Application No. 22-05-006
Exhibit PAC/1800
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Supplemental Testimony of Allen Berreth

April 2023

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ATTACHED EXHIBITS

Exhibit PAC/1801—2020 California Wildfire Mitigation Plan

Exhibit PAC/1802—2021 and 2022 California Wildfire Mitigation Plan Update

Exhibit PAC/1803—Final Distribution Security Plan

Exhibit PAC/1804—Direst Testimony of Brett S. Allsup from A.18-04-002

Exhibit PAC/1805—Proposed Covered Conductor Project Details Spreadsheet

Exhibit PAC/1806—Alternatives to Initiatives (Guidance 2 worksheet)

Augmented for Proposed Programs

Q. Are you the same Allen Berreth who previously submitted direct, supplemental, and rebuttal testimony in this proceeding on behalf of PacifiCorp d/b/a Pacific Power (PacifiCorp or the Company)?

A. Yes.

I. PURPOSE OF TESTIMONY

Q. What is the purpose of your second supplemental testimony?

A. On February 10, 2023, the California Public Utilities Commission (Commission) issued a Ruling ordering supplemental testimony on PacifiCorp's risk-based analysis and investment decisions (February 10 Ruling).[1] This testimony is specifically focused on the areas of distribution physical security, wildfire mitigation, and vegetation management.

Q. Does your testimony address any specific requirements of the Order?

A. Yes. My testimony addresses requirement 1part (a), 2 part (a), which focuses on the risk-based decision-making framework, and requirement 3 parts (c) – (f) of Appendix A of the February 10 Ruling, which focus on wildfire mitigation and vegetation management costs.

II. RISK-BASED INVESTMENT TESTIMONY

Q. The February 10 Ruling requires PacifiCorp to "present testimony that provides the actual relevant analysis and conclusions supporting its proposed investments as part of the testimony."[2] Are you prepared to do that as part of this testimony?

A. Yes. I have attached PacifiCorp's testimony on the implementation of the risk-based

[1] *Administrative Law Judge's Ruling Ordering Supplemental Testimony* at Attachment A (Feb. 10, 2023).
[2] *Id.*

decision-making that was filed in PacifiCorp's 2019 General Rate Case to this testimony as Exhibit PAC/1801. Additionally, I have also attached PacifiCorp's 2020 Wildfire Mitigation Plan, and the 2021 and 2022 Updates, to my testimony as Exhibit PAC/1802.

Q. What are the investments that PacifiCorp has identified as incremental Risk-Based Spend in this proceeding?

A. Below is the updated table from my Direct Testimony (PAC/800) which identifies the total company incremental Risk-Based Spend that has been included in this proceeding.

Table 1: Updated Proposed Incremental Risk-Based Spend

Risk to be Mitigated	Type of Spend	Time Period	Total Spend Proposed
Distribution Physical Security	Capital	2022-2023	$105,000[3]
Wildfire Risk	Capital	2022-2023	$74,291,752
Wildfire Risk	Expense	2023	$5,864,719

Q. Where have you provided support for the $105,000 for Distribution Physical Security that has been proposed for inclusion in this proceeding?

A. These investments were supported in section IV of my direct testimony (PAC/800) where I discussed how these investments were identified through the Company's Final Distribution Security Plan. The Final Distribution Security Plan is provided as Exhibit 1803 to this testimony.

[3] A portion of the $105,000 spend identified here may not be in service until 2024, pending project completion date.

Q. Where have you provided support for the approximately $80 million in Wildfire Risk Spend?

A. These investments and proposed updates have been described in detail through my direct (PAC/800),[4] supplemental (PAC/1200),[5] and Rebuttal (PAC/1600)[6] testimony. These investments are further supported by the approved Wildfire Mitigation Plan and Updates, which are provided in Exhibit 1802.

III. PACIFICORP'S RISK-BASED DECISION-MAKING FRAMEWORK

Q. Does PacifiCorp believe that Decision 19-04-020 (Decision) requires it to use the Voluntary Agreement to structure the risk-based decision-making components for all of its General Rate Case filings?

A. Yes. Ordering paragraph fifteen (15) of the Decision approved the Voluntary Agreement for a Risk Based Decision-Making Framework between the Safety and Enforcement Division and the Small and Multi-Jurisdictional Utilities as contained in Attachment 3 of the Decision with the understanding that Bear Valley Electric Service, Liberty Utilities, PacifiCorp, and Southwest Gas Corporation would begin using this framework to structure the risk-based decision-making components of their General Rate Case (GRC) applications starting with their respective GRC applications filed following issuance of the Decision on May 6, 2019.

Q. Did you meet these requirements of this Voluntary Agreement?

A. Yes. See Table 1 below that outlines the requirements in D.19-04-020 and where PacifiCorp's response can be found in corresponding testimony

[4] PAC/800, Berreth/17-34.
[5] PAC/1200, Berreth/10-24.
[6] PAC/1600, Berreth/3-14.

Table 1: Voluntary Agreement for a Risk Based Decision-Making Framework

D.19-04-020 – GRC Risk Testimony Template	**A.22-05-006 – Corresponding Testimony**
1. Witness Qualifications and Purpose of Testimony	Exh. PAC/800, p. 1 Exh. PAC/1200, p. 1
2. Description of Risk-Based Methodology	Exh. PAC/800, pp. 1–2 Exh. PAC/801, pp. 1–2 Exh. PAC/1200, pp. 1–10, 12–18 Exh. PAC/1600, pp. 14–15 (further explanation of risk modeling process)
3. Comparison with Cycla Ten-Step Approach	Exh. PAC/800, pp. 3–5 Exh. PAC/1200, pp. 1–5
4. Identification and Scoring of Top Safety Risks	Exh. PAC/800, pp. 5–6 Exh. PAC/1200, pp. 3–8 Exh. PAC/1201
4(a). Utilizing the PacifiCorp Risk Event Table	Exh. PAC/1200, p. 8 (Table 2)
5. Discussion of each major risk	Exh. PAC/800, pp. 8–12 (physical security risks), 13–17 (wildfire risk)
6. Existing Controls in place to mitigate risks	Exh. PAC/800, pp. 7 (Spill Prevention, Control, and Countermeasure program), 17–36 (wildfire risk mitigations) Exh. PAC/1200, pp. 12–18 (wildfire risk mitigations), 21–23 (PSPS refinement), 24 (covered conductor)
7. Proposed Mitigations	Exh. PAC/800, pp. 17–36 (wildfire risk mitigations) Exh. PAC/1200, pp. 12–18 (wildfire risk mitigations), 21–23 (PSPS refinement), 24 (covered conductor)

D.19-04-020 – GRC Risk Testimony Template	**A.22-05-006 – Corresponding Testimony**
8. Risk-Spend Efficiency calculation per mitigation	Exh. PAC/800, pp. 10–12 (physical security risks), 17–36 (risk analysis and costs per wildfire mitigation category) Exh. PAC/1200, p. 9 Exh. PAC/1600, p. 15
9.Alternative Mitigations and RSE	Exh. PAC/1200, p. 9
10. Request for Funding of Mitigations	Exh. PAC/800, pp. 7–8, 12–13 (physical security risks), 18 (wildfire mitigation system hardening capital costs), 28 (wildfire mitigation TY annual expense), 35 (vegetation management) Exh. PAC/1200, pp. 10–12 (explanation of cost calculation), 18–20 (expanded cost detail), 25–30 (memorandum accounts) Exh. PAC/1600, pp. 2 (cost revisions), 7–14 (response to Cal Advocates positions on costs),
11. Proposed Accountability Reporting and Monitoring of Risk Reduction	Exh. PAC/1200, pp. 20–21 (updates to wildfire risk modeling), 21–23 (PSPS refinement), 24 (covered conductor assessment) Exh. PAC/1600, pp. 5–6 (WMP review by OEIS), 5–6 (identification of new mitigation programs through WMP review).
12. Attachment or Workpaper exhibits:	
12(a). Impact and Scoring	Exh. PAC/1201
12(b). Risk Templates for Top 10 Risks	Exh. PAC/1201

Q. Can you explain why PacifiCorp did not use the outline in D.19-04-020 for organizing the testimony?

A. As the table above depicts, PacifiCorp has provided all the elements described in D.19-04-020 through the pendency of this proceeding. However, PacifiCorp provides service in five other states, and organized the testimony to describe the investments identified in the revenue requirement in this proceeding. As the most significant portion of these investments are the wildfire investments are reviewed by OEIS through the wildfire mitigation plan, PacifiCorp adjusted the organization of its testimony to reflect this.

IV. PACIFICORP'S WILDFIRE MIIGATION AND VEGETATION MANAGEMENT COSTS

Q. For the purposes of selecting mitigation measures, how does PacifiCorp approach modeling wildfire risk?

A. PacifiCorp's wildfire risk evaluation models, processes, and tools employ the concept that risk is generally a combination of likelihood and consequence. The likelihood, or probability, of an event is an estimate of a particular event occurring within a given timeframe. The consequence of an event is generally expressed in terms of potential impacts to customers, public safety partners, communities, and the utility facilities when an event occurs.

Q. What factors are considered in PacifiCorp's wildfire risk methodology?

A. PacifiCorp's risk methodology incorporates the CPUC Fire-Threat Map and High Fire Threat District (HFTD), and it considers topography, vegetation-based fuels data, climatology, demographics, historic fire weather days, live and dead fuel moisture

estimates, and the presence of structures and evaluates the potential impact in terms of harm to people and damage to property to identify the geographic areas in PacifiCorp's service territory at the greatest risk of wildfire should an ignition occur.

Q. What is the purpose of PacifiCorp's risk methodology?

A. The purpose of PacifiCorp's risk methodology is to understand the overall utility risk and associated risk components of wildfire spatially and temporally across the company's service territory, use this understanding to inform the development of a comprehensive wildfire mitigation strategy, and use a common suite of tools and analysis to inform situational awareness and assess overall utility risk and long-term investment, such as the type, scope, and timing of wildfire mitigation measures and vegetation management included in its application.

Q. For this application, what kind of risk modeling approach or analysis did PacifiCorp conduct to determine the type, scope, and timing of wildfire mitigation measures and vegetation management included in its application?

A. As described in PAC/1200 at 15, PacifiCorp's wildfire mitigation programs and costs have been developed over multiple years through the Wildfire Mitigation Plan (WMP) proceedings, which include an evaluation and evolution of risk analysis and methodologies used. PacifiCorp's modeling efforts were initially outlined in the Company's 2019 Wildfire Mitigation Plan[7] (WMP) and later evolved and expanded in subsequent WMPs and WMP Updates,[8] and leveraged the Commission-approved

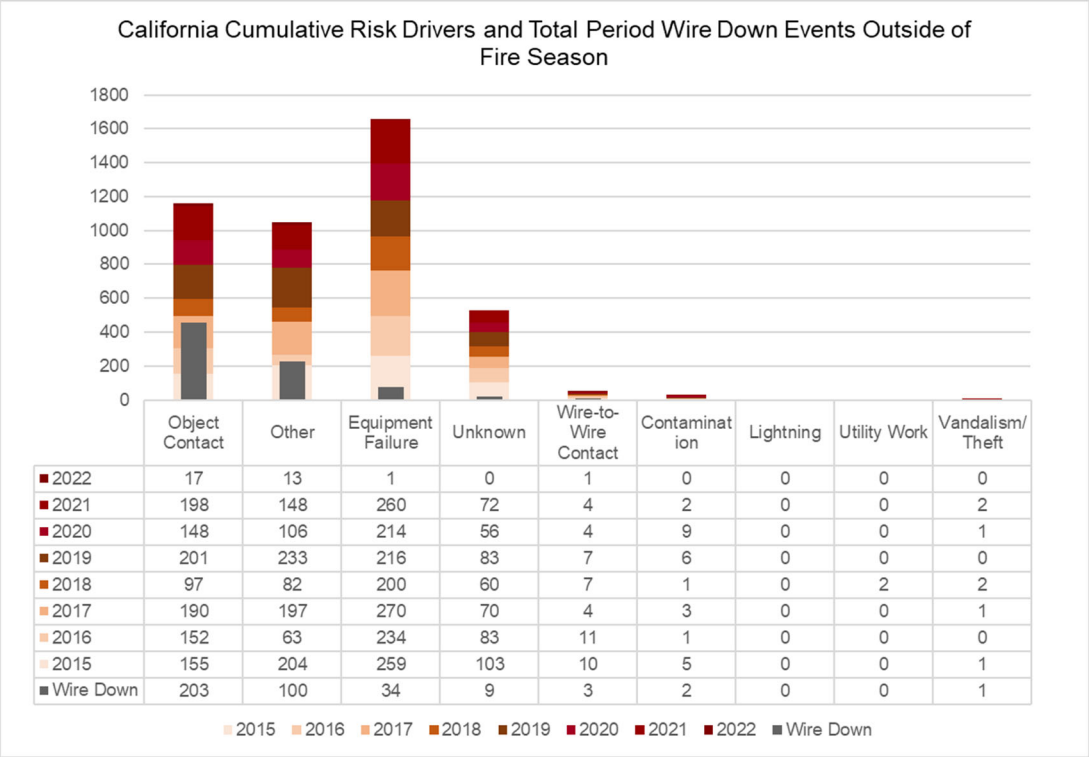
[7] As discussed in PAC/800 at 13, PacifiCorp's first Wildfire Mitigation Plan was filed and approved in 2019. PacifiCorp's three-year WMP was filed and approved in 2020.
[8] As discussed in PAC/1600 at 4, PacifiCorp's three-year WMP was filed and approved in 2020. This plan was then updated and approved in 2021. PacifiCorp's most recent annual update, the 2022 WMP Update, was filed on May 6, 2022 and approved by OEIS on December 9, 2022. As discussed above, these have been provided as PAC/1802.

High Fire Threat District (HFTD) map to identify geographic locations with a heightened level of wildfire risk. PacifiCorp then analyzed both general historic ignition data and utility related ignition data in the State of California and, more specifically, the Company's service territory in northern California to understand ignition risk drivers.

To determine the potential risk drivers specific to PacifiCorp, the Company leveraged a data driven approach that analyzed certain categories of historical outage records as a proxy for risk events. Outage data is the best available data to correlate an identifiable event on the electrical network to the risk of a utility related wildfire. There is a logical physical relationship: when a fault creates a spark, there is a risk of fire. An unplanned outage – which is when a line is unintentionally de-energized – is most often the result of a fault. Accordingly, the Company closely analyzed the causes and frequency of outages. This analysis was leveraged to determine which wildfire mitigation programs and protocols are best suited to minimize fault events, thereby reducing the risk of fire.

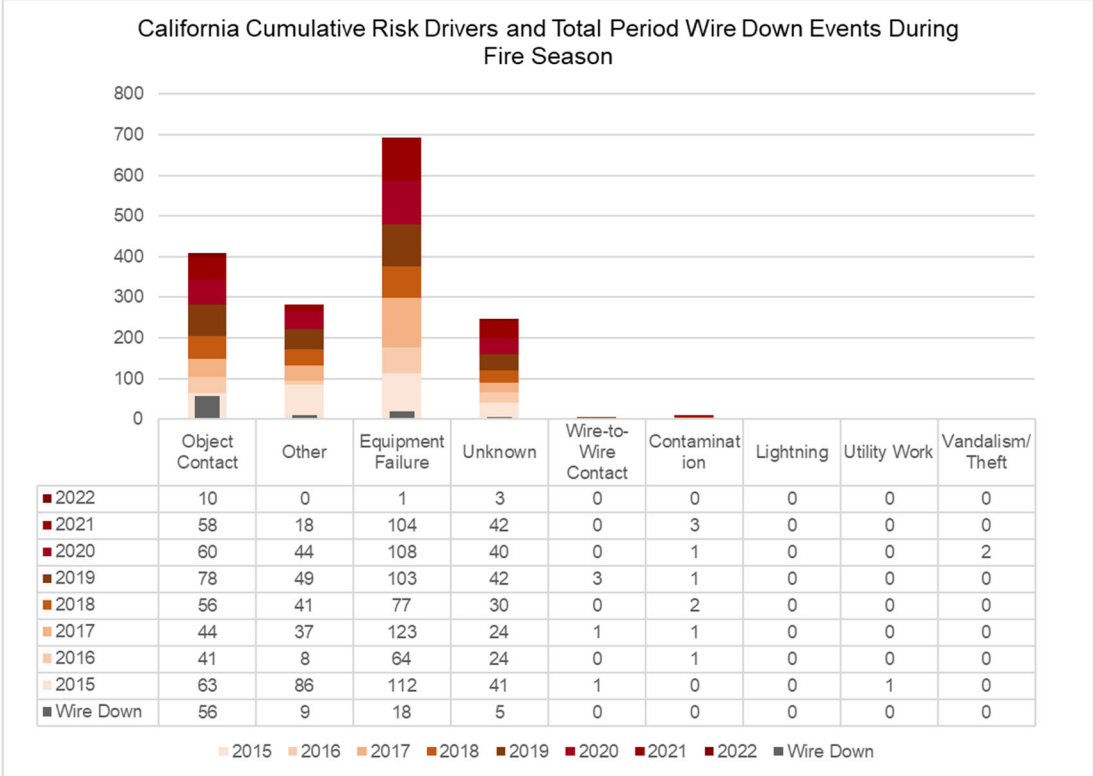
In the first years of the WMP implementation, information from the ignition risk drivers helped shape PacifiCorp's programs which typically focus on methods, tactics, and technologies that reduce outages or, more specifically, fault events as noted above. Figure 1and Figure 2 demonstrate PacifiCorp's cumulative risk drivers and wire down events experienced outside of fire season and during fire season since 2015. As demonstrated in the figure, PacifiCorp's primary risk drivers with wire down events are object contact, other, equipment failure, and unknown.

Figure 1: California Risk Drivers and Wire Down Events Outside of Fire Season



	Object Contact	Other	Equipment Failure	Unknown	Wire-to-Wire Contact	Contamination	Lightning	Utility Work	Vandalism/ Theft
2022	17	13	1	0	1	0	0	0	0
2021	198	148	260	72	4	2	0	0	2
2020	148	106	214	56	4	9	0	0	1
2019	201	233	216	83	7	6	0	0	0
2018	97	82	200	60	7	1	0	2	2
2017	190	197	270	70	4	3	0	0	1
2016	152	63	234	83	11	1	0	0	0
2015	155	204	259	103	10	5	0	0	1
Wire Down	203	100	34	9	3	2	0	0	1

Figure 2: California Risk Drivers and Wire Down Events During Fire Season



	Object Contact	Other	Equipment Failure	Unknown	Wire-to-Wire Contact	Contamination	Lightning	Utility Work	Vandalism/ Theft
2022	10	0	1	3	0	0	0	0	0
2021	58	18	104	42	0	3	0	0	0
2020	60	44	108	40	0	1	0	0	2
2019	78	49	103	42	3	1	0	0	0
2018	56	41	77	30	0	2	0	0	0
2017	44	37	123	24	1	1	0	0	0
2016	41	8	64	24	0	1	0	0	0
2015	63	86	112	41	1	0	0	1	0
Wire Down	56	9	18	5	0	0	0	0	0

Table 2 below generally maps PacifiCorp's key risk drivers to the primary programs included in the WMP, demonstrating what elements impact a group or groups of risk drivers. It is important to note that elements in the table may not address a risk driver 100 percent but are designed to mitigate the risk associated with that driver. Furthermore, for many risk drivers, risk is mitigated through a combination of programs and there is not always a 1:1 relationship between a risk driver category and a mitigation program. All elements and programs in the plan, including system hardening and vegetation management, work together to collectively mitigate wildfire risk.

Table 2: Risk Driver Mapping to Potential Mitigation Programs

Key Risk Driver (Highest Risk to Lowest Risk)	Significant Contributor to Wire Down Events	Potential Mitigation Categories / Programs				
		Asset Inspections	**Vegetation Management**	**System Hardening**	Field Operations	System Operations
Object Contact	X	X	**X**	**X**	X	X
Other	X	X	**X**	**X**	X	X
Equipment Failure	X	X	**X**	**X**	X	X
Unknown	X	X	**X**	**X**	X	X
Wire-to-wire Contact	X	X		**X**	X	X
Contamination		X		**X**	X	X
Lightning				**X**		
Utility Work		X		**X**	X	X
Vandalism/Theft		X		**X**		

Q. How did this analysis inform type, scope, and timing of wildfire mitigation measures and vegetation management included in its application?

A. As outlined above, the Commission-approved HFTD map identified locations of heightened wildfire risk within PacifiCorp's service territory. The evaluation of risk drivers identified PacifiCorp's top key risks and informed what program elements best mitigate these key risks. In terms of type, both system hardening and vegetation management programs were developed and selected to mitigate the top wildfire risk

drivers of contact with object, other, equipment failure, and unknown, a category that is generally attributed to temporary risk events not determined during response patrols. Regarding scope, the programs were selected for deployment throughout the HFTD and prioritized to the high-risk locations first, generally focused on Tier 3.

Q. Did this analysis include any quantitative risk reduction calculations or effectiveness estimates?

A. No, the required analytical tools and datasets were not in use and available at that time; however as described below, these measures are planned for the future.

Q. How did PacifiCorp determine the proposed wildfire mitigation measures were reasonable and cost-effective?

A. As described above, this analysis included identification of top risk drivers. As the proposed costs and programs are designed to mitigate these top risks, PacifiCorp believes these mitigation measures are reasonable. Additionally, through participation in the Joint Utility Covered Conductor Working Group established by the Final Decisions of the investor-owned utilities' 2022 WMP Updates, PacifiCorp has been able to collaborate and benchmark with other utilities and learned its proposed costs and programs are generally consistent with known utility practices leveraged in California to mitigate wildfire risk. For example, PacifiCorp's general conclusion that covered conductor is an effective mitigation strategy in geographic areas of highest wildfire risk is aligned with and consistent with other utilities in California.

Q. Does PacifiCorp plan to develop its own quantitative assessment of effectiveness in the future?

A. Yes. As described in the Company's WMP, PacifiCorp is investing in data analytics software beginning in 2023 to enable the evaluation of overall effectiveness of mitigation programs, validate risk modeling assumptions and outputs, and enable Risk-Spend Efficiency (RSE) calculations. Once complete, the effectiveness model will calculate the risk reduction resulting from system hardening or other wildfire mitigation projects in a proposed project site. This will be determined based on how the potential mitigation project addresses risk drivers contributing to elevated wildfire risk in that specific location. As described above, this is an area of active research in utility risk management and PacifiCorp is participating in joint working groups with other utilities, government agencies, and wildfire risk experts to implement best practices for accurately modeling mitigation effectiveness. The effectiveness model will be used to enhance existing processes for project selection by incorporating risk modeling tool outputs and the estimated risk reduction of potential wildfire mitigations into a user-friendly analytics platform for use by program managers and project engineers.

Q. In determining these programs, did PacifiCorp consider any alternatives?

A. Yes. As part of its WMP, PacifiCorp systematically identified alternatives on both a macro level as well as an individual initiative or program level, which were explored in PacifiCorp's First Quarterly Report on Progress filed September 9, 2020.

Q. What were the alternatives considered for wildfire mitigation measures and vegetation management included in its application?

A. Program alternatives for specific initiatives were outlined in PacifiCorp's First Quarterly Report on Progress filed September 9, 2020. As noted in the report, any particular alternative needs to be considered, more often than not, in conjunction with other variables at issue in deployment at any particular location, especially given that initiatives and programs typically work in conjunction to mitigate PacifiCorp's top wildfire risk drivers described in my testimony above. Along these lines, it may not make sense to assume that one initiative can be compared to another initiative on a wholesale basis, without factoring those many other variables. Consequently, the Company incorporates a qualitative analysis to identify, at a program level, the general alternatives and criteria that might elevate an alternative in certain circumstances. See Exhibit/PAC 1806, adapted from PacifiCorp's First Quarterly Report on Progress filed September 9, 2020.

Q. Has this analysis substantively changed since September 9, 2020?

A. No. The assessment of alternatives has not substantively changed. The programs themselves have evolved and improved through the WMP process. For example, in the 2020 three-year WMP, the covered conductor program was forecasted to include approximately 131 miles of covered conductor. Through additional analysis, feedback and continuous improvement, this program has expanded significantly.

Q. How many cumulative miles of covered conductor is PacifiCorp proposing in this application?

A. From 2021 to 2025, PacifiCorp is proposing 434 miles of covered conductor which

reflects 17 percent of overhead distribution miles within PacifiCorp's overall service territory and 53 percent of the overhead distribution miles within the HFTD Tiers 2 and 3. See Table 3 below.

Table 3: Cumulative Miles of Covered Conductor Proposed[9]

Year	Non-Tier (miles)	HFTD: Tier 2 & Tier 3 (miles)	Total (miles)
2021	**0**	**7**	**7**
2022	**0**	**30**	**30**
2023	**0**	**195**	**195**
2024	**3**	**110**	**113**
2025	**0**	**89**	**89**
Total Proposed (2021-2025)	**3**	**431**	**434**
Total Overhead Distribution Miles in Service Territory	**1,707**	**814**	**2,521**
% of Total in Proposal	**0%**	**53%**	**17%**

Q. What additional details can you provide regarding these proposed miles?

A. The summary of proposed miles of covered conductor above was compiled using specific details of both completed and planned projects. These details, which include project name, incurred or planned costs, location, mileage, description, and status have been included as Exhibit PAC/1805.

Q. Will PacifiCorp's covered conductor program end in 2025?

A. No. The plan total in Table and Exhibit PAC/1805 reflect the total planned projects through 2025. PacifiCorp's full covered conductor program, which includes over 800 miles and 100 percent of the HFTD, is forecasted to continue through 2029.

[9] Consistent with PAC/1200 at 12 and how dollars are reported and forecasted, miles reported and forecasted in this table are determined based on what the full project was or will be considered used and useful. This practice is different than WMP or quarterly reporting to the Office of Energy Infrastructure Safety which include partial project "segment" reporting to track progress.

Q. Table 4 included in PAC/1200 provided expanded cost detail of distribution wildfire mitigation programs originally included in Table 3 of PAC/800. Can you provide an update on actual costs incurred in 2022?

A. Yes. PacifiCorp incurred $36 million total capital expenditures placed in service in calendar year 2022. See Table below.

Table 4: Planned and Actual Distribution Wildfire Mitigation Capital Expenditures in Calendar Year 2022

Distribution Program	CY2022 Plan[10]	CY2022 Actuals
System Hardening: Line Rebuild	$27,967,865	$31,272,298
System Hardening: Advanced Protection & Control	$3,520,000	$4,537,523
System Hardening: Pole mounted overcurrent and overvoltage equipment replacement	$2,644,000	$0
Installation of Weather Stations	$1,250,000	$287,646
Total Distribution	**$35,381,865**	**$36,097,467**

V. CONCLUSION

Q. Please summarize your recommendation to the Commission.

A. I recommend that the Commission approve the wildfire mitigation costs as proposed by the Company and including the updates noted in previous testimony and revenue requirement update.

Q. Does this conclude your second supplemental testimony?

A. Yes.

[10] See Table 4 of PAC/1200.

Application No. 22-05-006
Exhibit PAC/1801
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Supplemental Testimony of

Allen Berreth

2020 California Wildfire Mitigation Plan

April 2023



2020 California Wildfire Mitigation Plan

PacifiCorp

Implementing Requirements of Senate Bill 901 and Rulemaking 18-10-007

February 7, 2020

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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 populations	Per Government 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 are particularly likely to contact power lines in the event of high winds and/or ignite if they catch a spark.
Baseline (ignition probability, maturity)	A measure, typically of the current state, to establish a starting point for comparison.
Carbon dioxide equivalent	Tons of greenhouse gases (GHG) emitted, multiplied by the global warming potential relative to carbon dioxide.
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	In accordance with the interim definition adopted in D.19-05-042, 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 stations, emergency operations centers), government facilities sector (schools, jails, 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), 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), and chemical sector (facilities associated with the provision of manufacturing, maintaining, or distributing hazardous materials and chemicals).
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.

Term	Definition
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.
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 CALFIRE and loCALFIRE agency evacuation orders, to include both “voluntary” and “mandatory” in addition to other orders such as “precautionary” and “immediate threat”.
Fuel density	Mass of fuel (vegetation) per area which could combust in a wildfire.
Fuel management	Removing or thinning vegetation to reduce the potential rate of propagation or intensity of wildfires.
Fuel moisture content	Amount of moisture in a given 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 in order 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 in order 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).
High Fire Threat District (HFTD)	Per D.17-01-009, areas of the State designated by the CPUC and CALFIRE to have elevated wildfire risk, indicating where utilities 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” shall be defined as those areas with a population of less than 7 persons per square mile.
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).
Ignition-related deficiency	Any condition which may result in ignition or has previously resulted in ignition, even if not during the past five years.

Term	Definition
Impact/consequence of ignitions	The effect or outcome of a wildfire ignition, affecting objectives, which may be expressed by terms including, although not limited to health, safety, reliability, 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 in order to validate that a piece of equipment is in good condition and expected to operate safely and effectively.
Invasive species	Non-native species whose proliferation increases the risk of wildfires.
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.
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 were it 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.
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	An event with significant probability of ignition, including wires down, contacts with objects, line slap, events with evidence of significant heat generation, and other events that cause sparking or have the potential to cause ignition.
Near-miss simulation	Simulation of what the consequence would have been of an ignition had it occurred.
Need for PSPS	When utilities' criteria for utilizing PSPS are met.
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.

Term	Definition
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-ignited wildfire.
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 in the course of other company business.
Percentile conditions	Top X% of a particular set (e.g. wind speed), based on a historical data set with sufficient detail.
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	Measurements of activity identified in WMPs and subsequent annual updates, in terms of volume or scope of work, such as number trees trimmed or miles of power lines hardened.
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 were destroyed by wildfire, including both third-party property and utility assets.
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.
PSPS weather	Weather that exceeds a utility's risk threshold for initiating a PSPS.
Red Flag Warning	RFW, level of wildfire risk from weather as declared by the National Weather Service.

Term	Definition
RFW Circuit Mile Day	Sum of miles of utility grid subject to Red Flag Warning each day. For example, if 100 circuit miles were under a RFW for 1 day, and 10 of those miles were under RFW for an additional day, then the total RFW circuit mile days would be 110. To calculate a Red Flag Warning (RFW) day, hours of a RFW shall be converted to fractions of a day by dividing by 24. For example, if a period of 12 days saw 1 hour of RFW each day, then the number of RFW days would be 12 * 1 hour / 24 hours = 0.5 RFW days. The reporting unit RFW circuit mile days takes into account the geographic scope of the RFW by multiplying its duration by the number of circuit miles within the scope of the RFW during the given time. [1]
Risk map[2]	A collection of data sufficient to represent the spatial distribution (e.g., across a geography) of a given type of risk (i.e., the probability of an event and its consequence) and the spatial representation thereof. Data inputs shall include the variables and conditions used to calculate risk for a given point, line, or polygon.
Risk mapping algorithm[3]	A risk mapping algorithm is a methodology for calculating risk levels from data inputs across a spatial display (i.e., map of geography).
Risk-spend efficiency	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.
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" shall 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.
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.
Span	The space between adjacent supporting poles or structures on a circuit consisting of electric line 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.

[1] Definition amended per WMP Clarification Document from 11/15/2020 at page 11.
[2] Added per WMP Clarification Document from 11/15/2020 at page 11.
[3] Added per WMP Clarification Document from 11/15/2020 at page 11.

Term	Definition
Top 30% of proprietary fire potential index	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).
Trees with strike potential / hazard trees	Trees that could either 'fall in' to a power line, or have branches detach and 'fly in' to contact a power line in high-wind conditions.
Unplanned outage	Electric outage that occurs with no advance notice from the utility (e.g. blackout).
Urban region	In accordance with GO 165, "urban" shall 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-ignited wildfire	Wildfires ignited by utility infrastructure or employees, including all wildfires determined by AHJ investigation to originate from ignition caused by utility infrastructure.
Vegetation management	Trimming and clearance of trees, branches, and other vegetation that poses the risk of contact with electric equipment.
Vegetation risk index	Risk index indicating the probability of vegetation-related outages along a particular circuit, based on the vegetation species, density, height, and growth rate.
Weather normalization	Adjusting metrics based on relative weather risk, with RFW circuit mile days as the normalization factor.
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 a combination of various outcomes of the wildfire and their associated probabilities.
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
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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Executive Summary

Wildfire has long been an issue of notable public concern, especially for electric utilities that have always needed to mitigate the potential for a wildfire sparked by an electric facility. As discussed below, the California Public Utilities Commission (CPUC or Commission) has worked to address the specific risks created by operation of an electric grid with targeted regulations and programs since at least 2007. PacifiCorp, in California d/b/a PacifiCorp, has been an active participant in these proceedings. However, decades of trends in the growth of wildfire frequency, size and intensity have magnified these concerns and necessitated a more intensive prevention and response paradigm. At the same time, increasing and widespread human development in the wildland-urban interface has increased the areas where people (and their residences) are intermixed with, or located near, substantial wildland vegetation. This has exacerbated the costs of wildfire damage in terms of both property damage and loss of human life. The November 2018 Camp Fire presents a devastating recent example; this fire decimated the city of Paradise and resulted in the death of 87 people.

The CPUC first initiated a decade-long fire safety rulemaking that began in 2008. The first phase of this rulemaking focused on immediate measures in the highest fire risk area, in southern California. Thereafter rules of a longer implementation time were developed that would 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 risks on its systems As result a Fire Prevention Plan and a Drought Mitigation Plan were prepared and implemented starting in 2014. In early 2018 as the multiple phase rulemaking concluded, the state of California experienced catastrophic wildfires in both northern and southern California making clear that these efforts needed to be augmented.

In response to Senate Bill (SB) 901,[4] California took a comprehensive approach to mitigating wildfires while also working to create a more resilient electric grid. A key element of SB 901 is the requirement for all electric utilities to develop and implement Wildfire Mitigation Plans (WMPs). These WMPs were first filed and approved in 2019; this 2020 WMP builds on the company's 2019 WMP and includes the additional information requested by the Commission pursuant to its updated WMP filing templates. This WMP represents another incremental step towards mitigation of these wildfire risks in the state of California.

The first WMPs were developed and filed in the Commission's rulemaking docketed as R.18-10-007. Following approval of the 2019 WMPs, the Commission has continued to engage with stakeholders, including the utilities, to improve and refine the WMP process. As a result of this stakeholder engagement, the 2020 WMP includes an increase in robust data that is intended to allow the Commission and stakeholders to review each utility's progress in mitigating wildfire risk and hardening their systems. While all major initiatives require a ramp-up period, PacifiCorp has made strides during the first year of its WMP implementation and has intended to capture its successes and lessons learned in this filing. Among other things, the 2020 WMPs are designed to continue collecting baseline data to evaluate progress on a going forward basis. While PacifiCorp is unable to provide five years of historic data for all of the metrics included in this report, the company has and will continue to improve upon its data collection as implementation of wildfire mitigation measures continue.

[4] SB 901 was signed into law by the Governor of California in September 2018.

The company also notes that as a small, multi-jurisdictional utility it was not subject to the Safety Model and Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP) requirements that are applicable to the three large investor owned utilities. These requirements were adopted by the Commission as part of rulemaking R.13-11-006. PacifiCorp (and the other small and multi-jurisdictional utilities) were respondents to that rulemaking; however, the Commission determined that the risk-based decision making requirements adopted for California's three largest electric utilities should not initially apply to smaller utilities, including PacifiCorp, because it would not be practical or appropriate to apply the same processes to these much smaller entities. Instead, the CPUC required the small and multi-jurisdictional utilities to begin incorporating risk-based decision making into their General Rate Case (GRC) filings.

Starting in 2018, PacifiCorp leveraged lessons learned from other utilities, previous risk and health assessment methodologies and principles of the International Standardization Organization's "Risk Management – Principles and Guidelines"[5] to develop the company's first risk based decision-making framework, which was subsequently included in PacifiCorp's 2018 GRC filing. This methodology included an assessment of the company's top categorical risks including, but not limited to, substation transformer failure, substation circuit breaker failure, overhead distribution conductor failure, and relay mis-operation.

While PacifiCorp remains fully committed to the continued development and improvement of the company's risk based decision making framework, the company is not, however, subject to the S-MAP and RAMP requirements in the same way or on the same timeline. Therefore many of the elements requested by the Commission in this 2020 WMP filing may not be applicable to PacifiCorp, specifically elements related to risk reduction, resource allocation methodology, and risk-spend efficiency calculation. To the extent that a program addresses a top categorical risk included in the company's GRC filing, PacifiCorp was able to qualify relative risk ranking but cannot provide the discreet calculations as requested. At the guidance of the WSD,[6] these elements are marked "does not apply," "not applicable," or "N/A" throughout this WMP. In addition, the company has not experienced any Public Safety Power Shutoff ("PSPS") events on its system; as a result, the company does not have any data of its own on which to base improvements or implementation changes. Instead, PacifiCorp has monitored the PSPS events experienced by other utilities and incorporated lessons learned into its own procedures and plans (*e.g.*, lessons learned regarding customer communications and coordination with public safety officials).

The company's WMP is intended to guide PacifiCorp's efforts to minimize the risks of a fire igniting from any of the company's facilities. The WMP also addresses the response to an active wildfire (whether ignited by the company's facilities or otherwise) to minimize the potential for damage to PacifiCorp's facilities and its customers. As set forth in greater detail in Section 5 of this WMP, 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 create its general approach to managing wildfire risk. This experience includes its years of experience implementing safety and reliability

[5] International Standardization Organization's Risk Management-Principles and Guidelines are identified as ISO 3100 and is an internationally recognized standard for risk management. Adopting these principles and guidelines positions an organization to be able to achieve objectives, improve the identification of risks, and more effectively allocate resources for risk reduction

[6] Clarified in an email from Melissa K. Semcer, Program Manager Wildfire Safety Division at the California Public Utilities Commission on January 6, 2019.

risk mitigation programs. As a result, many of the initiatives and programs identified in this plan are an extension or augmentation of scope for its already existing programs (*e.g.*, the company's vegetation maintenance inspection and correction programs). This experience was also leveraged together with historical data when new programs or activities were necessary (*e.g.*, installation of covered conductor).

Historic data used by the company to design its WMP initiatives and programs was obtained from CALFIRE data sources in addition to the company's own outage records; PacifiCorp's outage records include the frequency, duration, and cause of outages experienced on energized circuits. These outage records are used to describe ignition probability drivers and represent the most accurate depiction of how often potential ignition events may occur within the company's service territory. During 2019, the first year of its WMP implementation, PacifiCorp was able to materially implement the plan despite the constraints of start-up efforts and available resources. Section 5.0 of this plan provides additional detail regarding the company's progress; key successes during 2019 include the formation of a Wildfire Mitigation Program Office, increased staffing of a data scientist, installation of 10 weather stations for enhanced situational awareness, completion of 10 system automation projects for advanced fault detection and coordination, full implementation of HFTD inspection and correction requirements, partial completion of various inspection related pilot projects, as well as other efforts summarized in Section 2.5.

The 2020 WMP builds on these successes, as described above; in Section 5 of this plan the company sets forth its objectives for the next year and the next three years. Key objectives for 2020 include installation of 38 line miles of covered conductor, installation and commissioning of 31 system automation programs, replacement of 3 line miles of small diameter copper conductor with aluminum stranded conductor, proactive replacement of 189 in-service wooden poles with fiberglass for enhanced structural resilience, as well as evaluation of various pilot project results and continued implementation of enhanced inspection and correction programs. The company expects that the first three to five years of WMP implementation will be critical in terms of establishing data records to evaluate its progress. With the creation of the 2020 WMP and related data collection, the company has made significant progress in creating and providing a baseline of data to measure its incremental changes in these programs and initiatives. WSD has also been working collaboratively with the utilities and other stakeholders to ensure that data collected is as uniform as possible in order to allow comparisons and also that the data collected is useful for evaluation purposes.

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

Program	Responsible Role/Person
PacifiCorp's 2020 Wildfire Mitigation Plan	Vice President, T&D Operations

2. Program owners specific to each component of the plan

The following table include the high level wildfire mitigation programs addressed in PacifiCorp's 2020 WMP, as well as identified responsible owners to deliver the programs. While each program may have various contributors for each specific initiative, PacifiCorp has assigned specific responsibility at the program level to one person.

Program	Responsible Role/Person
Risk Assessment and mapping	Director of Asset Performance and Wildfire Mitigation, T&D Operations
Situational Awareness and forecasting	Director of Asset Performance and Wildfire Mitigation, T&D Operations
Grid Design and system hardening	Wildfire Mitigation Delivery Director, T&D Operations
Asset Management and inspections	Director of Asset Management, T&D Operations
Vegetation management and inspections	Director of Environmental & Vegetation Management, T&D Operations
Grid operations and protocols	Vice President of System Operations, T&D Systems Operations
Data Governance	Director of Asset Performance and Wildfire Mitigation, T&D Operations
Resource allocation methodology	Director of Asset Management, T&D Operations
Emergency planning and preparedness	Disaster/Risk Planning Manager, T&D Systems Operations
Stakeholder cooperation and community engagement	Director of Commercial Accounts and Community Relations, External Affairs and Customer Solutions

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 2/5/2020 (Date) at Portland (Name of city), ~~California.~~ Oregon

David Lucas VP, T+D Operations
(Signature and Title of Corporate Officer)

2. Metrics and Underlying Data

The following subsections include PacifiCorp's performance report on progress and outcome metrics within the utility's service territory over the past five years. In most cases, PacifiCorp was able to pull data and populate the tables as the requirements were consistent with business practices or readily available data sets. However, many of the proposed metrics or reporting requirements included in this section proved challenging for PacifiCorp to populate, specifically retroactive values regarding programs that were initiated in 2019. For example, PacifiCorp incorporated specific documentation requirements into current inspection and correction programs in 2019 to reflect changing regulations. These new requirements specifically facilitate the clear identification of findings that could increase the probability of ignition as a result of inspections. Item 2.a. of Table 2 in Section 2.3 requests that PacifiCorp include the number of equivalent Level 1 findings that could increase the probability of ignition discovered per circuit mile inspected for the years 2015 through 2019. While PacifiCorp is able to clearly identify values for 2019, extrapolation was required to populate equivalent values for the years 2015 through 2018 prior to changes in regulation and subsequent amendments to PacifiCorp's documentation processes. Additionally, PacifiCorp's GIS data generally reflects the data set required to operate the system, not necessarily track asset or ancillary features and, therefore, certain data sets were not available in the manner requested. Notes are provided throughout the document where assumptions or extrapolation was required to fit PacifiCorp's available data into the specific set of requirements.

PacifiCorp understands the value of and is committed to tracking and trending metrics over time to inform decision making, effectiveness, and overall progress of programs and looks forward to continuing to capture and report data in an effective and consistent manner.

2.1 Lessons learned: How tracking metrics on the 2019 plan has informed the 2020 plan

Data and metrics captured regarding the 2019 plan or included in this section of PacifiCorp's 2020 WMP were used to inform continued progress in the implementation of the company's wildfire mitigation programs. Historic data was also used to develop the company's risk assessment and mapping which informed program development included in Section 3.0. However, PacifiCorp is early in the implementation of its multi-year WMP and, therefore, tracking metrics has not yet resulted in significant changes, lessons learned, or amendments to programs. A discussion of high level lessons learned was included in Section 5.0. These lessons learned were more operations based lessons learned and less informed through tracking 2019 metrics. Furthermore, as included in PacifiCorp's Off-Ramp filing Advice Letter filed on November 27, 2019 pursuant to Decision 19-05-036, "there are no components of the WMP currently recommended to be suspended, eliminated, or minimized within its plan due to concerns regarding effectiveness."

However, as PacifiCorp's implementation of its multi-year WMP progresses with associated tracking of metrics, the company expects that this data will become more influential and impactful to components, initiatives, or programs as a whole; PacifiCorp expects the most value will occur after the first three year period of implementation. General lessons learned through program implementation were included in Section 5.0

2.2 Recent performance on progress metrics, last 5 years

The following table includes PacifiCorp's recent performance on progress metrics over the last 5 years. As PacifiCorp's WMP and associated programs were developed in 2019, all data reported prior to 2019 represents the company's interpretation of historic data in light of current programs, risk mapping, and circuit topography.

When reviewing this data, as well as any other data included in this plan, it is critical to understand that PacifiCorp identifies, tracks, and reports inspection based on facilities[7] as opposed to line miles. When an inspector completes an inspection of a facility, the inspection includes all assets at that facility location, as well as any applicable and adjacent line miles. This method allows PacifiCorp to level load resources and distribute work as evenly as practical across each year where appropriate. While a strong correlation can be made between number of facilities and line-miles when discussing inspections, it is expected that the number of equivalent line-miles inspected in any given year will vary, often significantly, as the number of facilities to be inspected vary each year and not all spans are the same length across the entire system. Additionally, as is expected with multi-year inspection programs, the actual topology and system inspected will significantly change from year to year, to include variations in voltage, type of installation, span length, geographic location, and environmental conditions. Therefore, PacifiCorp cautions against drawing any meaningful conclusions regarding annual trends when reviewing inspection and correction metrics as included in the document. Instead, PacifiCorp recommends using the full data set provided to calculate qualitative multi-year averages, identify the relative range of values that can be expected, and understand qualitative relative order of magnitude for comparison to other utilities.

Table 1: Recent performance on progress metrics, last 5 years

#	Progress metric name	Inspection Type	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
1.a.	Grid condition[8] findings per mile of HFTD	Patrol	0.01	0.02	0.04	0.06	0.04	Findings per mile of circuit in HFTD	PacifiCorp implemented its HFTD mapping as well as fire threat condition programs 2019. Therefore, grid condition findings per HFTD were available in 2019. PacifiCorp has included the number of grid condition findings for 2015-2018 assuming that the HFTD zones are equivalent to those in 2019/2020. Additionally, PacifiCorp plans, tracks, and reports inspections and corrections per facility point as opposed to per line mile. However, equivalent inspection miles
		Detailed	9	14	15	9	7		
		Other	0.03	0.02	0.06	0.02	0.01		

[7] "Facilities" refers to a location where PacifiCorp has one or more assets installed. Usually, this would mean a pole or structure but could also be pad-mounted switchgear, a substation, or a switching station. These facilities were included in the GIS data requested in Section 2.7.
[8] PacifiCorp interprets and defines grid condition finding as an actionable Condition with an assigned Condition Code as defined and described in Section 5.3.4.

#	Progress metric name	Inspection Type	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
1.b.	Grid condition findings per total miles	Patrol	0.11	0.14	0.05	0.17	0.11	Findings per total miles of circuit	were extrapolated in years 2015-2019 assuming little to no changes in grid topology. While these values reflect best estimates or equivalent line-miles, slight difference may exist when comparing to other data sets. Furthermore, the evolution of PacifiCorp's electronic database requires extrapolation when determining condition findings per inspection type. However, PacifiCorp's programmatic inspection results were generally extrapolated and categorized as either "Detailed" or "Safety" inspection results. "Other" inspection types might include the results of internal audits or administrative changes described in Section 5.3.4.14.
		Detailed	13	17	14	12	16		
		Other	0.05	0.05	0.04	0.03	0.02		
2	Vegetation clearance findings from inspection		-	-	-	-	-	Percent of right of way with noncompliant clearance based on application rules and regulations at the time of inspection, as percentage of all right of way inspected	While PacifiCorp's programs include clearance inspections and correction of findings, the company does not currently have an electronic database that preserves the data in a way required to answer this question. However, PacifiCorp has incorporated the need for an electronic solution into a program described in Section 5.3.5.6.
3	Extent of grid modularization		N/A	N/A	N/A	N/A	17.08	Number of sectionalizing and automated grid control devices per circuit mile	
	Extent of grid modularization in HFTD		N/A	N/A	N/A	N/A	11.35		
4	Data collection and reporting						75%	Percent of data requested in SDR and WMP Collected in initial submission	Qualitative answer which takes into consideration not applicable sections noted throughout the WMP

2.3 Recent performance on outcome metrics, annual and normalized for weather, last 5 years

The following table includes PacifiCorp's recent performance on outcome metrics, annual and normalized for weather over the last 5 years. As PacifiCorp's WMP and associated programs were developed in 2019, all data reported before 2019 represents the company's interpretation of historic data in light of current programs, risk mapping, and circuit topography.

As included in the following tables, PacifiCorp interprets a fire threat (risk) condition (table 2; metric 2.2.a) to be a discovered finding that could be interpreted to reflect an increased probability of ignitions; in company standards this attribute is designated as a Fire Risk Condition and is one which based on the inspection guidelines could be expected to pose a future fire risk if not corrected in a timely fashion. See Section 5.3.4 for more information.

As included in PacifiCorp's 2019 WMP[9] and further contemplated in the company's Data Collection for WMPs Report[10], PacifiCorp concluded that a circumstance where the potential exists for a fault creating a spark, which could result in the ignition of a fire if it lands in an adequate fuel bed, is considered a potential electric utility ignition event based on both the company's review of primary causes of fires in California and available CALFIRE data sets. PacifiCorp's outage records, which document the frequency, duration, and cause of outages experienced on energized circuits, represent the most accurate depiction of how often these potential ignitions may have occurred within the company's service territory. These records were applied using the methodology included in PacifiCorp's Data Collection for WMPs Report to populate applicable values in the table below and all potential ignition event related values throughout the company's 2020 WMP.

Since the approval of PacifiCorp's 2019 WMP, the company has developed additional data collection processes consistent with conditions of the approval, including the establishment of a Fire Incident Data Reporting process and wires down events, PacifiCorp has improved its data collection methods. These efforts have likely resulted in identifying more events that could be categorized as "fires potentially involving utility equipment" or "wires down", causing an increase event counts. Prior years' data was reliant on interpretation of comments contained generally in outage records and was likely not a comprehensive listing of the more minor occurrences; noteworthy occurrences were captured through other company processes, such as claims management procedures.

As discussed above, when reviewing this data, as well as any other data included in this plan, it is critical to understand that PacifiCorp identifies, tracks, and reports inspection based on facilities[11] as opposed to line miles. Additionally, as discussed in Section 2.2, PacifiCorp cautions against

[9] See Section III.D.2 at page 24 of the Initial 2019 WMP of PacifiCorp filed 2/6/2019 pursuant to Senate Bill 901, Rulemaking (R.)18-10-007

[10] See PacifiCorp (U 901 E) Data Collection for Wildfire Mitigation Plans Report filed 7/30/19 pursuant to Senate Bill 901, and the California Public Utilities Commission Rulemaking (R.)18-10-007, Decision (D.)19-05-036

[11] "Facilities" refers to a location where PacifiCorp has one or more assets installed. Usually, this would mean a pole or structure but could also be pad-mounted switchgear, a substation, or a switching station. These facilities are included in the GIS data requested in Section 2.7.

drawing any meaningful conclusions regarding annual trends when reviewing inspection and correction metrics as included in the document. Instead, PacifiCorp recommends using the full data set provided to calculate qualitative multi-year averages, identify the relative range of values that can be expected, and understand qualitative relative order of magnitude for comparison to other utilities.

Table 2: Recent performance on outcome metrics, last 5 years

Metric Type	#	Outcome Metric Name	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
Near Misses	1.a.	Number of all events (such as unplanned outages, faults, conventional blown fuses, etc.) that could result in ignition, by type according to utility-provided list (total)	1,257	796	1,096	777	1,122	Number per year	Not limited to fire season and includes major events
	1.b.	Number of all events (such as unplanned outages, faults, conventional blown fuses, etc.) that could result in ignition, by type according to utility-provided list (normalized)	0.061	0.217	0.048	0.064	0.115	Number per RFW circuit mile day per year	
	1.c.	Number of wires down (total)	47	53	81	32	80	Number of wires down per year	Not limited to fire season and includes major events and potential ignition sources
	1.d.	Number of wires down (normalized)	0.002	0.014	0.004	0.003	0.008	Number of RFW circuit mile day per year	
Near Misses (limited to fire season)	1.a.2	Number of all events (such as unplanned outages, faults, conventional blown fuses, etc.) that could result in ignition, by type according to utility-provided list (total)	417	191	277	260	311	Number per year	Limited to fire season and includes major events
	1.b.2	Number of all events (such as unplanned outages, faults, conventional blown fuses, etc.) that could result in ignition, by type according to utility-provided list (normalized)	0.020	0.052	0.012	0.021	0.032	Number per RFW circuit mile day per year	

Metric Type	#	Outcome Metric Name	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
	1.c.2	Number of wires down (total)	7	6	8	8	19	Number per year	Limited to fire season and includes major events and potential ignition sources
	1.d.2	Number of wires down (normalized)	0.000	0.002	0.000	0.001	0.002	Number per RFW circuit mile day per year	
Utility Inspection Findings	2.a.	Number of Level 1 findings that could increase the probability of ignition discovered per circuit mile inspected	0.03	0.07	0.05	0.14	0.10	Average number of Level 1 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	PacifiCorp schedules, completes, and tracks inspection performance on a "per facility" basis as opposed to a "per mile" basis. However, equivalent inspection miles were extrapolated in years 2015-2019 assuming little to no changes in grid topology. Furthermore, PacifiCorp implemented its HFTD mapping as well as fire threat condition programs fully in 2019. PacifiCorp has attempted to interpret current day policies and apply to previous inspection and correction programs. However, sometimes this was not possible due to lack of specific data. Therefore, all data from 2015-2019 should be viewed as qualitative and not absolute.
	2.b	Number of Level 2 findings that could increase the probability of ignition discovered per circuit mile inspected	0.33	0.25	0.19	0.26	0.18	Average number of Level 2 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	
	2.c.	Number of Level 3 findings that could increase the probability of ignition discovered per circuit mile inspected	0	0	0	0	0	Average number of Level 3 findings that could increase the probability of ignition discovered by all inspections per circuit mile per year	PacifiCorp interprets all fire threats to be of either immediate or medium level of risk. Therefore, all conditions that could increase the probability of ignition are included as either Level 1 or Level 2 conditions.
Customer Hours of PSPS and other outages	3.a.	Customer hours of planned outage including PSPS (total)	47,595	60,799	58,405	70,909	80,071	Total customer hours of planned outages per year	Only planned outages, not limited to fire season and includes major events

Metric Type	#	Outcome Metric Name	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
	3.b.	Customer hours of planned outages including PSPS (normalized)	2.33	16.57	2.58	5.82	8.19	Total customer hours of planned outages per RFW circuit mile day per year	
	3.c.	Customer hours of unplanned outages, not including PSPS (total)	215,936	81,069	297,749	91,502	29,1163	Total customer hours of unplanned outages per year	Excludes planned outages, not limited to fire season and includes major events
	3.d.	Customer hours of unplanned outages, not including PSPS (normalized)	11	22	13	8	30	Total customer hours of unplanned outages per RFW circuit mile day per year	
	3.e.	Increase in System Average Interruption Duration Index (SAIDI)	(51.63)	(39.24)	(20.51)	(13.24)	(3.40)	Change in minutes as compared to the previous year	Excludes Major events and planned outages, not limited to fire season
	3.f.	Customer hours of unplanned outages not including PSPS or Major Events (total)	75,364	66,115	53,724	42,709	50,376	Total customer hours of unplanned outages per year	Excludes planned outages, not limited to fire season and excludes major events No PSPS events have occurred.
	3.g.	Customer hours of unplanned outages not including PSPS or Major Events (normalized)	3.69	18.02	2.37	3.51	5.15	Total customer hours of unplanned outages per RFW circuit mile day per year	
Customer Hours of PSPS and other outages (limited to fire season)	3.a.1	Customer hours of planned outage including PSPS (total)	12,769	27,161	14,390	45,532	24,591	Total customer hours of planned outages per year	Only planned outages, limited to fire season and includes major events
	3.b.1	Customer hours of planned outages including PSPS (normalized)	0.62	7.40	0.64	3.74	2.51	Total customer hours of planned outages per RFW circuit mile day per year	
	3.c.1	Customer hours of unplanned outages, not including PSPS (total)	31,142	16,386	8,298	47,841	20,950	Total customer hours of unplanned outages per year	Excludes planned outages, limited to fire season and includes major events
	3.d.1	Customer hours of unplanned outages, not including PSPS (normalized)	1.52	4.47	0.37	3.93	2.14	Total customer hours of unplanned outages per RFW circuit mile day per year	
	3.e.1	Increase in System Average Interruption Duration Index (SAIDI)	9.57	(49.73)	(1.13)	0.86	14.29	Change in minutes as compared to the previous year	Excludes Major events and planned outages, limited to fire season
	3.f.1	Customer hours of unplanned outages not including PSPS or Major Events (total)	20,991	15,922	8,280	9,208	20,827	Total customer hours of unplanned outages per year	Excludes planned outages, limited to fire season and

Metric Type	#	Outcome Metric Name	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
	3.g.1	Customer hours of unplanned outages not including PSPS or Major Events (normalized)	1.03	4.34	0.37	0.76	2.13	Total customer hours of unplanned outages per RFW circuit mile day per year	excludes major events. No PSPS events have occurred.
Utility Ignited wildfire fatalities	4.a.	Fatalities due to utility-ignited wildfire (total)	0	0	0	0	0	Number of fatalities per year	
	4.b.	Fatalities due to utility-ignited wildfire (normalized)	0	0	0	0	0	Number of fatalities per RFW circuit mile day per year	
Accidental deaths resulting from utility wildfire mitigation activities	5.a.	Deaths due to utility wildfire mitigation activities (total)	0	0	0	0	0	Number of fatalities per year	
OSHA reportable injuries from utility wildfire mitigation initiatives	6.a.	OSHA-reportable injuries due to utility wildfire mitigation activities (total)	N/A	N/A	N/A	N/A	0	Number of OSHA-reportable injuries per year	PacifiCorp diligently tracks all safety statistics including but not limited to accidental deaths, OSHA-reportable, or near misses. However, as PacifiCorp is early it its WMP implementation, it is challenging to report historic safety statistics regarding wildfire mitigation programs as requested, specifically any values prior to 2019 as these programs did not exist. Therefore, PacifiCorp was not able to populate all cells within the applicable tables.
	6.b.	OSHA-reportable injuries due to utility wildfire mitigation activities (normalized)	N/A	N/A	N/A	N/A	0	Number of OSHA-reportable injuries per year per 1000 line miles of grid	PacifiCorp diligently tracks all safety statistics including but not limited to accidental deaths, OSHA-reportable, or near misses. However, as PacifiCorp is early it its WMP implementation, it is challenging to report historic safety statistics regarding wildfire mitigation programs as requested, specifically any values prior to 2019 as these programs did not exist.

Metric Type	#	Outcome Metric Name	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
									Therefore, PacifiCorp was not able to populate all cells within the applicable tables.
Value of assets destroyed by utility-ignited wildfire, listed by asset type	7.a.	Value of assets destroyed by utility-ignited wildfire (total)	$98,492	$0	$0	$0	$225,692	Dollars of damage or destruction per year	
	7.b.	Value of assets destroyed by utility-ignited wildfire (normalized)	$5	$0	$0	$0	$23	Dollars of damage or destruction per RFW circuit mile day per year	
Structures damaged or destroyed by utility ignited wildfire	8.a.	Value of structures destroyed by utility-ignited wildfire (total)	$85,728	$0	$0	$0	$15,000	Number of structures destroyed per year	
	8.b.	Value of structures destroyed by utility-ignited wildfire (normalized)	$4.19	$0.00	$0.00	$0.00	$1.53	Number of structures destroyed per RFW circuit mile day per year	
Acreage burned by utility-ignited wildfire	9.a.	Acreage burned by utility ignited wildfire (total)	16	5	3	1	126	Acres burned per year	Acreage burned is an approximate value, and is not limited to wildfire. In some cases the field references the burn area as a small fire (typically a small grass fire), these fires are often under a half acre in size. For calculation purposes, fires with this designation were calculated as a half-acre. In addition CALFIRE fire perimeters were also evaluated for utility ignitions from 2015-2018 (2019 has yet to be released), and no utility caused outages occurred in PacifiCorp's Service territory.
	9.b.	Acreage burned by utility-ignited wildfire (normalized)	0.001	0.001	0.000	0.000	0.013	Acres burned per RFW circuit year	
Number of utility wildfire ignitions	10.a.	Number of ignitions (total) according to existing ignition data reporting requirement	2.00	6.00	4.00	4.00	14.00	Number per year	Fire locations are mapped to the best known location. Actual locations may vary given the data provided by the field. In some cases an address was unknown and therefore the fire
	10.b.	Number of ignitions (normalized)	0.0001	0.0016	0.0002	0.0003	0.0014	Number per RFW circuit mile per year	
	10.c.	Number of ignitions in HFTD (subtotal)	2.00	2.00	1.00	3.00	5.00	Number in HFTD per year	

Metric Type	#	Outcome Metric Name	Annual Performance					Unit(s)	Comments
			2015	2016	2017	2018	2019		
	10.c.i	Number of ignitions in HFTD Zone 1	0.00	0.00	0.00	0.00	0.00	Number in HFTD Zone 1 per year	was mapped to the closest known outage location.
	10.c.ii	Number of ignitions in HFTD Tier 2	2.00	2.00	1.00	3.00	5.00	Number in HFTD Tier 2 per year	
	10.c.iii	Number of ignitions in HFTD Tier 3	0.00	0.00	0.00	0.00	0.00	Number in HFTD Tier 3 per year	
	10.d.	Number of ignitions in HFTD (subtotal, normalized)	0.00	0.00	0.00	0.00	0.00	Number in HFTD per RFW circuit mile day per year	
	10.d.i.	Number of ignitions in HFTD Zone 1 (normalized)	0.00	0.00	0.00	0.00	0.00	Number in HFTD Zone 1 per RFW circuit mile day per year	
	10.d.ii.	Number of ignitions in HFTD Tier 2 9Normalized)	0.00	0.00	0.00	0.00	0.00	Number in HFTD Tier 2 per RFW circuit mile day per year	
	10.d.iii.	Number of ignitions in HFTD Tier 3 (normalized)	0.00	0.00	0.00	0.00	0.00	Number in HFTD Tier 3 per RFW circuit mile day per year	
	10.e.	Number of ignitions in non-HFTD (subtotal)	0.00	4.00	3.00	1.00	9.00	Number in non-HFTD per year	
	10.f.	Number of ignitions in non-HFTD (normalized)	0.00	0.00	0.00	0.00	0.00	Number in non-HFTD per RFW circuit mile day per year	
Critical infrastructure impacted	11.a.	Critical infrastructure impacted by PSPS	0.00	0.00	0.00	0.00	0.00	Number in non-HFTD per RFW circuit mile day per year Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per year	
	11.b.	Critical infrastructure impacted by PSPS (normalized)	0.00	0.00	0.00	0.00	0.00	Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per RFW circuit mile day per year	

2.4 Description of additional metrics

In 2019, PacifiCorp proposed the addition of a series of metrics that were aligned to performance such that, as time passed, the metric results could be reasonably correlated to actions taken by the company in the execution of its WMP. Some of these additional metrics were included as part of the Standard Data Request, while others are more significantly different, but are reasonably correlated to better wildfire resilience of the utility equipment.

As noted in previous filings, PacifiCorp will make data available upon request to pertinent entities or individuals, such as universities or researchers including for validation purposes. PacifiCorp also includes progress reports regarding any WMP programs or initiatives on the company's public website. PacifiCorp viewed participation in regulatory proceedings, discovery requests, and workshops as opportunity to present data, engage third parties, solicit feedback, and, where appropriate, seek validation or make necessary changes to any program or initiative. This general approach has been applied to all metrics or data sets, including those in the table below.

Table 3: List and description of additional metrics, last 5 years[12]

Metric	Performance					Unit(s)	Underlying Assumptions	Third-party Validation
	2015	2016	2017	2018	2019			
PC3a.Events Recorded with Fire Reference: Not Fire Season	14	10	1	7	20	Outage event(s)	Data source is outage reporting system in which outage makes reference to fire in comment or outage cause	As noted in previous filings, PacifiCorp will make data available upon request to pertinent entities or individuals, such as universities or researchers. PacifiCorp also includes progress reports regarding any WMP programs or initiatives on the company's public website. PacifiCorp also viewed participation in regulatory proceedings, discovery requests, and workshops as opportunity to present data, engage third parties, solicit feedback, and, where appropriate, seek validation or make necessary changes to any program or initiative. This general approach has been applied to all metrics or data sets, including those in this table.
PC3b.Events Recorded with Fire Reference: Fire Season	13	12	5	23	19	Outage event(s)		
PC4a. Events Recorded with Fire Reference: damage fire, equipment fire, pole fire: Not Fire Season	6	6	0	1	7	Outage event(s)	Subset of PC3 where record makes reference to utility equipment or key components	
PC4b. Events Recorded with Fire Reference: damage fire, equipment fire, pole fire: Fire Season	5	3	4	5	5	Outage event(s)		
PC5. Wire down risks	9	7	8	8	20	Outage event(s)	Data source is outage reporting system in which cause code or comments would result in downed conductor	
PC6. Wire down trend	NA	-2	1	0	12	Outage event(s)	Reduction in quantity of wire down events, year over year, during the designated fire season period	

[12] See PacifiCorp's July 30, 2019 filing UE901 per D. 19.05.069 for more background information and discussion of proposed metrics.

2.5 Description of program targets

In its 2019 WMP, PacifiCorp outlined specific actions intended to mitigate fire risk associated with its overhead equipment, a portion of which would be complete before the 2019 fire season as well as certain before its next WMP submission. These deliveries, in addition to effectiveness metrics the company outlined in its WMP, fulfill this plan requirement for program targets. Since 2019 was the first year of WMP implementation, all target completions are related to this first year's performance. Table 4 below includes a high level list and description of PacifiCorp's total program targets and 2019 progress to meet these overall program targets. PacifiCorp attempted to populate the Table 4 template in a way that clearly describes and accurately depicts the company's program targets. PacifiCorp augmented the table slightly to provide additional detail and context while also meeting the requirements to provide program targets. Additional data regarding PacifiCorp's progress toward the company's 2019 WMP activities and initiatives is included in Section 5.0.

Table 4: List and description of total program targets, 2019 progress[13] [14]

Program Details			Total Program Targets		2019 Progress		Underlying assumptions
Program	Initiative	Duration	Total Planned Unit(s)	Anticipated Completion (EOY)	2019 Performance / Update	Cumulative Percent Complete of Total Plan (%)	
Situational Awareness	Weather Station Installation	Multi-year (4 yr)	35 stations	2022	10 stations	29%	See Section 5.3.2.1
Asset management and inspections	Enhanced transmission inspections using IR/alternate technologies	Single pilot project (2 yr)	1 Pilot Project	2020	Implemented pilot project; 100% of total data collected	75%	See Section 5.3.4.5
	Complete planned inspections, including additional HFTD inspections	Annual program/target	3,311 equivalent line miles	Annual / on-going	3,310 equivalent line-miles	99.9% in 2019	See Section 5.3.4.3

[13] Changed from "last 5 years" per WMP Clarification Document issued 1/15/2020.
[14] As discussed in more detail above, PacifiCorp will make data available upon request to pertinent entities or individuals, such as universities or researchers for third-party validation purposes. For Table 4, third party validation has been removed as a separate column.

Program Details			Total Program Targets		2019 Progress		Underlying assumptions
Program	Initiative	Duration	Total Planned Unit(s)	Anticipated Completion (EOY)	2019 Performance / Update	Cumulative Percent Complete of Total Plan (%)	
	Implement LiDAR inspection pilot project for distribution and transmission lines	Single pilot project (2 yr)	1 Pilot Project	2020	Completed flights and collection of data	75%	See Section 5.3.4.7
System Hardening:	Installation of Covered Conductor	Multi-year (5 yr)	221 line-miles	2023	Engineering and scoping completed for 38 line-miles planned in 2020	10%	See Section 5.3.3.3
	Replacement of Cu Conductor	Multi-year (5 yr)	53 line miles	2023	Engineering specification and scope completed for 3 line miles planned in 2020;	3%	See Section 5.3.3.18
	Installation of System Automation Equipment	Multi-year (4 yr)	68 projects	2022	10 projects complete	15%	See Section 5.3.3.9
	Proactive Wood Pole Replacement	Multi-year (5 yr)	4,000	2023	Engineering standard and specification completed;	10%	See Section 5.3.3.6
Vegetation Management and Inspections: Vegetation Management and Inspections:	Detailed inspections of vegetation around distribution (and transmission) electric lines and equipment	Annual program/target	1,170 line miles	Annual / on-going	1,170 line-miles	100% in 2019	See Section 5.3.5.2 & Section 5.3.5.3
	Other – Radial Pole Clearing	Annual program/target	15,060 poles	Annual / on-going	14,132 poles expanded program in 2019,full program in 2020	94% in 2019	See Section 5.3.5.9

2.6 Detailed information supporting outcome metrics

The following tables include PacifiCorp's detailed information supporting outcome metrics over the last five years.

PacifiCorp tracks all safety statistics including, but not limited to, accidental deaths, OSHA-reportable, or near misses. However, as PacifiCorp is early in its WMP implementation, reporting historic safety statistics regarding wildfire mitigation programs as requested is challenging, specifically with respect to any values prior to 2019 because these programs did not explicitly exist. Therefore, PacifiCorp was not able to populate all cells within the applicable tables.

However, as PacifiCorp's wildfire mitigation programs were implemented beginning in 2019, values from 2019 have been included. PacifiCorp moving forward will ensure these elements are properly tracked consistent with this requirement.

Table 5: Accidental deaths due to utility wildfire mitigation initiatives, last 5 years

Activity	Victim															Total
	Full-Time Employee					Contractor					Member of Public					
Year	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	
Inspection	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Vegetation Management	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Utility Fuel Management	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Grid Hardening	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Other	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Total	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0

Table 6: OSHA-reportable injuries due to utility wildfire mitigation initiatives, last 5 years

Activity	Victim															Total
	Full-Time Employee					Contractor					Member of Public					
Year	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019	
Inspection	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Vegetation Management	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Utility Fuel Management	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Grid Hardening	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Other	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0
Total	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	0	0

PacifiCorp has not developed specific algorithms to model ignition beyond those that were inherent in the risk-based modeling foundational to the California Fire Map development. Within that process fire spread was modeled based upon historic fire weather overlaid onto terrain (independent of the location of utility assets) and with assumed "extreme case" fuel conditions. Notwithstanding this data source, through the map development process, as territory leads, PacifiCorp's local and corporate personnel assessed impacts to communities via historical and professional experience lenses. Thus, certain areas which may have indicated lower impact risks were elevated due to historic egress or access issues or from input gained during normal and extreme operating conditions.

Table 7: Methodology for potential impact of ignitions

List of all data inputs used in impact simulation	Sources of data inputs	Data selection and treatment methodologies	Assumptions, including SME input	Equation(s), functions, or other algorithms used to obtain output	Output type(s), e.g. wind speed model	Comments
Historic fire weather	CALFIRE shape files, USFS map products, cause data	2007 thru 2019	Historic perimeters serve as potential future fire risk areas	N/A	Map of elevated areas	
Terrain	GIS data	All geography served by company	Terrain constant over time	N/A	N/A	
Fuel conditions	Landfire data	All geography served by company	Fuel not substantially different over long time continuum	N/A	N/A	
Historic egress/access issues	Map products (Tiger, Google)	All geography served by company	Local operational input; map review of egress and fire history	N/A	Elevation of CALFIRE led map product	

2.7 Mapping recent, modelled, and baseline conditions

PacifiCorp incorporated the company's 1 mile x 1 mile grid to document and determine boundaries in both the GIS data submitted as well as the data used to populate applicable tables. Data was provided at the resolution of square mile as requested. It is critical to note that the data submitted and included in the applicable tables reflects a static snapshot in time of a dynamic changing data set and system. Over time, as PacifiCorp's WMP evolves either through rulemaking, data requests, additional discovery, workshops, and collaboration with both Staff and stakeholder, it is expected that this data can and will change.

PacifiCorp has included all data requested to the extent that the data requested is a mapped feature and could be prepared and provided in a way that facilitates the delivery of the company's WMP, facilitates the ability to repeat the data population and analysis, does not compromise the data quality, and supports further development of elements and supplemental analysis to inform decision making. To accomplish the tasks requested in this section and included in Tables 8 and 9 while ensuring alignment with the above approach, PacifiCorp, at the time of this filing, was not able to further subdivide the company's grid to the requested quarter mile resolution. As this would require PacifiCorp to deliver data and analysis in a way not currently processed or contemplated through standard operations, PacifiCorp was unable to provide this level of resolution. However, where applicable, the requested data was prepared and provided at the square mile resolution of the company's 1 mile x 1 mile grid.

Treatment of Confidential Data

In order to facilitate public access to the company's WMP, where possible, PacifiCorp has provided all requested location-specific GIS data with applicable attributes and details in alignment with the requirements in Table 8 and Table 9 and included in the attachments in Section 6.0 at a level that does not implicate confidential data. In order to achieve this objective, the company provided the general location of lines and facilities similar to other publicly available data sets in the GIS attachments; PacifiCorp determined that even at this "higher" level of detail, the data was useful and responsive. In addition, general information was used to populate applicable tables, such as grid modularization summary values in Table 1 and fault indicator summary values in Table 15. The data provided can be used to determine and inform a qualitative analysis and benchmarking with other utilities throughout California without the need to provide all supporting confidential data; providing such large quantities of confidential data creates risks that are not outweighed by the perceived benefits. PacifiCorp suggests an in-person meeting with WSD to discuss whether additional, narrowly tailored data is necessary for its review.

Use of Census Population Data

Per the WMP Clarification Document circulated on 1/15/2020, PacifiCorp leveraged the boundaries of the census tract data available at census.gov (https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html). This tract data was then overlaid with PacifiCorp's 1 mile x 1 mile grid to calculate the equivalent population per square mile within each of the company's 1 mile x 1 mile grids. PacifiCorp then applied the definitions within the CA WMP, CFR 17.701, and GO 165 to classify each 1 mile x 1 mile grid as being either highly rural, having a population

density less than 7 persons per square mile, rural, having a population density of less than 1,000 persons per square mile, or urban, having a population density greater than 1,000 person per square mile. The calculation and depiction of locations within PacifiCorp's service territory as highly rural, rural, and urban is consistent with the requirements in the WMP and definitions included in the Glossary.

In contrast to how PacifiCorp applies district level population density to characterizes the company's service territory as urban or rural consistent with the methodology and requirements found in rule 21.2 in CA General Order 95, the census data provided was extrapolated and calculated discretely for each 1 mile x 1 mile grid to classify grids as urban, rural, or highly rural as opposed to districts. Therefore, PacifiCorp cautions making any correlations between the district classifications used for compliance with CA GO 95 and the grid values presented in this document.

Incorporation of Wildlife Urban Interface

PacifiCorp leveraged and incorporated the GIS shape files generated between 2005 and 2007 which encompasses the entire state of California noting the Fire Hazard Severity Zone map which triggers WUI requirements in Chapter 7A of the California Building Code, which is an effective approach to incorporating the WUI to meet the requested requirements of this section.

Identification of Access and Functional Needs Customers

PacifiCorp continues to develop methods to expand customers identified with access and functional needs (AFN). PacifiCorp modified its customer service billing system to identify AFN customers; identifying AFN customers through the billing system allows the company to easily export a customer list for both individual customer outreach and updating our internal mapping system.

The company can identify customers currently billed on the medical baseline rate; all customers on this rate schedule were coded as AFN. The next step was outreach to the communities in PacifiCorp's service territory encouraging AFN customers to contact the company to self-identify. The PSPS webpage was also updated to include a FAQ that directed customers reliant on electricity for mobility or medical concerns to contact the company in order to code such customers as AFN. A letter and brochure were distributed to community partners throughout areas identified as either Tier 3 or a high fires risk area. The recipients included the following: the Karuk Tribe Community Center, local hospitals, medical supply companies, Great Northern (a resource center for energy assistance and other community support), the Red Cross, Siskiyou County's Emergency Manager, Social Services, and Public Health Departments, the Salvation Army, and master metered communities. The letter requested that each entity distribute the brochure which included information on cost savings programs, outage preparedness specific to AFN customers, and requested that the entity's clients contact the company to self-identify as an AFN. Over a thousand brochures were mailed and the company will be following up with the entities on the efficacy of the literature. PacifiCorp will continue to monitor the list of AFN customers to evaluate the impact of its communication. The company anticipates that the number of AFN customer will continue to grow and change as more customers become aware of this option. For the preparation of the data set requested, including the GIS data provided as requested in Table 9, a current snapshot of PacifiCorp's list of AFN customers was provided based on the methodology described above.

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2020 WMP Planned Activity

PacifiCorp also included, as requested in Table 9, the company's planned 2020 WMP initiative activity per year in the GIS layer attached as Section 6.6. System wide programs, such as inspection and correction programs or emergency planning programs, were not included in this layer as these programs apply system wide each year and are not location specific. Location specific programs, included in Section 5.3.3 were included.

As PacifiCorp is early in the implementation of its multi-year plan, the detailed scope for each location specific program activity has only been completed for the 2020 year. While the full scope of the multi-year programs is well understood and program dollars have been assigned in years 2021-2022 and included in Table 23 of Section 5.3.3, the specific locations and associated asset replacements have yet to be determined for each program in each year. However, PacifiCorp's location specific programs do include the completion of more detailed scope for years beyond 2020 to be completed during the 2020 calendar year, which is reflected in PacifiCorp's strategy included in Section 5.1. Where the annual scope has not yet been defined or specifically provided, PacifiCorp intends to follow the methodology described in Section 5 which includes systematic targeting of Tier 3 locations first followed by Tier 2, and Zone 1 or, where appropriate, the program specific methodology described for each program. A specific layer was not included regarding the 2020 pole replacement activity, as the location of this work is coincident to other planned program activity in 2020. See Section 5.3.3.6 for more information regarding planned work and prioritization methods.

Furthermore, as previously expressed at the September 2019 workshops, in the company's October 30, 2019 Phase II comments, in PacifiCorp's First Report Regarding Possible Off-Ramps[15], and Section 5 of this WMP, PacifiCorp anticipates that as these projects and programs are subject to evaluation in an effort to drive continuous improvement, specifics may need to change and adapt in response to changing conditions, resource constraints, and lessons learned.

See attached files in accordance with Table 8 requirements in Sections 6.1 – 6.3.

[15] PacifiCorp's First Report Regarding Possible Off-Ramps was filed on November 27, 2019 in compliance with Decision 19-05-036.

Table 8: Map file requirements for recent and modelled conditions of utility service territory, last 5 years

Layer name	Measurements	Units	Attachment location
Recent weather patterns	Average annual number of Red Flag Warning days per square mile across service territory	Area, days, square mile resolution	6.1
	Average 95th and 99th percentile wind speed and prevailing direction (actual)	Area, miles per hour, at a square mile resolution or better, noting where measurements are actual or interpolated	
Recent drivers of ignition probability	Date of recent ignitions categorized by ignition probability driver	Point, GPS coordinate, days, square mile resolution	6.2
Recent use of PSPS	Duration of PSPS events and area of the grid affected in customer hours per year	Area, customer hours, square mile resolution	6.3

See attached files in accordance with Table 9 requirements in Sections 6.4-6.6.

Table 9: Map file requirements for baseline condition of utility service territory projected for 2020

Layer name	Measurements / variables	Units	Appendix location
Current baseline state of service territory and utility equipment	Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory	Area, square mile resolution per type	6.4
	Urban vs. rural vs. highly rural regions of utility service territory	Area, square mile resolution per type	
	WUI regions of utility service territory	Area, square mile resolution	
	Number and location of critical facilities	Point, GPS coordinate	
	Number and location of customers	Area, number of people, square mile resolution	
	Number and location of customers belonging to access and functional needs populations	Area, number of people, square mile resolution	
	Overhead transmission lines	Line, quarter mile resolution	
	Overhead distribution lines	Line, quarter mile resolution	
	Location of substations	Point, GPS coordinate	
	Location of weather stations	Point, GPS coordinate	
	All utility assets by asset type, model, age, specifications, and condition	Point, GPS coordinate	
Location of planned utility equipment additions or removal	Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory	Line, quarter mile resolution	6.5
	Urban vs. rural vs. highly rural regions of utility service territory	Line, quarter mile resolution	
	WUI regions of utility service territory	Line, quarter mile resolution	
	Circuit miles of overhead transmission lines	Line, quarter mile resolution	
	Circuit miles of overhead distribution lines	Line, quarter mile resolution	
	Location of substations	Point, GPS coordinate	
Planned 2020 WMP initiative activity per year	Location of 2020 WMP initiative activity for each activity as planned to be completed by the end of each year of the plan term	Line, quarter mile resolution	6.6[16]

[16] WMP Guidelines, Attachment 1, includes this value published as 7.6. PacifiCorp assumes this to be in error and has, instead, included this in attachment 6.6.

3. Baseline Ignition Probability and Wildfire Risk Exposure

In PacifiCorp's 2019 WMP, the company explored historic wildfires, both independent of ignition source as well as honing in on those which could be attributed to utility ignition sources. Further, while ignition risks exist year round (whether due to human, natural or utility causes), the probability of sustaining those ignitions is well-correlated to environmental criteria during the specific "fire season" appropriate for the local conditions.[17]

The graphic below shows conceptually the nexus of these inputs.

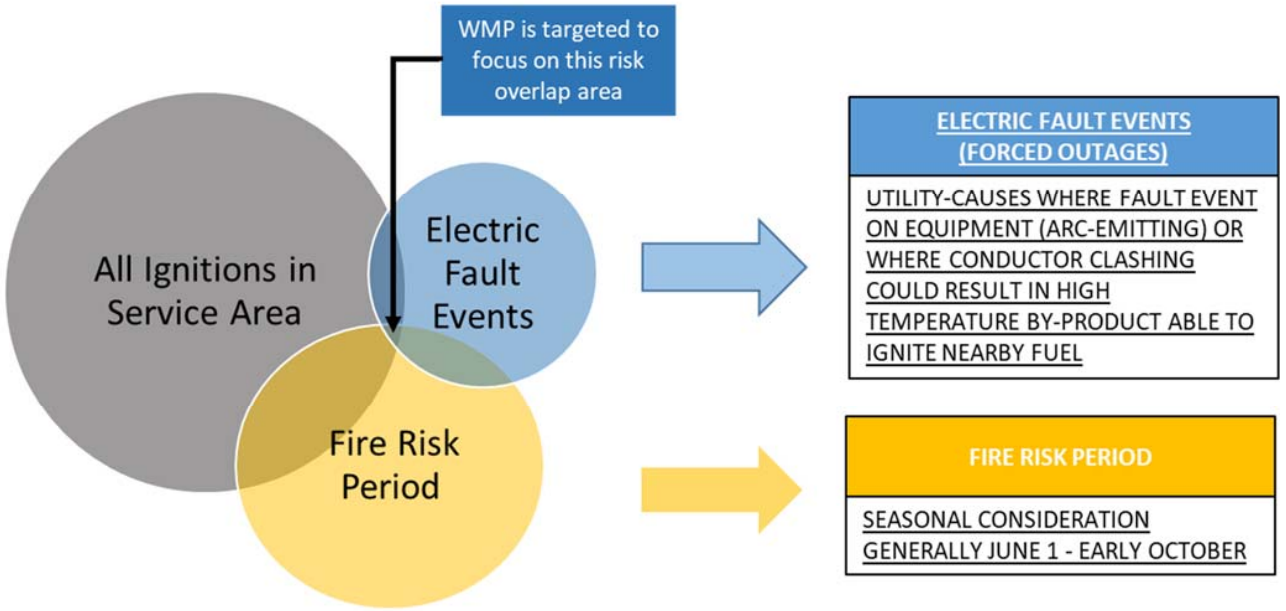


Figure 1: PacifiCorp's conceptual baseline ignition probability and wildfire risk exposure model

[17] CALFIRE and others have noted that "fire season" is a year-round phenomenon in California, however in northern California, particularly the area in which PacifiCorp serves, this trend is not discernable in the data the Company has assembled and appears contrary to such fire risk indicators as Red Flag Warning days or National Fire Danger Rating System elevated days.

To support the model shown above, PacifiCorp took two particular views of the data. The first was ignition independent of the ignition source included in Figure 2 and Figure 3. The second evaluated fault events which could result in an ignition risk specific to PacifiCorp's service territory included as Figure 4, Figure 5, and Figure 6. Lastly, due to the substantial difference in the probability of sustaining an ignition source between fire season and non-fire season, the Company developed data supporting the historic trend of the beginning and end of fire season included as Figure 7. Each of these depictions of data are presented below to demonstrate the ignition risks within PacifiCorp's service territory.

Figure 2 below depicts PacifiCorp's evaluation of ignition sources within the company's service territory from 2007-2017 independent of ignition cause or seasonality of the ignition.

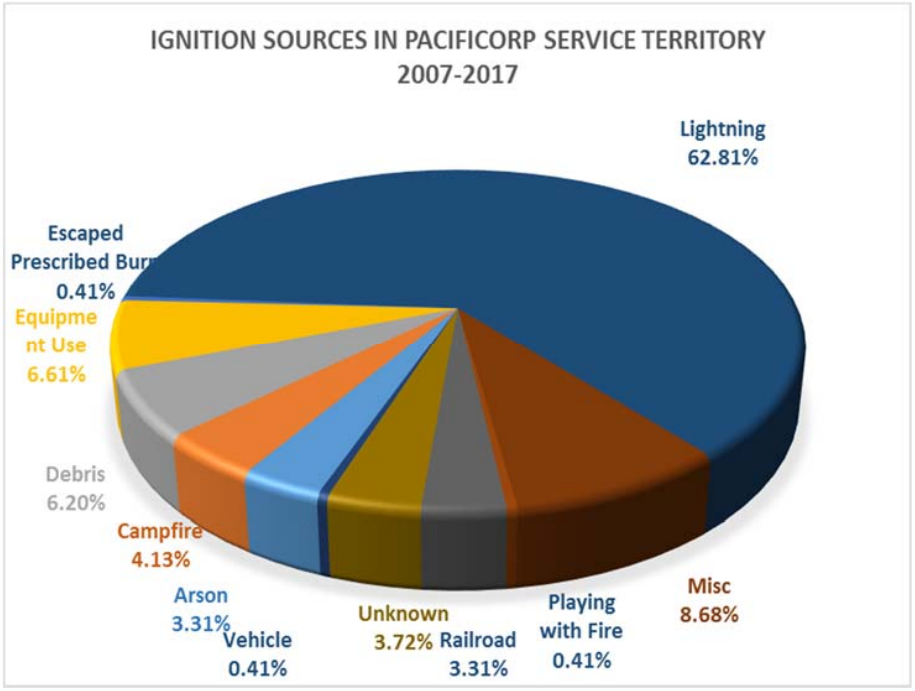


Figure 2: Ignition sources within PacifiCorp's service territory 2007-2017, independent of cause or seasonality

Figure 3 below depicts PacifiCorp's evaluation of ignition sources within the company's service territory specific to geographic wildfire risk tier from 2007-2017 independent of ignition cause or seasonality of the ignition.

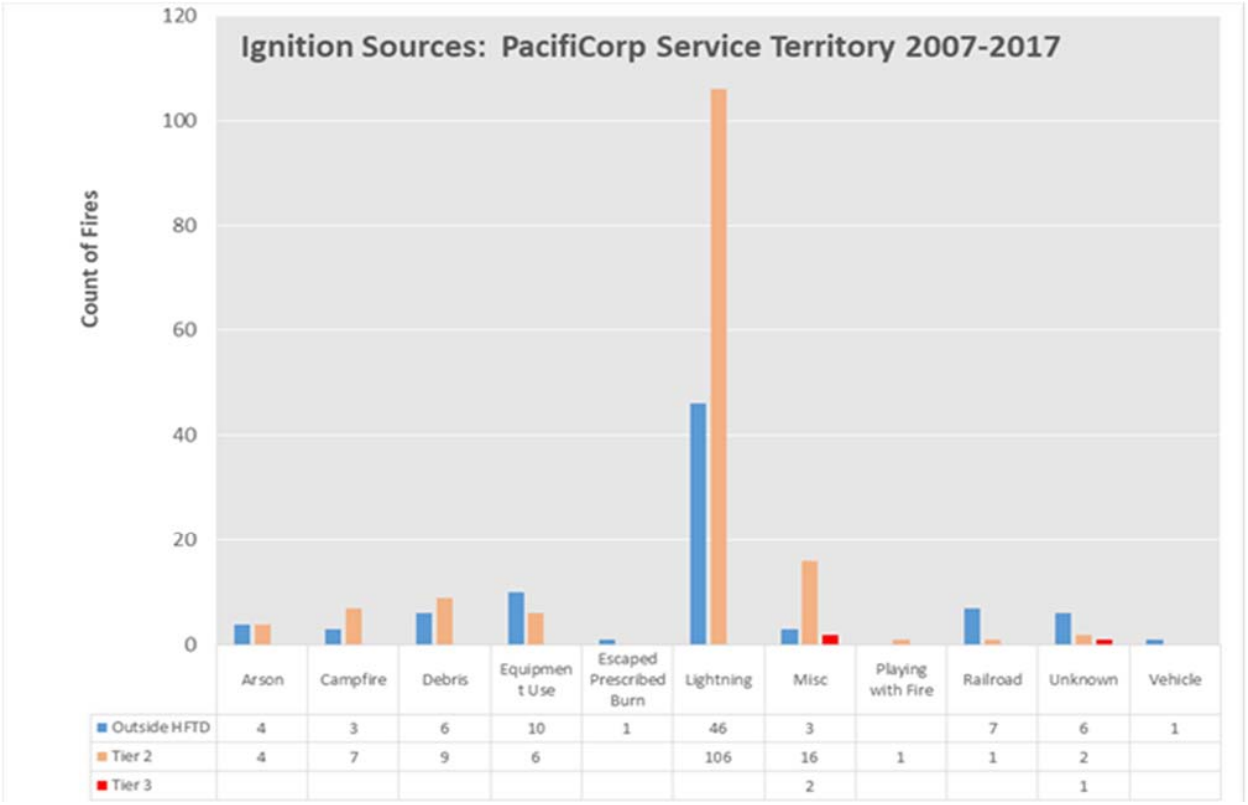


Figure 3: Ignition sources from 2007-2017 specific to geographic wildfire risk tier within PacifiCorp's service territory, independent of seasonality

Figure 4 below depicts PacifiCorp's evaluation of utility related outage events from 2015-2019 during fire season with the potential to result in an ignition event, classified by potential suspected initiating event type, as defined in D.14-01-015, page C-8. In Figure 5 and Figure 6 this data is further segmented focusing on contact and component elements. It is important to note that while this data set is helpful to identify potential fault scenarios that occur throughout PacifiCorp's service territory, the presence of an outage event with potential ignition risk does not explicitly infer that an ignition event has or will happen. This data was subsequently used to provide insight into PacifiCorp's ignition probability drivers.

