaluation forms, remedial action tracking, and post-exercise or after-incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response plans.

3. **Region prioritization**

   There is no region prioritization for this initiative. Incorporation of lessons learned may be prioritized in high-risk areas, such as PSPS zones where appropriate.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   The incident command system is activated periodically throughout the year in the normal course of operations. Additionally, an annual exercise is conducted to ensure that individuals otherwise not involved in incident management on a regular basis are practiced in responding.

5. **Future improvements to initiative**

   PacifiCorp has a goal of continuous incident management improvement.

7.3.10 Stakeholder cooperation and community engagement

7.3.10.1 Community engagement

PacifiCorp provides wildfire safety and preparedness and PSPS public outreach and education through a variety of channels. Some communication efforts target the

company's entire customer base, while other communications target communities in the HFTD with some overlap into non-HFTD locations depending on media market and distribution channel. PacifiCorp maintains a flexible, dynamic education and awareness strategy that is informed by customer survey data, community stakeholder input, and community needs. Overall, PacifiCorp's outreach includes information that can be heard, watched, and read in a variety of ways with the goal of accessibility and understandability.

1. **Risk to be mitigated / problem to be addressed**

   This initiative seeks to reduce the impact to the customer who may experience a de-energization.

2. **Initiative selection**

   As a component and last resort of wildfire mitigation, PacifiCorp may de-energize lines, which will always impact customers. PacifiCorp seeks to reduce the impact due to this loss of power by providing wildfire preparedness education to its customer. For the OEIS definition of this community engagement initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   Advertisements related to PSPS preparedness are run in the HFTD. However, additional community outreach programs, which include a webinar and various other videos, are available across the company's service territory.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   For 2022, PacifiCorp plans to update its survey to include an evaluation of PSPS impact reduction programs. For the past several years, the company has deployed some form of paid media campaign to raise awareness and action on wildfire safety. The company plans to expand this effort in 2022 as part of the broader community engagement strategy. The company will deploy radio, newspaper, digital, and social media ads, as a minimum, to promote wildfire safety and preparedness.

5. **Future improvements to initiative**

PacifiCorp plans to continually evaluate the communication plan and improve it based on feedback from customers and public safety partners as pictured in Figure 7.8.

Figure 7.8 Communications feedback loop

7.3.10.2 Cooperation and best practice sharing with agencies outside California

1. **Risk to be mitigated**

   Industry collaboration is another component of PacifiCorp's Wildfire Protection Plan. Through active participation in workshops, international and national forums, consortiums, and advisory boards, PacifiCorp maintains an understanding of existing best practices and collaborates with industry experts regarding new technologies and research.

2. **Initiative selection**

   Through our lessons learned we have been able to develop processes and procedures that are being adopted in other states and countries in coordination with other agencies and jurisdictions. Some key industry collaboration channels are shown in Figure 7.9. For the OEIS definition of this cooperation-related initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   PacifiCorp has used lessons learned and best practices to expand the PSPS process into other parts of our service territory such as areas deemed a high fire threat in Oregon, Washington and Utah.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   Pacific Power is an active member of the International Wildfire Risk Mitigation Consortium, an industry-sponsored collaborative that shares wildfire risk mitigation

insights and discoveries of innovative, unique utility wildfire practices from across the globe. This consortium, with working groups focused in the areas of asset management, operations and protocols, risk management, and vegetation management, supports working and networking channels between members of the global utility community to support the ongoing sharing of data, information, technology, and practices.

Additionally, PacifiCorp plays leadership and support roles through other organizations such as the Edison Electric Institute, the Electric Sector Coordinating Council, and the Institute of Electrical and Electronics Engineers (IEEE). Within the western United States, PacifiCorp also engages with the Western Energy Institute and the Rocky Mountain Electric League as well as the Western Protective Relaying Conference.

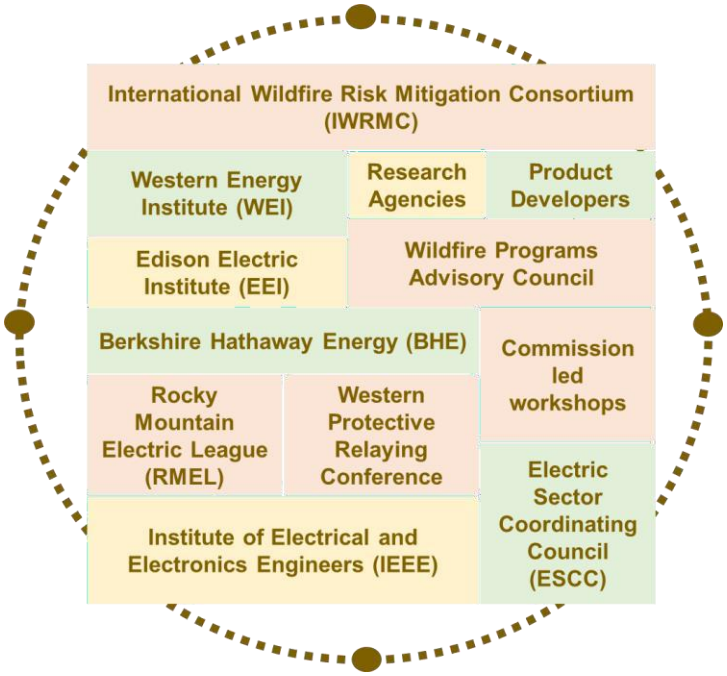

Figure 7.9 Key industry collaboration channels

Furthermore, PacifiCorp partners with certain research and response agencies to develop and test new technologies, such as existing efforts with the with the Oregon Department of Forestry to install wildfire cameras on utility infrastructure in key, high-risk locations. Additionally, PacifiCorp is working with Texas A&M University on a DFA pilot (see Section 4.4.1.1 on page 48).

Through these various engagement channels, PacifiCorp maintains industry networks, understands the evolution of technologies, discovers broader applications for such advancements, freely shares data to enable scientists and academics, collaborates with developers to push the boundaries of existing capabilities, and expands its research

network through support of advisory boards or grant funding.

5. **Future improvements to initiative**

   PacifiCorp's ethos of continuous improvement guides the company to always seek and incorporate lessons learned, and as new opportunities arise, PacifiCorp will evaluate them for incorporation into this initiative.

7.3.10.3 Cooperation with suppression agencies

PacifiCorp's emergency management team maintains relationships with federal and state emergency responders and mutual assistance groups. The company's emergency manager has contact information for state, county and tribal emergency managers, the state's Emergency Operations Center Emergency Support Functions (ESF) personnel, and the Geographic Area Coordination Centers for fire-related emergency response. District operations managers also maintain relationships with local first responders. If an incident like a wildland fire occurs and emergency operations are established, a district manager or an identified company representative will deploy when needed or requested to the jurisdictional agency's Incident Command Post (ICP) to provide necessary electric utility support and coordination.

Throughout the year, PacifiCorp also participates in regulatory proceedings, town hall meetings, and open-house events to engage other industry leaders, community leaders and members, and local emergency response management organizations. These events focus on a range of aspects of PacifiCorp's wildfire emergency planning and preparedness programs, including communication protocols, notification protocols, and resource coordination efforts.

1. **Risk to be mitigated / problem to be addressed**

   Suppression agencies may require the support of electric utility personnel to support wildfire suppression efforts.

2. **Initiative selection**

   This initiative has the potential to reduce the spread of wildfire. For the OEIS definition of this patrol inspection initiative, see Section 9.1 starting on page 244.

3. **Region prioritization**

   There is no region prioritization for this initiative.

4. **Progress on initiative since the last WMP submissionand plans, targets, and/or goals for the current year**

   PacifiCorp plans to maintain the relationship with suppression agencies in 2022.