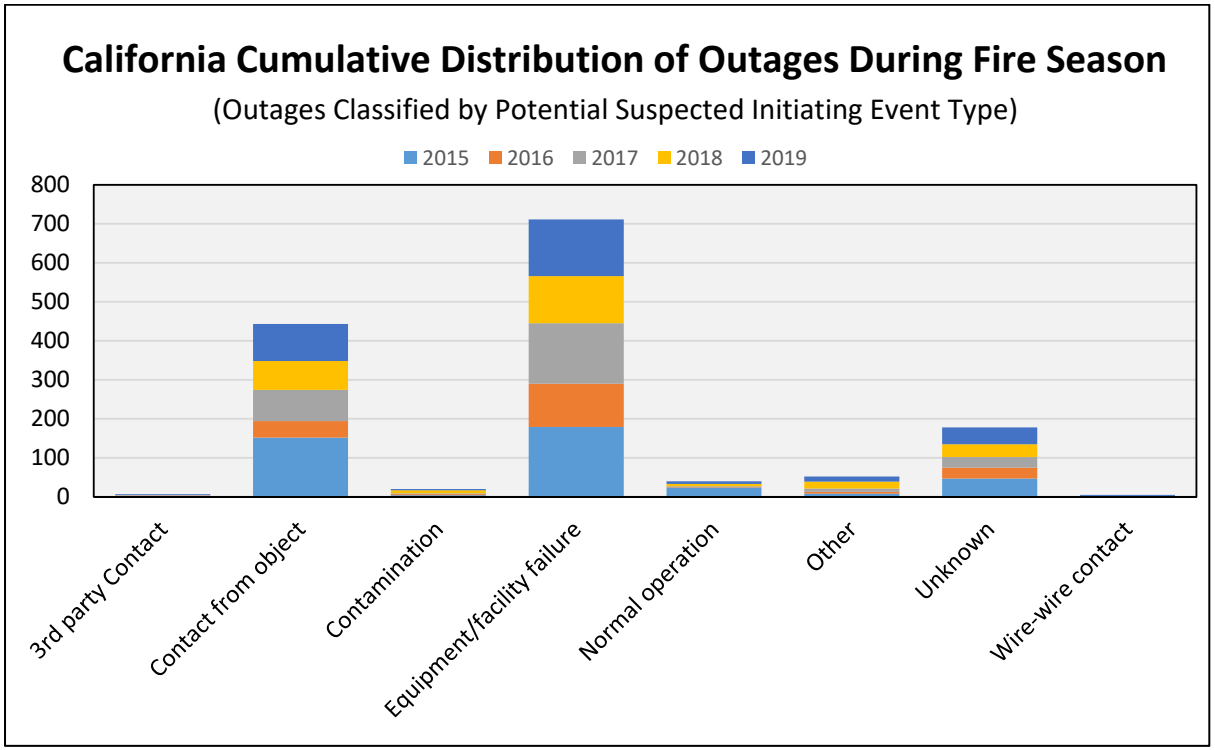


Figure 4: PacifiCorp's cumulative distribution of potential ignition events in California during fire season by outage cause category, 2014-2018

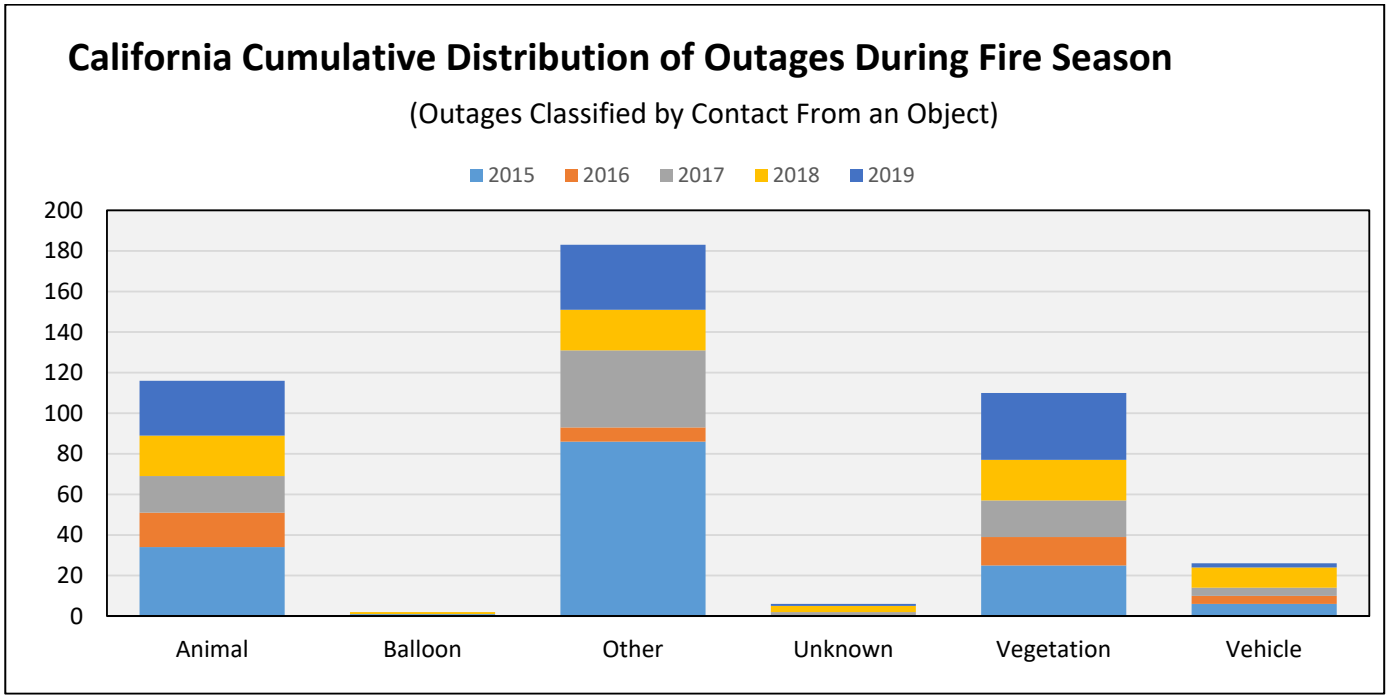


Figure 5: PacifiCorp's potential ignition events caused by contact from an object during fire season, 2015-2019

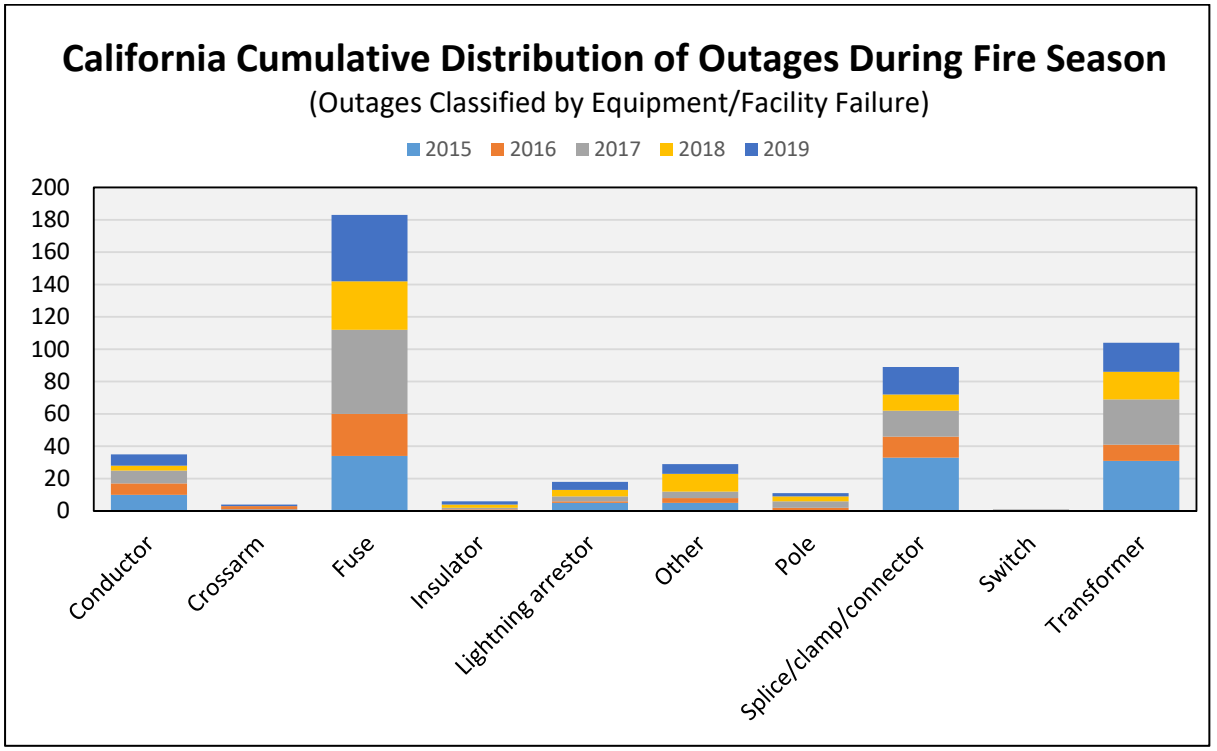


Figure 6: PacifiCorp's potential ignition events categorized as caused by equipment / facility failure during fire season, 2015-2019

Figure 7 below depicts the cumulative acres burned in both Northern California as well as PacifiCorp's service territory independent of the ignition cause per the fire initiation start date. This data set demonstrates that more acres are likely to burn in Northern California during fire season than other times of the year, confirming that elevated wildfire risk conditions are more likely during fire season.

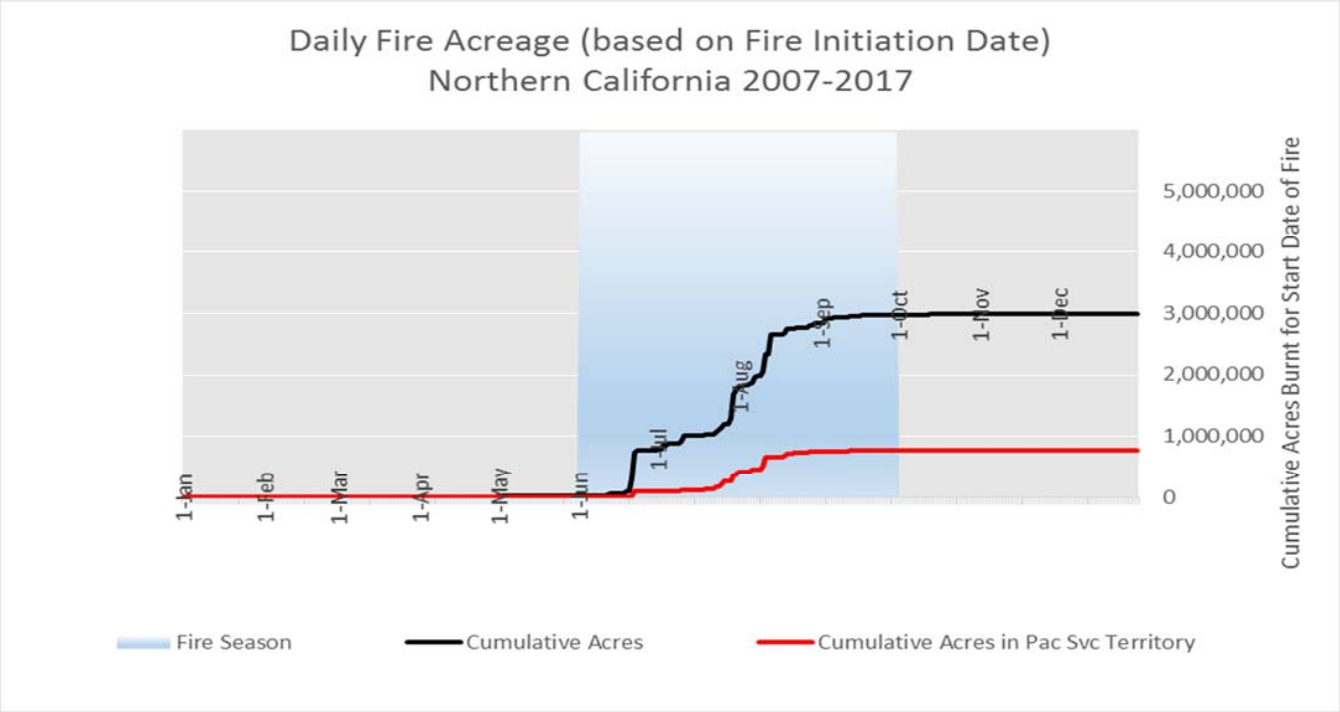


Figure 7: Fire acreage burned in Northern California per fire initiation start date, 2007-2017

3.1 Recent weather patterns, last 5 years

The following table includes PacifiCorp's weather analysis consistent with the method prescribed by the Wildfire Safety Division.

The company's proprietary measure for fire risk incorporates three key variables, including 1) dead fuel moisture measure, as measured by the Keetch Byram Drought Index (KBDI), 2) fire risk, as measured by a six-hour average of the Fosberg Fire Weather Index (FFWI6) and 3) fault risk, as measured by wind gust speed. While a sustained wind threshold is also monitored the company's experience to date indicates that gust wind thresholds appear to be trigger elevated risk periods more routinely than the sustained wind threshold being exceeded.

Table 10: Weather patterns, last 5 years

Weather Measurement	2015	2016	2017	2018	2019	5-yr historical Average	Unit(s)
Red Flag Warning days	20,443	3,669	22,645	12,175	9,781	13,743	RFW circuit mile days per year
Days rated at the top 30% of proprietary fire potential index or similar fire risk index measure[18]	NA	NA	NA	NA	1,391	1,391	Circuit mile days where proprietary measure rated above top 30% threshold[19] per year
95th percentile wind conditions	11,811	20,069	15,625	13,541	13,215	14,852	Circuit mile days with wind gusts over 95th percentile historical (meaning the prior 10 years, 2005-2014) conditions per year
99th percentile wind conditions	1,106	3,031	1,420	197	1,003	1,351	Circuit mile days with wind gusts over 99th percentile historical (meaning the prior 10 years, 2005-2014) conditions per year
Other	NA	NA	NA	NA	NA	NA	

[18] PacifiCorp does not calculate a blended fire potential index, rather it evaluates the coincidence of the three threshold metrics to determine fire risk. This process began in 2019, and the metric is calculated based upon the number of days in which the three thresholds were met in a "watch area" multiplied times the circuit miles within the "watch area".

[19] Threshold here defined as top 30% of FPI or equivalent scale (e.g., "Extreme" on SCE's FPI; "extreme", 15 or greater, on SDG&E's FPI; and 4 or above on PG&E's FPI.

3.2 Recent drivers of ignition probability

The following table includes PacifiCorp's recent drivers of ignition probability over the last five years. While not explicitly stated in the table, these values reflect an absolute annual total and average, not accounting for elevated risk environmental conditions influenced by fire season; an alternate Table 11b demonstrates these drivers for the period where sustained fire risks exist. In PacifiCorp's service territory, which is exposed to substantially different fall/winter weather from the summertime, when fire risks exist, such differentiation is critical. Without this differentiation, wildfire mitigation measures would be improperly aligned against the risks, and would needlessly drive costs up without commensurate reduction in utility wildfire risk.

This data leverages the materials assessed above, and aggregates them into the proscribed ignition probability drivers; the analysis, underlying data sources and assumptions are further discussed in 3.4.3.

Table 11: Key recent drivers of ignition probability, transmission lines, last 5 years

Incident Type by ignition probability driver		Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	Animal contact	n	3	0	0	2	1	1	0%	0%	0%	0%	100%	17%	0	0	0	0	1	0
	Balloon contact	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	18	3	11	2	2	7	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Unknown	n	0	1	0	1	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Veg. contact	n	5	1	5	1	7	4	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Vehicle contact	n	1	0	0	1	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Contamination		n	1	2	1	3	2	2	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
All types of Equipment / Facility failure	Conductor	n	3	6	1	0	1	2	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Crossarm	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Fuse	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Insulator	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Lightning arrestor	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	2	0	1	4	0	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Pole	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Sectionalizer	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0

Incident Type by ignition probability driver		Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
	Splice/clamp/connector	n	0	0	0	0	1	0	0%	0%	0%	0%	100%	100%	0	0	0	0	1	0
	Switch	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Transformer	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Voltage regulator	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Normal Operation		n	3	2	1	1	0	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Other		n	17	7	24	10	8	13	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Unknown		n	32	12	19	17	30	22	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Vandalism/Theft		n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Wire-to-wire contact		n	2	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Contact from 3rd party		n	1	0	0	0	1	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0

Table 11b: Key recent drivers of ignition probability, distribution lines, last 5 years[20]

Incident Type by ignition probability driver		Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	Animal contact	n	55	32	34	42	53	43	2%	0%	0%	2%	2%	1%	1	0	0	1	1	1
	Balloon contact	n	2	0	0	1	0	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	88	23	32	34	37	43	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Unknown	n	0	4	5	4	1	3	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Veg. contact	n	127	118	159	79	174	131	0%	1%	1%	3%	1%	1%	0	1	1	2	2	1
	Vehicle contact	n	15	9	11	18	9	12	0%	0%	0%	6%	0%	2%	0	0	0	1	0	0
Contamination		n	4	2	5	6	2	4	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
All typed of Equipment / Facility failure	Conductor	n	43	29	39	25	27	33	2%	0%	3%	0%	4%	2%	1	0	1	0	1	1
	Crossarm	n	5	4	3	2	7	4	0%	0%	0%	0%	14%	5%	0	0	0	0	1	0
	Fuse	n	122	130	156	127	118	131	0%	0%	1%	0%	1%	0%	0	0	1	0	1	0
	Insulator	n	3	5	2	5	6	4	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Lightning arrestor	n	10	12	13	14	8	11	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	13	10	19	35	32	22	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Pole	n	4	5	8	3	9	6	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Sectionalizer	n	0	1	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Splice/clamp /connector	n	137	60	100	41	71	82	0%	2%	0%	0%	0%	0%	0	1	0	0	0	0
	Switch	n	0	1	1	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Transformer	n	61	34	54	29	48	45	0%	0%	2%	0%	0%	0%	0	0	1	0	0	0
	Voltage regulator	n	0	0	0	1	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Normal Operation		n	31	13	19	18	27	22	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Other		n	175	43	194	73	224	142	0%	0%	0%	0%	0%	0%	0	0	0	0	1	0

[20] Additional table as requested in the WMP Clarification Document from 11/15/2020 in Section 3.2 at page 12

Incident Type by ignition probability driver	Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
		2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Unknown	n	132	116	88	85	108	106	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Vandalism/Theft	n	1	0	1	2	0	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Wire-to-wire contact	n	10	12	6	7	9	9	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Contact from 3rd party	n	4	3	4	1	8	4	0%	0%	0%	0%	13%	5%	0	0	0	0	1	0

In addition to the tables requested above, the company also included in the tables below, PacifiCorp's recent drivers of ignition probability over the last five years during fire season. These ignition probability drivers are complementary to the above requested data set with additional granularity that allows the company to understand ignition probability drivers as specifically experienced within the company's service territory during a subset of the year when environmental conditions are more likely to escalate an ignition event to a catastrophic wildfire event. As addressed previously and supported in Figure 7, within PacifiCorp's California service territory there is substantial difference in fire risk during the winter time as compared to the summer time, which dictates segmentation of the data set.

Table 11c: Key recent drivers of ignition probability during fire season, transmission lines, last 5 years

Incident Type by ignition probability driver		Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	Animal contact	n	2	0	0	2	1	1	0%	0%	0%	0%	100%	20%	0	0	0	0	1	0
	Balloon contact	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	16	2	11	0	2	6	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Unknown	n	0	0	0	1	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Veg. contact	n	2	0	2	0	0	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Vehicle contact	n	1	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Contamination		n	1	2	1	3	2	2	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
All typed of Equipment / Facility failure	Conductor	n	1	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Crossarm	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Fuse	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Insulator	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Lightning arrestor	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Pole	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Sectionalizer	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Splice/clamp /connector	n	0	0	0	0	1	0	0%	0%	0%	0%	100%	100%	0	0	0	0	1	0
	Switch	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0

Incident Type by ignition probability driver		Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
	Transformer	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Voltage regulator	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Normal Operation		n	2	0	1	0	0	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Other		n	2	1	5	3	0	2	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Unknown		n	8	0	4	6	10	6	0%	0%	0%	0%	10%	4%	0	0	0	0	1	0
Vandalism/Theft		n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Wire-to-wire contact		n	1	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Contact from 3rd party		n	1	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0

Table 11d: Key recent drivers of ignition probability during fire season, distribution lines, last 5 years

Incident Type by ignition probability driver		Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
			2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Contact from object	Animal contact	n	32	17	18	18	26	22	3%	0%	0%	6%	0%	2%	1	0	0	1	0	0
	Balloon contact	n	1	0	0	1	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	70	5	27	20	30	30	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Unknown	n	0	0	2	2	1	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Veg. contact	n	23	14	16	20	33	21	0%	0%	6%	5%	3%	3%	0	0	1	1	1	1
	Vehicle contact	n	5	4	4	10	2	5	0%	0%	0%	10%	0%	4%	0	0	0	1	0	0
Contamination		n	3	1	1	5	1	2	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
All typed of Equipment / Facility failure	Conductor	n	9	7	8	3	7	7	0%	0%	13%	0%	14%	6%	0	0	1	0	1	0
	Crossarm	n	1	2	0	0	1	1	0%	0%	0%	0%	100%	25%	0	0	0	0	1	0
	Fuse	n	34	26	52	30	41	37	0%	0%	2%	0%	2%	1%	0	0	1	0	1	0
	Insulator	n	0	1	1	2	2	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Lightning arrestor	n	5	1	3	4	5	4	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Other	n	5	3	4	11	6	6	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Pole	n	0	2	4	3	2	2	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Sectionalizer	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Splice/clamp /connector	n	33	11	16	10	16	17	0%	9%	0%	0%	0%	1%	0	1	0	0	0	0
	Switch	n	0	0	1	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
	Transformer	n	31	10	26	17	18	20	0%	0%	4%	0%	0%	1%	0	0	1	0	0	0
	Voltage regulator	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Normal Operation		n	22	1	1	6	7	7	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Other		n	6	4	3	15	13	8	0%	0%	0%	0%	8%	2%	0	0	0	0	1	0
Unknown		n	39	28	23	27	33	30	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0

Incident Type by ignition probability driver	Near misses tracked [y/n]	Number of incidents per year						Average percentage probability of ignition per incident						Number of ignitions per year from this driver					
		2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	2019	Average
Vandalism/Theft	n	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Wire-to-wire contact	n	0	0	1	0	3	1	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0
Contact from 3rd party	n	1	1	2	0	2	1	0%	0%	0%	0%	50%	17%	0	0	0	0	1	0

3.3 Recent use of PSPS, last 5 years

PacifiCorp developed its plans for PSPS in response to ESRB-8 in late 2018; it did not have such procedures in place prior to that time. In 2019, no PSPS procedures were initiated.

Table 12: Recent use of PSPS, last 5 years

PSPS characteristic	2015	2016	2017	2018	2019	Unit(s)
Frequency of PSPS events (total)	N/A	N/A	N/A	N/A	0	Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability, per year
Frequency of PSPS events (normalized)	N/A	N/A	N/A	N/A	0	Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof in order to reduce ignition probability, per RFW circuit mile day per year
Scope of PSPS events (total)	N/A	N/A	N/A	N/A	0	Circuit-events, measured in number of events multiplied by number of circuits de-energized per year
Scope of PSPS events (normalized)	N/A	N/A	N/A	N/A	0	Circuit-events, measured in number of events multiplied by number of circuits targeted for de-energization per RFW circuit mile day per year
Duration of PSPS events (total)	N/A	N/A	N/A	N/A	0	Customer hours per year
Duration of PSPS events (normalized)	N/A	N/A	N/A	N/A	0	Customer hours per RFW circuit mile day per year
Other	N/A	N/A	N/A	N/A	N/A	

3.4 Baseline state of equipment and wildfire and PSPS event risk reduction plans

The following subsections include PacifiCorp's baseline state of equipment and wildfire and PSPS event risk reduction plans. Additional relevant notes or assumptions used to populate these values can be found in Section 2.7. It is critical to note that, based on the way data was prepared to meet the GIS data requested in Section 2.4 and subsequently populate the tables below, certain facilities or components may be included in multiple categories below. For example, a single linear circuit mile of transmission with distribution underbuild will be included as both a circuit mile of transmission as well as a circuit mile of transmission. Similarly, a substations that includes both transmission and distribution components, is included as a distribution substation and transmission substation below. Therefore, PacifiCorp cautions using any summation or aggregation of the categorical data reflected in the tables below to draw trends or comparisons.

In contrast to how PacifiCorp applies district level population density to characterizes the company's service territory as urban or rural consistent with the methodology and requirements found in rule 21.2 in CA General Order 95, the census data provided was extrapolated and calculated discretely for each 1 mile x 1 mile grid to classify grids as urban, rural, or highly rural as opposed to districts. Therefore, PacifiCorp cautions making any correlations between the district classifications used for compliance with CA GO 95 and the grid values presented in this document.

3.4.1 Current baseline state of service territory and utility equipment

The following table includes PacifiCorp's current baseline state of service territory and utility equipment.

Table 13: Current baseline state of service territory and utility equipment

Land use	Characteristic tracked	In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
In urban areas	Circuit miles	55.2	0	6.7	0
	Circuit miles in WUI	0.03	0	3.2	0
	Number of critical facilities	75	0	5	0
	Number of critical facilities in WUI	0	0	1	0
	Number of customers	4,656	0	151	0
	Number of customers in WUI	0	0	24	0
	Number of customers belonging to access and functional needs populations	6	0	0	0
	Number of customers belonging to access and functional needs populations in WUI	0	0	0	0
	Circuit miles of overhead transmission lines	2.2	0	0.7	0
	Circuit miles of overhead transmission lines in WUI	0	0	0.2	0
	Circuit miles of overhead distribution lines	32.9	0	4.6	0
	Circuit miles of overhead distribution lines in WUI	0.03	0	2.3	0

Land use	Characteristic tracked	In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
	Number of substations (distribution/transmission)	1/0	0/0	0/0	0/0
	Number of substations in WUI (distribution/transmission)	0/0	0/0	0/0	0/0
In rural areas	Circuit miles	1,022.6	0.7	814.6	115.9
	Circuit miles in WUI	667.1	0.5	633.2	96
	Number of critical facilities	272	0	262	33
	Number of critical facilities in WUI	100	0	156	26
	Number of customers	14,505	1	13,383	1,080
	Number of customers in WUI	6,005	1	6,610	870
	Number of customers belonging to access and functional needs populations	17	0	8	0
	Number of customers belonging to access and functional needs populations in WUI	11	0	6	0
	Circuit miles of overhead transmission lines	164.5	0.2	150.9	23.3
	Circuit miles of overhead transmission lines in WUI	127.6	0.2	116.1	15.9
	Circuit miles of overhead distribution lines	728.4	0.5	419.8	38.5
	Circuit miles of overhead distribution lines in WUI	458.5	0.3	323	29.3
	Number of substations (distribution/transmission)	14/8	0/0	9/9	1/1
	Number of substations in WUI (distribution/transmission)	5/4	0/0	7/9	1/0
In highly rural areas	Circuit miles	1,231.6	6.1	614.2	0
	Circuit miles in WUI	498.4	5.3	429.4	0
	Number of critical facilities	198	0	139	0
	Number of critical facilities in WUI	64	0	111	0
	Number of customers	7,663	14	4577	0
	Number of customers in WUI	2,841	13	3,965	0
	Number of customers belonging to access and functional needs populations	7	0	2	0
	Number of customers belonging to access and functional needs populations in WUI	1	0	2	0
	Circuit miles of overhead transmission lines	217.3	1	169.3	0
	Circuit miles of overhead transmission lines in WUI	90.1	0.6	77.5	0
	Circuit miles of overhead distribution lines	937.9	4.8	356.7	0
	Circuit miles of overhead distribution lines in WUI	378	4.4	275.6	0
	Number of substations (distribution/transmission)	15/21	0/0	12/2	0/0
	Number of substations in WUI (distribution/transmission)	4/2	0/0	8/1	0/0

The following table includes PacifiCorp's current summary data on weather station count. PacifiCorp installed 10 weather stations in its Northern California service territory. Collectively, this weather station network is comprised of various weather instrumentation strategically installed in areas of significant concern with respect to strong wind events and rapid wildfire spread potential. The weather station network leverages applications performed previously by San Diego Gas & Electric (SDG&E). Due to northern California's wetter climate and shorter fire season, PacifiCorp augmented their weather station network with tipping bucket rain gauges at all locations and fuel moisture probes at approximately half of its locations. This contributes additional data regarding combustion potential of vegetation with respect to recent precipitation events.

In addition to this supplemental data, every weather station collects temperature, relative humidity, dew point and wind speed and direction, as well as maximum wind gusts during each collection period. Fire weather indices such as the Fosberg Fire Weather Index (FFWI) and the Keetch-Byram Drought Index (KBDI) are calculated by each data logger to provide additional information pertaining to wildfire risk. This data is continuously monitored by internal data loggers and collected on ten-minute intervals before it is transmitted to a central repository cloud database (which is critical for forecast operations). The data is also simultaneously transmitted to MesoWest, a weather data resource housed by the University of Utah's Atmospheric Science Department, which can be viewed at mesowest.utah.edu.

The current list of stations placed by PacifiCorp can be viewed at https://mesowest.utah.edu/cgi-bin/droman/stn_owner.cgi?owner=627. The graphic below shows the placement of the recently added PacifiCorp stations.

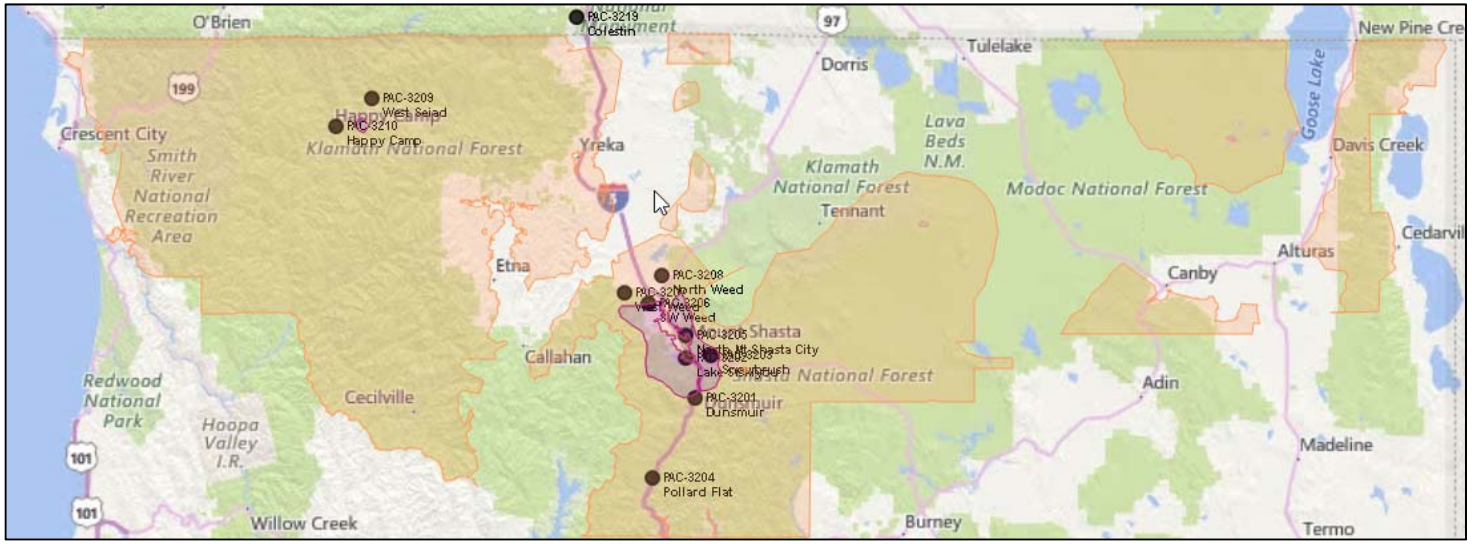


Table 14: Summary data on weather station count

Weather station count type	Current count	Unit(s)
Number of weather stations (total)	10	Total number located in service territory and operated by utility
Number of weather stations (normalized)	0.0031	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory
Number of weather stations in non-HFTD (total)	0.0000	Total number located in non-HFTD service territory and operated by utility
Number of weather stations in non-HFTD (normalized)	0.0000	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory
Number of weather stations in HFTD Zone 1 (total)	0.0000	Total number located in HFTD Zone 1 service territory and operated by utility
Number of weather stations in HFTD Zone 1 (normalized)	0.0000	Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory
Number of weather stations in HFTD Tier 2 (total)	8	Total number located in HFTD Tier 2 service territory and operated by utility
Number of weather stations in HFTD Tier 2 (normalized)	0.0073	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory
Number of weather stations in HFTD Tier 3 (total)	2	Total number located in HFTD Tier 3 service territory and operated by utility
Number of weather stations in HFTD Tier 3 (normalized)	0.0328	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory

Table 15 below includes PacifiCorp's summary data on fault indicator count. PacifiCorp interprets the use of the term fault indicator to imply presence of device(s) able to detect and react to fault current, specifically auto-isolation points such as reclosers, fuses, circuit breakers, as well as those device(s) that can be operated locally or remotely and does not require that it can only be operated under load; this designation and these values are subsequently used to identify "modularization." Specifically excluded are jumpers. Thus, it does include switching points and isolation devices that can function as control points and be proactively operated under PSPS watch conditions.

Table 15: Summary data on fault indicator count

Fault indicator count type	Current count	Unit(s)
Number of fault indicators (total)	45,709	Total number located in service territory and operated by utility
Number of fault indicators (normalized)	13.69	Total number located in service territory and operated by utility, divided by total number of circuit miles in utility service territory
Number of fault indicators in non-HFTD (total)	22,466	Total number located in non-HFTD service territory and operated by utility
Number of fault indicators in non-HFTD (normalized)	11.35	Total number located in non-HFTD service territory and operated by utility, divided by total number of circuit miles in non-HFTD service territory
Number of fault indicators in HFTD Zone 1 (total)	46	Total number located in HFTD Zone 1 service territory and operated by utility
Number of fault indicators in HFTD Zone 1 (normalized)	6.42	Total number located in HFTD Zone 1 service territory and operated by utility, divided by total number of circuit miles in HFTD Zone 1 service territory
Number of fault indicators in HFTD Tier 2 (total)	21,312	Total number located in HFTD Tier 2 service territory and operated by utility
Number of fault indicators in HFTD Tier 2 (normalized)	17.18	Total number located in HFTD Tier 2 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 2 service territory
Number of fault indicators in HFTD Tier 3 (total)	1,886	Total number located in HFTD Tier 3 service territory and operated by utility
Number of fault indicators in HFTD Tier 3 (normalized)	17.18	Total number located in HFTD Tier 3 service territory and operated by utility, divided by total number of circuit miles in HFTD Tier 3 service territory

3.4.2 Planned additions, removal, and upgrade of utility equipment by end of 3-year plan term

Table 16 and Table 17 below include PacifiCorp's planned additions, removals, and upgrades of utility equipment by the end of 3-year plan term. These planned changes to the system have the potential to impact the scope of the WMP and included assets.

Planned projects at the distribution level (4 kV to 34.5 kV) are derived from the regional distribution studies conducted approximately every five years as well as a complementary reliability analysis. These distribution studies include a review of historical system loading, an evaluation of projected systematic growth over a five year period, and a determination of the required system improvements to accommodate the projected load. Specific distribution system improvements may also be identified as required in customer requested system impact studies of large new load and large new generation facilities. There is one new substation being constructed in the HFTD (Tier 2) before 2022 that will utilize the latest wildfire mitigation construction standards where applicable.

Local transmission follows a similar approach to that of distribution. Planned projects at the sub-transmission level (69 to 115 kV) are derived from the regional transmission studies conducted every three to five years, which project five years of systemic load growth and describe the consequentially required transmission system improvements in detail as well as discuss the general direction proposed for longer term transmission improvement plans. Similar to distribution projects, specific transmission system improvements may also be identified as required in customer requested system impact studies of large new load and large new generation facilities.

At the main grid transmission level (115 kV and above) planned projects are primarily derived from the transmission planning assessments performed every year in accordance with the North American Electric Reliability Corporation (NERC) Standard TPL-001-4 and Western Electricity Coordinating Council (WECC) Criterion TPL-001-WECC-CRT-3.1. This assessment is comprised of the steady-state, transient stability and short circuit studies that evaluate the performance of the Bulk Electric System over a wide range of system conditions throughout the 10-year planning horizon. When the analysis identifies an inability of the system to meet the required level of performance, a corrective action plan is developed to identify transmission system improvements necessary to resolve the identified system deficiencies and ensure compliance with NERC and WECC reliability standards.

To support situational awareness, PacifiCorp established potential locations for new weather stations based upon the proactive de-energization zones outlined in its 2019 WMP. With that knowledge it engaged input from local weather professionals, specifically the Medford National Weather Service Office, to determine any "gaps" these stations could serve to fill for their purposes, while still supporting the company's needs for proximate data. After such review, specific poles were identified and due to the need for information about "wetting" events (that could impact live fuel ignition proneness) as well as focus on dead fuel moisture, elected to install stations with tipping rain gauges, and approximately half of them with fuel moisture sensors. As the company's information about weather patterns within the PDZs is augmented it anticipates installing additional weather stations in the Tier 2 areas in Modoc and Del Norte counties, as well as additional stations in more remote Siskiyou county, again requesting involvement from Public Safety Partners in targeting areas for their placement. The methodology above was used to

determine any potential changes to overhead transmission, overhead distribution, substations, and weather stations over a 3-year planning horizon and incorporated into both the table below as well as any applicable GIS layer included in Section 6.0.

Table 16: Location of planned utility equipment additions or removal by end of 3-yr plan

Land use	Characteristic tracked	Changes by end-2022			
		In non-HFTD	In HFTD Zone 1	In HFTD Tier 2	In HFTD Tier 3
In urban areas	Circuit miles of overhead transmission lines	0	0	0	0
	Circuit miles of overhead distribution lines	0	0	0	0
	Circuit miles of overhead transmission lines in WUI	0	0	0	0
	Circuit miles of overhead distribution lines in WUI	0	0	0	0
	Number of substations	0	0	0	0
	Number of substations in WUI	0	0	0	0
	Number of weather stations	0	0	0	0
	Number of weather stations in WUI	0	0	0	0
In rural areas	Circuit miles of overhead transmission lines	0	0	0.9	0
	Circuit miles of overhead distribution lines	0	0	0	0
	Circuit miles of overhead transmission lines in WUI	0	0	0.6	0
	Circuit miles of overhead distribution lines in WUI	0	0	0	0
	Number of substations	0	0	1	0
	Number of substations in WUI	0	0	0	0
	Number of weather stations	0	0	0	0
	Number of weather stations in WUI	0	0	0	0
In highly rural areas	Circuit miles of overhead transmission lines	0	0	0	0
	Circuit miles of overhead distribution lines	0	0	0	0
	Circuit miles of overhead transmission lines in WUI	0	0	0	0
	Circuit miles of overhead distribution lines in WUI	0	0	0	0
	Number of substations	0	0	0	0
	Number of substations in WUI	0	0	0	0
	Number of weather stations	0	0	0	0
	Number of weather stations in WUI	0	0	0	0

The following table includes the location of planned utility infrastructure upgrades, as included in PacifiCorp's 2020 WMP. This data set incorporates planned scope due to hardening initiatives including the installation of covered conductor as further described in Section 5.3.3.3 and 5.3.3.4, installation of system automation equipment as further described in Section 5.3.3.9, and the replacement of Cu conductor described in Section 5.3.3.18.

As described in Section 2.7, PacifiCorp is early in the implementation of its multi-year plan and the annual scope for each location specific program activity has only been completed for the 2020 year, including the system hardening projects contemplated in this data set. While the full scope of the multi-year programs is well understood and program dollars have been assigned in years 2021-2022 and included in Table 23 of Section 5.3.3, the specific locations and associated asset replacements have yet to be determined for each program in each year. However, PacifiCorp's location specific programs do include, as a component, the completion of more detailed scope for years beyond 2020 to be completed, where appropriate, during the 2020 calendar year which is reflected in the company's strategy included in Section 5.1. Where the annual scope has not yet been defined or specifically provided, PacifiCorp intends to follow the methodology described in Section 5 which includes systematic targeting of Tier 3 locations first followed by Tier 2, and Zone 1. Therefore, PacifiCorp has populated the table below to the extent that the information was available and complete. To review the full 2020-2022 grid design and system hardening program details, see Table 23.

PacifiCorp cautions attempts to correlate the data supplied in Table 17 to the details included Tables 23-30 or the prioritization method associated with the various programs. For example, the system automation projects are represented geospatially based on the most applicable substation location where the majority of the project scope may take place. Therefore, a system automation project prioritized and targeted to mitigate risk on a distribution circuit located within Tier 3 may appear, based on this data set, to be located within Tier 2 or Zone 1 based on the location of the associated substation. Furthermore, the units included in this table may not always correlate to the program units or tracked units as included in Table 23-30.

Table 17: Location of planned utility infrastructure upgrades

Land use	Characteristic tracked	In non-HFTD			In HFTD Zone 1			In HFTD Tier 2			In HFTD Tier 3		
		2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
Total circuit miles planned for hardening each year, all types and locations		0			0			33.8			10.3		
Total number of substations planned for hardening each year, all locations		2			0			11			2		
In urban areas	Circuit miles planned for grid hardening of overhead transmission lines	0			0			0			0		
	Circuit miles of overhead transmission lines in WUI to harden	0			0			0			0		

Land use	Characteristic tracked	In non-HFTD			In HFTD Zone 1			In HFTD Tier 2			In HFTD Tier 3		
		2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
	Circuit miles of overhead distribution lines to harden	0			0			0			0		
	Circuit miles of overhead distribution lines in WUI to harden	0			0			0			0		
	Circuit miles of overhead transmission lines in WUI to harden	0			0			0			0		
	Number of substations to harden	0			0			0			0		
	Number of substations in WUI to harden	0			0			0			0		
In rural areas	Circuit miles of overhead transmission lines to harden	0			0			0			0		
	Circuit miles of overhead transmission lines in WUI to harden	0			0			0			0		
	Circuit miles of overhead distribution lines to harden	0			0			31.8			10.3		
	Circuit miles of overhead distribution lines in WUI to harden	0			0			14.5			5.8		
	Circuit miles of overhead transmission lines in WUI to harden	0			0			0			0		
	Number of substations to harden	2			0			8			2		
	Number of substations in WUI to harden	0			0			7			1		
In highly rural areas	Circuit miles of overhead transmission lines to harden	0			0			0			0		
	Circuit miles of overhead transmission lines in WUI to harden	0			0			0			0		
	Circuit miles of overhead distribution lines to harden	0			0			2			0		
	Circuit miles of overhead distribution lines in WUI to harden	0			0			1			0		
	Circuit miles of overhead transmission lines in WUI to harden	0			0			0			0		
	Number of substations to harden	0			0			3			0		
	Number of substations in WUI to harden	0			0			1			0		

3.4.3 Status quo ignition probability drivers by service territory

PacifiCorp's primary data set for ignition probability drivers is its outage management repository, named Prosper/US. This system dates back to the early 2000s. It archives all outages and trouble calls reported by customers, public, and specific automated equipment (i.e. remote devices such as substation breakers or more recently, automated metering infrastructure). The data is interfaced into the repository from the real-time system, CADOPS, and upon completion of the outage event, within less than an hour is populated via an automated interface. Upon completion personnel identify whether the trouble call related to customer equipment, such as might result on the customer's service panel and be non-reportable, or whether the trouble call related to utility equipment and was reportable, whereupon company cause codes are used to differentiate the reason for the outage event; response personnel also provide comments that are documented as part of the permanent outage record. The outage causes, and any additional comments, were mapped to the drivers outlined below. Thus, while the Company does not explicitly use cause code balloons, it has an "Interference" cause category which is further decomposed to "Other Interfering Object" and comments generally designate the balloon involvement, allowing the outage to be associated with the ignition probability driver "Balloon contact". On the other hand, PacifiCorp's outage sub-cause designates "Car-Hit Pole", so those outages were able to be directly mapped to the ignition probability driver "Vehicle contact".

A primary assumption made relates to the location of the outage event. In PacifiCorp's outage management system all outage event details are attributed to the device where the fault event was cleared, such that if a car struck a pole several spans away from an auto isolation device (fuse, recloser, etc.), the outage event would be attributed to the fuse or recloser that "saw" that event. To the extent that circuits and device protective zones bridge across the boundaries for non-tier, Zone 1, Tier 2 and Tier 3, there may be slight inaccuracies in attribution spatially because of the precision implied by the latitude and longitude of the auto isolation point compared to where the circuit's protective zone exists.

The graphic below shows the process undertaken to map ignition drivers to outage causes. It is important to note that the outage data was developed to respond and subsequently analyze outage events and is being re-purposed through this effort to support the ignition process. As a result, certain assumptions relating to this mapping occurred. As this process matures, greater confidence in these relationships is likely to occur.

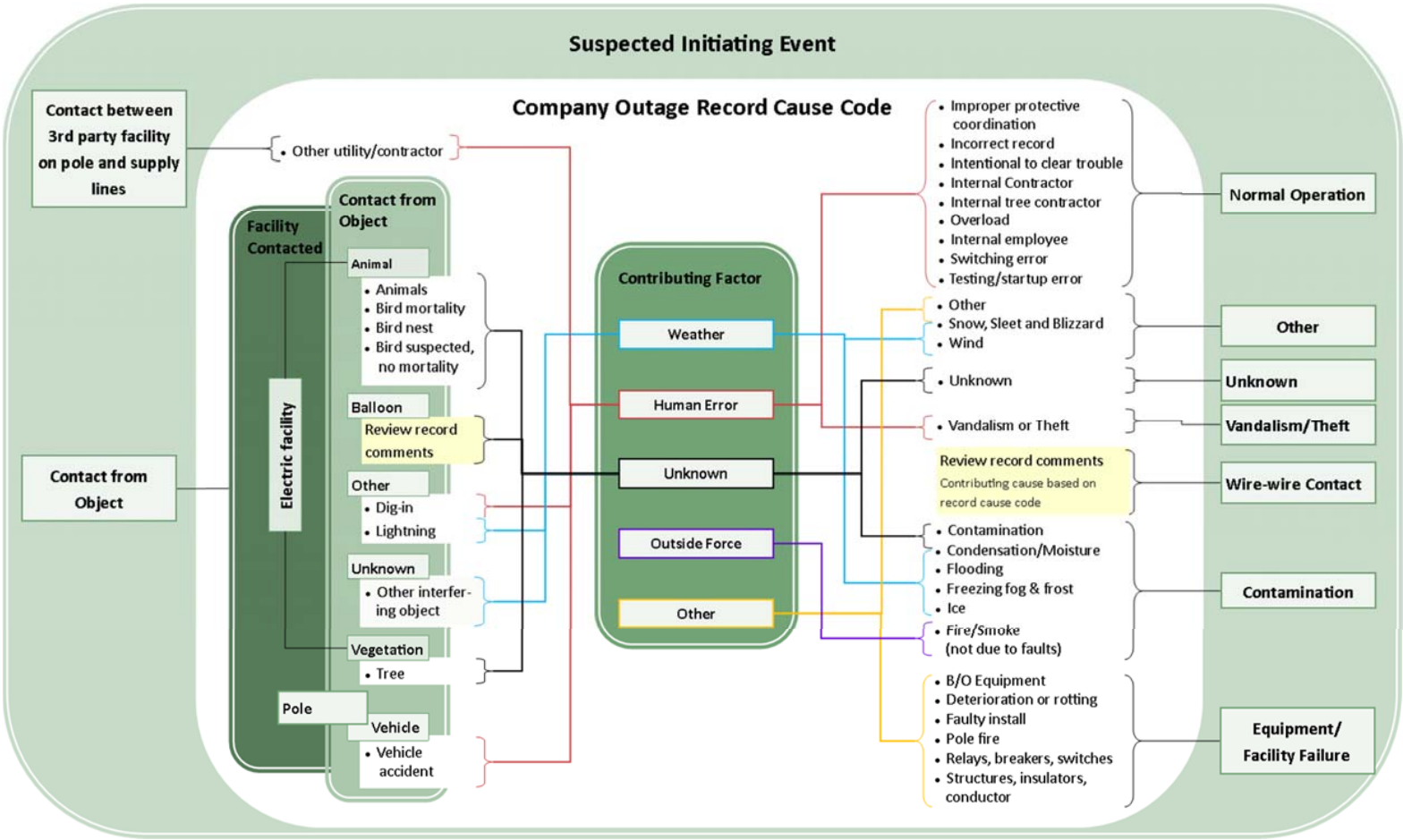


Figure 8: PacifiCorp's process to map ignition drivers to outage causes

Tables 18 a, b, c and d demonstrate incidents that have a potential risk of ignition, differentiated between distribution and transmission, categorized as either having occurred during fire season or outside of fire season.

Table 18: Key drivers of ignition probability – transmission

Incident Type by ignition probability driver		Number of incidents per year (according to 5-year Historical Average)	Average likelihood of ignition per Incident	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD - Zone 1	In HFTD - Tier 2	In HFTD - Tier 3
Contact from object	Animal contact	1.2	16.7%	1	1	0	0	0
	Balloon contact	0.0	0.0%	0	0	0	0	0
	Other	7.2	0.0%	0	0	0	0	0
	Unknown	0.4	0.0%	0	0	0	0	0
	Veg. contact	3.8	0.0%	0	0	0	0	0
	Vehicle contact	0.4	0.0%	0	0	0	0	0
Contamination		1.8	0.0%	0	0	0	0	0
All typed of Equipment/ Facility failure	Conductor	2.2	0.0%	0	0	0	0	0
	Crossarm	0.0	0.0%	0	0	0	0	0
	Fuse	0.0	0.0%	0	0	0	0	0
	Insulator	0.0	0.0%	0	0	0	0	0
	Lightning arrestor	0.0	0.0%	0	0	0	0	0
	Other	1.4	0.0%	0	0	0	0	0
	Pole	0.0	0.0%	0	0	0	0	0
	Sectionalizer	0.0	0.0%	0	0	0	0	0
	Splice/clamp/connector	0.2	100.0%	1	0	0	1	0
	Switch	0.0	0.0%	0	0	0	0	0
	Transformer	0.0	0.0%	0	0	0	0	0
	Voltage regulator	0.0	0.0%	0	0	0	0	0
Normal Operation		1.4	0.0%	0	0	0	0	0
Other		13.2	0.0%	0	0	0	0	0
Unknown		22.0	0.9%	1	0	0	1	0
Vandalism/Theft		0.0	0.0%	0	0	0	0	0
Wire-to-wire contact		0.4	0.0%	0	0	0	0	0
Contact from 3rd party		0.4	0.0%	0	0	0	0	0

Table 18b: Key drivers of ignition probability – distribution[21]

Incident Type by ignition probability driver		Number of incidents per year (according to 5-year Historical Average)	Average likelihood of ignition per Incident	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD - Zone 1	In HFTD - Tier 2	In HFTD - Tier 3
Contact from object	Animal contact	43.2	1.4%	3	2	0	1	0
	Balloon contact	0.6	0.0%	0	0	0	0	0
	Other	42.8	0.0%	0	0	0	0	0
	Unknown	2.8	0.0%	0	0	0	0	0
	Veg. contact	131.4	0.9%	6	3	0	3	0
	Vehicle contact	12.4	1.6%	1	1	0	0	0
Contamination		3.8	0.0%	0	0	0	0	0
All typed of Equipment/ Facility failure	Conductor	32.6	1.8%	3	2	0	1	0
	Crossarm	4.2	4.8%	1	1	0	0	0
	Fuse	130.6	0.3%	2	2	0	0	0
	Insulator	4.2	0.0%	0	0	0	0	0
	Lightning arrestor	11.4	0.0%	0	0	0	0	0
	Other	21.8	0.0%	0	0	0	0	0
	Pole	5.8	0.0%	0	0	0	0	0
	Sectionalizer	0.2	0.0%	0	0	0	0	0
	Splice/clamp/connector	81.8	0.2%	1	1	0	0	0
	Switch	0.4	0.0%	0	0	0	0	0
	Transformer	45.2	0.4%	1	1	0	0	0
	Voltage regulator	0.2	0.0%	0	0	0	0	0
Normal Operation		21.6	0.0%	0	0	0	0	0
Other		141.8	0.1%	1	1	0	0	0
Unknown		105.8	0.0%	0	0	0	0	0
Vandalism/Theft		0.8	0.0%	0	0	0	0	0
Wire-to-wire contact		8.8	0.0%	0	0	0	0	0
Contact from 3rd party		4.0	5.0%	1	0	0	1	0

[21] Additional table as requested in the WMP Clarification Document from 11/15/2020 in Section 3.3.3 at page 12.

Similar to with Table 11 in Section 3.2, PacifiCorp also included recent drivers of ignition probability over the last five years during fire season. These ignition probability drivers are complementary to the above requested data set with additional granularity that allows the company to understand ignition probability drivers as specifically experienced within the company's service territory during a subset of the year when environmental conditions are more likely to escalate an ignition event to a catastrophic wildfire event

Table 18c: Key drivers of ignition probability during fire season - transmission

Incident Type by ignition probability driver		Number of incidents per year (according to 5-year Historical Average)	Average likelihood of ignition per Incident	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD - Zone 1	In HFTD - Tier 2	In HFTD - Tier 3
Contact from object	Animal contact	1.0	20.0%	1	1	0	0	0
	Balloon contact	0.0	0.0%	0	0	0	0	0
	Other	6.2	0.0%	0	0	0	0	0
	Unknown	0.2	0.0%	0	0	0	0	0
	Veg. contact	0.8	0.0%	0	0	0	0	0
	Vehicle contact	0.2	0.0%	0	0	0	0	0
Contamination		1.8	0.0%	0	0	0	0	0
All typed of Equipment/ Facility failure	Conductor	0.2	0.0%	0	0	0	0	0
	Crossarm	0.0	0.0%	0	0	0	0	0
	Fuse	0.0	0.0%	0	0	0	0	0
	Insulator	0.0	0.0%	0	0	0	0	0
	Lightning arrestor	0.0	0.0%	0	0	0	0	0
	Other	0.0	0.0%	0	0	0	0	0
	Pole	0.0	0.0%	0	0	0	0	0
	Sectionalizer	0.0	0.0%	0	0	0	0	0
	Splice/clamp/connector	0.2	100.0%	1	0	0	1	0
	Switch	0.0	0.0%	0	0	0	0	0
	Transformer	0.0	0.0%	0	0	0	0	0
	Voltage regulator	0.0	0.0%	0	0	0	0	0
Normal Operation		0.6	0.0%	0	0	0	0	0
Other		2.2	0.0%	0	0	0	0	0
Unknown		5.6	3.6%	1	0	0	1	0
Vandalism/Theft		0.0	0.0%	0	0	0	0	0
Wire-to-wire contact		0.2	0.0%	0	0	0	0	0
Contact from 3rd party		0.2	0.0%	0	0	0	0	0

Table 18d: Key drivers of ignition probability during fire season - distribution

Incident Type by ignition probability driver		Number of incidents per year (according to 5-year Historical Average)	Average likelihood of ignition per Incident	Ignitions from this driver (according to 5-year historical average)				
				Total	In non-HFTD	In HFTD - Zone 1	In HFTD - Tier 2	In HFTD - Tier 3
Contact from object	Animal contact	22	1.8%	2	1	0	1	0
	Balloon contact	0	0.0%	0	0	0	0	0
	Other	30	0.0%	0	0	0	0	0
	Unknown	1	0.0%	0	0	0	0	0
	Veg. contact	21	2.8%	3	2	0	1	0
	Vehicle contact	5	4.0%	1	1	0	0	0
Contamination		2	0.0%	0	0	0	0	0
All typed of Equipment/ Facility failure	Conductor	7	5.9%	2	1	0	1	0
	Crossarm	1	25.0%	1	1	0	0	0
	Fuse	37	1.1%	2	2	0	0	0
	Insulator	1	0.0%	0	0	0	0	0
	Lightning arrestor	4	0.0%	0	0	0	0	0
	Other	6	0.0%	0	0	0	0	0
	Pole	2	0.0%	0	0	0	0	0
	Sectionalizer	0	0.0%	0	0	0	0	0
	Splice/clamp/connector	17	1.2%	1	1	0	0	0
	Switch	0	0.0%	0	0	0	0	0
	Transformer	20	1.0%	1	1	0	0	0
	Voltage regulator	0	0.0%	0	0	0	0	0
Normal Operation		7	0.0%	0	0	0	0	0
Other		8	2.4%	1	1	0	0	0
Unknown		30	0.0%	0	0	0	0	0
Vandalism/Theft		0	0.0%	0	0	0	0	0
Wire-to-wire contact		1	0.0%	0	0	0	0	0
Contact from 3rd party		1	16.7%	1	0	0	1	0

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

4.1 The objectives of the plan

This plan details PacifiCorp's planned efforts before, during and after the 2020 fire season to construct, maintain, and operate its electrical lines and equipment in a manner to minimize the risk of catastrophic wildfire, in accordance with the requirements of PUC Section 8386(a). In evaluating which engineering, construction, and operational strategies to employ in its California service territory to minimize wildfire risks associated with electric facilities, PacifiCorp was guided by the following core concepts/premises:

- Frequency of ignition events related to electric facilities can be reduced by engineering more resilient systems that experience fewer fault events.
- When a fault event does occur, the impact of the event can be minimized using equipment and personnel to isolate the fault event.
- Systems that facilitate situational awareness and operational readiness are central to mitigating fire risk and its impacts.
- A successful plan must reflect consideration of impact on stakeholders and communities, its effect on the provision of reliable and safe electric service, and the extent to which it is commensurate with both the risks and affordability issues that are specific to PacifiCorp's service territory and customer base.

While this plan addresses all regulatory directives and requirements, the set of principles included in the plan are evolving and are subject to change. As new analysis, technologies, practices, network changes, environmental influences, or risks are identified, changes to address them may be incorporated into future iterations of the plan which is a living document. In addition, the plan integrates and interfaces with various operating policies and asset management and engineering principles which are themselves subject to change. As appropriate, the current version of documents are incorporated either as appendices to this plan or by reference.

The specific immediate, near and longer term objectives of this plan are implementing the programs included in Section 5. PacifiCorp's general approach and core concepts remain the same for any objectives to be completed before the upcoming wildfire season, before the next annual update, within the next three years, and within the next ten years. Detailed differences in the programs to be completed in those planning horizons are included in Section 5.1.1 – Section 5.1.4.

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4.2 Understanding major trends impacting ignition probability and wildfire consequence

A. *Describe how the utility monitors and accounts for the contribution of weather to ignition probability 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.).*

PacifiCorp established flexible, time-independent input variables to ensure that its fire mitigation triggers would be temporally relevant. It supported the development of this risk model by evaluating historic fires throughout Northern California over the past decade. As discussed previously, it correlated the magnitude of the acreage burned against environmental conditions and observed that generally the largest fires occurred when three specific variables were present, KBDI, FFWI and wind gusts, at specific levels. As a result of this correlation it established thresholds and watch guidelines which inform its day-to-day activities. As conditions vary due to drought or wetting periods, this serves to alter what would have previously been considered "fire season". On the short term basis, FFWI and wind gusts are normal inputs to fire professionals and their response activities, thus aligning the operational functions of PacifiCorp with the public safety partners in a given area. The company expects that updating these data sets will be required as trends continue to unfold.

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

PacifiCorp further recognized the significant role that fuel (e.g. vegetation) plays in sustaining ignitions, and chose to address it in two different methods. First, KBDI is theorized to provide information regarding recent and protracted wetting or drying trends which will impact live fuel. Second, PacifiCorp placed fuel moisture sensors on approximately half of its weather stations. These devices are anticipated to provide extra insight into dry fuel conditions; at this time the trends and reasonably expected values have not yet been determined, however the data will support advancement of any thresholds. In combination, these two measures inform the fuel readiness aspect of wildfire risk.

4.2.1 Service territory fire-threat evaluation and ignition risk trends

The following table includes PacifiCorp's macro trends impacting ignition probability and/or wildfire consequence.

Primary drivers to ignition probability are chiefly environmental (including drought or impacts resulting in live and dead fuel changes), population-based and the results of additional infrastructure. Further segmenting these drivers into those relating to utility ignitions narrows them further. Below is the rank ordering assessment for PacifiCorp's service area.

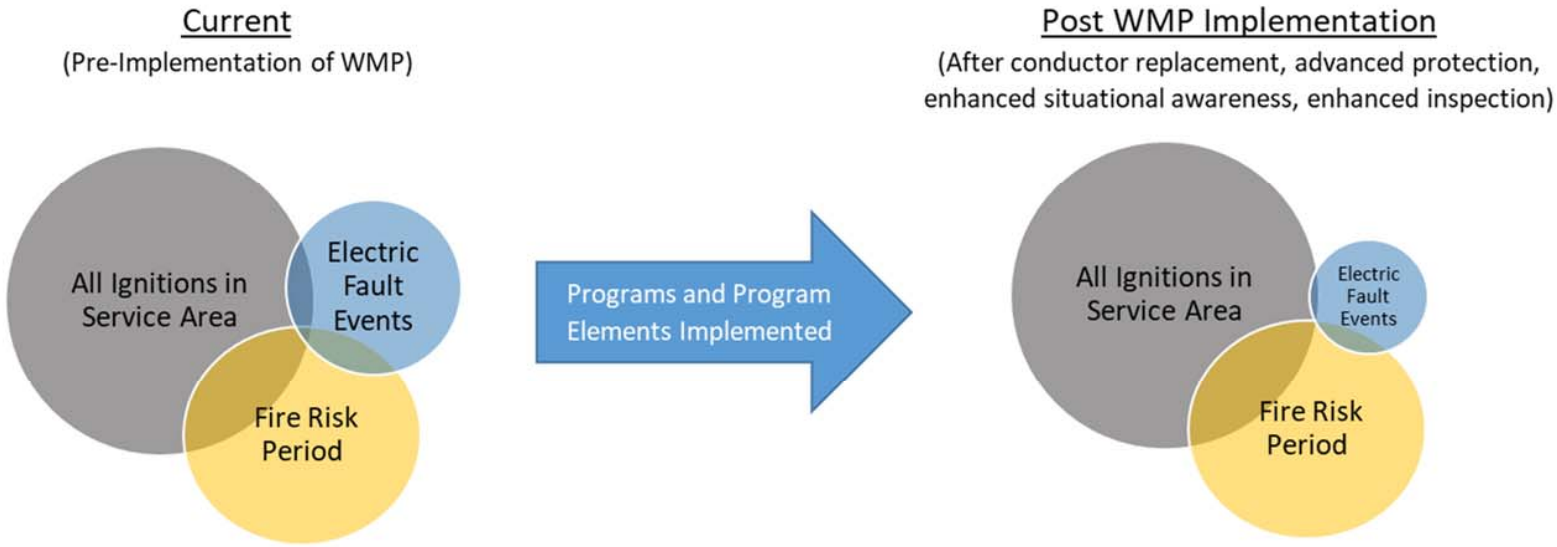
Table 19: Macro trends impacting ignition probability and/or wildfire consequence

Rank	Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10	Comments
1	Change in ignition probability and estimated wildfire consequence due to climate change	Reduced live and dead fuel moisture values relative to the historical baseline correlate with increased fire severity. Tree mortality may increase ignitions associated with tree line contact.
5	Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles	Tree mortality induced by disturbances such as beetle kill may increase ignitions associated with tree line contact. The relation between tree mortality and fire behavior is not clear and remains an active research area.
2	Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture	100+ years of fire suppression and exclusion have contributed to higher fuel loading and a shift from frequent low intensity fires that benefit the landscape to a smaller number of intense fires that have negative effects on the landscape.
7	Population changes (including Access and Functional Needs population) that could be impacted by utility ignition	This macro trend was interpreted to refer to aging population and individuals with limited mobility and/or cognitive impairments and how they could be impacted by utility-caused ignitions. Due to limited urban populations, this is not viewed as a major driver of fire consequence in PacifiCorp's service territory.
8	Population changes in HFTD that could be impacted by utility ignition	Future demographic trends in PacifiCorp's service territory are unknown, but this is not viewed as a major driver of fire consequence in PacifiCorp's service territory
6	Population changes in WUI that could be impacted by utility ignition	Structures in Wildland Urban Interface or Intermix are more vulnerable to fire losses than those in urbanized areas. As more structures are built in WUI/Intermix areas fire losses from all causes, not just utility ignitions, may increase.

Rank	Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10	Comments
3	Utility infrastructure location in HFTD vs non-HFTD	As additional utility infrastructure is added to HFTD areas to serve new development, utility ignition probability may increase due to the presence of utilities in HFTD areas that previously had no utility infrastructure. However, some of this increase in ignition probability may be offset by hardened infrastructure, advanced coordination, improved real-time monitoring of circuits or other fire prevention measures such as proactive de-energization.
4	Utility infrastructure location in urban vs rural vs highly rural areas	As more structures are built in rural & highly rural areas that are connected to the grid, increased presence of utilities may in areas that previously contained no utilities may increase utility ignition probability. However, some of this increase in ignition probability may be offset by hardened infrastructure, advanced coordination, improved real-time monitoring of circuits or other fire prevention measures such as proactive de-energization.

4.3 Change in ignition probability drivers

In the visual model shown previously, ignition is the outcome of an ignition source, favorable environmental conditions and available fuel. As WMPs are implemented the utility aspect of this is expected to limit substantially the probability of an ignition source of sufficient magnitude that can result in a utility-caused ignition. The tactics discussed in the WMP include reducing the probability of ignition during those environmentally favorable times in locations where fuel loads exist. Specifically, focusing on limiting the probability of ignition sources (assumed to be related to fault events) during the fire season is expected to dramatically impact utility-caused fire risks.

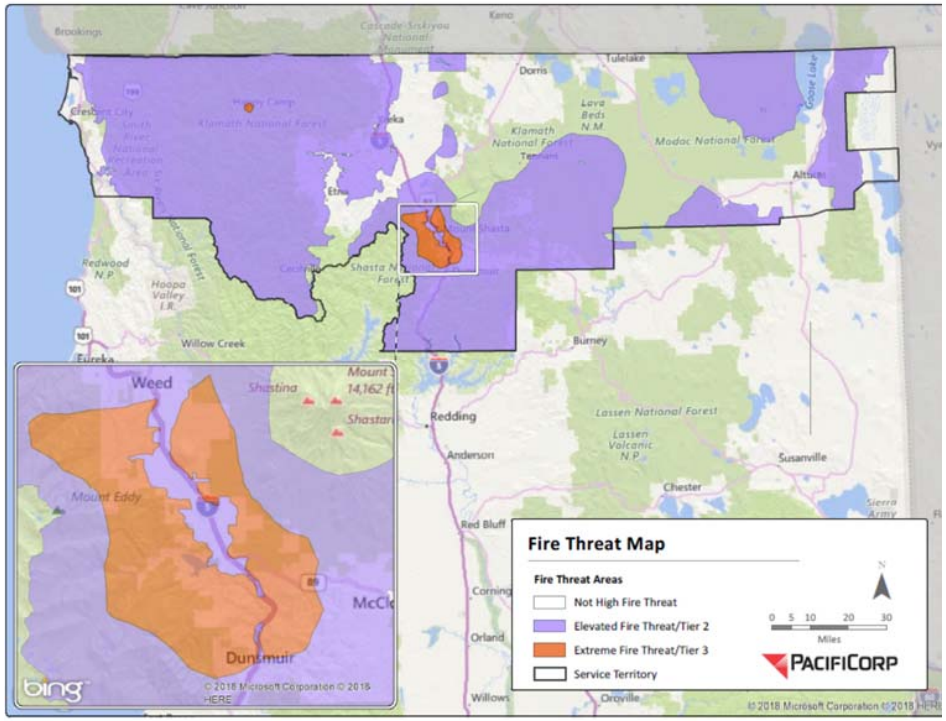


4.4 Directional vision for necessary PSPS

The following section addresses the regulatory requirements of PSPS events, the methodology applied to identify candidate PSPS zones, the potential impact to customers and communities, triggers for activation, subsequent communications and protocols, as well as lessons learned from 2019 and planned evolution of the program as a whole.

4.4.1 Methodology to Identify Candidate PSPS Zones

PacifiCorp, consistent with other California investor owned utilities, generally constrains PSPS events to Tier 3 areas and has established its plans consistent with regulatory requirements pursuant to Decision D. 12-04-024 (applicable to PacifiCorp pursuant to Resolution ESRB-8) and as adopted in the current PSPS Rulemaking, R.18-12-005. PacifiCorp has two Tier 3 areas within California, as shown in the graphic below.



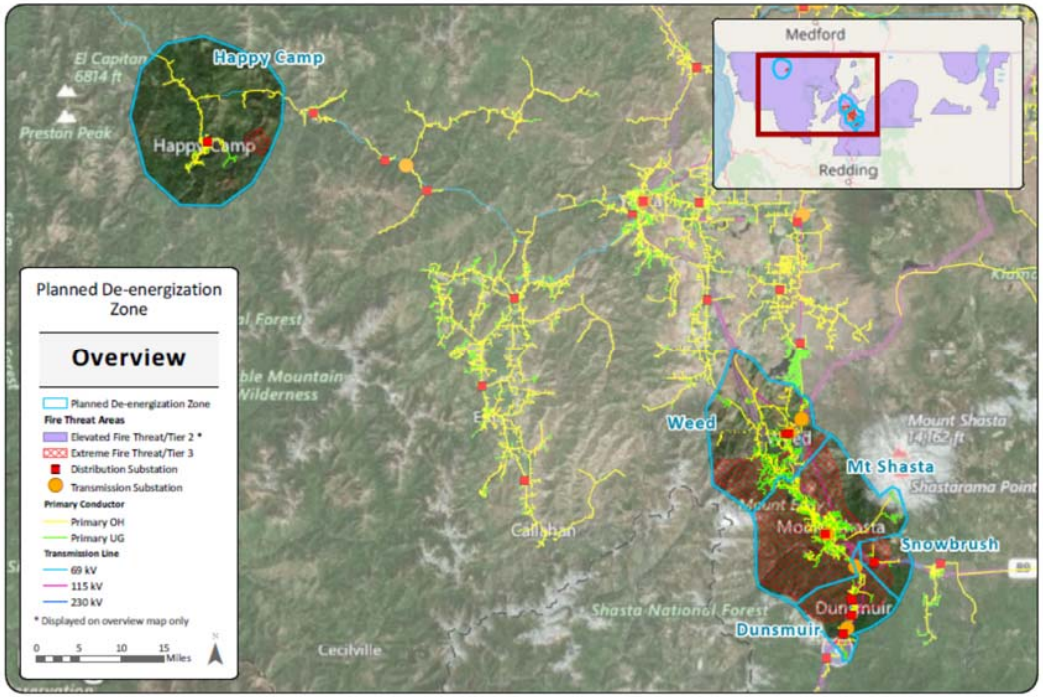
A Tier 3 designation itself does not require the development of a PSPS plan, rather it identifies high threat locations requiring further evaluation to determine if a PSPS event should be considered for mitigating fire risk. This is particularly relevant in the Happy Camp area which while the Tier 3 footprint contains no overhead electric equipment, has frequent weather of a widespread nature which could result in impacts to the community.

Nor must the PSPS zone be fully contained within the Tier 3 area; the shape instead is a result of similar risk levels given the weather history and other environmental factors in combination with associated electrical equipment in the area.

PacifiCorp reviewed fire threat, terrain, fire history, fuel characteristics and weather in determining the company's PSPS zones. It also considered wildland urban interface, defensible space, impacts to customers and facilities to establish its proactive de-energization zones. Additional details can be found in Annex A of the company's California Proactive De-Energization Plan.

4.4.2 PSPS Zones & Potential Impact to Customers

PacifiCorp, through its review, identified two primary zones where a PSPS event might be applicable in its California service territory. The two primary zones were further subdivided into smaller areas (shown outlined in the graphic) minimizing customer impact where appropriate based on weather monitoring capability and circuit topology. This approach resulted in five discrete PSPS areas with a mix of circuit topology and customer impacts as summarized in the below table.



Approximately 20% of PacifiCorp's California customers are located or are electrically-connected to the designated Tier 3 area within its service territory. Thus, it is challenging to mitigate the impacts of PSPS, until sufficient hardening efforts have been delivered to minimize the ignition risk during environmentally favorable periods described in Section 5.3.3.

However, as included in Section 5.3.3.8, PacifiCorp continues to evaluate opportunities within the company's pre-defined PSPS zones where projects can promote flexibility, enhance quality and quantity of localized data to inform decision making, and mitigate the impact of potential PSPS events. At this time, the following table includes the five discrete zones and potential customer impact associated with a PSPS events.

	PSPS Name	Substation	# of Circuits	Customers	Distribution OH	Distribution UG
1	Happy Camp	Seiad, Happy Camp	3	865	48.4	5.9
2	Weed	Weed, International Paper	5	2,589	90.5	62.1
3	Mt. Shasta	Mt. Shasta	6	5,074	86.4	76.7
4	Dunsmuir	North & South Dunsmuir	5	1,806	30.0	8.6
5	Snowbrush	Snowbrush	1	17	4.2	1.2
	Total	**9 Substations**	**20**	**10,351**	**259.5**	**154.5**

4.4.3 Criteria for PSPS

To successfully identify, activate, and implement a PSPS event within PacifiCorp's service territory in California, the company monitors weather information from the PSPS areas, uses a list of pre-determined and measurable triggers for activation of a watch event, incorporates additional local knowledge and data to potentially active a PSPS event, and then facilitates continuous monitoring of system conditions to determine when elevated risk conditions subside.

The main process outline is summarized below.

1) PacifiCorp utilizes automated weather systems monitoring to generate an internal notification based on the criteria, and a potential PSPS activation is triggered.
2) When a potential activation is triggered a Public Safety Power Shutoff Event Proposal is prepared and provided to the Vice President of System Operations and the Vice President of T&D Operations which contains the timing details, area, and forecasted duration of the event.
3) The Vice President of System Operations and the Vice President of T&D Operations evaluate all relevant information as described in the following subsections, including input from public safety partners to properly characterize and consider impacts to local communities.
4) The Vice President of System Operations and the Vice President of T&D Operations decide whether to implement a PSPS event.
5) If activated, the company's notification and activation protocols are followed, including activation of the company's emergency management system and customer/public notifications.
6) Conditions are continuously monitored during the PSPS event and when elevated risk conditions no longer exist, lines are patrolled for damage, and re-energized, ending the PSPS event.

Criteria Inputs

Building upon work completed in developing the California state-wide fire map in D. 17-12-024, PacifiCorp utilized weather data, geographic topography, fire probability and ignition data and historic fire data to determine the criteria for triggering proactive de-energization in each of the five PSPS area. While the primary triggers are the same – meaning that a candidate event will be identified based on the same thresholds – it is expected that localized topography and weather conditions will be evaluated in real time prior to making a determination to de-energize any power lines; by using microclimatology information, there may be an opportunity for de-energizing smaller areas at a time. For these reasons, it will be rare for proactive de-energization to be simultaneously activated in multiple areas. PacifiCorp uses the following measurements as inputs to the PSPS watch criteria.

- Hourly Fosberg Fire Weather Index (FFWI) which uses temperature, relative humidity, 10-minute wind-speed factored into a single weather index which is correlated to influence on fire spread, accumulated over a 6 hour period (FFWI6).

- The Keetch-Byram Drought Index (KBDI) which assesses the risk of fire by representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency.
- Forecasted wind speeds and potential sustained gusts.

An automatic notification is triggered internally for specific PSPS areas based on a forecast of the above measurements meeting the following levels:[22]

PSPS Watch Level 1	PSPS Watch Level 2
• KBDI >=622 and • FFWI6 >=30 and • Sustained wind >=16 mph or • Wind gust >=25 mph	• KBDI >=622 and • FFWI6 >=30 and • Wind gust >31 mph

While these general values are used to identify PSPS watch conditions, localized criteria and up to date information are incorporated when a determination is made to implement an actual PSPS event as described in the following subsection.

Criteria to Activate

After the first notification is delivered, PacifiCorp actively monitors weather conditions and endeavors to provide customers with additional notifications. During this time PacifiCorp begins actively engaging Public Safety Partners to ensure any relevant input is incorporated from these professionals. When Watch Level 2 levels are forecasted (or measured in actual conditions), PacifiCorp's Emergency Operation Center (EOC) is activated. The Watch Level 2 forecast is confirmed and continuously monitored throughout the potential PSPS event. Customer lists in the subject PSPS area are assembled, and a communication plan is implemented according to the details in Section 4.4.3. PacifiCorp also deploys additional resources in the subject PSPS area to monitor local environmental and asset conditions on the ground in real time.

Based on all of the information available to the EOC, the EOC Director, which under normal operation conditions will be the Vice President of T&D Operations, may make a decision to implement a PSPS. In general, barring other unique circumstances, a PSPS would not be implemented unless Watch Level 2 conditions are extremely likely in forecasted weather conditions. At the same time, realization of Watch Level 2 conditions does not necessarily mean that a PSPS is warranted. The EOC Director will consider all available information, including real time feedback from other EOC participants, local field input, recent fire activity, and other pertinent information provided by local emergency management professionals to determine whether PSPS is appropriate. As a matter of practical reality, the EOC Director cannot know if a PSPS will prevent a utility related ignition or not. 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 which would have otherwise occurred was prevented.

[22] While Red Flag Warnings provide the public awareness of heightened fire risk conditions and are considered by PacifiCorp when evaluating any candidate event, such warning do not sufficiently correlate to warrant inclusion as a key input to activation of the proactive de-energization process.

4.4.4 Communication Plan & Protocols

In the event of PSPS activation, identified personnel will receive an email notification from System Operations. The email will include the current or forecasted weather conditions triggering an event, the affected area, and the date and time of the event. The goal is to begin notifying customers 48 hours in advance of a potential PSPS event. If this is not possible due to weather or any other changing conditions, the notification process will begin as soon as possible.

Customer Communications

- The list of affected customers (generated by System Operations from the impacted circuits noted in the De-Energization Event Plan) is sent to the Customer Contact Center
- Using this list, the contact center will begin sending notifications utilizing preapproved templates for each state of the notification process.

During the PSPS event, customers will receive updates to the status of the outage. The trigger for an update will be when the status of the outage or the estimated time of restoration changes. If a previously noticed proactive de-energization event is cancelled, customers will receive a cancellation notice.

Method of Notification

- Customers will be contacted by text, email, or phone call based on their preference. If no preference is selected, a phone call will be made to the primary phone number on the account.
- Notifications for a proactive de-energization event are exempted from the 48 hour notification prior to a planned outage as required under Rule 25 under both the Force Majeure and Safety clauses listed under approved exemptions.
- Messages will be posted on social media, local media, and press release.

Timeframe for Communications	Type of Notification	Customer Service/Communications
48 hours before De-Energization	**Conditional**	48 hour notice to customers (including critical priority customers) Emergency response site goes live Notification posted on website, Social Media and emergency response site Mobilize local authorities for a live stream on Facebook

Timeframe for Communications	Type of Notification	Customer Service/Communications
		Issue a press statement/release Mandatory manager call for local employees impacted
2 hours	**Updated Conditional**	2 hour notice to customers (including critical priority customers) Notification posted on website, Social Media and emergency response site Mobilize local authorities for a live stream on Facebook Issue a press statement/release Mandatory manager call for local employees impacted
1 hour	**Imminent**	Mobilize local authorities for a live stream on Facebook Mandatory manager call for local employees impacted
De-Energization	**Immediate**	Notification posted on website, Social Media and emergency response site Mobilize local authorities for a live stream on Facebook Issue a press statement/release
Re-Energization	**Immediate**	Notice of cancellation customers (including critical priority customers) Notification posted on website, Social Media and emergency response site Issue a press statement/release

Outreach in Advance of the Implementation of a Public Safety Power Shut-Off

PacifiCorp provides information regarding proactive de-energization on the public website, including the following:

- Actions taken to harden the system to reduce risk,
- Monitoring conditions,
- Criteria for triggering a PSPS event,
- Map of tiers in California,
- Notification before, during, and at the conclusion on an event,
- Restoration information,
- PSPS candidate zones,
- PSPS zone status and forecasting leading up to and during a PSPS event, and
- Available community resources.

Additionally, PacifiCorp intends to communicate through additional methods such as social media, twitter, Facebook, pamphlets, and radio as described above as well as Section 5.3.10.1.

Access and Functional Needs Customers

Known vulnerable customers (medical conditions, etc.) will receive additional outreach from the company requesting they evaluate the safety of their situations and consider a back-up plan in case of a shut off or any emergency outage. PacifiCorp also refers to these customers as AFN, or access and functional needs customers, identified through the process described in Section 2.7.

Public Safety Authorities, Local Municipalities, Emergency Responders

The company's Emergency Manager will notify the appropriate local agencies based on the PSPS zone that was activated. PacifiCorp will work with agencies to minimize the impact of de-energization as much as possible and fully communicate the impacted areas and expected duration. The notification will be documented for reporting purposes after the event has ended.

4.4.5 Operations Response and Management

The following describes the company's PSPS operations response and management requirements in addition to those included in the company's Emergency Response Plans, and described in Section 5.3.9, such as pre-staging of additional resources.

Local Operational Response

Upon notification of a potential proactive de-energization event local operations will secure appropriate resources for required switching, restoration line patrolling, and response to public requests. In each PSPS plan, specific resource estimates have been provided. Further, in each of these plans switching has been identified that can aid in the quicker restoration of priority customers while patrolling continues on the remaining portions of the circuit.

After-Action Reporting/Plan Updates

As outlined in D. 12-04-024 and ESRB-8 there are reporting requirements following a proactive de-energization event. The forms and logs listed in Annex B of the company's California Proactive De-Energization Plan will be used to document required information throughout an event. In addition an annual refresh of the proactive de-energization process and documentation will be conducted and any necessary updates to the plan documented.

4.4.6 Lessons Learned

While PacifiCorp did not implement a PSPS event in the state of California during the 2019 fire season, PacifiCorp did remain vigilant and monitor elevated risk conditions throughout the year when required to maintain the ability to implement a PSPS event. During these time periods, PacifiCorp learned that the ability to efficiently and effectively implement a PSPS event within the company's service territory in a manner that keeps the impact to customers and communities as low as practical, is about flexibility, system knowledge, and the ability to make informed decisions to task appropriate action in the moment.

PacifiCorp has incorporated these lessons learned into the company's grid design and system hardening wildfire mitigation program focused on grid topology improvements to mitigate or reduce PSPS events. Further described in Section 5.3.3.8, 2019 represents the first year of PacifiCorp's PSPS program, and, therefore, the company does not yet have a defined list of mitigation projects. However, moving forward, PacifiCorp's grid topology improvements to mitigate or reduce PSPS events will focus on the evaluation of various scenarios within the company's pre-defined PSPS zones to understand what projects may be able to promote this flexibility. In some cases, these projects may include proactive installation of equipment. However, as weather patterns and risk can change quickly, specific proactive projects may not always be effective and the company may look at enhanced procedures and readiness to implement reactive switching or isolation points during an event.

4.4.7 Planned Evolution

Approximately 20% of PacifiCorp's California customers are located or are electrically-connected to the designated Tier 3 area within its service territory. Thus, it is challenging to mitigate the impacts of PSPS, until sufficient hardening efforts have been delivered to minimize the ignition risk during environmentally favorable periods described in Section 5.3.3.

Therefore, PacifiCorp anticipates that further implementation of system hardening programs can substantially reduce the need and impact of PSPS events and will, most likely, require that PacifiCorp's PSPS programs reflect a reduction in potential candidate zones, amendment to threshold criteria, and, where appropriate, removal of a PSPS zone entirely.

Additionally, as PacifiCorp continues to install and leverage data from local weather stations to facilitate informed decision making and enhanced situational awareness, the company may need to incorporate this new information into existing PSPS protocols. However, it is unknown at this time exactly how enhanced situational awareness and localized data will affect PacifiCorp's PSPS protocols. For example, discreet, localized values could enhance decision making and allow PacifiCorp to use real time conditions to initiate or terminate a PSPS event. This information may also demonstrate that localized effects and weather patterns reflect greater risk than initially contemplated, and, therefore, require an amendment to PSPS thresholds and a potential re-evaluation of boundaries and candidate zones. Regardless, the company recognizes that this new information will need to be incorporated into both the overall assessment of risk and selection of potential candidate zones as well as the threshold criteria used to make real time decisions during times of elevated risk.

It is also critical to note that the identification of candidate PSPS zones, as described in Section 4.4.1, is dependent on fire threat, terrain, fire history, fuel characteristics and weather patterns as well as wildland urban interface, defensible space, and impacts to customers and facilities. As many of these inputs are not fixed values, such as weather, PacifiCorp recognizes that the PSPS candidate boundaries can change and anticipates that future evaluation of new data could result in an amendment or relocation of potential PSPS zones.

Similarly, as included in Sections 5.3.3, PacifiCorp's grid design and system hardening programs include focused efforts on and the prioritization work in current known PSPS, Tier 2, and Tier 3 locations. Therefore, a change to PSPS risk evaluation and boundaries may require a change in the company's approach to hardening efforts.

Therefore, PacifiCorp intends the planned evolution of the company's PSPS program and protocols to mimic the implementation of both system hardening programs as well as situational awareness programs. Furthermore, as described above in Section 4.4.6, PacifiCorp intends the evolution of the company's PSPS program and protocols to incorporate flexibility, system knowledge, and the ability to make informed decisions based on accurate information to task appropriate action in the moment.

As PacifiCorp is early in the implementation of its multi-year WMP and 2019 represents the company's first year of PacifiCorp's PSPS program, it is challenging to know exactly how the company's PSPS programs and protocols will evolve or provide specific changes to the impact on customers

and circuits. However, where possible, the following table includes PacifiCorp's approach and planned evolution of the company's PSPS program and protocols before the next annual update, within the next 3 years, and within the next 10 years.

Timeframe	PacifiCorp's Approach/Planned Evolution
Planned evolution before the next annual update	• Incorporation of localized weather data and enhanced situational awareness • Continued communication with stakeholders re PSPS • Outreach to ensure AFN populations are specifically identified in plans • Development of PSPS forecast webpage for customers and stakeholders
Planned Evolution within the next 3 years	• Continued communication with stakeholders re PSPS • Ongoing outreach to ensure AFN populations are specifically identified in plans • Refinement to PSPS forecast webpage for customers and stakeholders • Incorporation of relevant grid topology programs to mitigate the impact of a PSPS event • Evaluation of system hardening programs to include potential reduction of candidates or PSPS boundaries or amendment to threshold criteria • Incorporation of localized weather data and enhanced situational awareness to review risk profile and overall candidate selection
Planned Evolution within the next 10 years	• Continued communication with stakeholders re PSPS • Ongoing outreach to ensure AFN populations are specifically identified in plans • Refinement to PSPS forecast webpage for customers and stakeholders • Continued incorporation of relevant grid topology programs to mitigate the impact of a PSPS event • Evaluation of system hardening program completion to include potential reduction of candidates or PSPS boundaries, amendment to threshold criteria, and, where appropriate, removal of the PSPS zone entirely • Continued incorporation of localized weather data and enhanced situational awareness to review risk profile and overall candidate selection

The following table includes PacifiCorp's anticipated characteristics of PSPS use over the next 10 years ranked. As PacifiCorp has not enacted a PSPS yet, the answers to these questions remain qualitative in nature as a decrease from zero is not possible. Additionally, those identified as "no change" reflect a general expectation of limited impacts due to PSPS. Furthermore, it is critical to note that many of these anticipated characteristics are interdependent, such as the PSPS scope, number of circuit miles, and number of impacted customers. Therefore, it was challenging to independently rank interdependent characteristics. In all instances below, PacifiCorp assumed a normalized value would be more impactful than a non-normalized value. Additional rationale and notes are included in the table below.

Table 20: Anticipated characteristics of PSPS use over the next 10 years

Rank order 1-9	PSPS characteristic	Significantly increase; increase; no change; decrease; significantly decrease	Comments
4	Number of customers affected by PSPS events (total)	Decrease	As PacifiCorp's system hardening programs bias toward customer density, PacifiCorp assumes this will be the second most impactful characteristic.
3	Number of customers affected by PSPS events (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	
6	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	PacifiCorp assumes implementation of system hardening projects as well as situational awareness will significantly affect threshold criteria and improve the quality of information used to implement PSPS events.
5	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	
2	Scope of PSPS events in circuit-events, measured in number of events multiplied by number of circuits targeted for de-energization (total)	Significantly decrease	PacifiCorp assumes implementation of system hardening projects as well as situational awareness will significantly decrease the scope of potential future PSPS event.
1	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.,	Significantly decrease	
8	Duration of PSPS events in customer hours (total)	Decrease	PacifiCorp assumes implementation of system hardening projects as well as situational awareness will significantly affect threshold criteria and improve the quality of information used to implement PSPS events, including the decision to end a PSPS event affecting duration.
7	Duration of PSPS events in customer hours (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	
N/A	Other	N/A	N/A

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5. Wildfire Mitigation Strategy and Programs for 2019 and for each year of the 3-year WMP term

The following subsections include PacifiCorp's strategy and programs for 2019 and for each year of the 3-year WMP term, including a discussion on the company's general approach, summary of 2019 progress and lessons learned, identification of resource limitations and challenges, and description of how the utility expects new technologies and innovations to impact the utility's strategy and implementation approach over the next 3 years

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 for both (1) the types of activities needed and (2) the extent of those activities needed to mitigate these two different groups of risks.*

PacifiCorp uses a combination of lessons learned from other utilities, general guidance from Commission-led initiatives, and engineering and operational best practices to determine a general approach to manage wildfire risk. PacifiCorp has extensive experience implementing existing programs, which target safety or reliability risk mitigation, to set a foundation and provide guidance into best practices for the design, implementation, and continuous improvement of a program. As a result, many of the company's wildfire mitigation programs are simply an extension or augmentation of scope to existing programs, such as inspection and correction programs. Where needed, new programs or activities are identified, designed and implemented such as installation of covered conductor.

In either case, to determine the types of activities needed and the extent that those activities are needed to mitigate wildfire risk as opposed to risks to safety and/or reliability, PacifiCorp relies on a combination of the core concepts included in Section 4.1 along with historical data, sounds engineering judgement, and documented ignition probability drivers.

Historic ignition data, as available from CALFIRE data sources, along with engineering judgement and operations knowledge indicate where and why historic ignitions have occurred. PacifiCorp's outage records, which document the frequency, duration, and cause of outages experienced on energized circuits, are often used to described ignition probability drivers and represent the most accurate depiction of how often potential ignition events may occur within the company's service territory. These core concepts provide guidance into the development of a program and include targeting a reduction in ignition probability associated with fault events, mitigation of impact should a fault event occur, and integration of systems that facilitate situational awareness to inform decision making and operational readiness while limiting the impact on stakeholders and communities.

PacifiCorp uses the historic ignition data and outage records in combination with the core concepts to develop the company's wildfire mitigation programs, which may include implementation of new technology, operational practices and procedures, engineering standards, or a combination of all of the above.

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

In 2019, PacifiCorp was able to materially deliver its 2019 WMP despite start-up efforts and resource constraints as described further in part C of Section 5.0. The following graphic reflects PacifiCorp's previously reported progress on 2019 WMP efforts.

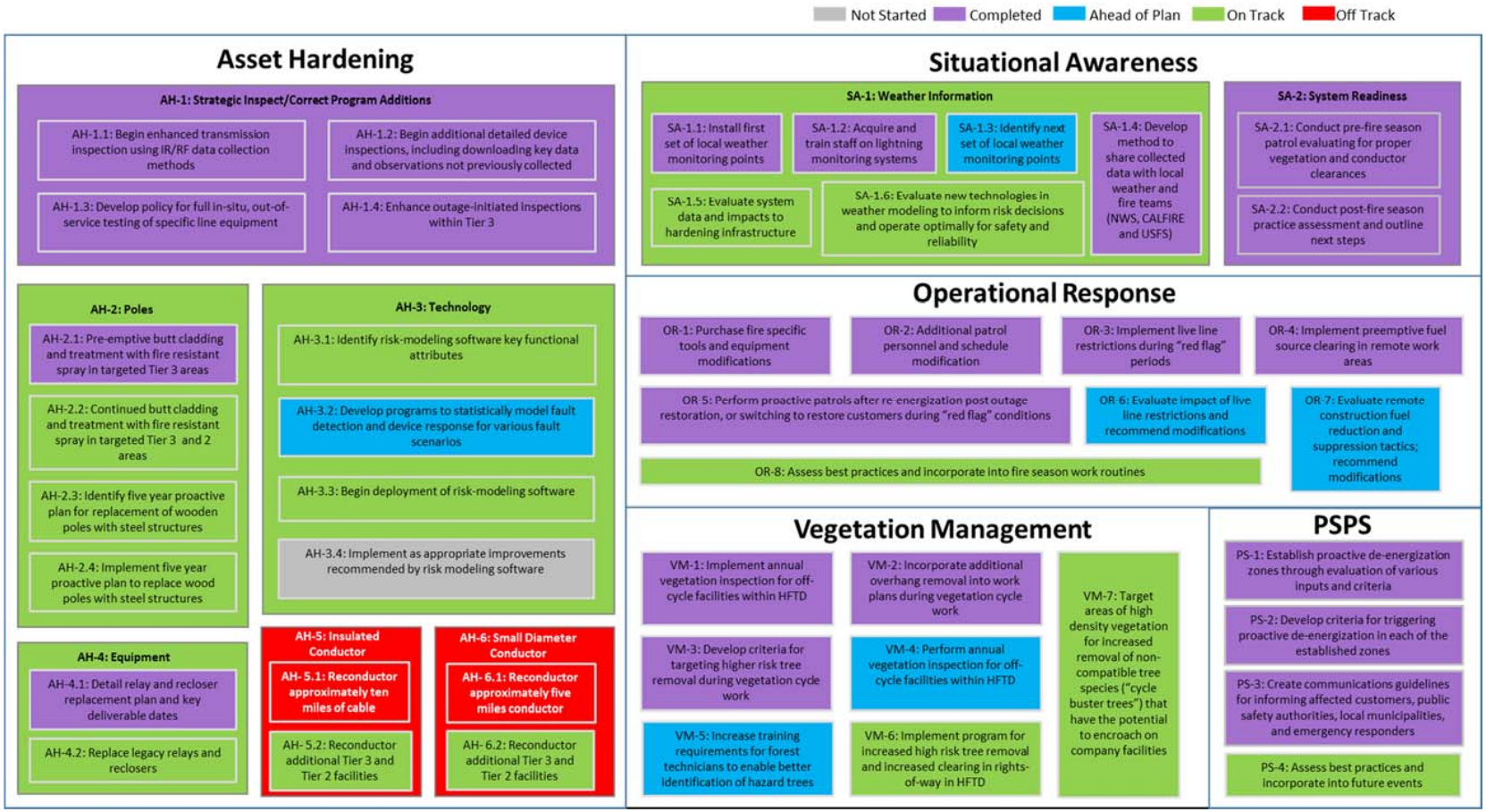


Figure 9: PacifiCorp's 2019 WMP Activities Summary Graphic

Additionally, the following table includes a brief summary of high level activities implemented in 2019, lessons learned, and minor changes or adjustments to existing programs incorporated into the 2020 WMP. As included in PacifiCorp's First Report Regarding Possible Off-Ramps[23], no significant changes were made nor were any new programs introduced or existing programs cancelled. This table is not meant to be an all-inclusive description of progress. Additional details regarding completed work and progress are included in Tables 21-30 in Section 5.3.

Wildfire Mitigation Category	Initiative/Program	Summary	Lessons Learned (where applicable)	Changing circumstances (where applicable)	Corresponding adjustments (where applicable)
Risk assessment and mapping	Climate-driven risk map modeling based on various relevant weather scenarios	PacifiCorp developed key variables against which it monitored forecast conditions to determine operational strategies to employ during the forecast risk periods	Additional threshold values will provide better guidance for operational and engineering staff, such that various combinations of permutations of these variables will identify risk levels (while not explicitly calculating an FPI)	Locations where weather patterns are determined to be substantially different warrant the development of customized threshold values	As more weather data is available (due to the placement of additional microstations) more granularity of historic data and identification of risk periods can occur
Situational awareness and forecasting	Advanced weather monitoring and weather station installation	PacifiCorp installed and commissioned 10 weather stations throughout the company's service territory in the state of California. The placement of additional stations in southern Oregon further complement regional situational awareness for both National Weather Service Personnel and other Public Safety Partners, as well as PacifiCorp's operations teams.	With multiple weather station installations, due to either positioning relative to needed measurements or ability to properly maintain established communication over inconsistent cellular networks, the weather stations needed to be moved multiple times and tested. PacifiCorp learned that this program has an iterative component that may continue over time in order to maintain data quality. Regular monitoring of the stations and verification of data streams is required.	Weather conditions and inconsistent cellular network communication capability	Inclusion of potential iteration and multiple attempts at positioning is now an understood and included element of weather station installation.
Grid design and system hardening	Distribution and transmission pole replacement and reinforcement, including with composite poles	An assessment of optimum material specification was performed prior to undertaking this full program, as noted in the company's	Steel was determined to be not preferable due to lightning environment, strength reduction when in high heat environment and	Cost and resource constraints	Change from use of steel to alternate materials such as fiberglass

[23] PacifiCorp's First Report Regarding Possible Off-Ramps was filed on November 27, 2019 in compliance with Decision 19-05-036.

Wildfire Mitigation Category	Initiative/Program	Summary	Lessons Learned (where applicable)	Changing circumstances (where applicable)	Corresponding adjustments (where applicable)
		2019 WMP filing. The overall system hardening program is effective, but is considering a minor modification to a specification and the use of polymer in place of steel.	costs; rather fiber reinforced polymer (FRP) poles.		
Asset management and inspections	HFTD Inspections & Corrections	Incorporated increase in inspection frequency and acceleration of correction timeframe per GO 95 and included in the 2019 WMP.	Additional granularity and functionality was required in both procedures, processes, data processing, and tools when identifying potential fire threat conditions and ensuring that these conditions were assigned an accelerated correction timeframe.	No additional specific changing circumstances identified for 2020-2022	Adjustments to internal policies, tracking mechanisms and frequency, and introduction of additional QA/QC reviews incorporated throughout 2019. No new adjustments.
	IR Inspections	PacifiCorp performed enhanced inspections on company owned overhead transmission lines in California via helicopter using IR/UV alternative technologies to identify hot spots, potential substandard connections or significant insulative degradation not typically detectable through visual inspection. Flights were performed at standard loading conditions as well as peak loading conditions.	Preliminary results indicate: • IR technology may be reliable method to potentially identify Conditions not normally found during a visual inspection; • Conditions can be detected at normal loading levels; • IR inspections may be more valuable at peak loading conditions; and • The combination of UV and IR inspections does not seem to be optimal	No specific changing circumstances identified for 2020-2022 yet (still completing the pilot). During 2019 activity, PacifiCorp discovered that loading may have a strong impact on results and, therefore, needed to be evaluated.	Additional flights/inspections added throughout 2019 to accommodate performing inspections during peak loading
	LiDAR inspections	PacifiCorp performed LiDAR (Light Detection and Ranging) data collection, analysis, and system modeling on PacifiCorp's transmission and distribution network in four select areas of Northern California consisting of 924 line-miles and 12,803 structures in both rural and suburban environments.	Lessons learned remain unknown as the pilot project is yet to be completed. PacifiCorp anticipates understanding how this technology can be used to inform, identify, and quantify items such as current vegetation clearances, potential encroachments, asset status/condition, other hazards such as leaning poles or threat trees, dead/dying	No specific changing circumstances identified for 2020-2022 yet (still completing the pilot)	No specific corresponding adjustments identified for 2020-2022 yet (still completing the pilot)

Wildfire Mitigation Category	Initiative/Program	Summary	Lessons Learned (where applicable)	Changing circumstances (where applicable)	Corresponding adjustments (where applicable)
			trees, and density per circuit/line		
Vegetation management and inspections	Other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations (radial pole clearing)	PacifiCorp radially cleared poles in 2019 using the specification and practices described in Section 5.3.5.9.	Throughout the implementation of PacifiCorp's radial pole clearing program in 2019, the activity and full scope of work proved to be more challenging, more complex, and less predictable than originally anticipated.	Varied terrain and significant range of scope and tools required	While no specific alterations where made to the program itself, PacifiCorp has set aside additional funding, resources, and time to more effectively plan and execute the company's 2020 work.
	Improvements of inspections - Electronic Tracking and Database	Execution of PacifiCorp's vegetation management wildfire mitigation program	Throughout PacifiCorp's planning and execution of the 2019 WMP, the company identified the need for an electronic database and GIS based planning tools to facilitate greater transparency, efficiency, and data analytics. Specifically, value was identified when populating PacifiCorp's 2020 WMP as many of the template elements proved challenging to populate in the manner requested.	This lesson learned reflects the growing wildfire risk and new reporting and measurement requirements per the CA 2020 WMP.	Implementation of new pilot project incorporating GIS based maps to determine scope and complete/record activity. See Section 5.3.5.6. Additional parallel activity to realize additional benefits through enhanced data analytics to inform vegetation density, vegetation diversity, and overall risk.
Grid operations and protocols	Automatic recloser operations	Implementation of the company's PCC 200, the company's policy designed to reduce the potential for ignition of a fire from sparks emitted when a line is re-energized despite a disturbance on the line through the augmentation of settings or features for reclosing devices.	Since PacifiCorp leverages a combination of devices and schemes throughout its service territory, application of a standard policy was more challenging than anticipated. PacifiCorp had to contemplate the application of this policy to various models of devices with a range of functionality and capability.	Implementation of the company's system automation grid hardening program.	No significant change other than awareness that the company's system automation grid hardening program will facilitate greater standardization but need to align with these strategies.
	PSPS events and protocols	In 2019, PacifiCorp implemented protocols governing execution of PSPS events including analysis of weather conditions,	While PacifiCorp did not implement a PSPS event in the state of California during the 2019 fire season, PacifiCorp did remain vigilant	Constantly changing weather patterns and overall risk levels.	A shifted focus from the capability and readiness to execute a PSPS event to a renewed focus on the evaluation of various

Wildfire Mitigation Category	Initiative/Program	Summary	Lessons Learned (where applicable)	Changing circumstances (where applicable)	Corresponding adjustments (where applicable)
		readiness of operations personnel, and emergency planning and restoration activities. While no actual PSPS events were execute, PacifiCorp learned a great deal through demonstration of the capability of executing a PSPS and general readiness.	and monitor elevated risk conditions throughout the year when required to be able to implement a PSPS event. During these time periods, PacifiCorp learned that the ability to efficiently and effectively implement a PSPS event within the company's service territory in a manner that keeps the impact to customers and communities as low as practical, is less about pre-installed devices and switching points and more about flexibility, system knowledge, and the ability to make informed decisions based on accurate information to task appropriate action in the moment. This includes leveraging local knowledge through collaboration with public safety partners.		scenarios within the company's pre-defined PSPS zones to understand what projects may be able to promote needed flexibility and real-time accurate information gathering such as continued installation of weather stations. PacifiCorp also incorporated collaboration with local public safety partners when determining whether or not to implement a PSPS event.
Data governance	Development of repositories to support wildfire analysis and risk mitigation for wildfire risks	In 2019 and 2020 WMPs PacifiCorp evaluated internal and external data sources to inform its assessment of wildfire risks. Certain of the datasets are internal (such as outage management) as well as external data sources (including weather, fire, habitat datasets)) which also are key to quantifying risks.	Data sources have varying degrees of accuracy and in general have been developed for their specific purposes (i.e. outage data to manage outages) rather than their application to quantifying wildfire risk.	As these datasets become repurposed reconciliation of anomalous results will be an important step in their continued value.	
Resource allocation methodology	All resource allocation methodology programs and risk spend efficiency calculations	In 2017, Per D. 19-04-020, PacifiCorp leveraged lessons learned from other utilities, previous risk and health assessment methodologies and basic principles of the International Standardization Organization's "Risk	While PacifiCorp remains fully committed to the continued development and improvement of the company's risk based decision making framework, many of the elements requested in this 2020 WMP	Further expansion and use of the company's risk based decision making framework to include wildfire risk and overall resource allocation.	Continued development and evolution of the company's risk based decision making framework and incorporate this methodology into PacifiCorp's CA WMP, specifically the methodology

Wildfire Mitigation Category	Initiative/Program	Summary	Lessons Learned (where applicable)	Changing circumstances (where applicable)	Corresponding adjustments (where applicable)
		Management – Principles and Guidelines" (ISO 31000)[24] to develop the company's first risk based decision making framework, which was subsequently included in the company's 2018 GRC filing and supporting testimony.[25]	filing may not be applicable to PacifiCorp, specifically risk reduction, resource allocation methodology, and risk-spend efficiency calculations.		as it applies to resource allocation.
Emergency planning and preparedness	Completion and execution of PacifiCorp's emergency response plan components specific to Fire Prevention, Preparedness and Response.	Initial development and filing of the company's Fire Prevention and Fire Prevention, Preparedness, and Response Plan filed per GO 166 Attachment E[26] as well as incorporation into PacifiCorp's 2019 and 2020 WMP plans.	Since originally filed in 2018, PacifiCorp, at the guidance of Staff and stakeholders, identified the need for additional elements and details[27] to be incorporated into the company's Fire Prevention, Preparedness, and Response Plan.	Further development and on-going evaluation of PacifiCorp's WMP, including the new elements contemplated in the company's 2020 WMP provided additional context and requirements. PacifiCorp assumes this will continue to have an impact on the company's Fire Prevention, Preparedness, and Response Plan.	Critical elements, such as the incorporation of risk assessment, system resilience, and situational awareness aspects from the WMP were incorporated into the company's Fire Prevention, Preparedness, and Response Plan in an attempt to make the Fire Prevention Plan more analogous to a playbook describing the operational readiness and response in the event of a wildfire. As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution.

[24] ISO 31000 is an internationally recognized standard for risk management, and adopting the principles and guidelines of ISO 31000 positions an organization to be able to achieve objectives, improve the identification of risks, and more effectively allocate resources for risk reduction.
[25] 2018 PacifiCorp GRC, Exhibit PAC/1000, Direct testimony of Brett S. Allsup, Implementation of a Risk-Based Investment Decision Making Framework
[26] PacifiCorp's General Order 166 Attachment E, Fire Prevention, Preparedness, and Response Plan, or FPP, initially filed on 10/31/2018.
[27] As indicated in CPUC Data Request 1.–is this the SDR? This was a data request regarding the 2019 WMP

Wildfire Mitigation Category	Initiative/Program	Summary	Lessons Learned (where applicable)	Changing circumstances (where applicable)	Corresponding adjustments (where applicable)
Stakeholder cooperation and community engagement	Community engagement	Implementation of the company's community engagement, specifically execution of town hall meetings and distribution of materials to facilitate emergency preparedness and awareness of PSPS events.	Communities have specific, localized concerns which need to be incorporated into communication and engagement.	Communities continue to want to be more engaged. Additionally, as PSPS protocols and programs change, communities may be affected differently.	PacifiCorp expanded the type and volume of communications and materials. Additionally, maps were provided to local officials and emergency responders regarding potential PSPS events.

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

The following subsections include the strategy and programs of PacifiCorp's plan on various planning horizons ranging from months to years. All strategy and programs contemplated throughout PacifiCorp's 2020 WMP, including this section, reflect the company's reasonable best estimates for completion timeframe. However, as previously expressed at the September 2019 workshops, in the company's October 30, 2019 Phase II comments, and in PacifiCorp's First Report Regarding Possible Off-Ramps[28], one area of concern that continues to be a challenge, is the availability of qualified resources and materials. All of the investor-owned utilities in California are implementing mitigation programs of a similar nature on similar timelines. As a result, resources are spread very thin and the utilities are competing for resources. PacifiCorp anticipates that this will continue to be an area of concern throughout the implementation if its multi-year programs.

As these projects and programs are subject to continuous evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to monitor potential changes, which the company will incorporate into future Off-Ramp filings.[29]

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

As previously described in the company's 2019 California Fire Risk Mitigation Plan and appropriate subsections of Section 5.3 in the company's 2020 WMP, PacifiCorp recognizes that certain emerging technologies, while currently expensive relative to benefit, may provide significant benefit to wildfire risk mitigation. Therefore, PacifiCorp is continuously evaluating the use of new or alternate technologies to either improve efficiency

[28] PacifiCorp's First Report Regarding Possible Off-Ramps was filed on November 27, 2019 in compliance with Decision 19-05-036.
[29] As required in Decision 19-05-036.

or capability of existing programs or implement new programs all with a focus on wildfire mitigation and the core concepts described in Section 4.1.

However, PacifiCorp anticipates that new technologies and innovations will not significantly influence the overall strategy and core concepts. Instead, PacifiCorp anticipates that new technologies and innovations will most likely impact specific components, elements, or effectiveness of programs included in Section 5.3 and, therefore may change specific goals, targets, or prioritization of programs to reflect this impact.

PacifiCorp is already piloting new technology programs to evaluate the application and effectiveness regarding wildfire mitigation. Examples include but are not limited to the use of Infrared inspections, LiDAR data collection, active and remote weather monitoring, and advance detection and coordination schemes and equipment. PacifiCorp anticipates that over the next three years, the results of these pilot projects will significantly inform and mold future programs, and may either evolve into complete wide scale programs or be removed from consideration.

E. *Utility's rationale and alternatives considered for wildfire mitigation programs included in the 2020 WMP*

Generally, the list of potential programs included in the 2020 WMP Guidelines Attachment 1[30] and included in this Plan encompass all potential approaches that the utility may take to mitigate wildfire risk. Additionally, PacifiCorp thoughtfully and strategically developed the elements of the company's wildfire mitigation programs described in Section 5.0 in a manner to mitigate wildfire risk and address company specific ignition probability drivers described in Section 3.0. Therefore, limited alternatives were considered to this list of programs. Furthermore, alternatives were not considered for compliance based programs, as PacifiCorp is dedicated to maintaining compliance with California specific requirements.

However, PacifiCorp did consider alternatives regarding specific details, tools, frequency, or scope of specific programs. Examples of such include, but are not limited to, the use of IR or LiDAR technology during inspections, specific clearance and cycles selected for vegetation management programs, and the use of fiberglass versus steel for pole replacement programs. Where appropriate, these specifics are included in the subsections of Section 5. Where significant alternatives to specifics of PacifiCorp's wildfire mitigation programs warranted evaluation, PacifiCorp also developed pilot projects to properly understand the potential value and effectiveness of these options. The use of these pilot projects allow PacifiCorp to test alternatives or enhancements with a controlled and limited scope in a manner that still facilitates execution of existing programs, resulting in significant and necessary progress toward the mitigation of wildfire risk throughout its California service territory. These programs are described in detail along with established programs throughout Section 5.3.

[30] Attachment 1 (WMP Guidelines) included in the ALJ's ruling on Wildfire Mitigation Plan Templates and Related Material and allowing comment filed 12/16/19.

5.1 Wildfire Mitigation Strategy

The following subsections include PacifiCorp's organization-wide wildfire mitigation strategy and goals for each of the following time periods.

5.1.1 Before the upcoming wildfire season, as defined by the California Department of Forestry and Fire Protection (CALFIRE)

Situational Awareness and forecasting:

- Complete calibration and integration of existing 10 weather stations to ensure in working condition and able for use in PSPS evaluations during the 2020 fire season;
- Perform verification and validation of forecast vs actual fire weather data from 2019 to improve forwarding looking forecast;

Grid Design and system hardening:

- Augment existing program tracking methods to incorporate new requirements as indicated in the 2020 WMP and implement a new, robust program tracking system for system hardening projects;
- Prioritize programs needed before the next fire season and annual update and ensure inclusion in the CY2020 execution plan;
- Final installation and commissioning of 25 field reclosers located within the PSPS candidate zones as a part of the installation of system automation equipment program;
- Installation of an RF network to facilitate remote implementation of fire season settings on newly installed field reclosers;
- Final installation and commissioning of 12 transmission and distribution substation relays with advanced protection and control capabilities;

Asset management and inspections:

- Complete the CY2020 planned inspections within the HFTD;
- Complete remaining scope of IR inspections of transmission lines pilot project to include IR capture at winter peak loading;
- Analyze results from LiDAR inspection pilot to determine next steps and potential pilot project expansion;

Vegetation management and inspections:

- Complete incremental Tier III visual vegetation inspections within the HFTD;
- Evaluate LiDAR inspection pilot to determine next steps and potential pilot project expansion as it relates to vegetation management;

Grid operations and protocols:

- Review existing operating protocols and ensure preparedness for 2020 fire season;
- Develop a plan and schedule to leverage new high impedance fault detection capabilities and data analytics to inform operating procedures and protocols;

Stakeholder cooperation and community engagement

- Improve 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;

5.1.2 Before the next annual update

PacifiCorp's wildfire mitigation strategy and goals to be accomplished before the next annual update include:

Situational awareness and monitoring:

- Complete installation of 10 additional weather stations and continue improvement of real time weather monitoring capability;
- Evaluate use and potential viability of RAWS-quality weather stations to augment the company's micro-station installations;
- Perform a probabilistic arc energy analysis on all circuits within the HFTD to improve circuit protection coordination;
- Perform a probabilistic arc energy analysis on all small diameter circuits outside of the HFTD to improve circuit protection coordination;
- Collaborate with Texas A&M and pilot distribution fault anticipation (DFA) technology at identified circuits to inform pre-fault inspection protocols;

Grid Design and system hardening:

- Complete full detailed scope for specific programs in years CY2021 and CY2022;
- Identify, scope, and begin all projects in some discipline related to the wildfire mitigation program through CY2023;
- Complete CY2020 scope of work pending resource constraints as identified in Section 5 above;
- Establish a system of audit with documentation through each phase of the project with checks and balances identified for quality assurance;

Asset management and inspections:

- Complete the CY2020 planned inspections within California;
- Collaborate with other industry utilities to further the evaluation of potential line equipment maintenance programs to augment existing compliance based programs;
- Establish long term strategy regarding the use of IR or LiDAR for equipment based inspections and maintenance;

Vegetation management and inspections:

- Evaluate and, if applicable, be prepared to implement a new tree density inventory system targeted initially within the HFTD to inform risk assessment and prioritization of efforts;
- Pilot new electronic planning, mapping, and record keeping system regarding vegetation management within the HFTD;
- Establish long term strategy regarding the use of LiDAR as it pertains to vegetation management and inspections;

Grid operations and protocols:

- Review existing operating protocols and ensure preparedness for 2021 fire season;
- Leverage RF network where available to facilitate remote implementation of fire season settings on newly installed field reclosers;
- Implement the plan to leverage new high impedance fault detection capabilities and data analytics to inform operating procedures and protocols;

Stakeholder cooperation and community engagement:

- Continue applicable 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;

5.1.3 *Within the next 3 years*

PacifiCorp's wildfire mitigation strategy and goals to be accomplished within the next 3 years include:

Situational awareness and monitoring:

- Complete installation of all program weather stations and continue improvement of real time weather monitoring capability;
- Install any viable RAWS-quality weather stations to augment the company's micro-station installations;
- Complete recommendations per probabilistic arc energy analysis on all circuits within the HFTD to improve circuit protection coordination;
- Complete recommendations per probabilistic arc energy analysis on all small diameter circuits outside of the HFTD to improve circuit protection coordination;
- Evaluate benefits of distribution fault anticipation (DFA) technology in normal system operations;

Grid Design and system hardening:

- Complete CY2020 – CY2022 system hardening program scope per Tables 23 – 31.
- Evaluate the use of additional new technologies as it relates to grid design and system hardening programs;

Asset management and inspections:

- Complete annual scope of planned inspections in CY2020-CY2022 within California;
- Evaluate potential incorporation of risk assessment software solutions to inform asset management and inspections programs and augment existing risk based decision making framework;
- Memorialize findings regarding evaluation of potential line equipment maintenance programs and incorporate, where appropriate, new programs into the long term asset management strategy;

Vegetation management and inspections:

- Evaluate overall workforce management strategies and structures to augment existing programs;
- Incorporate lessons learned though tree inventory system analytics to inform risk assessment and prioritization of efforts;
- Implement new electronic planning, mapping, and record keeping system regarding vegetation management within the HFTD;

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Grid operations and protocols:

- Review existing operating protocols and ensure preparedness for 2024 fire season;
- Expand capability of RF network to facilitate remote implementation of fire season settings on newly installed field reclosers;
- Validate efficacy of high impedance fault detection in both day to day and extreme weather condition operations;

Stakeholder cooperation and community engagement:

- Continue applicable improvements to internal and external customer and community facing forecast of PSPS status (website);
- Incorporate three year history, enhanced real time weather monitoring capability, and system hardening progress to, where appropriate, evaluate PSPS methodology and protocols and potential reduce the potential scope or impact of PSPS events;
- Continue partnering with public safety partners in communities throughout California regarding wildfire and PSPS preparedness;

5.1.4 Within the next 10 years

PacifiCorp's general goal within the next ten years is to complete the work included in this plan to mitigate wildfire risk and continue the vigilance of discovery, technology, shared information and program improvements and further grow the programs in areas identified from data collection and analysis. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to set additional specific goals on a ten year planning horizon, except to the extent that certain programs can be delivered within the three year period. However, as PacifiCorp progresses with program implementation and lessons learned are incorporated, the company anticipates firming up these longer term goals in future updates to the plan.

5.2 Wildfire Mitigation Plan Implementation

The following describes the processes and procedures PacifiCorp is using or intends to use to facilitate implementation of the company's WMP.

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.

To facilitate the implementation of PacifiCorp's 2020 WMP construction projects (system hardening, relays, reclosers, communication, etc.) a focused wildfire mitigation project management office has been established as described in Section 5.3.3. It is the responsibility of this department to monitor all aspects of construction (permitting, standards, estimating, construction, and post audit quality assurance) to ensure the plan deliverables are achieved. The non-construction aspects of the 2020 WMP are overseen by existing program offices such as Vegetation Management, Asset Management, Emergency Management etc. that will have the responsibility of collecting all pertinent information (inspection records, etc.) to ensure compliance. All collected data will be maintained in the company's corporate enterprise systems. Additional details regarding QA/QC or audit specifics for each program are further described in each program's respective subsection in Section 5.3.

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

The Emergency Management department will be responsible for ensuring annual review of preparedness of on-going tasks and processes such as; Wildfire Prevention Practices for operational employees and PSPS processes. Part of this review includes the use of desktop exercises and after event reports for lessons learned that can inform and improve future plans as included and further described in Section 5.3.9.

Additionally, imbedded within the program specific QA/QC and auditing plans is the incorporation of corrective action. Specific to the company's grid design and system hardening programs, PacifiCorp recently formed a Wildfire Mitigation Delivery Project Management Office within the Transmission and Distribution Operations department and assigned a Wildfire Mitigation Delivery Director to lead this effort. While this department remains in its early stages and is not yet fully formed, the office intends to explore and develop a quality assurance process throughout the life cycle of the programs, specifically focused on the construction phase of these programs, which will include a process to correct deficiencies discovered. Potential solutions currently under consideration might include the use of qualified inspectors, standardized forms and evaluations, or random sampling and inspection by the Wildfire Mitigation Delivery Director. PacifiCorp anticipates that this aspect of the program will evolve quickly and intends to provide additional updates and detail in the company's first annual update in 2021.

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.

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PacifiCorp has an existing inspection program that includes post-inspection auditing program of inspections performed by contractors. All additional inspections laid out in the 2020 WMP are included in the on-going inspection program and will be held to the same standard to ensure compliance with applicable statutes and commission rules. Additional program specific information has been included in applicable subsections of Section 5.3.4.

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

PacifiCorp leverages a range of data set, sources, processes, and tools to drive wildfire-related decisions, including grid operations, capital allocation, community engagement, and other areas such as PSPS evaluation or system hardening and pilot projects. Where pertinent to a specific component or program of the 2020 WMP and available in a way requested, PacifiCorp has included a description of relevant data set in applicable subsections throughout the Plan, such as PSPS activation measurements, data sets, and criteria described in Section 4.4.3 or internal and external data sets used to develop the company's ignition probability drivers included in Section 3.0.

It is challenging to provide a full list and description in the way requested of all data, meta-data, dashboards, reports, GIS data, products, QA/QC cleaning and analyzing, normalizing, and utilizing processes, as well as applicable cross references or dictionary definitions, as this work product is not part of a data set required to operate the system and, therefore, is not readily available. Furthermore, as PacifiCorp uses a vast range of data, meta-data, processes, tools, and products to drive wildfire-related decisions and the creation of this work product would be overly burdensome. Moving forward, PacifiCorp will look to provide additional details regarding the company's data leveraged to drive wildfire-related decision, but cannot, at this time, provide the information and specific work product in the manner requested. PacifiCorp also suggests additional discussions with the WSD to determine whether additional information would be helpful and to determine the most efficient and effective manner to provide this data.

5.3 Detailed wildfire mitigation programs

PacifiCorp leveraged the methodology and framework included in the company's 2018 GRC filing as well as PacifiCorp's 2019 WMP and subsequent collaborative efforts to inform the company's 2020 WMP and included programs.

The following subsections include PacifiCorp's detailed wildfire mitigation programs and initiatives organized into the following top categories:

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

Each of these categories is addressed in the following subsections. Each section includes a detailed description for the utility's programs, approximate timeline of each program, the utility's rationale behind each of the elements of this program, the utility's prioritization approach/methodology to determine spending and deployment of human and other resources, how the utility will conduct audits or other quality checks on each program, how the utility plans to demonstrate over time whether each component is effective, and expectations for general evolution (1) before the upcoming wildfire season, (2) before the next annual update, (3) within the next 3 years, and (4) within the next 10 years.

For each program, where requested, 2019 plan values were included as N/A. The 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

With each program, as new analysis, technologies, practices, network changes, environmental influences, or risks are identified, changes to address them may be incorporated into future iterations of the Plan which is, in effect, a living document. This may include changes to the specific programs

and initiatives included in Section 5.3 of this document. Where appropriate, PacifiCorp will memorialize such changes in either subsequent filings or future Off-Ramp filings.[31]

S-MAP and RAMP process for small and multijurisdictional utilities

As a small and multijurisdictional utility, PacifiCorp complies with the adopted methodology per D.19-04-020 regarding the company's S-MAP and RAMP process. Historically, PacifiCorp has performed annual risk assessment of its key transmission and distribution asset base to identify potential issues, develop investment drivers, target short and long term programs, and inform the company's capital, maintenance, and operational spending decision. In 2014, PacifiCorp began using an Asset Health Index (AHI) methodology combined with historic assessment elements such as asset utilization, system reliability, and asset condition inspections to develop comparative health of assets baseline and determine relative changes.

In 2017, Per D. 12-12-025,[32] PacifiCorp leveraged lessons learned from other utilities, previous risk and health assessment methodologies and basic principles of the International Standardization Organization's "Risk Management – Principles and Guidelines" (ISO 31000)[33] to develop the company's first risk based decision making framework, which was subsequently included in the company's 2018 GRC filing and supporting testimony.[34] This methodology included assessment of the company's top categorical risks including but not limited to substation transformer failure, substation circuit breaker failure, overhead distribution conductor failure, and relay mis-operation.

As is expected with small and multijurisdictional utilities per D.19-04-020, PacifiCorp has adhered to the 10 RAMP Elements in the company's risk based decision making framework but still remains in the early stages of the S-MAP and RAMP process.

Many of the elements requested in this 2020 WMP filing may not be applicable to PacifiCorp, specifically risk reduction, resource allocation methodology, and risk-spend efficiency calculations. To the extent that a program addresses a top categorical risk included in the company's GRC filing, PacifiCorp can qualify relative risk ranking. However, PacifiCorp, at this time, cannot provide the discreet calculations as requested. At the guidance of the Wildfire Safety Division of the California Public Utilities Commission,[35] these elements are marked "does not apply", "not applicable", or "N/A" throughout the company's filing.

[31] As required in Decision 19-05-036.
[32] CA Decision No. ("D") 14-12-025 issued on December 4, 2014.
[33] ISO 31000 is an internationally recognized standard for risk management, and adopting the principles and guidelines of ISO 31000 positions an organization to be able to achieve objectives, improve the identification of risks, and more effectively allocate resources for risk reduction.
[34] 2018 PacifiCorp GRC, Exhibit PAC/1000, Direct testimony of Brett S. Allsup, Implementation of a Risk-Based Investment Decision Making Framework
[35] Clarified in an email from Melissa K. Semcer, Program Manager Wildfire Safety Division at the California Public Utilities Commission on January 6, 2019.

5.3.1 Risk assessment and mapping

PacifiCorp actively participated in the development of the California Fire Threat map and leveraged that process and work product to determine its prioritization for public safety power shutoff and system hardening. Foundational to that work, as discussed previously, were local operating experiences and history such that local issues, such as ingress/egress were considered in promoting specific areas to elevated fire risk. Since that time PacifiCorp hasn't undertaken more specific risk assessment, however it has laid the groundwork for more locational-precise data through the placement of micro-weather stations. These stations produce information which can be consumed by the company in its real-time and after the fact analysis, as well as external stakeholders, including academia and other researchers, since the data is transmitted to MesoWest, a weather data resource housed by the University of Utah's Atmospheric Science Department, which can be viewed at mesowest.utah.edu.

5.3.1.1 A summarized risk map showing the overall ignition probability and estimated wildfire consequence along electric lines and equipment

Program Name	Risk Assessment and Mapping
Initiative Name	A summarized risk map showing the overall ignition probability and estimated wildfire consequence along electric lines and equipment
Description	PacifiCorp implemented fully throughout its systems the California High Fire Threat Map, which quantifies specific geography that under historically-viable fire weather conditions, could be subject to elevated fire risk. It created associations between the tier designation to inform inspection, vegetation management, correction timeframes, and prioritized hardening efforts.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Wildfire risk mapping is foundational to prioritizing efforts for a variety of activities undertaken throughout the business. With this information certain program locations can be advanced more rapidly, while other locations can be addressed later.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.

Plan for audits/quality checks		N/A
Planned demonstration of effectiveness over time		Effectiveness over time will be discernable through time via metrics such as those outlined in Table 1.
Planned Evolution	General	It is expected that varying surface (fuel) conditions and other temporal changes will need to be incorporated into the stable long term identification of higher fire risk areas.
	Before the upcoming wildfire season	N/A
	Before the next annual update	N/A
	Within the next 3 years	Develop method to incorporate temporal elements into stable fire threat map.
	Within the next 10 years	Incorporate method for temporal element inclusion to update basic stable fire threat map.

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5.3.1.2 Climate-driven risk map modeling based on various

Program Name	Risk Assessment and Mapping
Initiative Name	Climate-driven risk map modeling based on various
Description	Develop methods for incorporating climate impacts into wildfire risks into system hardening (long term prioritization) as well as situational awareness (short term response) actions. Specific climate conditions may result in elevated wildfire risk, as is experienced in southern California during Santa Ana wind conditions. To the extent that such a phenomenon exists in PacifiCorp's service territory, outlining the leading indicators of the condition, the probable effects and the appropriate mitigation measures is an important augmentation of the company's WMP.
Timeline to Minimize Risk [Planned/ Implemented]	Planned
Rationale for Program	More specific identification of weather phenomenon that leads to heightened risk will allow the company to align hardening and operational tactics appropriately including optimal use of public safety power shutoff actions.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.
Plan for audits/quality checks	PacifiCorp develops such theories engaging peer review to ensure well-vetted rationale and reasonable outcomes. To the extent that a climatological phenomenon is identified it would anticipate reviewing such products with audiences in venues such as the California Utility Forecasters Meeting[36]
Planned demonstration of effectiveness over time	Any advancements in this area should be discernable through the metrics supplied in Tables 1, 2, 10 and 12.

[36] This is an annually held conference by parties to advance the understanding of weather and its impacts to utilities and allows for academia, utilities and other interested parties to explore emerging information.

Planned Evolution	General	While PacifiCorp has not historically evaluated climate beyond its impact to fundamental needs to deliver power reliably, as it embarks on this aspect of risk mitigation it will be touching upon new areas of study to support developing such products. It will engage as appropriate with specialists, but align these endeavors toward their application to the utility environment and not necessarily fully develop in a manner not intended for other applications.
	Before the upcoming wildfire season	No specific advancement prior to the upcoming wildfire season is anticipated.
	Before the next annual update	PacifiCorp will begin exploring climate phenomenon with local weather professionals to identify any areas for investigation.
	Within the next 3 years	PacifiCorp will advance relevant climate phenomenon and share progress with local weather professionals through venues such as the California Utility Forecasters Meeting.
	Within the next 10 years	PacifiCorp will develop any utility relevant climate phenomenon and share application with local weather professionals through venues such as the California Utility Forecasters Meeting.

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

Program Name	Risk Assessment and Mapping
Initiative Name	Ignition probability mapping showing the probability of ignition along the electric lines and equipment
Description	In the approval of PacifiCorp's WMP, the company was ordered to produce annually a Utility Fire Incident Report similar to that required of the three largest Investor Owned Utilities in D.14-02-015. As a result of the data collected, in addition to the analysis done by PacifiCorp supporting its Metric #4: Events recorded with fire reference: damage fire, equipment fire, pole fire, PacifiCorp can more precisely begin to establish history for ignitions and fires related to specific component types. As it becomes clear that certain components, particularly in wildfire risk time periods are more prone to ignition, risk models can begin to incorporate equipment specifics. This data will support improved alignment of programs including hardening, vegetation management and inspection to mitigate these events.
Timeline to Minimize Risk [Planned/ Implemented]	Planned
Rationale for Program	Better granularity about specific components within certain higher risk environments will support improved performance at lower costs.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.
Plan for audits/quality checks	PacifiCorp will make underlying data available through the delivery of its Fire Incident Data Report as well as its proposed Metric #4.
Planned demonstration of effectiveness over time	It is expected that delivery of this activity will be visible in performance as outlined in Tables 2 and 3.

Planned Evolution	General	Historically data was not captured as is now planned, thus comparing history to current and future performance may result in conclusions being drawn that are not correct, due to variations in reporting practices over time. As such, any significance regarding trends must be cautiously undertaken, when comparing across those periods.
	Before the upcoming wildfire season	Submit Fire Incident Data Report, consistent with Order approving the company's WMP.
	Before the next annual update	Augment data; evaluate any recent observations to support understanding of equipment performance.
	Within the next 3 years	Augment data; incorporate risk findings into relevant risk methodology framework.
	Within the next 10 years	Augment data; incorporate risk findings into relevant risk methodology framework.

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

Program Name	Risk Assessment and Mapping
Initiative Name	Initiative mapping and estimation of wildfire and PSPS risk-reduction impact
Description	To develop PSPS boundaries the company evaluated fire weather wind patterns and magnitude coincident to tier designations within the California Fire Threat Map. It then considered electrical equipment and customers impacted within the specific geography. As a result proactive de-energization zones (PDZs) were outlined and sectioned to limit the number of customers likely to be affected by any PSPS implemented. Customers, including both critical (categorized consistent with the CPUC's directive of critical based upon Standard Industrial Classification Codes-SICC) and "medical baseline" customers were identified and attempts to limit the total customers and these critical customers resulted in sectioning up larger PDZs into five specific areas.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	In order to mitigate fire risk from utility equipment under the most extreme conditions, PSPS was developed as a method, with specific guidance in ESRB-8 to ensure proper notification protocols are undertaken to mitigate the consequences to customers and the public.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.
Plan for audits/quality checks	No specific plans for audits or quality checks were developed for these plans with parties outside of the impacted communities. The company met with these stakeholders in city/county coordination meetings for Public Safety Partners and open houses for customers. The material is broadly shared in map form at the company's website https://www.pacificpower.net/content/dam/pcorp/documents/en/pacificpower/outages-safety/wildfire-safety/CA_PDZ_Maps_All.pdf

Planned demonstration of effectiveness over time		It is anticipated that after action reports required by ESRB-8 will demonstrate the effectiveness of these plans. Additionally rulemaking activities regarding PSPS are further opportunities to determine that the plans properly balance risk of utility-caused ignition versus customer and community impacts.
Planned Evolution	General	PacifiCorp developed its PSPS plans in late 2018 and during 2019 had no occasion to activate them fully, however internal watch periods occurred twice, thus its experience with managing these risks is largely informed by observations of its utility peers, and it does regularly assess the reports that have been filed by utilities as well as the comments filed by parties. It has found this information helpful. In addition, as the company "hardens" its infrastructure, the probability of reaching thresholds that would result in a PSPS become lower, so incorporating the changing utility equipment will be an important aspect of refreshing these plans. Further, as equipment-specific risks become better known, dialing into those risks will additionally provide insight into specific risks to the system that could result in ignition.
	Before the upcoming wildfire season	Re-evaluate current PDZs in light of recent performance data developed in support of 2020 WMP.
	Before the next annual update	Modify PSPS plan in light of delivered system hardening projects. Communicate modifications to plan to communities.
	Within the next 3 years	Modify PSPS plan in light of delivered system hardening projects. Communicate modifications to plan to communities.
	Within the next 10 years	Modify PSPS plan in light of delivered system hardening projects. Communicate modifications to plan to communities.

5.3.1.5 Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment

Program Name	Risk Assessment and Mapping
Initiative Name	Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment
Description	N/A PacifiCorp does not, at this time, have a risk assessment and mapping wildfire mitigation program focused on match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment.

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5.3.1.6 Weather-driven risk map an modeling based on various relevant weather scenarios

Program Name	Risk Assessment and Mapping
Initiative Name	Weather-driven risk map an modeling based on various relevant weather scenarios
Description	PacifiCorp developed specific weather criteria based on its analysis of historic fires and their spread that were located in northern California (for latitudes north of the 40th parallel) as part of its 2019 WMP and in support of its PSPS plans. Associating independent variables, then developing methods for measuring (through the placement of weather stations in the areas of fire risk) and monitoring through the relevant risk period, weather-driven risk was incorporated into actions plans.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Using independent variables it was able to correlate extremely large fires to specific drought, fire weather and wind gusts, and using this data establish triggers, rather than specific maps, that could be expected
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.
Plan for audits/quality checks	Data was evaluated by fire science and weather professionals, and subsequently operationalized by weather professionals. No additional plan for audits of the data have been prepared, however the company is prepared to share its findings and experiences with any interested parties.
Planned demonstration of effectiveness over time	The effectiveness of this approach is demonstrated through its performance during fire season 2019, but anticipates that the metrics it proposed in its data collection plan, in addition performance shown in Table 2 indicates the effectiveness of the approach.

Planned Evolution	General	Many of the metrics being provided through the 2020 WMP are nascent and likely to be not properly comparable on a going-backward basis.
	Before the upcoming wildfire season	Re-evaluate weather independent variables for recent fire history environmental conditions.
	Before the next annual update	Assess approach and determine continued viability of method.
	Within the next 3 years	Assess approach and determine continued viability of method.
	Within the next 10 years	Assess approach and determine continued viability of method.

5.3.1.7 Other/not listen [only is an initiative cannot feasibly be classified within those listen above]

Program Name	Risk Assessment and Mapping
Initiative Name	Other/not listen [only is an initiative cannot feasibly be classified within those listen above]
Description	PacifiCorp, at this time, does not have any additional risk assessment and mapping wildfire mitigation programs.

Table 21 below summarizes all elements of PacifiCorp's risk assessment and mapping wildfire mitigation program. For each program, where requested, 2019 plan values were included as N/A. The 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 21: Risk assessment and mapping

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. A summarized risk map showing the overall ignition probability and estimated wildfire consequence along electric lines and equipment	2019 plan	PacifiCorp implemented fully throughout its systems the California High Fire Threat Map, which quantifies specific geography that under historically-viable fire weather conditions, could be subject to elevated fire risk. It created associations between the tier designation to inform inspection, vegetation management, correction timeframes, and prioritized hardening efforts. Wildfire risk mapping is foundational to prioritizing efforts for a variety of activities undertaken throughout the business. With this information certain program locations can be advanced more rapidly, while other locations can be addressed later.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
2. Climate-driven risk map modeling based on various	2019 plan	Develop methods for incorporating climate impacts into wildfire risks into system hardening (long term prioritization) as well as situational awareness (short term response) actions. Specific climate conditions may result in elevated wildfire risk, as is experienced in southern California during Santa Ana wind conditions. To the extent that such a phenomenon exists in PacifiCorp's service territory, outlining the leading indicators of the condition, the probable effects and the appropriate mitigation measures is an important augmentation of the company's WMP. PacifiCorp develops such theories engaging peer review to ensure well-vetted rationale and reasonable outcomes. To the extent that a climatological phenomenon is identified it would anticipate reviewing such products with audiences in venues such as the California Utility Forecasters Meeting											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
3. Ignition probability mapping showing the probability of ignition along the electric lines and equipment	2019 plan	N/A	N/A	Contact from object; All types of equipment/facility failure; Wire-to-wire contact/contamination; Other	N/A	N/A	Better use of PSPS in light of equipment and weather coincidence	New	N/A	2019 WMP Memorandum Account	Exceeds current requirements	GO95 Generally	Anticipate one study outcome per year, which is generally cumulative
	2019 actual	N/A	N/A										
	2020	1	$25,000										
	2021	1	$25,000										
	2022	1	$25,000										
	2020-2022 plan total	3	$25,000										

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
4. Initiative mapping and estimation of wildfire and PSPS risk-reduction impact	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A	N/A	Improper Application of PSPS Actions	N/A	N/A	Better informed stakeholder understanding of PSPS	Existing	N/A	2019 WMP Memorandum Account	Exceeds current requirements	GO95 Generally	Advanced ESRB-8 and HFTD maps to quantify impacted areas; communicated with communities
5. Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp does not, at this time, have a risk assessment and mapping wildfire mitigation program focused on match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment.											
6. Weather-driven risk map an modeling based on various relevant weather scenarios	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A	N/A	Contact from object; All types of equipment/facility failure; Wire-to-wire contact/contamination; Other	N/A	N/A	Better use of PSPS in light of equipment and weather coincidence	Existing	N/A	2019 WMP Memorandum Account	Exceeds current requirements	GO95 Generally	No specific charges developed for this plan; Assumes annual refresh to support operational and PSPS thresholds
7.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp, at this time, does not have any additional risk assessment and mapping wildfire mitigation programs.											

5.3.2 Situational awareness and forecasting

A critical element to PacifiCorp's WMP revolves around situational awareness, and as it has analyzed history, developing methods for incorporating found conditions to establish when similar conditions could be expected in the future and forecast when they may be expected. Thus it has enhanced substantially its situational awareness as part of its day to day and elevated fire risk periods. This has substantially enhanced the methods used by the company to limit risks of utility-caused ignitions while simultaneously limiting impacts to customers and communities the company serves.

The following subsections describe all required elements of PacifiCorp's situational awareness and forecasting wildfire mitigation initiatives.

5.3.2.1 Advanced weather monitoring and weather stations

Program Name	Situational Awareness
Initiative Name	Advanced weather monitoring and weather stations
Description	Implement weather monitoring functions, including placing needed stations to support needed level of granularity for real time and retrospective analysis of environmental conditions that could pose risk to utility or could result in utility operations that could create wildfire risk. Monitor real-time system, including establishing appropriate triggers to initiate specific responses throughout organization, which could include modifying reclosing or other device "fire settings", activating monitoring teams or initiating PSPS operations.
Timeline to Minimize Risk [Planned/ Implemented]	Partially Implemented
Rationale for Program	In order to ensure that locally appropriate utility operations take place sufficient weather monitoring data points need to exist to inform those operations. Thus placement of stations that support better understanding of local climatology that could result in elevated fire risk, as well as analysis of fire weather history are foundational steps. With this information the utility is better able to take actions when needed and not expend resources when there is no significant wildfire risk.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.

Plan for audits/quality checks		As weather stations are placed they are quality tested (calibrated) and verified that they are transmitting data. As data is analyzed and used to establish operational triggers this information is shared with Public Safety Partners and is available for review by these and other stakeholders. Annually the weather stations are calibrated to ensure all hardware is measuring properly and communicating properly with data aggregating resources.
Planned demonstration of effectiveness over time		Assessment of performance as outlined
Planned Evolution	General	During 2019 PacifiCorp installed 10 weather stations and with this data and established weather monitoring protocol enacted its operational plans throughout the 2019 fire season. The company is evaluating the viability of installing RAWS (Remote Automatic Weather Station)-quality stations to augment its micro-station installations.
	Before the upcoming wildfire season	Calibrate 10 weather stations placed during 2019.
	Before the next annual update	Install additional 2020 WMP stations.
	Within the next 3 years	Complete build out of PacifiCorp's California weather network.
	Within the next 10 years	Maintain and evaluate completeness of PacifiCorp's California weather network.

5.3.2.2 Continuous monitoring sensors

Program Name	Situational Awareness
Initiative Name	Continuous monitoring sensors
Description	At this time PacifiCorp does not have a specific initiative for continuous monitoring sensors. However, PacifiCorp is contemplating the use of distribution fault anticipation (DFA) technology through piloting with Texas A&M.

5.3.2.3 Fault indicators for detecting faults on electric lines and equipment

Program Name	Situational Awareness
Initiative Name	Fault indicators for detecting faults on electric lines and equipment
Description	Information being captured and communicated rapidly in a manner to enable operational staff to make rapid, accurate decisions is critical to safe and reliable service. In addition, devices that are able to detect fault events, operate rapidly when conditions have been reached and accurately perform the designed-for function are key components for the in situ environment. Fault indicators are devices capable of detecting and reacting to line fault events, in a manner that when such operations occur, the fault condition is confined to as small a section as possible, for as short of a time as possible. Awareness of these conditions allows for quick reaction to restore the system to the pre-fault condition state and ensure safety and customer reliability. To the extent fault events are able to rapidly be communicated to grid operations and local response personnel, they are better informed about the current state of the system, they become more situationally aware, and can better coordinate with other Public Safety Partners, while improving outcomes for the communities in which the event occurred. PacifiCorp efforts and strategy regarding deployment and use of fault indicators are prioritized based on geographic wildfire risk area such that the highest priority is given to Tier 3 areas and those facilities electrically-connected to Tier 3 and Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority. While this program is critical to facilitate situational awareness, the overall management of this program is better suited with PacifiCorp's grid design and system hardening program focused on system automation, additional details have been included in Section 5.3.3.9. Costs and timelines for this program were outlined in Table 23, Initiative Activities 2.

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

Program Name	Situational Awareness
Initiative Name	Forecast of a fire risk index, fire potential index, or similar
Description	To ensure that operational team members are aware of conditions which could favor spread of ignition it is important that such conditions are rationalized, and where appropriate, quantified and then communicated to throughout organization to enable proper mitigation takes place. This approach is also discussed in Section 5.3.1.6 as part of the weather monitoring function, which is found to have correlation to conditions in which ignition could result in fire spread.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Developing readily-understood indications of metrics that correlate to elevated fire risk provides guidance for operating personnel to consider as they undertake their daily activities. Such metrics can play an important role in limiting operations that could be inappropriate under elevated fire risk conditions but would otherwise be considered accepted good practice and environmentally benign.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.
Plan for audits/quality checks	In 5.3.1.6 PacifiCorp identified that its data was evaluated by fire science and weather professionals, and subsequently operationalized by weather professionals. No additional plan for audits of the data have been prepared, however the company is prepared to share its findings and experiences with any interested parties.
Planned demonstration of effectiveness over time	In 5.3.1.6 PacifiCorp asserted the effectiveness of this approach is demonstrated through its performance during fire season 2019, but anticipates that the metrics it proposed in its data collection plan, in addition performance shown in Table 2 indicates the effectiveness of the approach.

Planned Evolution	General	While PacifiCorp doesn't currently plan to create a single metric serving as a Fire Potential Index (or FPI), as its plans evolve, if such a need becomes apparent through feedback from operations team members, Public Safety Partners or other stakeholders it will consider such development. Generally however the company is concerned that various indices that have specific purpose (such as a Red Flag Warning meaning certain alert for fire suppression personnel), such an index could be broadly interpreted and perhaps misapplied. To the extent that a single index dictates specific actions and provides clarity to others about those expected actions, this can be beneficial, but if there is any element of subjectivity it can result in the index having limited value, and perhaps lead to greater confusion.
	Before the upcoming wildfire season	As stated in 5.3.1.6, re-evaluate weather independent variables for recent fire history environmental conditions.
	Before the next annual update	As stated in 5.3.1.6, assess approach and determine continued viability of method.
	Within the next 3 years	As stated in 5.3.1.6, assess approach and determine continued viability of method.
	Within the next 10 years	As stated in 5.3.1.6, assess approach and determine continued viability of method.

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

Program Name	Situational Awareness
Initiative Name	Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions
Description	During elevated risk periods operational staff and support staff may be activated to monitor equipment including lines and specific components to ensure safe operation during the exposure window. Section 5.3.6.3 also discusses additional resource utilized during elevated fire risk conditions.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	In order to limit the risk of ignition due to utility equipment but continue to serve customers during these periods establishing methods for monitoring the condition of the electrical equipment during the elevated risk periods is important. Such an action would be a potential alternate to PSPS, until such time that system hardening activities have been completed.
Prioritization Approach	Areas that are candidates for PSPS are the highest priority, which generally applies to Tier 3 areas, and those facilities electrically-connected to Tier 3. If a localized risk outside of Tier 3 were identified it would be weighed for the duration and extent of scope to critical and non-critical customers would be considered to evaluate priority. To the extent Mutual Assistance Agreements would need to be exercised to ensure appropriate coverage (once PacifiCorp resources are no longer able to be utilized) such agreements would be enacted.
Plan for audits/quality checks	No plans for audit or quality checks have been identified.
Planned demonstration of effectiveness over time	The effectiveness of this approach is demonstrated through its performance shown in Tables 2, 3, 8 and 12.

Planned Evolution	General	As the industry evolves with technology enhancements, PSPS experiences and is complemented by advancements of Public Safety Partners in their management of fire risks alteration of this strategy may occur. Such modifications to the approaches will, however, be communicated to stakeholders through PSPS updates with communities and Public Safety Partners.
	Before the upcoming wildfire season	Prepare operational and support teams to activation process.
	Before the next annual update	Evaluate effectiveness of real-time monitoring function, determine needed changes and inform stakeholders.
	Within the next 3 years	Evaluate effectiveness of real-time monitoring function, determine needed changes and inform stakeholders.
	Within the next 10 years	Evaluate effectiveness of real-time monitoring function, determine needed changes and inform stakeholders.

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5.3.2.6 Weather forecasting and estimating impacts on electric lines and equipment

Program Name	Situational Awareness
Initiative Name	Weather forecasting and estimating impacts on electric lines and equipment
Description	As weather evolves, understanding the probability of extreme events that could result in fires or PSPS impacts is important to gauge how best to mitigate against such events. As such, when PacifiCorp developed its PSPS triggers as outlined in 5.3.1.6, it retrospectively applied those thresholds to determine what history could have been expected, thus articulating how impactful any such operations would be to customers.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Evaluation of historical candidate PSPS levels allowed an assessment of whether it was a highly likely or very unlikely occurrence, enabling estimation of customer hours of PSPS interruption.
Prioritization Approach	Tier 3 areas, and those facilities electrically-connected to Tier 3 are highest priority while Tier 2 and Zone 1 areas are next highest priority. Non-tier areas are considered lowest fire mitigation risk priority.
Plan for audits/quality checks	Comparison against threshold levels was conducted by fire science and weather professionals to verify the frequency, duration and extent of PSPS and shared with Public Safety Partners and communities during PSPS open houses.
Planned demonstration of effectiveness over time	PacifiCorp anticipates refreshing this analysis on a yearly basis.

Planned Evolution	General	As systems become more resilient to fire risks due to completion of system hardening plans such comparative metrics will become more challenging to provide generally, since location will play a substantial role in whether there remains expected risks with the more resilient utility equipment.
	Before the upcoming wildfire season	Communicate recent history of performance against thresholds to stakeholders.
	Before the next annual update	Review, modify thresholds as appropriate and validate history of performance against thresholds.
	Within the next 3 years	Review, modify thresholds as appropriate and validate history of performance against thresholds.
	Within the next 10 years	Review, modify thresholds as appropriate and validate history of performance against thresholds.

5.3.2.7 Other/not listed [only if initiative cannot feasibly be classified within those listed above]

Program Name	Situational Awareness
Initiative Name	Other/not listed [only if initiative cannot feasibly be classified within those listed above]
Description	PacifiCorp does not have any other situational awareness wildfire mitigation programs.

Table 22 below summarizes all elements of PacifiCorp's risk assessment and mapping wildfire mitigation program. For each program, where requested, 2019 plan values were included as N/A. The 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 22: Situational awareness and forecasting

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Advanced weather monitoring and weather stations	2019 plan	NA	NA	Contact from object; All types of equipment/facility failure; Wire-to-wire contact/contamination; Other	N/A	N/A	N/A	New Proposed 2019	N/A	2019 WMP Memorandum Account	N/A (Supports structural loading cases for regular application)	GO95 Section IV	Generally uses micro stations with evaluation for RAWS-quality measurements
	2019 actual	10	$12,834										
	2020	10	$16,600										
	2021	10	$13,000										
	2022	5	$13,000										
	2020-2022 plan total	25	$14,440										
2. Continuous monitoring sensors	2019 plan	NA	NA	Contact from object; All types of equipment/facility failure; Wire-to-wire contact/contamination; Other	N/A	N/A	N/A	New Proposed 2020	N/A	2019 WMP Memorandum Account	Exceeds Regulation	GO95 Generally	Expansion of technology contingent of successful pilot experiences
	2019 actual	0	0										
	2020	4	$28,000										
	2021	8	$28,000										
	2022	12	$28,000										
	2020-2022 plan total	24	$28,000										
3. Fault indicators for detecting faults on electric lines and equipment	2019 plan	While this program is critical to facilitate situational awareness, the overall management of this program is better suited with PacifiCorp's grid design and system hardening program focused on system automation, additional details have been included in Section 5.3.3.9. Costs and timelines for this program were outlined in Table 23, Initiative Activities 2.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new; Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
4. Forecast of a fire risk index, fire potential index, or similar	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time PacifiCorp has not established a plan to develop a fire risk index beyond that which it is communicated in its 2019 and 2020 WMPs. In addition, no specific incremental spend has been identified.											
5. Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	Additional resources deployed during elevated fire risk conditions is captured in section 5.3.6.3.											
6. Weather forecasting and estimating impacts on electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A	NA	Contact from object; All types of equipment/ facility failure; Wire-to-wire contact/contamination; Other	N/A	N/A	Minimizes PSPS impacts to customers	New Proposed 2019	N/A	2019 WMP Memorandum Account	In/Exceeds Regulation	ESRB-8	Persists approach applied during 2019 fire season; retained forecasting firm with company-establish thresholds
7.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have any specific situation awareness and forecasting programs focused not included in other programs.											

5.3.3 Grid design and system hardening

PacifiCorp's electrical infrastructure is engineered, designed, and operated in a manner consistent with prudent utility practice, enabling the delivery of safe, reliable power to all customers. When installing new assets, PacifiCorp is committed to incorporating new technology and engineered solutions. When conditions warrant, PacifiCorp may engage in strategic system hardening, which PacifiCorp interprets to mean replacement of existing assets (or, in some circumstances, modifying existing assets using a new design and additional equipment) to make the assets more resilient. Specific to PacifiCorp's 2020 Wildfire Risk Mitigation Plan, grid design and system hardening are the use of enhanced programs or non-standard designs to specifically manage the electrical distribution and transmission system in high fire threat geographic locations to mitigate wildfire risk.

PacifiCorp's wildfire mitigation system hardening programs are designed in reference to the equipment on the electrical network which could be involved in the ignition of a wildfire or could be suspect to a wildfire event, such as a brush fire, and, therefore, require greater resilience in design. In general, system hardening programs attempt to reduce the occurrence of events involving the emission of sparks (or other forms of heat) from electrical facilities or enhance resilience to survive a fire event. No single program mitigates all wildfire risk related to all types of equipment. Individual programs address different factors, different circumstances, and different geographic areas. For example, one program might specifically focus on reducing the potential of arcing between two lines. Another program, however, might involve a systematic reconstruction of an entire line in a particular geographic area of concern, including use of non-wood poles, to support restoration efforts. Each program described below, however, shares the common objective of reducing overall wildfire risk associated with the design and type of equipment used to construct and operate electrical facilities.

Examples of such programs which are covered in greater detail in this section include installation of non-standard covered conductor, installation of advanced protection, control, and isolation schemes, and use of non-standard pole material specifications and parameters such as fiberglass in place of wood. For each program requested, PacifiCorp focused on wildfire mitigation specific components or initiatives that required additional funding, development, or tracking. Where an existing program was deemed sufficient or where PacifiCorp did not have a wildfire mitigation specific program, notes were included.

1. Routine maintenance programs and protocols (i.e. covering general maintenance approach and programmatic structure)

PacifiCorp interprets routine maintenance programs and protocols as it relates to grid design and system hardening to mean all non-inspection related planned, preventative maintenance activities as inspection related maintenance items are included in Section 5.3.4. PacifiCorp leverages a combination of policies, processes, procedures, and tools to identify, schedule, and complete non-inspection related planned and preventative maintenance activities, which are generally focused on either keeping the asset in good working condition, diagnosing the asset condition and need for repairs, or a combination of both. Examples of routine maintenance activities include the collection and analysis of oil samples from substation transformers, routine operation, cleaning, and battery replacement of circuit breakers, and functional inspection and battery

replacement of field reclosers. The oil sampling analysis provides insight into whether or not the transformer is showing signs of deterioration and requires repairs while the circuit breaker and recloser maintenance inform repair work and ensure the equipment continues to be in good working condition.

PacifiCorp's policies, which prescribe maintenance cycles and requirements, are generally the result of either state specific codes, balancing authority requirements, national electric codes, or industry best practices. Generally speaking, a "best practice" does not have a finite definition, unit of measure, or specific threshold; also it is not necessarily the optimum process but rather intended to include acceptable practices, methods or acts. It is, instead, a practice established by the culmination of assessment which generally includes one or more of; industry methods analysis (as may be supported through IEEE, NESC, NERC, WECC or other technical organizations in addition to peer validation), validation of individuals having standing by virtue of years of experience of qualified personnel, continuous improvement, or cross collaboration throughout the industry. As best practices are also informed by research results or technological advancements, they are flexible to evolve over time and reflect updates. Therefore, an expected level of subjectivity and fluidity is present in these policies and requirements where applicable.

Generally speaking, these non-inspection preventative maintenance activities are scheduled and planned in SAP, one of PacifiCorp's available tools for maintenance planning, work orders and work plans are created at the beginning of the year, work is scheduled by local operations managers and then centrally tracked to completion. Standard forms are used for each type of routine maintenance to capture the scope of work completed as well as relevant results or findings. These forms are stored in a central repository.

2. Non-Routine maintenance

PacifiCorp interprets non-routine maintenance as it pertains to grid design and system hardening as non-inspection related corrective or repair activities not associated with a major storm or major event, but could include corrective work due to isolated weather related events such as lightning. Inspection related maintenance items are included in Section 5.3.4. PacifiCorp's electrical infrastructure is engineered, designed, and operated in a manner consistent with prudent utility practice, enabling the delivery of safe, reliable power to all customers. However, over time, as a result of various circumstances, facilities placed in service may wear, break, become damaged by third parties or incidental contact, or otherwise be affected such that the facilities cannot operate per design. In these circumstances, PacifiCorp must perform non-routine maintenance to bring equipment back into proper working condition.

2.a. Emergency response maintenance/repair and

While PacifiCorp's intent is to perform maintenance activities to prevent failure and subsequent outages to customers, circumstances may still arise where either equipment failure is due to unforeseen circumstances such as third party damage and lightning events or where accurate and prudent diagnostics beyond visual inspection are not available to properly predict failure. In this case, a fault event or system abnormal condition

is detected at PacifiCorp's central grid operation center and resources are immediately dispatched to repair equipment and restore electrical service and system normal conditions.

Once at the site of the fault or equipment mis-operation, qualified personnel work quickly to identify and repair any damage in a methodical and systematic manner as to not exacerbate the situation or compromise worker or public safety. Wildfire emergency specific response programs and operational practices that facilitate this are further described in Section 5.3.6. As is expected, priority is given to emergency restoration or maintenance activities to restore electrical service to customer and maintain system normal conditions. Very little subjectivity exists in the identification and completion of emergency maintenance or repair activities, as the need is generally identified through detection of a fault event or abnormal operating conditions, which are all measureable activities. Similarly, effective completion of the activity results in restoration of service.

2.b. Inspection response maintenance/repair

As described above, routine maintenance activities performed are generally focused on either keeping the asset in good working condition, diagnosing the asset condition and need for repairs, or a combination of both. When the maintenance activity includes a diagnostic component, results are recorded and reviewed by qualified personnel to determine the necessity and urgency of any required repair work.

Qualified personnel may include operations staff when evaluating on-site results such as the failure of a breaker to operate or centralized engineering and technical support staff when preforming an engineering analysis of Dissolved Gas Analysis (DGA) testing of the oil in a transformer. Craft personnel may assess and subsequently repair the circuit breaker on-site to be placed back in service or request full asset replacement depending on the extent of the damage and the specific reason for failure to operate. Similarly, in the case of DGA testing, the results of diagnostic gas analysis are reviewed by engineering and technical support and then categorized as either (1) extreme, requiring immediate corrective action, (2) elevated, requiring follow up testing and monitoring, or (3) normal, requiring no corrective action or repair work.

While there can be subjectivity into the evaluation and categorization of results of maintenance activities, PacifiCorp generally uses a combination of industry accepted best practices, sound engineering judgement, and experienced based operations knowledge. The use of standardized forms and centralized teams where applicable does reduce the range of accepted practices and evaluation techniques and bounds the potential results and corrective actions.

5.3.3.1 Capacitor maintenance and replacement program

Program Name	Grid design and system hardening
Initiative Name	Capacitor maintenance and replacement program
Description	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on capacitor maintenance and replacement. Capacitor replacement and maintenance is included in the company's standard inspection, maintenance, and replacement protocols. Any enhanced inspections or accelerated correction timeframe/replacements are captured in Section 5.3.4.3, Improvement of inspections.

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

Program Name	Grid design and system hardening
Initiative Name	Circuit breaker maintenance and installations to de-energize lines upon detecting a fault
Description	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on circuit breaker maintenance and replacement. Circuit breakers are generally installed for all distribution circuits and transmission lines to detect fault current and protect equipment in the event that a fault is detected. Circuit breaker replacement and maintenance is included in the company's standard inspection, maintenance, and replacement protocols. Any enhanced inspections or accelerated correction timeframe/replacements are captured in Section 5.3.4.3, Improvement of inspections. Replacement of specific, targeted circuit breakers as a part of PacifiCorp's WMP to support overall advanced coordination and detection efforts are better captured in initiative 5.3.3.9, Installation of system automation equipment.

5.3.3.3 Covered conductor installation

PacifiCorp interprets the covered conductor installation wildfire mitigation program to include the proactive replacement of existing in-service lines with covered conductor on both applicable distribution and transmission lines. These programs are meant to cover multiple relevant technologies such Hendrix cable or spacer cable and include all elements required to design and install, such as but not limited to materials, engineering, circuit coordination review, hardware, connectors, and installation/construction. For the purposes of this document, these programs have been collectively described and then further separated into both transmission and distribution voltage classes in Table 23.

<table>
<tr><td>Program Name</td><td>Grid design and system hardening</td></tr>
<tr><td>Initiative Name</td><td>Covered conductor installation (transmission & distribution)</td></tr>
<tr><td>Description</td><td>PacifiCorp’s grid design and system hardening wildfire mitigation program focused on covered conductor installation includes replacement of existing single phase, two phase, and three phase overhead distribution and transmission conductor within the HFTD with insulated conductor solutions such as insulated cable, spacer cable, and crossarm insulation. The program is phased across 5 years, with the first year focused on engineering and program start up. The high level scope of this program includes the following:
<table>
<tr><th>Component</th><th>Total Program</th><th>2019[37]</th><th>2020</th><th>2021</th><th>2022</th><th>2023</th></tr>
<tr><td>Distribution (line-miles)</td><td>165</td><td>0</td><td>38</td><td>52</td><td>41</td><td>34</td></tr>
<tr><td>Transmission (line-miles)</td><td>24</td><td>0</td><td>0</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td>Total (line-miles)</td><td>189</td><td>0</td><td>38</td><td>60</td><td>49</td><td>42</td></tr>
</table>
The program includes all necessary components to install the preferred solution such as but not limited to materials, engineering, circuit coordination review, hardware, and installation/construction. This program also include the construction and installation of spacer cable consistent with NESC requirements.</td></tr>
<tr><td>Timeline to Minimize Risk
[Planned/ Implemented]</td><td>Planned</td></tr>
</table>

[37] 2019 efforts focused on development of engineering standard and detailed scoping.

Rationale for Program	PacifiCorp currently engineers, constructs, and operates overhead conductor consistent with company standards which account for the necessary electrical loading as well as structural competence under standard operating conditions. However, as demonstrated in the risk assessment, overhead distribution conductor can be susceptible to incidental contact with foreign objects or phase to phase contact which, under certain conditions, can result in a fault scenario. During fire season, these fault scenarios pose wildfire risk, because arcing associated with the fault could ignite a fire. Because of the different fault scenarios associated with different configurations of overhead distribution assets, PacifiCorp's covered conductor installation programs include specific solutions for single phase, two phase, and three phase configurations. ***Reconductor with Insulated Cable:*** While not part of standard prudent utility construction practices, specialized overhead insulated conductors can be constructed with additional shielding and enhanced insulating properties. Insulated cable has less susceptibility to incidental contact with foreign objects such as branches or Mylar balloons. While insulated cable 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. Therefore, PacifiCorp's program includes installing insulated cable on all single phase overhead conductor circuits within the HFTD. ***Spacer Cable Installation:*** As previously described, overhead three phase conductors can be susceptible to external factors, such as high winds which result in phase to phase contact and a potential fault scenario. Spacer cable can be installed on multi-phase installations to provide additional rigidity, hold the multiple phases apart, and reduce the probability that phase to phase contact can occur. Therefore, PacifiCorp's program includes installing spacer cable on multi-phase overhead conductor circuits within the HFTD. ***Crossarm Installation:*** Where weight precludes the installation of spacer cable, insulated conductor can be installed on the cross arm for a similar risk reducing effect. Therefore, PacifiCorp's covered conductor installation program includes the installation of insulated conductor on all V phase cross-arms within the HFTD.
Prioritization Approach	As with all grid design and system hardening programs, PacifiCorp prioritizes the location of work to be completed and includes all elements of the plan at those locations instead of prioritizing specific programs or initiatives. Tier 3 and Tier 2 activities are given the highest priority and all program elements planned on a given line or circuit in that location are combined into a project. This ensures that risk is mitigated in the highest risk geographic locations first and facilitates efficiency in planning and execution.

		Specific to the prioritization of covered conductor installation, PacifiCorp's general methodology included selecting locations where the dominant fire weather was experienced in 2019 and the installation of covered conductor can reduce the potential for a PSPS event. Furthermore, PacifiCorp took into consideration the constructability, such as the requirement to complete hardening of the backbone prior to any radial sections or taps as well as the location of critical customers and load centers. This prioritized the location of 2020 activity and will inform the 2021 and 2022 scope of work. As PacifiCorp's situational awareness and weather data accuracy improves, PacifiCorp may further refine this methodology.
Plan for audits/quality checks		Where applicable, PacifiCorp intends to use standard company policies and procedures to implement audits/quality checks of its grid design and system hardening wildfire mitigation programs. Examples of these policies and procedures include but are not limited to development and use of detailed engineering standards, thorough peer/panel review of engineering design prior to approval, rigorous and competitive procurement processes, and use of qualified personnel for construction. PacifiCorp recently formed a Wildfire Mitigation Delivery Project Management Office within the transmission and distribution operations department and assigned a Wildfire Mitigation Delivery Director to lead the effort. The Wildfire Mitigation Implementation PMO will be responsible for planning, tracking, completion, and quality assurance of PacifiCorp's grid design and system hardening programs. While this department remains in its early stages and is not yet fully formed, the office intends to explore and develop a quality assurance process throughout the life cycle of the programs, specifically focused on the construction phase of these programs. Potential solutions currently under consideration might include the use of qualified inspectors, standardized forms and evaluations, or random sampling and inspection by the Wildfire Mitigation Delivery Director. PacifiCorp anticipates that this aspect of the program will evolve quickly and intends to provide additional updates and detail in the company's first annual update in 2021.
Planned demonstration of effectiveness over time		Similar to all grid design and system hardening wildfire mitigation programs, effectiveness of the covered conductor program includes a reduction in outage events, specifically those relating to incidental contact. As a reduction in potential fault events correlates to a reduction in potential ignition scenarios, an effective covered conductor program will mitigate the potential of incidental contact to result in a fault scenario and potential ignition.
Planned Evolution	General	While PacifiCorp maintains its commitment to deliver the company's wildfire mitigation programs and projects as proposed, it is critical to recognize that, as these projects and programs are subject to continuous evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to keep a close eye on these potential changes, which the company will incorporate into future Off-Ramp filings.

		As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how various grid design and system hardening programs may be improved by either changes to scope, technology, timing, or prioritization.
	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.
	Within the next 3 years	No expected/planned evolution at this time.
	Within the next 10 years	As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's covered conductor program will evolve. However, the company anticipates that modification or evolution could occur within the next 10 years but most likely to take place beyond the 3 year timeframe.

5.3.3.4 Covered conductor maintenance

Program Name	Grid design and system hardening
Initiative Name	Covered conductor maintenance
Description	At this time, PacifiCorp does not have any grid design and system hardening programs focused on covered conductor maintenance. As PacifiCorp progresses with implementation of the company wildfire mitigation programs, the company will continue to evaluate covered conductor specific wildfire mitigation maintenance programs.

5.3.3.5 Crossarm maintenance, repair, and replacement

Program Name	Grid design and system hardening
Initiative Name	Crossarm maintenance, repair, and replacement
Description	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on crossarm maintenance, repair, and replacement. Routine crossarm maintenance, repair, and replacement are included in the company's standard inspection and correction programs, with an accelerated timeline for correction under the company's Inspection program improvement, Section 5.3.4.3.

5.3.3.6 Distribution pole replacement and reinforcement, including with composite poles

PacifiCorp's pole replacement and reinforcement programs include both transmission and distribution poles. The methodology and general program approach are the same, but the specific volume of assets to be replaced and expenditure is different. For the purposes of this filing, the programs have been described below and the separately accounted for in Table 23.

<table>
<tr><td>Program Name</td><td>Grid design and system hardening</td></tr>
<tr><td>Initiative Name</td><td>Distribution (and transmission) pole replacement and reinforcement, including with composite poles</td></tr>
<tr><td>Description</td><td>PacifiCorp's distribution and transmission pole replacement and reinforcement program includes both the incorporation of new engineering fiberglass specification for new construction/installations within the HFTD as well as accelerated proactive replacement of existing wooden structures within the HFTD with non-wooden solutions outside of existing inspection and replacement programs described in Section 5.3.4.1, Section 5.3.4.2, and Section 5.3.4.6.
<table>
<tr><th>Year</th><th>Total Program</th><th>2019[38]</th><th>2020</th><th>2021</th><th>2022</th><th>2023</th></tr>
<tr><td>Distribution (poles)</td><td>1,600</td><td>0</td><td>39</td><td>300</td><td>300</td><td>961</td></tr>
<tr><td>Transmission (poles)</td><td>2,400</td><td>0</td><td>150</td><td>180</td><td>180</td><td>1,890</td></tr>
<tr><td>Total (poles)</td><td>4,000</td><td>0</td><td>189</td><td>480</td><td>480</td><td>2,851</td></tr>
</table></td></tr>
<tr><td>Timeline to Minimize Risk [Planned/ Implemented]</td><td>Planned & Partial Implementation
Completed evaluation of technical specification options
Implemented new fiberglass pole standard for new construction within the HFTD
Begin phased implementation of proactive replacement in 2020 (multi-year program)
Scope of full proactive replacement currently in progress</td></tr>
<tr><td>Rationale for Program</td><td>Currently, overhead poles and pole mounted equipment are replaced or reinforced within PacifiCorp's service territory, consistent with state specific requirements and prudent utility practice. Subject poles are identified through routine inspection and testing, major weather events, or joint use accommodation projects.</td></tr>
</table>

[38] 2019 efforts focused on development of engineering standard and detailed scoping.

	Traditionally, when a pole is identified for replacement through routine testing and inspections, a new wooden pole suitable for the intended use and design is installed in its place. While the use of wooden poles is consistent with prudent utility practice and considered safe and structurally sufficient to support overhead electrical facilities during standard operating conditions, alternate construction such as steel or fiberglass can provide additional structural resilience during wildfire events and, therefore, aid in restoration efforts. Accelerating the replacement of wooden poles with non-wooden solutions within the HFTD in addition to condition-based replacement can improve vintage diversity for adjacent pole loading, improve overall structural resilience, reduce wildfire risk, and support restoration efforts should a wildfire event happen. Furthermore, over time, joint use services have been permitted to attach to utility wooden poles within the existing safety factor margin designed for utility use only, effectively reducing the actual engineering safety factor. Proactive installation of new non-wooden poles with enhanced structural capability works to re-establish this original safety factor as designed.
Prioritization Approach	As with all grid design and system hardening programs, PacifiCorp prioritizes the location of work to be completed and includes all elements of the various programs at those locations instead of prioritizing specific programs or initiatives. Tier 3 and Tier 2 activities are given the highest priority and all program elements planned on a given line or circuit in that location that can be worked in parallel are combined into a project. This ensures that risk is mitigated in the highest risk geographic locations first and facilitates efficiency in planning and execution. Specific to PacifiCorp's pole replacement program, PacifiCorp first prioritizes pole replacements coincident to other planned programs or projects such as installation of covered conductor or replacement of Cu conductor (See Sections 5.3.3.3, 5.3.3.18). As these other programs target Tier 3 and Tier 2 locations as well as locations that are most likely to experience a PSPS event, the pole replacement program will essentially prioritize replacement of poles within Tier 3 and Tier 2 initially with a focus on mitigating potential PSPS events. Further criteria is then applied to this subset of PacifiCorp's poles and these poles are replaced based on age, condition, pole loading calculation and modeling, and overall diversity on the circuit or line. Beyond where coincident with other programs, PacifiCorp will apply a further prioritization method to identify where pole replacement should take place as a stand-alone project beyond CY2020. This prioritization methodology takes into consideration geographic wildfire tier designation, outstanding conditions, age, age diversity, pole loading calculation and modeling, presence of joint use attachments and presence of distribution underbuild.

Plan for audits/quality checks		Where applicable, PacifiCorp intends to use standard company policies and procedures to implement audits/quality checks of its grid design and system hardening wildfire mitigation programs. Examples of these policies and procedures include but are not limited to development and use of detailed engineering standards thorough peer/panel review of engineering design prior to approval, rigorous and competitive procurement processes, and use of qualified personnel for construction. PacifiCorp recently formed a Wildfire Mitigation Delivery Project Management Office within the Transmission and Distribution Operations department and assigned a Wildfire Mitigation Delivery Director to lead this effort. The Wildfire Mitigation Implementation PMO will be responsible for planning, tracking, completion, and quality assurance of PacifiCorp's grid design and system hardening programs. While this department remains in its early stages and is not yet fully formed, the office intends to explore and develop a quality assurance process throughout the life cycle of the programs, specifically focused on the construction phase of these programs. Potential solutions currently under consideration might include the use of qualified inspectors, standardized forms and evaluations, or random sampling and inspection by the Wildfire Mitigation Delivery Director. PacifiCorp anticipates that this aspect of the program will evolve quickly and intends to provide additional updates and detail in the company's first annual update in 2021.
Planned demonstration of effectiveness over time		This programs aims to improved structural resilience to either prevent pole failure during severe conditions or survive a wildfire event and support quicker, safer restoration efforts. Therefore, planned demonstration of effectiveness is a generally downward trend in pole related failures either before or during a wildfire event.
Planned Evolution	General	While PacifiCorp maintains its commitment to deliver the company's wildfire mitigation programs and projects as proposed, it is critical to recognize that, as these projects and programs are subject to evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to keep a close eye on these potential changes, which the company will incorporate into future Off-Ramp filings. As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how various grid design and system hardening programs may be improved by either changes to scope, technology, timing, or prioritization. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's pole replacement program will evolve. However, the company anticipates that modification or evolution is most likely to take place after the next three years of implementation.

	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.
	Within the next 3 years	No expected/planned evolution at this time.
	Within the next 10 years	Potential for evolution beyond the 3+ year timeframe which could potential include the use alternate technology or expansion and broadening of scope.

5.3.3.7 Expulsion fuse replacement

Program Name	Grid design and system hardening
Initiative Name	Expulsion fuse replacement
Description	Overhead expulsion fuses serve as one of the primary system protection devices on the overhead system. The expulsion fuse has a small metal element within the fuse body that is designed to melt when excessive current passes through the fuse body, interrupting the flow of electricity to the downstream distribution system. Under certain conditions, the melting action and interruption technique will expel an arc out of the bottom of the fuse tab. To reduce the potential for ignition as a result of fuse operation, PacifiCorp has identified alternate methodologies and equipment that do not expel an arc for installation within the HFTD. PacifiCorp's overhead expulsion fuse replacement program includes incorporation of a new engineering standard to be applied to new construction projects throughout the HFTD as well as proactive replacement of existing in-service expulsion fuses along with other system hardening projects throughout the HFTD (such as covered conductor or pole replacements). The new engineering standard is completed and has been incorporated into new construction projects. Replacement of in-service overhead expulsion fuses requires installation of new overhead equipment and potentially replacement of or augmentation to other protection and control equipment on a given circuit. Therefore, as opposed to initiating a separate program, PacifiCorp is incorporating this element into other system hardening programs to embrace maximum planning and spend efficiency (pole replacement, covered conductor replacement, advanced coordination, etc.). PacifiCorp will continue to evaluate the need for an additional, stand-alone overhead expulsion fuse program should all fuses not be replaced through other programs. At that time, these fuses will most likely be evaluated and prioritized based on geographic location and overall wildfire risk (Tier 3/II/Zone 1) for replacement. As part of the company's 2019 WMP vegetation management programs, PacifiCorp's radial pole clearing program was expanded. This supplemental vegetation management program helps mitigate the potential risk and impact of overhead expulsion fuses by reducing the available fuel at the base of the pole, along with similar risks from other overhead equipment, within the HFTD until alternate devices can be installed as a part of the broader programs.

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5.3.3.8 Grid topology improvements to mitigate or reduce PSPS events

Program Name	Grid design and system hardening
Initiative Name	Grid topology improvements to mitigate or reduce PSPS events
Description	The totality of the company's wildfire mitigation programs include, as a component, improvements to mitigate or reduce PSPS events. Examples of such programs include the installation of covered conductor, installation and operation of weather stations, or enhanced inspections and corrections. While the company's many wildfire mitigation programs are designed and focused to reduce the overall wildfire risk, PacifiCorp anticipates that, as these programs evolve, an additional benefit may be realized through the reduction of potential PSPS events. However, PacifiCorp interprets the grid topology improvements to mitigate or reduce PSPS events to be specific program components which mitigate either the frequency, duration, or overall impact of PSPS events not included in other wildfire mitigation programs such as those noted above. As many of PacifiCorp's points of delivery (customers) reside within the HFTD and PSPS zones, it is challenging to mitigate or reduce the entire existence of a PSPS event through grid topology improvements alone. Therefore, efficient and effective grid topology improvements mitigate or reduce PSPS events in the company's service territory to focus on augmentation or evaluation of existing circuitry as opposed to complete relocation of assets. While PacifiCorp did not implement a PSPS event in the state of California during the 2019 fire season, PacifiCorp did monitor elevated risk conditions throughout the year when required to remain vigilant and maintain the capacity to implement a PSPS event. During these time periods, PacifiCorp learned that the ability to efficiently and effectively implement a PSPS event within the company's service territory in a manner that keeps the impact to customers and communities as low as practical is about flexibility, system knowledge, and the capability to make informed decisions based on accurate information to task appropriate action in the moment. As a result, PacifiCorp's grid topology improvements to mitigate or reduce PSPS events will focus on the evaluation of various scenarios within the company's pre-defined PSPS zones to understand what projects may be able to promote this flexibility and inform decision making. As 2019 represents the first year of PacifiCorp's PSPS program, the company does not yet have a defined list of mitigation projects. PacifiCorp anticipates that as this program evolves, these projects may include proactive installation of equipment but also recognizes that as weather patterns and risk can change quickly, specific proactive projects may not always be effective. Alternatively, the company may also look at enhance procedures and readiness to implement reactive switching or isolation points during an event.

		In any case, PacifiCorp assumes these projects will be limited in scope and expenditure and may need to be considered on a case by case basis. At this time, no specific scope or budget has been set aside for this program.
Timeline to Minimize Risk [Planned/ Implemented]		Planned
Rationale for Program		PSPS events, while critical to reducing wildfire risk, can cause disruption to customers and communities. PacifiCorp's grid topology improvements to mitigate or reduce PSPS events program are developed to mitigate either the frequency, duration, or overall impact of PSPS events.
Prioritization Approach		High priority given to the program specifically focused within existing PSPS candidate zones described in Section 4.4.1.
Plan for audits/quality checks		N/A
Planned demonstration of effectiveness over time		The effectiveness of these programs is a reduction in frequency, duration, or overall impact of PSPS events. However, as PSPS has not yet implemented a PSPS, PacifiCorp has very little data to leverage and measurement of effectiveness of this program may be challenging. Additionally, as the implementation and evolution PacifiCorp's PSPS program is directly influenced by hazardous and high risk weather conditions, changing weather conditions may also make this a moving target as described in Section 4.4.7.
Planned Evolution	General	While PacifiCorp maintains its commitment to deliver the company's wildfire mitigation programs and projects as proposed, it is critical to recognize that, as these projects and programs are subject to continuous evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to keep a close eye on these potential changes, which the company will incorporate into future Off-Ramp filings. Additionally, as PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how grid topology improvements to mitigate or reduce PSPS events may be improved by either changes to scope, technology, timing, or prioritization. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's grid topology improvements to mitigate or reduce PSPS

		events program will evolve. However, PacifiCorp anticipates that this program will evolve alongside the company's overall PSPS program as described in Section 4.4.7.
	Before the upcoming wildfire season	No evolution planned/anticipated at this time.
	Before the next annual update	Incorporation of localized weather data and enhanced situational awareness to influence projects
	Within the next 3 years	• Incorporation of relevant grid topology programs to mitigate the impact of a PSPS event • Evaluation of system hardening programs to include potential reduction of candidates or PSPS boundaries, amendment to threshold criteria, and, where appropriate, removal of the PSPS zone entirely • Incorporation of localized weather data and enhanced situational awareness to review risk profile and overall candidate selection
	Within the next 10 years	• Continued incorporation of relevant grid topology programs to mitigate the impact of a PSPS event • Evaluation of system hardening program completion to include potential reduction of candidates or PSPS boundaries, amendment to threshold criteria, and, where appropriate, removal of the PSPS zone entirely • Continues incorporation of localized weather data and enhanced situational awareness to review risk profile and overall candidate selection

5.3.3.9 Installation of system automation equipment

PacifiCorp interprets system automation equipment to mean all equipment, schemes, engineering, and processes to facilitate advance detection and coordination on the company's distribution circuits.

<table>
<tr><td>Program Name</td><td>Grid design and system hardening</td></tr>
<tr><td>Initiative Name</td><td>Installation of system automation equipment</td></tr>
<tr><td>Description</td><td>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 expedite restoration efforts. Currently, the scope of this program includes 68 projects throughout the HFTD over four years, with completion of the program in 2022 as indicated below.
<table>
<tr><th>Component</th><th>Total Program</th><th>2019</th><th>2020</th><th>2021</th><th>2022</th><th>2023</th></tr>
<tr><td>Projects</td><td>68</td><td>10</td><td>31</td><td>24</td><td>3</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>Timeline to Minimize Risk [Planned/ Implemented]</td><td>Planned and Partial Implementation (See Table 23)</td></tr>
<tr><td>Rationale for Program</td><td>Advanced coordination refers to the upgrade and deployment of distribution 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 expedite restoration efforts.

While the existing protection and control equipment and schemes are consistent with prudent utility practice and are sufficient to safely operate the electric system under standard operating conditions, advance coordination can further reduce operational risk in specific scenarios. Specific to wildfire mitigation, advanced coordination can allow for the detection of high impedance faults, such as those consistent with brush fires, reduce fault isolation time and reduce potential exposure to ignition events, improve fault location and records to facilitate timely response to fire events and support continuous improvement, and can provide ability to remotely operate equipment, which is critical for PSPS efforts.</td></tr>
</table>

Prioritization Approach	As with all grid design and system hardening programs, PacifiCorp prioritizes the location of work to be completed and includes all elements of the plan at those locations instead of prioritizing specific programs or initiatives. Tier 3 and Tier 2 activities are given the highest priority and all program elements planned on a given line or circuit in that location are combined into a project. Specific to the installation of system automation equipment, the specific projects are prioritized based on the proportional amount of line miles exposed in Tier 3 and Tier 2 that are protected or controlled by the equipment proposed for upgrades and enhancements. Within that prioritization, additional consideration, where needed, was given to the type and vintage of existing equipment (such as relays) in the event that further prioritization and delineation was needed. This approach ensures that risk is mitigated in the highest risk geographic locations first and facilitates efficiency in planning and execution.
Plan for audits/quality checks	Where applicable, PacifiCorp intends to use standard company policies and procedures to implement audits/quality checks of its grid design and system hardening wildfire mitigation programs. Examples of these policies and procedures include but are not limited to development and use of detailed engineering standards, thorough peer/panel review of engineering design prior to approval, rigorous and competitive procurement processes, and use of qualified personnel for construction. PacifiCorp recently formed a Wildfire Mitigation Delivery Project Management Office within the transmission and distribution operations department and assigned a Wildfire Mitigation Delivery Director to lead the effort. The Wildfire Mitigation Implementation PMO will be responsible for planning, tracking, completion, and quality assurance of PacifiCorp's grid design and system hardening programs. While this department remains in its early stages and is not yet fully formed, the office intends to explore and develop a quality assurance process throughout the life cycle of the programs, specifically focused on the construction phase of these programs. Potential solutions currently under consideration might include the use of qualified inspectors, standardized forms and evaluations, or random sampling and inspection by the Wildfire Mitigation Delivery Director. PacifiCorp anticipates that this aspect of the program will evolve quickly and intends to provide additional updates and detail in the company's first annual update in 2021.
Planned demonstration of effectiveness over time	This programs aims to improve advanced detection, coordination, and protection schemes on PacifiCorp's circuits within the HFTD in California. Therefore, PacifiCorp views demonstration of effectiveness as a generally downward trend in protection and control mis-operation, faster isolation times during a fault event, greater resolution in fault location information during a fault event, and the availability of additional fault data after an event occurs.