5. **Future improvements to initiative**

   The company will continue to maintain the current initiative and update plans based on lessons learned, learnings from other utility plans and regulation changes.

7.3.10.4 Forest service and fuel reduction cooperation and joint road map

Refer to Section 7.3.5.2, page 186 Detailed Inspections and management practices for vegetation clearances around distribution electrical line and equipment.

8

PUBLIC SAFETY POWER SHUTOFFS (PSPS)

8 PUBLIC SAFETY POWER SHUTOFFS (PSPS)

8.1 DIRECTIONAL VISION FOR NECESSITY OF PSPS

Describe any lessons learned from PSPS since the last WMP submission and describe 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 the projected evolution over time of the circuits and numbers of customers that the utility expects will be impacted by any necessary PSPS events. 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 have been applied to those years.

Instructions for Table 8-.1-1:

Rank order, from highest (1 – greatest anticipated change in reliability or impact on ignition probability or estimated wildfire consequence. over the next 10 years) to lowest (9 - minimal change or impact, next 10 years), the characteristics of PSPS events (e.g., numbers of customers affected, frequency, scope, and duration), regardless of if the change is an increase or a decrease. To the right of the ranked magnitude of impact, indicate whether the impact would be a significant increase in reliability, a moderate increase in reliability, limited or no impact, a moderate decrease in reliability, or a significant decrease in reliability. For each characteristic, include comments describing the expected change and expected impact, using quantitative estimates wherever possible.

Lessons Learned

PacifiCorp's experience with implementing PSPS remains relatively low, with two PSPS events and one PSPS Watch implemented since 2019. Despite limited experience, PacifiCorp is committed to learning from the events and incorporating any changes or improvements needed. Lessons learned from the 2021 PSPS experience, which can be found in PacifiCorp's PSPS Post Event Report[29] filed on March 1, 2022, include the need to have a more streamlined process to produce GIS mapping data for others, the need for better CRC communication and the need for better notification records. From these lessons learned, PacifiCorp has developed next steps and plans to implement a Public Safety Partner portal, have additional messaging to customers during events about CRCs and implement several

[29] PacifiCorp's 2021 Post-Season Public Safety Power Shut-Off Report was submitted consistent with Decisions (D.) 21-06-034 and 20-03-004. Decision Adopting Phase 3 Updated and Additional guidelines and Rules for Public Safety Power Shutoffs (Proactive De-energizations) of Electric Facilities to mitigation Wildfire Risk Caused by Utility Infrastructure.

new notification improvement steps in 2022.

Evolution over 1, 3, and 10 years

It is the intention of the WMP initiatives to reduce the probability of using a PSPS over the coming years.

The culmination of initiatives should result in more granular situational awareness within a hardened system, which would provide better insights as to when (if at all) a PSPS might be used and how to minimize customer impacts. PacifiCorp continues to believe that the implementation of grid hardening initiatives such as the Line Rebuild program (covered conductor) should reduce the ignition risk associated with risk drivers, such as contact by object, and thus raise the thresholds for initiating a PSPS event. The exact impact to preliminary thresholds for a PSPS watch is still being evaluated; PacifiCorp has not adjusted thresholds at this time. Improvements to weather forecasting, in conjunction with implemented initiatives, such as increased asset inspections, more timely corrections and increased vegetation management, may also make the system more resilient against extreme weather events, such as those associated with climate change.

The PacifiCorp meteorology department generates situational awareness reports on a daily basis, to aid in decision-making during periods of elevated risk, including in support of PSPS assessment and activation. These reports identify where fuels (dead and live vegetation) are critically dry, where and when critical fire weather conditions are expected (gusty winds and low humidity), and where and when the weather is forecast to negatively impact system performance and reliability. It is the intersection of these three triggers that result in the potential for a PSPS event.

PacifiCorp continues to develop a fully mature aggregate index to assess risk, similar to the FPI used by other utilities. It is PacifiCorp's intent to procure modeling tools and begin using an index by 2023, through the Situational Awareness initiative described in Section 7.3.2.4 on page 156 to assess risk and PSPS decision-making. PacifiCorp expects that this will be an iterative process as new information, methods and industry best practices are incorporated. Additionally, Pacific Power expects to potentially refine this methodology as the company finds a balance between adequately warning the public of a potential PSPS event versus raising a false alarm too frequently or over-use of PSPS as a tool.

Over the next three to 10 years, PacifiCorp will evolve its index, in collaboration with other utilities to reduce the scale, scope and impact of PSPS events.

Table 8.1 Anticipated characteristics of PSPS use over next 10 years (WMP Table 8.1-1)

Rank order 1-9	PSPS characteristic	Significantly increase; increase;no change; decrease. significantly decrease	Comments
5	Number of customers affected by PSPS events (total)	Decrease	Completing mitigation efforts removes exposed segments of circuits and helps protect customers served by those segments from PSPS risk.
6	Number of customers affected by PSPS events (normalized by fire weather, e.g., RFW line mile days)	Decrease	Completing efforts removes exposed circuit segments and helps protect customers served by those segments from PSPS risk.
3	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	Grid configurations and communication technologies are being introduced, which give the company more ability to remotely reconfigure the network's system protection; this removes risk and reduces the need for PSPS operations.
4	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	Grid configurations and communication technologies are being introduced, which give the company more ability to remotely reconfigure the network's system protection; this removes risk and reduces the need for PSPS operations.
1	Scope of PSPS events in circuit-events, measured in number of events multiplied by number of circuits targeted for de-energization (total)	Significantly decrease	As the company builds out its weather network, enhances its LRAM modeling and completes asset hardening projects the scope of events will reduce.
2	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)	Significantly decrease	As the company builds out its weather network, enhances its LRAM modeling and completes asset hardening projects the scope of events will reduce.
7	Duration of PSPS events in customer hours (total)	Decrease	The addition of more network modularization, including advancement of grid technologies, will reduce the duration of PSPS events.
8	Duration of PSPS events in customer hours (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	The addition of more network modularization, including advancement of grid technologies, will reduce the duration of PSPS events.
	Other (Describe) – Rank as 9 and leave other columns blank if no other characteristics associated with PSPS		

8.2 PROTOCOLS ON PUBLIC SAFETY POWER SHUTOFF

Describe protocols on Public Safety Power Shutoff (PSPS or de-energization), highlighting changes since the previous WMP submission:

1. *Method used to evaluate the potential consequences of PSPS and wildfires. Specifically, the utility is required to discuss how the relative consequences of PSPS and wildfires are compared and evaluated. Inaddition, the utility must report the wildfire risk thresholds and decision-making process that determine the need for a PSPS.*
2. *Strategy to minimize public safety risk during high wildfire risk conditions and details ofthe considerations, including but not limited to a list and description of community assistance locations and services provided during a de-energization event.*
3. *Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization (e.g., decision tree).*
4. *Strategy to provide for safe and effective re-energization of any area that is de-energized due to PSPS protocol.*
5. *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, must include a complete listing of which entities the electrical corporation considers to be priority essential services. This section must also include a 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.*
6. *Protocols for mitigating the public safety impacts of these protocols, including impactson first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies.*

PacifiCorp's general process for a PSPS is described in Figure 8.1:

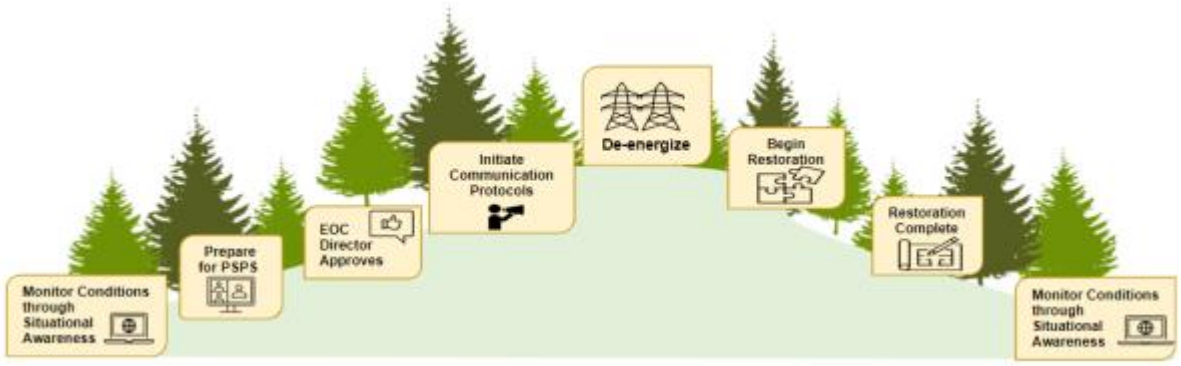

Figure 8.1 PSPS process

PacifiCorp uses an internal escalation process to ensure that it addresses fire risk mitigation at the same time it works to limit community impacts from potential de-energization. To ensure the best possible service for customers, PacifiCorp is establishing "internal watches" during which the company performs the following tasks:

- Activates the Emergency Coordination Center (ECC)
- Conducts pre-risk period patrols
- Interrogates relays to identify any recent events
- Alters system protection control settings
- Develops granular forecasts for periods of concurrent elevated risk
- Prepositions line and vegetation personnel to monitor key locations
- Notifies public safety partners of elevated concern and the company's mitigation efforts
- Actively monitors the network during the period
- Upon all-clear notice restores system settings and shut down the ECC

PacifiCorp PSPS protocols

Currently, situational awareness reports are used throughout the elevated risk process to inform decision making. Reports include fuel information and where weather conditions have the potential of ignition. When PacifiCorp procures Technosylva as described in section 7.3.2.4, it will be used to support the evaluation of potential consequences of PSPS and wildfires. It is anticipated that this will be an iterative process, where PacifiCorp seeks to balance wildfire safety and customer reliability.

When a PSPS is imminent, PacifiCorp utilizes a contracted vendor to support the rapid deployment of Community Resource Centers in the community. PacifiCorp is prepared to set up CRCs as per section 7.3.9.3 page 219, where the CRC locations and services are provided.

In Section 7.3.9.4 page 222, PacifiCorp has described the PSPS/de-energization protocols.

In Section 7.3.9.5 page 224, PacifiCorp has described the re-energization protocols.

PacifiCorp uses a common language that integrates the notification and communication protocols developed for California Statewide Alert and Warning Guidelines.

To meet this requirement, the messages address: (1) Who is the source of the warning? (2) What is the threat? (3) Does this affect my location? (4) What should I do? and (5) How long is this event expected to last?

Communications point customers toward education and outreach materials shared by the company before each wildfire season.

PacifiCorp notifies customers and delivers clear and understandable information, communicates to customers in different languages (English, Spanish, Chinese, and Tagalog) and uses multiple modes/channels of communication in a way that addresses different AFN populations.

PacifiCorp communicates the possibility of a de-energization event, the estimated start date and time, the estimated duration of the event, and the estimated time to restore power in warning notifications. These warnings also let customers know when they can expect additional notification and they coincide with the timelines outlined in Table 8.2.

Timelines

The timelines in Table 8.2 may be reduced if changing conditions do not allow for advance notification. If that happens, the company will notify customers as soon as possible and will include a summary of the circumstances prohibiting compliance to the regulatory requirements in the final report.

Table 8.2 Notification timeline

48 Hours	De-energization Warning
24 Hours	De-energization Warning
2 Hours	De-energization Imminent
1 Hour	De-energization Imminent
Event Begins	De-energization Begins
Re-energization Begins	Re-energization Begins
Re-energization Completed	Re-energization Completed
Cancellation of Event	De-energization Event Canceled

8.3 PROJECTED CHANGES TO PSPS IMPACT

Describe utility-wide plan to reduce scale, scope and frequency of PSPS for each of the following time periods, highlighting changes since the prior WMP report and including key program targets used to track progress over time,

1. *By June 1 of current year*
2. *By September 1 of current year*
3. *By next WMP submission*

Reducing the impact of PSPS is a significant goal of PacifiCorp's WMP and PacifiCorp perceives the best way to reduce PSPS impacts is to reduce the number, geographic scope, and duration of PSPS events. While recognizing the general application of all mitigation initiatives to help reduce the impact of PSPS, PacifiCorp also acknowledges that certain

initiatives are more directly tied to the PSPS Program.

Above all, improved situational awareness reflects a category of initiatives closely related to the PSPS decision-making process. Like other utilities, PacifiCorp's situational awareness plans include the installation of additional weather stations to access localized weather risk data and inform decision making. Additionally, to better leverage this weather data and other key information, PacifiCorp is investing in range of new data processing and modeling capabilities.

This includes key investment and the development of an operational weather forecast model that leverages fully redundant HPCC capabilities to process and deliver a twice daily 96-hour forecast as described in Section 7.3.2.4 on page 156. Furthermore, PacifiCorp is procuring Technosylva's WFE-A modeling suite as described in Section 4.5.1.1 on page 66, including FireCast, to model fire spread risk daily across PacifiCorp's service territory, FireSim to model on demand fires spread potential, and WRRM to quantify asset risk and inform planning.

This additional data and more sophisticated situational awareness model will continue to better inform decision making, which reduces PSPS impacts by (i) reducing the likelihood that a PSPS will be implemented unnecessarily and (ii) facilitating a more surgical application of PSPS, thereby reducing its scope. This effort is further described in Section 7.3.2.4 on page 156.

Other initiatives have less direct involvement in the PSPS decision-making process. But those initiatives can still have a dramatic influence on reducing PSPS impacts by reducing the likelihood of PSPS. Many of PacifiCorp's initiatives are specifically geared to reduce wildfire ignition risk with the most notable being covered conductor. PacifiCorp's covered conductor will materially reduce PSPS impacts by (a) making PSPS substantially less likely and (b) helping PacifiCorp surgically reduce the size and areas of impact. Above all, the mechanical properties of a covered conductor design physically prevent the initiation of a flash-over due to vegetation on the line. Notably, while data continues to be gathered to better understand specific relationships, the general correlation between wind, vegetation contacts, and wildfire spread is well-understood. Installing covered conductor will increase the grid's resiliency against wind-driven vegetation contacts, which can lead to devasting wildfire ignitions. High winds are, of course, a critical factor in the assessment of risk and considered in any PSPS decision-making process. The mitigation benefits of covered conductor, especially when combined with other grid hardening efforts implemented as part of a rebuild effort, will significantly decrease PSPS impacts by significantly decreasing the likelihood of a PSPS. If the powerlines can withstand higher wind speeds, it will decrease the occurrence of PSPS events. Covered conductor projects also give PacifiCorp flexibility to take a more surgical approach to PSPS.

As a specific example, PacifiCorp recently completed approximately 3 miles of covered conductor in Mt Shasta as depicted in Figure 8.2.