Planned Evolution	General	While PacifiCorp maintains its commitment to deliver the company's wildfire mitigation programs and projects as proposed, it is critical to recognize that, as these projects and programs are subject to continuous evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to keep a close eye on these potential changes, which the company will incorporate into future Off-Ramp filings. Additionally, as PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how various grid design and system hardening programs may be improved by either changes to scope, technology, timing, or prioritization. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's installation of system automation program will evolve. However, given how quickly advanced detection, protection, and control equipment is changing, the company anticipates that modification or evolution could take place in the 3 year timeframe, specifically regarding the communication methods and schemes.
	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.
	Within the next 3 years	Potential for evolution in the 3 year timeframe, most likely to incorporate changes to communication methods or schemes.
	Within the next 10 years	Continued evolution.

5.3.3.10 Maintenance, repair, and replacement of connecters, including hotline clamps

Program Name	Grid design and system hardening
Initiative Name	Maintenance, repair, and replacement of connecters, including hotline clamps
Description	PacifiCorp does not currently have a specific grid design and system hardening wildfire mitigation program focused on maintenance, repair, and replacement of connectors, including hotline clamps. Replacement of connectors, where applicable, is included in other programs such as installation of covered conductor.

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

Program Name	Grid design and system hardening
Initiative Name	Mitigation of impact on customers and other residents affected during PSPS event
Description	PacifiCorp does not currently have an additional 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 5.3.3.8. Both of these programs are combined as relevant grid topology improvements pertaining to grid design and system hardening that reduce PSPS events inherently also mitigate the impact on customers. Furthermore, 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 and Section 5.6.2.

5.3.3.12 Other corrective action

Program Name	Grid design and system hardening
Initiative Name	Other corrective action
Description	At this time, PacifiCorp does not have any grid design and system hardening wildfire mitigation programs focused on other corrective action. PacifiCorp's relevant corrective actions are included in the company's Improvement of inspections in Section 5.3.4.3.

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

Program Name	Grid design and system hardening
Initiative Name	Pole loading infrastructure hardening and replacement program based on pole loading assessment program
Description	Pole loading to accommodate safety factors and necessary specifications are included in PacifiCorp's engineering and construction standards. At this time, PacifiCorp has piloted the use of LiDAR to create structural models to calculate pole loading capacity. In addition, specific pole loading assessment of in-service assets was included as a subset to the methodology of PacifiCorp's pole replacement programs included in Section 5.3.3.6. Where appropriate, pole loading assessment of new construction has also been incorporated into the new standards developed included in Section 5.3.3.6.

5.3.3.14 Transformers maintenance and replacement

Program Name	Grid design and system hardening
Initiative Name	Transformers maintenance and replacement
Description	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on transformer maintenance and replacement. Transformer replacement and maintenance is included in the company's standard inspection, maintenance, and replacement protocols. Any enhanced inspections or accelerated correction timeframe/replacements are captured in Section 5.3.4.3, Improvement of inspections.

5.3.3.15 Transmission tower maintenance and replacement

Program Name	Grid design and system hardening
Initiative Name	Transmission tower maintenance and replacement
Description	PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on transmission tower maintenance and replacement outside of standard inspection and correction programs describes in Section 5.3.4 or transmission pole replacement as included in Section 5.3.3.6.

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5.3.3.16 Undergrounding of electric lines and/or equipment

Program Name	Grid design and system hardening
Initiative Name	Undergrounding of electric lines and/or equipment
Description	PacifiCorp recognizes that value may exist in installation of underground electrical equipment. However, in PacifiCorp's experience, undergrounding of electric utility lines tends to be less economical as compared to the installation of overhead electric lines, including the installation of covered conductor. Therefore, at this time, PacifiCorp does not have any grid design and system hardening wildfire mitigation programs specifically focused on undergrounding of electric lines and/or equipment. Should these conditions change, PacifiCorp,

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

Program Name	Grid design and system hardening
Initiative Name	Updates to grid topology to minimize risk of ignition in HFTDs
Description	At this time, PacifiCorp does not have any specific grid design and system hardening wildfire mitigation programs focus on updates to grid topology to minimize risk of ignition in HFTDs. PacifiCorp recognizes that, as weather patterns change and overall modeling and assessments evolve, updates to grid topology is something to continue to evaluate. Other grid design and system hardening programs include, as a component, grid topology improvements to minimize the risk of ignition in the HFTD. Similar to the company's grid topology improvement to mitigate or reduce PSPS events described in Section 5.3.3.8, PacifiCorp recognizes that it is challenging to mitigate wildfire risk through grid topology changes alone. Therefore, PacifiCorp focuses more on augmentation of existing circuitry through system hardening efforts included throughout Section 5.3.3.

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5.3.3.18 Other – Replace small size Cu conductor

Program Name	Grid design and system hardening
Initiative Name	Replace small size Cu conductor
Description	The scope of this program includes the replacement of small diameter copper and iron conductors throughout PacifiCorp's California service territory with aluminum stranded conductor. A high level summary of the program scope is included below.

Component	Total Program	2019	2020	2021	2022	2023
Distribution (line-miles)	53	0[39]	3	26	13	11

Timeline to Minimize Risk [Planned/ Implemented]	Planned
Rationale for Program	Small diameter copper and iron conductors do not coordinate with upstream fusing and relay settings required for advanced fault detection programs. Under certain fault conditions the small diameter conductor with fail before the protection scheme will operate. Replacing the conductor with a larger size will ensure proper protective coordination.
Prioritization Approach	As with all grid design and system hardening programs, PacifiCorp prioritizes the location of work to be completed and includes all elements of the plan at those locations instead of prioritizing specific programs or initiatives. Tier 3 and Tier 2 activities are given the highest priority and all program elements planned on a given line or circuit in that location are combined into a project. This ensures that risk is mitigated in the highest risk geographic locations first and facilitates efficiency in planning and execution.
Plan for audits/quality checks	Where applicable, PacifiCorp intends to use standard company policies and procedures to implement audits/quality checks of its grid design and system hardening wildfire mitigation programs. Examples of these policies and procedures include but are not limited to the development and use of detailed engineering standards, thorough peer/panel review

[39] 2019 efforts significantly focused on engineering and scoping efforts.

		of engineering design prior to approval, rigorous and competitive procurement processes, and use of qualified personnel for construction. PacifiCorp recently formed a Wildfire Mitigation Delivery Project Management Office within the transmission and distribution operations department and assigned a Wildfire Mitigation Delivery Director to lead the effort. The Wildfire Mitigation Implementation PMO will be responsible for planning, tracking, completion, and quality assurance of PacifiCorp's grid design and system hardening programs. While this department remains in its early stages and is not yet fully formed, the office intends to explore and develop a quality assurance process throughout the life cycle of the programs, specifically focused on the construction phase of these programs. Potential solutions currently under consideration might include the use of qualified inspectors, standardized forms and evaluations, or random sampling and inspection by the Wildfire Mitigation Delivery Director. PacifiCorp anticipates that this aspect of the program will evolve quickly and intends to provide additional updates and detail in the company's first annual update in 2021.
Planned demonstration of effectiveness over time		The demonstration of effectiveness over time of the replacement of Cu conductor is a reduction of mis-coordination events of the circuits in scope for replacement and the ability to implement advance protection and control schemes.
Planned Evolution	General	While PacifiCorp maintains its commitment to deliver the company's wildfire mitigation programs and projects as proposed, it is critical to recognize that, as these projects and programs are subject to continuous evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to keep a close eye on these potential changes, which the company will incorporate into future Off-Ramp filings. Additionally, as PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how various grid design and system hardening programs may be improved by either changes to scope, technology, timing, or prioritization. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's installation of replacement of Cu conductor program will evolve. However, given the small and simplistic scope of the program, it is unlikely that the program will evolve significantly prior to completion.
	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.

	Within the next 3 years	No expected/planned evolution at this time.
	Within the next 10 years	No expected/planned evolution at this time.

The following table summarizes all elements of PacifiCorp's grid design and system hardening wildfire mitigation programs. Applicable pilot programs, such as Infrared inspections or LiDAR inspections, were only assigned dollar values for known spend in known years through the duration of the pilot project scope. Future potential spend associated with expansion or evolution of the pilot projects, which will be defined in future updates as the results of the pilot projects are evaluated, is not yet known and, therefore, is represented with TBD in the table below. For each program, where requested, 2019 plan values were included as N/A. Additionally, the 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 23: Grid design and system hardening

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Capacitor maintenance and replacement program	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on capacitor maintenance and replacement. Capacitor replacement and maintenance is included in the company's standard inspection, maintenance, and replacement protocols. Any enhanced inspections or accelerated correction timeframe/replacements are captured in Section 5.3.4.3, Improvement of inspections.											
2. Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on circuit breaker maintenance and replacement. Circuit breakers are generally installed for all distribution circuits and transmission lines to detect fault current and protect equipment in the event that a fault is detected. Circuit breaker replacement and maintenance is included in the company's standard inspection, maintenance, and replacement protocols. Any enhanced inspections or accelerated correction timeframe/replacements are captured in Section 5.3.4.3, Improvement of inspections. Replacement of specific, targeted circuit breakers as a part of PacifiCorp's WMP to support overall advanced coordination and detection efforts are better captured in initiative 5.3.3.9, Installation of system automation equipment.											

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
3. Covered conductor installation - transmission	2019 plan	N/A	N/A	Contact from object; Wire-to-wire contact / contamination	N/A	N/A	N/A	New Proposed in 2019	N/A	2019 WMP Memorandum Account	N/A (exceeds standard design)	N/A	Program can include multiple design types based on installation voltage/ type
	2019 actual	0	$0										
	2020	0	$0										
	2021	8	$725,000										
	2022	8	$725,000										
	2020-2022 plan total	16	$725,000										
3b. Covered conductor installation - distribution	2019 plan	N/A	N/A	Contact from object; Wire-to-wire contact / contamination	N/A	N/A	N/A	New Proposed in 2019	N/A	2019 WMP Memorandum Account	N/A (exceeds standard design)	N/A	Program can include multiple design types based on installation voltage/ type
	2019 actual	0	$0										
	2020	38	$207,237										
	2021	52	$218,904										
	2022	41	$282,439										
	2020-2022 plan total	131	$235,405										
4. Covered conductor maintenance	2019 plan	At this time, PacifiCorp does not have any grid design and system hardening programs focused on covered conductor maintenance. As PacifiCorp progresses with implementation of the company wildfire mitigation programs, the company will continue to evaluate covered conductor specific wildfire mitigation maintenance programs.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
5. Crossarm maintenance, repair, and replacement	2019 plan	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on crossarm maintenance, repair, and replacement. Routine crossarm maintenance, repair, and replacement are included in the company's standard inspection and correction programs, with an accelerated timeline for correction under the company's Inspection program improvement, Section 5.3.4.3.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
6. Distribution pole replacement and reinforcement, including with composite poles	2019 plan	N/A	N/A	Contact from object; All types of equipment / facility failure	N/A	N/A	Facilitates restoration efforts through enhanced resiliency	New Element Proposed in 2019	CA GO 95 & 165 2018 GRC	2019 WMP Memorandum Account	Exceeds Regulation	CA GO 95 & 165	Exceeds regulation to the extent that poles are identified for replacement above and beyond standard inspection programs
	2019 actual	0	$0										
	2020	39	$8,436										
	2021	300	$8,427										
	2022	300	$8,427										
	2020-2022 plan total	639	$8,427										
6b. Transmission pole replacement and reinforcement, including with composite poles	2019 plan	N/A	N/A	Contact from object; All types of equipment / facility failure	N/A	N/A	Facilitates restoration efforts through enhanced resiliency	New Element Proposed in 2019	CA GO 95 & 165 2018 GRC	2019 WMP Memorandum Account	Exceeds Regulation	CA GO 95 & 165	Exceeds regulation to the extent that poles are identified for replacement above and beyond standard inspection programs
	2019 actual	0	$0										
	2020	150	$24,480										
	2021	180	$24,478										
	2022	180	$24,478										
	2020-2022 plan total	510	$24,478										
7.Expulsion fuse replacement	2019 plan	PacifiCorp is incorporating this element into other system hardening programs to embrace maximum planning and spend efficiency (pole replacement, covered conductor replacement, advanced coordination, etc. PacifiCorp will continue to evaluate the need for an additional overhead expulsion fuse program should all fuses not be replaced through other programs											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
8. Grid topology improvements to mitigate or reduce PSPS events	2019 plan	N/A	N/A	N/A - Not an ignition probability risk reduction program	N/A	N/A	Reduced impact of PSPS events	New Proposed in 2019	N/A	2019 WMP Memorandum Account	Exceeds standard engineering design	N/A	In evaluation phase; No specific program dollars assigned. See Section 5.3.3.8
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
9. Installation of system automation equipment	2019 plan	N/A	N/A	All - Regardless of the cause, this program reduces that potential that a fault scenario results in an ignition event through advanced coordination	N/A	N/A	N/A	New Proposed in 2019	N/A	2019 WMP Memorandum Account	N/A (exceeds standard design)	N/A	As these projects are not scoped on a line-mile basis, the values reported reflect projects
	2019 actual	10	$271,445										
	2020	31	$97,710										
	2021	24	$76,375										
	2022	3	$166,667										
	2020-2022 plan total	58	$92,449										
10. Maintenance, repair, and replacement of connectors, including hotline clamps	2019 plan	PacifiCorp does not currently have a specific grid design and system hardening wildfire mitigation program focused on maintenance, repair, and replacement of connectors, including hotline clamps. Replacement of connectors, where applicable, is included in other programs such as installation of covered conductor.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
11. Mitigation of impact on customers and other residents affected during PSPS events	2019 plan	PacifiCorp does not currently have an additional 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 5.3.3.8. Both of these programs are combined as relevant grid topology improvements pertaining to grid design and system hardening that reduce PSPS events inherently also mitigate the impact on customers. Furthermore, 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 and Section 5.6.2.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
12. Other corrective action	2019 plan	At this time, PacifiCorp does not have any grid design and system hardening wildfire mitigation programs focused on other corrective action. PacifiCorp's relevant corrective actions are included in the company's Improvement of inspections in Section 5.3.4.3.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
13. Pole loading infrastructure hardening and replacement program based on pole loading assessment program	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	Pole loading to accommodate safety factors and necessary specifications are included in PacifiCorp's engineering and construction standards. At this time, PacifiCorp has piloted the use of LiDAR to create structural models to calculate pole loading capacity. In addition, specific pole loading assessment of in-service assets was included as a subset to the methodology of PacifiCorp's pole replacement programs included in Section 5.3.3.6. Where appropriate, pole loading assessment of new construction has also been incorporated into the new standards developed included in Section 5.3.3.6.											
14. Transformers maintenance and replacement	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on transformer maintenance and replacement. Transformer replacement and maintenance is included in the company's standard inspection, maintenance, and replacement protocols. Any enhanced inspections or accelerated correction timeframe/replacements are captured in Section 5.3.4.3, Improvement of inspections.											
15. Transmission tower maintenance and replacement	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp does not have a specific grid design and system hardening wildfire mitigation program focused on transmission tower maintenance and replacement outside of standard inspection and correction programs describes in Section 5.3.4 or transmission pole replacement as included in Section 5.3.3.6.											
16. Undergrounding of electric lines and/or equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp recognizes that value may exist in installation of underground electrical equipment. However, at this time, PacifiCorp does not have any grid design and system hardening wildfire mitigation programs specifically focused on undergrounding of electric lines and/or equipment.											

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
17. Updates to grid topology to minimize risk of ignition in HFTDs	2019 plan	At this time, PacifiCorp does not have any specific grid design and system hardening wildfire mitigation programs focus on updates to grid topology to minimize risk of ignition in HFTDs. PacifiCorp recognizes that, as weather patterns change and overall modeling and assessments evolve, updates to grid topology is something to continue to evaluate. Other grid design and system hardening programs include, as a component, grid topology improvements to minimize the risk of ignition in the HFTD. Similar to the company's grid topology improvement to mitigate or reduce PSPS events described in Section 5.3.3.8, PacifiCorp recognizes that it is challenging to mitigate wildfire risk through grid topology changes alone. Therefore, PacifiCorp focuses more on augmentation of existing circuitry through system hardening efforts included throughout Section 5.3.3.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
18.Other - Replace small size Cu conductor	2019 plan	N/A	N/A	All - Regardless of the cause, this program reduces that potential that a fault scenario results in an ignition event through advanced coordination	N/A	N/A	N/A	New Proposed in 2019	N/A	2019 WMP Memorandum Account	N/A (exceeds standard design)	N/A	Program facilitates enhanced coordination which reduces impact of all types of fault events and reduced potential of ignition
	2019 actual	0	$0										
	2020	3	$166,000										
	2021	26	$51,923										
	2022	13	$75,000										
	2020-2022 plan total	42	$67,214										

5.3.4 Asset management and inspections

PacifiCorp interprets asset management and inspections wildfire mitigation programs to include all proactive maintenance or inspections performed not already discussed in Section 5.3.3. Generally, these programs focus on inspection and correction of overhead energized electric lines, but also extend to intrusive pole testing, substation inspections, and pilot projects to deploy enhanced or alternate diagnostic technology. For each program requested, PacifiCorp focused on wildfire mitigation specific components or initiatives that required additional funding, development, or tracking. Where an existing program was deemed sufficient or where PacifiCorp did not have a wildfire mitigation specific program, notes were included.

Utilities protocols relating to maintenance or any electric lines that could directly, or indirectly relate to wildfire ignition

Inspection and correction programs are the cornerstone of a resilient system. These programs are tailored to identify conditions that could result in premature failure or potential fault scenarios, including situations in which the infrastructure may no longer be able to operate per code or engineered design, or may become susceptible to external factors, such as weather conditions.

PacifiCorp performs inspections on a routine basis as dictated by both state specific regulatory requirements and company-specific policies. When an inspection is performed on a PacifiCorp asset, inspectors use a predetermined list of condition codes (defined below) and priority levels (defined below) to describe any noteworthy observations or potential non-compliance discovered during the inspection. Once recorded, the company uses condition codes to establish the scope of and timeline for corrective action to make sure that the asset is in conformance with National Electric Safety Code (NESC®) requirements, state-specific code requirements such as California General Orders, and/or company specific policies. This process is designed to correct conditions while reducing impact to normal operations.

Key terms associated with PacifiCorp's Inspections & Corrections Program are defined as follows:

- **Detailed Inspection** – a careful visual inspections accomplished by visiting each structure, as well as inspecting spans between structures, which is intended to identify 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 which need to be corrected in order to maintain reliable and safe service.

- **Pole Test & Treat** – an inspection of wood poles to identify decay, wear, or woodpecker damage, which may include pole-sounding, inspection hole drilling, and excavation tests to assess the pole condition and identify the need for any treatment, repair, or replacement.

- **Patrol / Visual Assurance Inspection**– a brief visual inspection performed by viewing each facility from a vantage point allowing reasonable viewing access, which is intended to identify damage or defects to the transmission and 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.

- **Enhanced Visual Inspection** – Visual Assurance Inspection paired with additional data collection such as infrared, ultraviolet, or LiDAR technology to further evaluate and categorize the current status of electric utility assets and inform the need for a prioritization of corrective actions.

- **Condition** – The state of something with regard to appearance, quality, or working order which can sometimes be used to identify potential impact to normal system operation or clearance, which is typically identified by an inspection.

- **Condition Codes** – Predetermined list of codes for use by inspectors to efficiently capture, categorize, and communicate observations and inform the scope of and timeline for potential corrective action.

- **Correction** – Scope of work required to remove a Condition within a specified timeframe.

- **Priority Level** – the level of risk assigned to the condition observed, as follows:
    - Priority A – Risk of high potential impact to safety or reliability which includes, as a subset, imminent threats equivalent to Level 1 conditions;
    - Priority B – Any other risk of at least moderate potential impact to safety or reliability, equivalent to Level 2 conditions;
    - Priority C – Any other risk of at least low potential impact to safety or reliability, equivalent to Level 3 conditions;

PacifiCorp's asset inspection program involves three primary types of inspections: (1) Visual Assurance Inspection; (2) Detailed Inspection, and (3) Pole Test & Treat. Inspection cycles, which dictate the frequency of inspections, are set by PacifiCorp asset management and reflect both industry best practices and state specific requirements. In general, Visual Assurance Inspections are conducted more frequently, to quickly identify any obvious damage or defects which could affect safety or reliability, and Detailed Inspections are performed less frequently as detailed inspections are more thorough or intrusive. The frequency of Pole Test & Treat is typically dictated based on state specific requirements and, where applicable, is conducted in conjunction with certain Detailed Inspections.

Regardless of the type of inspection, the inspector conducting the inspection will notate any Conditions and assign a Condition Code and Priority Level in PacifiCorp's Facility Point Inspection (FPI) system. Corrections are then scheduled and completed within the correction timeframes established by PacifiCorp asset management, which typical reflect industry best practices or state specific requirements. In all cases, the timeline

for Corrections takes into account the Priority Level of any identified Condition. Not surprisingly, a Priority A Condition is addressed on a much shorter timeframe than a Priority B Condition.

Wildfire Mitigation Inspection and Correction Program Enhancements

While 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 ignite a fire. Nonetheless, recognizing the growing risk of wildfire and recent changes to California General Orders, PacifiCorp designed and incorporated additional elements to supplement the company's standard inspection and correction programs mitigate the growing wildfire specific operational risks and create greater resiliency against wildfires beginning in 2018 with full implementation in 2019. There are four primary elements to these improvements: (1) creating a fire risk Condition Code; (2) increasing inspection frequencies in Fire High Consequence Areas; (3) narrowing Correction timeframes for Fire Risk Conditions; and (4) piloting new technologies to facilitate Enhanced Visual Inspections.

1. Fire Risk Conditions

PacifiCorp currently designates certain Conditions as "Fire Risk Conditions." Each Condition is still assigned a Condition Code (i.e. CONDFRAY for a damaged or frayed primary conductor) – but certain Condition Codes are categorically designated as a Fire Risk Condition. Accordingly, if a Condition is designated under a particular Condition Code associated as a fire risk, the Condition will also be designated as a Fire Risk Condition. To this end, a review was performed on all existing Condition Codes to determine whether the Condition Code could have any correlation with fire ignition. Condition Codes reflecting an appreciable risk of fire ignition were designated as Fire Risk Conditions. For example, if a damaged or frayed primary conductor was observed during an inspection, the inspector would record condition code CONDFRAY, which is designated as a Fire Risk Condition because the Condition could eventually result in an ignition under certain circumstances. In contrast, the observation of a missing or broken guy marker would result in the condition code GUYMARK, which is not designated as a Fire Risk Condition.

2. Inspection Frequency

Consistent with California General Order 165 and California General Order 95, PacifiCorp increased the frequency of all three inspections types for assets located in Tier 2 and Tier 3 of the HFTD. Consistent with industry best practices, inspections are PacifiCorp's preferred mechanism to identify Conditions, including those considered to be Fire Risk Conditions. Therefore, an increase in the frequency of inspections should result in more timely identification of potential Fire Risk Conditions. Relevant wildfire mitigation inspection frequencies are included in the table below.

Asset Classification	Inspection Name	Minimum Frequency
Main Grid Transmission	Safety/Visual Assurance	Every year
	Detailed Inspection	Every 2 years

Asset Classification	Inspection Name	Minimum Frequency
	Detailed / Pole Test and Treat	Every 10 years
OH Local Transmission	Safety/Visual Assurance	Every year
	Detailed Inspection	Every 5 years
	Detailed / Pole Test and Treat	Every 10 years
OH Distribution	Safety/Visual Assurance	Tier 2 & 3 - Every year Non-Tier - Every 2 years
	Detailed Inspection	Every 5 years
	Detailed / Pole Test and Treat	Every 20 years

3. Correction Timeframe

Reducing the time allowed for Correction of Fire Risk Conditions, as identified through regular inspections, will result in reduced exposure to the wildfire risk. PacifiCorp uses a state specific approach to determine an appropriate scope and timeframe for Corrections of Conditions, including Fire Risk Conditions. These timeframes reflect a balance between local operation risk from wildfire threats and prudent utility practice. Fire Risk Conditions identified within Tier 2 and Tier 3 within the HFTD are assigned a higher risk level than those outside of the HFTD, and, therefore, are corrected within a shorter timeframe to reduce operation risk. Wildfire mitigation related correction timeframes are consistent with CA GO 95 Rule 18A and are included in the table below:

Priority	Location	Correction Timeframe
A - imminent	Any	Immediately
A	Any	30 days
B	Tier 3	6 months
	Tier 2	12 months
	Other	36 months
C	Any[40]	5 years

[40] PacifiCorp defines a Fire Risk Condition as having at least moderate potential impact to safety or reliability and, as a result, only assigns a condition code priority of A or B to this subset of Conditions. Therefore, accelerated correction timeframes for Fire Risk Conditions which include specific rules based on geographic wildfire risk location cannot apply to C conditions.

4. Piloting New Technologies to Facilitate Enhanced Inspections

As previously defined, Enhanced Inspections are a visual assurance or patrol inspection paired with additional data collection such as infrared or ultraviolet to further evaluate and categorize the current status of electric utility assets and inform the need for a prioritization of corrective actions. This is an extension consistent with the definition included in the Glossary of Terms.

The use of infrared (IR), ultraviolet (UV), and Light Detection and Ranging (LiDAR) technology can identify potential hot spots, partial discharge, or compromised clearance of energized equipment respectively, which can be indicative of loose connections or encroachment threat, potential future failure, and potential elevated wildfire risk. Therefore, PacifiCorp's improvements to inspection and correction programs included piloting new technology to diagnose additional potential threats. PacifiCorp initiated these pilot programs in 2019 which are further discussed in Section 5.3.4.4, Section 5.3.4.5, Section 5.3.4.7, and Section 5.3.4.8.

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5.3.4.1 Detailed inspections of distribution electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	Detailed inspections of distribution electric lines and equipment
Description	PacifiCorp's detailed inspection program includes a careful visual inspections accomplished by visiting each structure, as well as inspecting spans between structures, which is intended to identify 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 which need to be corrected in order to maintain reliable and safe service. Detailed inspections are performed consistent with General Order 165 and California General Order 95 requirements regarding frequency and correction timeframe.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented (Existing Program)
Rationale for Program	Compliance with California General Order 165 & General Order 95
Prioritization Approach	No specific prioritization within the program outside of adherence to California General Order 165 & General Order 95 that requires inspection frequency cycle reduction and condition correction acceleration for Tier 2 and Tier 3 locations.
Plan for audits/quality checks	See Section 5.3.4.14
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of Conditions and reduction in ignition probability drivers such as fault events associated with equipment failure or mis-operation.

Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. Currently, PacifiCorp's detailed inspection program already incorporates reduced frequency of inspection and accelerated timeframe for correction per D.18-05-042.
	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. Pending the results of the enhanced inspection pilot projects (included in Section 5.3.4.4, Section 5.3.4.5, Section 5.3.4.5, Section 5.3.4.7, and Section 5.3.4.8), PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection programs or specifically to the company's detailed inspection of distribution lines. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's detailed inspection program evolution but the company anticipated that it would be within the next three years.
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

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5.3.4.2 Detailed inspections of transmission electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	Detailed inspections of transmission electric lines and equipment
Description	PacifiCorp's detailed inspection program includes a careful visual inspections accomplished by visiting each structure, as well as inspecting spans between structures, which is intended to identify 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 which need to be corrected in order to maintain reliable and safe service. Detailed inspections are performed consistent with General Order 165 and California General Order 95 requirements regarding frequency and correction timeframe.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Compliance with General Order 165
Prioritization Approach	No specific prioritization within the program outside of adherence to California General Order 165 & General Order 95 that requires inspection frequency reduction and condition correction acceleration for Tier 2 and Tier 3 locations
Plan for audits/quality checks	See Section 5.3.4.14
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of Conditions and reduction in ignition probability drivers such as fault events associated with equipment failure or mis-operation.

Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. Currently, PacifiCorp's detailed inspection program already incorporates reduced frequency of inspection and accelerated timeframe for correction per D.18-05-042.
	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. Pending the results of the enhanced inspection pilot projects (included in Section 5.3.4.4, Section 5.3.4.5, Section 5.3.4.5, Section 5.3.4.7, and Section 5.3.4.8), PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection programs or specifically to the company's detailed inspection of transmission lines. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's detailed inspection program evolution but the company anticipated that it would be within the next three years.
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

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5.3.4.3 Improvement of inspections

Program Name	Asset management and inspections
Initiative Name	Improvement of inspections
Description	While PacifiCorp's traditional inspection and correction programs are effective at maintaining regulatory compliance and managing routine operational risk. They also mitigate wildfire risk by identifying and correcting Conditions which, if uncorrected, could ignite a fire. Nonetheless, recognizing the growing risk of wildfire, PacifiCorp designed and incorporated additional elements to supplement the company's standard inspection and correction programs mitigate the growing wildfire specific operational risks and create greater resiliency against wildfires beginning in 2018 with full implementation in 2019. There are four primary elements to this proposal: (1) creating a fire risk Condition Code; (2) increasing inspection frequencies in Fire High Consequence Areas; (3) narrowing Correction timeframes for Fire Risk Conditions; and (4) piloting new technologies to facilitate Enhanced Visual Inspections. General discussion of these elements is included on page 175 under the Wildfire Mitigation Inspection and Correction Program Enhancements subsection. PacifiCorp's asset management and inspections wildfire mitigation program focused on improvement of inspections generally includes items (1) through (3). Other details regarding piloting of new technologies are included in Sections 5.3.4.4, Section 5.3.4.5, Section 5.3.4.7, and Section 5.3.4.8.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	California General Order 165 and California General Order 95
Prioritization Approach	No specific prioritization within the program outside of adherence to California General Order 165 & General Order 95 that requires inspection frequency reduction and condition correction acceleration for Tier 2 and Tier 3 locations

Plan for audits/quality checks		See Section 5.3.4.14
Planned demonstration of effectiveness over time		Demonstrated effectiveness includes the identification of Conditions and reduction in ignition probability drivers such as fault events associated with equipment failure or mis-operation. While new technologies are discusses in Section 5.3.4.4, Section 5.3.4.5, Section 5.3.4.7, and Section 5.3.4.8, effectiveness of improved inspections as they pertain to the use of new technology include the identification of Conditions not traditionally identified through visual inspection programs.
Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. This same approach applies to the improvement of inspection.
	Before the upcoming wildfire season	No expected/planned evolution at this time.
	Before the next annual update	No expected/planned evolution at this time.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. Pending the results of the enhanced inspection pilot projects, PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection program or to specific elements. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's inspection program evolution but the company anticipated that it would be within the next three years
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

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5.3.4.4 Infrared inspections of distribution electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	Infrared inspections of distribution electric lines and equipment
Description	At this time, PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on the infrared inspections of distribution electric lines and equipment. As a part of the company's 2019 wildfire mitigation efforts, the use of infrared technology was applied to transmission lines which is further discussed in Section 5.3.4.5. Depending on the results of this pilot project, PacifiCorp may pursue an extension of this pilot project to include distribution lines. However, the collection methodology and quality of inspection difficulties will need to be evaluated as PacifiCorp's distribution lines tend to be located in areas with a tree canopy, making efficient collection of valuable IR data challenging.

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5.3.4.5 Infrared inspections of transmission electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	Infrared inspections of transmission electric lines and equipment
Description	As included in the company's 2019 California WMP, PacifiCorp proposed implementing new enhanced transmission line inspections with a focus on proactive identification of equipment failure. When developed, and included in the 2019 WMP, these inspections were thought to be an annual inspection performed via either helicopter or UAS technology. PacifiCorp also noted in the Company's 2019 WMP that the frequency of proposed programs/inspections reflected PacifiCorp's reasonable best estimate based on available knowledge and prudent utility practices and that PacifiCorp anticipated using data collected during these new inspections to further inform required frequency and anticipates changing the frequency at a future date to better reflect a risk-based approach. Therefore, PacifiCorp implemented a pilot project in 2019 to further evaluate and inform an infrared inspection program. To accomplish this, PacifiCorp performed enhanced inspections on company owned overhead transmission lines in California using alternative technologies to identify hot spots, potential substandard connections or significant insulative degradation not typically detectable through visual inspection. Helicopter services were utilized to collect Infrared (IR) and Ultraviolet (UV or Corona) data for all connections and energized equipment. The data was analyzed and a corrective action timeline was assigned based on the severity level for each detected abnormality. To supplement the data collection in California and provide a wider range of results, PacifiCorp also inspected a subset of its Oregon service territory, adding approximately 422 line miles, or 50%, to any statistical analysis to provide a broader data set for evaluation. As IR inspections measure heat and look for anomalies, the effectiveness of IR inspections can depend on the loading on the particular line or piece of equipment being inspected. Therefore two rounds of inspections where performed, under normal loading conditions and under peak loading conditions. To accomplish this, data capture was performed first on all lines in June of 2019 during normal loading conditions. Subsequently, the transmission lines were then categorized into either Summer peaking or Winter peaking and scheduled for an appropriate second set of inspections which was either completed in July of 2019 or January of 2020. All Conditions detected during these inspections have either been corrected or are scheduled for correction depending on severity of the condition detected and when outages of the transmission lines could be scheduled.

Results

No actionable conditions were found with the collected UV data. One (1) abnormal heating Conditions was detected using IR data with a severity rating of medium, reflecting a frequency of 1 finding per 1,474 line-miles inspected total, or $236,900 per condition detected effective cost. Based on the CA scope alone, the frequency of findings was 1 per 1,474 line miles inspected or $236,900 per Condition.

The following table includes the scope of work completed during the IR and UV pilot project in California. The winter peak loading flights were scheduled and completed at the time this document was prepared but only preliminary results were available.

Targeted Inspection	Inspection Description	Inspection Window	Days	Line-Miles	Cost	# of Findings	$/findings	Finding/ Line Mile
Pre-Fire Season	UV and IR inspections are completed in targeted high-risk areas in California before fire risk elevates further during fire season	June 11-18, 2019	8 days	737	$98,800	0	N/A – No findings	N/A – No findings
Summer Peak Loading	To detect abnormal system conditions that would not be evident during low loading periods, previously flown lines that peak in summer are re-inspected during this period	July 15-24, 2019	10 days	505	$94,000	1	$94,000/ finding	1 finding per 505 line-miles
Winter Peak Loading[41]	To detect abnormal system conditions that would not be evident during low loading periods, previously flown lines that peak in winter are to be re-inspected during this period	January 13-19, 2020	7 days	232	$44,100	0	N/A – No findings	N/A – No findings
Total	All inspections combined		25 days	1,474	$236,900	1	$236,900/ finding	1 finding per 1,474 line-miles

Preliminary Conclusions

[41] Winter Peak Loading inspection summary includes preliminary results and planned values. At this time this document was completed, the formal report had not yet been compiled for incorporation into PacifiCorp's 2020 WMP.

	Preliminary results indicate that IR technology may a reliable method to detect abnormal heating conditions and potentially identify Conditions not normally found during a visual inspection. While more expensive and challenging to coordinate on a line-miles basis, preliminary results also indicate IR inspections may be more valuable when performed on equipment or lines at peak loading conditions rather than at normal loading conditions based on the identification of more conditions during the pilot project when inspections were perfumed at peak loading conditions. However, elevated heating can still be detected at normal loading conditions. While UV inspections are also a proven method of finding abnormal and potentially hazardous conditions that are not detectable during visual inspections, preliminary results did not prove the combination of UV and IR inspections to be optimal because the best time to conduct IR inspections (peak load) does not correspond to the best time to conduct UV inspections (early morning / late evening). Because of this, PacifiCorp plans to remove the UV component of the IR inspection pilot project moving forward.
Timeline to Minimize Risk [Planned/ Implemented]	Partial Implementation Further evaluation required
Rationale for Program	The use of infrared (IR) and ultraviolet (UV) technology can identify potential hot spots and partial discharge on energized equipment, which can be indicative of loose connections and potential future failure and pose a wildfire risk. Therefore, PacifiCorp developed and implemented a pilot project to included Enhanced Visual Inspection on overhead transmission lines within the all of California to include the capture of IR and UV data.
Prioritization Approach	High priority given based on availability of contracted resources. This task generally does not compete with other programs for resources other than funding. No specific prioritization within the program itself due to the benefit of a large data set to support analysis of results and the financial benefit of packaging the total work together.
Plan for audits/quality checks	See Section 5.3.4.14

Planned demonstration of effectiveness over time		Identification of Conditions not traditionally identified through visual inspections.
Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. Currently, PacifiCorp's detailed inspection program incorporates reduced frequency of inspection and accelerated timeframe for correction per D.18-05-042.
	Before the upcoming wildfire season	PacifiCorp intends to complete the full scope of its pilot project as described above and analyze results.
	Before the next annual update	PacifiCorp plans to evaluate the full results from the company's initial pilot project, potentially remove the UV component of the IR inspection pilot project on any subsequent flights or inspection, and schedule implement any subsequent flights to support data collection, condition identification, and wildfire risk mitigation. PacifiCorp anticipates that the IR pilot project may inform or evolve into a more formal or routine program before the next annual update in 2021.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. Pending the results of the enhanced inspection pilot projects, PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection programs or specifically to the company's IR inspection of transmission lines. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's detailed inspection program evolution but the company anticipated that it would be within the next three years.
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

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5.3.4.6 Intrusive pole inspections

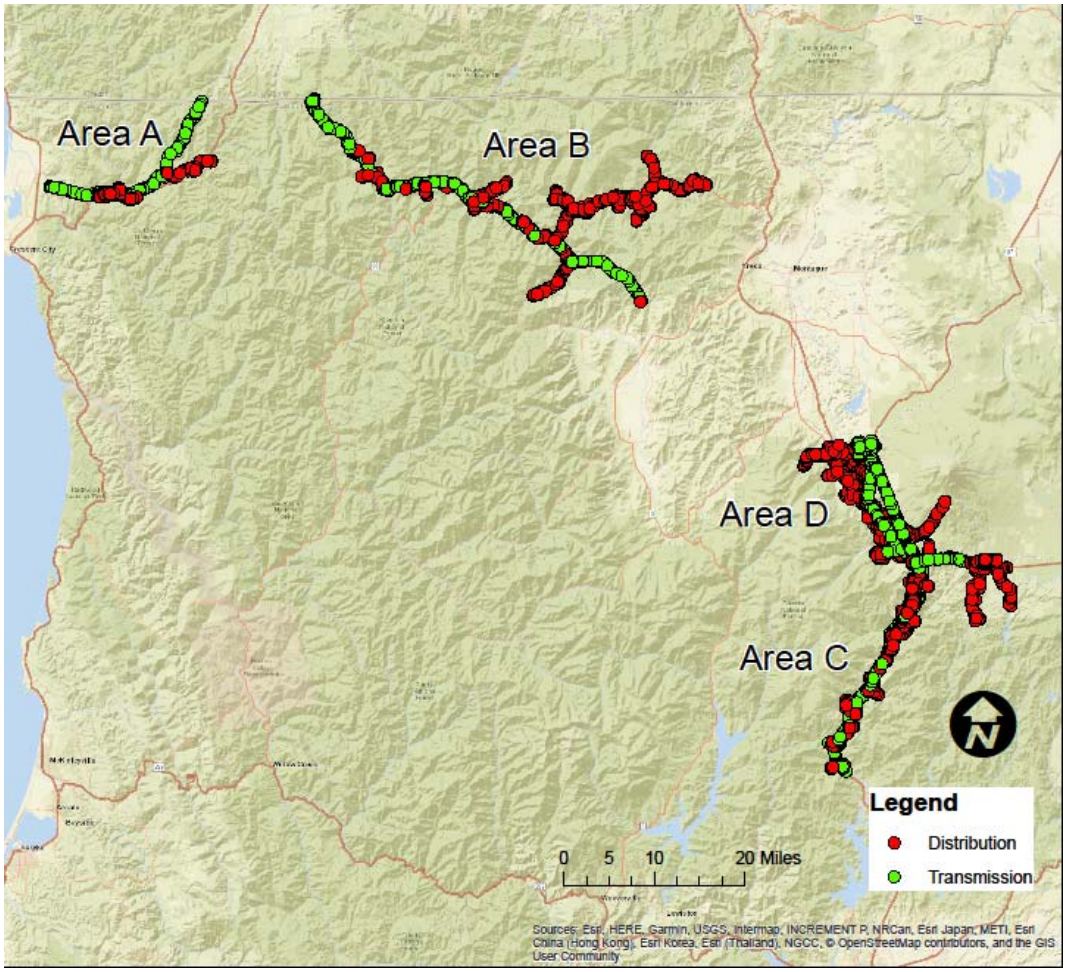
Program Name	Asset management and inspections
Initiative Name	Intrusive pole inspections
Description	PacifiCorp's Pole Test and Treat program was described in Section 5.3.4 under the Utilities protocols relating to maintenance or any electric lines that could directly, or indirectly relate to wildfire ignition subsection. Components of this intrusive testing program can include excavation, pole sounding, pole boring, strength testing, and treatment depending on the material and specifications of in the installation. These tests are performed on a frequency consistent with CA state requirements and general utility best practices.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Compliance with General Order 165
Prioritization Approach	Highly prioritized to meet CA General Order compliance requirements
Plan for audits/quality checks	See Section 5.3.4.14
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of poles needing proactive replacement as identified through this testing that was not identified through visual inspection.

Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe, including intrusive pole inspections. However, as PacifiCorp is early in its implementation of its's multi-year WMP, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's intrusive pole inspection program evolution.
	Before the upcoming wildfire season	No planned evolution at this time
	Before the next annual update	No planned evolution at this time
	Within the next 3 years	No planned evolution at this time
	Within the next 10 years	No planned evolution at this time

5.3.4.7 LiDAR inspections of distribution electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	LiDAR inspections of distribution electric lines and equipment
Description	PacifiCorp performed LiDAR (Light Detection and Ranging) data collection, analysis, and system modeling on the PacifiCorp network in four select areas of Northern California consisting of 924 line-miles and 12,803 structures. Assets inspected include both transmission and distribution in rural and suburban environments. Contractor services were utilized for data collection via fixed wing aircraft, data processing, and system modeling. PacifiCorp intends to use system models to identify any imminent threats, assess current status and risk, map vegetation densities, and inform future vegetation clearing cycles. While the specific elements or results of this program have yet to be determined, PacifiCorp anticipates that this work to inform, identify, and quantify items such as current vegetation clearances, potential encroachments, asset status/condition, other hazards such as leaning poles or threat trees, dead/dying trees, and density per circuit/line. Utilizing these models to inform and respond to immediate vegetation hazards and further inform clearing cycles may aid in preventing faults, nuisance trips, and downed lines related to tree strikes, falling branches, and other vegetation encroachments. Refer to the below chart and map for details on the assets and geographic areas where this pilot program is being implemented:

Area of Interest	Description	Total OH Line-Miles	Distribution		Transmission	
			Line-Miles	Voltage(s)	Line-Miles	Voltage(s)
A	NW CA Del Norte Substation to Oregon State Line	132	18	12.47 kV	114	115kV
B	Klamath National Forrest Line 33 - Oregon State Line to Junction	174	104	4.16 kV, 12.47 kV	70	69kV
C	North Central CA Line 2 - Shasta to South End	266	99	2.4kV, 4.16kV, 12.47kV, 20.8kV	167	69kV, 115kV
D	Shasta to Weed	352	155	2.4kV, 4.16kV, 12.47kV, 20.8kV	197	69kV, 115kV
TOTAL	***A, B, C, D***	***924***	***376***	***2.4kV, 4.16kV, 12.47kV, 20.8kV***	***548***	***69kV, 115kV***

	
Timeline to Minimize Risk [Planned/ Implemented]	Partial implementation that requires further evaluation

Rationale for Program		LiDAR data collection allows for highly accurate 3D modeling of assets and any objects within a range of those assets. This model can be used to calculate pole lean, identify potential compromised clearance or encroachments, evaluate threats and verify exact locations of assets. The identification of these hazards can help prevent fault scenarios and reduce ignition risk. However, full deployment and application remains unclear. Therefore, PacifiCorp developed and implemented a pilot project to scan and model a select subset of assets using LiDAR technology.
Prioritization Approach		High priority given based on availability of contracted resources. This task generally does not compete with other programs for resources other than funding. However, prioritization was performed when determining the scope of the pilot project. As opposed to performing a LiDAR inspection and assessment of all of PacifiCorp' service territory, PacifiCorp prioritized 4 specific areas of interest to reflect the range of installations, environmental conditions, topography, topology and wildfire risks that might exist throughout the company's CA service territory.
Plan for audits/quality checks		See Section 5.3.4.14
Planned demonstration of effectiveness over time		Effectiveness of the LiDAR inspections of transmission electric lines and equipment are recommended corrective or proactive work not typically identified through traditional visual inspections or processes included in Sections 5.3.4 and 5.3.5. Additional areas that may demonstrate effectiveness is overall condition assessment, risk assessment, and more informed planning of future pilot projects or enhanced inspections.
Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution.
	Before the upcoming wildfire season	PacifiCorp intends to complete the full scope of its pilot project as described above and analyze results.
	Before the next annual update	PacifiCorp plans to evaluate the full results from the company's initial pilot project and schedule implement any subsequent inspections to support data collection, condition identification, and wildfire risk mitigation. PacifiCorp

		anticipates that the LiDAR pilot project may either inform new programs and evolve into a more formal or routine program before the next annual update in 2021 depending on the results and effectiveness of the pilot.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. Pending the results of the enhanced inspection pilot projects, PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection programs or specifically to the company's LiDAR inspection of transmission lines. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's detailed inspection or vegetation inspection program evolution but the company anticipated that it would be within the next three years.
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

5.3.4.8 LiDAR inspections of transmission electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	LiDAR inspections of transmission electric lines and equipment
Description	PacifiCorp's Transmission LiDAR inspection initiative summary is included in the previous section which describes the distribution and transmission LiDAR inspections of distribution electric lines and equipment. As the collection and analysis of this data was viewed as a system wide activity and model, a separate program was not designed or implemented. However, LiDAR inspections were performed on a subset of PacifiCorp's transmission lines in CA. See Section 5.3.4.7 for more details.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented – Not yet complete (See Section 5.3.4.7)

5.3.4.9 Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations

Program Name	Asset management and inspections
Initiative Name	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations
Description	At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionally inspection of distribution lines not included in other programs.

5.3.4.10 Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandates by rules and regulations

Program Name	Asset management and inspections
Initiative Name	Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandates by rules and regulations
Description	At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionally inspection of transmission lines not included in other programs.

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5.3.4.11 Patrol inspections of distribution electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	Patrol inspections of distribution electric lines and equipment
Description	PacifiCorp's patrol inspection program includes a brief visual inspection performed by viewing each facility from a vantage point allowing reasonable viewing access, which is intended to identify damage or defects to the transmission and 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 Patrol inspections are performed consistent with General Order 165 and California General Order 95 requirements regarding frequency and correction timeframe.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Compliance with California General Order 165 & General Order 95
Prioritization Approach	No specific prioritization within the program outside of adherence to California General Order 165 & General Order 95 that requires inspection frequency reduction and condition correction acceleration for Tier 2 and Tier 3 locations
Plan for audits/quality checks	See Section 5.3.4.14
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of Conditions and reduction in ignition probability drivers such as fault events associated with equipment failure or mis-operation.

Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. Currently, PacifiCorp's patrol inspection program already incorporates reduced frequency of inspection and accelerated timeframe for correction per D.18-05-042.
	Before the upcoming wildfire season	No planned evolution at this time
	Before the next annual update	No planned evolution at this time
	Within the next 3 years	Pending the results of the enhanced inspection pilot projects, PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection program or specifically to the company's patrol inspection of distribution lines. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's detailed inspection program evolution but the company anticipated that it would be within the next three years.
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

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5.3.4.12 Patrol inspections of transmission electric lines and equipment

Program Name	Asset management and inspections
Initiative Name	Patrol inspections of transmission electric lines and equipment
Description	PacifiCorp's patrol inspection program includes a brief visual inspection performed by viewing each facility from a vantage point allowing reasonable viewing access, which is intended to identify damage or defects to the transmission and 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 Patrol inspections are performed consistent with General Order 165 and California General Order 95 requirements regarding frequency and correction timeframe.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Compliance with California General Order 165 & General Order 95
Prioritization Approach	No specific prioritization within the program outside of adherence to California General Order 165 & General Order 95 that requires inspection frequency reduction and condition correction acceleration for Tier 2 and Tier 3 locations
Plan for audits/quality checks	See Section 5.3.4.14
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of Conditions and reduction in ignition probability drivers such as fault events associated with equipment failure or mis-operation.

Planned Evolution	General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. Currently, PacifiCorp's patrol inspection program already incorporates reduced frequency of inspection and accelerated timeframe for correction per D.18-05-042.
	Before the upcoming wildfire season	No planned evolution at this time
	Before the next annual update	No planned evolution at this time
	Within the next 3 years	Pending the results of the enhanced inspection pilot projects, PacifiCorp anticipates that either additional scope may be added to the entirety of its inspection program or specifically to the company's patrol inspections of transmission lines. As the pilot projects are in early stages of development and implementation, it is challenging to know specifically how and when the results of these programs may impact PacifiCorp's detailed inspection program evolution but the company anticipated that it would be within the next three years.
	Within the next 10 years	Continued evolution based on use of new technology for advanced detection.

5.3.4.13 Pole loading assessment program to determine safety factor

Program Name	Asset management and inspections
Initiative Name	Pole loading assessment program to determine safety factor
Description	Pole loading to accommodate safety factors and necessary specifications are included in PacifiCorp's engineering and construction standards. At this time, PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on pole loading assessment to determine safety factor of in-service assets. Specific pole loading assessment of in-service assets was included as a subset to the methodology of PacifiCorp's pole replacement programs included in Section 5.3.3.6. Where appropriate, pole loading assessment of new construction has also been incorporated into the new standards developed included in Section 5.3.3.6.

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5.3.4.14 Quality assurance/ quality control of inspections

Program Name	Asset management and inspections
Initiative Name	Quality assurance/ quality control of inspections
Description	PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on quality assurance/quality control of inspections. Instead, PacifiCorp leverages the company's standard quality assurance / quality control programs targeted at the complete portfolio of inspections, to include those performed within Tier 2 and Tier 3. The company's standard quality assurance / quality control programs includes physical audits of annual random selection of inspected facilities and quarterly review of condition records by a centralized team for quality and adherence to policies and procedures.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	The quality and completeness of inspections directly impacts PacifiCorp's ability to detect and mitigate potential wildfire risk. PacifiCorp's quality assurance and quality control of inspections programs are designed to monitor both the quality of the inspection itself as well as the records associated with findings with the intent to continuously learn and improve both the knowledge base of inspectors and data quality of records.
Prioritization Approach	No prioritization applied to this program.
Plan for audits/quality checks	No audits/quality checks are appropriate for a quality check program.
Planned demonstration of effectiveness over time	Reduction in audit findings identified and data quality errors detected over time will demonstrate effectiveness of this program.

Planned Evolution	General	While PacifiCorp's current quality assurance / quality control processes have been historically accurate, the company recognizes that program evolution will be critical as PacifiCorp introduces new programs or amends existing programs, especially those pertaining to wildfire mitigation. As PacifiCorp is early in its WMP implementation, it is challenging to know exactly how and when the evolution of quality assurance / quality control programs will be necessary, but, PacifiCorp anticipates that these programs will evolve in some way.
	Before the upcoming wildfire season	Not planned at this time.
	Before the next annual update	Not planned at this time.
	Within the next 3 years	PacifiCorp anticipates that the scope of this program may grow and frequency of review may change at this time.
	Within the next 10 years	PacifiCorp anticipates that the scope of this program may grow and frequency of review may change at this time.

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5.3.4.15 Substation inspections

Program Name	Asset management and inspections
Initiative Name	Substation inspections
Description	PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on substation inspection and, instead, considers its standard substation inspection program to include inspections of substations within the HFTD to mitigate wildfire risk. As a part of this program, qualified personnel inspects PacifiCorp's substations in California on a monthly basis which includes the assessment of physical safety, security, and performance of substation components, including fencing, grounding, and major equipment, as well as the performance of minor housekeep tasks to ensure safe and reliable service.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Compliance with General Order 174
Prioritization Approach	No specific prioritization within the program outside of adherence to California General Order 174
Plan for audits/quality checks	See Section 5.3.4.14
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of corrective work and reduction in ignition probability drivers such as fault events associated with substation equipment failure.

Planned Evolution	General	No planned evolution at this time
	Before the upcoming wildfire season	No planned evolution at this time
	Before the next annual update	No planned evolution at this time
	Within the next 3 years	No planned evolution at this time
	Within the next 10 years	No planned evolution at this time

5.3.4.16 Other / not listed [only if an initiative cannot feasibly be classified within those listed above]

Program Name	Asset management and inspections
Initiative Name	Other / not listed [only if an initiative cannot feasibly be classified within those listed above]
Description	PacifiCorp does not, at this time, have any other asset management and inspections wildfire mitigation programs.

The following table summarizes all elements of PacifiCorp's asset management and inspections wildfire mitigation programs. The 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 24: Asset management and inspections

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with [illegible]	Cite associated rule	Comments
1. Detailed inspections of distribution electric lines and equipment	2019 plan	474	$382	All types of equipment failure; Contact from object	N/A	N/A	N/A	Existing	CA GO 95 & 165	N/A	In Compliance with Regulation	CA GO 95 & 165	Program incorporated new requirements in 2019
	2019 actual	473	$383										
	2020	605	$425										
	2021	486	$529										
	2022	480	$535										
	2020-2022 plan total	1,571	$491										
2. Detailed inspections of transmission electric lines and equipment	2019 plan	62	$516	All types of equipment failure; Contact from object	N/A	N/A	N/A	Existing	CA GO 95 & 165	N/A	In Compliance with Regulation	CA GO 95 & 165	Program incorporated new requirements in 2019
	2019 actual	62	$516										
	2020	122	$484										
	2021	236	$250										
	2022	268	$250										
	2020-2022 plan total	626	$283										
3. Improvements of inspections	2019 plan	N/A - Elements already captured in other relevant programs	N/A - Elements already captured in other relevant programs	All types of equipment failure; Contact from object	N/A	N/A	N/A	New in 2019	CA GO 95 & 165	N/A	In Compliance with Regulation	CA GO 95 & 165	Program improvements already captured in other relevant programs
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with [illegible]	Cite associated rule	Comments
4. Infrared inspections of distribution electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on the infrared inspections of distribution electric lines and equipment. As a part of the company's 2019 wildfire mitigation efforts, the use of infrared technology was applied to transmission lines which is further discussed in Section 5.3.4.5. Depending on the results of this pilot project, PacifiCorp may pursue an extension of this pilot project to include distribution lines. However, the collection methodology and quality of inspection difficulties will need to be evaluated as PacifiCorp's distribution lines tend to be located in areas with a tree canopy, making efficient collection of valuable IR data challenging.											
5. Infrared inspections of transmission electric lines and equipment	2019 plan	784	$153	All types of equipment failure; Contact from object	N/A	N/A	N/A	New in 2019 (Pilot)	N/A	2019 WMP Memorandum Account	Exceeding Regulations	CA GO 95 & 165	New pilot program planning to evolve; No clear values beyond 2020 yet
	2019 actual	1,246	$155										
	2020	232	$190										
	2021	TBD	TBD										
	2022	TBD	TBD										
	2020-2022 plan total	TBD	TBD										
6. Intrusive pole inspections	2019 plan	92	$880	All types of equipment failure;	N/A	N/A	N/A	Existing	CA GO 165	N/A	In Compliance with Regulation	CA GO 95 & 165	Existing historic compliance based program
	2019 actual	92	$880										
	2020	150	$1,484										
	2021	226	$987										
	2022	230	$970										
	2020-2022 plan total	606	$1,104										
7. LiDAR inspections of distribution electric lines and equipment	2019 plan	250	$520	All types of equipment failure; Contact from object	N/A	N/A	N/A	New in 2019 (Pilot)	2019 CA WMP	2019 WMP Memorandum Account	Exceeding Regulations	CA GO 95 & 165	New pilot program planning to evolve; No clear values beyond 2020
	2019 actual	376	$491										
	2020	TBD	TBD										
	2021	TBD	TBD										
	2022	TBD	TBD										
	2020-2022 plan total	TBD	TBD										
8. LiDAR inspections of transmission electric lines and equipment	2019 plan	0	0	All types of equipment failure; Contact from object	N/A	N/A	N/A	New in 2019 (Pilot)	2019 CA WMP	2019 WMP Memorandum Account	Exceeding Regulations	CA GO 95 & 165	New pilot program planning to evolve; No clear values beyond 2020
	2019 actual	548	$491										
	2020	TBD	TBD										
	2021	TBD	TBD										
	2022	TBD	TBD										
	2020-2022 plan total	TBD	TBD										

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with [illegible]	Cite associated rule	Comments
9. Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionally inspection of distribution lines not included in other programs.											
10. Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionally inspection of transmission lines not included in other programs.											
11. Patrol inspections of distribution electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	2,002 2,002 1,941 2018 1941 5,900	$161 $161 $135 $130 $135 $133	All types of equipment failure; Contact from object	N/A	N/A	N/A	Existing	CA GO 165	N/A	In Compliance with Regulation	CA GO 95 & 165	Program incorporated new requirements in 2019;
12. Patrol inspections of transmission electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	718 718 657 767 767 2,191	$273 $273 $298 $256 $256 $268	All types of equipment failure; Contact from object	N/A	N/A	N/A	Existing	CA GO 165	N/A	In Compliance with Regulation	CA GO 95 & 165	Program incorporated new requirements in 2019
13. Pole loading assessment program to determine safety factor	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	Pole loading to accommodate safety factors and necessary specifications are included in PacifiCorp's engineering and construction standards. At this time, PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on pole loading assessment to determine safety factor of in-service assets. Specific pole loading assessment of in-service assets was included as a subset to the methodology of PacifiCorp's pole replacement programs included in Section 5.3.3.6. Where appropriate, pole loading assessment of new construction has also been incorporated into the new standards developed included in Section 5.3.3.6.											

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with	Cite associated rule	Comments
14. Quality assurance/ quality control of inspections	2019 plan	N/A - Elements already captured in other relevant programs	N/A - Elements already captured in other relevant programs	All	N/A	N/A	N/A	Existing	N/A	N/A	N/A	N/A	General program and best practices applied to an accounted for in other relevant programs
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
15. Substation inspections	2019 plan	444	$405	All types of equipment failure; Contact from object	N/A	N/A	N/A	Existing	CA GO 174	N/A	In Compliance with Regulation	CA GO 174	Values reported indicate number of substation inspections completed or planned and $/inspection
	2019 actual	439	$394										
	2020	444	$400										
	2021	444	$400										
	2022	444	$400										
	2020-2022 plan total	1,332	$400										
16.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan	PacifiCorp does not, at this time, have any other asset management and inspections wildfire mitigation programs.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

5.3.5 Vegetation management and inspections

PacifiCorp's vegetation management program is designed to address the risks that trees growing into or near power lines can create safety and service reliability risks. The overall objective is to minimize vegetation related faults, including any faults which 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 PacifiCorp's Transmission & Distribution Vegetation Management Program Standard Operating Procedures (Standard Operating Procedures).

PacifiCorp's existing Vegetation Management Program is consistent with GO 95, Rule 35 (as recently amended) and is generally described below. To supplement existing programs, Table 25 includes a summary of PacifiCorp's California vegetation management fire risk mitigation plan, reflecting new programs which exceed current regulatory requirements. Additional detailed information for each program has been included in the following subsections.

Existing Tactics and Strategies

Fully described in PacifiCorp's Standard Operating Procedures, the core of vegetation management efforts are directed to two primary areas. Like other utilities, PacifiCorp prunes vegetation to maintain a safe distance between tree limbs and power lines; PacifiCorp also identifies and removes hazard trees. Like other utilities, PacifiCorp contracts with vegetation management service providers to perform pruning and tree removal work.

Maintaining safe clearances is the starting point of any utility vegetation management plan, including PacifiCorp's. From an overall perspective, it is important to note that there is a distinct set of procedures for vegetation management work on distribution circuits and another set of procedures for vegetation management work on transmission lines.

Vegetation management of distribution circuits centers on cycle work. In areas without an elevated risk, regular vegetation management work on any particular circuit is done 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, however, regular vegetation management work is done annually, consistent with current regulations.

Vegetation management on transmission lines focus on maintaining extended clearances and employing practices to prevent any future vegetation growth disrupting clearances. Because of the nature of transmission lines, wider rights-of-way allow PacifiCorp to generally maintain clearances well in excess of the Minimum Vegetation Clearance Distance (MVCD) required in Table 2 of FAC-003-04.[42] Accordingly, rather than scheduling vegetation management work for transmission lines on a fixed cycle timeframe, such work is scheduled on an as-needed basis, dependent on the results of regular inspections and specific local conditions. In addition, PacifiCorp vegetation management endorses IVM as industry best practice.

IVM essentially tries to prevent any clearance issue from ever emerging, by managing the species of trees (and other vegetation) growing in the right-of-way. Under such an approach, tall growing trees are removed long before there is any issue with clearance requirements.

In addition to clearance work, removal of hazard trees is a key overall strategy for both distribution and transmission vegetation management. This strategy is discussed in greater detail, in subsection implemented tactics and strategies below.

There are other notable "tactics" specifically geared towards mitigating the wildfire risk. Consistent with PRC § 4292 and 4293, PacifiCorp requires a ten foot cylinder of clear space from pole top to bare ground around "subject" poles in state regulated areas. When appropriate, bare-ground herbicide treatments are used to keep the ten 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.

Many other strategies and tactics described in the Standard Operating Procedures support (even if only indirectly) the overall objective of reducing vegetation related faults. Any fault occurring in the HFTD is considered a wildfire ignition risk. Consequently, all such strategies and tactics are incorporated as part of PacifiCorp's 2020 WMP. For example, the Standard Operating Procedures includes strategies and tactics for obtaining property owner approval for tree removals, thereby supporting the overall strategy of removing hazard trees.

Very generally, all of the tactics and strategies in the Standard Operating Procedures are "existing" practices. The current form of the Standard Operating Procedures was first published in 2008, and periodic updates to content have been made. The most current version is Revision 07, dated August 19, 2019.

Implemented 2019 Tactics and Strategies

PacifiCorp has implemented other new elements to its vegetation management program. Along these lines, PacifiCorp performed specific wildfire mitigation projects in 2018 and 2019. Applying this experience, PacifiCorp has implemented new vegetation management processes to mitigate wildfire risk. PacifiCorp vegetation management will complete annual vegetation inspections on all lines in the HFTD. Correction work will be completed based on those inspection results. This is a change from previous practices because additional inspection and correction work is being done on lines which would otherwise not have been scheduled for inspection and work under the previous schedule for regular cycle maintenance work on distribution lines. Correction work will also target reduction of overhang, prompt removal of hazard trees, and more aggressive removal of higher risk trees.

Collaboration with Local Land Managers

PacifiCorp routinely collaborates with local land managers in obtaining permits, scheduling work, and addressing particular issues as they arise during the course of work. 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 some agencies to enhance communication on

authorization permits and upcoming vegetation management work on federal properties.

From a larger perspective, PacifiCorp has worked with and made joint efforts with the Edison Electric Institute and other utilities to collaborate with federal agencies to expedite approvals for vegetation management work on transmission and distribution facilities. PacifiCorp representatives participated in the drafting of an agreement specifically aimed at building collaboration between the federal agencies and the utilities on these issues. As a result, the Memorandum of Understanding on Vegetation Management for Powerline Rights-of-Way, dated September 29, 2016, was signed by the Edison Electric Institute, Utility Arborist Association, the National Park Service, United States Fish and Wildlife Service, Bureau of Land Management (BLM), United States Forest Service, and the United States Environmental Protection Service. The purpose of the MOU is to facilitate cooperation and coordination among the parties regarding vegetation management within and immediately adjacent to existing and future powerline right of ways and associated facilities. The MOU facilitates "implementation of cost effective and environmentally sound vegetation management plans, procedures, and practices for powerline ROWs that will reduce adverse environmental and cultural impacts while enhancing the ability of utilities to provide uninterrupted electrical service to customers and address public safety." (MOU at 4.)

These efforts culminated in the recent 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. The new law, codified at 43 U.S.C.A. § 1772, establishes 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. PacifiCorp understands that the BLM and the USFS, the two federals agencies responsible for the lands where PacifiCorp's rights-of-way are located, are engaged in a rulemaking to "develop a consolidated and coordinated process for the review and approval of plans." 43 U.S.C.A. § 1772(c)(4)(A). When those regulations are finalized, PacifiCorp plans to submit a vegetation management plan under 43 U.S.C.A. § 1772(c)(1) to both the BLM and the USFS.

In conformance with 43 U.S.C.A. § 1772, the vegetation management plan may be part of an existing plan, which may be a larger Operations and Maintenance Plan (O&M Plan), as such PacifiCorp has initiated coordination with federal land managing agencies in California, to develop an O&M Plan(s) to 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. The O&M Plan will outline measures to be implemented by PacifiCorp for the protection of sensitive resources based on maintenance activity type, including vegetation management activities. The O&M Plan will also include agreed upon roles and responsibilities of PacifiCorp and the applicable land managing agency to support PacifiCorp's rapid response to correct conditions identified, including vegetation management conditions, in a timely manner. The service area of the O&M Plan may be forest or field office specific or agency specific, which will be determined through further coordination with the land managing agencies. To ensure consistent application of the O&M Plan across a forest, field office, or PacifiCorp's footprint within a land managing agency, PacifiCorp is also coordinating the development of a Master Permit(s), which is a consolidation of existing right-of-way grants or special use permits within a single or multiple field offices or forests, respectively. The Master Permit(s) will include by reference the O&M Plan and ensure consistent application of the O&M Plan across the applicable jurisdictional boundary. Currently, PacifiCorp is coordinating this effort with the Klamath National Forest and has approached the topic with other

forests within Northern California. PacifiCorp anticipates completion of an O&M Plan with the Klamath National Forest by end of year, 2020.

The following subsections include detailed descriptions regarding PacifiCorp's specific vegetation management and inspections wildfire mitigation programs.

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5.3.5.1 Additional efforts to manage community environmental impacts

Program Name	Vegetation management and inspections
Initiative Name	Additional efforts to manage community environmental impacts
Description	As described above, PacifiCorp collaborates with local emergency responders or state organizations as needed to reduce fuel and facilitate improved escape or evacuation routes. For example, in 2019 Governor Gavin Newsom directed CALFIRE to determine which communities within each county had the greatest wildfire risk. CALFIRE determined the Lake Shastina area as one of the high priority project areas. As a result, PacifiCorp partnered with CALFIRE in Big Springs, California on the Lake Shastina Fuels Reduction Project to improve escape routes for residents and access for emergency responders. This project involved clearing 100 feet on each side of road of State Highway 97, Big Springs Road and 2 miles west on Jackson Rach Road. Any utility distribution or transmission facilities that fell within the 100' clearing were also targeted for tree removal in associated rights of ways. Trees and vegetation that had potential to grow into facilities (non-compatible vegetation) and brush were removed in a distribution utility corridor and 2 transmission corridors that fell within the footprint of the CALFIRE fuel reduction project. CALFIRE also removed all brush species, thinned small trees to provide 20-30' spacing and pruned all remain trees 6-8' above ground. While collaboration such as this is critical to the overall reduction of wildfire risk in the state of CA, PacifiCorp, at this time, does not have a specific program dedicated to this effort. Instead, these efforts are on an as-needed basis and incorporate additional efforts to manage community environments within other programs, such as those included in Section 5.3.9 and Section 5.3.10.

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5.3.5.2 Detailed inspections of vegetation around distribution electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	Detailed inspections of vegetation around distribution electric lines and equipment
Description	PacifiCorp regularly inspects its lines and facilities as described in Sections 5.3.4.1. These inspections, include, as a component, the identification of imminent threats, including high risk vegetation. Additionally, PacifiCorp's vegetation management program includes conducting inspections on distribution lines in advance of distribution cycle maintenance work. Accordingly, pre-work inspections are done immediately prior to the cycle work to identify which trees will be worked in the cycle, which would also include correction of any imminent threats or hazards. Beginning in 2019, PacifiCorp implemented an additional vegetation management inspection of all overhead lines in HFTD areas in California. Although conducting annual vegetation inspections exceeds previous levels of inspections to maintain regulatory requirements, PacifiCorp vegetation management believes that this tool is the most effective strategy to identify high risk trees at the earliest stage possible. This strategy facilitates removal of high risk trees before such trees could ever fall into a line and cause a wildfire, consistent with GO95 requirements. Each year, prior to the height of fire season, a vegetation inspection is conducted in the HFTD. Consistent with existing procedures, a Level 1[43] assessment is conducted to identify any trees which may have become high risk trees over the course of the prior year; suspect trees are subjected to a Level 2[44] assessment, as outlined in ANSI A300 (Part 9). In addition, the inspector will identify for pruning or removal vegetation which is likely to violate minimum clearance distances prior to the next annual inspection. In conjunction with such annual inspections, vegetation management annually completes correction work based on the inspection results, including the prompt removal of all high risk trees identified during the annual vegetation inspection.

[43] A Level 1 assessment does not have the same meaning or requirements as a Level 1 condition.
[44] A Level 2 assessment does not carry the same meaning or requirements as a Level 2 condition.

Timeline to Minimize Risk [Planned/ Implemented]		Implemented
Rationale for Program		Trees growing into or near power lines can create safety and service reliability risks. Therefore, PacifiCorp's detailed inspections of vegetation around distribution electric lines and equipment includes focused vegetation inspections within the HFTD to identify both planned cycle work as well as imminent threats with an overall objective is to minimize vegetation related faults, including any faults which could be a source of fire ignition. Additionally, this program facilitates the identification of any vegetation issues that have ignition probability in compliance with GO95.
Prioritization Approach		• Top priority at PacifiCorp to complete inspections per compliance requirements. • New inspection elements focused on HFTD locations.
Plan for audits/quality checks		See Section 5.3.5.13
Planned demonstration of effectiveness over time		Demonstrated effectiveness of this program is the identification of corrective work and reduction in ignition potential through the identification and mitigation of vegetation related conditions.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.
	Before the upcoming wildfire season	No planned evolution
	Before the next annual update	No planned evolution

	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. While PacifiCorp is early in the implementation of its multi-year WMP, PacifiCorp anticipates incorporating changes within the next three years. Additionally, as included in Section 5.3.5.6, PacifiCorp is beginning implementation of an electronic planning and tracking system to include specific GIS locations and detailed descriptions of required work as well as records of completed activities. PacifiCorp anticipates that this planning and tracking system will be fully implemented and incorporated in all facets of the company's vegetation management program within the next three years.
	Within the next 10 years	Continued evolution of planning and tracking systems. Monitor of existing programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.

5.3.5.3 Detailed inspections of vegetation around transmission electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	Detailed inspections of vegetation around transmission electric lines and equipment
Description	PacifiCorp regularly inspects its lines and facilities as described in Section 5.3.4.2. These inspections, include, as a component, the identification of imminent threats, including high risk vegetation. Similar to PacifiCorp's detailed inspections of vegetation around distribution electric lines and equipment, PacifiCorp's detailed inspections of vegetation around transmission electric lines and equipment focus on maintaining clearances, but with transmission, the clearance distances are much greater. Because of the nature of transmission lines, wider rights-of-way generally allow PacifiCorp to maintain clearances well in excess of the required minimum clearances set forth in the "Minimum Vegetation Clearance Distance" (MVCD).[45] Accordingly, rather than scheduling vegetation management work for transmission lines on a fixed cycle timeframe, such work is scheduled on an as-needed basis, depending on the results of regular inspections and specific local conditions. To determine whether work is needed, an "Action Threshold" is applied, meaning that work is done if vegetation has grown within the action threshold distance. Additionally, PacifiCorp employs "Integrated Vegetation Management" (IVM) practices to prevent vegetation growth from ever violating clearances which are further described in Section 5.3.5.20. Beginning in 2019, PacifiCorp implemented an additional vegetation management inspection for all overhead lines in HFTD areas in CA. Although conducting annual vegetation inspections exceeds previous levels of inspections to maintain regulatory requirements, this tool is the most effective strategy to identify high risk trees at the earliest stage possible. This strategy facilitates removal of high risk trees before such trees could ever fall into a line and cause a wildfire, consistent with GO95 requirements. Each year, prior to the height of fire season, a vegetation inspection is conducted in the HFTD. Consistent with existing procedures, a Level 1 assessment is conducted to identify any trees which may have become high risk trees over the course of the prior year; suspect trees are subjected to a Level 2 assessment, as outlined in ANSI A300 (Part 9). In addition, the inspector will identify for pruning or removal vegetation which is likely to violate minimum clearance distances prior to the next annual inspection.

[45] See Table 2 of FAC-003-04, available at https://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-003-4.pdf

		In conjunction with such annual inspections, vegetation management annually completes correction work based on the inspection results, including the prompt removal of all high risk trees identified during the annual vegetation inspection.
Timeline to Minimize Risk [Planned/ Implemented]		Implemented
Rationale for Program		Trees growing into or near power lines can create safety and service reliability risks. Therefore, PacifiCorp's detailed inspections of vegetation around distribution electric lines and equipment includes focused vegetation inspections within the HFTD to identify both planned cycle work as well as imminent threats with an overall objective is to minimize vegetation related faults, including any faults which could be a source of fire ignition. Additionally, this program facilitates the identification of any vegetation issues that have ignition probability in compliance with GO95.
Prioritization Approach		• Top priority at PacifiCorp to complete inspections per compliance requirements. • New inspection elements focused on HFTD locations
Plan for audits/quality checks		See Section 5.3.5.13
Planned demonstration of effectiveness over time		Demonstrated effectiveness of this program is the identification of corrective work and reduction in ignition potential through the identification and mitigation of vegetation related conditions.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.
	Before the upcoming wildfire season	No planned evolution

	Before the next annual update	No planned evolution
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. While PacifiCorp is early in the implementation of its multi-year WMP, PacifiCorp anticipates incorporating changes within the next three years. Additionally, as included in Section 5.3.5.6, PacifiCorp is beginning implementation of an electronic planning and tracking system to include specific GIS locations and detailed descriptions of required work as well as records of completed activities. PacifiCorp anticipates that this planning and tracking system will be fully implemented and incorporated in all facets of the company's vegetation management program within the next three years.
	Within the next 10 years	Continued evolution of planning and tracking systems. Monitor of existing programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.

5.3.5.4 Emergency response vegetation management due to red flag warning or other urgent conditions

Program Name	Vegetation management and inspections
Initiative Name	Emergency response vegetation management due to red flag warning or other urgent conditions
Description	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 trimming. When PacifiCorp activates its emergency response procedures and programs, vegetation management is involved to support the emergency event, generally performing additional inspections and vegetation management or clearing activity with qualified personnel and crews as required by operations. As these vegetation management specific components are critical to the success of PacifiCorp's emergency response programs and grid operations and protocols, the emergency response vegetation management due to red flag warning or other urgent conditions is a subset and component of both the company's general emergency response plans and the company's grid operations and protocols wildfire mitigation program focused on personnel work procedures and training conditions of elevation fire risk. Therefore, PacifiCorp does not at this time have a specific vegetation management and inspections wildfire mitigation program focused on Emergency response vegetation management due to red flag warning or other urgent conditions. See Section 5.3.6.3 and Section 5.3.9.

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5.3.5.5 Fuel management and reduction of "slash" from vegetation management activities

Program Name	Vegetation management and inspections
Initiative Name	Fuel management and reduction of "slash" from vegetation management activities
Description	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 six inches in diameter a byproduct, also referred to as "slash." This byproduct can be located either on the ground along the right of way or above ground within the tree canopy or other existing vegetation. The presence of "slash" from vegetation management activities can contribute to the overall fuel availability along a utility right-of-way. A potential spark event, regardless of the cause, can lead to a potential ignition event if the weather conditions and availability of fuel is sufficient. To reduce the probability that a potential spark event can lead to a potential ignition, PacifiCorp performs fuel management and reduction of "slash" from vegetation management activities. PacifiCorp's fuel management and reduction of "slash" from vegetation management activities, which are described further within the company's Transmission and Distribution Vegetation Management Program Standard Operating Procedures manual, focus on ensuring that these materials are not left within the tree canopy and that they are disposed of properly to reduce the volume of available fuel within the right of way. While critical to the success of PacifiCorp's overall vegetation management and inspections wildfire mitigation strategy, the Fuel management and reduction of "slash" from vegetation management activities is a component of the company's vegetation management to achieve clearances around electric lines and equipment. See Section 5.3.5.20.

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5.3.5.6 Improvement of inspections

Program Name	Vegetation management and inspections
Initiative Name	Improvement of inspections
Description	While PacifiCorp's traditional vegetation management and inspections programs are effective at maintaining regulatory compliance and managing routine operational risk, they also mitigate wildfire risk through the maintenance of vegetation clearances, identification of vegetation threats, and removal of fuel within the right of way. Nonetheless, recognizing the growing risk of wildfire and changing regulatory conditions, PacifiCorp designed and incorporated additional elements to supplement the company's standard vegetation management and inspections programs, mitigate the growing wildfire specific operational risks, and create greater resiliency against wildfires. Based on pilot trials in 2018, PacifiCorp implemented three new elements to its long-term vegetation management program for the purpose of further mitigating wildfire risk in the HFTD. First, PacifiCorp vegetation management has implemented annual vegetation inspections on all lines in the HFTD, with correction work also done based on those inspection results. Second, vegetation management increased the minimum ending distances applicable to distribution cycle work completed in the HFTD. Third, vegetation management expanded annual pole clearing on subject equipment poles located in the HFTD. In addition, PacifiCorp is evaluating and working to implement electronic and GIS-based planning, tracking, and recording of vegetation management activities. **Annual Vegetation Inspection**: As described in Section 5.3.5.2 and 5.3.5.3, beginning in 2019, PacifiCorp implemented an additional vegetation management inspection all overhead lines in HFTD areas in CA. Although conducting annual vegetation inspections exceeds previous levels of inspections to maintain regulatory requirements, this tool is the most effective strategy to identify high risk trees at the earliest stage possible. This strategy facilitates removal of high risk trees before such trees could ever fall into a line and cause a wildfire, consistent with GO95 requirements. Each year, prior to the height of fire season, a vegetation inspection is conducted in the HFTD. Consistent with existing procedures, a Level 1 assessment is conducted to identify any trees which may have become high risk trees over the course of the prior year; suspect trees are subjected to a Level 2 assessment, as outlined in ANSI A300 (Part 9). In addition, the inspector will identify for pruning or removal vegetation which is likely to violate minimum clearance distances prior to the next annual inspection.

	In conjunction with such annual inspections, vegetation management annually completes correction work based on the inspection results, including the prompt removal of all high risk trees identified during the annual vegetation inspection. **Extended Clearances**: As described in Section 5.3.5.20, for any distribution cycle work in the HFTD, regardless of applicable cycle, PacifiCorp adopted increased minimum clearance specifications beginning in 2020. The new minimum clearance specifications require pruning to at least twelve (12) feet, in all directions and for all types of trees. As discussed in Section 5.3.5.20, minimum clearance specifications dictate the distance achieved after pruning is completed. By increasing the minimum distance required at the time pruning is done, PacifiCorp further minimizes the potential of vegetation contacting a power line at any time. By increasing distances to at least twelve feet, PacifiCorp vegetation management will meet or exceed industry standards and best practices. This practice also aligns with the both the California Public Utilities Commission issued new requirement to maintain four feet clearance at all times in the California High Fire Threat District, as well as the recommended, in the Appendix E Guidelines of GO 95, Rule 35, to use a minimum clearance specification of twelve feet. By using a greater clearance specification for fast growing trees, and for the under and overhang clearance on moderate growing trees, PacifiCorp goes beyond the CPUC's recommendation. **Pole Clearing**: As included in Section 5.3.5.9, PacifiCorp vegetation management has implemented expanded pole clearing in addition to previous programs and regulations on subject equipment poles located in the HFTD. Pole clearing involves removing all vegetation within a ten-foot radius cylinder of clear space around a subject pole and applying herbicides and soil sterilants to prevent any vegetation regrowth (unless prohibited by law or the property owner). 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, similar to "slash management", pole clearing is designed to reduce the risk of fire ignition if sparks are emitted from electrical equipment. Pole clearing will be performed on wildland vegetation in the HFTD around poles which 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. **Electronic Tracking and Database:** Historically, PacifiCorp has tracked vegetation management activities at the local level, generally relying on paper forms, maps, documents, and local knowledge. In recognition of growing wildfire risk, and move toward improved transparency, efficiency, and data analytics, PacifiCorp is planned to incorporate and pilot the use of the utility's electronic database programs to identify, plan, track, and record completion of vegetation

	management activities. Foresters will begin working the GIS department to secure digital maps consistent with the company's master version and use electronic forms and records to capture activities. This will facilitate additional granularity in reporting, additional record retention, and enhanced analytics.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	The improvements to programs as included in this section are designed to: • Ensure that distribution and transmission facilities are inspected appropriately and comply with CA GO95 requirements; • Reduce the potential for incidental contact through extended clearances; • Reduce the volume of fuel available through radial pole clearing; and • Provide additionally transparency and granularity of data to support enhanced data analytics and optimization.
Prioritization Approach	See individual programs for details. General prioritization includes completion of compliance based requirements and then completion of additional activities within the HFTD.
Plan for audits/quality checks	See Section 5.3.5.13
Planned demonstration of effectiveness over time	Demonstrated effectiveness of this program is the identification of corrective work and reduction in ignition potential through the identification and mitigation of vegetation related conditions.
Planned Evolution: General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. This same approach applies to the improvement of vegetation management activities and inspections.

	Before the upcoming wildfire season	No planned evolution
	Before the next annual update	Pilot new electronic planning, mapping, and record keeping system with the HFTD.
	Within the next 3 years	Continue evaluation and expansion of new electronic planning, mapping, and record keeping system.
	Within the next 10 years	Monitor existing programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.

5.3.5.7 LiDAR inspections of vegetation around distribution electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	LiDAR inspections of vegetation around distribution electric lines and equipment
Description	PacifiCorp does not have a specific vegetation management and inspections wildfire mitigation program focused on LiDAR inspections of vegetation around distribution electric lines and equipment. Instead, PacifiCorp incorporates, as a component, LiDAR inspections of vegetation around distribution lines and equipment in its LiDAR inspections of distribution electric lines and equipment program. See Section 5.3.4.7.

5.3.5.8 LiDAR inspections of vegetation around transmission electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	LiDAR inspections of vegetation around transmission electric lines and equipment
Description	PacifiCorp does not have a specific vegetation management and inspections wildfire mitigation program focused on LiDAR inspections of vegetation around transmission electric lines and equipment. Instead, PacifiCorp incorporates, as a component, LiDAR inspections of vegetation around transmission lines and equipment in its LiDAR inspections of transmission electric lines and equipment program. See Section 5.3.4.8.

5.3.5.9 Other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations

Program Name	Vegetation management and inspections
Initiative Name	Other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations
Description	At this time, PacifiCorp does not have any other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations, and other described programs.

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5.3.5.10 Other discretionally inspection of vegetation around transmission electric lines and equipment beyond inspections mandated by rules and regulations

Program Name	Vegetation management and inspections
Initiative Name	Other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations
Description	At this time, PacifiCorp does not have any other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations, and other described programs.

5.3.5.11 Patrol inspections of vegetation around distribution electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	Patrol inspections of vegetation around distribution electric lines and equipment
Description	PacifiCorp's description of patrol inspections of vegetation around distribution electric lines and equipment is included in the company's description of detailed inspections of vegetation around distribution lines and equipment. See Section 5.3.5.2

5.3.5.12 Patrol inspections of vegetation around transmission electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	Patrol inspections of vegetation around transmission electric lines and equipment
Description	PacifiCorp's description of patrol inspections of vegetation around transmission electric lines and equipment is included in the company's description of detailed inspections of vegetation around transmission lines and equipment. See Section 5.3.5.3

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5.3.5.13 Quality assurance / quality control of inspections

Program Name	Vegetation management and inspections
Initiative Name	Quality assurance / quality control of inspections
Description	PacifiCorp's Transmission and Distribution Vegetation Management Standard Operating Procedures manual includes the company's standard procedures and protocols for performing vegetation management audits. In general, this standard includes routine tree crew audits of transmission, distribution, post-inspection, and pole clearing activities where the primary purpose in an assessment of quality assurance. Each audit includes a Forester, crew leader, and, optionally, the Supervisor. During these audits, standard forms are used to capture any observations and exceptions along with comments, required corrective work, and feedback for the inspectors. Similar to PacifiCorp's other programs, if during the course of the audit, an exception is identified that violates either federal or state law or poses as imminent safety or reliability risk, the audit will be temporarily suspended, the crew may be shut down, and the corrective work will be performed immediately. These audits benefit both PacifiCorp and the Contractor and are considered a best management practice (American National Standards Institute 2006).
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Auditing and quality of inspection is critical to ensure required work is being documented and listed and to ensure clearance or high risk trees are being identified for mitigation.
Prioritization Approach	PacifiCorp prioritizes focusing enhanced audit efforts within the HFTD to ensure work complies with regulations and reduces wildfire risk.
Plan for audits/quality checks	NA

Planned demonstration of effectiveness over time		Work audits provide key information to improve work quality and specification adherence. The identification of exceptions and an overall improvement in the quality of work is an effective quality assurance / quality control program.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.
	Before the upcoming wildfire season	No evolution planned at this time.
	Before the next annual update	As included in Section 5.3.5.6, PacifiCorp is planning to pilot a new electronic planning, mapping, and record keeping system with the HFTD. PacifiCorp anticipates that this new system will extend to all or a portion of the company's QA/QC procedures and processes within the next year.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections may be improved by either changes to scope, tools, frequency, or correction timeframe. While PacifiCorp is early in the implementation of its multi-year WMP, PacifiCorp anticipates incorporating changes within the next three years. Additionally, as included in Section 5.3.5.6, PacifiCorp is beginning implementation of an electronic planning and tracking system to include specific GIS locations and detailed descriptions of required work as well as records of completed activities. PacifiCorp anticipates that this planning and tracking system will be fully implemented and incorporated in all facets of the company's vegetation management program within the next three years. Furthermore, PacifiCorp is currently piloting the use of LiDAR technology to performed enhanced inspections of its distribution and transmission lines to inform and support, among other programs, the company's vegetation management programs. While not clear at this time, this pilot project may inform evolution of the company's overall vegetation management programs, including any QA/QC programs or program elements.
	Within the next 10 years	No evolution planned at this time.

5.3.5.14 Recruiting and training of vegetation management personnel

Program Name	Vegetation management and inspections
Initiative Name	Recruiting and training of vegetation management personnel
Description	PacifiCorp's general approach to recruiting and training of vegetation management personnel can be found in the company's Transmission and Distribution Vegetation Management Program Standard Operating Procedures manual. In general, PacifiCorp takes advantage of training that is provided by the company and arboriculture industry and issues materials as needed, such as a High Risk Tree Identification presentation created in 2019 to educate inspectors on proper identification of defective trees that have the potential to strike the facilities. PacifiCorp at this time does not have a vegetation management and inspections wildfire mitigation program focused on recruiting and training of vegetation management personnel.

5.3.5.15 Remediation of at-risk species

Program Name	Vegetation management and inspections
Initiative Name	Remediation of at-risk species
Description	Remediation of at-risk species is a subset to the company's vegetation management to achieve clearances around electric lines and equipment program as it contains, as an element, the company's practices procedures, and funding to remediate at-risk species. See Section 5.3.5.18.

5.3.5.16 Removal and remediation of trees with strike potential to electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	Removal and remediation of trees with strike potential to electric lines and equipment
Description	Removal and remediation of trees with strike potential to electric lines and equipment is a subset to the company's vegetation management to achieve clearances around electric lines and equipment program as it contains, as an element, the company's practices procedures, and funding to remove and remediate trees with strike potential to electric lines and equipment. See Section 5.3.5.18.

5.3.5.17 Substation inspections

Program Name	Vegetation management and inspections
Initiative Name	Substation inspections
Description	PacifiCorp's vegetation detailed inspection and correction program included in Sections 5.3.5.2 and 5.3.5.3, discretionary inspection included in 5.3.5.9, and overall management activities to achieve proper clearances in Section 5.3.5.20, include work in and around substations. Therefore, PacifiCorp does not have a specific vegetation management and inspections program focused on substation inspection. See Sections 5.3.5.2, 5.3.5.3, 5.3.5.9, and 5.3.5.20.

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5.3.5.18 Substation vegetation management

Program Name	Vegetation management and inspections
Initiative Name	Substation vegetation management
Description	PacifiCorp's vegetation detailed inspection and correction program included in Sections 5.3.5.2 and 5.3.5.3, discretionary inspection included in 5.3.5.9, and overall management activities to achieve proper clearances in Section 5.3.5.20, include work in and around substations. Therefore, PacifiCorp does not have a specific vegetation management and inspections program focused on substation inspection. See Sections 5.3.5.2, 5.3.5.3, 5.3.5.9, and 5.3.5.20.

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5.3.5.19 Vegetation inventory system

Program Name	Vegetation management and inspections
Initiative Name	Vegetation inventory system
Description	PacifiCorp recognizes the importance and value of creating and maintaining a vegetation inventory system. Such a system can help to assess risk, customize vegetation management programs, and optimize task assignment and execution. PacifiCorp does not have a defined vegetation inventory system program at this time. However, the company is currently evaluating required steps, funding, and technology requirements to develop, implement, and incorporate a new tree density inventory system targeted initially within the HFTD to inform risk assessment and prioritization of efforts. PacifiCorp is prioritizing this task, intends to evaluate in 2020, and provide an update and further program details in the next annual update.

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5.3.5.20 Vegetation management to achieve clearances around electric lines and equipment

Program Name	Vegetation management and inspections
Initiative Name	Vegetation management to achieve clearances around electric lines and equipment
Description	Maintaining safe clearances is the starting point of any utility vegetation management plan, including PacifiCorp's. PacifiCorp's vegetation management program to achieve clearances around electric lines and equipment includes four key components: (1) cycle trimming, (2) hazard tree removal, (3) remediation of at-risk species, and (4) removal of tall trees with path to strike electric lines and equipment. Therefore, this program includes other elements referenced in Section 5.3.5.15 and Section 5.3.5.16. **Cycle Trimming:** PacifiCorp has adopted a minimum clearance distance, at time of work, of at least twelve (12) feet for all distribution lines and at least twenty (20) feet for transmission lines under 115 kV and thirty (30) feet for any transmission lines of 115 kV or above. These minimum clearance distances are consistent with the recommendation in the Appendix E Guidelines of GO 95, Rule 35. These minimums are being used in existing work projects, and the next revision of the Standard Operating Procedures will reflect the same. In addition, PacifiCorp 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 minimum clearance of twelve (12) feet 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 vertically faster 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 almost always prunes beyond the minimum required distances because of the physical structure of the tree. PacifiCorp uses natural target pruning for all prune work. 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 (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.)

Fourth, PacifiCorp uses forty (40) feet for minimum clearance after work on a 345 kV transmission line. This additional clearance is driven by heightened reliability concerns.

As part of existing efforts to mitigate the risk of wildfire, PacifiCorp has previously conducted targeted vegetation management projects in the HFTD. In essence, this has increased the frequency of work in particular areas, based on local conditions and growth rates. As a practical matter, increasing the frequency of work in particular areas typically results in clearances being maintained well in excess of those clearances required under GO 95, Table 1.

Correction work done in conjunction with off cycle inspections will address any outstanding clearance issues. Because of historic success in maintaining clearance requirements through its regular cycle maintenance programs, PacifiCorp does not anticipate that substantial additional clearance work will be required. Thus, no separate incremental costs for additional work to maintain clearance minimums are forecasted at this time and all costs associated with this effort have been captured and included in Table 25.

Hazard Tree Removal: PacifiCorp defines "hazard trees" as "dead, dying, diseased, deformed, or unstable trees which have a high probability of falling and contacting a substation, distribution or transmission conductors, structure, guys or other Company electric facility."

PacifiCorp's existing Standard Operating Procedures 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." (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."). Furthermore, the existing Standard Operating Procedures encourage removal even when removal is not required under GO 95, Rule 35 or PRC § 4293.

Hazard trees are identified through the inspections discussed in Sections 5.3.5.2 and 5.3.5.3 and by field crews performing work. To identify hazard trees, PacifiCorp uses the practices set forth in ANSI A300 (Part 9); Smiley, Matheny, and Lilly (2011), *Best Management Practices: Tree Risk Assessment,* International Society of Arboriculture; and CALFIRE Power Line Fire Prevention Field Guide §§ 12-19. In summary, PacifiCorp uses an initial Level 1 assessment, as defined in ANSI A300 (Part 9), with particular attention to the prevailing winds and trees on any uphill

slope. Suspect trees are subjected to a Level 2 assessment, as outlined in ANSI A300 (Part 9), to further assess their condition.

In many circumstances, obtaining property owner consent to removal is often part of the process. To accomplish removal when a property owner objects to removal, PacifiCorp goes to great lengths to obtain property owner permission, making repeated and reasoned requests by different representatives of the company.

Moving forward, in addition to existing practices, PacifiCorp plans to increase efforts to identify and remove hazard trees. As discussed in Section 5.3.5.6, PacifiCorp increased the frequency of its vegetation management inspections and implemented conducting an annual vegetation inspection on lines in the HFTD in 2019. More frequent inspections will necessarily improve the identification of hazard trees. Hazard trees identified during annual inspections will, of course, be removed or pruned sufficiently to eliminate the hazard (unless a property owner prevents such work). As a result, some hazard trees will be identified and removed earlier than under the existing program (i.e. which would have then occurred during the next regular cycle).

PacifiCorp plans to be more aggressive in generally reducing total inventory, thereby proactively removing more trees before such trees ever become hazard trees. While it would be unfeasible to remove all trees which have the potential to become hazard trees (i.e. by definition, all trees eventually become hazard trees when they die), PacifiCorp plans to remove a greater number of trees in the HFTD which have a higher potential of becoming a hazard tree.

Remediation of at-risk species*:* As discussed in the clearances section above, PacifiCorp distinguishes between slow growing, moderate growing, and fast growing species. Moderate growing and especially fast growing species present certain reliability and at-risk concerns. Accordingly, such species are subject to increased minimum clearance distances. In addition, removal of cycle buster trees, which are extremely fast growing species, is encouraged. As part of the new program for increased higher risk tree removal, as discussed above, PacifiCorp is targeting particular areas of high density vegetation for increased removal of non-compatible tree species that have a potential to encroach on facilities.

Removal of tall trees with path to strike electric lines and equipment*:* PacifiCorp does not limit inspections or tree assessments to a pre-determined distance (which would be, presumably, the defined width of a particular right-of-way easement). As discussed in the hazard tree section above, PacifiCorp's definition and assessment of hazard trees necessarily incorporates trees which are tall enough to fall into the right-of-way and strike a powerline. PacifiCorp does not conduct a Level 2 assessment on every tree tall enough to strike a powerline, because this would be unfeasible. Instead, PacifiCorp conducts a Level 1 assessment to identify trees tall enough to strike a powerline which

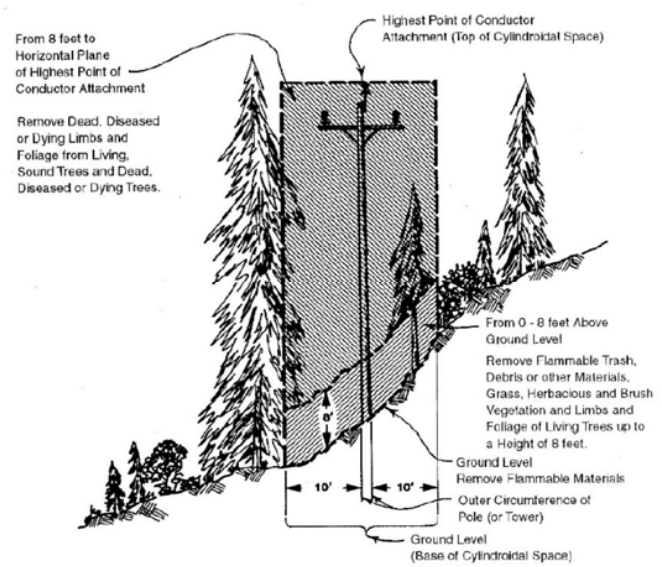
	may also be hazard trees; if such a tree is identified, PacifiCorp then conducts a Level 2 assessment to determine whether the tree is, in fact, a hazard tree subject to removal. Moreover, PacifiCorp will consider tree height as a factor in determining whether any particular tree is a candidate for preemptive removal.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	When constructing an overhead line, PacifiCorp makes every effort to avoid building new lines over or through trees that currently need or will need to be cleared from the facilities in the future. This general approach reduces the volume of vegetation management activates required while also reducing general operational exposure and wildfire risk. Where PacifiCorp operates existing lines or where this vegetation cannot be avoided in order to properly serve customers and meet federal and state requirements, PacifiCorp leverages its Vegetation Management Standard Operating Procedures to ensure safe and reliable delivery of power. In the absence of such practices or programs, vegetation can lead to incidental contact and fault scenarios which, depending on the environmental conditions and presence of additional fuel, can lead to wildfire events. Therefore, maintaining safe clearances is the starting point of any utility vegetation management plan, including PacifiCorp's.
Prioritization Approach	System wide with specific rules applied to the HFTD
Plan for audits/quality checks	See Section 5.3.5.13
Planned demonstration of effectiveness over time	Demonstrated effectiveness includes the identification of corrective work and maintenance of proper clearance, as identified through audits, and reduction in ignition potential by identifying and mitigating vegetation related conditions.
Planned Evolution — General	As with all of PacifiCorp's inspection programs, the company intends to implement these programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. This same approach applies to the improvement of vegetation management activities.

	Before the upcoming wildfire season	No planned evolution
	Before the next annual update	• Pilot new electronic planning, mapping, and record keeping system with the HFTD. • Evaluate potential expansion of program scope. • Evaluate potential implementation of a program for increased higher risk tree removal and increased clearing of rights-of-way in the HFTD.
	Within the next 3 years	As PacifiCorp continues to implement its multi-year WMP, the company will continue to evaluate how inspections and programs may be improved by either changes to scope, tools, frequency, or correction timeframe. While PacifiCorp is early in the implementation of its multi-year WMP, PacifiCorp anticipates incorporating changes within the next three years. Additionally, as included in Section 5.3.5.6, PacifiCorp is beginning implementation of an electronic planning and tracking system to include specific GIS locations and detailed descriptions of required work as well as records of completed activities. PacifiCorp anticipates that this planning and tracking system will be fully implemented and incorporated in all facets of the company's vegetation management program within the next three years.
	Within the next 10 years	Continued evolution of planning and tracking systems. Monitor of existing programs, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution.

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5.3.5.21 Other – Radial Pole Clearing

Program Name	Vegetation management and inspections
Initiative Name	Radial Pole Clearing (including incremental)
Description	PacifiCorp vegetation management has expanded pole clearing to include 2,768 Local Responsibility Area (LRA) subject equipment poles located in the HFTD in additional to its existing program in compliance with regulations of clearing 12,292 State Responsibility Area (SRA) subject poles. Pole clearing involves the removal of all vegetation within a ten-foot radius cylinder of clear space around a subject pole and the application of herbicides and soil sterilants to prevent any vegetation regrowth (unless prohibited by law or the property owner). See image[46] included, nothing that the image is meant to describe a concept, not a specification and, therefore does not incorporate the ten foot radius included in PacifiCorp's program. 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, similar to "slash management", pole clearing is designed to reduce 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 which 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.



[46] 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

Timeline to Minimize Risk [Planned/ Implemented]		Implemented
Rationale for Program		As described in Section 5.3.3.7, overhead equipment, under certain conditions, can create a spark. This potential spark, depending on the environmental conditions and the presence of fuel, has the potential to result in an ignition. In contrast to other programs, radial pole clearing is not designed to prevent contact between vegetation and a power line. Instead, similar to "slash management", pole clearing is designed to reduce the risk of fire ignition if sparks are emitted from electrical equipment through elimination of the presence of fuel. While PacifiCorp views this as a stand-alone program, radial pole clearing also significantly mitigates the potential risk and impact of overhead expulsion fuses and other equipment within the HFTD until non-expulsion fuses can be installed as a part of the broader programs, as indicated in Section 5.3.3.7. Furthermore, this program aligns with the recommended by CALFIRE to remove vegetation from LRA poles in the HFTD.
Prioritization Approach		Specifically targeting wildland vegetation in the HFTD around poles which have fuses, air switches, clamps or other devices that could create sparks.
Plan for audits/quality checks		Section 5.3.5.13
Planned demonstration of effectiveness over time		PacifiCorp views effectiveness of this program as removal of vegetation around the poles. PacifiCorp plans to ensure this effectiveness through an annually assessment of transmission lines or distribution feeders for any further vegetation growth on or around the poles.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution. Specific to radial pole clearing, this could include a change to tools, specifications and frequency, or both.
	Before the upcoming wildfire season	No planned evolution

	Before the next annual update	No planned evolution
	Within the next 3 years	As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when programs may evolve and change. However, PacifiCorp anticipates the company's radial pole clearing program may begin incorporating new technology, specifications, or frequencies within the next three years.
	Within the next 10 years	Continued potential expansion of scope, change to frequency, or introduction of new tools.

The table below includes details regarding PacifiCorp's vegetation management and inspections wildfire mitigation programs. The 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 25: Vegetation management and inspections

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Additional efforts to manage community and environmental impacts	2019 plan	While collaboration such as this is critical to the overall wildfire risk reduction in the state of CA, PacifiCorp, at this time, does not have a specific program dedicated to this effort. Instead, these efforts are on an as-needed basis and incorporates additional efforts to manage community environments within other programs, such as those included in Section 5.3.9 and Section 5.3.10.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
2. Detailed inspection of vegetation around distribution electric lines and equipment	2019 plan	N/A	N/A	Contact from object	N/A	N/A	Reduces escalation should an ignition event occur through removal of fuel	Existing	2018 GRC & 2019 WMP	N/A	In Compliance with Regulation	GO95	Program incorporated new requirements in 2019
	2019 actual	825	$1,985										
	2020	825	$1,725										
	2021	825	$1,725										
	2022	825	$1,725										
	2020-2022 plan total	2,475	$1,725										
3. Detailed inspection of vegetation around transmission electric lines and equipment	2019 plan	N/A	N/A	Contact from object	N/A	N/A	Reduces escalation should an ignition event occur through removal of fuel	Existing	2018 GRC & 2019 WMP	N/A	In Compliance with Regulation	GO95	Program incorporated new requirements in 2019
	2019 actual	345	$3,339										
	2020	345	$2,098										
	2021	345	$2,098										
	2022	345	$2,098										
	2020-2022 plan total	1,035	$2,098										

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
4. Emergency response vegetation management due to red flag warning or other urgent conditions	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	As these vegetation management specific components are critical to the success of PacifiCorp's emergency response programs and grid operations and protocols, the emergency response vegetation management due to red flag warning or other urgent conditions is a subset and component of both the company's general emergency response plans and the company's grid operations and protocols wildfire mitigation program focused on personnel work procedures and training conditions of elevation fire risk. Therefore, PacifiCorp does not at this time have a specific vegetation management and inspections wildfire mitigation program focused on Emergency response vegetation management due to red flag warning or other urgent conditions. See Section 5.3.6.3 and Section 5.3.9.											
5. Fuel management and reduction of "slash: from vegetation management activities	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	While critical to the success of PacifiCorp's overall vegetation management and inspections wildfire mitigation strategy, the Fuel management and reduction of "slash" from vegetation management activities are components of the company's vegetation management to achieve clearances around electric lines and equipment. See Section 5.3.5.20.											
6. Improvement of inspections	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - Elements already captured in other relevant programs	N/A - Elements already captured in other relevant programs	Contact from object	N/A	N/A	Reduces escalation should an ignition event occur through removal of fuel	Existing	2018 GRC & 2019 WMP	N/A	In Compliance with Regulation	GO95	Program incorporated new requirements in 2019
7. LiDAR inspections of vegetation around distribution electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp does not have a specific vegetation management and inspections wildfire mitigation program focused on LiDAR inspections of vegetation around distribution electric lines and equipment. Instead, PacifiCorp incorporates, as a component, LiDAR inspections of vegetation around distribution lines and equipment in its LiDAR inspections of distribution electric lines and equipment program. See Section 5.3.4.7.											

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
8. LiDAR inspections of transmission electric lines and equipment	2019 plan	PacifiCorp does not have a specific vegetation management and inspections wildfire mitigation program focused on LiDAR inspections of vegetation around transmission electric lines and equipment. Instead, PacifiCorp incorporates, as a component, LiDAR inspections of vegetation around transmission lines and equipment in its LiDAR inspections of transmission electric lines and equipment program. See Section 5.3.4.8.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
9. Other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations	2019 plan	At this time, PacifiCorp does not have any other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations, and other described programs.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
10. Other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations	2019 plan	At this time, PacifiCorp does not have any other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations, and other described programs.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
11. Patrol inspections of vegetation around transmission electric lines and equipment	2019 plan	PacifiCorp's description of patrol inspections of vegetation around distribution electric lines and equipment is included in the company's description of detailed inspections of vegetation around distribution lines and equipment. See Section 5.3.5.2											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
12. Patrol inspections of vegetation around transmission electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp's description of patrol inspections of vegetation around transmission electric lines and equipment is included in the company's description of detailed inspections of vegetation around transmission lines and equipment. See Section 5.3.5.3											
13. Quality assurance/ quality control of inspections	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - Elements already captured in other relevant programs	N/A - Elements already captured in other relevant programs	Contact from object	N/A	N/A	Reduces escalation should an ignition event occur through removal of fuel	Existing	N/A	N/A	N/A	N/A	General program and best practices applied to an accounted for in other relevant programs
14. Recruiting and training of vegetation management personnel	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp's general approach to recruiting and training of vegetation management personnel can be found in chapter 1 of PacifiCorp Transmission and Distribution Vegetation Management Program Standard Operating Procedures manual. In general, PacifiCorp takes advantage of training that is provided by the company and arboriculture industry and issues materials and course as needed, such as a High Risk Tree Identification presentation created in 2019 to educate inspectors on proper identification of defective trees that have the potential to strike the facilities. However, At this time, PacifiCorp does not have a vegetation management and inspections wildfire mitigation program focused on recruiting and training of vegetation management personnel.											
15. Remediation of at-risk species	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	Remediation of at-risk species is a subset to its vegetation management to achieve clearances around electric lines and equipment program as it contains, as an element, the company's practices procedures, and funding to remediate at-risk species. See Section 5.3.5.18.											

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
16. Removal and remediation of trees with strike potential to electric lines and equipment	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	Removal and remediation of trees with strike potential to electric lines and equipment is a subset to the company's vegetation management to achieve clearances around electric lines and equipment program as it contains, as an element, the company's practices procedures, and funding to remove and remediate trees with strike potential to electric lines and equipment. See Section 5.3.5.18.											
17. Substation vegetation inspections	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp's vegetation detailed inspection and correction program included in Sections 5.3.5.2 and 5.3.5.3, discretionary inspection included in 5.3.5.9, and overall management activities to achieve proper clearances in Section 5.3.5.20, include work in and around substations. Therefore, PacifiCorp does not have a specific vegetation management and inspections program focused on substation inspection. See Sections 5.3.5.2, 5.3.5.3, 5.3.5.9, and 5.3.5.20.											
18. Substation vegetation management	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp's vegetation detailed inspection and correction program included in Sections 5.3.5.2 and 5.3.5.3, discretionary inspection included in 5.3.5.9, and overall management activities to achieve proper clearances in Section 5.3.5.20, include work in and around substations. Therefore, PacifiCorp does not have a specific vegetation management and inspections program focused on substation inspection. See Sections 5.3.5.2, 5.3.5.3, 5.3.5.9, and 5.3.5.20.											
19. Vegetation inventory system	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	PacifiCorp recognizes the importance and value of creating and maintaining a vegetation inventory system. Such a system can help to assess risk, customize vegetation management programs, and optimize task assignment and execution. At this time, PacifiCorp does not have a defined vegetation inventory system program. However, the company is currently evaluating required steps, funding, and technology requirements to develop, implement, and incorporate a new tree density inventory system targeted initially within the HFTD to inform risk assessment and prioritization of efforts. PacifiCorp is prioritizing this task, intends to evaluate in 2019, and provide an update and further program details in the next annual update.											

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
20. Vegetation management to achieve clearances around electric lines and equipment	2019 plan	N/A	N/A	Contact from object	N/A	N/A	Reduces escalation should an ignition event occur through removal of fuel	Existing	2018 GRC & 2019 WMP	N/A	In Compliance with Regulation	GO95	Program incorporated new requirements in 2019
	2019 actual	3,195	$1,196										
	2020	3,195	$1,029										
	2021	3,195	$1,029										
	2022	3,195	$1,029										
	2020-2022 plan total	9,585	$1,029										
16.Other/not listed - Radial Pole Clearing	2019 plan	N/A	N/A	N/A	N/A	N/A	Reduces escalation should an ignition event occur through removal of fuel	Existing	2018 GRC & 2019 WMP	N/A	In Compliance with Regulation	GO95	Similar to substation inspections, units are reported on a per pole basis
	2019 actual	14,132	$125										
	2020	15,060	$118										
	2021	15,060	$118										
	2022	15,060	$118										
	2020-2022 plan total	45,180	$118										

5.3.6 *Grid operations and protocols*

PacifiCorp interprets grid operations and protocols to include settings, procedures, strategies, and best practices leveraged to either operate and control the grid or respond to an event in a manner that mitigates wildfire risk. These programs range from disabling automatic reclosing on field reclosing devices to proactive staging of suppression equipment or resources through the company's service territory. The following subsections include the details of PacifiCorp's grid operations and protocols wildfire mitigation programs.

5.3.6.1 Automatic recloser operations

Program Name	Grid operations and protocols
Initiative Name	Automatic recloser operations
Description	The manner in which an electrical system is operated can mitigate the wildfire risk. PacifiCorp has a specific policies to address system operations during fire season. This policy is designed to reduce the potential for ignition of a fire from sparks emitted when a line is re-energized despite a disturbance on the line. Recognizing the increasing magnitude of the wildfire risk, PacifiCorp's policies were significantly revised in June 2018 to incorporate more conservative procedures designed to reduce the potential of ignition because of a fault on PacifiCorp's electrical network. From a practical perspective, there are two primary subject areas addressed with these revision: (a) settings for automatic reclosers and (b) line testing after lock-out. Furthermore, implementing and continuously improving this program requires advanced investigation of fault events to understand the nature and type of faults and whether or not this program is properly mitigating these events.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Automatic reclosers are currently deployed on various transmission lines and distribution circuits throughout PacifiCorp's service territory. When a line trips open, an automatic recloser may operate to close the circuit very quickly, so long as the cause of a momentary trip has cleared. The reclosing function in an important feature as it allows PacifiCorp to maintain service on a line that had tripped, rather than opening the circuit and de-energizing the line. In general, automatic recloser operation is beneficial, because it reduces outages and improves customer reliability. The actual operation of recloser equipment does not directly present wildfire risk, as the recloser equipment itself does not emit sparks or otherwise pose an ignition risk.

	The operation of automatic reclosers, however, indirectly implicates some degree of ignition risk. When a fault is detected on the line, a recloser will trip and reclose based on pre-determined settings in an attempt to re-energize the line. If the cause of the fault is no longer present when the device recloses, the line will re-energize resulting in limited impact to customers. If the cause of the original fault still remains when the device recloses, however, the original fault scenario will be experienced a second time and, depending on the circumstances, potentially result in arcing or an emission of sparks. As a result, in some limited circumstances, the second fault scenario could lead to a fire ignition. Accordingly, automatic recloser settings can have a significant impact on wildfire mitigation. The issue with line-testing is very similar. If a breaker has "locked-out" – meaning that it has opened and no longer conducts electricity – a system operator will sometimes "test" the line. To test the line, the system operator will close the device, thereby allowing the line to be re-energized. If the fault has cleared, then the system will run normally. If the fault has not cleared, the device will lock-out again. If the device locks again, the system operator then knows that additional investigation or work will be required before the line can be successfully re-energized. Because faults are often temporary, line-testing can be an efficient tool to maintain customer reliability. At the same time, line-testing can result in the emission of sparks if a fault has not yet cleared when the line is tested. Accordingly, a "no-test" policy reduces the risk of ignition, and a "no-test" policy is applicable in certain circumstances during fire season. Therefore, PacifiCorp has designed and developed its automatic reclosing operations wildfire mitigation program to include more restrictive system operating procedures during when wildfire conditions are more elevated to reduce this risk.
Prioritization Approach	No prioritization necessary as this is implementation of a process/setting requirement.
Plan for audits/quality checks	PacifiCorp's program includes detailed investigation into fault events to include a deeper understanding of type and nature of faults experienced, which includes any faults experienced during fire season in CA. A result of this investigation not only yields identification of any mis-operations or near miss events but also corresponding changes and correction to the settings or approach to the program. Additional unwanted results or actions may be identified through the after action review process described in the company's Emergency Response Plan and addressed in Section 5.3.9.

Planned demonstration of effectiveness over time		Demonstration of effectiveness is a lack of unwanted reclosing operations on applicable equipment within the HFTD during fire season.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution. Specific to the automatic recloser operations program, PacifiCorp anticipates evolution of this program to align with the company's implementation and evolution of system automation and grid design system hardening program included in Section 5.3.3.9.
	Before the upcoming wildfire season	No planned evolution at this time.
	Before the next annual update	No planned evolution at this time.
	Within the next 3 years	As PacifiCorp implements the company's grid design and system hardening program focused on the installation of system automation equipment, the company anticipates additional features and capabilities regarding the protection and control of PacifiCorp's distribution circuits may become available or possible. These advancements will most likely be focused on faster detection of a broader range of fault scenarios as well as quicker communication of events to other devices. While the specifics of this potential evolution remain unknown, PacifiCorp anticipates incorporating either lessons learned or advanced features identified through other programs into the company's automatic recloser operations program and policies within the next 3 years.
	Within the next 10 years	Continued implementation of new technologies or advancements.

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5.3.6.2 Crew-accompanying ignition prevention and suppression resources and services

Program Name	Grid operations and protocols
Initiative Name	Crew-accompanying ignition prevention and suppression resources and services
Description	PacifiCorp does not currently deploy crew-accompanying ignition prevention and suppression resources and services as part of its routine operational practices. When an emergency occurs, PacifiCorp communicates and collaborates with local emergency response teams as described in Section 5.3.9, which can include crew-accompanying ignition prevention and suppression resources and services. Additionally, during elevated risk conditions or during fire season, PacifiCorp leverages specific work practices and protocols and makes available specific resources and tools for use by operations personnel as included in Section 5.3.6.6. However, PacifiCorp does not currently have a specific grid operations and protocols wildfire mitigation program focused on crew-accompanying ignition prevention and suppression resources and services. As part of the annual WMP review process the use of these services will be re-evaluated and considered for future incorporation.

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5.3.6.3 Personnel work procedures and training conditions of elevation fire risk

Program Name	Grid operations and protocols
Initiative Name	Personnel work procedures and training conditions of elevation fire risk
Description	PacifiCorp's personnel work procedures and training conditions of elevation fire risk can be grouped into five main categories of (1) work restrictions, (2) work site preparation, (3) power equipment, (4) vehicles, and (5) outage restoration / re-energization protocols. 1. **Work Restrictions**: PacifiCorp field operations are able to mitigate some wildfire risk by managing the way that field work is scheduled and performed. To effectively manage work during fire season, area managers regularly review local CALFIRE conditions and weather forecasts provided to them as part of PacifiCorp's monitoring program discussed in the situational awareness section below. General Scheduling Restrictions. Certain work restrictions already apply within heavily vegetated areas managed by the National Forest Service or Bureau of Land Management, and PacifiCorp plans to apply similar work restrictions in the HFTD. During fire season generally, field operations managers are encouraged to defer any non-essential work which is (i) in the HFTD and at a specific location with predominately wildland vegetation, and (ii) requires the use or power tools or has the potential that sparks will be emitted from electrical equipment. During periods in which a Red Flag Warning is published by the National Weather Service, field operations managers should not schedule such work unless immediately necessary to maintain reliable electric service, consistent with prudent utility practices. Hot Work Restrictions. In the HFTD during fire season, field operations managers are encouraged to evaluate whether work should be performed during a planned interruption, rather than while a line energized. Time of Day Restrictions. In the HFTD during fire season, field operations managers are encouraged to consider using alternate work hours to accommodate evening and night work, when there may be less risk of ignition. Wind Restrictions. In the HFTD during fire season, Field Personnel are encouraged to defer work, if feasible, when there are windy conditions at a particular work site. Driving Restrictions. In the HFTD during fire season, Field Personnel are encouraged to keep vehicles on designated roads whenever operationally feasible. In addition, field operations personnel should not park

vehicles in areas where vegetation is more than 8 inches tall. If necessary, a parking site should be cleared, as part of the work-site preparation discussed below.

Activity Restrictions. Use of any incendiary device or any object which could emit sparks and ignite a fire, except the use of approved equipment necessary to complete a work function (i.e. use of power equipment, as discussed below), is prohibited when working in any area with wildland vegetation. Discharging a fire-arm or using fireworks at a work site is prohibited at all times. Smoking at a work site is generally discouraged, and smoking is especially discouraged when Field Personnel are working in an area with any amount of wildland vegetation; if smoking during a work break in the field, Field Personnel are required (i) to smoke in an area without dry grass underfoot; (ii) to ensure that all materials are extinguished after smoking; and (iii) to deposit all ash and other refuse resulting from the smoking activity in a fire-safe, metal container.

2. **Work-Site Preparation**: If wildland vegetation posing an ignition risk is prevalent at a worksite, and the work to be performed involves power tools or the potential emission of sparks from electrical equipment, Field Personnel working during fire season are encouraged to employ best practices and remove vegetation at the work site, especially when there is dry or tall wildland grass. In addition to clearing work, the water truck resources, discussed below, are strategically assigned to sometimes accompany Field Personnel working in the HFTD during fire season. Depending on local conditions, dry vegetation in the immediate vicinity may be sprayed with water prior to work as a preventative measure.

3. **Power Equipment**. Even when operated properly, certain power tools and equipment pose some ignition risk because of their potential to emit or cause a spark. Accordingly, field operations plans to sometimes use electric-powered alternatives or modified equipment which reduces the potential for sparks. Specifically, when performing work in HFTD areas during fire season, field operations will use chainsaws, generators, and weed-eaters which are powered with electric battery or equipped with spark arrestors. In addition, outside the HFTD, field operations personnel are encouraged to use such equipment when working in any wildland areas during the fire season. To make equipment available, field operations proposes to retrofit a sufficient quantity of existing equipment or purchase new equipment, so that each district with HFTD has equipment available. Long term, when purchasing new equipment generally, field operations plans to always purchase chainsaws, generators, and weed-eaters which are electric powered or equipped with spark arrestors.

4. **Vehicles:** Vehicles can be a source of ignition. As discussed above, field operations personnel are instructed to stay on designated roads during fire season, as feasible, and to avoid vegetation which could contact the

	undercarriage of parked vehicle. To further mitigate any wildfire risk associated with the use of vehicles, field operations plan to convert, over time, the vehicle exhaust configuration of work trucks. To accomplish this objective, field operations will strategically convert some vehicles in districts with the greatest amount of HFTD. Long term, when new vehicles are purchased, PacifiCorp plans to purchase trucks with a vehicle exhaust configuration which minimizes ignition risk. 5. **Outage Restoration / Re-Energization Protocols:** After a fault results in an outage or a PSPS event occurs, all or part of a circuit might remain de-energized while either restoration work is performed or until high risk conditions change, depending on the design, loading conditions, and sectionalizing capability of the circuit. In some cases, additional foreign objects, such as tree limbs or other debris, can come into contact with the de-energized line and remain undetected throughout the duration of the PSPS event or restoration efforts. To mitigate the risk of re-energizing the line with additional foreign objects on the line, field operations may perform a line patrol on certain de-energized sections of the circuit depending on local conditions. Typically, this type of line patrol does not involve a close inspection of any particular facility; instead, it is a quick visual assessment specifically targeted to identify obvious foreign objects which may have fallen into the line during restoration work or PSPS event.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	During fire season, PacifiCorp modifies operations procedures, under certain circumstances, to further mitigate wildfire risk. In particular, there are operations procedures applicable when weather conditions create an elevated risk of wildfire and other operations procedures applicable in geographic areas of elevated wildfire risk. These procedures are targeted to reduce the potential of direct or indirect causes of ignition during planned activities, fault response, and outage restoration. In general, these programs focus on the elimination of potential ignitions due to the use of traditionally accepted operational practices or equipment that, under certain circumstances such as elevated wildfire risk, can result in an ignition. Additionally, these programs aim to reduce the presence of available fuel or escalation of an existing event.
Prioritization Approach	Amendments to operational practices, procedures, and tools are prioritized within the HFTD.

Plan for audits/quality checks		PacifiCorp has a goal of continuous incident management improvement which includes, as a component, the disaster and emergency preparedness plan and operational practices and procedures. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document. This review process which is imbedded in the company's Emergency Response Plan, does include work performed by operations personnel and would, inherently identify any deficiencies included in this program. Instead of designing a separate QA/QC process, PacifiCorp' intends to leverage the company's existing QA/QC process including after action reviews, correction of deficiencies, and incorporation of lessons learned. See Section 5.3.9 for more information. Additionally, PacifiCorp conducts an annual wildfire preparedness check for districts that operate within the HFTD. This includes an inventory of equipment, vehicles, and refresher training for employees on operational practices. The results from these checks inform the quality of preparedness before entering fire season and inform the on-going program.
Planned demonstration of effectiveness over time		Demonstrated effectiveness of this program is generally downtown trend regarding utility caused ignitions within the HFTD of PacifiCorp's service territory during fire season.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution. Specific to personnel work procedures and training, this could incorporate the use of different tools, further abbreviation of work schedules or allowed scope during fire season, or enhancement to restoration outage protocols. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's grid operations and protocols programs will evolve. However, PacifiCorp anticipates that evolution in the form of changes to processes or available tools is most likely to occur within the next three years.
	Before the upcoming wildfire season	No planned evaluation at this time.

	Before the next annual update	No planned evaluation at this time.
	Within the next 3 years	PacifiCorp anticipates that evolution in the form of changes to processes or available tools is most likely to occur within the next three years.
	Within the next 10 years	Continued expansion of evolution.

5.3.6.4 Protocols for PSPS re-energization

Program Name	Grid operations and protocols
Initiative Name	Protocols for PSPS re-energization
Description	PacifiCorp considers re-energization after a PSPS event to be a subset of outage restoration / re-energization protocols included in Section 5.3.6.3. Therefore, PacifiCorp does not have a separate protocol for PSPS.

5.3.6.5 PSPS events and mitigation of PSPS impacts

Program Name	Grid operations and protocols
Initiative Name	PSPS events and mitigation of PSPS impacts
Description	The purpose of a PSPS is to limit the potential for overhead utility equipment creating an ignition source which could catastrophically impact communities. The implementation of a PSPS event, as it applied to wildfire mitigation, is focused on extreme elevated risk conditions and applies to a specific subset of PacifiCorp's service territory. Details regarding PacifiCorp's PSPS plans, including the regulatory requirements of proactive de-energization, the methodology applied to identify candidate de-energization zones, the potential impact to customers and communities, triggers for activation, subsequent communications and protocols, as well as lessons learned from 2019 and planned evolution of the program can be found in Section 4.4. Furthermore, PacifiCorp's protocols on PSPS events, including the company's strategy to minimum the public safety risk during high wildfire risk conditions as it applies to the implementation of a PSPS event, can be found in Section 5.6.2. At this time, PacifiCorp does not have an additional grid operations and protocols wildfire mitigation program not already included and discussed in Section 4.4 and Section 5.6.2.

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5.3.6.6 Stationed and on-call ignition prevention and suppression resources and services

Program Name	Grid operations and protocols
Initiative Name	Stationed and on-call ignition prevention and suppression resources and services
Description	PacifiCorp's stationed and on-call ignition prevention and suppression resources and services wildfire mitigation program includes two basic elements: (1) personal suppression equipment and (2) water truck resources. 1. **Basic Personal Suppression Equipment:** Personal safety is the first priority, and PacifiCorp Field Personnel are encouraged to evacuate and call 911 if necessary. Field Personnel working in the HFTD maintain the capability to extinguish a small fire which ignited while field personnel were working in the field. Field personnel should attempt suppression only if the fire is small enough so that one person can effectively fight the fire while maintaining their personal safety. All field personnel working in the HFTD during fire season will have basic suppression equipment available onsite, with field utility trucks will carrying the following equipment: (1) Fire Extinguisher; (2) Shovel; (3) Pulaski; (4) Water Container; and (5) Dust Mask. The water container should hold at least five gallons and may be a pressurized container or a backpack with a manual pump (or other approved container). Short term, these five items are required on any trucks performing work in the HFTD during fire season. Long term and to eliminate any administrative confusion, PacifiCorp plans to make such equipment standard on all trucks used for field work. Existing stocks of fire extinguishers rated ABC-5 pound minimum shall satisfy the requirement. New fire extinguishers, however, will be rated ABC-10 pound minimum, and area managers are encouraged to have any trucks frequently working in wildland areas equipped with fire extinguishers rated ABC-10 pound minimum. 2. **Water Truck Resources:** PacifiCorp also maintains additional equipment which may be used to respond to small ignitions. To be clear, these resources are not dispatched to reported fires (i.e. like a fire truck). Instead, PacifiCorp resources are strategically assigned to accompany field personnel if conditions warrant. For example, if it is necessary to perform work in the HFTD during a period in which there is a Red Flag Warning, PacifiCorp field operations may schedule a water truck to join field personnel working in the field. As discussed above, the water truck can be used to help prep the site for work. And in the extremely unlikely event there was an ignition, the water truck could be used to assist in the suppression of a small fire.

Timeline to Minimize Risk [Planned/ Implemented]		Implemented
Rationale for Program		Equipping field personnel and strategically locating suppression tools and resources can provide PacifiCorp with a strategic advantage to stop the growth of a spark or fire into a wildfire event. While not common, this program requires limited investment and is fairly simple to implement as compared to other wildfire mitigation programs.
Prioritization Approach		Prioritize implementation for field personnel or operations areas working in Tier 3 and Tier 2.
Plan for audits/quality checks		PacifiCorp performs an annual verification of available equipment as part of its overall fire season preparation. As a part of this exercise, local operations managers identify any deficiencies in required equipment, and take steps to close these gaps ensuring that these programs continue to be implemented year after year.
Planned demonstration of effectiveness over time		Demonstration of effectiveness of this program is the availability of these resources during an emergency event. This aspect is included in the overall after action review processes and requirements included in the company's emergency response programs in Section 5.3.9.
Planned Evolution	General	As with all of PacifiCorp's programs, the company intends to implement these processes, pilot new technologies or methods where appropriate, and translate lessons learned or effectiveness into program modification and evolution. Specific to stationed and on-call ignition prevention and suppression resources and services, this could incorporate the use of different tools, number of resources, or application of these resources. As PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know specifically how and when the company's grid operations and protocols programs will evolve. However, PacifiCorp anticipates that evolution in the form of changes to processes or available tools is most likely to occur within the next three years.
	Before the upcoming wildfire season	No planned evaluation at this time.
	Before the next annual update	No planned evaluation at this time.

	Within the next 3 years	PacifiCorp anticipates that evolution in the form of changes to processes or available tools is most likely to occur within the next three years.
	Within the next 10 years	Continued expansion of evolution.

5.3.6.7 Other not listed [only if an initiative cannot feasibly be classified within those listed above]

Program Name	Grid operations and protocols
Initiative Name	Other not listed [only if an initiative cannot feasibly be classified within those listed above]
Description	At this time, PacifiCorp does not have any additional grid operations and protocols wildfire mitigation programs.

The following table includes details regarding PacifiCorp's grid operations and protocols wildfire mitigation programs. PacifiCorp, where appropriate, mapped the 2019 WMP values to the most applicable program below. It is important note that spend associated with these programs are event-based. Therefore, PacifiCorp will continue to include applicable dollars in the company's planned dollars but it is expected that the use of these dollars with vary significantly and often be zero, such as the values reported in 2019 actuals. Additionally, the 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 26: Grid operations and protocols

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Automatic recloser operations	2019 plan	N/A	N/A	All - Regardless of the cause, this program reduces that potential that a fault scenario results in an ignition event	N/A	N/A	Reduces escalation should an ignition event occur through removal of subsequent fault event	New in 2019	N/A	2019 WMP Memorandum Account	Non-standard operating practice	N/A	Program is applicable to all HFTD OH lines
	2019 actual	1,200	$0										
	2020	1,200	$500										
	2021	1,200	$500										
	2022	1,200	$500										
	2020-2022 plan total	3,600	$500										
2. Crew-accompanying ignition prevention and suppression resources and services	2019 plan	PacifiCorp does not currently deploy crew-accompanying ignition prevention and suppression resources and services as part of its routine operational practices. When an emergency occurs, PacifiCorp communicates and collaborates with local emergency response teams as described in Section 5.3.9, which can include crew-accompanying ignition prevention and suppression resources and services. Additionally, during elevated risk conditions or during fire season, PacifiCorp leverages specific work practices and protocols and makes available specific resources and tools for use by operations personnel as included in Section 5.3.6.6. However, PacifiCorp does not currently have a specific grid operations and protocols wildfire mitigation program focused on crew-accompanying ignition prevention and suppression resources and services. As part of the annual WMP review process the use of these services will be re-evaluated and considered for future incorporation.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
3. Personnel work procedures and training in conditions of elevated risk	2019 plan	N/A	N/A	Equipment related ignition	N/A	N/A	Reduces escalation should an ignition event occur through removal of subsequent fault event	New in 2019	N/A	2019 WMP Memorandum Account	Non-standard operating practice	N/A	Program is applicable to all HFTD OH lines
	2019 actual	1,200	$0										
	2020	1,200	$917										
	2021	1,200	$917										
	2022	1,200	$917										
	2020-2022 plan total	3,600	$917										
4. Protocols for PSPS re-energization	2019 plan	PacifiCorp considers re-energization after a PSPS event to be a subset of outage restoration / re-energization protocols included in Section 5.3.6.3. Therefore, PacifiCorp does not have a separate protocol for PSPS.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
5. PSPS events and mitigation of PSPS impacts	2019 plan	At this time, PacifiCorp does not have an additional grid operations and protocols wildfire mitigation program not already included and discussed in Section 4.4 and Section 5.6.2.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
6. Stationed and on-call ignition prevention and suppression resources and services	2019 plan	N/A	N/A	N/A	N/A	N/A	Reduces escalation should an ignition event occur	New in 2019	N/A	2019 WMP Memorandum Account	Non-standard operating practice	N/A	Program is applicable to all HFTD OH lines
	2019 actual	1,200	$250										
	2020	1,200	$250										
	2021	1,200	$250										
	2022	1,200	$250										
	2020-2022 plan total	3,600	$250										

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
7.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan	At this time, PacifiCorp does not have any additional grid operations and protocols wildfire mitigation programs.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

5.3.7 Data governance

PacifiCorp has leveraged existing data sources to produce metrics supporting its WMPs, some of which are its data sources while others may be external data sources. In a small number of situations that 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 the new applications to be fed from existing sources (to the extent possible). The core data relates to outage data, which is collected and categorized consistent with IEEE 1366 & IEEE 1782 as well as Commission Decisions D.96-09-045 and D.16-01-008, while circuit equipment is derivative of the company's Geographic Information System. In keeping with the approach of leveraging existing repositories, the newly installed weather stations feed data in the University of Utah's Department of Atmospheric Science's Mesowest application, treating this resource as the repository for weather information from these and other weather stations. Additionally, the 2020 WMP is reliant upon other external data sources, such as the National Weather Service's Red Flag Warnings (as accessible through https://mesonet.agron.iastate.edu/info/data sets/vtec.html) features of elevated fire weather. If these external data sources alter process it could result in modifications in this correlating data, to which the company and other stakeholders need to be attentive.

5.3.7.1 Centralized repository for data

Program Name	Data governance
Initiative Name	Centralized repository for data
Description	Thorough and accurate data is required to ensure decisions made based upon that data can be repetitively and consistently evaluated to achieve the same conclusions through time. To the extent that data that underpins these decisions is highly subjective and has substantial uncertainty associated with it, repetition and consistent conclusions are not likely to occur. Data systems leveraged include outage and circuit topology (which are company repositories) in addition to weather, which is housed through the University of Utah's Mesowest.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	Accurate and reliable data is critical for analysis; repeatable queries on this data will allow for consistent analysis and persistent long-term strategies to be adopted through the WMPs.

Prioritization Approach		Data is prioritized most highly if it is core to the business processes, such as those associated with outage response, crew processes and facility information (such as outage data), as well as that which the company is directed to complete through regulation or statute (such as fire incident data). The next priority of data relates to that which is foundational to decisions that are developed responsive to business process or regulation, thus supporting the accomplishment of key initiatives (such as weather data underpinning risk analysis).
Plan for audits/quality checks		Outage data is quality checked as it is completed by assigned internal personnel. Fire incident data is quality checked by peer review (cross-department verification)
Planned demonstration of effectiveness over time		The effectiveness of the data collection processes the company's established are expected to be demonstrated by the ability to correctly and consistently supply key data as outlined through its 2020 WMP submission.
Planned Evolution	General	As the company discovers that its risk and prioritization methods are better served by additional targeted data it will augment the legacy data sources and attempt to retrospectively correlate any critical information, however, more probably the majority of additional detail will be prospectively available. Thus, early conclusions may be discovered to be better supported through these additional details.
	Before the upcoming wildfire season	No specific deliverables on this initiative are planned prior to the upcoming wildfire season.
	Before the next annual update	Develop methods to ensure programmatic associations among data sources; evaluate frequent refresh cycle for assessment on interim performance as compared to these data sources (i.e. outages and weather, ignitions and fire weather warnings, etc.)
	Within the next 3 years	Refresh data and ensure programmatic associations among data sources; evaluate and implement frequent refresh cycle for assessment on interim performance as compared to these data sources.
	Within the next 10 years	Refresh data and ensure programmatic associations among data sources; evaluate and implement frequent refresh cycle for assessment on interim performance as compared to these data sources.

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5.3.7.2 Collaborative research on utility ignition and/or wildfire

Program Name		Data governance
Initiative Name		Collaborative research on utility ignition and/or wildfire
Description		Collaborate with industry and academia to explore methods to quantify utility ignition risk, wildfire risk from utility ignitions and other phenomenon that are at the intersection of fire/utility/weather.
Timeline to Minimize Risk [Planned/ Implemented]		Planned and Implemented
Rationale for Program		Wildfire risk especially that related to utility ignitions, is a newly-emerging cross-technical area of expertise. The development of the California Fire Threat Map product in 2018 (that comprised several years of analysis and mapping/computational efforts) demonstrated the need for collaboration and structured assessment amongst the various technical specialties. Such efforts need to continue to be explored to ensure that best possible outcomes emerge, notably electrical system configuration and operational approaches will result in a broader range of possible variables that need to be appraised in identifying best practices.
Prioritization Approach		PacifiCorp will prioritize collaboration where it is able to fill in gaps not filled by other parties, given its unique position as a company which operates across six western states, with sister companies in additional states. Further, it has substantial experience in certain program areas and where those areas of expertise can more broadly support widespread benefit it will engage as such.
Plan for audits/quality checks		As opportunities become available PacifiCorp will review materials in a peer environment to model after academic processes. Further, it will support collaboration on an as-requested basis, recognizing the priorities outlined above.
Planned demonstration of effectiveness over time		As efforts are found beneficial they should be evidenced by PacifiCorp's performance against Tables 2,3,10 and 11. More broadly however, the aggregation of all utilities should demonstrate improved performance against these metrics. Finally, further models or other analytical products would evidence effectiveness of this approach.
Planned Evolution	General	PacifiCorp was an active participant in the development of the California Fire Threat Map. The involvement led to better map products for the state while it also resulted in better and quicker adoption of the product (and other regulations) into PacifiCorp's operating environment. This experience led to expansion into the other states the

		company serves as well as within its sister companies held by Berkshire Hathaway Energies, who further bench-tested the analytical approaches and mitigation measures devised.
	Before the upcoming wildfire season	PacifiCorp is currently involved in EEI collaboration with DOE regarding wildfire grid hardening and serves in a sponsor role for an upcoming Wildfire Technology Summit. It is also sharing WMP analysis and mitigation measures 2019 plans and actions through industry meetings such as with the IEEE Distribution Reliability Working Group.
	Before the next annual update	Continued involvement with the California Energy Commission's Next Gen Wildfire Modeling Project as a Technical Advisory Committee member.
	Within the next 3 years	Specific deliverables have not yet been defined, however as the scientific process proceeds it is expected that these interim deliverables will be introduced into the company's WMP.
	Within the next 10 years	Specific deliverables have not yet been defined, however as the scientific process proceeds it is expected that these interim deliverables will be introduced into the company's WMP.

5.3.7.3 Documentation and disclosure of wildfire-related data and algorithms

Program Name		Data governance
Initiative Name		Documentation and disclosure of wildfire-related data and algorithms
Description		Wildfire related data and algorithms are key elements in evaluating mitigation approaches and implementing those found to be the most effective. As external conditions continue to evolve, better vetted approaches will produce improved outcomes for stakeholders at least cost.
Timeline to Minimize Risk [Planned/ Implemented]		Implemented and Planned
Rationale for Program		Peer review of considered and adopted algorithms related to wildfire and utility operations will introduce opportunities for improvements of these approaches and adoption by others for whom such algorithms may advance their approaches toward wildfire mitigation.
Prioritization Approach		PacifiCorp considers data that drives PSPS decisions to be the highest priority, followed by data supportive of optimization of mitigation approaches, particularly those which are particularly costly.
Plan for audits/quality checks		As outlined previously, PacifiCorp has attempted to be transparent as to the influencers for PSPS and asset hardening approaches and expects to continue this approach. It will explore opportunities to engage parties who may have specific insight into aspects of the data which the company may not be familiar with.
Planned demonstration of effectiveness over time		It is expected that outcomes such as those evidenced in Tables 2, 3, 4, 10 and 11 will provide insight into the effectiveness of the measures.
Planned Evolution	General	PacifiCorp has provided transparency into its rationale during the filing and review process of its 2019 WMP. Further, during the establishment of its PSPS plans it outlined its foundational analysis to Public Safety Partners, including weather professionals and fire scientists. Concurrently PacifiCorp is participating in the active Proactive De-energization proceeding and will incorporate guidance established during that process into any relevant algorithms or risk quantification.

	Before the upcoming wildfire season	PacifiCorp intends to re-evaluate its PSPS triggers and determine the need for modifying the combination of KBDI, FFWI6 and wind gusts and explore whether a lower KBDI threshold should be considered that would likely be associated with a higher FFWI6 and wind gust. These products will again be reviewed by interested Public Safety Professionals, fire scientists and weather professionals.
	Before the next annual update	PacifiCorp anticipates continued assessment of PSPS thresholds, particularly after is has an additional fire season to complement its most recent fire season experience. Any approaches found particularly useful by stakeholders, regulators or other interested parties will be communicated.
	Within the next 3 years	PacifiCorp anticipates continued assessment of PSPS thresholds, particularly after is has additional fire seasons to review. Any approaches found particularly useful by stakeholders, regulators or other interested parties will be communicated.
	Within the next 10 years	PacifiCorp anticipates continued assessment of PSPS thresholds, particularly after is has additional fire seasons to review. Any approaches found particularly useful by stakeholders, regulators or other interested parties will be communicated.

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5.3.7.4 Tracking and analysis of near miss data

Program Name	Data governance
Initiative Name	Tracking and analysis of near miss data
Description	Near miss data may provide opportunities to evaluate conditions not conducive to ignition, which could help identify specific conditions, locations, topological or other specifics that are lower probability of ignition, while enabling the corollary conditions (i.e. actual ignitions) to be further analyzed.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	In PacifiCorp's 2019 WMP it proposed effectiveness measures that might be considered to be near miss data sources, specifically fault events (from its outage reporting system), fault events where fire was involved and ignition events. Those fault events which do not lead to ignition offer insight into environmental, operational and conditional information which might better inform future actions to mitigate utility-caused ignitions.
Prioritization Approach	Data prioritization will be targeted toward continuing to broadly categorize outage data as completely as possible using the proposed methods in the company's proposed effectiveness metrics in addition to continuing to explore the newly established ignition probability drivers developed for the 2020 WMP.
Plan for audits/quality checks	PacifiCorp has internally reviewed its proposed metrics, the relationships creating the ignition probability drivers and will be producing its fire incident data report, all of which can be made available for quality review. As the company analyzes this data it will discover opportunities for improving data quality which it will cycle into the data sets.
Planned demonstration of effectiveness over time	Assessment of near miss trends will demonstrate the effectiveness of programs adopted through the WMP, which are expected to be further evidenced through Tables 2, 3, 10 and 11.

Planned Evolution	General	PacifiCorp outlined its approach to assessing near miss analysis with the graphic depicted in Figure 1 in Section 3; to the extent that the fault events, ignitions and overlaps change these variations will support assessment of the variations. If however, variations in underlying tracking systems supporting this analysis occur, incorrect conclusions could result.
	Before the upcoming wildfire season	Review opportunities for further data quality improvements associated with data mapping of fault and ignition probability drivers, including components involved.
	Before the next annual update	Prepare refresh analysis of fault events, ignition probability drivers and involved components.
	Within the next 3 years	Prepare refresh analysis of fault events, ignition probability drivers and involved components; incorporate findings into risk analysis framework as appropriate for any regulatory requirements associated with risk based modeling systems.
	Within the next 10 years	Prepare refresh analysis of fault events, ignition probability drivers and involved components; incorporate findings into risk analysis framework as appropriate for any regulatory requirements associated with risk based modeling systems.

5.3.7.5 Other / not listed [only if an initiative cannot feasibly be classified within those listed above]

Program Name	Data governance
Initiative Name	Other / not listed [only if an initiative cannot feasibly be classified within those listed above]
Description	PacifiCorp does not have any other data governance wildfire mitigation programs at this time.

The following table includes details regarding PacifiCorp's data governance as it applies to the company's wildfire mitigation programs. The 2019 WMP did not include specific annual requirements and, therefore, PacifiCorp only provided the total proposed program units and costs. Including any 2019 plan values for WMP programs contemplated in the company's 2019 WMP would be confusing and not helpful in understanding progress or the company's overall programs as these values reflect the total multi-year program proposals.

Table 27: Data governance

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Centralized repository for data	2019 plan	PacifiCorp, at this time, does not have a specific data governance wildfire mitigation program focused on a centralized repository for data that maps to the tracking and level of details requested in this table. Additional details regarding PacifiCorp's plan and approach are included in Section 5.3.7.1.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
2. Collaborative research on utility ignition and/or wildfire	2019 plan	PacifiCorp, at this time, does not have a specific data governance wildfire mitigation program focused on a collaborative research on utility ignition and/or wildfire that maps to the tracking and level of details requested in this table. Additional details regarding PacifiCorp's plan and approach are included in Section 5.3.7.2.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
3. Documentation and disclosure of wildfire-related data and algorithms	2019 plan	PacifiCorp, at this time, does not have a specific data governance wildfire mitigation program focused on a documentation and disclosure of wildfire-related data and algorithms that maps to the tracking and level of details requested in this table. Additional details regarding PacifiCorp's plan and approach are included in Section 5.3.7.3.											
	2019 actual												
	2020												
	2021												
	2022												

	2020-2022 plan total	
4. Tracking and analysis of near miss data	2019 plan	PacifiCorp, at this time, does not have a specific data governance wildfire mitigation program focused on the tracking and analysis of near miss data that maps to the tracking and level of details requested in this table. Additional details regarding PacifiCorp's plan and approach are included in Section 5.3.7.4.
	2019 actual	
	2020	
	2021	
	2022	
	2020-2022 plan total	
5.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan	PacifiCorp does not have any other data governance other wildfire mitigation programs.
	2019 actual	
	2020	
	2021	
	2022	
	2020-2022 plan total	

5.3.8 Resource allocation methodology

At this time, PacifiCorp does not have a resource allocation methodology development and application program specifically focused on wildfire mitigation. Instead, PacifiCorp takes a more general approach, weighs the available resources, evaluates long lead timelines to procure materials, and overall wildfire risk associated with a geographic area to prioritize work and allocate resources. Compliance based activities take first priority while others are prioritized based on geographic wildfire Tier (Tier 2 vs Tier 3) and overall availability of materials. As opposed to prioritizing a certain type of program, PacifiCorp prioritizes the location of work to be completed 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 and avoid working in the same location multiple times. 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.

As previously described in Section 5.3 under the S-MAP and RAMP process for small and multijurisdictional utilities subheading, PacifiCorp, as a small and multijurisdictional utility, complies with the adopted methodology per D.19-04-020 regarding the company's S-MAP and RAMP process. As is expected with small and multijurisdictional utilities per D.19-04-020, PacifiCorp has adhered to the 10 RAMP Elements in the Company's GRC testimony but still remains in the early stages of the S-MAP and RAMP process.

Many of the elements requested in this 2020 WMP filing may not be applicable to PacifiCorp, specifically many of the components requested in this section. At the guidance of the Wildfire Safety Division of the California Public Utilities Commission,[47] these elements are marked "does not apply" or "not applicable" throughout the company's filing. However, PacifiCorp fully anticipates that as the company progressing through the S-MAP and RAMP process, these sections will become applicable and will be subsequently amended in future updates.

[47] Clarified in an email from Melissa K. Semcer, Program Manager Wildfire Safety Division at the California Public Utilities Commission on January 6, 2019.

5.3.8.1 Allocation methodology development and application

Program Name	Resource allocation methodology
Initiative Name	Allocation methodology development and application
Description	N/A – See general approach described in Section 5.3.8.

5.3.8.2 Risk reduction scenario development and analysis

Program Name	Resource allocation methodology
Initiative Name	Risk reduction scenario development and analysis
Description	N/A

5.3.8.3 Risk spend efficiency analysis

Program Name	Resource allocation methodology
Initiative Name	Risk spend efficiency analysis
Description	N/A

5.3.8.4 Other / not listen [only if an initiative cannot feasibly be classified within those listed above]

Program Name	Resource allocation methodology
Initiative Name	Other / not listen [only if an initiative cannot feasibly be classified within those listed above]
Description	N/A

The following table includes details regarding PacifiCorp's resource allocation methodology as it applies to the company's wildfire mitigation programs.

Table 28: Resource allocation methodology

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	What proceeding has reviewed	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Allocation methodology development and application	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - While PacifiCorp remains fully committed to the continued development and improvement of the company's risk based decision making framework, many of the elements requested in this 2020 WMP filing may not be applicable to PacifiCorp, specifically many of the components requested in this section. At the guidance of the Wildfire Safety Division of the California Public Utilities Commission, these elements are marked "does not apply" or "not applicable" throughout the company's filing.											
2. Risk reduction scenario development and analysis	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - While PacifiCorp remains fully committed to the continued development and improvement of the company's risk based decision making framework, many of the elements requested in this 2020 WMP filing may not be applicable to PacifiCorp, specifically many of the components requested in this section. At the guidance of the Wildfire Safety Division of the California Public Utilities Commission, these elements are marked "does not apply" or "not applicable" throughout the company's filing.											
3. Risk spend efficiency analysis	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - While PacifiCorp remains fully committed to the continued development and improvement of the company's risk based decision making framework, many of the elements requested in this 2020 WMP filing may not be applicable to PacifiCorp, specifically many of the components requested in this section. At the guidance of the Wildfire Safety Division of the California Public Utilities Commission, these elements are marked "does not apply" or "not applicable" throughout the company's filing.											
4.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - While PacifiCorp remains fully committed to the continued development and improvement of the company's risk based decision making framework, many of the elements requested in this 2020 WMP filing may not be applicable to PacifiCorp, specifically many of the components requested in this section. At the guidance of the Wildfire Safety Division of the California Public Utilities Commission, these elements are marked "does not apply" or "not applicable" throughout the company's filing.											

5.3.9 Emergency planning and preparedness

PacifiCorp's emergency planning and preparedness wildfire mitigation programs and overall 2020 WMP were developed in support of the company's overall Emergency Response Plan and integrate fully with the Utilities Code section 786.6 and GO-166. This Emergency Response Plan includes the tactics, policies, and procedures which are used in response to any emergency incident or planned event which impacts or has the potential to impact assets or customers within PacifiCorp's service territory. High level elements of this plan include but are not limited to:

- Elevated risk situational awareness notification processes in preparation of a potential emergency;
- Standardized hazard analysis;
- Emergency internal and external communication methods, protocols, and requirements during an emergency;
- Emergency notification protocols and processes;
- Resource availability and predetermined response times between areas of operation;
- Mutual assistance protocols and capability;
- Authority, governance, and key contacts; and
- After action reporting requirements to identify gaps and incorporate lessons learned.

PacifiCorp's Emergency Response Plan follows the National Incident Management System (NIMS) and the Incident Command System (ICS), and it is the foundation for the company's response to all crisis and emergencies. Consequently, PacifiCorp's Emergency Response Plan follows the all-hazards approach, which includes coordinating with other utilities and all levels of government. The plan supports an organized and efficient response to a wide variety of events of differing magnitudes. The all-hazard plan is a management tool providing a scalable response, organizational structure, procedures for information management, operational activities, a smooth transition to restoring normal services and the implementation of post-incident actions.

While described in the company's overall Emergency Response Plan, this basic approach is applicable with respect to any type of emergency event including wildfire events ranging from a relatively small wildfire that a local CALFIRE suppression agency is able to control, to the larger wildfire events which require a coordinated interagency response. As a result, PacifiCorp's internal response structure is organized for a wildfire event in a manner substantially identical to any other incident requiring an emergency response.

Executive Policy Group

The PacifiCorp Executive Policy Group consists of executives and administrators from key internal organizations and is activated based on the severity of the incident and need for strategic support. As part of the structure, the group collects and analyzes information, makes high-level strategic and procedural decisions, assists in the continuation of critical business processes, and helps facilitate cross-platform incident coordination in support of those responsible for managing the incident. Concerns for public safety is a key consideration in determining the need to activate the Executive Policy Group.

Emergency Operations Center (EOC)
Bringing representatives from various PacifiCorp organizations together in an Emergency Operations Center (EOC) optimizes unity of effort and enables staff to share information, provide policy guidance to on-scene personnel, plan for contingencies, deploy resources efficiently, and generally provide any support necessary. The composition of the team may vary depending on the nature and complexity of the incident.

Emergency Response / Service Restoration
Activation of the response function takes place according to the escalating threat, human impacts or severity of the incident. Most local incidents can be handled at the district operating level; but some incidents, like some wildland fires, require resources and support beyond the capabilities and authority of the district or regional operating area. Incidents that threaten the company as a whole (e.g. contagious disease, cyber-attacks), or place the company's stability at risk, may require high level management, strategic policy and financial decisions, crisis communications or other crisis management functions. Typically, even a relatively large wildfire would not threaten the company as whole, but a large, uncontrolled wildfire threatening catastrophic damage to people and property could require such crisis management functions. Operations return to normal as soon as practical, which typically occurs when the incident no longer needs the support and coordination functions provided by the EOC. If support functions can be managed by individual organizations through normal procedures, operations may return to normal.

Pre-incident Preparedness
If an event is anticipated or advanced warning is received (i.e. a winter storm warning), pre-incident activities may be implemented in advance of an actual event. Forecasts of extreme wildfire conditions may warrant pre-incident activities. These activities may include deploying additional response personnel and resources, customer and stakeholder advanced notification, and situational monitoring of wildfire conditions, such as wind speed, temperature, humidity and fuel conditions (all of which might contribute to the ignition and/or spread of a wildland fire).

Response to Incidents
The level of response is dictated by the seriousness of the incident. Incidents may be localized, or they may require support from an Emergency Operations Center. Moderate outage events and localized incidents require localized plan activation. In general, however, localized incidents can be quickly resolved with internal resources. These incidents have little or no impact on the public or normal operations and are managed by supervisors in the impacted district or area.

More complex outage events and potential threats which are beyond the scope of local management often require coordination of a considerable amount of resources, extended involvement and contact with internal business units and external stakeholders, and the potential for the incident to expand rapidly. This type of incident disrupts a significant number of customers, includes extended restoration time, or a perceived threat to service exists beyond the level where normal operating practices and local resources are sufficient to respond, and requires Emergency Operations Center activation. This type of incident might include, for example, a wildland fire, severe weather forecasts, or a security threat. Additional personnel from surrounding operations districts may be required to respond.

Mutual Assistance
Electric utilities have the ability to call upon other electric companies for emergency assistance, in the form of personnel, material or equipment, to aid in maintaining or restoring electric service when such service has been disrupted by acts of the elements, sabotage or equipment malfunctions. PacifiCorp is a member of several regional and national mutual assistance agreements with electric service providers. Parties to these agreements can request or provide assistance and resources to other members to support the restoration of electrical service when it cannot be restored in a timely manner by the affected company alone.

Community Outreach / External Collaboration
Dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management. The outage restoration call-back program is an automated system that simultaneously initiates call backs to hundreds or thousands of customers providing updated estimated times for restoration and to verify service has been restored. Communication with customers, key internal and external stakeholders and all levels of management as early as possible is key. The PacifiCorp Joint Information System (JIS) consists of processes and tools to facilitate communication with the public, news organizations, government entities and external stakeholders through social media, website restoration information, press releases and notification protocols while ensuring the messaging is consistent and comprehensive.

Regional Business Managers
PacifiCorp regional business managers maintain company relationships with local government jurisdictions and community organizations. Regional business managers are the primary contact for local leadership and critical customers in their area of responsibility.

District Operations Managers
District operations managers maintain relationships and exchange contact information with local first responders. In the event of a wildland fire, district managers deploy to the jurisdictional agency's Incident Command Post (ICP) to ensure electric safety awareness. The district operations manager acts as the liaison between the ICP and PacifiCorp's Control Center and Emergency Operations Center.

Emergency Managers
PacifiCorp's emergency management team interfaces and maintains relationships with federal and state emergency responders and mutual assistance groups. The 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 dispatch centers for fire-related emergency response.

Training, Exercises and Continuous Improvement
An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities. It is critical individuals having responsibility for functions within the incident command system

are familiar with their responsibilities and have practiced 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. The incident command system is activated periodically throughout the year in the normal course of operations. An annual exercise is conducted to ensure that individuals otherwise not involved in incident management on a regular basis are practiced in responding.

PacifiCorp has a goal of continuous incident management improvement. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.

1. A description of how plan is consistent with disaster and emergency preparedness plan prepared pursuant to Public Utilities Code Section 768.6, including:

As previously described, PacifiCorp's emergency planning and preparedness wildfire mitigation programs and overall 2020 WMP were developed in support of the company's overall Emergency Response Plan and integrate fully with the Utilities Code section 786.6 and GO-166.

While PacifiCorp follows an identical approach to both emergency management of wildfire events and other emergency events, PacifiCorp recognizes that the specifics of emergency management for wildfire events can vary from other types of emergency management in terms of both preparation and response. For example, the governmental emergency responders with whom PacifiCorp will coordinate will be different in a wildfire as compared to other types of events. For small wildfires, PacifiCorp personnel will likely work directly with local CALFIRE personnel; for larger wildfires, PacifiCorp management will likely coordinate with an incident command center which could involve representatives of both state and federal agencies, likely including the Bureau of Land Management or the National Forest Service. Furthermore, preparation activities, fire precaution levels and relevant tools may differ significantly.

Where appropriate, PacifiCorp's emergency response plan components specific to Fire Prevention, Preparedness and Response not contemplated in the company's Emergency Response Plan have been included in the Fire Prevention, Preparedness, and Response Plan filed per GO 166 Attachment E.[48] Since originally filed in 2018, PacifiCorp has incorporated additional elements and details[49] such as incorporation of risk assessment, system resilience, and situational awareness aspects from the WMP into the company's Fire Prevention, Preparedness, and Response

[48] PacifiCorp's General Order 166 Attachment E, Fire Prevention, Preparedness, and Response Plan, or FPP, initially filed on 10/31/2018.
[49] As indicated in CPUC Data Request 1.7

Plan in an attempt to make the Fire Prevention Plan more analogous to a playbook describing the operational readiness and response in the event of a wildfire.

As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution.

a. *Plans to prepare for and restore service, including workforce mobilization (including mutual aid and contractors) and prepositioning equipment and employees*

As with any response, PacifiCorp will attempt to preposition personnel and equipment into impacted areas in a proactive manner. However, PacifiCorp understands not every event supports a proactive approach but still maintains the ability to move personnel and equipment into impacted areas after the start of an event. Depending on the size and type of event, PacifiCorp will first deploy its internal workforce and then supplement the workforce with contractors. Should the event grow beyond the ability of the internal and contract workforce, PacifiCorp would reach out to others via mutual assistance agreements.

Electric utilities have the ability to call upon other electric companies for emergency assistance, in the form of personnel, material or equipment, to aid in maintaining or restoring electric service when such service has been disrupted by acts of the elements, sabotage or equipment malfunctions. PacifiCorp is a member of several regional and national mutual assistance agreements with electric service providers. Parties to these agreements can request or provide assistance and resources to other members to support the restoration of electrical service when it cannot be restored in a timely manner by the affected company alone. Details regarding membership, activation, notification, resource departure and arrival are all included in PacifiCorp's Emergency Response Plan. PacifiCorp intends to leverage these same programs and elements for emergency management of wildfire events.

b. *Emergency communications, including community outreach, public awareness, and communications efforts before, during, and after a wildfire in English, Spanish, and the top three primary languages used in California other than English or Spanish, as determined by United States Census data*

Dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management. Communications efforts are listed in the WMP, Emergency Response Plan and PSPS Playbook which provides both messaging and cadence for public and stakeholder communications throughout the preparation, response and restoration cycle. The outage restoration call-back program is an automated system that simultaneously initiates call backs to hundreds or thousands of customers providing updated estimated times for restoration and to verify service has been restored. Communication with customers, key internal and external stakeholders and all levels of management as early as possible is key. The PacifiCorp Joint Information System consists of processes and tools to facilitate communication with the public, news organizations, government entities and external stakeholders through social media, website restoration information, press

releases and notification protocols while ensuring the messaging is consistent and comprehensive. Additional information regarding PacifiCorp's community outreach, public awareness, and communication efforts can be found in Section 5.3.9.2.

c. Showing that the utility has an adequate and trained workforce to promptly restore service after a major event, taking into account mutual aid and contractors

PacifiCorp has dedicated resources in the California service territory available to respond as needed to events. In addition to the resources in California, PacifiCorp has internal resources from Oregon and Washington that can be deployed. In the event these resources are insufficient, mutual assistance agreements can also be deployed. The table below provides the approximate count of construction / response craft positions available to support California operations. While this count is relatively representative of available resources, these numbers may fluctuate as personnel change. Additionally, in the event these resources are insufficient, mutual assistance agreements can also be deployed as described in the previous section.

Location	Field Support	Field Responders	Total
California	10	30	45
Oregon and Washington	102	370	550
Total	112	400	595

2. Customer support in emergencies, including protocols for compliance with requirements adopted by the CPUC regarding activities to support customers during and after a wildfire, including

In reporting outages, PacifiCorp will continue its use of the company's customer outage management protocols and its real time outage map to inform customers regarding the presence and location of outages as well as the estimated restoration plans, consistent with standard operating practices. 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 5.3.6.4.

PacifiCorp has also implemented a variety of consumer protections and procedures to assist the company's customers when a disaster impacts their communities, consistent with 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. In considering which of these protections to implement and the duration of the relief so provided the type, scale, and size of the event are evaluated and a program is developed commensurate with 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.

Specific details regarding these programs are included below.

a. Outage reporting

Specific to wildfire mitigation, PacifiCorp intends to enhance outreach through customer contact center to provide impacted customers with information regarding service interruptions, restoration efforts, along with relief support by adding to the scripts a high-level overview of customer protections, including directing the caller to the company webpage(s).

b. 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 12-month period has lapsed or potentially longer;
- Contact all community outreach contractors, community based organizations who assist in enrolling hard-to reach low-income customers, to better inform customers of these eligibility changes; and
- Partner with program administrator 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.

c. Billing adjustments

PacifiCorp's billing adjustments include the ability to pro-rate monthly bill and any charges to the date of the emergency or subsequent damage to customer premises, and recalibrate approach for estimating energy usage during when premises are unoccupied as a result of the disaster to avoid estimating errors.

d. Deposit waivers

In the event of a wildfire emergency, PacifiCorp can waive deposit and late fee requirements for one year from the declared emergency.

e. Extended payment plans

In the event of a wildfire emergency, affected customers with existing service or those seeking to establish service at a new residence, who have prior arrearage, are offered a payment plan with 20 percent due, with equal installments for the remainder for no less than twelve billing cycles with no interest.

f. Suspension of disconnection and nonpayment fees

In the event of a wildfire emergency, PacifiCorp may suspend disconnection for non-payment and associated fees, and eliminate reporting to credit reporting agencies or any collection services for unpaid

g. Repair processing and timing

Immediately after the emergency, an assessment is made to identify the premises of affected customers whose utility service had been disrupted or degraded and, if applicable, the meter is removed.

h. Access to utility representatives

In the event of a wildfire emergency, 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.

3. Coordination with Public Safety Partners, such as stationing utility personnel in county Emergency Operations Centers

Similar to PacifiCorp's general approach to emergency management, The Emergency Response Plan has procedures for the integration of utility personnel into the public sector response structure for an incident or event requiring electric utility support and coordination. If the public sector requests personnel to the Emergency Operations Center they will be made available.

PacifiCorp's emergency management team interfaces and maintains relationships with federal and state emergency responders and mutual assistance groups. The 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 dispatch centers for fire-related emergency response. District operations managers also maintain relationships and exchange contact information with local first responders regularly. In the event of an incident where emergency operations are established, such as a wildland fire, 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. The district operations manager or identified company representative acts as the liaison between the ICP and PacifiCorp's Control Center and Emergency Operations Center. Furthermore, PacifiCorp regional business managers maintain company relationships with local government jurisdictions and community organizations. Regional business managers are the primary contact for local leadership and critical customers in their area of responsibility

In preparation throughout the year, PacifiCorp also participates in various regulatory proceedings, town hall meetings, and open house events to engage other industry leaders, community leaders and members, and local emergency response management organization. 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.

4. Describe the utility efforts to identify which additional languages are in use within the utility's service territory, including plan to identify and mitigation language access challenges.

PacifiCorp uses a multi-faceted effort to communicate information regarding wildfire prevention and response to customers. Communication methods include the following: targeted radio public service announcements; social media posts on Facebook and Twitter; informative banners on website homepage, wildfire safety landing page on website; targeted bill messages; press releases posted to our website and distributed to local media; news articles for local chamber publications; prepared talking points for regional business managers; pre-determined outreach to local community authorities and organizations to participate in prevention and preparedness focused town halls; and live informative Facebook events. Additional information regarding PacifiCorp's community outreach, public awareness, and communication efforts can be found in Section 5.3.9.2. The following subsection include detailed descriptions of PacifiCorp's emergency planning and preparedness wildfire mitigation initiatives. Each of these programs is ultimately governed by PacifiCorp's Emergency Response Plan and Fire Prevention, Preparedness, and Response Plan.

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5.3.9.1 Adequate and trained workforce for service restoration

Program Name	Emergency planning and preparedness
Initiative Name	Adequate and trained workforce for service restoration
Description	This program includes the implementation of training, tools, work processes, and procedures to ensure PacifiCorp maintains an adequate and trained workforce for service restoration, with a specific focus on wildfire preparedness and restoration efforts in response to a wildfire or PSPS event. To ensure the identified workforce have the proper wildfire mitigation training, each year refresher training is provided to applicable field employees within the HFTD. This involves reviewing operating practices that reduce wildfire risk while performing routine work and confirming the availability of fire mitigation / suppression tools before fire season. To ensure adequate workforce levels are available when required, PacifiCorp has access to additional resources in other service territory areas that can be deployed as needed. Additionally, PacifiCorp is a member of mutual assistance agreements with partnering utilities that provides access to even more resources if required when responding to an event.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	When an emergency or major events occurs, it is critical the resources tasked with rebuilding infrastructure to restore service are sufficient and work in such a way as to not escalate risk. Similar to when performing planned or routine work, PacifiCorp field operations are able to mitigate some wildfire risk by utilizing specific operating procedures during fire season in heightened fire risk areas. **Trained:** While PacifiCorp is experienced with and prepared to respond to emergency events, responding to an emergency involving a wildfire event 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 to use specialized tools or monitor and react to changing weather patterns. **Adequate:** In certain situations the required resources to respond to an event, or restore after an event can be more than what is available in the local district on a daily basis. For these cases where an event exceeds the local district's

		capability to respond, PacifiCorp needs to be able to have access to additional resources to ensure adequate resources can be deployed to mitigate or respond to the wildfire event.
Prioritization Approach		While access to available resources is a system wide program the specific wildfire mitigation training is prioritized for staff actively working within the HFTD zones in California. However, as the company may pull from additional resources during an emergency, PacifiCorp provides the training to all applicable employees that might respond to a wildfire event.
Plan for audits/quality checks		In general as part of the 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. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.
Planned demonstration of effectiveness over time		An effective response to any event is determined by the ability to implement a coordinated response for restoration and recovery activities, which includes, as a component, the availability of an adequate and trained workforce. This determination would be evaluated as part of the post event lessons learned process.
Planned Evolution	General	As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when each program will evolve. However, where appropriate, PacifiCorp has provided the company's estimate.
	Before the upcoming wildfire season	Complete training in HFTD operations locations
	Before the next annual update	Continued training regarding wildfire response in non-HFTD locations
	Within the next 3 years	Continued evolution based on lessons learned.

	Within the next 10 years	Continued evolution based on lessons learned.

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5.3.9.2 Community outreach, public awareness, and communication efforts

Program Name	Emergency planning and preparedness
Initiative Name	Community outreach, public awareness, and communication efforts
Description	Dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management. This program also incorporates creation of reading materials and guides, maintenance and upkeep of a wildfire safety specific publicly available website, the use of print, email, and phone notifications, as well as in person communication with communities at public information sessions and town hall meetings.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	While PacifiCorp is working hard to reduce wildfire risk associated with potential utility ignition, it is also critical that customers and member of communities throughout the company's service territory take steps to be prepared during wildfire season and mitigate localized wildfire risk. These steps might include creating an emergency plan or kit, updating contact information, and creating a defensible space through tree trimming and brush clearing around dwellings. Communication of these potential steps is key. Additionally, dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management to ensure an event does not escalate and that restoration activities can be performed safely and efficiently.
Prioritization Approach	This program applies company-wide with an initial prioritization in the highest risk areas such as Tier 2 and Tier 3.
Plan for audits/quality checks	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. As a part of these events, 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. PacifiCorp has a goal of continuous incident management improvement which includes, as a component, effective community outreach, public awareness, and communication effort. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document. Additionally, PacifiCorp leverages existing customer service processes and local leaders to capture feedback and improve communications, including the accessibility and content of the company's website.
Planned demonstration of effectiveness over time		An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities which, as a component, includes effectivities community outreach, public awareness, and communication efforts.
Planned Evolution	General	As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when each program will evolve. However, where appropriate, PacifiCorp has provided the company's reasonable best estimate.
	Before the upcoming wildfire season	Continued implementation of 2019 work with an update of new recommendations and planned activities
	Before the next annual update	No anticipated or planned evolution at this time.
	Within the next 3 years	While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when this program will evolve. However, PacifiCorp anticipates a change in either the frequency, type, or platform of communication due to changing technologies, customer preference, and changing risks/needs.
	Within the next 10 years	Continued evolution of frequency, type, or platform/method of communication due to changing technologies, customer preference, and changing risks/needs

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5.3.9.3 Customer support in emergencies

Program Name	Emergency planning and preparedness
Initiative Name	Customer support in emergencies
Description	This program includes PacifiCorp's consumer protections and procedures implemented to assist the company's customers when a disaster impacts their communities, consistent with D.18-03-011. The consumer protections include, but may not be limited to the following: • Waiving deposit requirements for customers in the affected area; • Expediting opening and closing accounts and new services; • Suspending energy usage estimates when the structures are unoccupied during the emergency event; • Discontinuing billing, including minimum billings for customers incapable of receiving electric service; • Offering long-term payment plans (up to 12 months) on amounts in arrears for customers impacted by the emergency event; • Discontinuing disconnections and late fees for non-payment in designated areas; • Freezing standard and high-usage reviews for CARE customers. See Section 5.3.9 for more details.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	When emergencies occur, depending on the type, scale, and size of the event, customers may require support ranging from outage communication and estimated restoration times to discontinuation of billing or application of minimum billing. Additionally communication and support is required during a PSPS event for customers and communities, including known vulnerable customers and critical facilities.
Prioritization Approach	System wide application

Plan for audits/quality checks		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. As a part of these events, 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. PacifiCorp has a goal of continuous incident management improvement which includes, as a component, customer support in emergencies. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document. Additionally, PacifiCorp leverages existing customer service processes and local leaders to capture feedback and improve communications, including the accessibility and content of the company's website.
Planned demonstration of effectiveness over time		An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities which, as a component, includes customer support.
Planned Evolution	General	As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when each program will evolve. However, where appropriate, PacifiCorp has provided the company's reasonable best estimate.
	Before the upcoming wildfire season	Continued implementation of program
	Before the next annual update	Continued implementation of program

	Within the next 3 years	While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when this program will evolve. However, PacifiCorp anticipates potential evolution of regulatory requirements or a shift in customer needs in the next three years.
	Within the next 10 years	Continued evolution of and integration of new needs/requirements.

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5.3.9.4 Disaster and emergency preparedness plan

Program Name	Emergency planning and preparedness
Initiative Name	Disaster and emergency preparedness plan
Description	The details regarding PacifiCorp's emergency preparedness plan are included in the general discussion in Section 5.3.9 beginning on page 105. Wildfire mitigation specific components are also included in the general discussion beginning on page 105.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	PacifiCorp's emergency planning and preparedness wildfire mitigation programs and overall 2020 WMP were developed in support of the company's overall Emergency Response Plan and integrate fully with the Utilities Code section 786.6 and GO-166. Additionally, disaster and emergency preparedness plan remains a critical cornerstone of the company's processed and procedure to ensure the safe delivery of reliable power. Specific to wildfire risk mitigation, this plan ensures that PacifiCorp is prepared to respond to a wildfire event, reducing the potential for escalation and accelerating restoration.
Prioritization Approach	This program applies company-wide with an initial prioritization in the highest risk areas such as Tier 2 and Tier 3.
Plan for audits/quality checks	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. As a part of these events, 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. PacifiCorp has a goal of continuous incident management improvement which includes, as a component, the disaster and emergency preparedness plan. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.
Planned demonstration of effectiveness over time		An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities, which includes, as a component, the disaster and emergency preparedness plan.
Planned Evolution	General	As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when each program will evolve. However, where appropriate, PacifiCorp has provided the company's reasonable best estimate.
	Before the upcoming wildfire season	Continued implementation of plan in CA with specific elements focused on response efforts in the HFTD
	Before the next annual update	No anticipated or planned evolution at this time.
	Within the next 3 years	While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when this program will evolve. However, PacifiCorp anticipates a change in either the regulatory requirements or risk assessment and hazards that require a shift or evolution to the program in the next three years.
	Within the next 10 years	Continued evolution of the plan per lessons learned and After Action Reviews

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5.3.9.5 Preparedness and planning for service restoration

Program Name	Emergency planning and preparedness
Initiative Name	Preparedness and planning for service restoration
Description	The details regarding PacifiCorp's emergency preparedness plan are included in the general discussion in Section 5.3.9 beginning on page 105. Wildfire mitigation specific components are also included in the general discussion beginning on page 105.
Timeline to Minimize Risk [Planned/ Implemented]	Implemented
Rationale for Program	PacifiCorp's emergency planning and preparedness wildfire mitigation programs and overall 2020 WMP were developed in support of the company's overall Emergency Response Plan and integrate fully with the Utilities Code section 786.6 and GO-166. Additionally, disaster and emergency preparedness plan remains a critical cornerstone of the company's processed and procedure to ensure the safe delivery of reliable power. Specific to wildfire risk mitigation, this plan ensures that PacifiCorp is prepared to respond to a wildfire event, reducing the potential for escalation and accelerating restoration.
Prioritization Approach	This program applies company-wide with an initial prioritization in the highest risk areas such as Tier 2 and Tier 3.
Plan for audits/quality checks	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. As a part of these events, 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. PacifiCorp has a goal of continuous incident management improvement which includes, as a component, the preparedness and planning for service restoration. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.
Planned demonstration of effectiveness over time		An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities, which includes, as a component, the overall preparedness and planning for service restoration.
Planned Evolution	General	As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution. While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when each program will evolve. However, where appropriate, PacifiCorp has provided the company's reasonable best estimate.
	Before the upcoming wildfire season	Continued implementation of plan in CA with specific elements focused on response efforts in the HFTD
	Before the next annual update	No anticipated or planned evolution at this time.
	Within the next 3 years	While PacifiCorp is early in the implementation of its multi-year WMP, it is challenging to know exactly how and when this program will evolve. However, PacifiCorp anticipates a change in either the regulatory requirements or risk assessment and hazards that require a shift or evolution to the program in the next three years.
	Within the next 10 years	Continued evolution of the plan through After Action Reviews

5.3.9.6 Protocols in place to learn from wildfire events

Program Name	Emergency planning and preparedness
Initiative Name	Protocols in place to learn from wildfire events
Description	PacifiCorp's leverages existing systems and processes included in the company's Emergency Response Plan to learn from wildfire events in the same manner PacifiCorp learns from any emergency event. Therefore, PacifiCorp does not have a specific program for incorporation of lessons learned that is not already covered in a previous program. As is further described in Section 5.3.9, An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities. It is critical that individuals having responsibility for functions 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. 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. PacifiCorp has a goal of continuous incident management improvement. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.

5.3.9.7 Other / not listed [only if an initiative cannot feasibly be classified within those listed below]

Program Name	Emergency planning and preparedness
Initiative Name	Other / not listed [only if an initiative cannot feasibly be classified within those listed below]
Description	PacifiCorp does not, at this time, have any other emergency planning and preparedness wildfire mitigation programs

The following table includes details regarding PacifiCorp's emergency planning and preparedness as it applies to the company's wildfire mitigation programs.

Table 29: Emergency planning and preparedness

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Adequate and trained workforce for service restoration	2019 plan	N/A - System Wide	N/A - Not a specifically budgeted program	N/A - Response related	N/A	N/A	Reduces risk of escalation; Supports accelerated restoration to reduced impact of an event on communities	Existing with wildfire specific modifications	GRC	N/A	N/A	GO 166	Program is an extension of existing emergency management programs
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
2. Community outreach, public awareness, and communication efforts	2019 plan	N/A - System Wide	N/A - Not a specifically budgeted program	Contact from objects	N/A	N/A	Reduces risk of escalation; Supports accelerated restoration to reduced impact of an event on communities	Existing with wildfire specific modifications	GRC	N/A	N/A	GO 166	Community outreach reduces the potential of third party contact and supports restoration
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
3. Customer support in emergencies	2019 plan	N/A - System Wide	N/A - Not a specifically budgeted program	N/A - Response related	N/A	N/A	Reduces risk of escalation; Supports accelerated restoration to reduced impact of an event on communities	Existing with wildfire specific modifications	GRC	N/A	N/A	R.18-12-005	Program is an extension of existing emergency management programs
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
4. Disaster and emergency preparedness plan	2019 plan	N/A - System Wide	N/A - Not a specifically budgeted program	N/A - Response related	N/A	N/A	Reduces risk of escalation; Supports accelerated restoration to reduced impact of an event on communities	Existing with wildfire specific modifications	GRC	N/A	N/A	GO 166	Program is an extension of existing emergency management programs
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
5. Preparedness and planning for service restoration	2019 plan	N/A - System Wide	N/A - Not a specifically budgeted program	N/A - Response related	N/A	N/A	Reduces risk of escalation; Supports accelerated restoration to reduced impact of an event on communities	Existing with wildfire specific modifications	GRC	N/A	N/A	GO 166	Program is an extension of existing emergency management programs
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
6. Protocols in place to learn from wildfire events	2019 plan	PacifiCorp's leverages existing systems and processes included in the company's Emergency Response Plan to learn from wildfire events in the same manner PacifiCorp learns from any emergency event. Therefore, PacifiCorp does not have a specific program for incorporation of lessons learned that is not already covered in a previous program.											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												
7.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan	PacifiCorp does not, at this time, have any other emergency planning and preparedness wildfire mitigation programs											
	2019 actual												
	2020												
	2021												
	2022												
	2020-2022 plan total												

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5.3.10 Stakeholder cooperation and community engagement

5.3.10.1 Community engagement

Program Name	Stakeholder cooperation and community engagement
Initiative Name	Community engagement
Description	While PacifiCorp is working hard to reduce wildfire risk association with potential utility related ignition, it is also critical that customers and member of communities throughout the company's service territory take steps to be prepared during wildfire season and mitigate localized wildfire risk. As included in Section 5.3.9.2, these steps might include creating an emergency plan or kit, updating contact information, and creating a defensible space through tree trimming and brush clearing around dwellings. Communication of these potential steps is key. Additionally, dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management, including preparation for emergencies throughout the year. As part of this preparation, PacifiCorp participates in various regulatory proceedings, town hall meetings, and open house events to engage other industry leaders, community leaders and members, and local emergency response management organization. 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. Furthermore, PacifiCorp uses a multi-faceted effort to communicate information regarding wildfire prevention and response to customers and communities. Communication methods include the following: targeted radio public service announcements; social media posts on Facebook and Twitter; informative banners on website homepage, wildfire safety landing page on website; targeted bill messages; press releases posted to our website and distributed to local media; news articles for local chamber publications; prepared talking points for regional business managers; pre-determined outreach to local community authorities and organizations to participate in prevention and preparedness focused town halls; and live informative Facebook events. Finally, as a part of PacifiCorp's standard operating procedures and resource structure, Regional Business Managers, PacifiCorp employees that live and work within the communities served, typically lead PacifiCorp's involvement in these initiatives to ensure the community is being engaged with consistently regarding all relevant programs, including wildfire mitigation programs.

	However, at this time, PacifiCorp does not have a specific stakeholder cooperation and community engagement wildfire mitigation program focused on community engagement. While PacifiCorp values community engagement as a wildfire risk mitigation strategy, the company has incorporated, as an element, stakeholder cooperation and community engagement as a component of its overall Emergency Response Programs as included in Section 5.3.9.2.

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5.3.10.2 Cooperation and best practice sharing with agencies outside CA

Program Name	Stakeholder cooperation and community engagement
Initiative Name	Cooperation and best practice sharing with agencies outside CA
Description	PacifiCorp actively participates in regulatory proceedings, workshops, and initiatives as a part of the company's wildfire mitigation efforts. Additionally, as PacifiCorp operates in 6 different states throughout the western United States, the company is well positioned to cooperate, communicate, and collaborate with agencies and organizations outside of California. PacifiCorp broadly shares experience with stakeholders, communities, and relevant agencies across these six states. Examples of such opportunities include participation in special meetings and presentations called by the Commissioners in Oregon, wildfire preparation town halls in high risk communities, collaboration with the Oregon Department of Forestry to enhance restoration planning and situational awareness, and internal best practices sharing between peers throughout PacifiCorp. Furthermore, as a part of Berkshire Hathaway Energy, PacifiCorp is able to share lessons learned across multiple utilities throughout the US, Canada, and the United Kingdom and inform program development and evolution, including, as an example, active participation and best practices sharing with regulators in Alberta, Canada. While values exists in cooperation and best practice sharing with agencies outside of California, PacifiCorp, at this time, does not have a specific stakeholder cooperation and community engagement wildfire mitigation plan focused on cooperation and best practice sharing with agencies outside California.

5.3.10.3 Cooperation with suppression agencies

Program Name	Stakeholder cooperation and community engagement
Initiative Name	Cooperation with suppression agencies
Description	Similar to PacifiCorp's general approach to emergency management, The Emergency Response Plan has procedures for the integration of utility personnel into the public sector response structure for any incident or event, including wildfire events. In times of emergencies, PacifiCorp's emergency management group interfaces and maintains relationships with federal and state emergency responders and mutual assistance groups, including fire suppression agencies. The 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 dispatch centers for fire-related emergency response. Therefore, as opposed to having a separate program, at this time, cooperation with suppression agencies is a component of the company's emergency planning and preparedness programs outlined in Section 5.3.9.

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5.3.10.4 Forest service and fuel reduction cooperation and joint roadmap

Program Name	Stakeholder cooperation and community engagement
Initiative Name	Forest service and fuel reduction cooperation and joint roadmap
Description	As described in PacifiCorp's' vegetation management programs and in Section 5.3.5, PacifiCorp has worked with and made joint efforts with the Edison Electric Institute and other utilities to collaborate with federal agencies to expedite approvals for vegetation management work on transmission and distribution facilities. PacifiCorp representatives participated in the drafting of an agreement specifically aimed at building collaboration between the federal agencies and the utilities on these issues. As a result, the Memorandum of Understanding on Vegetation Management for Powerline Rights-of-Way, dated September 29, 2016, was signed by the Edison Electric Institute, Utility Arborist Association, the National Park Service, United States Fish and Wildlife Service, Bureau of Land Management (BLM), United States Forest Service, and the United States Environmental Protection Service. The purpose of the MOU is to facilitate cooperation and coordination among the parties regarding vegetation management within and immediately adjacent to existing and future powerline right of ways and associated facilities. The MOU facilitates "implementation of cost effective and environmentally sound vegetation management plans, procedures, and practices for powerline ROWs that will reduce adverse environmental and cultural impacts while enhancing the ability of utilities to provide uninterrupted electrical service to customers and address public safety." (MOU at 4.) These efforts culminated in the recent 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. The new law, codified at 43 U.S.C.A. § 1772, establishes 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. PacifiCorp understands that the BLM and the USFS, the two federals agencies responsible for the lands where PacifiCorp's rights-of-way are located, are engaged in a rulemaking to "develop a consolidated and coordinated process for the review and approval of plans." 43 U.S.C.A. § 1772(c)(4)(A). When those regulations are finalized, PacifiCorp plans to submit a vegetation management plan under 43 U.S.C.A. § 1772(c)(1) to both the BLM and the USFS. Additionally, PacifiCorp collaborates with local emergency responders or state organizations as needed to reduce fuel and facilitate improved escape or evacuation routes, which includes the forest service. For example, in 2019 Governor Gavin Newsom directed CALFIRE to determine which communities within each county had the greatest wildfire risk.