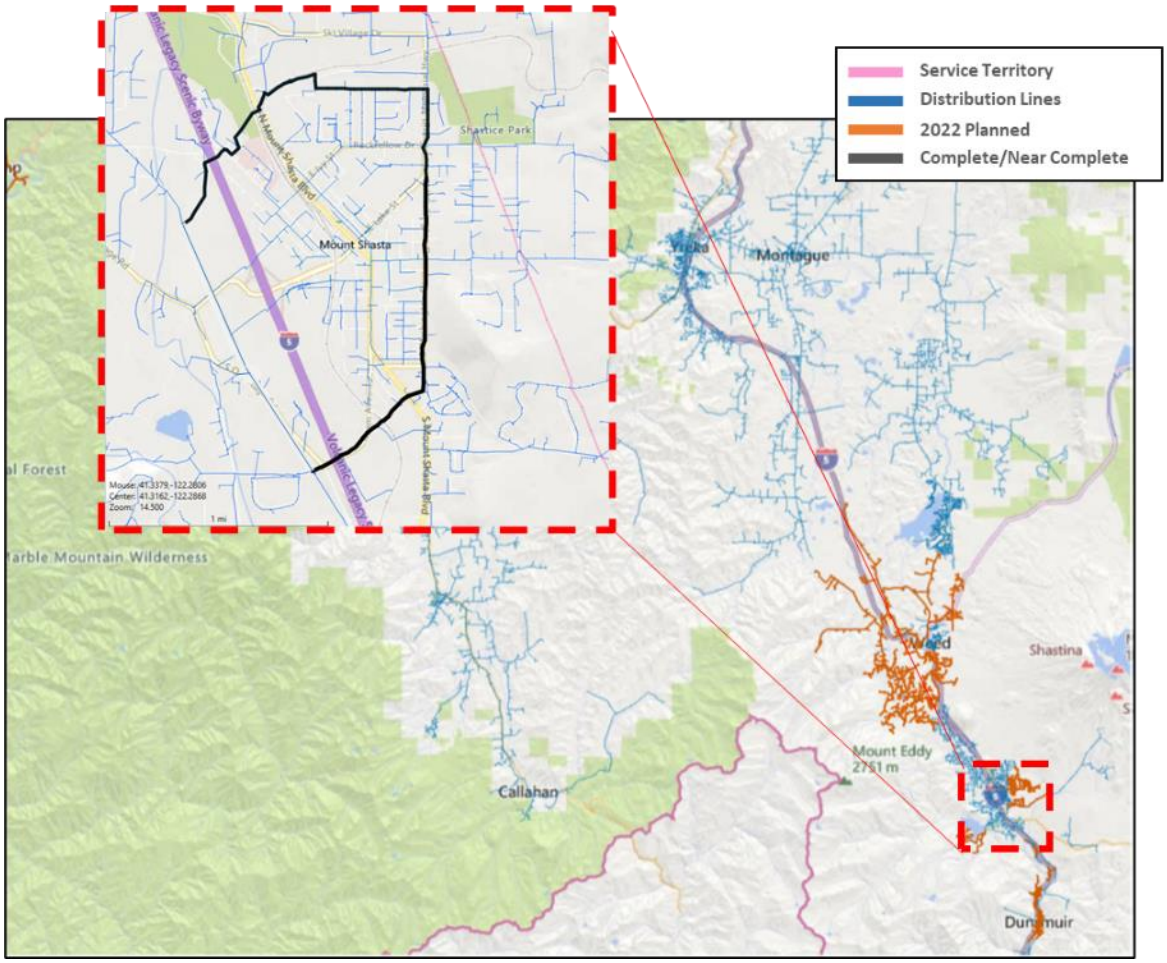

Figure 8.2 Example Grid Hardening Project in Mt Shasta

While the entire Mt Shasta grid hardening plan includes the implementation of approximately 82 miles of covered conductor over three years, this initial step will begin to provide flexibility and resilience. Prior to the completion of this project, any extreme or localized risk experienced by the inner 3 miles that may have required implementation of a PSPS event, would have directly impacted any taps or other circuits or circuit segments fed from this loop. Prior to grid hardening, PacifiCorp was not able to isolate the risk posed to the main loop from the taps or distant portions of the circuit. The covered conductor removes that direct linkage and provides flexibility in decision making. Conditions experienced by the main loop will no longer necessitate a PSPS event on the entire circuit. While this example is small in scope and not likely to have immediate material impacts on decision making, it demonstrates the general concept of mitigating PSPS impacts through implementation of covered conductor. As more and more miles are hardened, more and more direct linkages will be broken, further mitigating the impact of PSPS.

Other initiatives specifically address reducing the impact of a PSPS that has actually been implemented. Examples include the new portable battery program and generator rebate program

discussed in Section 7.3.3.11 on page 168. Additionally, PacifiCorp continues improving its readiness to open Community Resource Centers in any community impacted by a PSPS as described in Section 7.3.9.3 on page 219.

Specific program targets associated with these initiatives can be found in Section 5.3 on page 114and Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx. The following describes planned program deliverables with direct linkages to PSPS impacts by June of the current year, September 1 of the current year, and before the next WMP Update.

By June 1 of the current year

Installed weather stations will have their annual calibration completed and be prepared to provide accurate weather data to situational awareness forecast processes which can potentially reduce the scope and scale of a PSPS.

By September 1 of the current year

Several initiatives will be significantly progressed, as per 2022-05-02_PC_2022_Q1-QDR_R1.xlsx quarterly targets. Much of these initiatives, such as those related to the grid hardening category, are projected to impact the scale, scope and frequency of PSPS over time.

By next Annual WMP Update

PacifiCorp will have met the goals described in Table 5.1, which directly impact the scale, scope, frequency or impact of PSPS over time. As an example, PacifiCorp initiated the installation of covered conductor in 2021. Based on targets in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx for covered conductor, PacifiCorp anticipates that a significant portion of covered conductor will be completed, providing significant ignition risk reduction, thus potentially reducing the frequency of PSPS.

A key change since the 2021 WMP Update is that PacifiCorp plans to implement Technosylva modelling tools to enhance situational awareness. As described above, this addition to PacifiCorp initiatives is projected to provide more granular data, with increased accuracy such that PacifiCorp can potentially reduce the scope of a PSPS by the next annual update.

8.4 ENGAGING VULNERABLE COMMUNITIES

Report on the following:

1. *Describe protocols for PSPS that are intended to mitigate the public safety impacts of PSPS on vulnerable, marginalized and/or at-risk communities. Describe how the utility is identifying these communities.*
2. *List all languages which are "prevalent" in utility's territory. A language is prevalent if it is spoken by 1,000 or more persons in the utility's territory or if it is spoken by 5% or more of the population within a "public safety answering point" in the utility territory[30] (D.20-03-004).*
3. *List all languages for which public outreach material is available, in written or oral form.*
4. *Detail the community outreach efforts for PSPS and wildfire-related outreach. Include efforts to reach all languages prevalent in utility territory.*

PacifiCorp describes its outreach plan in greater detail, responsive to each of these points outlined in its PSPS Phase 2 Progress Report and in sections 7.3.9 and 7.3.10 starting on pages 217 and 225 respectively.

Engaging vulnerable communities information has been provided in the 2022 Annual Access and Functional Needs Plan of PacifiCorp filed on January 31, 2022.

8.5 PSPS-SPECIFIC METRICS

PSPS data is reported quarterly. Placeholder tables below to be filled in based on quarterly data

Instructions for PSPS table: of Attachment 3:

In the attached spreadsheet document, report performance on the following PSPS metrics within the utility's service territory over the past seven years as needed to correct previously reported data. Where the utility does not collect its own data on a given metric, the utility is required to 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.

Please see WMP Table 11 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx submitted on May 2, 2022.

[30] See Cal. Government Code § 53112

8.6 IDENTIFICATION OF FREQUENTLY DE-ENERGIZED CIRCUITS

Senate Bill 533 (2021) added an additional requirement to the WMPs. Pub. Util. Code Section 8386(c)(8) requires the "Identification of circuits that have frequently been de-energized pursuant[31] to a de-energization event to mitigate the risk of wildfire and the measures taken, orplanned to be taken, by the electrical corporation to reduce the need for, and impact of, future de-energization of those circuits, including, but not limited to, the estimated annual decline in circuit de-energization and de-energization impact on customers, and replacing, hardening, or undergrounding any portion of the circuit or of upstream transmission or distribution lines." To comply with this statutory addition, utilities are required to populate Table 8.3 and provide a map showing the listed frequently de-energized circuits.