	CALFIRE determined the Lake Shastina area as one of the high priority project areas. As a result, PacifiCorp partnered with CALFIRE in Big Springs, California on the Lake Shastina Fuels Reduction Project to improve escape routes for residents and access for emergency responders. This project involved clearing 100 feet on each side of road of State Highway 97, Big Springs Road and 2 miles west on Jackson Rach Road. Any utility distribution or transmission facilities that fell within the 100' clearing were also targeted for tree removal in associated rights of ways. Trees and vegetation that had potential to grow into facilities (non-compatible vegetation) and brush were removed in a distribution utility corridor and 2 transmission corridors that fell within the footprint of the CALFIRE fuel reduction project. CALFIRE also removed all brush species, thinned small trees to provide 20-30' spacing and pruned all remain trees 6-8' above ground. While collaboration such as this is critical to the overall reduction of wildfire risk in the state of California, PacifiCorp, at this time, does not have a specific program dedicated to this effort. Instead, these efforts are on an as-needed basis and incorporates additional efforts to manage community environments within other programs, such as those included in Section 5.3.9.2 and Section 5.3.10.1 and the company's overall vegetation management and inspections programs described in Section 5.3.5.

5.3.10.5 Other / not listed [only if an initiative cannot feasibly be classified within those listed above]

Program Name	Stakeholder cooperation and community engagement
Initiative Name	Other / not listed [only if an initiative cannot feasibly be classified within those listed below]
Description	At this time, PacifiCorp does not have any other stakeholder cooperation and community engagement programs.

The following table includes details regarding PacifiCorp's stakeholder cooperation and community engagement wildfire mitigation programs.

Table 30: Stakeholder cooperation and community engagement

Initiative activity	year	Line miles to be treated	Spend/treated line mile	Ignition probability drivers targeted	Risk reduction	risk-spend efficiency	Other risk drivers addressed	Existing/new	Existing: What proceeding has reviewed program	If new: Memorandum account	In/exceeding compliance with regulations	Cite associated rule	Comments
1. Community engagement	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	However, at this time, PacifiCorp does not have a specific stakeholder cooperation and community engagement wildfire mitigation program focused on community engagement. While PacifiCorp values community engagement as a wildfire risk mitigation strategy, the company has incorporated, as an element, stakeholder cooperation and community engagement as a component of its overall Emergency Response Programs as included in Section 5.3.9.2.											
2. Cooperation and best practice sharing with agencies outside of CA	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	N/A - System Wide	N/A - Not a specifically budgeted program	All	N/A	N/A	Reduces risk of escalation through support of accelerated restoration	Existing	N/A	N/A	N/A	N/A	N/A
3. Cooperation with suppression agencies	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	In times of emergencies, PacifiCorp's emergency management group interfaces and maintains relationships with federal and state emergency responders and mutual assistance groups, including fire suppression agencies. The 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 dispatch centers for fire-related emergency response. Therefore, as opposed to having a separate program, at this time, cooperation with suppression agencies is a component of the company's emergency planning and preparedness programs outlined in Section 5.3.9.											
4. Forest service and fuel reduction cooperation and joint roadmap	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	While collaboration such as this is critical to the overall reduction of wildfire risk in the state of CA, PacifiCorp, at this time, does not have a specific program dedicated to this effort. Instead, these efforts are on an as-needed basis and incorporates additional efforts to manage community environments within other programs, such as those included in Section 5.3.9.2 and Section 5.3.10.1 and the company's overall vegetation management and inspections programs described in Section 5.3.5.											
5.Other/not listen [only is an initiative cannot feasibly be classified within those listen above]	2019 plan 2019 actual 2020 2021 2022 2020-2022 plan total	At this time, PacifiCorp does not have any other stakeholder cooperation and community engagement programs.											

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5.3.11 Definitions of initiative activities by category

Category	Initiative	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 modelling based on various relevant weather scenarios	Development and use of tools and processes to estimate incremental risk of foreseeable climate scenarios, such as drought, across 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.
	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 risk-spend efficiency 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 shall inform operational decision-making.
	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 shall inform operational decisions.

Category	Initiative	Definition
	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.
	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.

Category	Initiative	Definition
	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 CALFIRE-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).
	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).

Category	Initiative	Definition
	Updates to grid topology to minimize risk of ignition in 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 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
	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.
	Infrared inspections of distribution electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using infrared (heat-sensing) technology and cameras that can identify "hot spots", or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
	Infrared inspections of transmission electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using infrared (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).
	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.

Category	Initiative	Definition
	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 GO165, 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 in the course of 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 in the course of 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 shall 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 subcontractors, 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 to plan and execute vegetation management work or promotion of fire-
	Detailed inspections of vegetation around distribution electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
	Detailed inspections of vegetation around transmission electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
	Emergency response vegetation management due to red flag warning or other urgent 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 reduction of “slash” from vegetation management activities	Plan and execution of fuel management activities that reduce the availability of fuel in proximity to potential sources of ignition, including both reduction or adjustment of live fuel (in terms of species or otherwise) and of dead fuel, including "slash" from vegetation

Category	Initiative	Definition
		management activities that produce vegetation material such as branch trimmings and felled trees.
	Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
	LiDAR inspections of vegetation around distribution electric lines and equipment	Inspections of 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 vegetation around transmission electric lines and equipment	Inspections of 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).
	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 in the course of 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 in the course of other company business
	Quality assurance / quality control of vegetation inspections	Establishment and function of audit process to manage and confirm work completed by employees or subcontractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
	Recruiting and training of vegetation management personnel	Programs to ensure that the utility is able to identify and hire qualified vegetation management personnel and to ensure that both full-time 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.
	Remediation of at-risk species	Actions taken to reduce the ignition probability and wildfire consequence attributable to at-risk vegetation species, such as trimming, removal, and replacement.

Category	Initiative	Definition
	Removal and remediation of trees with strike potential to electric lines and equipment	Actions taken to remove or otherwise remediate trees that could potentially strike electrical equipment, if adverse events such as failure at the ground-level of the tree or branch breakout within the canopy of the tree, occur.
	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 inventory system	Inputs, operation, and support for centralized inventory of vegetation clearances updated based upon inspection results, including (1) inventory of species, (2) forecasting of growth, (3) forecasting of when growth threatens minimum right-of-way clearances ("grow-in" risk) or creates fall-in/fly-in risk.
	Vegetation management to achieve clearances around electric lines and equipment	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.
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.
	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 were 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 local 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.

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Category	Initiative	Definition
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
	Collaborative research on utility ignition	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 modelling capabilities for different risk reduction scenarios based on wildfire mitigation initiative implementation; analysis and application to utility decision-making.
	Risk spend efficiency 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 Access and Functional Needs 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.

Category	Initiative	Definition
	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 Access and Functional Needs 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 CALFIRE, federal fire authorities, county fire authorities, and local CALFIRE 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.
	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).

5.4 Methodology for enterprise-wide safety risk and wildfire-related risk assessment

The fundamental inputs outlining wildfire risk are explored in Section 3, but relate substantially to the limitation of fault events that could result in ignition, and these risks vary with time of year, largely due to the impactful role that environment plays in sustaining ignitions that lead to wildfire. Additionally, PacifiCorp actively participated in the development of the California Fire Threat map and leveraged that process, which aligns with other utilities who participated in the development, to identified specific geographic areas subject to elevated risk. PacifiCorp leveraged this assessment to inform inspection, vegetation management, correction timeframes, and prioritized hardening efforts. This assessment is consistent with other utilities

Outside of the California Fire Threat map development, the company's 2018 GRC established a generalized approach for enterprise-wide safety risk, and as the assessment of the case evolved, it coincided fortuitously with the establishment of newly strengthened wildfire mitigation regulations as adopted through General Orders 95, 165 and 166. As a small multi-jurisdictional utility, PacifiCorp was not required to develop a RAMP (Risk Assessment Model Program) which includes at its core elements quantifying risk spend efficiencies; it relies upon substantial data and analytical methods which may be cost-burdensome for the small customer base it serves to fund. Thus the SMJUs were directed to provide data rationalizing investment that demonstrated that the underlying principles of cost versus risk efficiency existed generally through the prioritization of its programs. In its rate case and supported through data requests, the company met that requirement. However, the establishment of SB901 and now WSD-directed WMPs expands further this effort on the company's part, specifically relating to wildfire risk.

5.5 Planning for workforce and other limited resources

In the event workforce or other resources are limited, PacifiCorp is a member of several mutual assistance groups which would provide either manpower, resources or logistical assistance. Mutual assistance partners may also release contract crews from duties on their property to aid in any response we may request. PacifiCorp has historically both sent and received mutual assistance for responses which were beyond the local capability with successful results each time. These plans are able to be immediately implemented without need for additional negotiation thus providing resources as soon as logistically possible, usually less than 24 hours. Additional details are included in Section 5.3.9.

As included in Section 5 Part C, one area of concern that continues to be a challenge regarding the successful implementation of PacifiCorp's multi-year WMP, is the availability of qualified resources and materials. While PacifiCorp maintains its commitment to deliver the company's wildfire mitigation programs and projects as proposed, it is critical to recognize that, as these projects and programs are subject to continuous evaluation in an effort to drive continuous improvement, specifics may need to change and adapt to moving market conditions, resource constraints, and lessons learned. PacifiCorp intends to keep a close eye on these potential changes, which the company will incorporate into future Off-Ramp filings.[50] Furthermore, as included in Section 5.3.3, PacifiCorp recently formed a Wildfire Mitigation Delivery Project Management Office within the transmission and distribution operations department and assigned a Wildfire Mitigation Delivery Director to lead the effort. The Wildfire Mitigation Implementation PMO will be responsible for planning, tracking, completion, and quality assurance of PacifiCorp's grid design and system hardening programs. While this department remains in its early stages and is not yet fully formed, the office intends to explore and develop a quality assurance process throughout the life cycle of the programs, which would include the procurement of critical resources and the identification of any shortages regarding the construction phases of applicable programs.

[50] As required in Decision 19-05-036.

5.6 Expected outcome of a 3-year plan

5.6.1 Planned utility infrastructure construction and upgrades

PacifiCorp outlined in its 2019 WMP that it intended to implement a wide range of situational assessment, asset hardening, operational strategies and inspection/correction programs, all specifically tuned to minimize the impact of wildfire that could be the result of utility ignitions. The details of each of these programs were included in Tables 22-30, with the overall program targets summarized in Table 4 of Section 2.5. To reflect the company's planned utility infrastructure construction and upgrades, see GIS data attached in Appendix 6.5 and the summary below.

PacifiCorp calculates cost of service regarding all applicable customers during rate case proceedings. These costs are generally socialized across the system at a level greater than per circuit or per customer, making location specific cost of service calculations challenging to create and potentially mis-leading if used to inform decisions or analysis. Therefore, it was challenging for PacifiCorp to provide the level of detail requested in this section. However, where appropriate, PacifiCorp has provided infrastructure construction and upgrades planned over the next three years in the summary below.

Program Details			Total Program Targets		3-yr Planned Outcome		Underlying assumptions
Program	Initiative	Duration	Total Planned Unit(s)	Anticipated Completion (EOY)	Unit(s)	Cumulative Percent Complete of Total Plan (%)	
Situational Awareness	Weather Station Installation	Multi-year (4 yr)	35 stations	2022	20 stations	80%	See Section 5.3.2.1
Asset management and inspections	Enhanced transmission inspections using IR/alternate technologies	Single pilot project (2 yr)	1 Pilot Project	2020	1 Pilot Project	100%	See Section 5.3.4.5
	Complete planned inspections, including additional HFTD inspections	Annual program/target	3,311 equivalent line miles	Annual / on-going	3,311 equivalent line miles	100%	See Section 5.3.4.3
	Implement LiDAR inspection pilot project for distribution and transmission lines	Single pilot project (2 yr)	1 Pilot Project	2020	1 Pilot Project	100%	See Section 5.3.4.7

Program Details			Total Program Targets		3-yr Planned Outcome		Underlying assumptions
Program	Initiative	Duration	Total Planned Unit(s)	Anticipated Completion (EOY)	Unit(s)	Cumulative Percent Complete of Total Plan (%)	
System Hardening:	Installation of Covered Conductor	Multi-year (5 yr)	221 line-miles	2023	147 line-miles	78%	See Section 5.3.3.3
	Replacement of Cu Conductor	Multi-year (5 yr)	53 line miles	2023	42 line miles	79%	See Section 5.3.3.18
	Installation of System Automation Equipment	Multi-year (4 yr)	68 projects	2022	68 projects	100%	See Section 5.3.3.9
	Proactive Wood Pole Replacement	Multi-year (5 yr)	4,000	2023	1,149 poles	85%	See Section 5.3.3.6
Vegetation Management and Inspections:	Perform annual inspections on all lines in the HFTD	Annual program/target	1,170 line miles	Annual / on-going	1,170 poles	100%	See Section 5.3.5.2 & Section 5.3.5.3
Vegetation Management and Inspections:	Implement radial pole clearing program	Annual program/target	15,060 poles	Annual / on-going	15,060 poles	100%	See Section 5.3.5.9

The data sets required to populate Table 31 as requested are not readily available or representative of typical data sets used by the company to operate the system. Additionally, PacifiCorp does not have any experience in forecasting the type of conditions, such as weather and environmental conditions, that are required to predict trends in ignition probability drivers and, therefore, found it challenging to populate the table as requested. Furthermore, it is challenging to apply system wide data sets to location specific projects and provide quantitative future values. PacifiCorp does anticipates a general reduction in utility-related fault events within PacifiCorp's service territory during fire season within the HFTD after the implementation of the company's WMP as described in Section 4.3. While the company will be in a position to be less vulnerable to utility operational events that could result in ignition and could threaten communities it serves upon implementation of these proposed mitigation programs, PacifiCorp was not able to populate the table below with specific values.

Table 31: Change in drivers of ignition probability taking into account planned initiatives, for each year of plan

Incident type by ignition probability driver	Detailed risk driver	Are near missed tracked?	Number of incidents per year			Average percentage likelihood of ignition per incident			Number of ignitions per year		
			2020	2021	2022	2020	2021	2022	2020	2021	2022
Contact from object	Animal contact	n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
	Balloon contact	n									
	Other	n									
	Unknown	n									
	Veg. contact	n									
	Vehicle contact	n									
Contamination		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
All types of equipment/ facility failure	All types	n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
	Conductor	n									
	Crossarm	n									
	Fuse	n									
	Insulator	n									
	Lightning arrestor	n									
	Other	n									
	Pole	n									
	Sectionalizer	n									
	Splice/clamp/connector	n									
	Switch	n									
	Transformer	n									
	Voltage regulator	n									
Normal Operations		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
Other		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
Unknown		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
Vandalism/Theft		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								

Incident type by ignition probability driver	Detailed risk driver	Are near missed tracked?	Number of incidents per year			Average percentage likelihood of ignition per incident			Number of ignitions per year		
			2020	2021	2022	2020	2021	2022	2020	2021	2022
Wire-to-wire contact		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								
Contact from 3rd party		n	No discrete data available; General reducing trend anticipated specific to fire season within PacifiCorp's service territory within the HFTD								

5.6.2 Protocols on Public Safety Power Shut-off

The following subsections describe PacifiCorp's protocols on Public Safety Power Shut-off (PSPS or de-energization), including:

5.6.2.1 *Strategy to minimize public safety risk during high wildfire risk conditions and details of the considerations, including but not limited to list and description of community assistance locations and services provided during a de-energization event.*

PacifiCorp's strategy to minimize the public safety risk during high wildfire risk conditions begins with proper planning and clear communication and encompasses elements from many of the programs already included in this plan.

As described in Section 5.3.10.1, PacifiCorp participates in various regulatory proceedings, town hall meetings, and open house events to engage other industry leaders, community leaders and members, and local emergency response management organization. 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, including the implementation of potential PSPS events.

Furthermore, PacifiCorp uses a multi-faceted effort to communicate information regarding wildfire prevention and response to customers and communities. Communication methods include the following: targeted radio public service announcements; social media posts on Facebook and Twitter; informative banners on website homepage, wildfire safety landing page on website; targeted bill messages; press releases posted to our website and distributed to local media; news articles for local chamber publications; prepared talking points for regional business managers; pre-determined outreach to local community authorities and organizations to participate in prevention and preparedness focused town halls; and live informative Facebook events.

Finally, as a part of PacifiCorp's standard operating procedures and resource structure, Regional Business Managers, PacifiCorp employees that live and work within the communities served, typically lead PacifiCorp's involvement in these initiatives to ensure the community is being engaged with consistently regarding all relevant programs, including wildfire mitigation programs.

In preparation of a PSPS event, PacifiCorp leverages the notification process and protocols included in Section 4.4.3 which includes additional notification to vulnerable customers as well as public safety authorities, local municipalities, and emergency responders. These notifications provide affected parties with additional time to prepare for a potential PSPS event in order to mitigate the impact.

During a PSPS event, PacifiCorp leverages the communication protocols included in Section 4.4.3 as well as general emergency communication and protocols included in Section 5.3.9 to ensure customers and communities have up to date and accurate information that informs good decision making. Furthermore, PacifiCorp offers various customer care services during an emergency as described in Section 5.3.9.

Additionally, during a PSPS event PacifiCorp partners with local support organizations (Red Cross, etc.) to coordinate, setup and communicate the location of any community shelters, if required based on the anticipated duration of the event. Services at these locations would include company personnel to respond to inquiries regarding the PSPS event and provide a charging station for mobile devices. Information about these shelters would be posted on the PacifiCorp website and shared with local emergency services.

Furthermore, the totality of the company's wildfire mitigation programs includes, as a component, improvements to mitigate or reduce PSPS events. While the company's many wildfire mitigation programs, such as installation of covered conductor, installation and operation of weather stations, or enhanced inspections and corrections, are designed and focused to reduce the overall wildfire risk, PacifiCorp anticipates that, as these programs evolve, an additional benefit may be realized through the reduction of potential PSPS events. Further details regarding PacifiCorp's grid topology improvements to mitigate or reduce PSPS events are included in Section 5.3.3.8.

5.6.2.2 *Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization (e.g., decision tree).*

Evident in all aspects from the identification of PSPS candidates to the determination of execution of a PSPS event, PacifiCorp's PSPS program and protocols focus on ensuring public safety while maintaining an effective balance between wildfire risk reduction and impact to communities and customers.

For example, as opposed to applying a PSPS to all of PacifiCorp's HFTD service territory, PacifiCorp incorporated location specific grid topology and configuration, terrain, fire history, presence of wildland urban interface, defensible space, impacts to customers and facilities, fuel characteristics and weather into the existing fire risk mapping designations to identify specific areas within each Tier 3 or Tier 3 adjacent location where a public safety power shut-off should be considered. Furthermore, these geographic locations were further subdivided based on grid topology and risk factors to reduce the impact of any single PSPS event in a given area, resulting in five discreet areas. These five discreet areas, where applicable, were further subdivided into approximately three sub-zones, each which different classification of risk and, therefore, different, escalating thresholds for activation.

Furthermore, PacifiCorp takes a strategic and methodical approach in determining when and where to implement and PSPS event. The company leverages weather predictions to prepare for a potential PSPS event but evaluate live data, and to the extent available, local data to make any final determinations. The specific triggers and measurements as well as monitoring systems used to inform a potential PSPS event initiation and duration are included in Section 4.4.

5.6.2.3 *Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol.*

To mitigate the risk of issues being present on a circuit that is ready to be re-energized following a PSPS protocol, field operations performs a line patrol on de-energized sections of the circuit. This patrol is completed just before re-energizing the line. Typically, this type of line patrol does not

involve a close inspection of any particular facility; instead, it is a quick visual assessment specifically targeted to identify obvious foreign objects which may have fallen into the line during restoration work or PSPS event.

5.6.2.4 *Company standards relative to customer communications, including consideration for the need to notify priority essential services –critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies. This section, or an appendix to this section, shall include a complete listing of which entities the electrical corporation considers to be priority essential services. This section shall also include description of strategy and protocols to ensure timely notifications to customers, including access and functional needs populations, in the languages prevalent within the utility's service territory.*

As included in Section 4.4, in the event of Proactive De-energization, identified personnel will receive an email notification from System Operations. The email will include the current or forecasted weather conditions triggering an event, the affected area, and the date and time of the event. The goal is to begin notifying customers 48 hours in advance of a potential de-energization event. If this is not possible due to weather or any other changing conditions, the notification process will begin as soon as possible.

Customer Communications

- The list of affected customers (generated by System Operations from the impacted circuits noted in the De-Energization Event Plan) is sent to the Customer Contact Center
- Using this list, the contact center will begin sending notifications utilizing preapproved templates for each state of the notification process.

During the PSPS event, customers will receive updates to the status of the outage. The trigger for an update will be when the status of the outage or the estimated time of restoration changes. If a previously noticed proactive de-energization event is cancelled, customers will receive a cancellation notice.

Method of Notification

- Customers will be contacted by text, email, or phone call based on their preference. If no preference is selected, a phone call will be made to the primary phone number on the account.
- Notifications for a proactive de-energization event are exempted from the 48 hour notification prior to a planned outage as required under Rule 25 under both the Force Majeure and Safety clauses listed under approved exemptions.
- Messages will be posted on social media, local media, and press release.

Timeframe for Communications	Type of Notification	Customer Service/Communications
48 hours before De-Energization	**Conditional**	48 hour notice to customers (including critical priority customers) Emergency response site goes live Notification posted on website, Social Media and emergency response site Mobilize local authorities for a live stream on Facebook Issue a press statement/release Mandatory manager call for local employees impacted
2 hours	**Updated Conditional**	2 hour notice to customers (including critical priority customers) Notification posted on website, Social Media and emergency response site Mobilize local authorities for a live stream on Facebook Issue a press statement/release Mandatory manager call for local employees impacted
1 hour	**Imminent**	Mobilize local authorities for a live stream on Facebook Mandatory manager call for local employees impacted
De-Energization	**Immediate**	Notification posted on website, Social Media and emergency response site Mobilize local authorities for a live stream on Facebook Issue a press statement/release
Re-Energization	**Immediate**	Notice of cancellation customers (including critical priority customers) Notification posted on website, Social Media and emergency response site Issue a press statement/release

Outreach in Advance of the Implementation of a Public Safety Power Shut-Off

PacifiCorp provides information regarding proactive de-energization on the public website, including the following:

- Actions taken to harden the system to reduce risk,
- Monitoring conditions,
- Criteria for triggering a PSPS event,
- Map of tiers in California,
- Notification before, during, and at the conclusion on an event,
- Restoration information,
- PSPS candidate zones,
- PSPS zone status and forecasting leading up to and during a PSPS event, and
- Available community resources.

Additionally, PacifiCorp intends to communicate through additional methods such as social media, twitter, Facebook, pamphlets, and radio as described above as well as Section 5.3.10.1.

Access and Functional Needs Customers

Known vulnerable customers (medical conditions, etc.) will receive additional outreach from the company requesting they evaluate the safety of their situations and consider a back-up plan in case of a shut off or any emergency outage. PacifiCorp also refers to these customers as AFN, or access and functional needs customers, identified through the process described in Section 2.7.

Public Safety Authorities, Local Municipalities, Emergency Responders

The company's Emergency Manager will notify the appropriate local agencies based on the PSPS zone that was activated. PacifiCorp will work with agencies to minimize the impact of de-energization as much as possible and fully communicate the impacted areas and expected duration. The notification will be documented for reporting purposes after the event has ended.

List of Priority Essential Services

PacifiCorp provided critical facilities and AFN customers as part of the GIS data set submission in Section 6.0. At the guidance of the WSD, specific customer data has not been included. However, a general list and summary of categorical critical facilities and AFN customers is included in the tables below.

PSPS Zone Name	Critical Facilities	AFN Customers
Happy Camp	25	0
Weed	41	0
Mt. Shasta	88	2
Dunsmuir	23	1
Snowbrush	8	0

An additional breakdown of the critical facilities included in each PSPS candidate zone is included below.

PDZ	Critical Facility Type	Total
Dunsmuir	Air/water/solid waste	3
	Elementary & secondary schools	3
	Fire protection	1
	Police	1
	Radio and communication equipment	11
	Sewerage	1
	Water supply	3
Dunsmuir Total		**23**
Happy Camp	Air/water/solid waste	5
	Child day care	1
	Elementary & secondary schools	3
	Fire protection	1
	Police	1
	Radio and communication equipment	7
	Residential care	2
	Sewerage	5

PDZ	Critical Facility Type	Total
Happy Camp Total		**25**
Mt Shasta	Air/water/solid waste	1
	Child day care	2
	Elementary & secondary schools	17
	Fire protection	6
	Gen med hospital	4
	Police	3
	Radio and communication equipment	27
	Residential care	1
	Sewerage	6
	Skilled nursing facility	1
	Specialty hospital	1
	Water supply	19
Mt Shasta Total		**88**
Snowbrush	Radio and communication equipment	8
Snowbrush Total		**8**
Weed	Air/water/solid waste	1
	Child day care	1
	Colleges, universities	4
	Elementary & secondary schools	4
	Fire protection	2
	Gen med hospital	1
	Jail	1
	Radio and communication equipment	22
	Sewerage	1
	Skilled nursing facility	1
	Water supply	3
Weed Total		**41**

5.6.2.5 *Protocols for mitigating the public safety impacts of these protocols, including impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies.*

PacifiCorp's strategy to mitigate public safety risk during high wildfire risk conditions includes mitigating impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies. Similar to the identification of vulnerable customers, PacifiCorp identifies critical customers that have the potential to be affected by a PSPS event, such as hospitals, other utilities, and critical infrastructure for the community. The presence of these critical facilities is not only incorporated into the overall identification of potential PSPS candidates but also informs notification and communication protocols in preparation for and during a PSPS event.

6. Utility GIS Attachments

The requested GIS layers have been electronically included in this filing as attachments.

6.1 Recent weather patterns

The following table includes the requirements and GS data naming convention included in Attachment 6.1

GIS Naming Convention			Properties from Tables in Section 2.7		
Attachment location	**GIS File-geodatabase file name**	**GIS Layer Name**	**Layer name**	**Measurements**	**Units**
6.1	Data_Table8.gdb	WWA_PAC_FW_2015-2019_Durations_Grid	Recent weather patterns	Average annual number of Red Flag Warning days per square mile across service territory	Area, days, square mile resolution
	Data_Table8.gdb	Ave95_99th_PercentileWind_Grid		Average 95th and 99th percentile wind speed and prevailing direction (actual)	Area, miles per hour, at a square mile resolution or better, noting where measurements are actual or interpolated

6.2 Recent drivers of ignition probability

The following table includes the requirements and GS data naming convention included in Attachment 6.2

GIS Naming Convention			Properties from Tables in Section 2.7		
Attachment location	**GIS File-geodatabase file name**	**GIS Layer Name**	**Layer name**	**Measurements**	**Units**
6.2	Data_Table8.gdb	Ignition_Probability_Grid	Recent drivers of ignition probability	Date of recent ignitions categorized by ignition probability driver	Point, GPS coordinate, days, square mile resolution

6.3 Recent use of PSPS

The following table includes the requirements and GS data naming convention included in Attachment 6.3.

GIS Naming Convention			Properties from Tables in Section 2.7		
Attachment location	**GIS File-geodatabase file name**	**GIS Layer Name**	**Layer name**	**Measurements**	**Units**
6.3	N/A	N/A	Recent use of PSPS	Duration of PSPS events and area of the grid affected in customer hours per year	Area, customer hours, square mile resolution

6.4 Current baseline state of service territory and utility equipment

The following table includes the requirements and GS data naming convention included in Attachment 6.4.

GIS Naming Convention			Properties from Tables in Section 2.7		
Attachment location	**GIS File-geodatabase file name**	**GIS Layer Name**	**Layer name**	**Measurements**	**Units**
6.4	Data_Table9MapLayer1.gdb	HFTD_Grid	Current baseline state of service territory and utility equipment	Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory	Area, square mile resolution per type
		LANDUSE_Grid		Urban vs. rural vs. highly rural regions of utility service territory	Area, square mile resolution per type
		WUI_Grid		WUI regions of utility service territory	Area, square mile resolution
		Critical_Facilities		Number and location of critical facilities	Point, GPS coordinate
		Customer_Grid		Number and location of customers	Area, number of people, square mile resolution
		CustomerAFN_Grid		Number and location of customers belonging to access and functional needs populations functional needs populations	Area, number of people, square mile resolution
		Distirbution_Line_OH		Overhead transmission lines	Line, quarter mile resolution
		Transmission_Line		Overhead distribution lines	Line, quarter mile resolution
		Distribution_Sub & Transmission_Sub		Location of substations	Point, GPS coordinate
		Weather_Stations		Location of weather stations	Point, GPS coordinate
		All_poles		All utility assets by asset type, model, age, specifications, and condition	Point, GPS coordinate

6.5 Location of planned utility equipment additions or removal

The following table includes the requirements and GS data naming convention included in Attachment 6.5.

GIS Naming Convention			Properties from Tables in Section 2.7		
Attachment location	**GIS File-geodatabase file name**	**GIS Layer Name**	**Layer name**	**Measurements**	**Units**
6.5	Data_Table9MapLayer2.gdb	Lines_HFTD	Location of planned utility equipment additions or removal	Non-HFTD vs HFTD (Zone 1, Tier 2, Tier 3) regions of utility service territory	Line, quarter mile resolution
		Lines_LandUse		Urban vs. rural vs. highly rural regions of utility service territory	Line, quarter mile resolution
		Lines_LandUse00		WUI regions of utility service territory	Line, quarter mile resolution
		Transmission_Line		Circuit miles of overhead transmission lines	Line, quarter mile resolution
		Distirbution_Line		Circuit miles of overhead distribution lines	Line, quarter mile resolution
		Substation		Location of substations	Point, GPS coordinate

6.6 Planned 2020 WMP initiative activity by end-2022

The following table includes the requirements and GS data naming convention included in Attachment 6.6.

GIS Naming Convention			Properties from Tables in Section 2.7		
Attachment location	**GIS File-geodatabase file name**	**GIS Layer Name**	**Layer name**	**Measurements**	**Units**
6.6[51]	Data_Table9MapLayer3.gdb	Distribution Line/Substations	Planned 2020 WMP initiative activity per year	Location of 2020 WMP initiative activity for each activity as planned to be completed by the end of each year of the plan term	Line, quarter mile resolution

[51] Assumed to be an error and interpreted as 6.6 as there was no 7.6 in the template.

Application No. 22-05-006
Exhibit PAC/1802
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Supplemental Testimony of

Allen Berreth

2021 and 2022 California Wildfire Mitigation Plan Update

April 2023



2022 Wildfire Mitigation Plan

May 6, 2022
Revised July 15, 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:

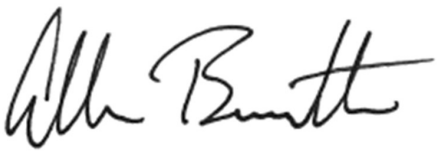
(See Rule 1.11)

(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. 218 Section 7.3.6.2, pg. 219-220 Section 8.2, pg. 255-261
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.243; 7.3.9; pg. 235; 8.2; pg. 255
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. 269
9	Plans for vegetation management	Section 7.3.5, pg.193
10	Plans for inspections of the electrical corporation's electrical infrastructure	Section 7.3.4 pg. 181
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. 255-237
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. 168

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. 283 Section 7.3.3.3, pg. 168
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. 240
20	A statement of how the electrical corporation will restore service after a wildfire	Section 7.3.9, pg. 235
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. 237
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	$18,520
2020 Difference	$6,491
2021 Planned	$33,375
2021 Actual	$42,149
2021 Difference	($8,774)
2022 Planned	$91,900
2020-22 Planned (with 2020 and 2021 Actual)	$152,570

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	$560
Situational Awareness	$278	$1,178	($900)	$462	$1,473	($1011)	$3,054	$5,705
Grid Design and System Hardening	$15,403	$8,937	$6,466	$25,035	$23,092	$1,936	$74,603	$106,639
Asset Management and Inspections	$1,219	$1004	$215	$848	$919	($71)	$974	$2,897
Vegetation Management	$5,783	$6,999	($1,215)	$6,561	$16,199	($9,638)	$12,413	$35,610
Grid Operations	$2,000	$0	$2,000	$0	$0	$0	$0	$0
Data Governance	$25	$181	($156)	$210	$215	($5)	$400	$796
Resource Allocation	$278	$0	($278)	$0	$0	$0	$0	$0
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	$18,520	$6,491	$33,375	$42,149	($8,774)	$91,900	$152,570

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 243 and Section 7.3.10.1 Community Engagement on page 243 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).

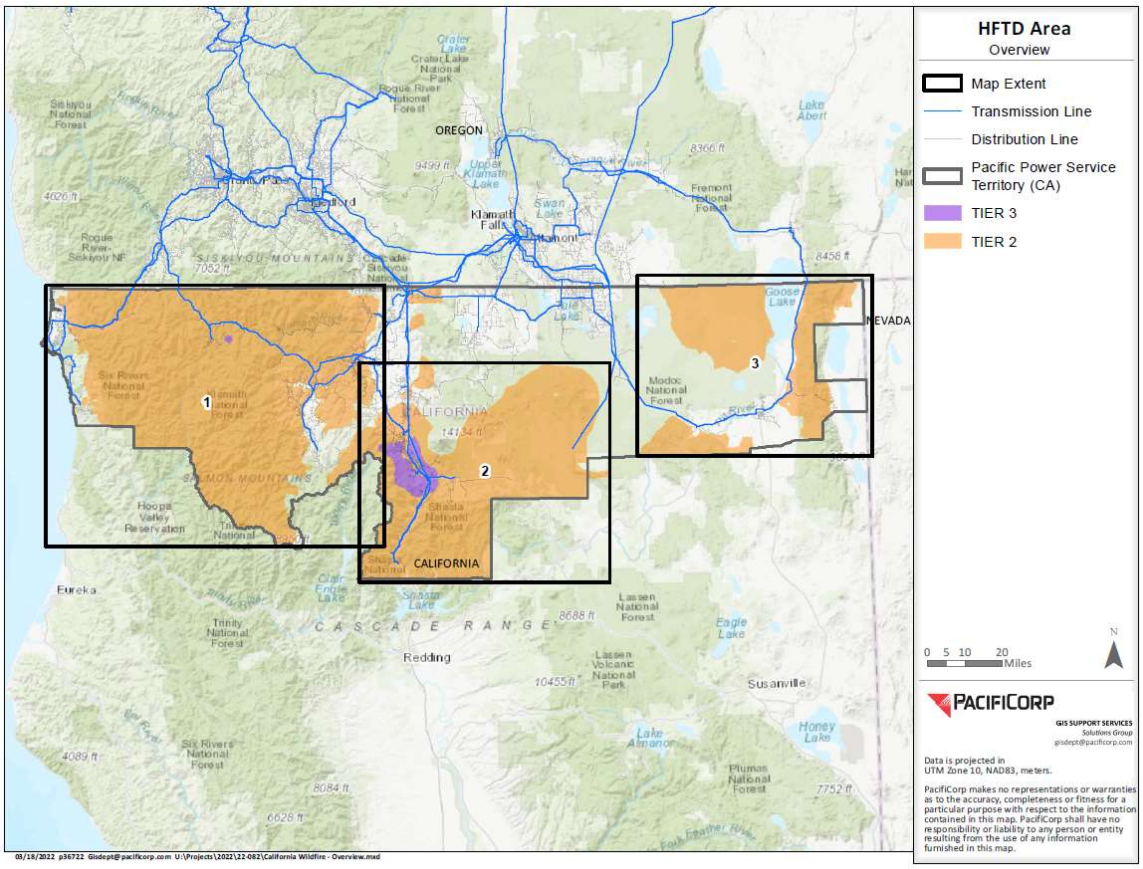


Figure 4.2 HFTD area

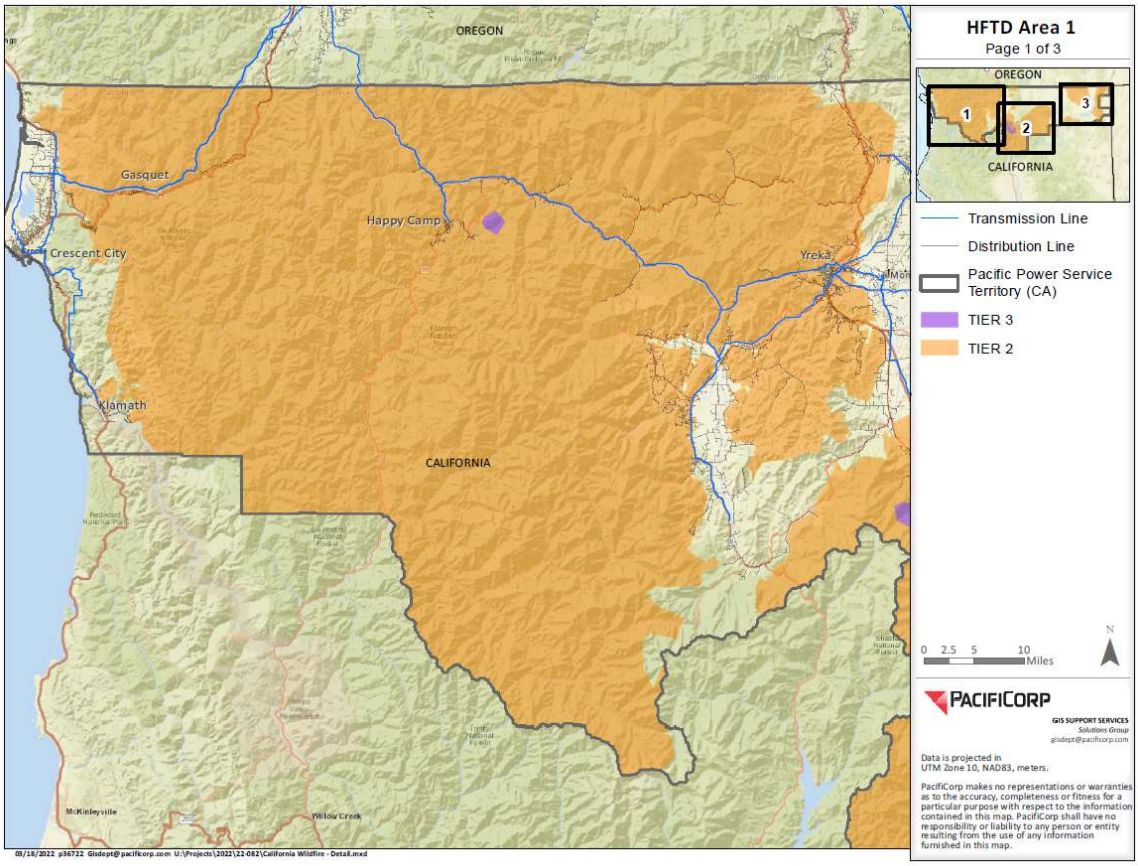


Figure 4.3 HFTD area 1

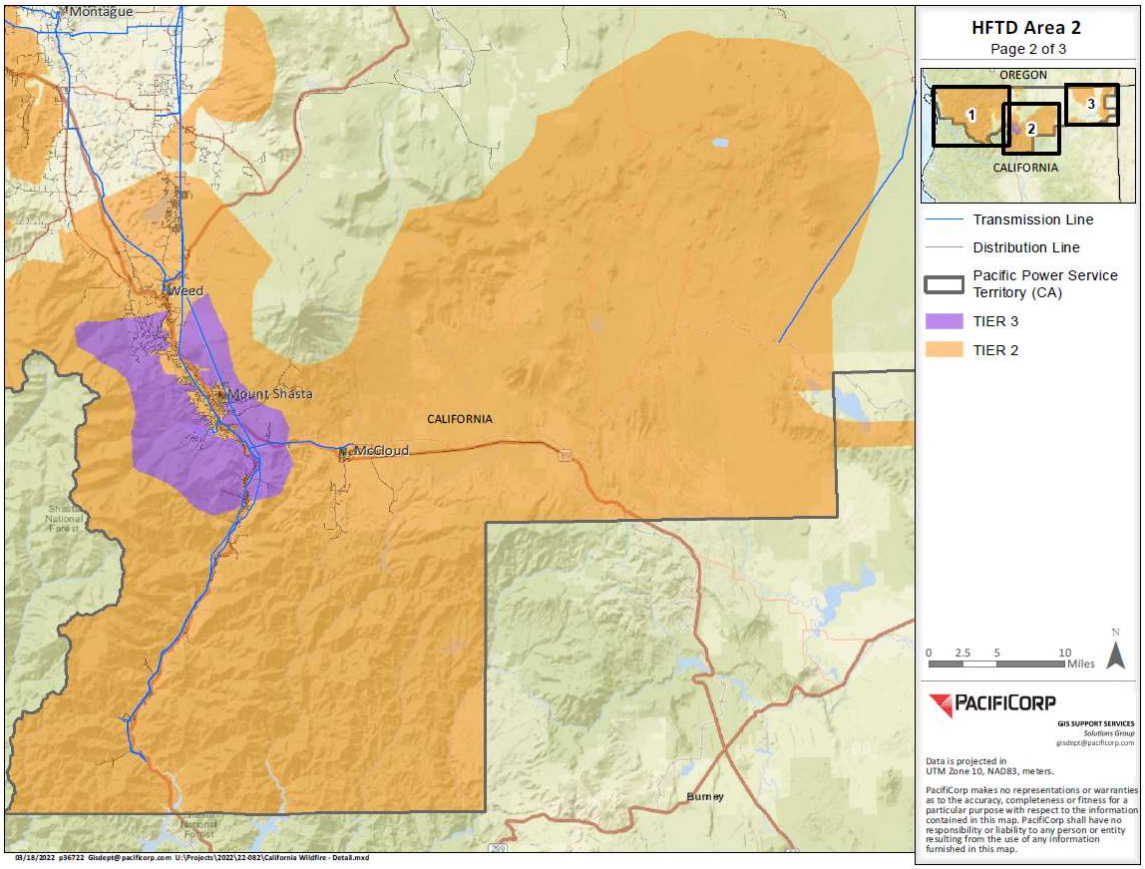


Figure 4.4 HFTD area 2

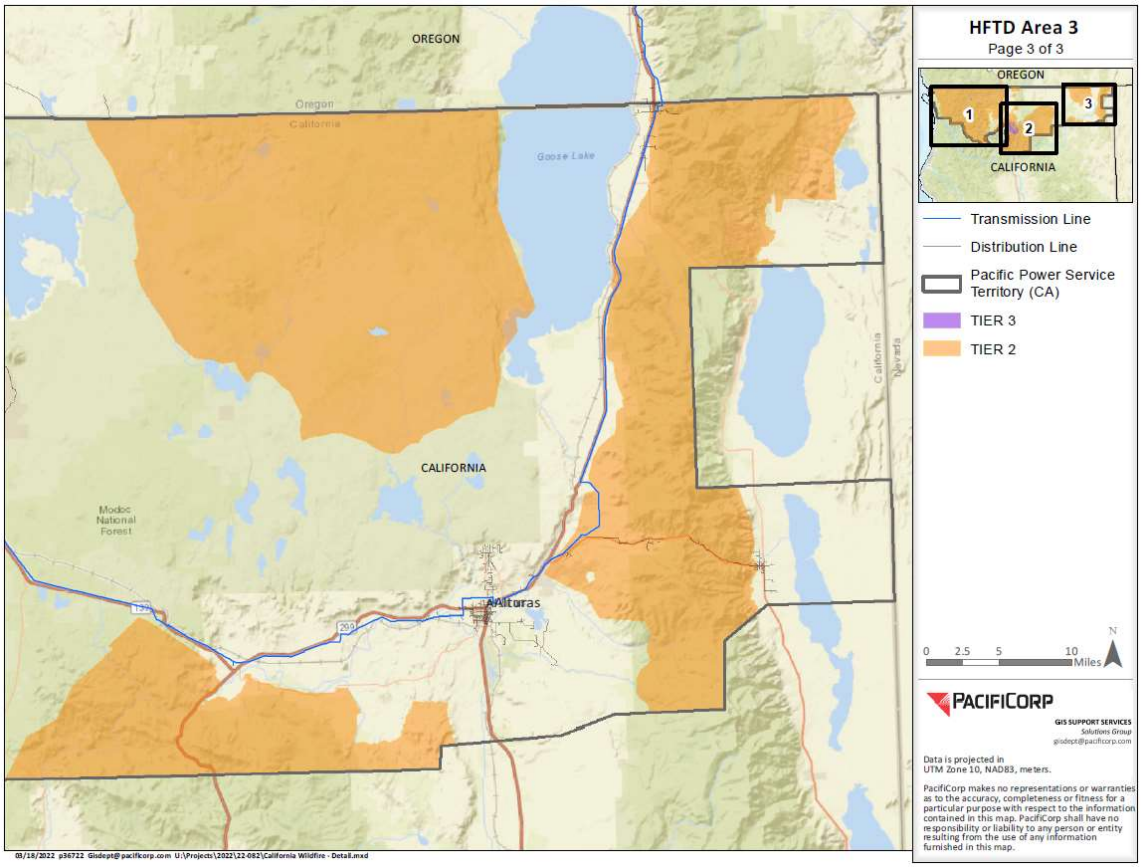


Figure 4.5 HFTD area 3

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 168). 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.

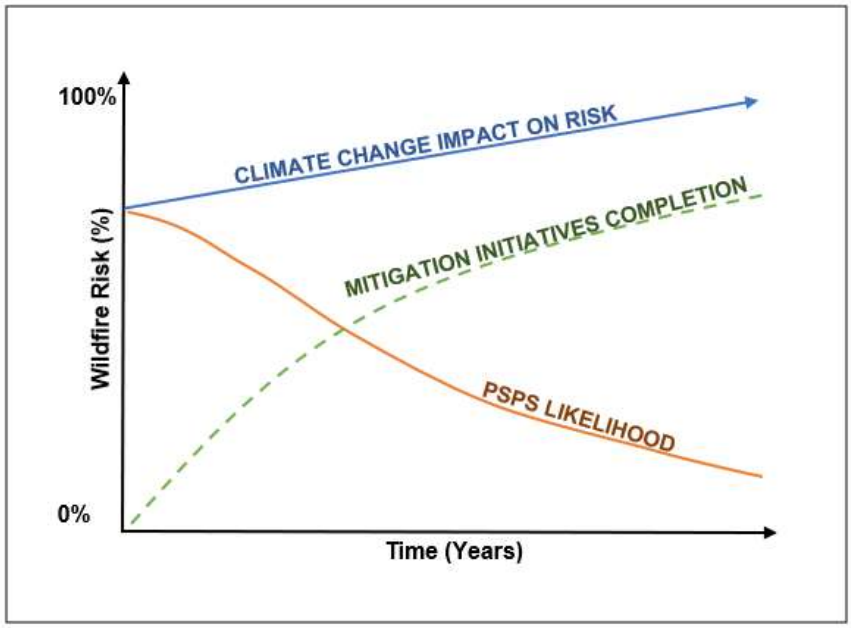


Figure 4.6 Climate change, mitigation initiatives and PSPS

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 183 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 theWRRM.

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 ismore 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 sensitiveareas.

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

Replacement asset — The new asset class used to replace an existing asset class. Replacement assetshave 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 toprovide an overall risk reduction for that project.

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

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

Vulnerability — A combination of exposure and susceptibility, Vulnerability is the measure ofpotential (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.

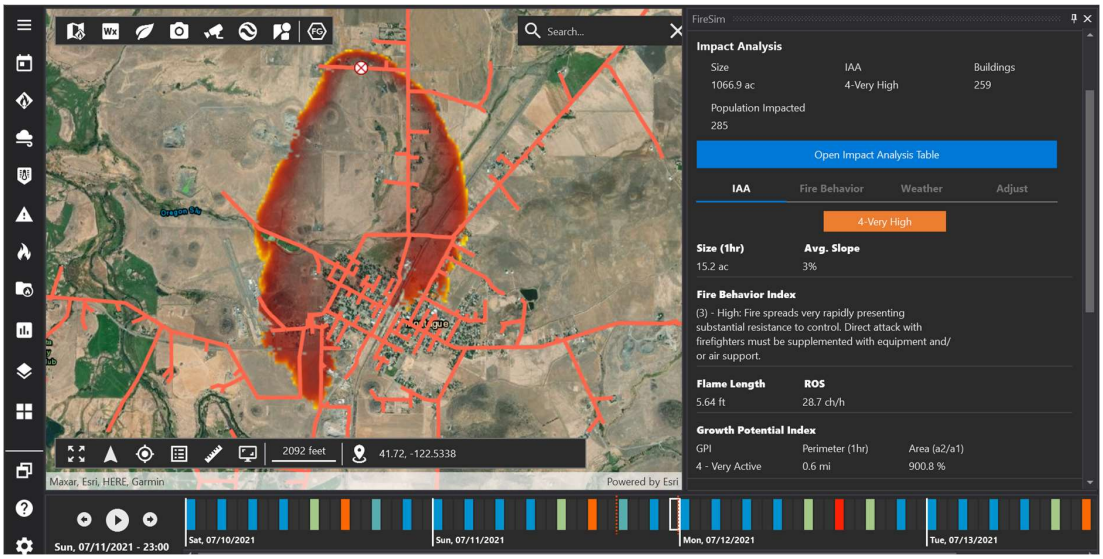


Figure 4.7 Wildfire growth simulation example

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.

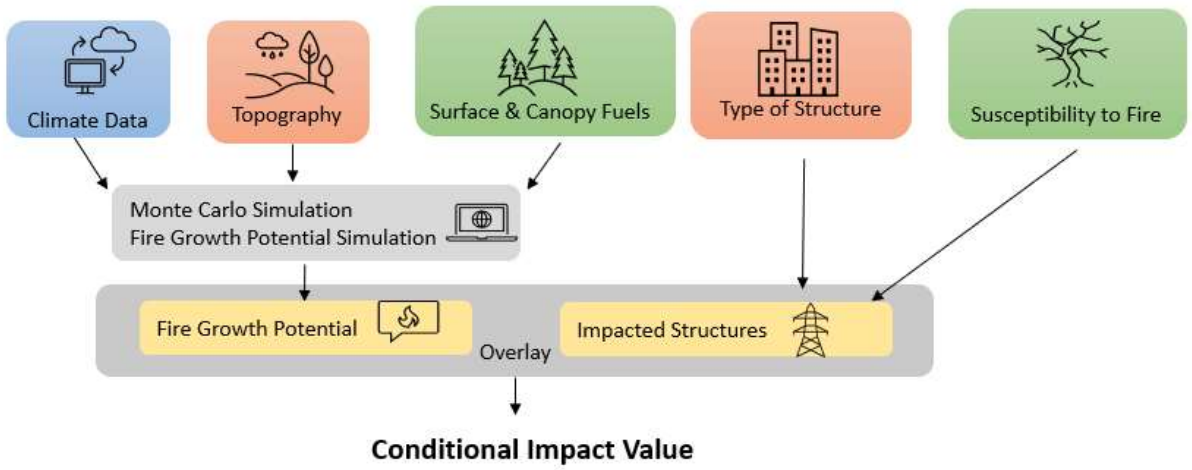


Figure 4.8 Wildfire growth simulation and structure values

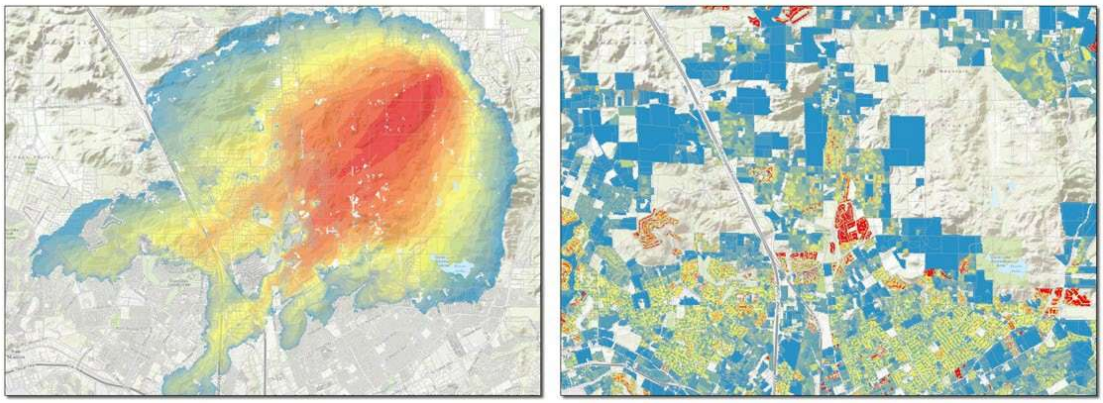


Figure 4.9 Fireplain simulation results

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 ratiofor when those failures might result in an ignition (see Figure 4.10).

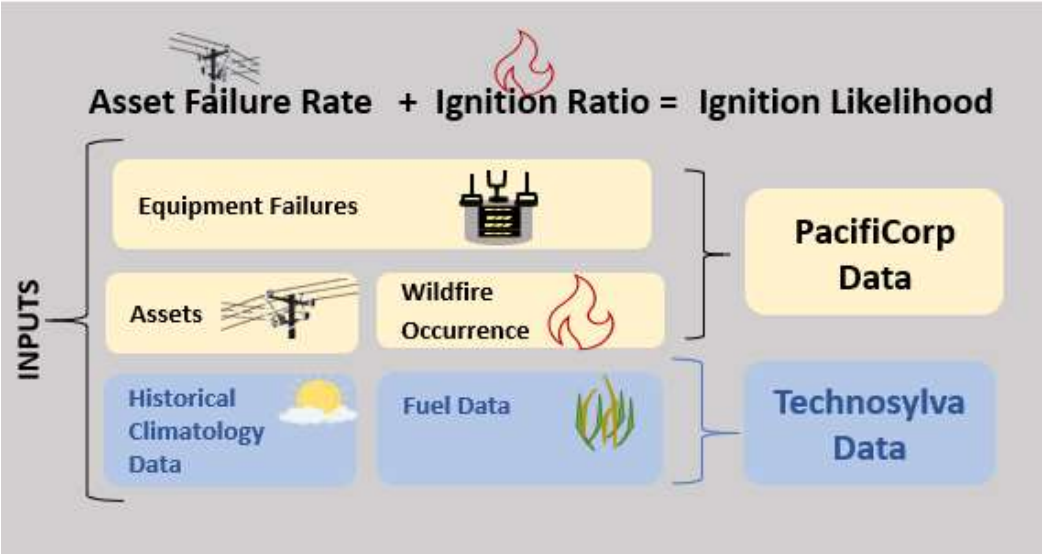


Figure 4.10 Ignition likelihood

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).

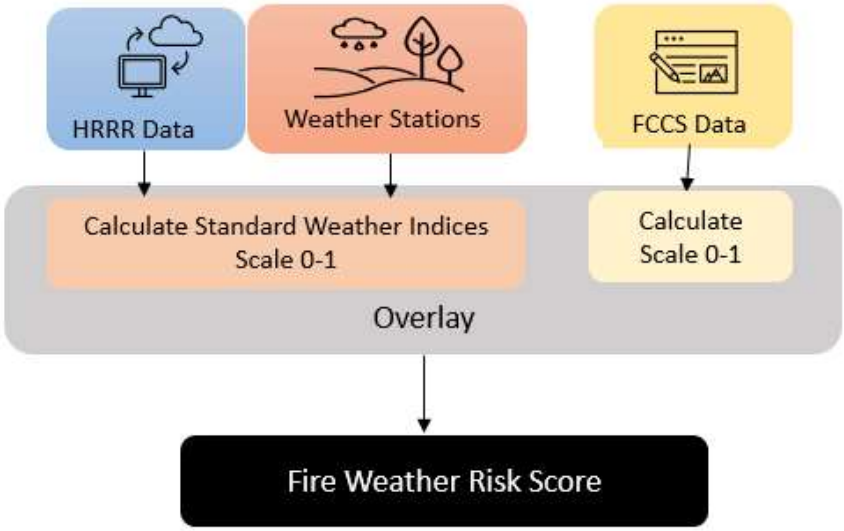


Figure 4.11 Fire weather risk

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 163.

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.

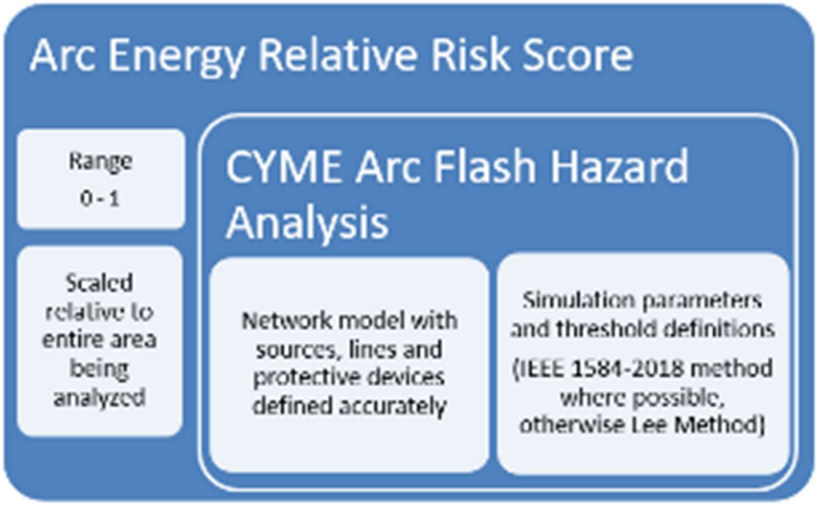


Figure 4.12 Available probabilistic arc energy risk

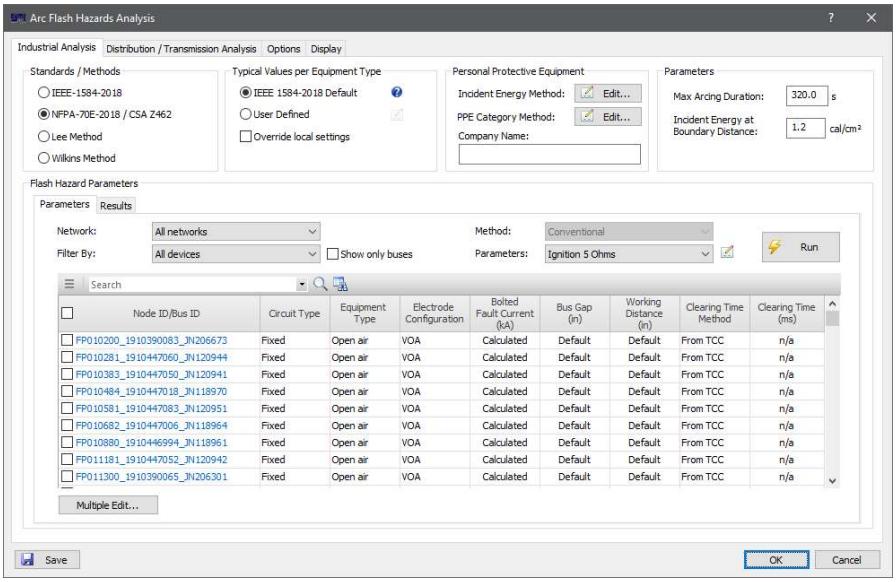


Figure 4.13 Example CYME arc flash analysis input

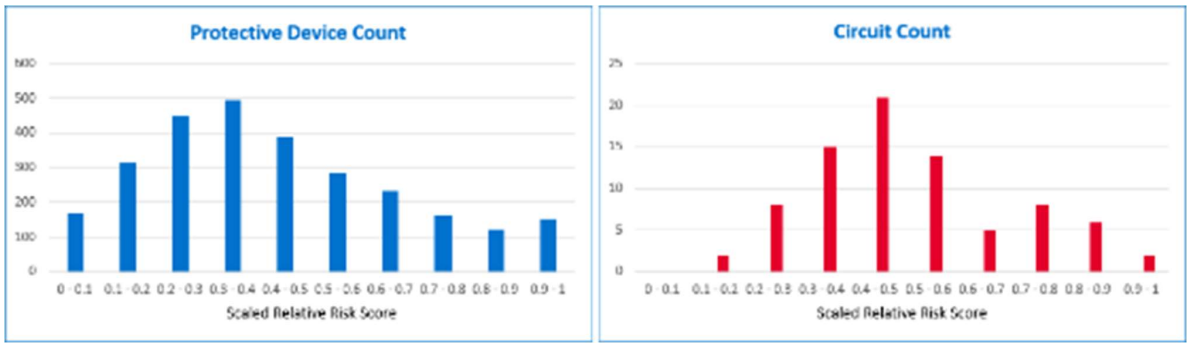


Figure 4.14 Summary of arc energy risk scores (scaled to the range 0-1)

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):

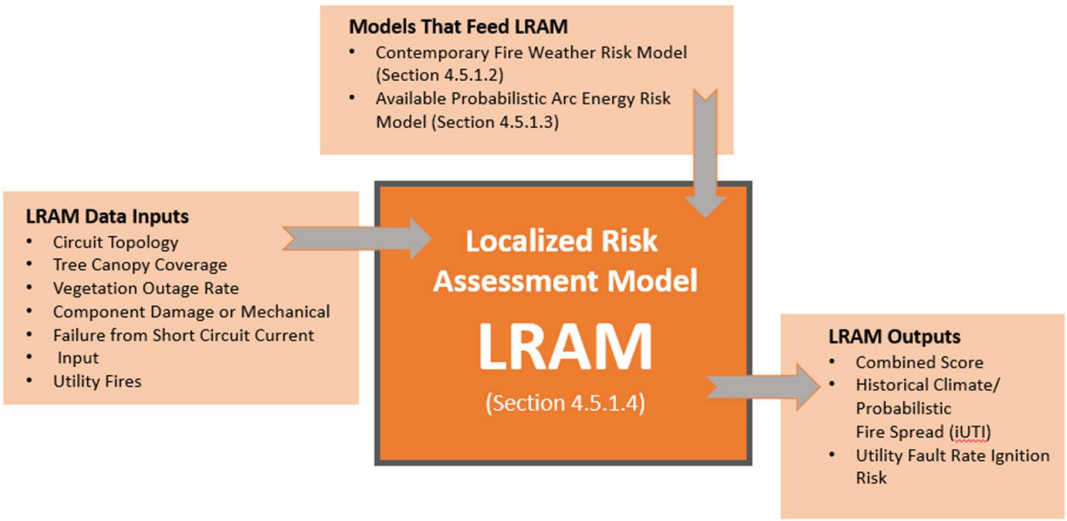


Figure 4.15 LRAM inputs and outputs

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.

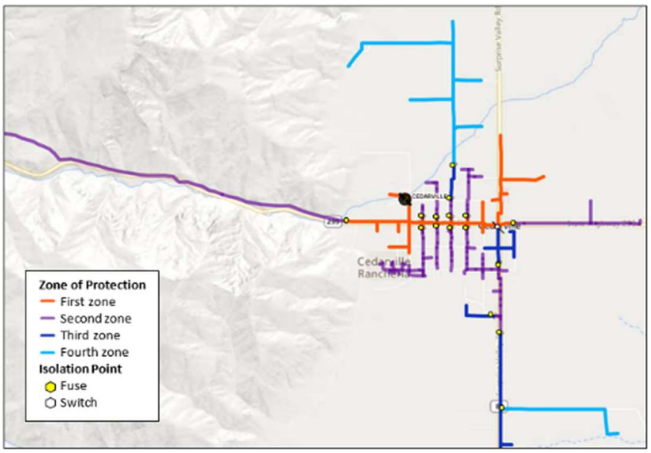


Figure 4.16 Example of a Zone of Protection

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.	

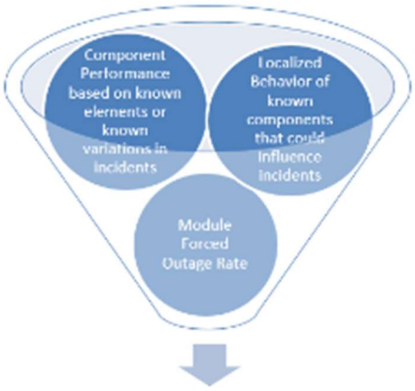


Figure 4.17 Fault rate ignition risk process

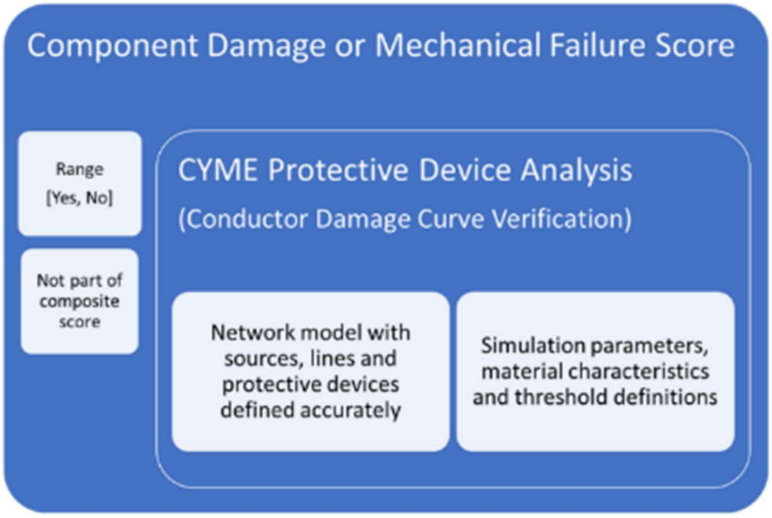


Figure 4.18 Component damage or mechanical failure from short circuit current methodology

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.

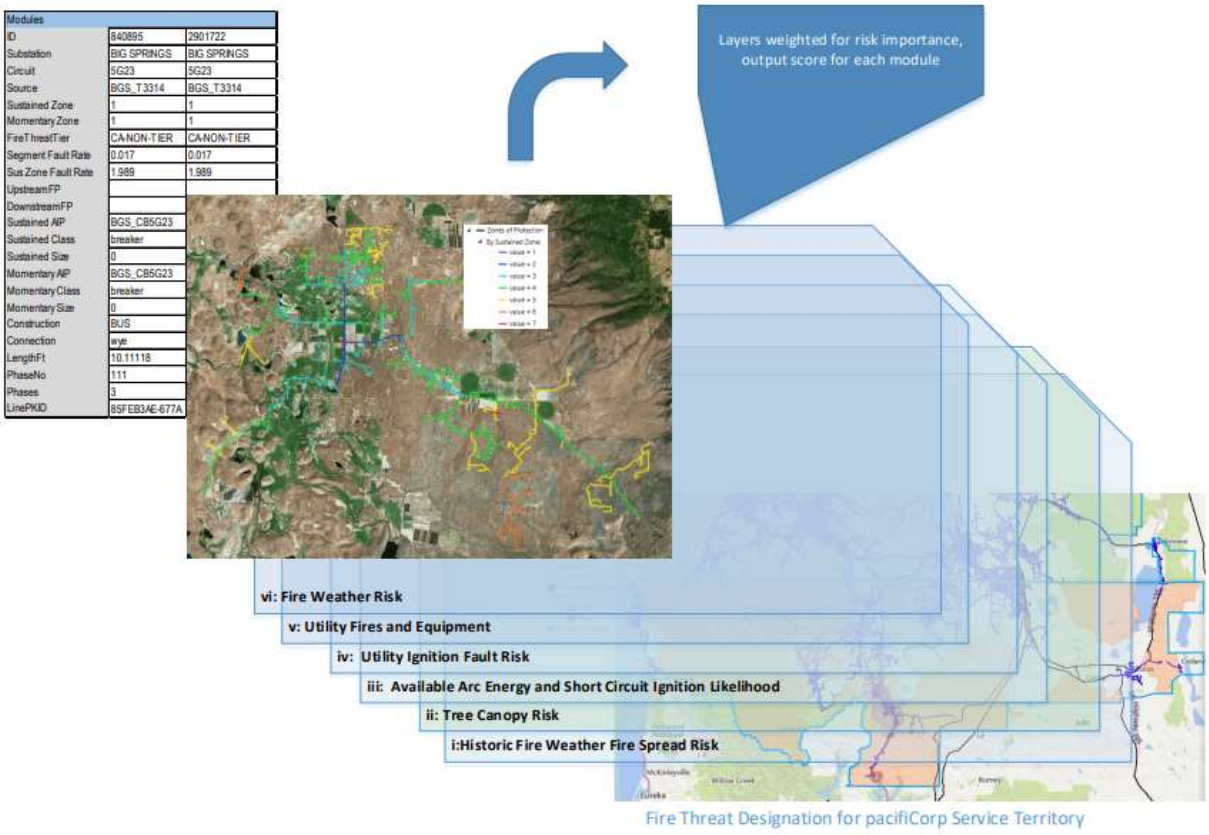


Figure 4.19 LRAM input layers

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.

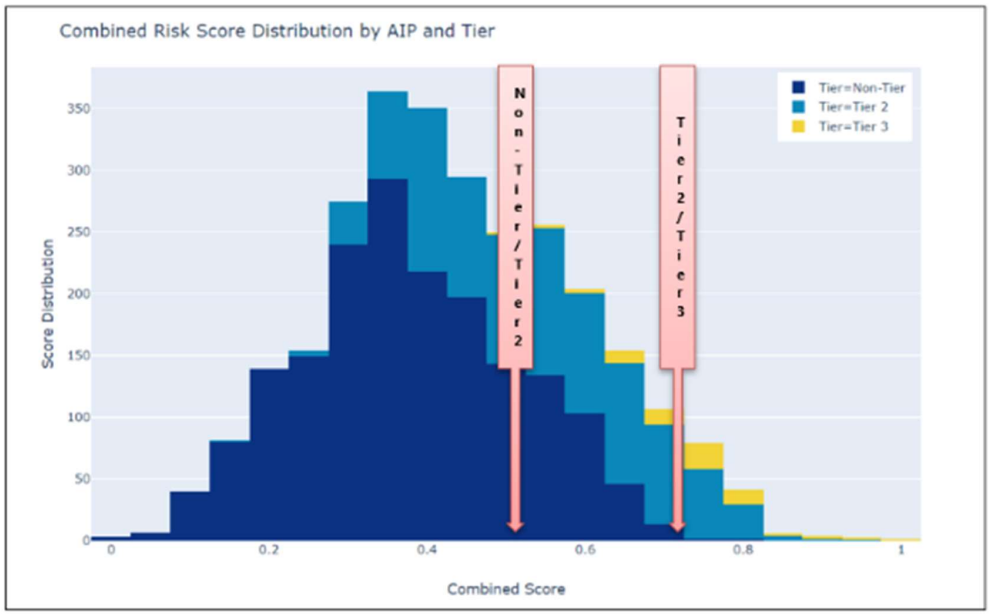


Figure 4.20 Distribution of the Combined Risk Score among the ZOP in California
The two arrows demonstrate where we see choose risk boundaries between Non-Tier/Tier 1 and Tier 1/Tier 2

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.

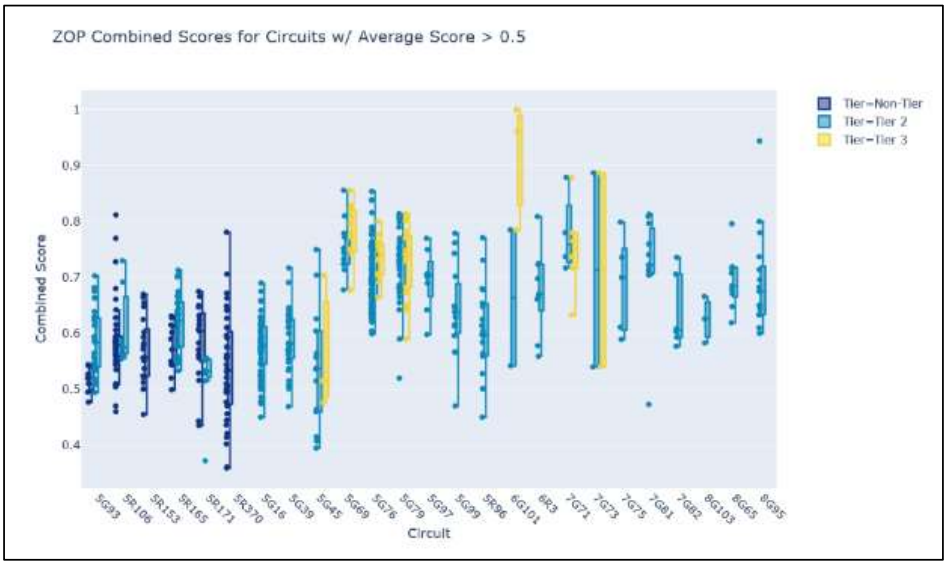


Figure 4.21 Box plot for the combined score of each circuit
colored by HFTD designation
where each point is the score for a specific ZOP

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		
	Vehi**cle contact**	x	x				x	x	x						x	x
Contamination		x				x					x					x
Equipm**ent / 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								
Unknow**n**		x	x		x			x								
Vandal**ism/Theft**		x	x	x											x	
Wire-t**o-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.)

12. 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.

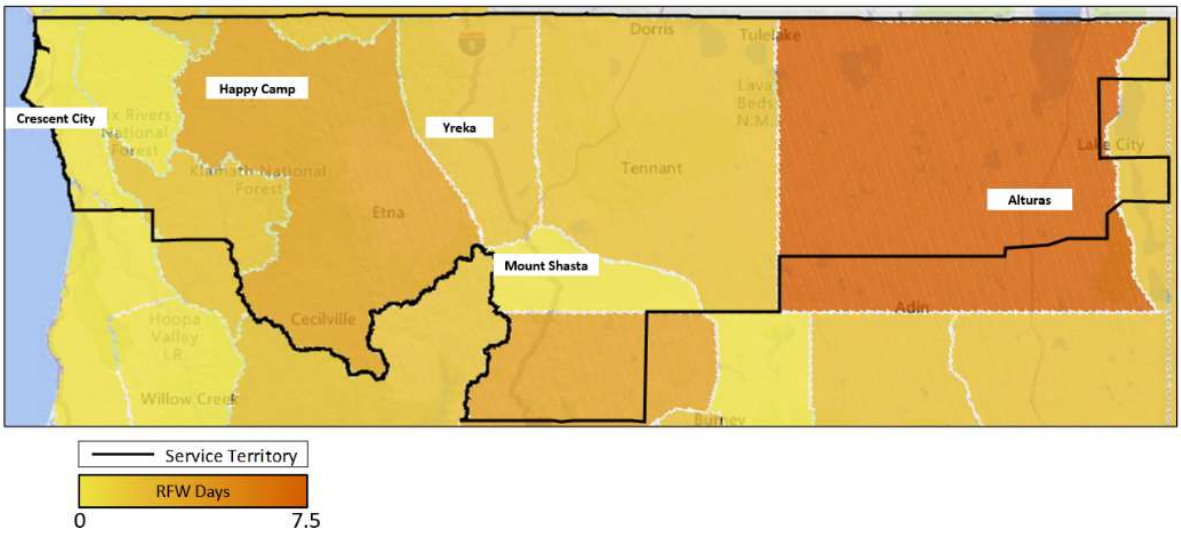


Figure 4.23 Red Flag Warning days, example

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.

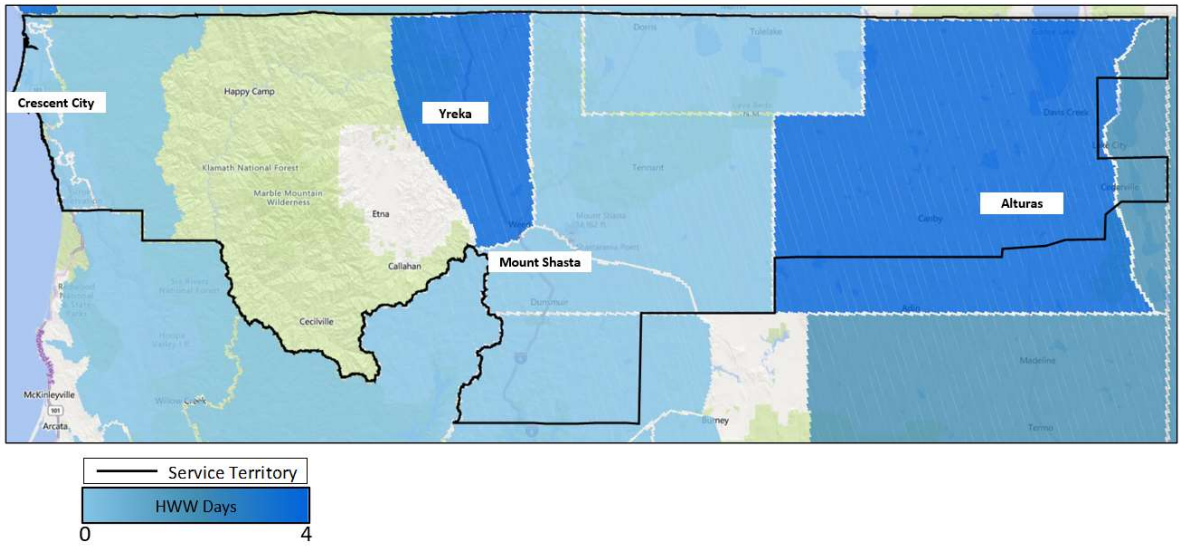


Figure 4.24 High Wind Warning days, example

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.

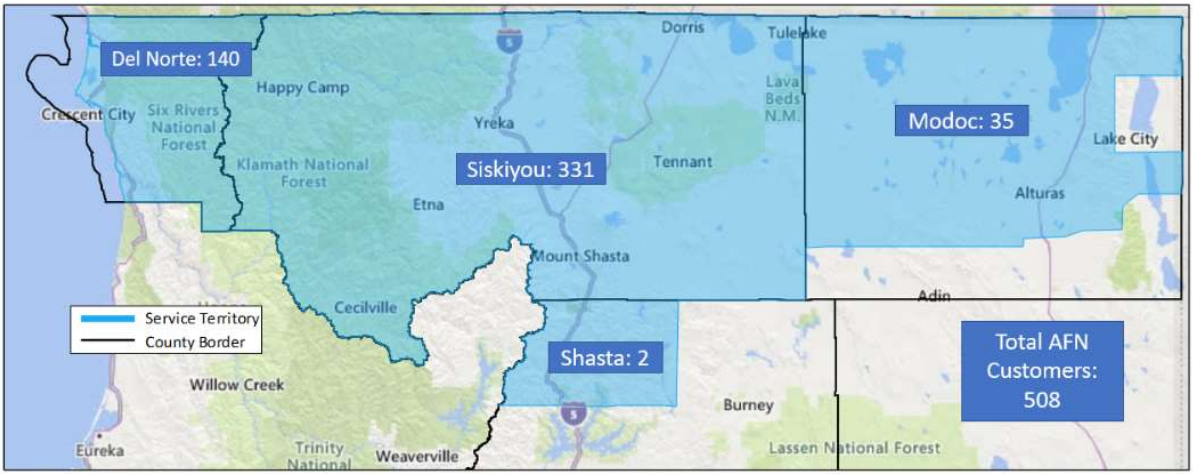


Figure 4.25 Access and Functional Needs population

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.)

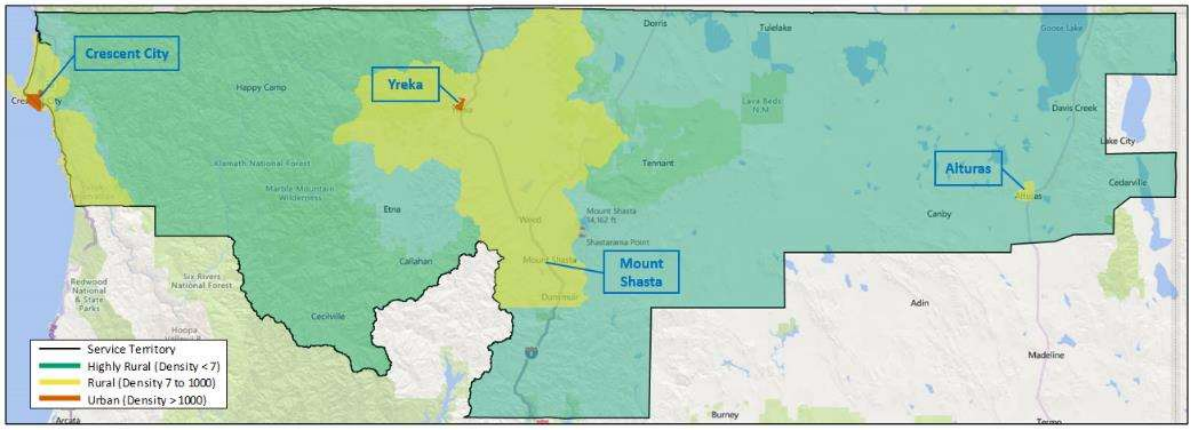


Figure 4.26 Population density[17]

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 234 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 226.
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 169 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 173 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 176.
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 218 and Section 7.3.6.2 on page 219.
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 231.
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 261 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 189.

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 181. 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*.

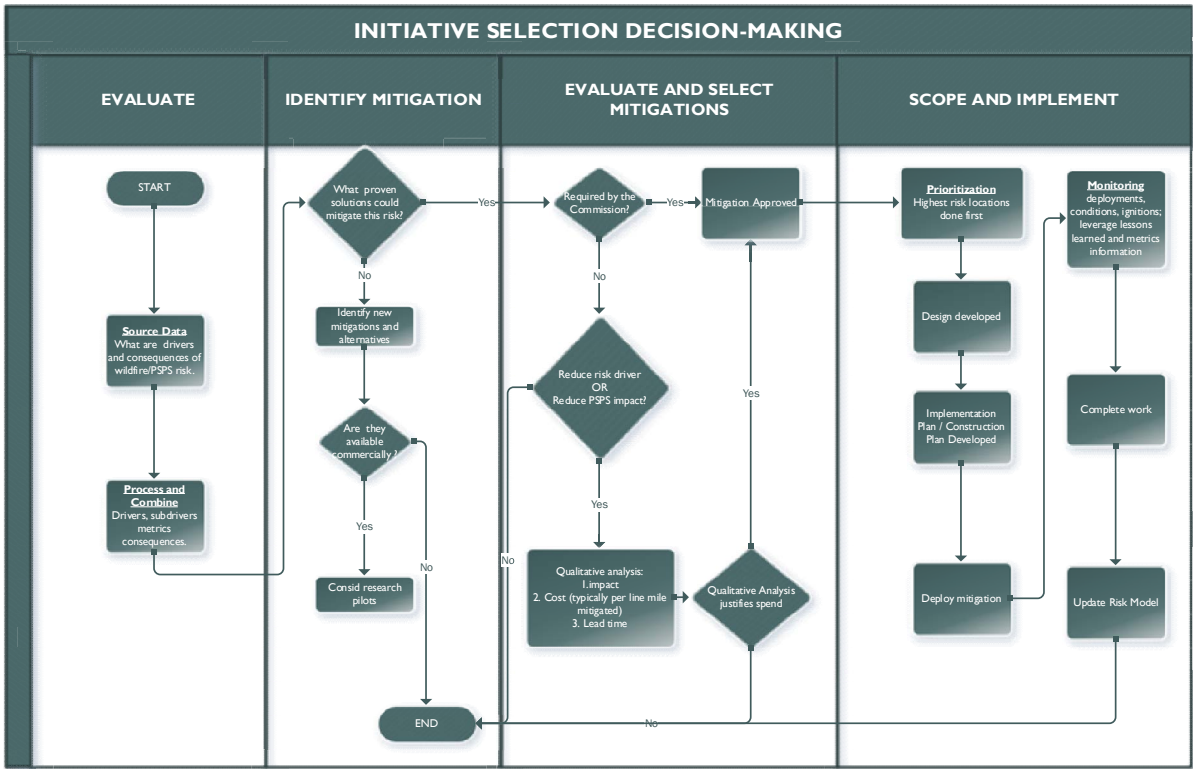


Figure 7.1 Initiative selection decision-making flowchart

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.

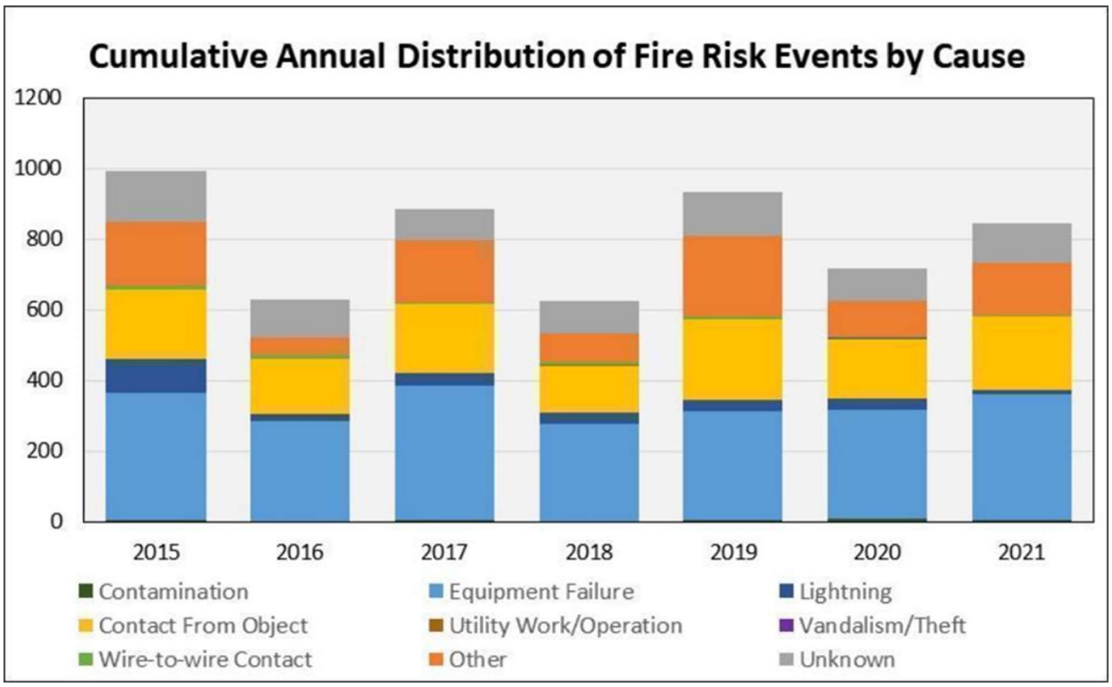


Figure 7.2 Cumulative annual distribution of fire risk events by cause

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 282.

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 181, 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 235.

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 282, 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 181.

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 271.

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

1. **Risk to be mitigated**

PacifiCorp recognizes the value in understanding climate driven risks based on relevant weather scenarios. Currently, PacifiCorp's LRAM tool includes a layer designated as "Fire Weather," the climate driven risk element based on various relevant weather scenarios described in Section 4.5.1.2. This layer is relatively static and based on a combination of available datasets such as the HRRR weather data and the LANDFIRE 2020 FCCS datasets. To complement this layer and incorporate a wider array of weather scenarios, PacifiCorp is in the process of procuring a WRF model of the service territory and implementing Technosylva's WFA-E suite discussed in Section 4.5.1.1. Through procurement and implementation of these tools and datasets, this initiative is planned to support a wildfire risk-based resource allocation methodology.

2. **Initiative selection**

Historically, PacifiCorp initiatives were prioritized based on the HFTD map, where areas inside the HFTD are worked first. However, as the wildfire mitigation programs mature, the Company is moving towards a quantitative risk-based methodology to identify and prioritize mitigation activities, such as through RSE, as recommended by OEIS and other stakeholders. To develop an RSE, PacifiCorp first began developing a wildfire risk model, LRAM, consisting of layers of data weighted for risk importance such as:

- Fire Weather Risk, which maps to a climate-driven risk based on various relevance weather scenarios
- Utility Fires and Equipment
- Utility Ignition Fault Risk
- Available Arc Energy and Short Circuit Ignition Likelihood
- Tree Canopy Risk
- Historic Fire Weather Fire Spread Risk

Fire weather risk uses a combination of the High-Resolution Rapid Refresh (HRRR) model tool from NOAA, which is a 3km resolution of weather data which is updated every hour and LANDFIRE 2020 Fuel Characteristic Classification System Fuel beds (FCCS) dataset. This combination allows for the incorporation of wildfire-relevant

impacts such as weather trends and fuel data into LRAM. PacifiCorp has provided a map of the of the LRAM fire weather scores below.

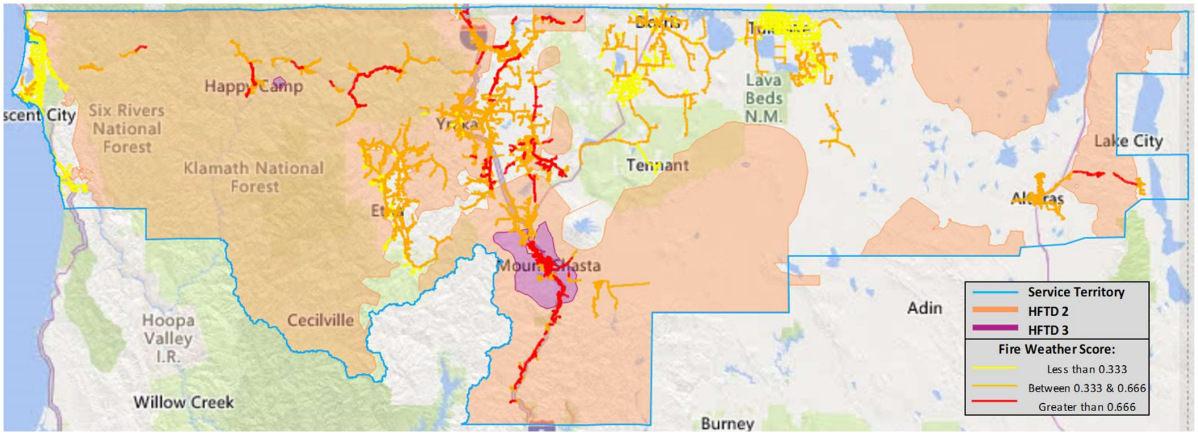


Figure 4 : Map of LRAM Fire Weather Score

This initiative was selected to be developed as a data element of LRAM to support RSE development, therefore the spend associated with this initiative has been accounted for in initiative 7.3.1.1 which supports the overall development of LRAM and related data elements.

3. Region prioritization

Wildfire risk mapping and modelling encompasses the entire PacifiCorp service territory, where tier 3 and tier 2 areas are used to validate that model risks align with the HFTD.

4. Progress on initiative

The company has materially delivered Phase 1 of its LRAM, and has "Combined Scores," at the ZOP level. Climate data and models are rapidly evolving to improve; therefore, LRAM is not seen as a fully operationalized simulation and modeling tool, but rather a tool which can be updated as needed for continuous improvement.

As new and improved data elements are made available, PacifiCorp will evaluate those elements and consider updates to risk models. Specifically related to the climate driven risks and models, PacifiCorp plans to update from the HRRR model to WRF model in 2023, which will provide a 30yr, 2km resolution, hourly, reanalysis of weather variables across PacifiCorp territory. WRF looks at 30yrs of data and provides a more granular resolution of data than the HRRR model.

The WRF data is being procured as a mandatory component of the operational tool being developed for the development of the fire potential index (FPI), described in

initiative 7.3.2.4 Forecast of Fire Risk Index, Fire Potential Index, or similar. Therefore, the progress on this initiative does not have spend associated with it, as the spend is captured under initiative 7.3.2.4.

5. **Future improvements to initiative**
   PacifiCorp anticipates that the update to WRF in 2023 will be a significant improvement to the climate risk elements climate driven risk modelling. While there are no specific climate risk updates planned in the future, PacifiCorp does plan to continuously be learning about improved updates and will incorporate them as the benefit is worth the cost.