Table 8.3 Frequently de-energized circuits

ID of Circuit	County	Dates of Outages	# of Customers Affected	Measures taken, or plannedto be taken, to reduce the need for, and impact of, future PSPS of circuit
N/A	N/A	N/A	N/A	N/A

[31] "Frequently de-energized circuit" has been defined in the glossary as "A circuit which has been de-energized pursuant to a de-energization event to mitigate the risk of wildfire three or more times in a calendar year."

9

APPENDIX

9 APPENDIX

9.1 DEFINITIONS OF INITIATIVE ACTIVITIES BY CATEGORY

Table 9.1 Definitions of initiative activities by category

Category	Initiative activity	Definition
A. Risk mapping and simulation	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Development and use of tools and processes to develop and update risk map and simulations and to estimate risk reduction potential of initiatives for a given portion of the grid (or more granularly, e.g., circuit, span, or asset). May include verification efforts, independent assessment by experts, and updates.
	Climate-driven risk map and modeling based on various relevant weather scenarios	Development and use of tools and processes demonstrating medium and long-term climate trends based on the best available climate models demonstrating the most wildfire-relevant impacts (e.g., warming trends, fuel moisture trends, soil moisture trends, vegetation distribution trends). Describe how these trends are being incorporated into risk modeling or other risk-informed analyses.
	Ignition probability mapping showing the probability of ignition along the electric lines and equipment	Development and use of tools and processes to assess the risk of ignition across regions of the grid (or more granularly, e.g., circuits, spans, or assets).
	Initiative mapping and estimation of wildfire and PSPS risk-reduction impact	Development of a tool to estimate the risk reduction efficacy (for both wildfire and PSPS risk) and RSE of various initiatives.
	Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment	Development and use of tools and processes to assess the impact of potential ignition and risk to communities (e.g., in terms of potential fatalities, structures burned, monetary damages, area burned, impact on air quality and greenhouse gas, or GHG, reduction goals, etc.).
B. Situational awareness and forecasting	Advanced weather monitoring and weather stations	Purchase, installation, maintenance, and operation of weather stations. Collection, recording, and analysis of weather data from weather stations and from external sources.
	Continuous monitoring sensors	Installation, maintenance, and monitoring of sensors and sensorized equipment used to monitor the condition of electric lines and equipment.
	Fault indicators for detecting faults on electric lines and equipment	Installation and maintenance of fault indicators.
	Forecast of a fire risk index, fire potential index, or similar	Index that uses a combination of weather parameters (such as wind speed, humidity, and temperature), vegetation and/or fuel conditions, and other factors to judge current fire risk and to create a forecast indicative of fire risk. A sufficiently granular index is required to inform operational decision-making.

Category	Initiative activity	Definition
	Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions	Personnel position within utility service territory to monitor system conditions and weather on site. Field observations is required to inform operational decisions.
	Weather forecasting and estimating impacts on electric lines and equipment	Development methodology for forecast of weather conditions relevant to utility operations, forecasting weather conditions and conducting analysis to incorporate into utility decision-making, learning and updates to reduce false positives and false negatives of forecast PSPS conditions.
C. Grid design and system hardening	Capacitor maintenance and replacement program	Remediation, adjustments, or installations of new equipment to improve or replace existing capacitor equipment.
	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Remediation, adjustments, or installations of new equipment to improve or replace existing fast switching circuit breaker equipment to improve the ability to protect electrical circuits from damage caused by overload of electricity or short circuit.
	Covered conductor installation	Installation of covered or insulated conductors to replace standard bare or unprotected conductors (defined in accordance with GO 95 as supply conductors, including but not limited to lead wires, not enclosed in a grounded metal pole or not covered by: a "suitable protective covering" (in accordance with Rule 22.8), grounded metal conduit, or grounded metal sheath or shield). In accordance with GO 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non-conductive material having the electrical insulating efficiency (12kV/in. dry) and impact strength (20ft.-lbs) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D
	Covered conductor maintenance	Remediation and adjustments to installed covered or insulated conductors. In accordance with GO 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non- conductive material having the electrical insulating efficiency (12kV/in. dry) and impact strength (20ft.-lbs) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D.

Category	Initiative activity	Definition
	Crossarm maintenance, repair, and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing crossarms, defined as horizontal support attached to poles or structures generally at right angles to the conductor supported in accordance with GO 95.
	Distribution pole replacement and reinforcement, including with composite poles	Remediation, adjustments, or installations of new equipment to improve or replace existing distribution poles (i.e., those supporting lines under 65kV), including with equipment such as composite poles manufactured with materials reduce ignition probability by increasing pole lifespan and resilience against failure from object contact and other events.
	Expulsion fuse replacement	Installations of new and CAL FIRE-approved power fuses to replace existing expulsion fuse equipment.
	Grid topology improvements to mitigate or reduce PSPS events	Plan to support and actions taken to mitigate or reduce PSPS events in terms of geographic scope and number of customers affected, such as installation and operation of electrical equipment to sectionalize or island portions of the grid, microgrids, or local generation.
	Installation of system automation equipment	Installation of electric equipment that increases the ability of the utility to automate system operation and monitoring, including equipment that can be adjusted remotely such as automatic reclosers (switching devices designed to detect and interrupt momentary faults that can reclose automatically and detect if a fault remains, remaining open if so).
	Maintenance, repair, and replacement of connectors, including hotline clamps	Remediation, adjustments, or installations of new equipment to improve or replace existing connector equipment, such as hotline clamps.
	Mitigation of impact on customers and other residents affected during PSPS event	Actions taken to improve access to electricity for customers and other residents during PSPS events, such as installation and operation of local generation equipment (at the community, household, or other level).
	Other corrective action	Other maintenance, repair, or replacement of utility equipment and structures so that they function properly and safely, including remediation activities (such as insulator washing) of other electric equipment deficiencies that may increase ignition probability due to potential equipment failure or other drivers.
	Pole loading infrastructure hardening and replacement program based on pole loading assessment program	Actions taken to remediate, adjust, or install replacement equipment for poles that the utility has identified as failing to meet safety factor requirements in accordance with GO 95 or additional utility standards in the utility's pole loading assessment program.
	Transformers maintenance and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing transformer equipment.
	Transmission tower maintenance and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing transmission towers (e.g., structures such as lattice steel towers or tubular steel poles that support lines at or above 65kV).

Category	Initiative activity	Definition
	Undergrounding of electric lines and/or equipment	Actions taken to convert overhead electric lines and/or equipment to underground electric lines and/or equipment (i.e., located underground and in accordance with GO 128).
	Updates to grid topology to minimize risk of ignition in the HFTDs	Changes in the plan, installation, construction, removal, and/or undergrounding to minimize the risk of ignition due to the design, location, or configuration of utility electric equipment in the HFTDs.
D. Asset management and inspections	Detailed inspections of distribution electric lines and equipment	In accordance with GO 165, careful visual inspections of overhead electric distribution lines and equipment where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
	Detailed inspections of transmission electric lines and equipment	Careful visual inspections of overhead electric transmission lines and equipment where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
	Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
	IR inspections of distribution electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using IR (heat-sensing) technology and cameras that can identify "hot spots", or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
	IR inspections of transmission electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using IR (heat-sensing) technology and cameras that can identify "hot spots", or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
	Intrusive pole inspections	In accordance with GO 165, intrusive inspections involve movement of soil, taking samples for analysis, and/or using more sophisticated diagnostic tools beyond visual inspections or instrument reading.
	LiDAR inspections of distribution electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
	LiDAR inspections of transmission electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).

Category	Initiative activity	Definition
	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	Inspections of overhead electric transmission lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations, including GO 165, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations	Inspections of overhead electric distribution lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations, including GO 165, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Patrol inspections of distribution electric lines and equipment	In accordance with GO 165, simple visual inspections of overhead electric distribution lines and equipment that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out during other company business.
	Patrol inspections of transmission electric lines and equipment	Simple visual inspections of overhead electric transmission lines and equipment that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out during other company business.
	Pole loading assessment program to determine safety factor	Calculations to determine whether a pole meets pole loading safety factor requirements of GO 95, including planning and information collection needed to support said calculations. Calculations must consider many factors including the size, location, and type of pole; types of attachments; length of conductors attached; and number and design of supporting guys, per D.15-11-021.
	Quality assurance / quality control of inspections	Establishment and function of audit process to manage and confirm work completed by employees or contractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
	Substation inspections	In accordance with GO 175, inspection of substations performed by qualified persons and according to the frequency established by the utility, including record-keeping.
E. Vegetation management and inspection	Additional efforts to manage community and environmental impacts	Plan and execution of strategy to mitigate negative impacts from utility vegetation management to local communities and the environment, such as coordination with communities, local governments, and agencies to plan and execute vegetation management work.
	Detailed inspections and management practices for vegetation clearances around distribution electrical lines and equipment	Careful visual inspections and maintenance of vegetation around the distribution right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded. Describe the frequency of inspection and maintenance programs.

Category	Initiative activity	Definition
	Detailed inspections and management practices for vegetation clearances around transmission electrical lines and equipment	Careful visual inspections and maintenance of vegetation around the transmission right-of- way, where individual trees are carefully examined, visually, and the condition of each rated and recorded. Describe the frequency of inspection and maintenance programs.
	Emergency response vegetation management due to red flag warning or other urgent weather conditions	Plan and execution of vegetation management activities, such as trimming or removal, executed based upon and in advance of forecast weather conditions that indicate high fire threat in terms of ignition probability and wildfire consequence.
	Fuel management and, management of all wood and “slash” from vegetation management activities	Plan and execution of fuel management activities in proximity to potential sources of ignition. This includes pole clearing per PRC 4292 and reduction or adjustment of live fuel (based on species or otherwise)
	Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
	Remote sensing inspections of vegetation around distribution electric lines and equipment	Inspections of right-of-way using remote sensing methods such as LiDAR, satellite imagery, and UAV.
	Remote sensing inspections of vegetation around transmission electric lines and equipment	Inspections of right-of-way using remote sensing methods such as LiDAR, satellite imagery, and UAV.
	Other discretionary inspections of vegetation around distribution electric lines and equipment	Inspections of rights-of-way and adjacent vegetation that may be hazardous, which exceeds or otherwise go beyond those mandated by rules and regulations, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Other discretionary inspections of vegetation around transmission electric lines and equipment	Inspections of rights-of-way and adjacent vegetation that may be hazardous, which exceeds or otherwise go beyond those mandated by rules and regulations, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Patrol inspections of vegetation around distribution electric lines and equipment	Visual inspections of vegetation along rights-of- way that is designed to identify obvious hazards. Patrol inspections may be carried out during other company business.
	Patrol inspections of vegetation around transmission electric lines and equipment	Visual inspections of vegetation along rights-of- way that is designed to identify obvious hazards. Patrol inspections may be carried out during other company business.
	Quality assurance / quality control of vegetation management	Establishment and function of audit process to manage and oversee the work completed by employees or contractors, including packaging QA/QC information for input to decision-making and workforce management processes. This includes identification of the percentage of vegetation inspections that are audited annually, as a program target in Table 5.3-1.

Category	Initiative activity	Definition
	Recruiting and training of vegetation management personnel	Programs to ensure that the utility can identify and hire qualified vegetation management personnel and to ensure that both employees and contractors tasked with vegetation management responsibilities are adequately trained to perform vegetation management work, according to the utility's wildfire mitigation plan, in addition to rules and regulations for safety. Include discussion of continuous improvement of training programs and personnel qualifications.
	Identification and remediation of "at-risk species"	Specific actions, not otherwise described in other WMP initiatives, taken to reduce the ignition probability and wildfire consequence attributable to "at-risk species,", such as trimming, removal, and replacement.
	Removal and remediation of trees with strike potential to electric lines and equipment	Actions taken to identify, remove, or otherwise remediate trees that pose a high risk of failure or fracture that could potentially strike electrical equipment.
	Substation inspection	Inspection of vegetation surrounding substations, performed by qualified persons and according to the frequency established by the utility, including record-keeping.
	Substation vegetation management	Based on location and risk to substation equipment only, actions taken to reduce the ignition probability and wildfire consequence attributable to contact from vegetation to substation equipment.
	Vegetation management enterprise system	Inputs, operation, and support for a centralized vegetation management enterprise system updated based upon inspection results including (1) inventory of and management activities such as trimming and removal of vegetation.
	Vegetation management to achieve clearances around electric lines and equipment Additional vegetation management practices beyond regulatory requirements and recommendations	Actions taken to ensure that vegetation does not encroach upon the minimum clearances set forth in Table 1 of GO 95, measured between line conductors and vegetation, such as trimming adjacent or overhanging tree limbs. Identifying and discussing additional vegetation management actions (e.g., trimming and removal of vegetation) taken beyond the minimum regulatory requirements and recommendations, for example, enhanced vegetation management.
	Vegetation management activities post-fire	Vegetation management (VM) activities during post-fire service restoration including, but not limited to activities or protocols that differentiate post-fire VM from programs described in other WMP initiatives; supporting documentation for the tool and/or standard the utility uses to assesses the risk presented by vegetation post-fire; and how the utility includes fire-specific damage attributes into its assessment tool/standard.
F. Grid operations and protocols	Automatic recloser operations	Designing and executing protocols to deactivate automatic reclosers based on local conditions for ignition probability and wildfire consequence.

Category	Initiative activity	Definition
	Protective equipment and device settings	The utility's procedures for adjusting the sensitivity of grid elements to reduce wildfire risk, other than automatic reclosers (such as circuit breakers, switches, etc.). For example, PG&E's Fast Trip Settings.
	Crew-accompanying ignition prevention and suppression resources and services	Those firefighting staff and equipment (such as fire suppression engines and trailers, firefighting hose, valves, and water) that are deployed with construction crews and other electric workers to provide site-specific fire prevention and ignition mitigation during on-site work
	Personnel work procedures and training in conditions of elevated fire risk	Work activity guidelines that designate what type of work can be performed during operating conditions of different levels of wildfire risk. Training for personnel on these guidelines and the procedures they prescribe, from normal operating procedures to increased mitigation measures to constraints on work performed.
	Protocols for PSPS re- energization	Designing and executing procedures that accelerate the restoration of electric service in areas that are de-energized, while maintaining safety and reliability standards.
	PSPS events and mitigation of PSPS impacts	Designing, executing, and improving upon protocols to conduct PSPS events, including development of advanced methodologies to determine when to use PSPS, and to mitigate the impact of PSPS events on affected customers and residents.
	Stationed and on-call ignition prevention and suppression resources and services	Firefighting staff and equipment (such as fire suppression engines and trailers, firefighting hose, valves, firefighting foam, chemical extinguishing agent, and water) stationed at utility facilities and/or standing by to respond to calls for fire suppression assistance.
G. Data governance	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.
	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.
	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.
	Tracking and analysis of near-miss data	Tools and procedures to monitor, record, and conduct analysis of data on near miss events.
H. Resource allocation methodology	Allocation methodology development and application	Development of prioritization methodology for human and financial resources, including application of said methodology to utility decision-making.
	Risk reduction scenario development and analysis	Development of modeling capabilities for different risk reduction scenarios based on wildfire mitigation initiative implementation; analysis and application to utility decision- making.