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

1. **Risk to be mitigated**

   A comprehensive view of Wildfire Risk includes an ignition probability or ignition likelihood factor. Ignition likelihood, as a component of baseline risk, helps to inform long term project selection and prioritization. Additionally, ignition likelihood, as a component of dynamic risk, helps to inform the impacts of fire weather scenarios to inform real time decision making. In both applications, the assessment of ignition probability helps to reduce overall wildfire risk through informed mitigation tactics. PacifiCorp's initial development of ignition probability mapping was included in LRAM as discussed in Section 4.5.1.4.

2. **Initiative selection**

   Historically, PacifiCorp initiatives were prioritized using the HFTD map where work inside the HFTD, and specifically Tier 3, was worked first. As PacifiCorp's risk mapping and resource allocation methodologies evolve, the Company is moving towards a quantitative methodology to prioritize work, more granularly, based on wildfire risk. Additionally, PacifiCorp is seeking to understand the RSE associated with initiatives selected for implementation and understanding the likelihood of ignition, through the selection of this initiative, is a foundational step towards the development of RSE.

   As described in section 4.5.1.4, Localized Risk Assessment Model, LRAM consists of a combination of layers, weighted for risk importance, to produce the output of a "combined score." Contributing layers to Combined Score include both the Utility Risk Layer and Environmental Risk Layer.

   The Utility Risk Layer describes, as a quantitative ranking, the likelihood that utility infrastructure would experience a fault or spark, using the following inputs:

- Outage rates which are derived from historic fault data attributed to causes such as contact with object or equipment failure,
- Tree canopy data from satellite tree canopy data to determine the potential for fall in risks that could result in outage events,
- Ignition history on a circuit and
- Available probabilistic arc energy risk modelled level of potential energy that could be released during a fault event.

The Environmental Risk Layer quantifies, as a relative ranking, the potential for escalation of a spark to an ignition using the following inputs:

- iUTI: Integrated Utility Threat Index that depicts long term, climatological fire weather patterns.
- Contemporary Fire Weather Risk Model (Wildfire Risk Score): Nearer term assessment of frequency and intensity of fire weather events paired with location specific fuel density information.
- Historic Fire Area: Incorporates known wildfire perimeter areas to highlight where large wildfire growth and spread have occurred.

The Combined Score then describes the likelihood, as a quantitative ranking, of a utility spark or fault occurring and escalating into an ignition. This combined score is generally used to understand ignition probability and target long term investment in grid hardening to mitigate the risk of ignition probability.

As development of this initiative supports the overall objectives of LRAM to represent wildfire risk, which can be further developed to support RSE, therefore portions of the spend associated with this initiative has been accounted for in initiative 7.3.1.1 which supports the overall development of LRAM and related layers which constitute LRAM.

While LRAM presents a first step at assessing ignition probability for long term planning and baseline risk, PacifiCorp is also making investments and advancing dynamic risk assessment capabilities through the implementation of Technosylva's WFA-E tools accounted for in initiative 7.3.2.4. These tools, once fully operational, will be providing an ignition likelihood to PacifiCorp within 2022, across the overhead distribution system.

3. Region prioritization

Wildfire risk mapping and modelling encompasses the entire PacifiCorp service territory, where tier 3 and tier 2 areas are used to validate that model risks align with

the HFTD.

4. **Progress on initiative**

The company has materially delivered Phase 1 of its LRAM and has "Combined Scores" at the ZOP level. The next phases of development include using the LRAM foundation alongside Technosylva's WRM module to create a quantifiable resource allocation methodology, risk reduction and RSE.

At this time, PacifiCorp does not plan to change the methodology or data inputs for ignition probability used within LRAM, but PacifiCorp isstreamlining those processes. For example, in Section 4.5.1.3, PacifiCorp notes that key improvements planned include data import and processing improvements. These improvements to data importing will automate some processes, freeing up valuable resource time for other initiative developments.

PacifiCorp has begun to develop operational tools through the procurement of Technosylva which includes a model of ignition likelihood, as mapped in Figure 4.10. Moving forward, PacifiCorp plans to validate the ignition likelihood model being provided from Technosylva and incorporate the use of it in the development of RSE, resource allocation methodology and risk reduction. Additionally, ignition likelihood is a component of the operational tool, Technosylva, described in section 7.3.2.4 Forecast of a fire risk index, fire potential index or similar, therefore the spend associated with this Technosylva module has been included in that section.

5. **Future improvements to initiative**
With the purchase of Technosylva WFA-E, PacifiCorp is further aligning with the methodologies of other utilities in the OEIS Risk Modelling utilities workshops. As PacifiCorp continues to attend these workshops, it is anticipated that further improvements for greater alignment and model improvements may be scoped, planned and implemented, particularly after the release of updated 2023 Risk Modelling guidelines.

7.3.1.4 Initiative mapping and estimation of wildfire and PSPS risk reduction impact

1. **Risk to be mitigated**

PSPS is a tool used as a measure of last resort to mitigate risk. PacifiCorp recognizes the impact that a PSPS implementation can have, including on irrigation, public transportation and other facilities. This initiative seeks to develop a tool to support wildfire and PSPS risk information which can be used to inform PSPS decision making.

2. **Initiative selection**

Once fully operation, PacifiCorp plans to use Technosylva's WFA-E tools to estimate risk reduction efficacy described in section 7.3.1.2, 7.3.1.2 and detailed in 7.3.2.4,

where the spend is also captured. This initiative was selected for implementation, based on its capabilities to advance quantitative decision-making and RSE calculations and feedback from OEIS and other stakeholders.

3. **Region prioritization**

   Wildfire risk mapping and modelling encompasses the entire PacifiCorp service territory, where tier 3 and tier 2 areas are used to validate that model risks align with the HFTD.

4. **Progress on initiative**

   Historically, PacifiCorp has taken a qualitative approach to decision making and RSE assessments that incorporates subject matter expertise and input from public safety partners. Through participation in the OEIS hosted Risk Modelling workshops, PacifiCorp learned that several utilities are leveraging Technosylva's expertise to advance methodologies for quantitative assessments. After PacifiCorp procures Technosylva WFA-E, plans for the development of a PSPS risk tool using it can begin.

5. **Future improvements to initiative**
   As PacifiCorp obtains more information from other utilities and more familiarity with the procured Technosylva WFA-E module, it is anticipated that a tool will be developed, aligned with learnings from other utilities, where feasible, and that the tool will be continuously evaluated for improvements.

7.3.1.5 Match drop simulations showing the potential wildfire consequence of ignition that occur along the electric lines and equipment

1. **Risk to be mitigated**

   A component of Wildfire Risk includes the match drop simulations to indicate the potential wildfire consequence of an ignition. These simulations can support both resource allocation methodologies such as RSE calculations and project prioritization or other, more dynamic, decision-making processes. For these reasons, PacifiCorp recognizes the need for a comprehensive view of wildfire risk which includes match drop simulations to gain an understanding of the consequences associated with an ignition.

2. **Initiative selection**

   In the 2020, PacifiCorp engaged Pyregence and participated in a technical advisory committee to support further development of practical tools for utility operations and engineering personnel in the areas of "match drop" simulations along specific corridors.[25] The Pyregence Ignition Modelling research helped inform the

[25] See Section 4.3 of PacifiCorp's 2021 WMP Update at page 52 for more information.

understanding of how fire-affecting climate change may impact PacifiCorp's service territory, specifically in terms of changes to ignition probability and estimated wildfire consequence as discussed in 4.2.1 beginning on page 38. While direct applications of this research were more static and not fully operationalized at PacifiCorp, this research demonstrated the potential value and usefulness of ignition simulation modeling. Therefore, PacifiCorp's first pass at assessing the potential wildfire consequence of ignitions was incorporated into the company's risk model, LRAM, financially accounted for in Section 7.3.1.1. Additionally, as further described below, this initiative has evolved to include more dynamic components of wildfire consequences of ignition through implementation of Technosylva's FireSim product, financially accounted for in Section 7.3.2.4 and technically described in Section 4.5.1.1.

3. **Region prioritization**

Wildfire risk mapping and modelling encompasses the entire PacifiCorp service territory, where tier 3 and tier 2 areas are used to validate that model risks align with the HFTD.

4. **Progress on initiative**

Historically, PacifiCorp initiatives were prioritized based on the HFTD map, where areas inside the HFTD are worked first. However, as the wildfire mitigation programs mature, the Company is moving towards a quantitative risk-based methodology to identify and prioritize mitigation activities, such as through RSE, as recommended by OEIS and other stakeholders. To develop an RSE, PacifiCorp first began developing a wildfire risk model, LRAM.

As described in section 4.5.1.4 Localized Risk Assessment Model, page 91, LRAM consists of a combination of layers, weighted for risk importance, to produce the output of a "Combined Score". Contributing layers to Combined Score include both the Utility Risk Layer and Environmental Risk Layer:

The Utility Risk Layer describes, as a quantitative ranking, the likelihood that utility infrastructure would experience fault or spark using the following inputs:

- Outage Rates: Historic fault data attributed to causes such as contact with object or equipment failure.
- Tree Canopy: Satellite tree canopy data to determine the potential for fall in risks that could result in outage events.
- Ignition History: History of ignitions on a circuit.
- Available Probabilistic Arc Energy Risk Model: Calculated/modeled level of potential energy that could be released during a fault event.

The Environmental Risk Layer quantifies, as a relative ranking, the potential for escalation of a spark to an ignition using the following inputs:

- iUTI: Integrated Utility Threat Index that depicts long term, climatological fire weather patterns.
- Contemporary Fire Weather Risk Model (Wildfire Risk Score): Nearer term assessment of frequency and intensity of fire weather events paired with location specific fuel density information.
- Historic Fire Area: Incorporates known wildfire perimeter areas to highlight where large wildfire growth and spread have occurred.

The Combined Score then describes the likelihood, as a quantitative ranking, of a utility spark or fault occurring and escalating into an ignition. This combined score is generally used to understand ignition probability and target long term investment in grid hardening to mitigate the risk of ignition probability.

While helpful to inform project prioritization and overall risk model development, LRAM does not include full simulation capabilities, such as "match-drop" simulations. Specifically, the Environmental Risk Layer is helpful to understand the relative potential escalation for a spark using key factors and data, but does not allow for multiple, operational simulations using updated, or real time information.

With the procurement of Technosylva, as financially accounted for in Section 7.3.2.4 (Forecast of a fire risk index, fire potential index, or similar) and technically described in Section 4.5.1.1, PacifiCorp will obtain the Technosylva FireSim product and build upon this initial research. The FireSim product will specifically model wildfire spread through the simulation of millions of wildfires across the service territory, similar to "match-drop" simulations. These simulations will then be incorporated into the Wildfire Risk score at three-hour time internals across the forecast period.

5. **Future improvements to initiative**
   With the procurement of Technosylva WFA-E, PacifiCorp will have achieved a significant progression in maturity of this initiative. It is anticipated that the continued maintenance costs of Technosylva will continue to provide the most updated Match Drop simulation in its wildfire risk scores.

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 271.

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 158, 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 158 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 271.

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 271.

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 271.

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 7.5) within the company's broader emergency management department. This new team consists of four experienced professionals and one manager.

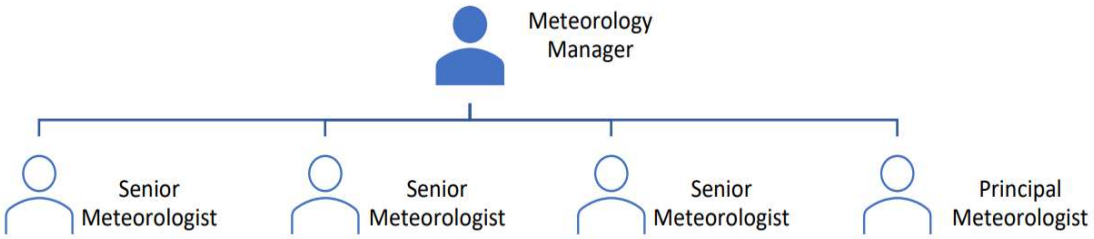


Figure 7.5 Meteorology team

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 219, and Section 7.3.6.4 Personnel Work Procedures and Training on page 221 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 7.6. For the OEIS definition of the weather forecasting initiative, see Section 9.1 starting on page 271.

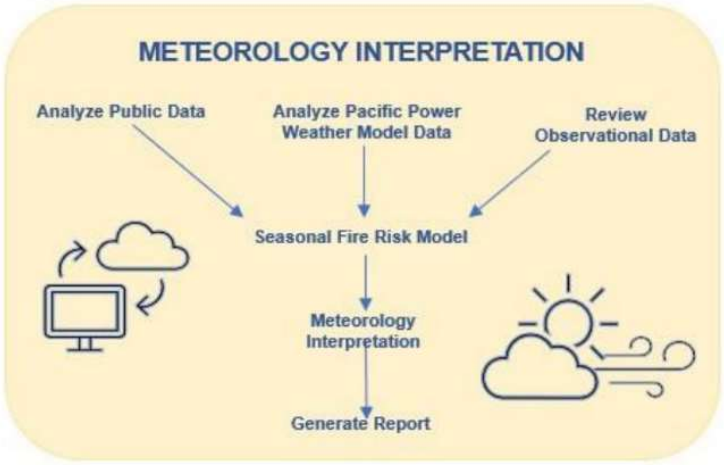


Figure 7.6 Meteorology Interpretation

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 181-183, 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 192, 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 271.

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 180.

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 7.7 below

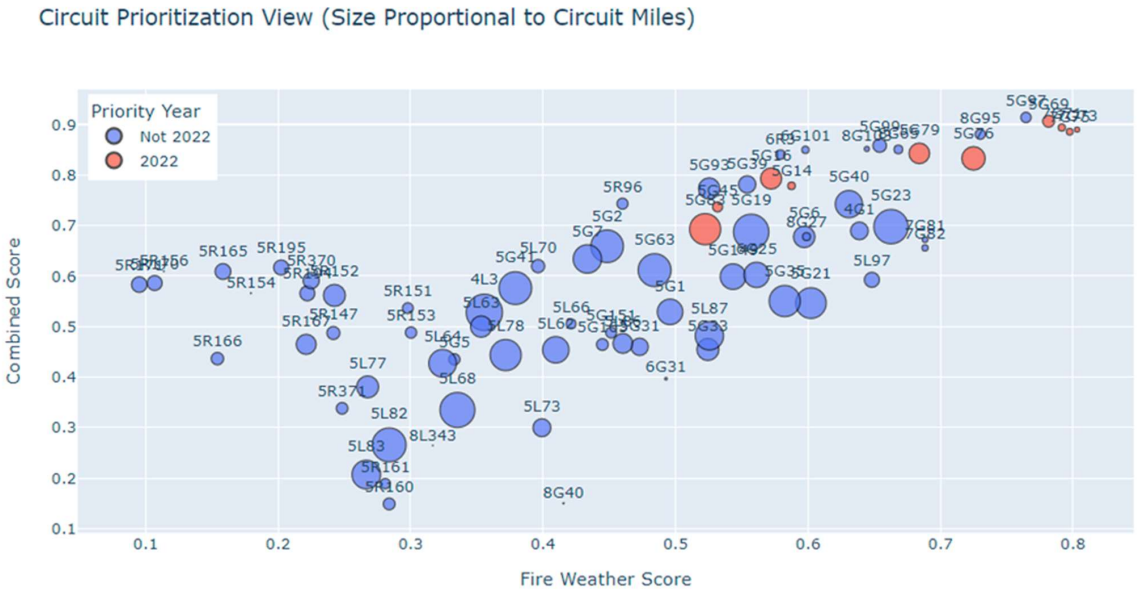


Figure 7.7 Pre-LRAM priority is shown by color using the projected year of construction

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 282.

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 271.

3. **Region prioritization**

   The prioritization of this initiative shall align with the Section 7.3.4.1 on page 181 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 181. 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 181-183, 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

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

   Some materials are more susceptible to fire and ignition than others, PacifiCorp can build a more resilient system by utilizing equipment which is more fire resistant by using alternate materials such as fiber glass or steel poles. As PacifiCorp identifies poles for replacement through the Line Rebuild program, described in section 7.3.3.3. PacifiCorp plans to mitigate the risk associated with wood poles by replacing them with more fire resilient materials.

2. **Initiative selection**

   Through the line rebuild program, a significant number of poles in the HFTD are planned for replacement to accommodate the higher loads (or heavier weight) of covered conductor. As poles are replaced through the line rebuild program, they will be replaced with non-wood materials, which are more fire resistant, such as fiber glass or steel.

3. **Region prioritization**

   Region prioritization of pole replacement aligns with the covered conductor program, which aligns with tier 3 and tier 2 circuits being worked first.

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

   The line rebuild program is a multi-year initiative, including an engineering design phase, procurement phase and installation phase. Since the previous WMP submission, PacifiCorp has completed the engineering design phase on several projects and identified poles for replacement. Additionally, since the last WMP submission, 87 poles have been replaced, as stated in the 2022-05-02_PC_2022_Q1-QDR_R1 submission of Table 12.

5. **Future improvements to initiative**

   PacifiCorp plans to complete the current line rebuild plan, which includes the replacement of poles in the HFTD areas and then explore the expansion of the

initiative outside of the highest fire-risk areas.

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 271.

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 271.

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 271.

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 271.

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 169 and 7.3.4.1 on page 181.

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 271.

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 169, 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 169.

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 271.

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 181-183, 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 181-183, 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

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

PacifiCorp overhead distribution equipment and lines are designed to meet all industry standards and compliance requirements. Under certain conditions, such as high wind speeds, these lines can become more vulnerable to the "contact by object" risk drivers. On higher risk lines, PacifiCorp plans to address this risk through a line rebuild program, which may include the installation of covered conductor, undergrounding of electric lines, replacement of poles and/or replacement small copper diameter conductor. While undergrounding is the most effective methods for reducing utility related ignition risks and nearly eliminates "contact by object" risks, both undergrounding and covered conductor substantially mitigate the ignition risk associated with "contact by object." Other benefits included improved reliability and PSPS avoidance. Covered conductor is generally a more cost-effective mitigation strategy. In certain scenarios, however, there are specific topological cost drivers which can make undergrounding more cost effective than covered conductor. Undergrounding can be the appropriate solution for many instances, including to improve reliability in remote or rugged terrain locations. In addition, land-owners may bear some of the cost because of land-owner preferences for undergrounding, making an underground strategy more cost effective. In the circumstance that undergrounding lines is more cost effective and/or culturally appropriate, PacifiCorp plans to use an underground design in conjunction with the line rebuild program.

2. **Initiative selection**

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. Undergrounding involves increased expenses related to additional equipment needs, procurement of land, and additional labor requirements. In general PacifiCorp estimates that undergrounding costs range between $1 million- $6 million per line mile based on existing potential projects evaluated to date. However, PacifiCorp recognizes that the range could be much bigger depending on each project and the specific location evaluated. 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. In table 12, spend for the line rebuild program is accounted for in initiative 7.3.3.3 however where undergrounding is implemented, the line miles will be reported for under this initiative,

7.3.3.16.

3. **Region prioritization**

   Region prioritization of undergrounding aligns with the covered conductor program, which aligns with tier 3 and tier 2 circuits being worked first, as these circuits represent the greatest ignition risk.

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

   The line rebuild program is a multi-year initiative, including an engineering design phase, procurement phase and installation phase. In previous WMP submissions, PacifiCorp had not identified any circuits which met the criteria for undergrounding conductor, however since the previous submission of the WMP, PacifiCorp has completed the engineering design phase on several higher priority circuits, which includes the cost evaluation of covered conductor versus undergrounding, and identified two projects where undergrounding provided the following benefits:

   - Reduced maintenance cost and improved access in a heavy tree canopy area with limited access,
   - Avoided cost increase that would be experienced with overhead construction at higher elevations where the additional pole loading requirements result in substantially more pole replacements
   - Avoidance of important cultural areas with permitting and construction constraints.

5. **Future improvements to initiative**

   PacifiCorp plans to complete the current line rebuild plan, which includes the select installation of undergrounded lines, in the HFTD areas and then explore the expansion of the initiative outside of the highest fire-risk areas. For additional information on underground installation see Section 9.4.

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 271.

   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 181, 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 271.

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 271.

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 181. For the OEIS definition of this intrusive pole inspection initiative, see Section 9.1 starting on page 271.

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 187 is being done on transmission lines.

7.3.4.8 LiDAR inspections of transmission electric lines and equipment

1. **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.

2. **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 271.

3. **Region prioritization**

   LiDAR inspections took place on lines with higher fault rates that had an increased fire risk potential.

4. **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.

5. **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 271.

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 188, 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 271.

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 271.

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[26]	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

[26] 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 188.

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 271.

   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 271.

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 197, 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 271.

   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 271.

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 7.8 below.[27]

[27] 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

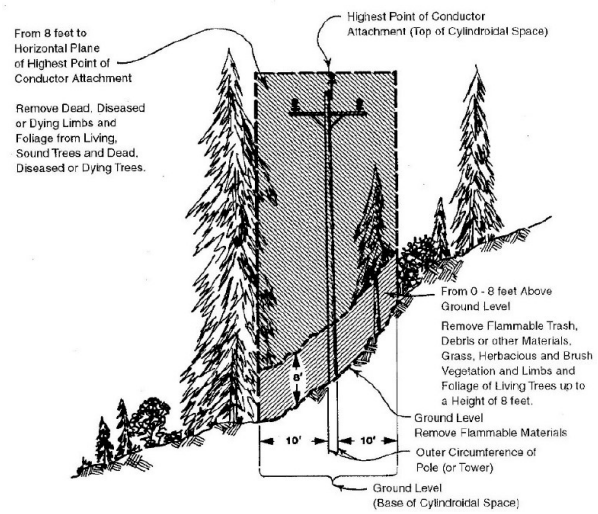


Figure 7.8 Pole clearing

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 188. 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 189. For the OEIS definition of this inspection improvement initiative, see Section 9.1 starting on page 271.

   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 214.

   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 271.

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 204, 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 271.

   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 206 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 271.

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 206 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 271.

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 271.

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 271.

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 271.

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 206-207.

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 210, 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 271.

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 271.

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 271.

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 271.

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.[28]

Through conducting patrols of lines in the HFTD, see Section 7.3.5.11 on page 206, 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."[29] 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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[28] (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.)

[29] 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 271.

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 207and 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 219 are not compatible with the hardware installed. For the OEIS definition of this automatic recloser initiative, see Section 9.1 starting on page 271.

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 219, 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 271.

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 162, 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 271.

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 271.

   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 251. It further describes its emergency plans including restoration actions in Section 7.3.9.5 on page 242.

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

   PacifiCorp will execute a PSPS as a last resort mitigation during extreme fire weather conditions where the probability of weather-related system impacts is much higher than normal and the consequences of ignitions due to high winds and dry conditions can lead to a catastrophic wildfire. While power lines are de-energized, they are still exposed to strong winds and the potential for damage. Even after the wind has dropped below levels associated with system impacts, fire weather conditions are typically still extreme, therefore before re-energizing a line, post-event patrols are completed to determine whether any damage has occurred to the line which needs to be corrected prior to re-energization.

2. **Initiative selection**

   Post-event patrols and restoration of a de-energized circuit will not begin until the risk reduces, generally indicated by the reduction in wind speed below impactful levels as measured by local weather stations paired with continued reduction of forecasted wind speeds as determined by the meteorology department.

   After a potential PSPS event has been identified, advanced restoration planning activities begin on circuits or portions of circuits identified by meteorology that may be part of the PSPS event, before the event even occurs. Proactive patrols of the identified circuits or portions of circuits are initiated pre-event to gather additional information about the circuits that may be included in PSPS event. Depending on the needs, both local and regional resources may be leverages. Additionally contracted resources may also be used depending on the volume of work required. Increased resource levels used to perform pre-event inspections will be maintained to support re-energization activities for circuits or portions of circuits that experienced a PSPS.

During the restoration planning activities, the Emergency Coordination Center (ECC) will work with other departments to prioritize restoration activities. While there will be restoration focus on critical infrastructure and services, the ECC will also be evaluating weather, system impacts, and outage duration. During the PSPS event, field personnel may be actively patrolling the de-energized circuits for damage (i.e. line down, broken crossarms, tree through line, etc.) and debris (i.e. tree branches and other items blown into the line). Repairs will be made if issues are discovered. While the de-energized circuit will still have to be patrolled prior to re-energization, these activities will reduce the time necessary to restore service.

3. Post-event patrols and restoration of a de-energized circuit will not begin until weather stations in the area indicate that winds have fallen below impactful levels and are forecasted to remain below impactful levels. Once the meteorology department has indicated the conditions are favorable to re-energize and no other risk has been identified, field personnel will begin ground patrols of the de-energized circuits. As they patrol, the circuit will be restored in a stepped process so customers can be re-energized as the patrol progresses. Patrols will not occur during nighttime hours given the difficulty of seeing damage or items in the line that could cause an ignition. Patrol personnel will rest during this time and be prepared to re-start re-energization activities once there is adequate daylight. It should be noted that the quantity and/or severity of the damage found on a circuit during final patrol can delay re-energization.

4. **Region Prioritization**

   All lines de-energized as part of a PSPS event will be patrolled in their entirety, using a step restoration process. The step restoration process allows certain customers, usually closer to the substation, to be restored as the patrol progresses and not have to wait for the entire circuit to be patrolled. PacifiCorp works with emergency and public safety partners to identify critical customers for prioritization, when possible.

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

   PacifiCorp is continuously looking for opportunities to reduce event restoration time to balance potential impacts to customers with wildfire risk. In 2021, reduce patrols times and aerial patrols were utilized during the 2021 PSPS event in Dunsmuir, California and were found to expedite the re-energization process. While aerial patrols were possible during the 2021 PSPS event in Dunsmuir, there are times where it is not safe to utilize aerial patrols. However, this event highlighted that, when feasible and available, aerial patrols can be utilized to minimize de-energization duration. For 2022, PacifiCorp will continue to explore the use of aerial patrols, when safe to do so, as a means to expedite patrols prior to re-energization.

5. **Future improvements to initiative**

PacifiCorp is continuously evaluating opportunities to minimize restoration timeframes. Circuit hardening, more granular de-energization capability, and the introduction of other patrol methods are planned to support timely re-energization.

7.3.6.6 PSPS events and mitigation of PSPS impacts

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

PSPS reduces the risk of powerline-caused wildfires but also introduces the potential for economic and societal impacts in the affected communities. PacifiCorp recognizes the need to reduce these impacts as much as is reasonable and feasible. As described in Section 8.3, 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.

2. **Initiative selection**

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 168. PacifiCorp's additional programs or efforts to mitigate the impact on customers and other residents affected during a PSPS event are described in Section 7.3.3.11. These programs include the free portable battery to promote alternative power sources to mitigate the impacts of a PSPS on customers who rely on electric power for medical equipment. For the free portable battery program, outreach is performed to offer medical baseline customers free portable batteries, custom sized for their medical equipment, and training on the equipment. Should this customer experience a PSPS, they have a backup battery to mitigate the impact of the PSPS.

In addition to the free portable battery, PacifiCorp is increasing the density of its weather station network to provide more granular observations along its distribution circuits and transmission lines in areas of wildfire risk. This, in combination with existing sectionalizing devices, should allow for more targeted PSPS, reducing the number of customers impacted by a PSPS. Further, PacifiCorp will be able to use the results of its 30-year WRF reanalysis and Wildfire Risk Reduction Model (WRRM) outputs to inform the installation of new sectionalizing devices to isolate the highest risk portions of a circuit, further reducing the PSPS impacts to the affected communities.

3. **Region prioritization**

   PacifiCorp grid design and system hardening programs are focused on prioritizing the HFTD areas, these programs include the targeted installation of reclosers and relays to support more targeted PSPS events, instead of a broad full circuit approach, further reducing the impact of PSPS.

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

   Since the 2021 WMP, PacifiCorp has initiated the free portable battery program, as further described in Section 7.3.3.11. To minimize the impact on PSPS events on medical baseline customers, PacifiCorp has implemented a program to provide backup batteries at no cost. Customers who depend on medical equipment powered by electricity can receive the backup battery through this program. This is PacifiCorp's initiative and response to the 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'*. Phase 1 of the free portable battery program began delivery to the medical baseline customers who met the criteria that were located in the HFTD Tier 2 and 3 areas. Next phases of the battery program will expand outreach to all medical baseline customers in the California service territory.

   For 2022, PacifiCorp plans to expand the program based on learnings from other utilities.

5. **Future improvements to initiative**

   PacifiCorp plans to be continually improving PSPS events and will continue to reduce the impact of PSPS, primarily through grid hardening efforts but also through more granularity in situational awareness initiatives.

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 271.

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**

   The utility operates with a wide range of both new and legacy database systems that pertain to wildfire mitigation efforts and reporting. For example, risk event data is captured through the company's outage reporting system while asset inspection data is captured and stored in a mainframe type, asset management system. Furthermore, sensitive customer information is stored in an alternate, secure, and restricted database used by customer service and other customer facing organizations such as billing. While the company is not planning to move to a centralized database for all potential data used by the company day-to-day, PacifiCorp does recognize the value in consistent reporting and aggregation of critical datasets pertaining to wildfire mitigation. Due to the large volume of data related to wildfire mitigation initiatives and the complexity associated with processing and validating this data, a well-designed platform to visualize and systematically extract key data can improve access and retrieval of data, enhance reporting capabilities and accuracy, supplement compliance, and tracking of programs.

2. **Initiative selection**

   As of now, utility data related to wildfire mitigation initiatives is collected through a variety of applications, often which are custom made for the contractor, resource group, and/or task as described above. And while it may not make sense to combine databases from an operations management, information security, and customer data

protections perspective, PacifiCorp developed an-in house tool that provides visualization of data that is stored in many databases or repositories through the use of layers. Examples of such data include multi-layered access to PacifiCorp's line maps, risk maps, location of weather stations, location of completed grid hardening projects, outage data and risk scores through the LRAM data layer. This tool is a helpful planning tool for integrated visualization of multiple layers of static data, including risk layers. This enhanced capability to have a map view of circuits, risk and equipment locations also includes the ability to retrieve the data in excel format for reporting, compliance checks and program tracking.

Additionally, compliance checks and program tracking can better be managed with a central repository of wildfire mitigation initiative targets previously reported. This initiative also includes developing and maintaining a central repository of initiative data, such as targets, filings, and data request responses which is managed by the new, Wildfire Program Delivery Team accounted for in Section 7.2.

3. **Region prioritization**

This initiative 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 this data can be reviewed more than non HFTD data.

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

When the last WMP was submitted, in 2021, PacifiCorp had not established a specific central repository for all WMP related filings and data requests. Data collected for WMP filings were stored in multiple locations and data collected for data requests were stored by a different group, instead of centrally located. At the beginning of 2022, with the establishment of a Wildfire Mitigation Program Delivery group, PacifiCorp was able to allocate resources to start the development of a centralized Sharepoint site where all the information that is used to support fillings and data requests is currently stored, which is already showing positive results in terms of consistency and clarity of the data provided for field audits and desktop verifications.

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 168 (to ensure that projects are properly

categorized and represented spatially), and vegetation management initiatives in Section 7.3.5 on page 193 (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**

PacifiCorp anticipates that this new central repository of filings and data requests will further progress the company's ability to make quantitative based updates to initiatives and is the first step towards consistent reporting and efficient data sharing. Incremental improvements to data management are expected to occur over the next five years to further progress towards a more streamlined process.

Additionally, PacifiCorp plans to expand this repository of data for all collected wildfire mitigation data which can be accessed and utilized by engineering, project management, and management. Some applications of this data could include:

- Data informed updates to system operation procedures;
- Outage informed project prioritization and risk reduction evaluation; and
- Development of dashboards and reports to support wildfire mitigation initiatives and alignment with recent discussions with other IOUs in the joint workstreams.

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

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

Situational awareness tools utilize wildfire related data through the Technosylva models described in Section 4.5.1.1 Wildfire related data should be accurate and

promptly integrated into modelling to best inform tools and decisions.

2. **Initiative selection**

   Utility fire data utilized in LRAM comes from a centralized data base of field records, augmented by the risk event investigation team, as described in Table 4.3. Additional wildfire related data, such as historical fires across PacifiCorp territory are provided directly to Technosylva by various fire agencies, as described in the table found in Section 4.5.1.1.

   PacifiCorp utilizes commonly available algorithms to model wildfire spread and does not have custom algorithms related to wildfire. LRAM, described in 4.5.1.4 utilizes ELM Fire, an open-source geospatial model intended for simulating wildland fire; and Technosylva utilizes their FireSim model algorithms, which is also utilized by other utilities in California.

3. **Region prioritization**

   This initiative has no region prioritization, the same process is used across all data.

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

   Since last year's WMP update, PacifiCorp plans have pivoted to incorporate the use of Technosylva modelling in plans to develop new tools, as described throughout this 2022 WMP update. The procurement of Technosylva WFA-E supports a common algorithm to that used by other California utilities.

5. **Future improvements to initiative**

   With the procurement of Technosylva WFA-E, PacifiCorp will have obtained a significant advancement in wildfire algorithms and plans to continue attending the OEIS hosted Risk Modelling workshops to learn of future improvements and recommendations from other utilities.

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 271.

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 continues to leverage existing data sources to produce metrics supporting its WMPs, some of which are its data sources while others may be external data sources. The core data relates to outage data, which is collected and categorized consistent with IEEE 1366 & IEEE 1782 as well as Commission Decisions D.96-09-045 and D.16-01-008. Additionally, PacifiCorp performs data reviews to identify opportunities for further data quality improvements when outage data is refreshed, which occurs on an annual 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 to improve efficiency. PacifiCorp's long-term plan also includes the evaluation of existing tracking databases and capability to identify any additional information that should be captured and analyzed. Additionally, PacifiCorp intends to review existing classifications of ignition risk drivers, which is generally a function of outage cause codes and categorization, and assess whether additional environmental or operational risk information can be ascertained by analyzing non-ignition risk driver data. While not directly tied to ignition risk, this data may offer insight into other types of utility risks.

7.3.8 Resource allocation methodology

PacifiCorp's resource allocation methodology relies on the general approach for informed decision-making, described in Section 7.1.B in which the available resources, 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.

7.3.8.1 Allocation methodology development and application

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

   This initiative addresses the need for a consistent methodology for prioritization of wildfire mitigation resources and applying this information to initiative decision-making. PacifiCorp also recognizes the incremental value a resources allocation strategy can have as deployment of multiple wildfire mitigation initiatives are ramping up. As PacifiCorp is continuing to tackle new initiatives and ramp up existing initiatives, further development of a resource allocation strategy will be important.

2. **Initiative selection**

   By engaging in this initiative, PacifiCorp's main goal is to develop and apply a methodology to monitor, prioritize, direct, and optimize the use of resources in order to successfully deliver its wildfire mitigation plan. For the OEIS definition of this allocation initiative, see Section 9.1 starting on page 271.

3. **Region prioritization**

   This methodology is applied across all wildfire mitigation initiatives across all PacifiCorp territories. Generally, for initiative investment, the methodology prioritizes compliance requirements, then work with the greatest risk reduction potential. In California, 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. For human resources allocation, PacifiCorp focuses on the identification, acquisition, and adequate allocation of expertise that aligns with the needs for managing wildfire mitigation work. Additionally, PacifiCorp promotes awareness of its wildfire mitigation plans and compliance requirements throughout the company's organization to ensure resources

are prioritized and assigned to wildfire mitigation activities as expected.

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

   Throughout 2021, PacifiCorp has continued to use the general methodology described in Section 7.1.B to prioritize investment and address wildfire risk in PacifiCorp's Tier 3 and Tier 2 areas and will continue to do so during the current year. In line with the human resources allocation methodology, in 2021 PacifiCorp created a new Wildfire Mitigation Program Delivery group and opened new positions with its PMO group to ensure adequate resources are hired and assigned to manage wildfire mitigation initiatives. These resources play a key role in developing plans and assigning and managing resources to execute those plans. Additionally, PacifiCorp has attended the related OEIS and IOU workshops to learn from other utilities, shared best practices and lessons learned as initiative implementation progresses

5. **Future improvements to initiative**

   PacifiCorp will assess the results of its most recent investment in additional human resources and adjust allocation as needed according to demands posed by individual initiatives. In addition to that, starting in 2022 PacifiCorp is performing a series of presentations and meetings as part of its Internal Stakeholder Engagement plan to ensure prioritization of wildfire mitigation activities throughout the organization. For initiative investment, as PacifiCorp matures risk modeling elements, and learns more from other utility practices, changes to the existing methodology will be evaluated and implemented. .

7.3.8.2 Risk reduction scenario development and analysis

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

   Risk reduction scenario development and analysis can help inform decision making, particularly when selecting initiatives or prioritizing projects. While not a complete replacement to subject matter expertise, the ability to model various scenarios and understand impacts on risk, particularly risk reduction, can also bring additional transparency to the decision-making process. This initiative includes PacifiCorp's efforts to develop such modeling capabilities for application to different risk reduction scenarios based on implementing wildfire mitigation initiatives implementation and informing utility decision-making.

2. **Initiative selection**

   PacifiCorp understands the need to evaluate different risk reduction scenarios. To date, this initiative has been directly tied to the development and use of LRAM, which is discussed in Section 4.5.1.4 starting on page 81. The Combined Score for each zone of protection, calculated by LRAM, helps to select assets, evaluate projects, and

prioritize implementation of projects based on risk. While helpful to inform project prioritization and overall risk model development, LRAM does not include full simulation or modeling capabilities. As PacifiCorp ramps up the implementation of Grid Hardening initiatives, assessment of different risk reduction scenarios becomes essential to understand the efficiency of mitigation strategies. Therefore, PacifiCorp is investing in additional tools, data, and modeling capabilities through procurement of the Technosylva WFA-E suite of tools discussed in Section 4.5.1.1 and accounted for in initiative 7.3.2.4.

For the OEIS definition of this risk reduction scenario development initiative, see Section 9.1 starting on page 271.

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 submission and plans, targets, and/or goals for the current year**

PacifiCorp continued using LRAM to assess risk reduction and prioritize work within the HFTD. Updates to LRAM layers were performed as required to keep the data current. Certain initiatives under development such as Expulsion Fuse Replacements can benefit from the use of updated LRAM combined risk scores. While LRAM presents a first step toward assessing risk reduction scenarios to inform project prioritization, PacifiCorp is also making investments and advancing modeling capabilities through the implementation of Technosylva's WFA-E tools discussed in Section 4.5.1.1 and accounted for in initiative 7.3.2.4. These tools, once fully operational, will include a project selection tool called WRRM. Additionally development of WRRM will also be critical to inform risk spend efficiency calculations discussed in Section 7.3.8.3.

5. **Future improvements to initiative**

PacifiCorp is continuously improving risk modeling to better evaluate risk reduction. As mentioned in section 4.5.1.4, PacifiCorp plans to evolve the LRAM model toward S-MAP and RAMP products which will align with other utilities practices and improve assessment of risk reduction scenarios. Additionally, PacifiCorp intends to implement Technosylva's WFA-E modelling in 2022, with continues, expanded use in 2023.

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, which is a useful tool for continuously evaluating mitigation options, selecting and planning scope of work, and can be applied to compare various initiatives.

2. **Initiative selection**

   PacifiCorp is developing RSE calculations to assess performance of individual initiatives and compare multiple initiatives based on cost-effectiveness. For the OEIS definition of this RSE initiative, see Section 9.1 starting on page 271.

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 the methodology described in Figure 35 to calculate RSE using outage data and LRAM's environmental risk score as inputs. Upon completion of a verification process, PacifiCorp plans to report objective RSE values for line rebuilds (covered conductors), and possibly other Grid Hardening initiatives in 2023.

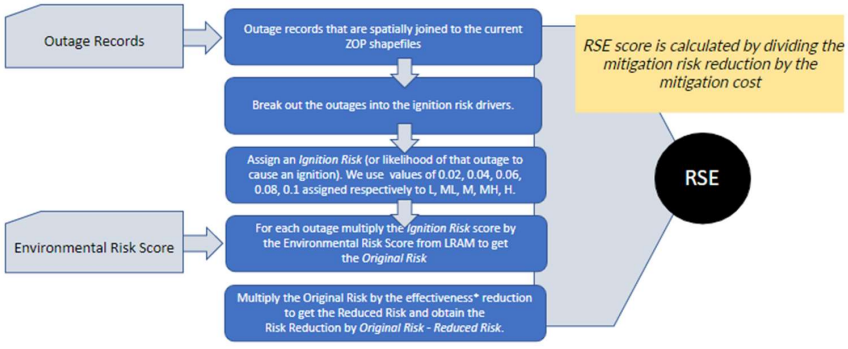


Figure 9 : RSE Flowchart

5. **Future improvements to initiative**

   The methodology for RSE and calculation parameters will be refined throughout 2022, PacifiCorp understands there is inherent uncertainty in the RSE calculations and plans

to develop a verification process that will enable the assessment of factors that influence the estimated RSE values. PacifiCorp also aims to leverage Technosylva's WRRM model to expand upon existing capabilities of RSE. Once these improvements are implemented, PacifiCorp will calculate RSE for initiatives in other categories. 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 271.

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 271.

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 271.

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 271.

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 271.

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 271.

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 271.

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 7.10.



Figure 7.10 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 7.11. For the OEIS definition of this cooperation-related initiative, see Section 9.1 starting on page 271.

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.

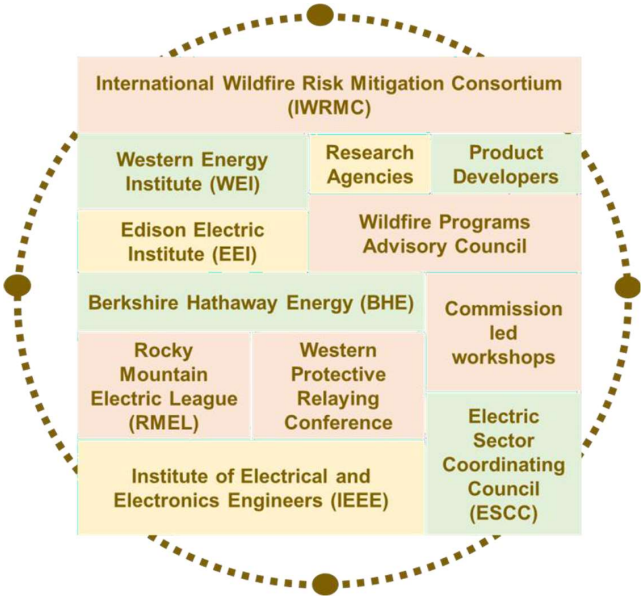


Figure 7.11 Key industry collaboration channels

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 271.

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

1. **Risk to be mitigated**

Vegetation management activities may result in impacts on communities 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 from stakeholders including concerned customers or the communities affected that may result in inefficiencies or delays.

2. **Initiative selection**

Coordination with authorizing agencies and customers is a critical component to successful delivery of 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 271.

3. **Region prioritization**

Implementation of initiatives described above, including the process to notify communities of vegetation management activity, 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 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 time required for agency review and permitting. Projects are reviewed and packaged where feasible to streamline review and coordination with authorizing agencies.

4. **Progress on initiative**

PacifiCorp collaborates with CalFire, local logging companies and forest service agencies on fire breaks/fuels reduction and safety projects as opportunities arise. In

the past, this collaboration included:

- Cal Fire – In the Lake Shastina community, PacifiCorp participated in a joint fuel reduction project with Cal Fire. While CalFire was clearing 100' from roads to allow for emergency vehicle access, PacifiCorp collaborated to concurrently clear vegetation along transmission lines.
- Shasta Trinity USFS – In 2021 while the US Forest Service was completing a large scale fuel reduction project along Hwy 89, PacifiCorp joined the efforts and removed many large trees along Line 2. Additionally, this project also involved Cal Trans; who provided the flagging for the operations.
- Dunsmuir Fire Safe Council – During a city of Dunsmuir fuel reduction project along the I-5 corridor, PacifiCorp had facilities in the area and provided crew support to remove vegetation within the project area.
- Logging Companies – As logging companies work near PacifiCorp facilities, the Company provides fuel reduction support. For example, for a logging project adjacent to line 2 and line 14, PacifiCorp provided mowing services along the right of way to connect their project on either side of the transmission lines.

These types of collaborative efforts are often at the request of community groups or as concurrent work is identified within the year. PacifiCorp does not have a specific plan or overarching joint roadmap to drive cooperative work with other groups but, instead relies on existing partnerships and working relations to identify opportunities as they arise through coordinating with these groups while implementing the vegetation management program.

5. Future improvements to initiative

Cooperation with agencies for fuel reduction projects has been successful and PacifiCorp will continue to engage with other land managing agencies within its service territory in the future.

In 2022, PacifiCorp plans to continue cooperation with the aforementioned organizations and any other organizations that may have aligned objectives.

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 these 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[30] filed on March 1, 2022 included three lessons learned.

The first lesson focused on a more streamlined process to produce GIS mapping data. Real time production of GIS mapping data was more challenging to produce and distribute than anticipated. The Public Safety Partner Portal is the identified resolution to address GIS mapping data streamlining. The second lesson learned focused on the need for better CRC

[30] 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.

communication to customers. CRC information is being included in messaging to customers and external media sources. The third lesson learned was the need for better notification records. Confirmation of notifications was delayed and inconsistent. There are three actions related to this lesson, including standing up external notification system technical support, increased education for call center personnel and quicker verification of notifications.

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 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 163 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.*

1. Method Used to Evaluate PSPS Consequences

PacifiCorp evaluates the weather-related outage risk and wildfire risk across its service territory every day using a combination of recently deployed weather and wildfire models, LRAM/HRRR, publicly available information from the National Weather Service and Geographic Area Coordination Center, and in-house subject matter experts. It is the intersection of these two risks that can result in a PSPS.

To assess the risk for wind-related outages, PacifiCorp correlated five years of historical High Resolution Rapid Refresh (HRRR) model forecasts to outage occurrence over that same period to generate circuit-level fragility curves. These results are used by PacifiCorp to convert the daily wind forecasts from NOAA's HRRR model to wind gust percentiles and expected outage rates. This allows PacifiCorp to

identify circuits at higher risk of wind-related outages up to 48 hours in advance. PacifiCorp is currently working to implement a more robust version of this tool using its 96-hour WRF model (operational) and the 30-year WRF reanalysis (in progress).

PacifiCorp currently relies on its internal meteorologists as well as publicly available observations and forecasts from the GACC to assess local and regional wildfire risk. This assessment considers fire weather conditions, National Fire Danger Rating System (NFDRS) outputs, and fire weather indices such as the Hot-Dry-Windy Index as forecast by PacifiCorp's WRF. PacifiCorp also considers fire weather and fire potential forecasts from the GACC and NWS. Going forward, PacifiCorp is on track to deploy Technosylva's Wildfire Analyst Enterprise by August of 2022. This tool will become an important component of the company's wildfire risk assessment by providing detailed circuit level ignition and wildfire consequence forecasts.

2. Strategy to Minimize Public Safety Risk

PacifiCorp has a working relationship with state, county and local agencies which are available to support any response. Through these well-established partnerships, accurate situational awareness, and response capabilities, PacifiCorp is able to safely execute PSPS actions. Using an approach which provides regular and ongoing updates while maintaining a common operating picture across all response agencies.

PacifiCorp works with local emergency managers, public safety partners, and tribal leadership to identify appropriate deployment locations for Community Resource Centers (CRCs). In general, PacifiCorp has identified at least 3 CRC locations per county and at least one CRC per PSPS zone, where most CRC locations are within 10-20 miles of PSPS zones. Additionally, PacifiCorp contracts with private vendors to support the deployment of temporary CRCs in the event that fixed facilities are not a feasible option. The current list of identified CRC locations is below.

General Area	PSPS Zone Name	CRC Identified
Siskiyou County	Mt Shasta PSPS Zone	Mt Shasta Community Center
	Weed / Snowbrush PSPS Zone	Weed Community Center
	Dunsmuir PSPS Zone	Dunsmuir Community Center
	Happy Camp PSPS Zone	Karuk Senior Nutrition Program Happy Camp Wellness Center Kahtishraam Wellness Center
Del Norte County	Cave Junction PSPS Zone	Selma Community Center Cave Junction Senior Center Cave Junction High School

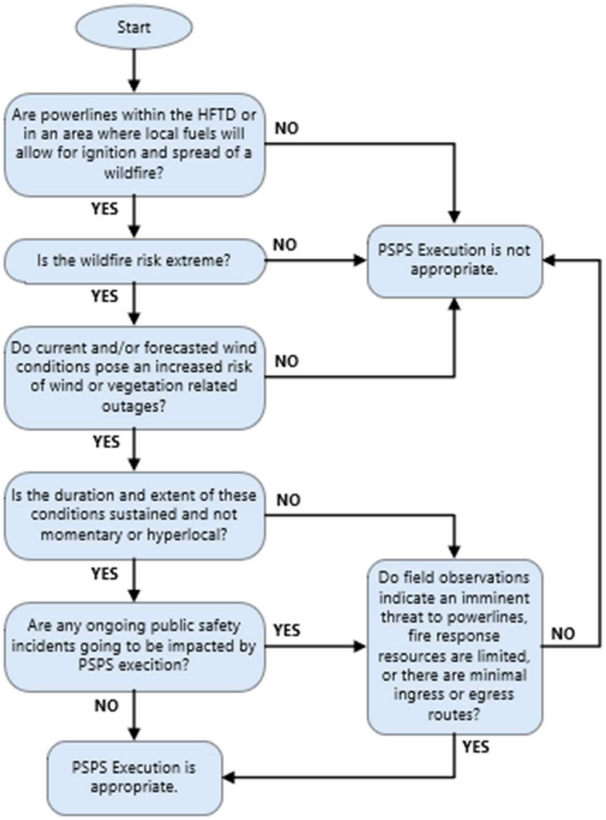
Additionally, PacifiCorp provides (CRCs) to affected areas as needed to support

community needs. CRC capabilities typically include:

- Shelter from environment
- Air conditioning
- Air Purifiers & Air Quality Monitors
- Potable water & Non-perishable snacks
- Seating and tables
- Restroom facilities
- Refrigeration & Heating for medicine and/or baby needs
- Interior and area lighting
- On-site security
- Televisions
- Ice
- Communications capability such as Wi-fi access, SatPhone, Radio, Cellular phone etc.
- On-site medical support
- Charging stations for Cell Phones, AM/FM/Weather radios, computers, etc.
- Small Crates for Pets
- AFN/LEP Population support
- Portable ADA Ramp
- Personal Protective Equipment

3. Outline of Tactical and Strategic Decision-Making Protocols for Initiating PSPS

The decision tree below outlines the tactical and strategic decision-making protocols for initiating PSPS. PacifiCorp considers multiple factors when assessing the conditions that influence the PSPS decision making such as fuels, forecast wind conditions, field observations, and ingress or egress routes. The duration and extension of forecasted weather conditions is also evaluated in this protocol.



4. Strategy to Provide Safe and Effective Re-Energization

PacifiCorp has a working relationship with state, county and local agencies which are available to support any response. Through these well-established partnerships, accurate situational awareness and response capabilities, the Company is able to safely restore power within areas affected by PSPS actions. PacifiCorp uses a liaison officer approach which provides regular and ongoing updates to emergency management agency partners. This approach maintains a common operating picture across all response agencies and provides the greatest opportunity for safe power restoration while also considering any variables to be mitigated or just in time adjustments to plans to be completed directly from the Emergency Coordination Center. PacifiCorp maintains the ability to deploy emergency management staff to local Emergency Operation Centers at the request of the local or state entity.

5. Company Communication Standards

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 direct customers to education and outreach materials shared by the company before each wildfire season.

PacifiCorp notifies customers and delivers clear and understandable information; communications are available in different languages (English, Spanish, Chinese traditional, Chinese simplified, German, Hmong, Mixteco, Vietnamese and Tagalog) and use multiple modes/channels to reach 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 notifications coincide with the timelines outlined in **Error! Reference source not found.** and identify when customers can expect additional information as the event progresses..

Keeping in mind that weather related events are extremely dynamic and weather forecasting can be challenging, the timelines in **Error! Reference source not found.** may be reduced if changing conditions do not allow for such advance notification. This dynamic nature and potential deviation from the timeline is recognized in D.19-05-042. In these instances, the company will promptly notify customers and will include a summary of the circumstances warranting deviation from these timelines in the final report.

Throughout the notification process, PacifiCorp performs positive or affirmative communication with Medical Baseline Customers through special procedures and methods, such as personal phone notification instead of automatic calls, in-person notification at the service location in the event contact cannot be confirmed and tracked verification of contact with these customers.

Table 8.2 Notification timeline

72 Hours	De-Energization Watch with Initial Public Safety Partner Notification
48 Hours	De-energization Watch or Warning with Initial Public Notification
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

5. Protocols for Mitigating Public Safety Impacts of these Protocols

PacifiCorp's general process for a PSPS is described in Figure 8.1:

PacifiCorp PSPS protocols

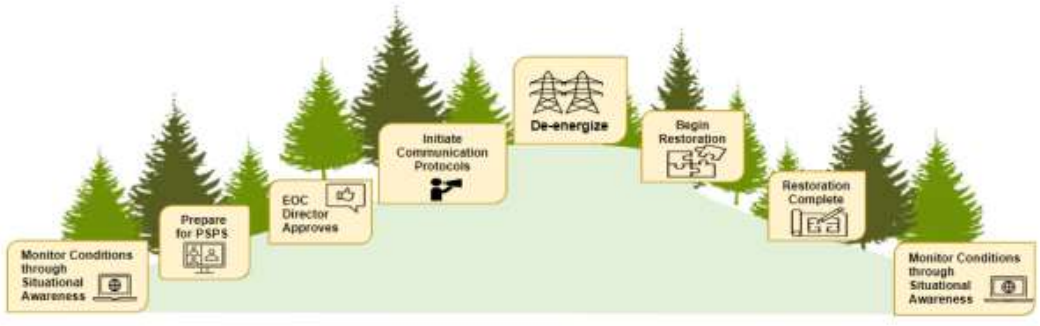


Figure 8.1 PSPS process

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-event patrols
- Alters system protection settings, if applicable
- 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 watch period
- Notify and coordinate with all appropriate critical infrastructure and public safety partners for plan development, response actions and mitigation strategies.
- Upon an all-clear notice, the ECC shuts down.

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 completes procurement and implementation of the Technosylva suite of tools described in section 7.3.2.4, these tools 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 237, where the CRC locations and services are provided.

In Section 7.3.9.4 page 240, PacifiCorp has described the PSPS/de-energization protocols.

In Section 7.3.9.5 page 242, PacifiCorp has described the re-energization protocols.

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 163. 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 163.

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.

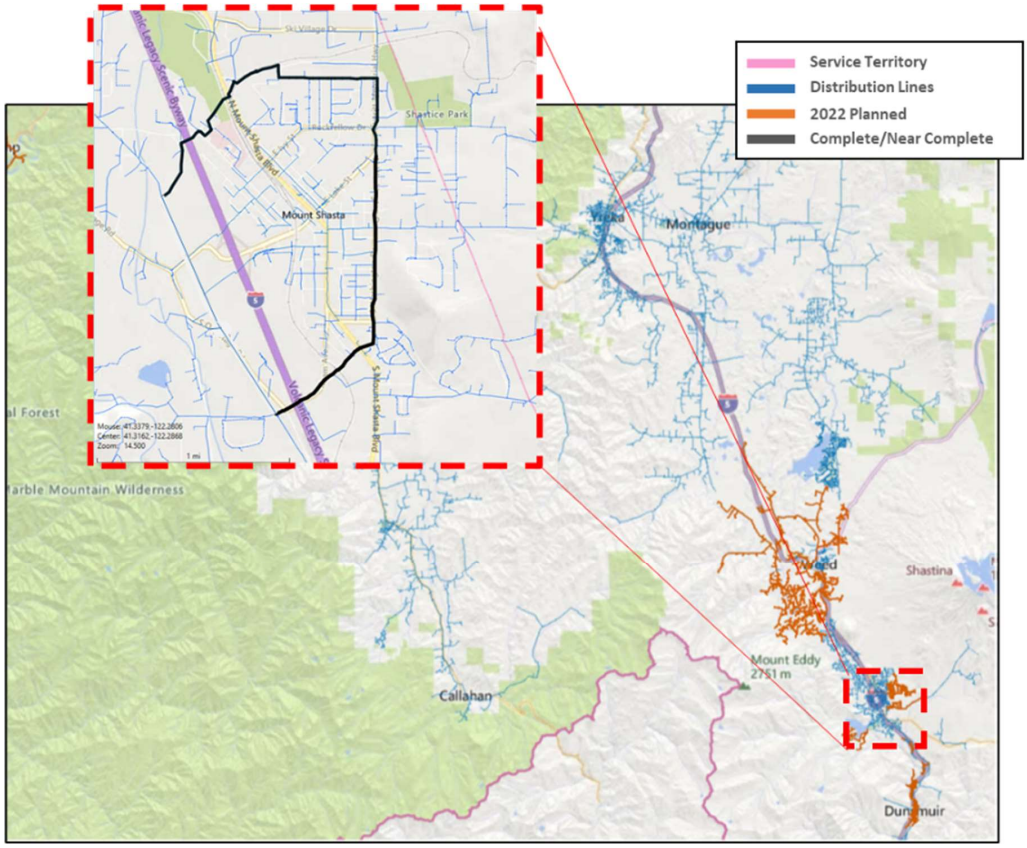


Figure 8.2 Example Grid Hardening Project in Mt Shasta

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 176. 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 237.

Specific program targets associated with these initiatives can be found in Section 5.3 on page 114 and 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[31] (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 235 and 243 respectively.

Information regarding PacifiCorp's engagement with vulnerable communities information has been provided in the 2022 Annual Access and Functional Needs Plan of PacifiCorp filed on January 31, 2022 and is summarized below:

1. **PSPS Protocols Intended to Mitigate the Public Safety Impacts of PSPS on Vulnerable, Marginalized, and/or At-Risk Communities**

   Vulnerable customers, such as those customers identified to need electricity for medical equipment or AFN customers, receive additional outreach prior to a PSPS, which is intended to mitigate the impact of a PSPS for these customers. Prior to a PSPS, PacifiCorp endeavors to accomplish "confirmed communication" with these customers, either through a phone conversation (not voicemail) or, in some circumstances, through a personal visit from a PacifiCorp employee. Medical baseline customers who could not be reached through these means are then forwarded to emergency services for follow-up.
   PacifiCorp currently identifies AFN customers through collaboration with state and Community Based Organizations (CBOs). Additionally, PacifiCorp includes on its PSPS website FAQs information on how customers can sign up for the medical baseline program.

[31] See Cal. Government Code § 53112

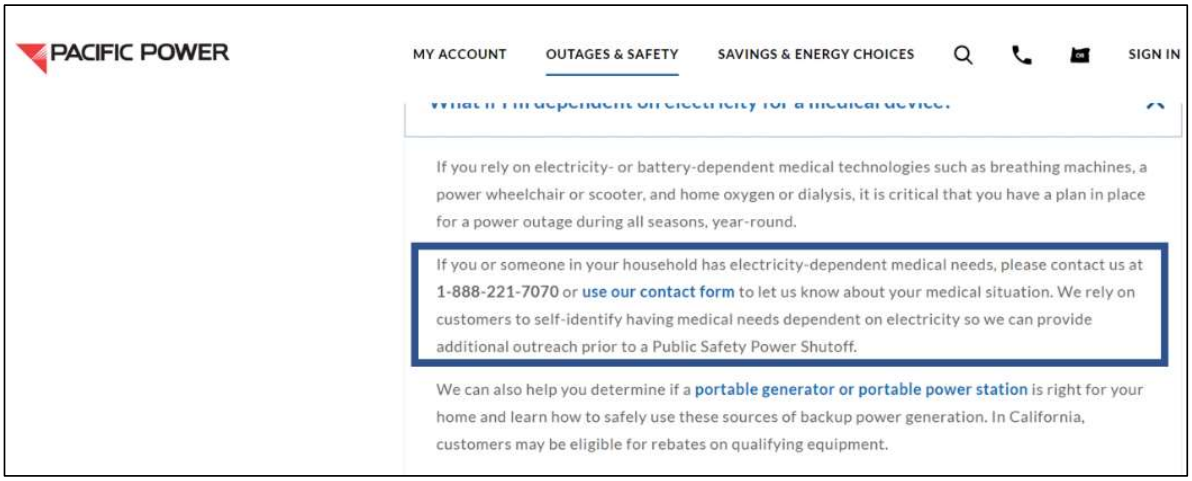


Figure 3 : Medical Baseline Signup Online

2. **Prevalent Languages**

English is the prevalent language in the PacifiCorp California service territory.

3. **Public Outreach Material Languages**

To ensure that outreach is provided in identified languages, Pacific Power delivers wildfire safety-specific communications including brochures, handouts, and bill messages translated into Spanish; a message in nine languages – which includes Chinese traditional, Chinese simplified, Tagalog, Vietnamese, Mixteco, Zapoteco, Hmong, German and Spanish – is included in PSPS event communications including press releases, social media posts and website updates. The company is working to expand those messages onto other, non-event PSPS and wildfire safety collateral.

4. **Community Outreach Efforts of PSSP and Wildfire-Related Outreach**

The Pacific Power PSPS webpage provides timely and detailed information for potential and actual PSPS events relevant to a specific location. Pacific Power's website has the bandwidth to manage site traffic under extreme demand; and has implemented bandwidth capacity to a level that will allow for increased customer access while maintaining site integrity. The webpage (available at www.pacificpower.net/psps) allows customers to determine the likelihood of a PSPS event based on address information. An additional online tool allows the customer to see the "Public safety power shutoff forecasting" for that area over the following seven days. The status indicates whether the area is operating as "Normal," whether there is a PSPS "Watch," or whether there is an actual PSPS "Event." The website is easily accessible by mobile device - additionally - the Pacific Power 'app' is available

for mobile devices which allows customer access to real-time outage updates and information. Material languages are described in Section 3 above.

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.

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[32] 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

[32] "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. 193; Section 7.3.5.5.1 pg. 200
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. 215
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. 237
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. 251
D.21-06-034	Decision Adopting Phase 3 Updated	Section 8.1, pg. 251
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. 181; Section 7.3.4.11, pg. 188; Section 7.3.4.14, pg. 189; Section 7.3.5.19, pg. 215; Section 9.3, pg. 282
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. 181; Section 7.3.4.6, pg. 185; Section 7.3.4.11, pg. 188;
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. 210
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. 161; Section 7.3.3.3, pg. 169; Section 7.3.3.4, pg. 171; Section 7.3.3.7, pg. 173

9.3 COVERED CONDUCTOR INSTALLATION REPORTING

In Section 7.3.3.3, page 169 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.[33] 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

[33] 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 169.

9.4 UNDERGROUNDING IMPLEMENTATION REPORTING

In Section 7.3.3.16, on page 180, 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 169, 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 169, 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 169, 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 169.



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CALIFORNIA WILDFIRE MITIGATION PLAN UPDATE

MARCH 5, 2021

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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 populations	Per Government 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 are particularly likely to contact power lines in the event of high winds and/or ignite if they catch a spark.
Baseline (ignition probability, maturity)	A measure, typically of the current state, to establish a starting point for comparison.
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.

Term	Definition
Critical facilities and infrastructure	For brevity, in the 2021 WMP "critical facilitates and infrastructure" may be shortened to "critical infrastructure" and/or "critical facilities" throughout the WMP. Critical facilities and infrastructure is defined in accordance with the definition adopted in Decision (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 o Police Stations o Fire Station o Emergency Operations Centers o Public safety answering points ☐ Government Facilities Sector o Schools o Jails and prisons ☐ Healthcare and Public Health Sector o Public Health Departments o 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) ☐ Energy Sector o 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 o 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 o Communication carrier infrastructure including selective routers, central offices, head ends, cellular switches, remote terminals and cellular sites ☐ Chemical Sector o 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 o Facilities associated with automobile, rail, aviation, major public transportation, and maritime transportation for civilian and military
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.

Term	Definition
Detailed inspection	In accordance with General Order (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.
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 the California Department of Forestry and Fire Protection (CALFIRE) and loCALFIRE agency evacuation orders, to include both "voluntary" and "mandatory" in addition to other orders such as "precautionary" and "immediate threat".
Fuel density	Mass of fuel (vegetation) per area which could combust in a wildfire.
Fuel management	Removing or thinning vegetation to reduce the potential rate of propagation or intensity of wildfires.
Fuel moisture content	Amount of moisture in a given 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 GO 95.
Greenhouse gas (GHG) emissions	Health and Safety Code 38505 identifies seven GHGs that Air Resource Board is responsible to monitor and regulate in order 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 in order 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).
High Fire Threat District (HFTD)	Per D.17-01-009, areas of the State designated by the California Public Utilities Commission (CPUC or Commission) and CALFIRE to have elevated wildfire risk, indicating where utilities 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" shall be defined as those areas with a population of less than 7 persons per square mile.
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.[1]

Term	Definition
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 period, calculated as the number of overhead circuit miles that were under an HWW multiplied by the number of days those miles were under said HWW. For example, if 100 overhead circuit miles were under an HWW for 1 day, and 10 of those miles were 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).
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, affecting objectives, which may be expressed by terms including, although not limited to health, safety, reliability, economic and/or environmental damage.
Initiative	Measure or activity proposed or in process designed to reduce the consequences and/or probability of wildfire or Public Safety Power Shutoff (PSPS).
Inspection protocol	Documented procedures to be followed in order to validate that a piece of equipment is in good condition and expected to operate safely and effectively.
Invasive species	Non-native species whose proliferation increases the risk of wildfires.
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.
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 were it not for an outage. Typically called unserved energy.
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.
Member of the public	Any individual not employed by the utility.

Term	Definition
Multi-attribute value function	Risk calculation methodology introduced during CPUC's Safety Model Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Proceeding (RAMP) proceedings.
Near miss	An event with significant probability of ignition, including wires down, contacts with objects, line slap, events with evidence of significant heat generation, and other events that cause sparking or have the potential to cause ignition.
Near-miss simulation	Simulation of what the consequence would have been of an ignition had it occurred.
Need for PSPS	When utilities' criteria for utilizing PSPS are met.
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-ignited wildfire.
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 in the course of other company business.
Percentile conditions	Top X% of a particular set (e.g., wind speed), based on a historical data set with sufficient detail.
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, such as number of trees trimmed or miles of power lines hardened.
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 were destroyed by wildfire, including both third-party property and utility assets.

Term	Definition
PSPS event	Defined as the time period 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.
PSPS weather	Weather that exceeds a utility's risk threshold for initiating a PSPS.
Red Flag Warning (RFW)	RFW, level of wildfire risk from weather as declared by the National Weather Service.
RFW OH Circuit Mile Day	Sum of overhead circuit miles of utility grid subject to RFW each day within a given time period, calculated as the number of overhead circuit miles that were under an RFW multiplied by the number of days those miles were under said RFW. For example, if 100 overhead circuit miles were under an RFW for 1 day, and 10 of those miles were 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 event: ☐ 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" shall 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 Wildfire Mitigation Plan (WMP), “area” shall 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.
Span	The space between adjacent supporting poles or structures on a circuit consisting of electric line and equipment. "Span level" refers to asset-scale granularity.

Term	Definition
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).
Trees with strike potential / hazard trees	Trees that are of sufficient height that if they were to fail could 'fall in' to the line / trees that are dead, dying, diseased, deformed, or unstable trees which have a high probability of falling and contacting a substation, distribution or transmission conductors, structure, guys or other Company electric facility.
Unplanned outage	Electric outage that occurs with no advance notice from the utility (e.g. blackout).
Urban region	In accordance with GO 165, "urban" shall 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" shall be defined as census tracts.
Utility-ignited wildfire	Wildfires ignited by utility infrastructure or employees, including all wildfires determined by AHJ investigation to originate from ignition caused by utility infrastructure.
Vegetation management	Trimming and clearance of trees, branches, and other vegetation that poses the risk of contact with electric equipment.
Vegetation risk index	Risk index indicating the probability of vegetation-related outages along a particular circuit, based on the vegetation species, density, height, and growth rate.
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 a combination of various outcomes of the wildfire and their associated probabilities.
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).
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.

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 damage 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 wildland urban interface, 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 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 in order 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 plan.

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 is the requirement for all electric utilities to develop and implement Wildfire Mitigation Plans (WMPs or Plans). 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 fulfill 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.

A component of the 2020 WMP process was an inaugural set of durable datasets for assessment of mitigation activities, intended to allow review by the WSD, the Commission and stakeholders of data related to each utility's mitigation activities. Modifications to this data collection foundation occurred as the WSD updated its data taxonomy, the result of which is generally cascaded through this Plan Update, while certain GIS-based updates are anticipated in the company's first quarterly 2021 filing, due in May 2021. While all major initiatives require a ramp-up period, PacifiCorp has made significant strides during these first years of its WMP implementation. Where possible, this update outlined 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 with a goal 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.

For context when reviewing multiple updates, PacifiCorp cautions that when reviewing its WMP Update, it must be noted that certain requirements related to risk analysis processes and quantification applicable to Pacific Gas & Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) (collectively, the Large IOUs) do not apply to the three small multijurisdictional utilities (SMJUs), which includes PacifiCorp, Bear Valley Electric Service and Liberty Utilities. The regulations were developed for the Large IOUs in rulemaking R.13-11-006, which outlined Safety Model Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Plan (RAMP) requirements. SMJUs were directed to introduce risk-based decision making into their general rate cases (GRCs), which PacifiCorp complied with starting in its 2018 GRC, leveraging information developed by the Large IOUs as well as other utilities, previous risk and health assessment methodologies and principles of the International Standardization Organization's "Risk Management – Principles and Guidelines"[1] to develop the company's first 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 mis-operation. 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, certain of the risk rubrics, including Risk Spend Efficiency, 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 proceeding R.20-07-013.

PacifiCorp remains fully committed to the continued development and improvement of the company's risk-based decision making framework, but many of the elements contemplated in the 2021 guidelines template may not be applicable to PacifiCorp, or may not be required in exactly the same manner as is required of the Large IOUs. To the extent that a program addresses a top categorical risk included in the company's last GRC, PacifiCorp was able to qualify relative risk ranking but may not be able to provide the discreet calculations as requested. In addition, in terms of Public Safety Power Shutoff (PSPS) events, the company experienced one activation and two watch events, so data is limited. PacifiCorp has monitored the PSPS events experienced by other utilities and incorporated lessons learned from

[1] International Standardization Organization's Risk Management-Principles and Guidelines are identified as ISO 3100 and is an internationally recognized standard for risk management. Adopting these principles and guidelines positions an organization to be able to achieve objectives, improve the identification of risks, and more effectively allocate resources for risk reduction.

those records, in addition to the limited record identified above, into its own procedures and plans (e.g., lessons learned regarding customer communications and coordination with public safety officials).

The company's WMP is primarily intended to guide PacifiCorp's efforts to minimize the risks of a fire igniting from company facilities. The WMP also addresses the response to an active wildfire (whether ignited by the company's facilities or otherwise) to minimize the potential for damage to PacifiCorp's facilities and its customers. 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 its 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 its already existing programs (e.g., the company's vegetation maintenance inspection and correction programs). This experience was also leveraged together with historical data when new programs or activities were necessary (e.g., installation of covered conductor).

The company has incorporated a variety of available information sources including data gleaned from the California Department of Forestry and Fire Protection (CALFIRE) datasets (as well as United States Forest Service), weather and red flag warning data from the National Weather Service (NWS), in addition to the company's own outage records, circuit topology, as well as inspection and vegetation datasets. Notably, PacifiCorp's outage records include both planned and fault events, and specifically identify the frequency, duration, and cause of outages experienced on energized circuits. These outage records are analyzed to estimate ignition probability drivers, representing the most accurate depiction of how often potential ignition events may occur within the company's service territory. Through 2020, PacifiCorp was able to achieve substantial success despite significant startup activities required for such a substantial implementation plan.

The 2021 Plan Update builds on prior successes. In Chapter 5 of this plan update, the company sets forth its objectives for the next year and the following year, culminating the three-year Plan period. Key objectives for 2021 include:

- installation of 85 line miles of covered conductor
- installation and commissioning of 27 system automation programs
- proactive replacement of 128 in-service wooden poles with fiberglass for enhanced structural resilience.

In addition, PacifiCorp will continue evaluating various pilot project results and implementing enhanced inspection and correction programs. The company expects that the first three to five years of WMP implementation will be critical in terms of establishing data records to evaluate its progress. With the creation of the 2021 WMP Update and related data collection, the company has made significant progress in creating and providing a baseline of data to measure the incremental changes in its wildfire mitigation programs and initiatives.

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*

Executive-level owner with overall responsibility

- Name and title: Allen Berreth, Vice President- Transmission and Distribution (T&D) Operations, Pacific Power
- Email: allen.berreth@pacificorp.com
- Phone number: 503-813-6205

Table 1-1: Program owners specific to each section of the plan

Program	Program Owner	Title	Contact Information	Contact Phone
Overall Oversight	Allen Berreth	Vice President, T&D Operations	allen.berreth@pacificorp.com	503.813.6205
Statutory Adherence	Tim Clark	Senior Attorney, PacifiCorp	tim.clark@pacificorp.com	801.220.4565
Risk Assessment and mapping	Heide Caswell	Director of Asset Performance and Wildfire Mitigation, T&D Operations	heide.caswell@pacificorp.com	503.813.6216
Situational Awareness and Forecasting	Steven Vanderburg	Manager, Meteorology, T&D System Operations	steven.vanderburg@pacificorp.com	503.251.5264
Grid Design and system hardening	Amy McCluskey	Director of Wildfire Mitigation PMO	amy.mccluskey@pacificorp.com	503.813.5493
Asset Management and inspections	Amy McCluskey	Director of Asset Management, T&D Operations	amy.mccluskey@pacificorp.com	503.813.5493
Vegetation management and inspections	Brian King	Director of Environmental & Vegetation Management, T&D Operations	brian.king@pacificorp.com	503.813.6031
Grid operations and protocols	Erik Brookhouse	Vice President of System Operations, T&D System Operations	erik.brookhouse@pacificorp.com	503.813.5153
Data Governance	Heide Caswell	Director of Asset Performance and Wildfire Mitigation, T&D Operations	heide.caswell@pacificorp.com	503.813.6216

Resource allocation methodology	Allen Berreth	Vice President of T&D Operations	allen.berreth@pacificorp.com	503.813.6205
Emergency planning and preparedness	Justin Bukartek	Director, Emergency Management, T&D System Operations	justin.bukartek@pacificorp.com	503.813.5000
Stakeholder cooperation and community engagement	Alan Meyer	Director of Commercial Accounts and Community Relations, External Affairs and Customer Solutions	alan.meyer@pacificorp.com	541.955.7946

1.1 VERIFICATION

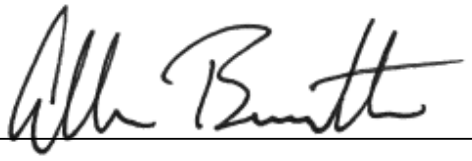
Complete the following verification for the WMP submission:

(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 March 5, 2021 at Portland, Oregon



Allen Berreth, Vice President, T&D Operations, Pacific Power

2 ADHERENCE TO STATUTORY REQUIREMENTS

Section 2 comprises a "check list" of the CPUC Code Sec. 8386 (c) requirements and subparts. Each utility shall both affirm that the WMP addresses each requirement AND cite the Section or Page Number where it is more fully described (whether in Executive Summary or other section of the WMP).

Table 2-1: Adherence to Statutory Requirements

Requirement	Description	WMP Section
1	An accounting of the responsibilities of persons responsible for executing the plan	Section 1
2	The objectives of the plan	Section 5 .2
3	A description of the preventive strategies and programs to be adopted by the electrical corporation to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks	Sections 4.2, 7.1, 7.3
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	Chapter 6
5	A discussion of how the application of previously identified metrics to previous plan performances has informed the plan	Section 4.1
6	Protocols for disabling reclosers and deenergizing 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 deenergizing portions of the electrical distribution system that consider the impacts on all of the aspects listed in PU Code 8386c	Sections 7.3.6.1, 8.2.
7	Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing 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 8.2, 8.4
8	Plans for vegetation management	Section 7.3.5
9	Plans for inspections of the electrical corporation's electrical infrastructure	Section 7.3.4
10	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 8.1
11	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
12	A description of how the plan accounts for the wildfire risk identified in the electrical corporation's Risk Assessment Mitigation Phase filing	Chapter 4

Requirement	Description	WMP Section
13	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	Chapter 4
14	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 7.3.3.16
15	A showing that the electrical corporation has an adequately sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with the electrical corporation	Sections 5.4, 7.3.8
16	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 should consider expanding the high fire threat district based on new information or changes in the environment	Section 4.2.5
17	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 4.5.1
18	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
19	A statement of how the electrical corporation will restore service after a wildfire	Section 7.3.9
20	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
21	A description of the processes and procedures the electrical corporation will use to do the following: 1. Monitor and audit the implementation of the plan. 2. Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies. 3. 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
22	(Guidance-1, Class B) **Action PC-1:** In its 2021 WMP Update, PacifiCorp shall provide a high-level description of its risk-informed decision-making approach used to select the portfolio of mitigation initiatives presented in its 2020 WMP.	Section 4.5.1

Requirement	Description	WMP Section
23	(Guidance-1, Class B) **Action PC-2:** In its 2021 WMP Update, PacifiCorp shall provide quantitative values for ignition risk reduction for each initiative in its 2020 WMP.	Section 4.5.1
24	(Guidance-1, Class B) **Action PC-3:** In its 2021 WMP Update, PacifiCorp shall provide quantitative values for wildfire consequence risk reduction for each initiative in its 2020 WMP.	Section 4.5.1
25	(Guidance-1, Class B) **Action PC-4:** In its 2021 WMP Update, PacifiCorp shall: 1) outline its risk assessment models, 2) demonstrate the inclusion of existing ignition data into the development of its risk assessment models, and 3) provide a table describing its risk assessment techniques used for each initiative in the format used by Southern California Edison (SCE).[10] If subparts 1 and 2 cannot be completed, PacifiCorp shall provide an update on the development of its risk assessment models with a detailed timeline including progress metrics.	Section 4, Table 4.2-2
26	(Guidance-3, Class A) **Action PacifiCorp-1:** In its 2021 WMP update, PacifiCorp shall explain how the composite score will aide in targeting and selection of specific initiatives and mitigations.	Section 4.5.1
27	(Guidance-3, Class A) **Action PacifiCorp-2:** In its 2021 WMP update, PacifiCorp shall submit a table describing its risk assessment techniques used for each initiative in the format used by Southern California Edison (SCE).	Table 4.2-2
28	(Guidance-3, Class A) **Action PacifiCorp-3:** In its 2021 WMP update, PacifiCorp shall explain and provide the analysis used to determine the sufficiency of relying on HFTD for prioritization and modeling efforts.	Section 4.2.5
29	(Guidance-3, Class A) **Action PacifiCorp-4:** In its 2021 WMP update, PacifiCorp shall explain how it integrates cost analysis into its modeling and decision-making.	Section 4.5.1
30	(Guidance-3, Class A) **Action PacifiCorp-5:** In its 2021 WMP update, PacifiCorp shall: 1) explain how its modeling efforts are dynamic and detail the frequency of calculations for both model inputs and outputs, and 2) justify why annual refreshing of the model is sufficient.	Section 4.5.1
31	(Guidance-3, Class A) **Action PacifiCorp-6:** In its 2021 WMP update, PacifiCorp shall provide more information on its procedures to utilize the results of its modeling efforts for decision- making and prioritization of WMP initiatives.	Section 4.5.1
32	(Guidance-3, Class A) **Action PacifiCorp-7:** In its 2021 WMP update, PacifiCorp shall explain how it intends to update its modeling approach in the event that one of the components fails the "Testing Validation" outlined in Attachment A of PacifiCorp's QR filing.	Section 4.5.1
33	(Guidance-4, Class B) **Action PC-5**: In its 2021 WMP Update, PacifiCorp shall: 1) discuss the relationship between various grid hardening, vegetation management, and asset management initiatives and the corresponding impacts on thresholds for initiating PSPS events, and 2) specifically how each initiative in its WMP affects its threshold values for initiating PSPS events.	Section 4.5, Chapter 8
34	(Guidance-4, Class B) **Action PC-6:** In its 2021 WMP Update, PacifiCorp shall discuss how the various grid hardening, vegetation management, and asset management initiatives are expected to reduce the frequency (i.e., number of events over time) of PSPS events.	Chapter 8

Requirement	Description	WMP Section
35	(Guidance-4, Class B) **Action PC-7:** In its 2021 WMP Update, PacifiCorp shall discuss how the various grid hardening, vegetation management, and asset management initiatives are expected to reduce the scope (i.e. number of customers impacted) of PSPS events for its entire service area, not just Tier 3 areas.	Chapter 8
36	(Guidance-4, Class B) **Action PC-8:** In its 2021 WMP Update, PacifiCorp shall discuss how the various grid hardening, vegetation management, and asset management initiatives are expected to reduce the duration of individual PSPS events.	Chapter 8
37	(Guidance-4, Class B) **Action PC-9:** In its 2021 WMP Update, PacifiCorp shall discuss how the various grid hardening, vegetation management, and asset management initiatives supports its Planned Evolution and Timeframe Table, as outlined in Section 4.4.7 of its 2020 WMP.	Chapter 4-7
38	(Guidance-5, Class B) **Action PC-10:** In its 2021 WMP Update, PacifiCorp shall provide initiative-level details on the current and future approaches to its decision-making in selecting WMP initiatives, identifying where systematic and programmatic advancements are expected. These initiative-level details shall include: 1) an identification the specific risk being mitigated, or problem being addressed, 2) how the initiative or program was selected, 3) how prioritization or targeting is approached for each initiative or program, 4) future plans to improve risk modeling for the initiative or program, and 5) a timeline for the implementation and updating of risk modeling to support the decision-making for each initiative or program. At a minimum, these details shall be provided for every initiative associated with asset management, vegetation management, grid hardening, and PSPS identified in PacifiCorp's 2020 WMP.	Section 4.5.1
39	(Guidance-5, Class B) **Action PC-11:** In its 2021 WMP Update, PacifiCorp shall provide discussion for the repetition of identical and zero-dollar totals for each individual initiative.	Sections 4.5, 7.3.1
40	(Guidance-6, Class B) **Action PC-12:** In its 2021 WMP Update, PacifiCorp shall report the RSE analysis for all Standard Operations and Augmented Wildfire Operation upon completion of the work described in its response to Condition Guidance-1.	Section 4.5.1
41	(Guidance-7, Class B) **Action PC-13:** In its 2021 WMP Update, PacifiCorp shall clearly distinguish and report on benefits of IR and LiDAR "enhanced" inspections, as currently implemented, compared to established "routine" inspections that may exist across its programs.	Section 7.3.4.5
42	(Guidance-8, Class C) In its 2021 WMP update, each electrical corporation shall: (i) include objectives for each of its initiatives that are measurable, quantifiable, and verifiable by the WSD; (ii) provide targets and timelines for all strategies, plans, and approaches to wildfire mitigation that are measurable, quantifiable and verifiable by the WSD; and (iii) dispense with empty rhetoric and not use terms that are ambiguous, misleading, or otherwise have the result of diluting commitments. Continued use of equivocating language may result in denial of future WMPs.	Section 5.4.1
43	(Guidance-10, Class B) **Action PC-14:** In its 2021 WMP Update, PacifiCorp shall detail all actions it has taken and will take prior to its 2022 WMP submittal to bring its data submissions into full compliance with the WSD's GIS data reporting requirements.	Section 7.3.7

Requirement	Description	WMP Section
44	(Guidance-11, Class B) **Action PC-15:** In its 2021 WMP Update, PacifiCorp shall: 1) provide a table with the current number of employees and vacancies for apprenticeship, line, and vegetation management personnel, and 2) a description of its recruitment, training, and retention strategies.	Section 7.3.8.1
45	(Guidance-11, Class B) **Action PC-16:** In its 2021 WMP Update, PacifiCorp shall provide an overall description of its recruiting strategy.	Section 7.3.8.1
46	(Guidance-11, Class B) **Action PC-17**: In its 2021 WMP Update, PacifiCorp shall 1) provide percentage numbers of personnel employed from out of state, and 2) the percentage that were working for another California utility immediately prior to being hired.	Section 7.3.8.1
47	(Guidance-12, Class B) **Action PC-18**: In its 2021 WMP Update, PacifiCorp shall provide a more detailed and structured 10-year plan that is comprehensive and provides its long-term, directional vision. The updated 10-year plan, at a minimum, shall include: 1) either a) anticipated annual quantitative benchmarks that are reasonable and achievable for each goal, or b) explain how it intends to track progress of each goal if a quantitative benchmark is not provided, and 2) a list of activities with metrics to track progress toward annual benchmarks.	Section 4.5
48	(PacifiCorp-1, Class B) **Action PC-19:** In its 2021 WMP Update, PacifiCorp shall investigate and discuss how it may apply existing risk analysis models to consider future climate scenarios rather than the current state of climate-caused risk.	Section 4.5.1
49	(PacifiCorp-1, Class B) **Action PC-20:** In its 2021 WMP Update, as part of its indicated coordination with the Pyregence Initiative, PacifiCorp shall explain how it plans to integrate expertise and lessons learned into its analysis and planning to deploy wildfire initiatives.	Chapter 4
50	(PacifiCorp-2, Class B) **Action PC-21**: In its 2021 WMP Update, PacifiCorp shall provide a cost/benefit analysis of the impact of having a higher density of weather stations across its territory.	Section 7.3.2
51	(PacifiCorp-3, Class B) **Action PC-22:** In its 2021 WMP Update, PacifiCorp shall present and explain a methodology for tracking and measuring the effectiveness of its covered conductor installations at reducing the frequency and probability of: 1) outages for its top 10 outage causes based on best available historical data, and 2) ignitions for all CPUC reportable ignitions.	Section 4.5.1
52	(PacifiCorp-4, Class B) **Action PC-23:** In its 2021 WMP Update, PacifiCorp shall 1) detail its QA/QC measures for asset management and inspection initiatives and 2) provide planned spend for these initiatives.	Section 7.3.3
53	(PacifiCorp-5, Class C) In its 2021 annual update, PacifiCorp shall: (i) describe whether recloser setting adjustments and the detection and alleviation of faults reduce ignition risk along PacifiCorp's grid; and (ii) report on its assessments, including all supporting data and results.	Section 4.5.1
54	(PacifiCorp-6, Class B) **Action PC-24:** In its 2021 WMP Update, PacifiCorp shall describe its efforts to develop policies regarding (a) data collection and governance, (b) data transparency, and (c) information sharing, beyond supporting network operations, to demonstrate support of wildfire mitigation activities.	Section 7.3.7

Requirement	Description	WMP Section
55	(PacifiCorp-7, Class C) In its 2021 WMP update, PacifiCorp shall: (i) describe its plan for receiving input from customers, such as surveys and any formal method of incorporating such input into its procedures; (ii) provide updates relating to the WMP that derive from D.20-03-024, particularly relating to effectiveness of outreach and AFN coordination; (iii) outline in detail how PacifiCorp cooperates with suppression agencies, including how it cooperates on training, incidents, and other activities; and (iv) detail how it plans to coordinate cooperative efforts relevant to reducing wildfire risk with federal agencies.	Section 7.3.10, Chapter 8

3 Actual and Planned Spending for Mitigation Plan

3.1 Summary of WMP initiative expenditures

In the Table 3-1, summarize the projected costs (in thousands) per year over the three-year WMP cycle, including actual expenditures for years passed.

In Table 3-2 break out projected costs per category of mitigations, over the three-year WMP cycle. The financials represented in the summary tables below equal the aggregate spending listed in the mitigations financial tables reported quarterly. Nothing in this document shall be construed as a statement that costs listed are approved or deemed reasonable if the WMP is approved, denied, or otherwise acted upon.

The tables below show spending projections and actuals for the three-year WMP plan period (2020-2022).

Table 3-1: Summary of WMP Expenditures - Total

Spend in thousands $	
2020 WMP Planned	24,708
2020 Actual	18,202
Difference	6,506
2021 Planned	27,772
2022 Planned	24,015
2020-22 Planned	71,021

Table 3-2: Summary of WMP Expenditures by Category

WMP Category	2020 WMP Planned	2020 Actual	Difference	2021 Planned	2022 Planned	2020-22 Planned (w/ 2020 Actual)
Risk and Mapping	$25	$186	($161)	$186	$186	$558
Situational Awareness	$278	$1,209	($931)	$233	$296	$1,738
Grid Design and System Hardening	$15,403	$8,788	$6,615	$19,246	$15,303	$43,337
Asset Management and Inspections	$1,219	$803	$416	$760	$775	$2,338
Vegetation Management	$5,783	$6,999	($1,216)	$6855	$6,900	$20,754
Grid Operations	$2,000	$0	$2,000	$0	$0	$0
Data Governance	$25	$186	($161)	$186	$186	$558
Resource Allocation	$278	$1,209	($931)	$233	$296	$1,738
Emergency Planning	$0	$0	$0	$0	$0	$0
Stakeholder Cooperation and Community Engagement	$0	$36	$0	$73	$73	$0

WMP Category	2020 WMP Planned	2020 Actual	Difference	2021 Planned	2022 Planned	2020-22 Planned (w/ 2020 Actual)
Total	$25,011	$19,416	$5,631	$27,772	$24,015	$71,021

3.2 SUMMARY OF RATEPAYER IMPACT

PacifiCorp currently does not have any ratepayer impacts due to utility-ignited wildfires and wildfire mitigation activities to report for each of the years below. To-date, PacifiCorp has not requested Commission approval of or put into rates any costs related to wildfire mitigation initiatives which have been completed, are still under review, projected to be completed, or proposed in previous, current or future WMPs. Additionally, the company has not yet requested recovery for any utility-ignited wildfires for the years identified below. As such projected costs and ratepayer impacts become available, the company will provide this information.

Table 3-3: WMP Electricity cost increase to customers

Annual performance - Actual						
Outcome metric name	**2016**	**2017**	**2018**	**2019**	**2020**	**Unit(s)**
Increase in electric costs to ratepayer due to utility-ignited wildfires (total)	NA	NA	NA	NA	NA	*Dollar value of average monthly rate increase attributable to utility-ignited wildfires per year (e.g., $3/month on average across customers for utility-ignited wildfires occurring in 20XX)*
Increase in electric costs to ratepayer due to wildfire mitigation activities (total)	NA	NA	NA	NA	NA	Dollar value of average monthly rate increase attributable to WMPs per year

4 LESSONS LEARNED AND RISK TRENDS

4.1 LESSONS LEARNED: HOW TRACKING METRICS ON THE 2020 PLAN HAS INFORMED THE 2021 PLAN

Describe how the utility's plan has evolved since the 2020 WMP submission. Outline any major themes and lessons learned from the 2020 plan and subsequent implementation of the initiatives. In particular, focus on how utility performance against the metrics used has informed the utility's 2021 WMP.