Category	Initiative activity	Definition
	RSE analysis	Tools, procedures, and expertise to support analysis of wildfire mitigation initiative risk- spend efficiency, in terms of MAVF and/ or MARS methodologies.
I. Emergency planning and preparedness	Adequate and trained workforce for service restoration	Actions taken to identify, hire, retain, and train qualified workforce to conduct service restoration in response to emergencies, including short-term contracting strategy and implementation.
	Community outreach, public awareness, and communications efforts	Actions to identify and contact key community stakeholders; increase public awareness of emergency planning and preparedness information; and design, translate, distribute, and evaluate effectiveness of communications taken before, during, and after a wildfire, including AFN populations and Limited English Proficiency populations in particular.
	Customer support in emergencies	Resources dedicated to customer support during emergencies, such as website pages and other digital resources, dedicated phone lines, etc.
	Disaster and emergency preparedness plan	Development of plan to deploy resources according to prioritization methodology for disaster and emergency preparedness of utility and within utility service territory (such as considerations for critical facilities and infrastructure), including strategy for collaboration with Public Safety Partners and communities
	Preparedness and planning for service restoration	Development of plans to prepare the utility to restore service after emergencies, such as developing employee and staff trainings, and to conduct inspections and remediation necessary to re-energize lines and restore service to customers.
	Protocols in place to learn from wildfire events	Tools and procedures to monitor effectiveness of strategy and actions taken to prepare for emergencies and of strategy and actions taken during and after emergencies, including based on an accounting of the outcomes of wildfire events.
J. Stakeholder cooperation and community engagement	Community engagement	Strategy and actions taken to identify and contact key community stakeholders; increase public awareness and support of utility wildfire mitigation activity; and design, translate, distribute, and evaluate effectiveness of related communications. Includes specific strategies and actions taken to address concerns and serve needs of AFN populations and Limited English Proficiency populations in particular.
	Cooperation and best practice sharing with agencies outside CA	Strategy and actions taken to engage with agencies outside of California to exchange best practices both for utility wildfire mitigation and for stakeholder cooperation to mitigate and respond to wildfires.
	Cooperation with suppression agencies	Coordination with CAL FIRE, federal fire authorities, county fire authorities, and local fire authorities to support planning and operations, including support of aerial and ground firefighting in real-time, including information-sharing, dispatch of resources, and dedicated staff.

Category	Initiative activity	Definition
	Forest service and fuel reduction cooperation and joint roadmap	Strategy and actions taken to engage with local, state, and federal entities responsible for or participating in forest management and fuel reduction activities; and design utility cooperation strategy and joint stakeholder roadmap (plan for coordinating stakeholder efforts for forest management and fuel reduction activities).

9.2 CITATIONS FOR RELEVANT STATUTES, COMMISSION DIRECTIVES, PROCEEDINGS, AND ORDERS

Throughout the WMP, cite relevant state and federal statutes, Commission directives, orders, and proceedings. Place the title or tracking number of the statute in parentheses next to comment, or in the appropriate column if noted in a table. Provide in this section a brief description or summary of the relevant portion of the statute. Track citations as end-notes and order (1, 2, 3…) across sections (e.g., if section 1 has 4 citations, section 2 begins numbering at 5).

Citation	Description/Summary	WMP Sections
Public Utilities Code § 8386	Law that, among other things, requires electric corporations to submit wildfire mitigation plans	Executive Summary, pg. viii
Public Resources Code § 4292	Minimum clearance around the base of the pole cleared of all flammable vegetation down to bare soil and the removal of all dead tree branches within this cylinder up to the cross-arm .	Section 7.3.5. pg. 182; Section 7.3.5.5.1 pg. 189
Public Resources Code § 4293	CAL FIRE requires 10 feet of minimum clearance around the base of the pole cleared of all flammable vegetation down to bare soil and the removal of all dead tree branches within this cylinder up to the cross-arm (within the State Responsibility Area)	Section 7.3.5.19, pg. 204
Resolution WSD-002	Guidance Resolution on 2020 Wildfire Mitigation Plans Pursuant to Public Utilities Code Section 8386.	Executive Summary, pg. viii
Resolution WSD-005	Resolution Ratifying Action of the Wildfire Safety Division on San Diego Gas & Electric Company's 2020 Wildfire Mitigation Plan Pursuant to Public Utilities Code Section 8386.	Executive Summary, pg. viii
Resolution WSD-011	Resolution implementing the requirements of Public Utilities Code Sections 8389(d)(1), (2) and (4), related to catastrophic wildfire caused by electrical corporations subject to the Commission's regulatory authority	Executive Summary, pg. viii
R.18-10-007	Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018)	Section 7.3.1.1, pg. 150; Section 4.5.1.4, pg. 81
R.20-07-013	Order Instituting Rulemaking to Further Develop a Risk-based Decision-making Framework for Electric and Gas Utilities	Executive Summary, pg. viii; Section 4.2, pg. 35

Citation	Description/Summary	WMP Sections
D.18-03-011	CPUC Phase 2 Decision Adopting Safety Model Assessment Proceeding Settlement Agreement with Modifications	Section 7.3.9.3, pg. 219
D.20-03-004	CPUC Decision on Community Awareness and Public Outreach Before, During, and After a Wildfire, and Explaining Next Steps for Other Phase 2 Issues	Section 8.1, pg. 232
D.21-06-034	Decision Adopting Phase 3 Updated	Section 8.1, pg. 232
General Order 95	Overhead electric line design, construction, and maintenance requirements in order to ensure adequacy of service and safety; covers topics such as proper grounding, clearances, strength requirements, and tree trimming	Executive Summary, pg. viii; Section 4.4.1.2, pg. 49; Section 5.4.3, pg. 123; Section 7.1, pg. 134; Section 7.3.4.1, pg. 171; Section 7.3.4.11, pg. 177; Section 7.3.4.14, pg. 178; Section 7.3.5.19, pg. 204; Section 9.3, pg. 255
General Order 96.b	[Provisions adopted by Decision (D.) 01-07-026 (July 12, 2001), D.02-01-038 (January 9, 2002), D.05-01-032 (January 13, 2005), D.07-01-024 (January 25, 2007), D.07-09-019 (September 6, 2007), D.08-05-019 (May 15, 2008), Resolution ALJ-221 (August 21, 2008), Resolution W-4749 (March 26, 2009), and D.09-04-005 (April 16, 2009) Resolution T-17327 (January 12, 2012) Resolution ALJ-346 (May 10, 2018)	Section 7.2, pg. 144
General Order 165	Inspection requirements for transmission and distribution facilities in order to ensure safety and high-quality electrical service; sets maximum allowable inspection cycle lengths, scheduling and performance of corrective action, record-keeping, and reporting	Executive Summary, pg. viii Section 4.5.2, pg. 101; Section 7.3.4.1, pg. 171; Section 7.3.4.6, pg. 174; Section 7.3.4.11, pg. 177;
General Order 166	Standards for Operation, Reliability, and Safety During Emergencies and Disasters	Executive Summary, pg. viii
General Order 174	Inspection requirements for substations to promote the safety of workers, the public, and enable adequacy of service	Section 7.3.5.15, pg. 199
SB 901	Wildfire Preparedness and Response	Executive Summary, pg. viii
WSD GIS Data Standards	Wildfire Safety Division Draft Geographic Information System Data Reporting Requirements and Schema for California Electrical Corporations (August 21, 2020); Sets forth requirements for WMP spatial data submissions	Section 6.5, pg. 130
WSD-017 OEIS Action Statement	Office of Energy Infrastructure Safety Final Revised Action Statement issued June 2021.	Section 7.3.2.2.2, pg. 154; Section 7.3.3.3, pg. 161; Section 7.3.3.4, pg. 163; Section 7.3.3.7, pg. 164

9.3 COVERED CONDUCTOR INSTALLATION REPORTING

In Section 7.3.3.3, page 161 covered conductor installation, report on the following key information for covered conductor installation:

- Methodology for installation and implementation

Covered conductor is installed as a component of the PacifiCorp Line Rebuild Program. The line rebuild program includes installing covered conductor, replacing poles with more fire resistant materials, and replacing small diameter copper conductor. When a circuit is identified for the Line Rebuild Program based on risk, engineering looks at the full system along that line for upgrades to align with Wildfire Mitigation objectives. Lines identified during the Line Rebuild evaluation for covered conductor installation are installed per internal standards and policies.[32] These policies and standards align with the manufacturer recommendations and provide the overall instruction for field installations.

- Design and design considerations (such as selection of type of covered conductor, additional hardware needed for installation, pole strengthening or replacements, etc.)

Once the line is identified for rebuild, generally as a result of risk analysis intended to reduce the potential for PSPS events, area engineering evaluates the scoped line for additional hardware needed for installations, similar to how other distribution projects are defined such as new connections or load growth accommodations. Additional hardware can include items such as cross arm replacement, pole replacement and small copper diameter conductor replacement. After the general scope is finalized, a detailed engineering analysis for each pole and segment is performed by a licensed engineering contractor. This pole loading calculations to determine whether pole replacements are needed to accommodate the additional weight of covered conductor. As a final step prior to construction, this detailed analysis is quality checked internally by engineering to ensure the final design meet internal standards.

- Implementation (including timeframes, prioritization, contractor and labor needs, etc.)

General implementation progress and timelines for covered conductor are included in Table 12 of 2022-05-02_PC_2022_Q1-QDR_R1.xlsx. Since initiation in 2019, the company has delivered fewer miles of covered conductor in California than planned and is currently faced with the continued challenge of ramping up to achieve 2022 targets. Line rebuild projects using covered conductor were initially viewed similar to other distribution projects with short lead times and moderate construction needs. However, these projects generally require a 12-24 project pipeline, depending on permitting and right of way requirements. Additionally, construction resources within the region tend to compete, resulting in construction bottle necks. PacifiCorp acknowledges that these challenges are likely to continue and impact the delivery of covered conductor. To address these challenges, PacifiCorp is planning to engage

[32] Example internal standards include Policy ED 061 and ED-061 supplied via data request to OEIS on March 8, 2022.

a construction management partner through a competitive bidding process in 2022. This new contracted partner is expected to facilitate delivery of the various aspects of covered conductor projects, such as project management, project controls, project reporting, engineering, estimating, permitting, surveying, material procurement, material management, construction, and post construction inspections. PacifiCorp anticipates that the new contracted partner will begin supporting the delivery of covered conductor in late 2022 or early 2023.

- Long-term operations and considerations (including maintenance, long-term effectiveness and feasibility, effectiveness monitoring, etc.)

Maintenance for covered conductor as per GO 95 and 165 will be integrated into the 2023 visual inspection processes for damage. PacifiCorp plans to monitor and measure effectiveness as per the initiative evaluation processes described in Attachment 6.

- Key assumptions

Key assumptions in the cost effectiveness of covered conductor have been explained in Attachment 6.

- Cost-effectiveness evaluations (including cost breakdown per circuit mile, comparison with alternatives, etc.)

PacifiCorp cost effectiveness evaluation of covered conductor has been provided in the Attachment 6: Joint Utility Response to Covered Conductor, provided to OEIS.

- Any other activities relevant to the covered conductor installation

PacifiCorp installs covered conductor and undergrounds conductor as part of the Line Rebuild Program described in Section 7.3.3.3 starting on page 161.

9.4 UNDERGROUNDING IMPLEMENTATION REPORTING

In Section 7.3.3.16, on page 171, undergrounding of electric lines and/or equipment, report on thefollowing key information for undergrounding implementation:

- Methodology for installation and implementation

As described in Section 7.3.3.3 starting on page 161, PacifiCorp evaluates the potential to convert overhead lines to underground lines for rebuild projects on a project-by-project basis. Through the design process, each individual project is assessed to determine whether sections of the rebuild should be completed with underground construction. Once selected, PacifiCorp installs underground lines consistent with engineering standards, local permitting requirements, and general construction practices.

- Design and design considerations (such as permitting requirements, additional hardware needed for installation, etc.)

When compared to overhead installations, undergrounding requires different conductor, vaults, and pad mounted equipment. Additionally, when converting to underground, customer equipment, such as meter bases, generally need to be changed or reconfigured. Generally, PacifiCorp does not have easements larger than what is needed for overhead lines and, therefore, conversion to underground often requires additional easements as the effective footprint of underground can be larger than overhead.

Despite these challenges undergrounding can be an appropriate solution in many instances. For example, the preferences of certain land-owners may favor undergrounding, and/or codes and zoning restrictions may dictate the use of underground. Furthermore, in highly remote or rugged terrain locations with few customer connections, underground may be the preferred alternative to improve reliability and reduce wildfire risk. Most customer overhead meter bases cannot accept underground conductor or are located in an area that may not support underground installation, therefore there can be a significant cost associated with converting an overhead line to underground where there are a lot of customers on the line.

- Implementation (including timeframes, prioritization, contractor and labor needs, etc.)

A typical timeline for undergrounding conductor can be two to five years, depending on land use permitting, easement requirements, number of customer connections, road or railroad crossings, and general topography. Underground projects also generally take longer to construct and can require additional contractors for civil construction work, and equipment operators.

Undergrounding conductor, when used, is a component of the line rebuild program, thus it is prioritized the same way as covered conductor. The general implementation process for underground is described below.

- Long-term operations and considerations (including maintenance, long-term effectiveness and feasibility, effectiveness monitoring, etc.)

As described in Section 7.3.3.3 starting on page 161, underground if generally the most effective at reducing the risk of any utility-related ignition. Other benefits include aesthetics, reliability, and PSPS avoidance. Additionally, underground installations do not require the

same vegetation management or asset inspection activities as overhead installations. This can be a long term operational and cost consideration. However, operations and maintenance of underground is not without challenges. Routine assessment of asset condition, typical accomplished through visual inspections for overhead equipment, can require the use of very expensive, highly specialized equipment. Additionally, should a fault occur on underground equipment resulting in an outage, fault location and restoration can be more challenging and more costly as compared to overhead installations. Additionally, the general cost of underground construction often makes it difficult to apply on a widespread basis. As described in Section 7.3.3.3 starting on page 161, PacifiCorp, at this time, is considering limited and strategic use of undergrounding on a project-by-project basis and plans to continue learning from other utilities that may be using underground more broadly as a wildfire mitigation tactic.

- Key assumptions

PacifiCorp generally assumes that underground is the most effective tactic to reduce ignition risk by eliminating or nearly eliminating the potential for contact with object, vegetation management, or other weather-related impact such as wind, which are get ignition risk drivers. Additionally, based on experience, PacifiCorp assumes that underground is more costly to construct that overhead.

- Cost-effectiveness evaluations (including cost breakdown per circuit mile, comparison with alternatives, etc.)

Generally, undergrounding conductor is more expensive than covered conductor due to the increase in equipment needed, additional procurement of land and additional labor. PacifiCorp estimates, based on experience and general observation of the California Service Territory that undergrounding could cost between $1 million - $6 million per line mile. The large range of costs reflects variation in permitting, construction, and number of meters on the line.

- Any other activities relevant to the undergrounding implementation

PacifiCorp installs covered conductor and undergrounds conductor as part of the Line Rebuild Program described in Section 7.3.3.3 starting on page 161.