Data and metrics developed through the 2020 WMP did not result in substantial changes to the specific selection of mitigation initiatives but were used to refine the company's approach in the prioritization and execution of its WMP. The area of largest change between 2020 and this update focused on the advancement of risk modeling techniques which was used to inform priorities for mitigation measures at specific locations. Fundamentally, historic data that had been previously used to target risk areas was weighed against current risk assessment, which informed longer-term strategies and priorities. In the case where priorities were found to be different, these are identified, but may not have been materially affected due to progress that had already been achieved on any given mitigation plan item, i.e. replacing a relay for a distribution circuit that had been designed and was ready for construction. Rather, this enhanced assessment process is more likely to pull projects forward in future years. In addition, the incorporation of risk assessment and fire risk mitigation in areas that were not identified as PSPS areas, but are within the HFTD, as well as those areas which weren't previously designated as HFTD suggests expansion of the company's fire mitigation efforts beyond that contained in its prior WMPs. Expanded PSPS and HFTD areas will be established once true risk spend efficiencies are calculated. The company anticipates this as part of its upcoming development activity.

4.2 UNDERSTANDING MAJOR TRENDS IMPACTING IGNITION PROBABILITY AND WILDFIRE CONSEQUENCE

Describe how the utility assesses wildfire risk in terms of ignition probability and estimated wildfire consequence, including use of Multi-Attribute Risk Score (MARS) and Multi-Attribute Value Function (MAVF) as in the Safety Model and Assessment Proceeding (S-MAP)2 and Risk Assessment Mitigation Phase (RAMP), highlighting changes since the 2020 WMP report. 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.).*

[2] 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

a. PacifiCorp has built upon the analysis provided in its 2019 and 2020 WMPs to further recognize wildfire risks from utility equipment. It evaluated the impact weather plays in its wildfire risk and outlined its Fire/Not Fire Season analysis, which it explains further in Section 4.4.4. Also, to further develop this concept and support its situational awareness tactics, the company identified three weather influencers to which it needed to be mindful, which serve a similar function as a "fire potential index" and act as inputs to identify operational strategies, such as affecting non-reclosing, employee watches and PSPS. Additional weather influencers used by the company are described below.

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

b. PacifiCorp further evaluated the variables for fuel indicators, including a measure of long-term drying, the Keetch Byram Drought Index (KBDI) and sustained wind, which can be correlated to fire size that could spread (not incorporating local terrain or fuel availability). The company further advanced this approach in 2020 with the use of vapor pressure deficit (VPD) to recognize the impact that alpine environments could have on the reliability of the KBDI, in addition to providing an estimate of short-term drying and its effect on fuel readiness. Finally, as PacifiCorp has built out its weather stations it has outfitted most of them with fuel moisture sensors to further augment its awareness of dryness that could result in wildfire risk. It also correlated Fosberg Fire Weather Index accumulated over a 6-hour period (FFWI6), in combination with wind gusts as a measure of weather driven forces that could cause utility damage. These elements are explained more fully in Section 8.2. The table below outlines the company thresholds used to determine elevated fire risk.

Table 4-1: Elevated Fire Risk Thresholds

PSPS Watch Level 1	PSPS Watch Level 2
☐ KBDI Mainly: KBDI >= 622 ☐ KBDI & VPD: KBDI >= 575 & Localized VPD > 94th ☐ VPD Mainly: Localized VPD >= 97th & KBDI >= 480 ☐ FFWI6 >= 30 and ☐ Wind gusts >=25 mph OR ☐ Sustained wind >=16	☐ KBDI & VPD: KBDI >= 650 & Localized VPD > 94th ☐ FFWI6 >= 30 and ☐ Wind gusts >= 31 mph

In addition, further situational awareness is applied using key metrics, such as:

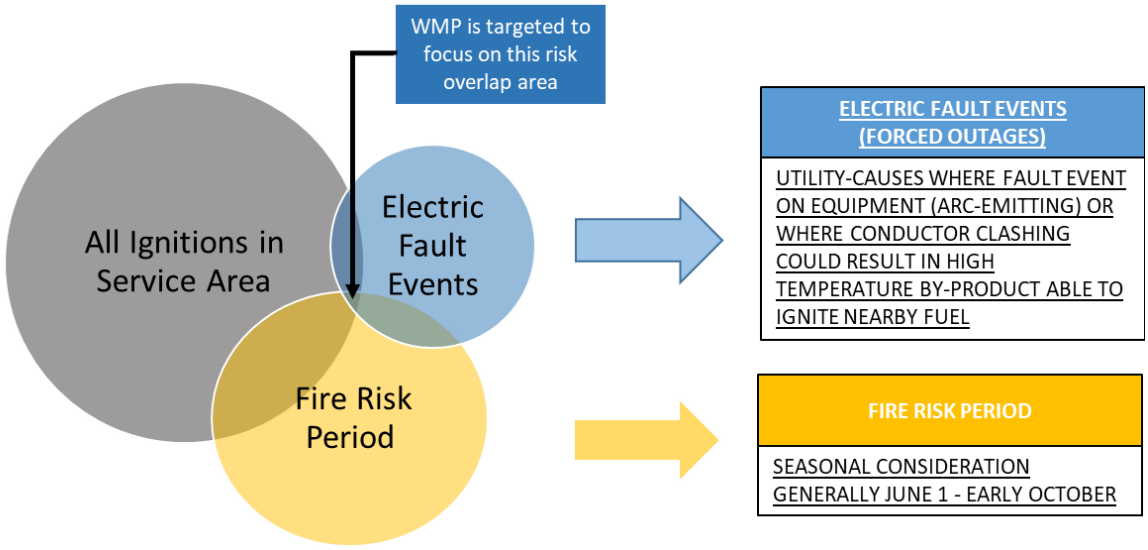
- Red flag warnings
- Availability of fire suppression resources
- Input received about need for electric supply to support key public safety partner locations

- Observer input regarding weather impacts to electrical equipment and positioned at key risk locations
- Input regarding any observed precipitation (or other meteorological input) that could indicate limits to fire spread risks.

In Section 4.5 the company outlines its risk modeling tool, however prior to location-specific analysis it looked broadly across the range of utility events which could lead to utility ignition. Thus, the company appraised what it considers the best proxy for ignition risk events, which it identified as forced outage events combined with actual ignitions. Thereafter it performed extensive analysis on this data to determine 1) what sort of trends in fault events occurred, 2) whether there was a substantial risk event driver, 3) how it would mitigate such drivers, 4) the coincidence of those drivers to weather that is conducive to wildfires and 5) how its proposed mitigation measures would influence future ignition probability risks. Next, it evaluated actual fire history and reviewed whether the event correlated to an ignition probability driver, as well as the weather conditions at the time of ignition.

PacifiCorp's fire risk model is founded upon the concept that fault events become a focal concern when they are experienced during fire risk time periods. The universe of fault events is represented by the blue circle in the Venn diagram below; such fault events might occur when trees, mylar balloons or animals contact phase conductors, or when equipment is damaged or reaches its end of life, causing the system's protection (like fuses, reclosers or breakers) to operate to clear the fault event, wherein an ignition risk could result. The yellow circle represents the environmental conditions that are conducive to fire risk periods, notably dry weather and generally elevated temperatures. When they overlap, they are a wildfire risk probability ignition driver. Those which remain only in the blue and do not overlap with the environmental conditions conducive to fire are however, and thus are still important for mitigation efforts but would not rise to the same level of importance as those which coincide with wildfire risk periods.

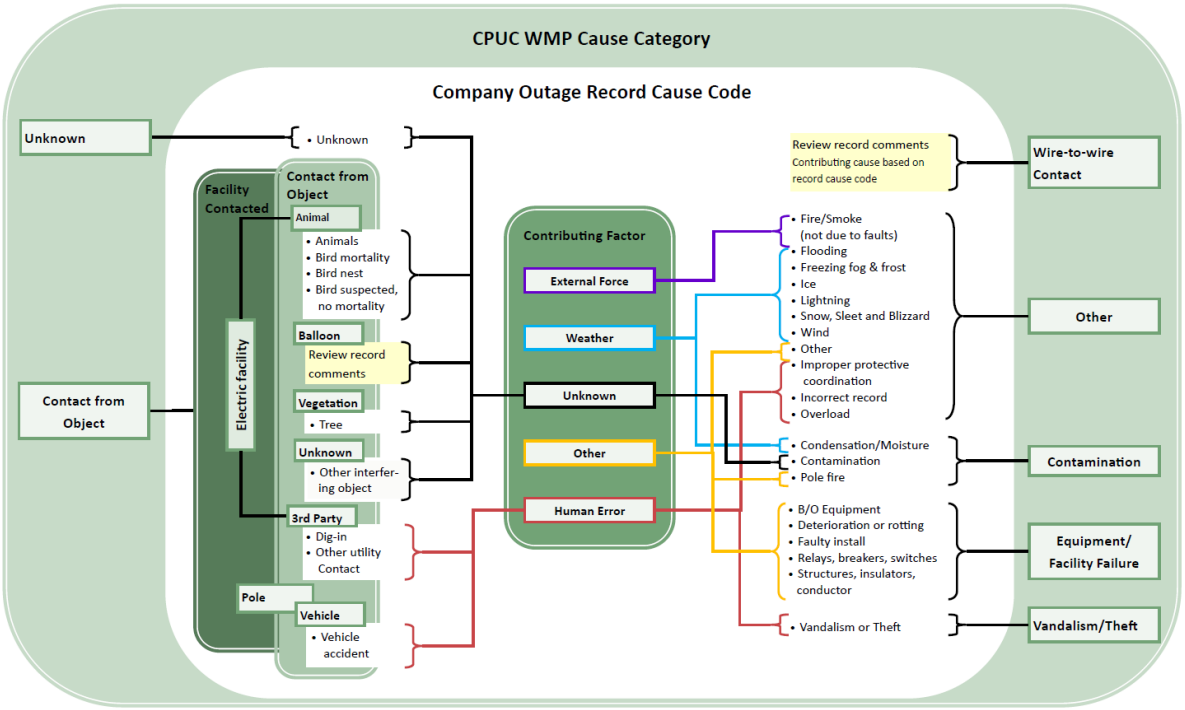
Figure 4.2-1: PacifiCorp's conceptual baseline ignition probability and wildfire risk exposure model



TRENDS IN RISK EVENTS

The graphic below shows the process undertaken to map outage causes to risk events. It is important to note that the company's outage data was developed to respond and subsequently analyze outage events, to benefit response and reliability improvement, using industry standards such as IEEE1366[3] and IEEE 1782[4], and is being re-purposed through this effort to support the evaluating ignition probabilities. As a result, certain assumptions relating to this mapping occurred. As this process matures and richer and better correlations between outages, aka risk events and ignition probabilities and actual ignitions are made, greater confidence in these relationships is likely to occur. In addition, as such data needs are recognized, they are becoming operationalized, such as modifying outage data collection systems to facilitate direct classification of wire down and wire-to-wire contact fault events (rather than relying on less precise classification methods). This results in slight variations in data when compared year over year.

Figure 4.2-2: PacifiCorp's process to map ignition drivers to outage causes

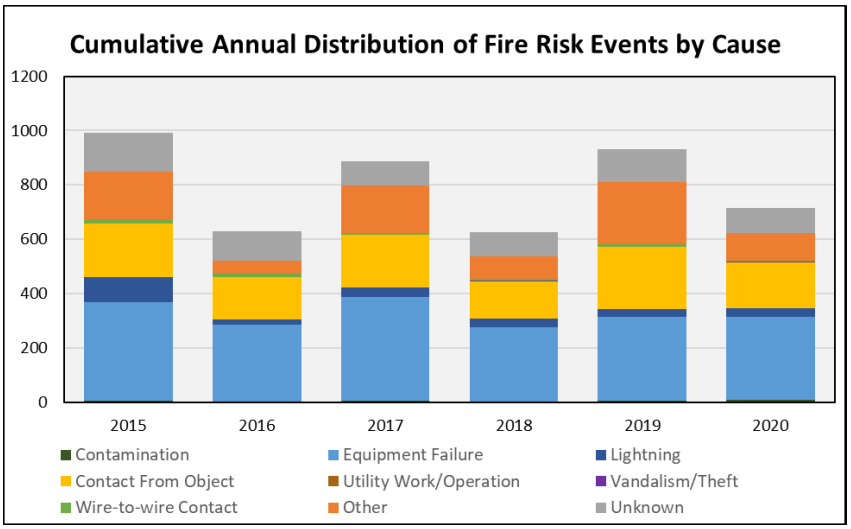


In the graphic below, annual outages, based upon their suspected initiating event are depicted. As can be seen performance in 2020 improved over performance in 2019, however this graphic doesn't support determining whether this is the beginning of a trend or part of the apparent cycle when compared year on year.

[3] IEEE 1366-2012 Guide for Electric Power Distribution Reliability Indices https://standards.ieee.org/standard/1366-2012.html

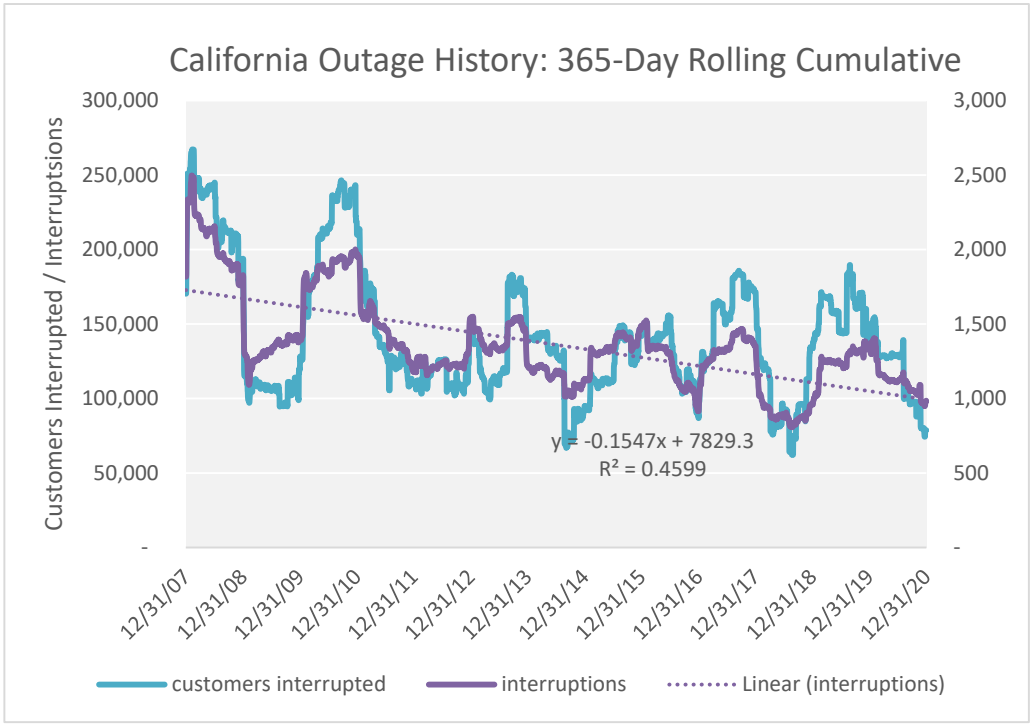
[4] IEEE 1782-2014 IEEE Guide for Collecting, Categorizing, and Utilizing Information Related to Electric Power Distribution Interruption Events https://standards.ieee.org/standard/1782-2014.html

Figure 4.2-3: Annual Distribution of risk event by cause category



In order to clearly establish evidence of a trend in performance, the analysis below was performed, in which each data point represents 365 days of performance (that day in addition to the prior 364 days) to see the long-term trend. With a correlation coefficient (R2) of 0.4599, there is correlation (reasonably so given the cycles which occur coincident to winter weather, which is most impactful for California outage performance. Thus, the trend is improving at approximately 56 interruptions per year. And while this trend relates to all outage causes, as PacifiCorp targets those which are more likely to be ignition probability driver causes, it expects to see a similar, but more dramatic improvement trend in risk reduction in the future.

Figure 4.2-4: 365 day rolling interruptions.



Climate impacts on wildfire risk from utility events (fire season/not fire season)

In Section 7.3.8 the company outlines how it modifies its operations of reclosing equipment through the application of a declared Fire Season. It provides history showing the dates during which the protocol was in place over the last seven years, as shown in Figure 4.2-5 below.

Figure 4.2-5: 2014-2020 company declared Fire Season

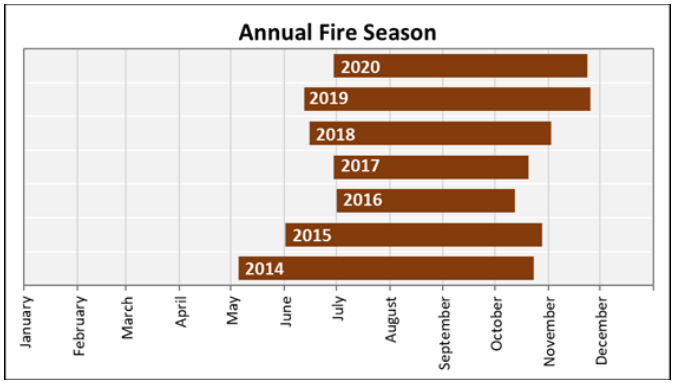
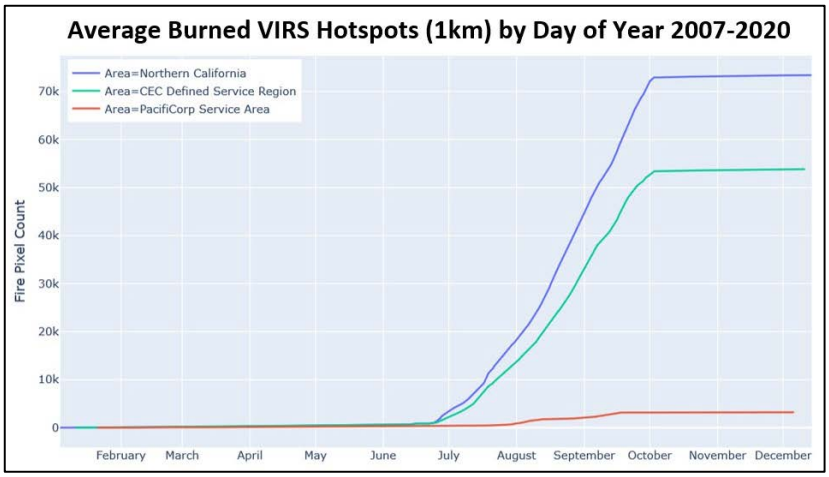


Figure 4.2-6: Average Burned VIRS Hotspots (1 km) by day of the year2007-2020



Further, the Company developed data evaluating area burned on a daily basis to re-evaluate the historic trend used to establish the beginning and end of fire. This provides a long-term history of fire growth for the day of the year, in northern California (from just north of Shasta Lake City, California), as well as PacifiCorp's designated service territory and in the specific area in which PacifiCorp's transmission and system service areas, independent of the ignition cause. This data set demonstrates bimodality in the fire environment and supports the need for pair-wise analysis of risk events. This concept was used to recognize the substantially different risks associated with fall/winter weather in the company's service territory; thus, the analysis that follows separately distinguishes Fire Season from Non-Fire Season. Notwithstanding this analysis, the company recognizes that climate changes, from year to year or over longer periods will cause this analysis to need to be refreshed, which it plans to incorporate into its annual wildfire risk assessment.

Figure 4.2-7: Annual Distribution of risk event by cause category by Fire Season

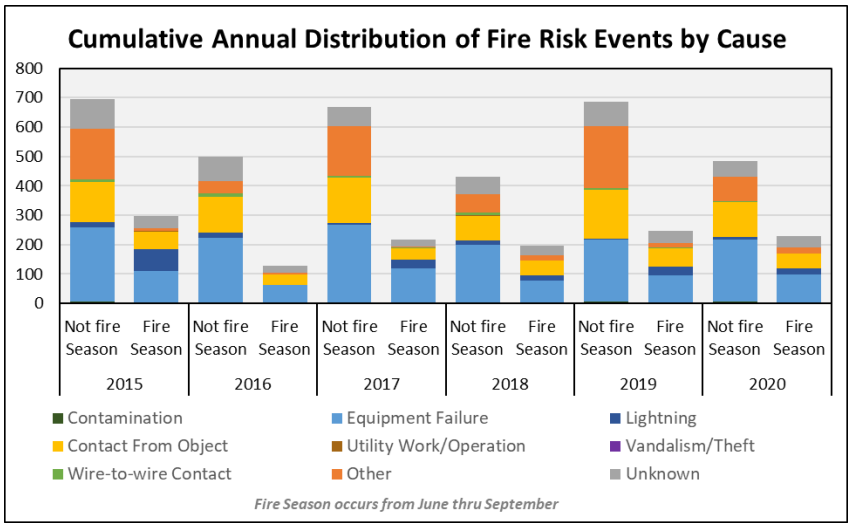


Figure 4.2-8: Annual Distribution of risk events as a result of contact from object by Fire Season

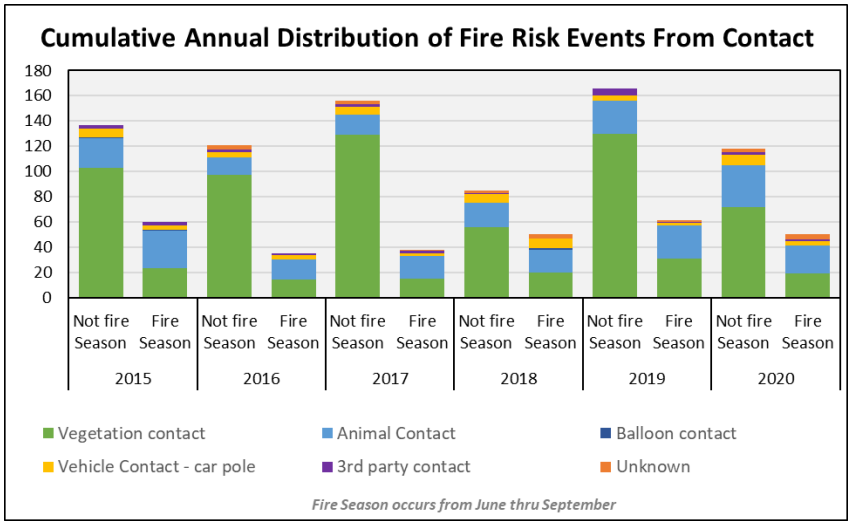
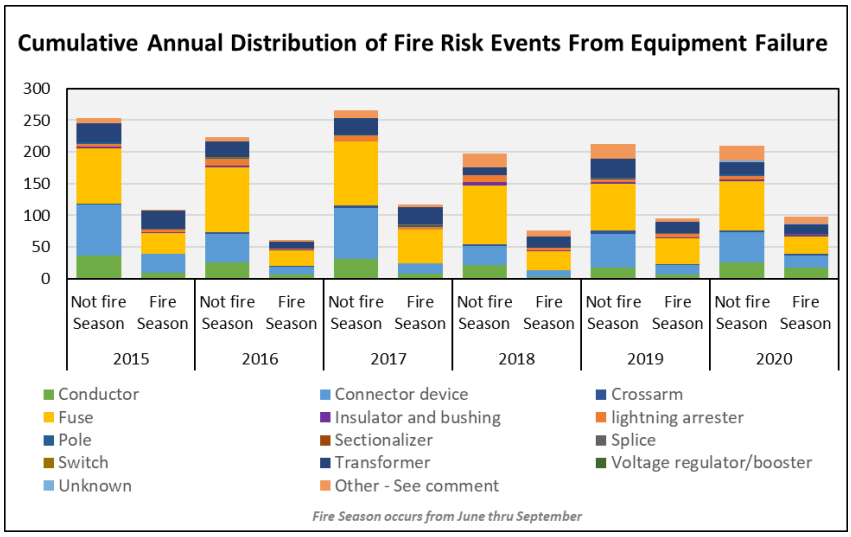
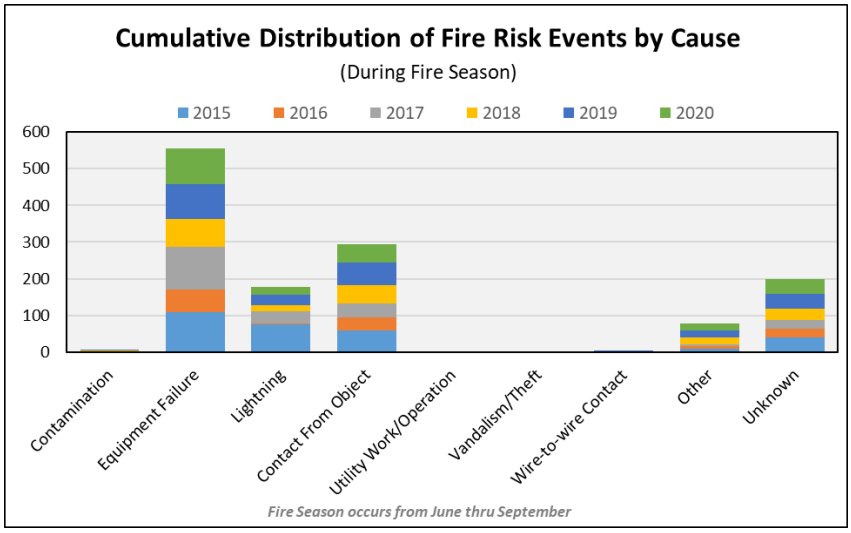


Figure 4.2-9: Annual Distribution of risk events as a result of equipment failure by Fire Season



Depicted below is PacifiCorp's evaluation of utility-related risk events from 2015-2020 during fire season with the potential to result in an ignition event, classified by potential suspected initiating event type, as defined in D.14-01-015, page C-8.

Figure 4.2-10: Historical cumulative risk event by cause category during fire season



In Figures 4.2-11 through 4.2-14, this data is further segmented focusing on contact and component elements. It is important to note that while this data set is helpful to identify potential fault scenarios that occur throughout PacifiCorp's service territory, the presence of an outage event with potential ignition risk does not explicitly infer that an ignition event has or will happen. This data was subsequently used to provide insight into PacifiCorp's ignition probability drivers.

Figure 4.2-11: Historical cumulative risk events as a result of contact from object during fire season

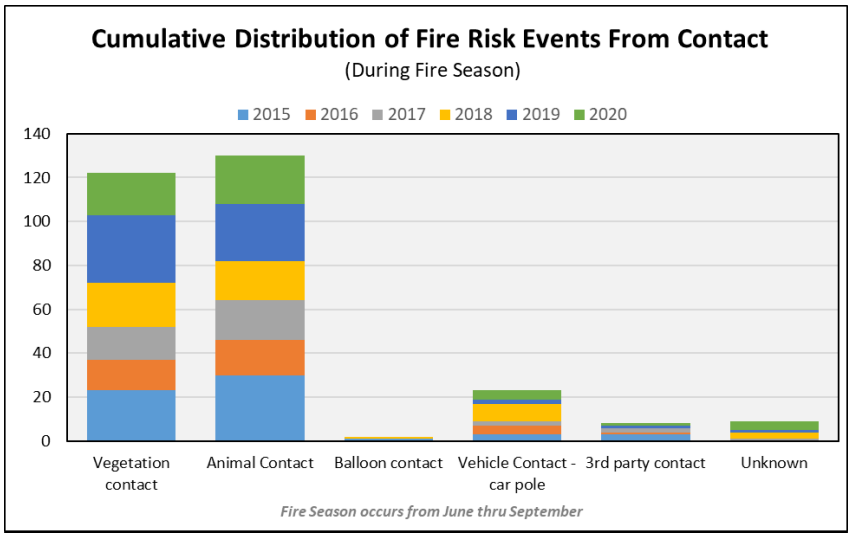


Figure 4.2-12: Annual distribution of fire risk as a result of contact from object during fire season

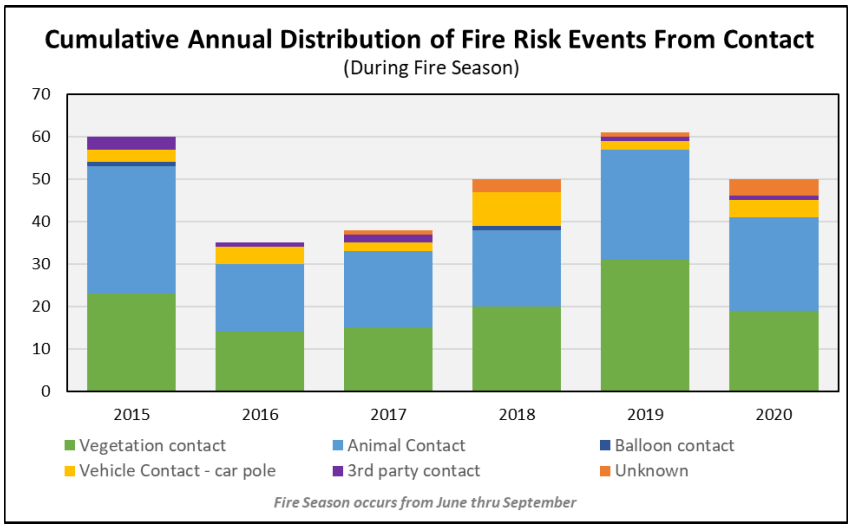


Figure 4.2-13: Historical cumulative risk events as a result of equipment failure during fire season

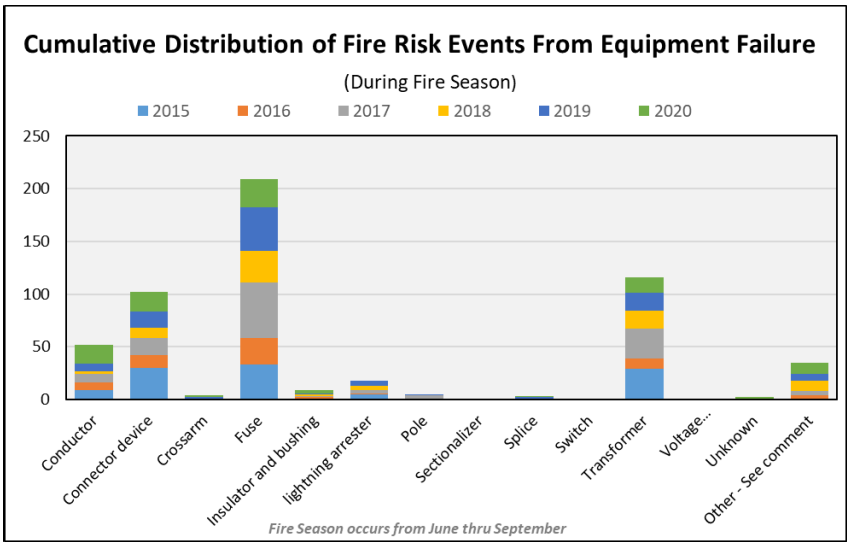
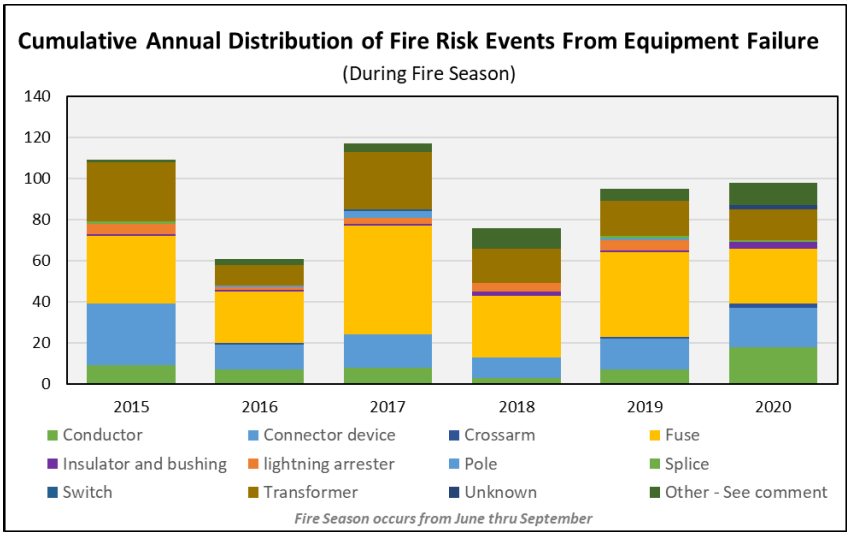


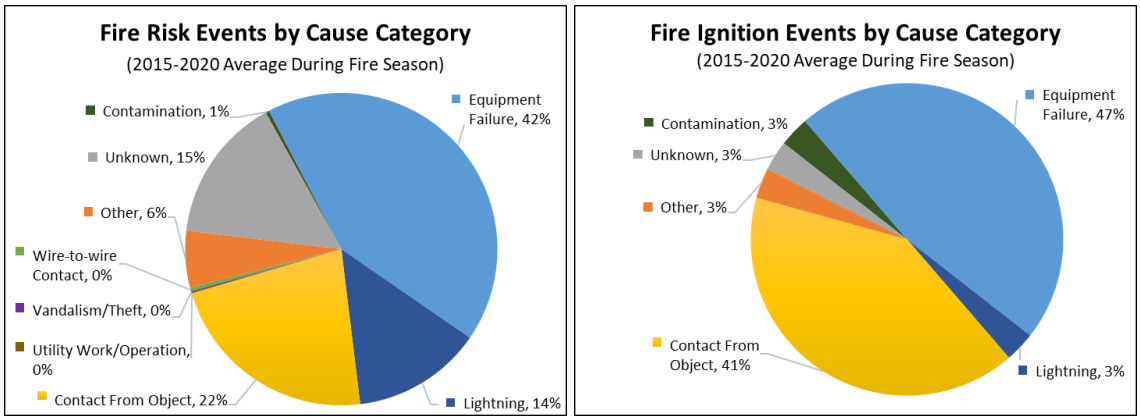
Figure 4.2-14: Annual distribution of fire risk as a result of equipment failure during fire season



Ignition probability drivers

The company further analyzed the data to determine during fire season those risk drivers with correlation to fire events. The following information found highlights that 64% of the risk events are due to equipment failure (damage) and contact from objects; the corollary view shows ignitions (based on the limited history the company has available) indicates that those two causes account for 88% of the recorded fires. Thus, mitigation measures biased toward equipment inspection & subsequent replacement and mitigations that minimize contacts from objects will result in substantial reduction in risk with an expected larger reduction in fire events.

Figure 4.2-15: 2015-2020 average risk and ignition events by cause category



Mitigation measures' influence on risk event and on ignition probability

In WSD's Evaluation of PacifiCorp's First Quarterly Report, WSD directed the company to utilize the convention adopted by SCE to organize each initiative into the category of interest described in the requested conditions based on how the initiative was classified in the WMP. The asset management section contains initiatives related to PacifiCorp's inspection programs (IN-n), the vegetation section contains vegetation management initiatives (VM-n), the asset hardening section contains system hardening initiatives (AH-n), and the PSPS section contains PSPS related initiatives (PS-n). The company was further directed to supply an analogous table that summarized the initiatives in this Plan Update and their related risk-informed decision-making basis. In Section 4.5 the company further outlines its intention to utilize the approach for estimating mitigation measure effectiveness to forecast changes in both risk events and ignition probabilities which will further support risk spend efficiency calculations.

Table 4-2: Initiative Mapping

PacifiCorp Wildfire Mitigation Initiative History						
Prior Initiative Name	In 2019 WMP	In 2020 WMP	2021 WMP Initiative ID	Initiative Name	Risk Event	Discussed In
		Pilot	**AH-12**	**Asset Hardening: Pole loading LiDAR Pilot**	Reduces Risk Event: Contact from Object, Equipment Failure, Improves Reliability	Section 4.4.1 Pilot 2
AH-2	**Yes**	Yes	**AH-2**	**Asset Hardening: Targeted Pole**	Reduces Risk Event: Contact from Object, Equipment Failure	Section 7.3.3.17
AH-4	**Yes**	Yes	**AH-4**	**Asset Hardening: Relay/Recloser**	Reduces Risk Event: Contact from Object, Equipment Failure, Improves Reliability	Section 7.3.3.33
AH-5	**Yes**	AH-5	**AH-5**	**Asset Hardening: Covered Conductor**	Reduces Risk Event: Contact from Object, Equipment Failure	Section 7.3.3.14
AH-6	**Yes**	AH-6	**AH-6**	**Asset Hardening: Small**	Reduces ignition probability	Section 7.3.3.35
		New	**IN-5**	**Inspection: LiDAR**	Reduces Risk Event: Equipment Failure	Section 7.3.4.5
AH-3	**Yes**	Yes	**RA-1**	**Technology: Risk Modeling**	Enabling tool supporting minimization of risk events	Section 4.5
SA-1	**Yes**	SA-1	**SA-1**	**Situational Awareness: Weather Information**	Enabling tool supporting minimization of risk events	Section 7.3.2
	No	New	**SA-3**	**Pilot: DFA**	Reduces ignition probability	Section 4.4.1 Pilot 1
VM-1	**Yes**	Yes	**VM-1**	**Vegetation Management:**	Ignition Risk: Contact from Object, Equipment Failure	Section 7.3.5.11
VM-3	**Yes**	Yes	**VM-15**	**Vegetation Management: Higher**	Reduces contact from object, ignition probability	Section 7.3.5.15
		New	**VM-5**	**Management: PSPS**	probability	Chapter 8

The company has identified many tools to mitigate against various risk events, including asset hardening, inspection and vegetation management programs, as well as protection coordination strategies. In review of its prior plans the company was criticized for appearing to adopt covered conductor as its lone strategy for limiting the probability of PSPS in the future. While the implementation of covered conductor is considered a key component in the reduction of PSPS probability, PacifiCorp has adopted many complementary elements to limit the probability or need for a PSPS event, evident by many components of the thorough rationale for assessing PSPS and fire risk described below. Components of the thorough rationale for mitigation of wildfire risk up to and including PSPS are outlined below. Additional practical examples are shown in Section 4.5.1 and tactics are explicitly detailed in Table 4-5.

1. Is there a fire risk such that PSPS would be a potential consideration (i.e. how frequently might this be considered)?
2. How substantial are the impacts of de-energizing?
    a. What number of customers, type and community impacts could be the result?
    b. How often would it be expected to occur, using long-term, short-term and forecast climate conditions?
    c. Is the area at risk as electrically-isolated and controllable as possible, such that the installation of additional switching points or devices, or alternate ties to sources result in fewer customer impacts, lower probability of occurrence or shorter duration of PSPS events?
3. Is the system's coordination of system protective devices as well-devised as possible?
4. Would the extension of a system neutral or other ground fault detection improve the probability that a fault would properly be detected?
5. Do system protective devices have advanced protection capability (i.e. fast tripping, ability for alternate settings, etc.)?
6. Can these settings be remotely reconfigured?
7. Is there fault history (in the form of outage events) that identify the risk events which occur, particularly those related to contact (i.e. animals, vegetation, etc.) or equipment performance or condition?
8. Can these risk events be expected to occur concurrent with fire weather conditions or are they coincident with non-fire conditions (winter weather with low KBDI and Fosberg indices)?
9. If there is limited outage history, is there environmental exposure or other leading indicators which suggest a future risk, despite past performance?
10. Are all maintenance and vegetation management activities up to date and acted upon?
11. Could additional patrols be advantageous as an alternate to de-energization?
12. Could enhanced inspections reveal latent situations that pose risk?
13. Are assets of a vintage or population that are prone to catastrophic end of life events?
14. Could the area benefit from targeted hardening activities against specific probability ignition drivers? And which hardening activities lend themselves to correcting any credible risks?
15. Finally, is the best long-term, targeted hardening activity reconductoring, whether overhead or underground?

In order to select mitigation measures considered for any given module of the electrical network the company has identified specific tactics which are valid measures for a given risk driver; in general these are identified by individuals assessing the situations, not developed programmatically based on model logic.

4.2.1 *SERVICE TERRITORY FIRE-THREAT EVALUATION AND IGNITION RISK TRENDS*

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

- *List and describe any macro trends impacting ignition probability and estimated wildfire consequence within utility service territory, highlighting any changes since the 2020 WMP report:*
- *Change in ignition probability and estimated wildfire consequence due to climate change*
- *Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles*
- *Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture*
- *Population changes (including Access and Functional Needs population) that could be impacted by utility ignition*

The WSD directed the company to evaluate the efficacy of the existing HFTD designation, any trends influencing that designation and current or future considerations for expanding the designation.

4.2.2 *SERVICE TERRITORY FIRE THREAT EVALUATION*

PacifiCorp used its Localized Risk Assessment Model (LRAM), described further in Section 4.5.1, to evaluate areas which were not considered to be an elevated fire threat, but its combined score, as measured by the LRAM combined scored exceeded a threshold value the company set. Those network sections with fire/climate scores that were found to be beyond 0.55 (from zero to one) that were not within the HFTD are shown in shades of blue in the graphics below. As a result of this comparison, the company has determined that two primary areas may be candidates for consideration within the HFTD, specifically Crescent City toward Klamath Glen and Montague.

Figure 4.2-16 - PacifiCorp HFTD versus Fire Risk Designation

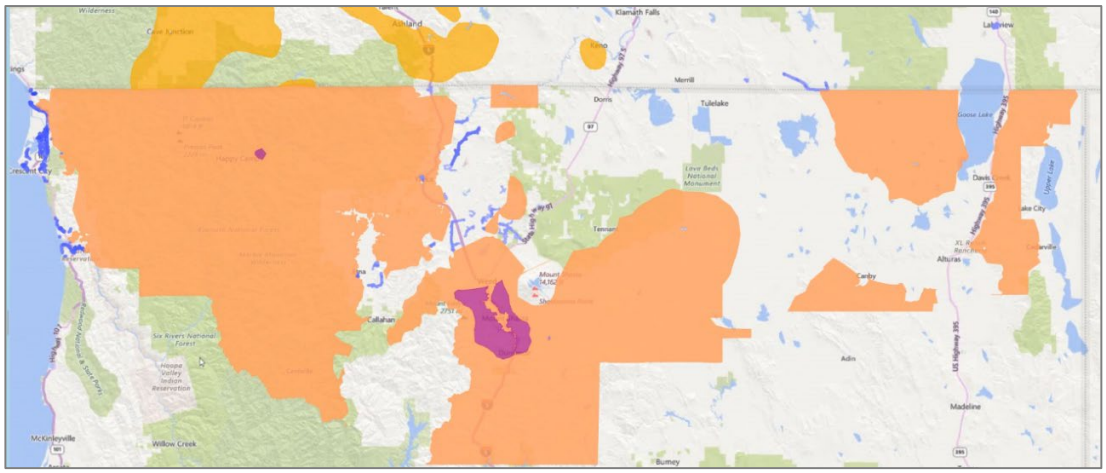


Figure 4.2-17 - Crescent City Close-up HFTD versus Fire Risk Designation

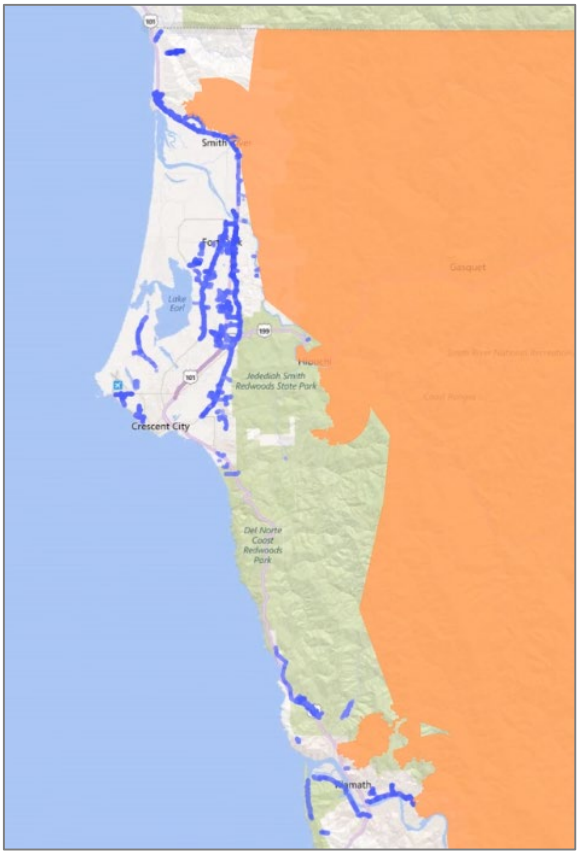
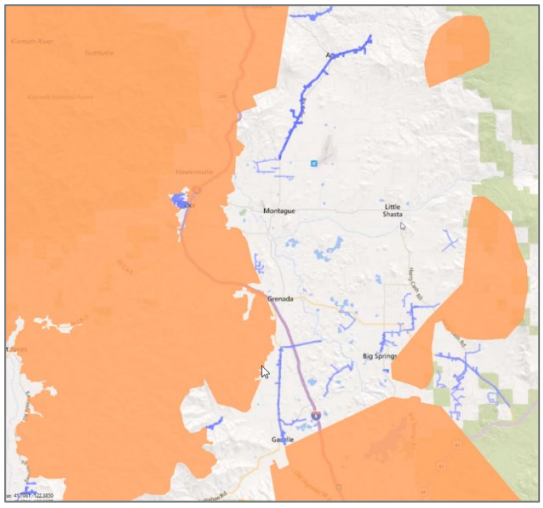


Figure 4.2-18 - Montague Close-up HFTD versus Fire Risk Designation



4.3 CHANGE IN IGNITION PROBABILITY DRIVERS

Based on the implementation of the above wildfire mitigation initiatives, explain how the utility sees its ignition probability drivers evolving over the 3-year term of the WMP, highlighting any changes since the 2020 WMP report. 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).

Since the 2020 WMP was filed, there have been limited changes to the macro trends within its service territory. However, the company is keeping a watchful eye on six key areas which could result in shifts to these trends in the future. These changing trends will be further incorporated into future iterations of WMPs.

Climate Change:

In response to feedback regarding the company's short-term planning gaps, including its lack of quantifiable consideration of climate change as it relates to wildfire risk in its service territory, the company has been in conversations with climate change experts (through the California Energy Commission's Pyregence Project climate science team), in addition to utilizing materials prepared by the 4th Climate Change Assessment[5] through CalAdapt to assess climate change and determined that fire-affecting climate change, particularly the effect of drying, is generally evenly impactful throughout the company's service territory (further discussion on these model results occurs in Section 4.5.1). Climate models suggest reductions in some of the fire weather inputs (i.e. wind gusts), which bear further analysis and reconciliation into models the company is preparing.

[5] 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.

Invasive Species:

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 affects and may consider inclusion of these patterns into its risk assessment model.

Population Changes:

The area in which 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 risks.

Population changes in the High Fire Threat Districts (HFTD):

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 area 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 below is quantitative analysis supporting these conclusions.

- Tract level ACS 5-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.

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

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 decrease 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 Wildland Interface 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.

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

Risk events and ignition probability:

Substantial efforts in inspection, vegetation management and situational awareness have occurred and will continue to unfold over the next ten years. And while limited rollout of its covered conductor program has occurred to date, significant accomplishments with improvement in protective devices have occurred, all of which are expected to limit risk events that are leading indicators for ignition probability. Over the ten-year period the company expects its covered conductor projects to be completed, all of which will limit the need for PSPS as well as the potential for ignition from utility equipment.

4.4 RESEARCH PROPOSALS AND FINDINGS

Report all utility-sponsored research proposals, findings from ongoing studies and findings from studies completed in 2020 relevant to wildfire and PSPS mitigation.

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 shall include statistical models, equations, etc. behind analyses*
5. *Timeline - Project timeline and reporting frequency to WSD*

Table 4-3: 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 – 2020+ (ongoing)*	*Per ignition*	*Lat/lon per ignition*	*Date, hour of ignition (estimated)*	-
Ignitions from contact with vegetation in enhanced vegetation areas	*2019 – 2020+ (ongoing)*	*Per ignition*	*Lat/lon per ignition*	*Date, hour of ignition (estimated)*	-

PacifiCorp's Research Strategy and Approach

PacifiCorp's strategy regarding new technology and research supportive of utility operations and engineering is to maintain industry networks that provide a vehicle to understand the evolution of technologies and discover broader utilization and application for such advancements. As it becomes aware of areas of study or applications of technology, it engages with developers, adopters, manufacturers and others to evaluate relevance for that technology within the company's network. It freely shares information and application experiences it has gained through past pilots or realized implementation programs. Further, it also freely shares data to enable scientists and academics to gain an understanding of the real-world relevance of advancing specific technologies. And finally, it collaborates with developers to serve as a test bed for direct application of experimental efforts. For instance, PacifiCorp plays leadership and support roles through organizations such as the Edison Electric Institute (EEI), the Electric Sector Coordinating Council (ESCC), the Institute of Electrical and Electronics Engineers (IEEE). Within the western United States, it engages with Western Energy Institute (WEI) and Rocky Mountain Electric League (RMEL) as well as the Western Protective Relaying Conference. It further collaborates on research and applications of technologies through its parent company (Berkshire Hathaway Energy, BHE) through various platforms targeted to extending advancements. It acts as mentors for developing talent through guidance of engineering and other technical specialties, and guides Capstone projects for the advancement of practical utility tools and methodologies. Finally, it continues to expand its research network through support of efforts such as the "next generation utility wildfire tools" by participating as a technical advisory committee member for the Pyregence project and lends support to other potential grant or funding efforts. To the Pyregence project the company has dedicated in kind support, through providing utility, engineering and data science knowledge and participation as the project develops deliverables.

Pilot 1-Distributed Fault Anticipation and Waveform Analysis

1. ***Purpose of Research***
   PacifiCorp is pursuing the use of distribution fault anticipation (DFA) technology through piloting with Texas A&M. In addition, the company is investigating application of waveform analytics with

Oakridge National Lab (ORNL) through the Department of Energy's Grid Modernization Lab Consortium partnership. While PacifiCorp did not identify continuous monitoring sensors as an initiative in its WMP, both of these technologies can be considered "continuous monitoring sensors."

2. ***Data Elements***
   Data elements will be determined by contractors at Texas A&M and scientists at ORNL.
3. ***Methodology***
   Methodology will be determined by contractors at Texas A&M and ORNL.
4. ***Timeline***
   PacifiCorp has contracted with Texas A&M to facilitate the DFA pilot, and the first installation at Weed substation (on two circuits) is in final stages of implementation, with commissioning expected in Q2 2021. The collaboration with ORNL regarding wave form analytics is in early scoping stages.
5. ***Results and Discussion***
   No results have yet been produced. The first results are expected at Weed substation no sooner than second quarter 2021. Once the first relays are commissioned, their event history will be routinely assessed and subsequently reported in updates. Due to the small set of circuits available for monitoring, the first of these conclusions will be reported no sooner than third quarter 2021. If DFA delivers the expected early detection of wave form deviations, PacifiCorp anticipates this technology to be highly effective at reducing fault operations, which consequentially reduces ignition probability.
6. ***Follow-Up Planned***
   If successful, PacifiCorp will install DFA when replacing substation/circuit relays where communication networks exist. Depending on the result of the pilot, PacifiCorp may consider near-time replacements. For those portions of the network with limited communications options, alternative communications strategies will be considered.

Pilot 2-LiDAR Pole Loading Assessment

1. ***Purpose of Research***
   Pole loading to accommodate safety factors and necessary specifications are included in PacifiCorp's engineering and construction standards. LiDAR data collection allows for highly accurate 3-Dimensional (3D) depictions of pole assets. These results can be used to identify potential pole loading concerns. Upon validation in the field, corrective work can be scheduled.
2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
LiDAR Point Cloud Data	2019	Once	10 cm	Single date	
Pole Locations	2019	Once	0.5 m	Single date	
Pole Lean	2019	Once	0.5 m	Single date	

3. **Methodology**
   Particular lines are identified based upon the fire risk, historic fault rates, inspection results that might indicate potential for insufficiently strong poles, in addition to joint user records. They are then flown with LiDAR, typically coincident to aerial inspections, and the data collected and processed for incorporation into strength modeling programs, typically PLSCadd. Various loading cases are reviewed to identify the performance of the poles and pole lines for each case and based

upon these results, replacement or strengthening (such as guying or use of phase raisers, etc.) would be considered.

4. ***Timeline***
   At this time, PacifiCorp has piloted the use of LiDAR to create structural models to calculate pole loading capacity. The pilot loading project was completed, and PacifiCorp observed positive results through improved identification of poles with pole loading concerns. The company is currently evaluating wider application of the technology and considering how to integrate this technology into other asset strategies (i.e. asset health index development).
5. ***Results and Discussion***
   The LiDAR Pole Loading Assessment Pilot produced usable and reliable structural information. While PacifiCorp has historically not experienced pole failures in its California service territory, resilient poles are an important element of a resilient electric system and reduce future ignition probability due to pole failure. Results from the pilot were incorporated into the company's pole replacement initiative.
6. ***Follow-Up Planned***
   PacifiCorp is evaluating use of LiDAR pole strength modeling in compiling an asset health index.

Pilot 3-LiDAR Vegetation Inspection Pilot Program

1. **Purpose of Research**
   LiDAR data collection allows for highly accurate 3D modeling of vegetation in proximity to utility assets. This data can be used to identify potential clearances encroachments and potential strike trees. The identification of these hazards can help prevent fault scenarios and reduce ignition risk. Therefore, PacifiCorp developed and implemented a pilot project assess using LiDAR data for vegetation management.
2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
LiDAR Point Cloud Data	2019-2020	per demo ~2/yr	10 cm	date of flight	
Encroachment Locations	2019-2020	per demo ~2/yr	10 cm	date of flight	
Fall-In Potential Locations	2019-2020	per demo ~2/yr	10 cm	date of flight	

3. ***Methodology***
   LiDAR analysis was provided from vendors using various data processing techniques. These submitted results were then compared to field review for some locations. Clearance violations reported by several vendors were compared where data locations overlapped. Individual tree identifications were also compared to satellite or aerial photography and field review.
4. ***Timeline***
   PacifiCorp completed one vendor pilot in late 2019, another in the second quarter of 2020, and a third is currently being evaluated for follow-up in 2021.
5. ***Results and Discussion***
   Using LiDAR for vegetation inspection has not yet proved to be a viable mitigation initiative. PacifiCorp has conducted a pilot and demonstrations from three different vendors, but all of these have had mixed results. PacifiCorp observed a high degree of false positives compared to field review of clearance violations. When clearance violations from different vendors were

compared for the same locations, there were substantially different results. Attempts to use LiDAR data for individual tree identifications also produced many false positives.

6. ***Follow-Up Planned***

PacifiCorp plans to continue working with vendors to improve the accuracy of both clearance violations and tree segmentation and identifications using LiDAR data. Additional efforts in 2021 may use legacy LiDAR data to attempt improvements to analysis accuracy without additional high-cost data collection. These also will evaluate the effectiveness of satellite data processing to augment clearance identification or in support of inventory, as discussed in Pilot 4.
Further description of these results is included in section 7.2.5.7.

Pilot 4-Vegetation Management Data Analytics

1. ***Purpose of Research***

PacifiCorp is using publicly available vegetation data to estimate the amount of tree canopy near our equipment. The goal is to determine whether low-cost datasets can be used to identify areas with higher risk of vegetation contact and/or greater need for vegetation maintenance work.

2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
NLCD Canopy Cover Raster	2016	3-5 years	30m	One year	
Tree Canopy Near Lines	2016	3-5 years	30m	One year	
Historic Vegetation Outages	2000-present	Daily	by isolation point, ~200m	outage timestamp, ~1 minute	
Historic Vegetation Maintenance	2000-present	Weekly	By circuit	weekly	

3. Methodology

A dataset of tree canopy area near PacifiCorp equipment was created by sampling the NLCD Canopy Cover raster data at the per pixel area, 30m resolution. The point layer was then clustered to avoid oversampling at circuit branch points and aggregated according to circuit and sub-circuit zones. Historic vegetation outages were compared to tree canopy area using a simple linear correlation, and vegetation trimming costs were compared to tree canopy area using a generalized linear model.

4. ***Timeline***

Construction of an initial data layer for estimated vegetation near distribution circuits was completed in the second quarter of 2020. Comparison of these results to historic vegetation maintenance records was completed in mid-2020, and comparison to historic vegetation outages was completed in late 2020. The next project phase using higher resolution vegetation cover data is anticipated in the third quarter of 2021.

5. ***Results and Discussion***

Comparison of vegetation area to outages and vegetation maintenance costs showed weak, but non-negligible, correlations. The dataset was predictive of vegetation trimming costs with large margins of error. The results highlight the limitations of the NLCD Canopy Cover layer but are also complicated 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, spatial resolution (30m) too high to capture smaller tree stands, and heavy use of masking in some locations. Together, these limitations result in a systematic bias towards underestimating tree coverage, with larger discrepancies occurring near roads or in developed areas.

6. ***Follow-Up Planned***
PacifiCorp is expanding these efforts through use of higher resolution vegetation canopy cover layers developed by a vendor from higher resolution satellite data. These products are not free, but they are substantially cheaper than obtaining LiDAR information for equivalent areas.

Pilot 5-Vegetation Management Database Pilot Program

1. ***Purpose of Research***
PacifiCorp's historic vegetation records often lack spatial granularity and are not centralized. The new vegetation management database allows vegetation management records to be centralized and incorporates GPS locations from field work.

2. ***Data Elements***

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

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

4. ***Timeline***
New records systems and equipment for recording GPS locations were distributed in early 2020 and are now in use throughout PacifiCorp's California territory. Additional refinement of this record system will occur throughout 2021.

5. ***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.

6. ***Follow-Up Planned***
Initial adoption of these systems by field crews resulted in some inconsistencies in formatting, which are being addressed. The system will be further refined over time to remove these early implementation problems.

Pilot 6- Radio Frequency (RF) / Infra-red (IR) for Line Patrolmen

1. ***Purpose of Research***
This pilot involves the use of new tools (IR and RF sensors) to supplement traditional visual inspections performed from the ground level and incorporate the capture and use of empirical data and measurements into condition identification. Traditionally, a human inspector has assessed assets visually; line patrolmen perform their inspection function on transmission circuits. PacifiCorp has experienced initial success from the use of IR in the company's enhanced inspection program discussion in Section 7.3.4.5. PacifiCorp expects that these tools, when used to

supplement visual inspections from the ground level, will similarly give the inspector additional "eyes" with the expectation to better identify a wider range of conditions.
Relevant Terms: Infrared, radio frequency, Do-FORM, splice

2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
SAP Work Order	2020-present	per pilot	GPS	day of pilot	
Do-FORM Completed Record	2020-present	per pilot	GPS	day of pilot	
RF Measurements	2020-present	per pilot	GPS	day of pilot	
IR Measurements	2020-present	per pilot	GPS	day of pilot	
Splice location (GPS)	2020-present	per pilot	GPS	day of pilot	

3. ***Methodology***
Lines are selected based on records that suggest a high rate of splices, which may be attributed to past outages or additional construction activities on a line. Work orders are created and a Do-FORM collection process established for field results to be entered. The line patrolman performs the land-based inspection and stops for specific measurements at key points, which includes all poles and any splices within spans. The data is uploaded and available through the Do-FORMS application.

4. ***Timeline***
The pilot is in the early stages of implementation. PacifiCorp has obtained the equipment which will be used by line patrolmen and has completed the data collection forms for mobile application. The company conducted the first training sessions virtually on August 25, 2020. Line patrolmen will engage the new RF and IR tools on targeted local transmission lines over the next couple of months. After the first trials and as employees gain experience, the company will likely make modifications to sensitivity levels, equipment usage, data collection and analysis methods.

5. ***Results and Discussion***
Similar pilots for airborne applications have yielded results in detecting leakage current for pole fire mitigation. PacifiCorp expects that this pilot will yield results over the next quarter. Early detection of latent conditions will result in avoided fault operations that have a direct impact on ignition probability.

6. ***Follow-Up Planned***
If successful, the company intends to outfit all line patrol personnel with detection equipment. Depending on the pilot's results, PacifiCorp may engage in further studies regarding applications on the distribution network.

Pilot 7-Sophisticated Program Control Settings

1. ***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: Setting group, relay, fault, relay event record, protective zone

2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
Relay ID (SAP ID)	2010-present	on commissioning	by protective zone	based on date range of event records	
Relay Setting Group(s)	2020-present	on commissioning	by protective zone	based on date range of event records	
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	

3. ***Methodology***

As new relays and reclosers are set they are evaluated for their coincidence to elevated fire risk. In areas where this risk exists, remote (grid operations) device control and mirrored bits coordination are planned for installation. For all installations, independent of fire risk area, advanced settings, including high impedance fault relays will be deployed.

4. ***Timeline***

PacifiCorp developed advanced distribution line settings that were piloted in several areas the company serves (including Weed, CA and Lincoln City, OR). After experimenting and making some minor modifications, the company has adopted those settings as the company's standard. The settings profiles include normal (fast trip followed by reclosing attempts), elevated risk (fast trip followed by single reclose attempt after sufficient time to limit persistence of heat), extreme risk (no reclose attempt), and safety hold (for line worker usage during line operations where no reclosing occurs). Furthermore, the company is piloting the use of mirrored-bits (or radio communications) between substation relays and their associated first zone line reclosers. This pilot is aimed to reduce device-to-device coordination time, which reduces arc energy. Initial results indicate this approach is highly valuable in locations where coordination delays are needed for proper device coordination; such coordination delays increase the duration during which arc energy is being experienced and reducing the duration reduces the probability of ignition. The goal is to maintain a high level of reliability while still reducing potential arc ignition time or magnitude. The company has also piloted high impedance fault detection, which is currently configured to alarm upon detection. As the company gains more experience with alarming versus device operation, settings will be modified; also, during high fire risk periods the high impedance element is functioning in a tripping (not just alarm) mode.

5. ***Results and Discussion***

PacifiCorp has used the alternate settings developed through this pilot in recent elevated risk events. While no line operations occurred during that time, the settings were available to

perform the protective function. A handful of high impedance faults have been recorded (not in the high fire threat area) resulting in tuning of the algorithm.
Analysis of protective device settings is part of PacifiCorp's standard operating practices. Either field engineers, relay support personnel or protection and control team members evaluate the operations to ensure that protective devices function as expected. Those reviews determine whether there should be any subsequent changes to the network, which could include targeted inspections, device settings changes, training or further engineering analysis.

6. ***Follow-Up Planned***
PacifiCorp plans to expand its use of advanced settings in Tier 2 areas, depending on the results of localized risk assessment scores (as discussed in response to Guidance-3 and PacifiCorp's Remedial Compliance Plan). As equipment is replaced for any reason, PacifiCorp plans to further incorporate the advanced settings protocols.

Pilot 8-Fault Detection Line Monitoring

1. ***Purpose of Research***
This pilot explores the use of continuous monitoring sensors, including both line sensors and station relays, for fault identification and detection.
Relevant Terms: Relay, LineScope

2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
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	

3. ***Methodology***
Lines and stations are selected based upon their coincidence to fire risk, length of line (percentage in fire risk tier), historic records of fault events with unknown locations and the impact to customer reliability when fault events occur. If communications technologies are not proximate to either line end, there are reduced technology opportunities.

4. ***Timeline***
The company has completed approximately 1/3 of its California transmission relays with fault detecting relays (and has outlined plans for the remainder to be completed); line sensor piloting (LineScope) has been completed and been found to be valuable in minimizing risk while maximizing reliability results; further installations are scheduled by Q2 2021. Single ended traveling wave is being piloted in four locations on three local transmission lines; the first installation was energized in late December 2020, and a first pair of temporary fault events were detected, and analysis conducted to correlate to impedance-based calculations. Additional field inspections were conducted, and no persistent fault evidence found. Additional pilots are to be installed in Q3 and Q4 2021.

5. ***Results and Discussion***

Substantial benefits have been experienced with the fault detection devices that have been placed, however no widespread metrics have yet been created due to the recent nature of the installations.

As addressed in Sophisticated Protection Control Settings, the device's event data is analyzed to guide response and correction actions.

6. ***Follow-Up Planned***

The company will continue to advance its multiyear installation plan. Further, the company will expand its use of fault detection equipment in areas where elevated risk scores are identified as it completes its element (zone of protection/module) analysis. As equipment is replaced due to its asset health indexing processes or when reactive reliability improvements are needed it will further incorporate viable fault detection equipment.

Pilot 9-Arc Energy Fault Modeling

1. ***Purpose of Research***

The pilot uses simulations of the distribution system model 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 circuit topology, length and materials used. Line sections, and ultimately protective zones and circuits, were scored based on arc energy values and line length (exposure). The score is a gauge of relative ignition risk and can be used for the purpose of identifying locations where system improvements can be proposed to reduce said risk.

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.

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.

2. ***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/long for each node in the model	Not used	The system model includes source, line and protective device details.

3. ***Methodology***

The 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 ANIS 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 may 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 zone of protection were evaluated for composite scoring by arc flash results and line length. That score was also aggregated to the circuit level. The result is a metric that helps the company focus on 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 4.4-1: Example CYME Arc Flash Analysis input

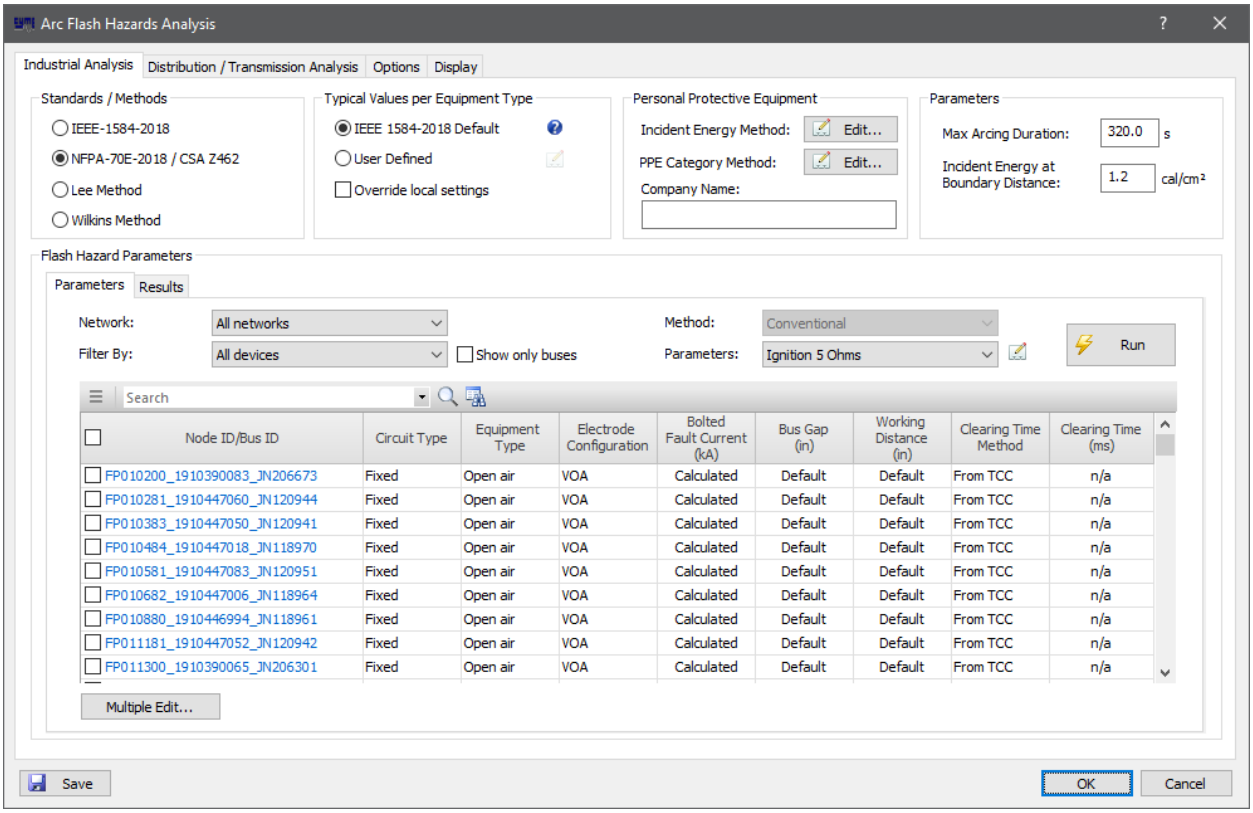
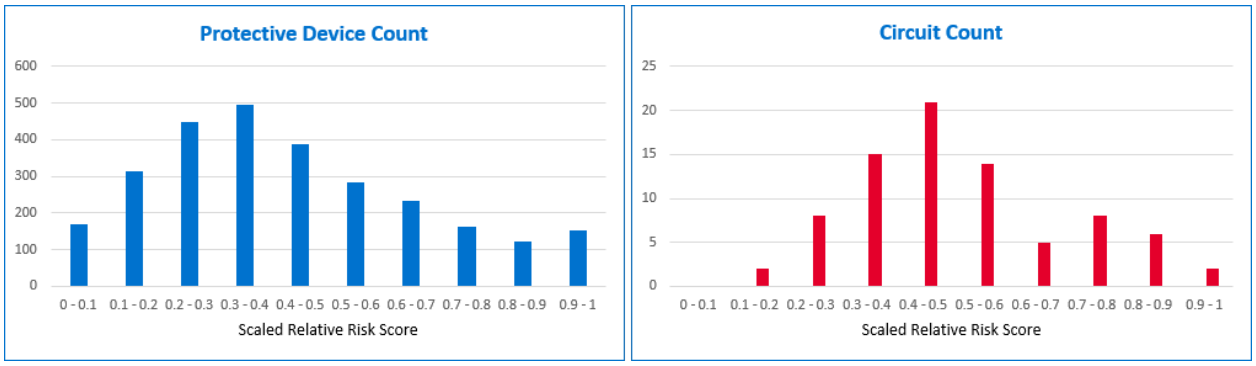


Figure 4.4-2: Summary of arc energy risk scores (scaled to the range 0..1)



4. ***Timeline***
   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 either updated or identified for update. PacifiCorp expanded the pilot throughout its California service area during 2020, with long term adoption intended over the next five years, including incorporation as a standard aspect of cyclical study process.
5. ***Results and Discussion***
   The results of the pilot were used to identify locations where the potential fault (based on the similarity to modeled configurations) reflected a higher risk of damaged conductor or ignition. PacifiCorp used the modeling results to identify locations where there was a higher risk of ignition from a fault condition. Use of this information allows for system network changes to preempt such a risk condition.
6. ***Follow-Up Planned***
   PacifiCorp plans to focus pilot expansion on elevated risk areas. As the company develops risk assessment scores for ZOPs, it will use these results to prioritize areas for study and remediation of arc energy risks. Long term, the company anticipates incorporating the methodology into its cyclical study processes.

Pilot 10-Pyregence Ignition Modeling

1. ***Purpose of Research***
   As part of the California Energy Commission's Next Generation Utility Wildfire Toolset, named Pyregence, PacifiCorp has supported the grant development and participated in a technical advisory committee role to create practical tools for utility operations and engineering personnel to deploy as part of their wildfire mitigation and risk management activities. The Pyregence ignition modeling tool employs "match drop" simulation along specific corridors. This tool will allow a utility to strategically quantify the wildfire risk associated with particular assets over a forecast period (up to five days) in support of operational decisions, including PSPS segmentation designs.

2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
Fire Consequence Forecasts	2020 - Ongoing	Published every 6 hours	500 ft	Hourly	Fire area, fire volume, and burned structures are provided
Gridded Weather Forecast	2016 – Ongoing	Published every 6 hours	3 km	Hourly	North American Model and High Resolution Rapid Refresh are provided

3. ***Methodology***

PacifiCorp piloted two products from Pyregence: their 5-day fire consequence maps and their 8-day gridded weather forecast of wind speed, gust, and the Fosberg Fire Weather Index obtained from the National Weather Service. The fire consequence maps are created by simulating millions of ignitions and calculating modeled burned area and volume for the forecast conditions after 6 hours (with no adjustment for suppression/intervention). The core of the methodology lies in overlaying our circuitry broken up by zones of protection over these data products in order to create forecasts localized at protection equipment. This information allows the company to better understand the timing of fire weather events and enables planning and prioritization of resources in a more informed manner. The Pyregence data layers have also been ported over into the company's propriety geospatial tool, GREATER, so that fire consequence and weather forecasts can be easily overlaid on the network. In the future these are expected to be more explicitly integrated into the PSPS decision making process. Conceptually, the company will combine these localized forecasts with downstream customer counts in order to get a picture of the associated risk at each zone of protection and how many customers would be affected if that zone was de-energized. Ideally, the company would target zones for de-energization that have the fewest customers but pose the greatest wildfire risk.

4. ***Timeline***

The pilot project is in trial use and expected to migrate to widespread application over 2021. The pilot product was first shared with Pyregence technical advisory committee (TAC) members in March 2020. Since that time, PacifiCorp has rendered the forecast products into its engineering and operations environment.

5. ***Results and Discussion***

A designated PacifiCorp platform has been created and network characteristics, including circuit zones of protection-level details has been provided to the Pyregence team, which is overlaying its calculation engine onto this base data.

The modeling process allows for short-term analysis of risk events within the electrical network. Such information will be used to elevate operational actions within the network in alignment with those areas which signal elevated risk.

6. ***Follow-Up Planned***

PacifiCorp's ignition modeling efforts have been advanced from pilot status. These programs have been expanded throughout our California service territory and fire risk areas in other states. They have been relied upon throughout the company's 2021 WMP update and are further described in section 4.5.1.

Pilot 11-Advanced Weather Station Modeling and Weather Stations

1. ***Purpose of Research***

This pilot focuses on exploring of the benefits of RAWS (remote automatic weather system) stations versus micro weather stations. Additionally, this pilot sought out to create a methodology to systematically identify blind spots in our weather station network and in the National Interagency Fire Center's 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. In particular, 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 USFS (United States Forest Service) and utility situational awareness.

Relevant Terms: RAWS (remote automatic weather system), micro-station, National Interagency Fire Center (NIFC), USFS (United States Forest Service)

2. ***Data Elements***

Data Element	Collection period	Collection frequency	Spatial granularity	Temporal granularity	Comments
RAWS station	2021-present	15 minutes	Lat/long for weather station	15 minutes	
Micro-station	2021-present	10 minutes	Lat/long for weather station	10 minutes	

3. ***Methodology***

PacifiCorp has leveraged the Localized Risk Assessment Model (LRAM) to site future weather stations in an objective and quantified manner. Using the LRAM we obtain the combined risk score for each zone of protection; this is a summary metric that reflects 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 piece is to obtain the locations of all RAWS, NWS, and PacifiCorp weather stations throughout our service territory and join them to combined risk score dataset from the LRAM. For each zone of protection, we then identify the nearest weather station and calculate the distance and difference in elevations from which we obtain a situational awareness score. Finally, we synthesize the situational awareness score with the combined risk score to create a risk blindness score. We can then visualize the risk blindness scores on a map in GREATER to identify locations that have both low situational awareness and high combined risk score and consequently are optimal locations for future weather stations.

4. ***Timeline***

PacifiCorp has received RAWS stations and micro-stations and plans to complete installations in Q2 2021 and access becomes viable in remote areas. Weather stations are being placed in Klamath Glen, Smith River, Cave Junction/Patricks Creek, Hornbrook, Fort Jones/Scott Valley, McCloud, Alturas, and Montague. (See response to PC-2 and Attachment D for graphic illustration.) PacifiCorp has installed two RAWS stations in its California service territory, at Klamath Glen and Smith River. (PacifiCorp is also installing additional RAWS stations in Oregon, including two just north of the state line in Grants Pass area).

5. ***Results and Discussion***
   Currently PacifiCorp has a strong initial base of micro-stations informing risk and enhancing operational response during elevated risk periods. Going forward the above-described methodology allows us to systematically identify the blind sports in our network and strategically place our weather stations to improve our situational awareness in our high-risk regions.
6. ***Follow-Up Planned***
   While the company has not yet identified an ideal weather station density it expects to continue to enhance its weather network, particularly as it evaluates the RAWS to micro-station correlations. We are currently utilizing the above-described methodology to place the new round of weather stations going out throughout 2021.

4.5 MODEL AND METRIC CALCULATION METHODOLOGIES

4.5.1 *ADDITIONAL MODELS FOR IGNITION PROBABILITY, WILDFIRE AND PSPS RISK*

Report details on methodology used to calculate or model ignition probability, potential impact of ignitions and / or PSPS, including list of all input used in impact simulation; data selection and treatment methodologies; assumptions, including Subject Matter Expert (SME) input; equation(s), functions, or other algorithms used to obtain output; output type(s), e.g., wind speed model; and comments.
For each model, organize details under the following headings:

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 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 and assumptions for analysis, including Subject Matter Expert (SME) input; equation(s), functions, statistical models, or other algorithms used to obtain output*
5. ***Timeline*** *– Model initiation and development progress over time. If updated in last WMP, provide update to changes since prior report.*
6. ***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.*

Purpose of the Model - Model and Metric Calculation:

In its Remedial Compliance Program filing[6] on July 27, 2020, the company outlined its roadmap for fire risk modeling which substantially evolved the deterministic method it had previously applied. The deterministic method was reliant on the High Fire Threat District, as developed and approved in D.17-012-024, in addition to risk analysis the company had developed with regard to climate risk drivers coincident to historic fires (independent of their cause) as well as analysis of outage events and their correlation to fires. While that groundwork set the stage for 1) identifying PSPS areas, 2) developing first phase mitigation plans and 3) outlining priorities, it was insufficient for the level of risk analysis contemplated by either the WSD or the company. As a result, the company leveraged its legacy reliability management

[6] 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

tools, and in combination with many previously untapped weather and land-based resources, began the development of its Localized Risk Assessment Model (LRAM).

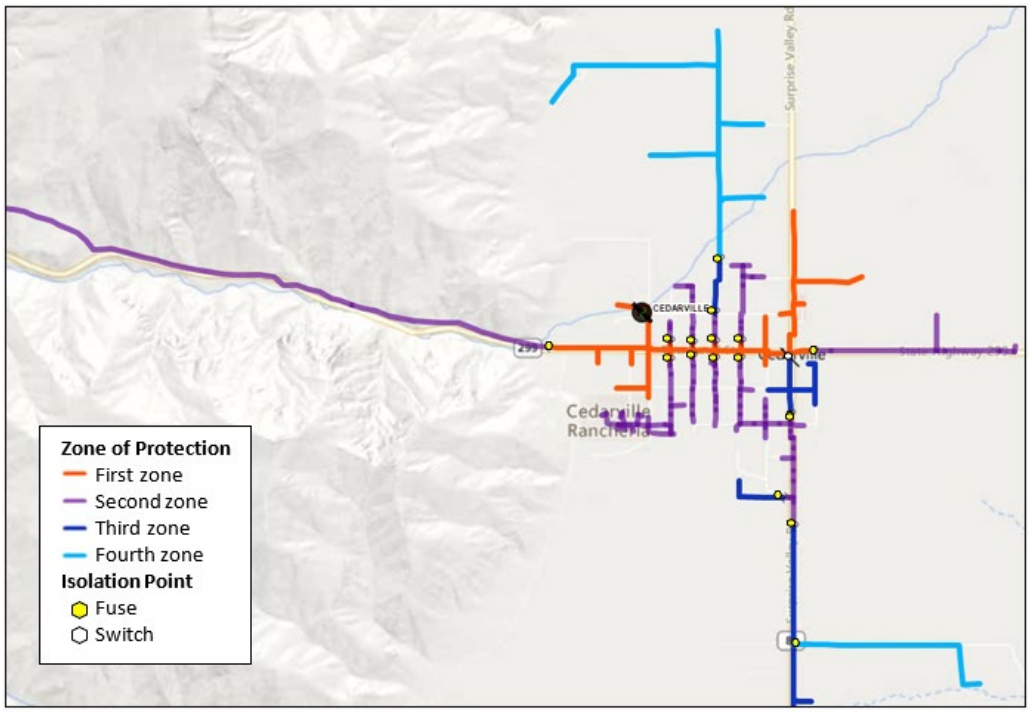
In its RCP filing it outlined the following. The first step in this process was to leverage prior risk modeling for application at the module level. The core logic in the existing risk modeling, as expressed by fire threat tier designation, remains sound. Modeling general ignition probability and historic fire weather fire spread probability, together and including population density to approximate impact, is the best and primary method to assess general wildfire risk, and this approach serves to establish risk to utility assets, irrelevant of the ignition cause. Accordingly, PacifiCorp used the Integrated Utility Threat Index (iUTI) to determine the relative risk score of each individual module.[7] Modules with varying iUTI scores are being assessed based on a weighted average proportionate to the portion of the module with any particular iUTI score.

Relevant Terms

- Zone of Protection (ZOP) A ZOP is a subsection of a circuit with control, either programmatically, automatically or manually. In Figure 4.5-1 below a graphic shows the ZOPs of a portion of a circuit beginning at the black dot, representing the substation's circuit breaker. All the orange color is the first ZOP, while the violet (downstream of a fuse, shown by the small hexagon) is the second ZOP, the dark blue the third ZOP and the cyan the fourth ZOP. Isolation devices are shown with a small hexagon.
  As such, the ZOP is the smaller granule against which any locational 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 serve to provide rankings for each ZOP that are used to target mitigation tactics and prioritize efforts for wildfire mitigation actions.

[7] The Integrated Utility Threat Index (iUTI) is described in detail in the Independent Review Team Final Report on the Production of the California Public Utility Commission's Statewide Fire Map, dated November 21, 2017, at 12-14.

Figure 4.5-1: Graphical example of a Zone of Protection



Data Elements

As a next step, PacifiCorp identified and incorporated additional risk quantification layers to adjust each module's risk score based on the various risk assessment methods. Table 4.5-1 below outlines each of the data elements used in the LRAM.

As new risks are identified[8] they will be quantified and incorporated into the risk assessment and cascaded into the mitigation prioritization. Each layer is intended to assess an element of wildfire risk, localized to the module (or ZOP) level. The specific factors considered in each layer, together with the methodology for weighing those factors, is explained in detail in the following sections.

[8] As of the 2021 WMP Update the company has reviewed its LRAM with a limited audience to discuss methodology and subject it to the limited peer review. It anticipates expanding this review with other utility stakeholders as the opportunities for such discussions arise.

Table 4-4: LRAM data elements

	Model Element	Influencer Type	Level of Granularity	Assumptions in the Model	Validation Method	Future Improvements
A	**Circuit Topology**	Utility Base Case	Spatially, approximate 10' accuracy	Conductor types, spacing, etc. are accurate	Review by engineering team	Better locational precision; more hardware detail in GIS
B	**Historic Climate/ Probabilistic Fire Spread (iUTI)**	Fire Climate Risk	30 m pixels rendered on circuit topology	Locations where climate has favored fire spread will continue to favor fire spread	Review by stakeholders/fire professionals	Better integration of contemporary fuel situation; utility focus on ignitions rather than agnostic to source
C	**Contemporary Fire Weather Risk**	Fire Climate Risk	3 km gridding	Climatology can generally be inferred with limited measured assets, i.e. weather stations; models can be used to gauge local climate patterns	Calibration using company and external weather sources to gauge local terrain impacts	Machine learning application to fine tune locational precision when coincident to weather assets
D	**Tree Canopy Coverage**	Fire Spread Risk/ Utility Risk Event	30 m granularity	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.	Comparison to historic vegetation outages and historic vegetation maintenance records.	Augmenting NLCD cover data with higher resolution datasets in developed areas.
F	**Vegetation Outage Rate**	Utility Risk Event	Reconciles outage events to autoisolation point/zones of protection; granularity in certain areas of model may not be particularly precise	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	Subject matter expertise	Reconciliation of tree canopy/vegetation performance would result in greater accuracy with causal relationship
G	**Utility Fault Rate Ignition Risk**	Utility Risk Event	Reconciles outage events to auto-isolation point/zones of protection; granularity in certain areas of model may not be particularly precise	Historic fault rates and locations have relationship to future risk events; circuit topology from year to year is relatively stable to enable translating past history forward onto zonal expectations	Quality checked by central engineering subject matter experts	Finer detail on locations of damaged equipment when risk events occur, i.e. which span was the location at which vegetation contact occurred?
H	**Available Probabilistic Arc Energy Risk**	Utility Risk Event	Sub-second time analysis overlaid on circuit topology	Requires accurate conductor registry in TCC/arc flash models	Quality checked by local engineering subject matter experts	Cyclic process to validate modeling and performance as part of annual readiness check
I	**Component Damage or Mechanical Failure**	Utility Risk Event	Device clearing time analysis overlaid on circuit topology	Requires accurate source and conductor representation in Protective Device Analysis models	Quality checked by local engineering	Cyclic process to validate modeling and performance as part of annual readiness check

	Model Element	Influencer Type	Level of Granularity	Assumptions in the Model	Validation Method	Future Improvements
	from Short Circuit Current				subject matter experts	
J	**Utility Fires**	Utility Ignition Event	GPS accuracy from field resource	Requires manual reporting processes instituted since 2019	Quality checked by risk, operations and engineering subject matter experts	Centralized database with information augmented by risk event investigation team

By combining all relevant risk influencers, PacifiCorp assigned each module a composite wildfire risk score, called "combined score", to reflect the total risk of a utility-related ignition occurring because of a fault on the ZOP.[9] In conjunction with reference to each layer discussed above, the composite risk score will also help PacifiCorp target mitigation programs to the highest risk portions of PacifiCorp's grid. Because of certain design goals, access limitations, and other factors not specifically calculated, a higher composite score does not necessarily mean that the module will always receive priority over a module with a lower risk score. For example, it would often 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.

Finally, each module is being separately considered for its relative PSPS impact, as measured by downstream customer counts (DCC). Factors in this risk assessment include:

- the total number of customers who would be impacted by de-energization of the module;
- the number and type of critical facilities which would be impacted by de-energization of the module, including an assessment of back-up generation capabilities;
- the number and type of access and functional needs customers who would be impacted by de-energization of the module, including an assessment of back-up generation capabilities;
- the economic impact to commercial customers if the module is de-energized. In each case, the number of customers is the sum of those customers directly served off the module as well as all downstream customers.

Unlike the layers discussed above, the PSPS impact layer is not intended to reflect the wildfire risk of ignition associated with the module, but rather its community impacts. Specifically, the PSPS impact layer helps PacifiCorp prioritize mitigation efforts. System hardening and other mitigation activities which reduce the wildfire risk associated with a module can justify strategies to minimize the PSPS impact of the module, by either eliminating the module from PSPS consideration or by reducing the probability that de-energization of the module would occur. Additional process as to how these calculations will influence mitigation measures is in the formative stages.

Consequently, PacifiCorp's strategy for fire risk modeling is intended to serve as a refreshable foundation establishing quantification methods for a variety of influencers that should be considered when estimating fire risk within any given zone of protection (ZOP) within its electrical network.

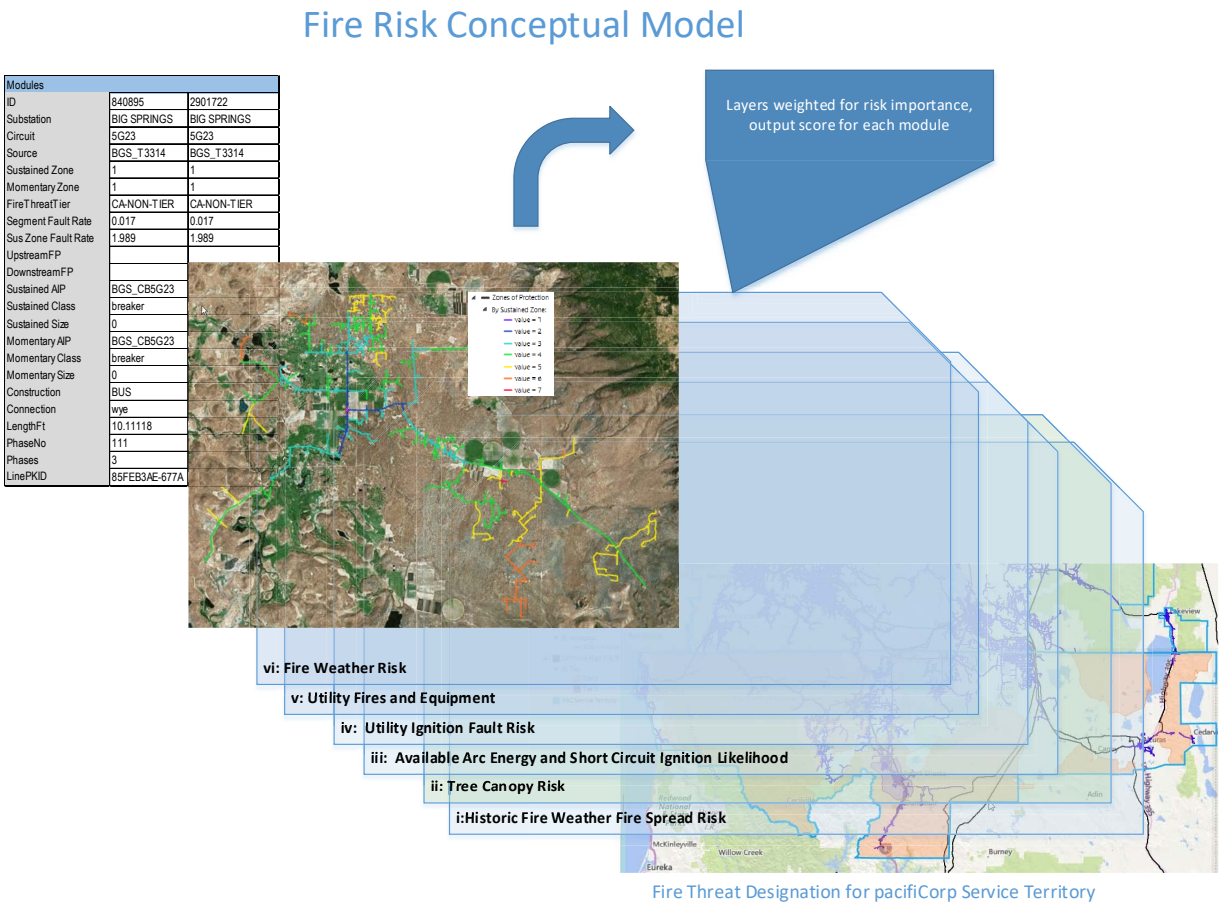
Methodology, including detailed construct of the Model Elements

The individual layers and model development parameters are outlined below. Within each of these ZOPs a variety of risks are consolidated to evaluate relative risk of that ZOP against all other California ZOPs. The construct of the model and the ancillary data layers are detailed below, 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. It is important to note that the model explicitly includes locations and inputs from utility ignition history the company has developed as one of the layers considered, which it titled "Utility Fires and Equipment". At this time the history is used as a flag for the ZOP, however the company is evaluating how it can extend this limited

[9] After additional development and experimentation, PacifiCorp will decide whether the score will be a specific numerical value, a ranking, or a more generalized risk assessment category. As more quantification of these risks advances, it is expected that the composite score will be reflected by a numerical value.

dataset more broadly across its equipment, using the involved components to establish equipment ignition rate. Such modification to the model would be reported in future WMP updates.

Figure 4.5-2: Sample Fire Risk Conceptual Model highlighting various Data Elements for the LRAM



Fire Threat Designation for pacifiCorp Service Territory

A. Circuit Topology

1. **Purpose of element** – Circuit topology is the company's base data in which containing the spatial locations and facility and equipment details such as Conductor types, spacing, and equipment.
2. **Relevant terms** – Standard GIS terminology
3. **Data elements** – GIS Point and line features
4. **Methodology** – PacifiCorp's base topology data is managed and mapped by the companies GIS department, and updates records based on field personnel work orders.
5. **Timeline** – Data is refreshed and maintained daily.
6. **Application and results** – the data is used to apply model area findings to specific facilities.

B. Historical Climate/ Probabilistic Fire Spread (iUTI)

1. **Purpose of element** – Using historic fire weather days simulate current fire spread for any of those days using random ignitions, modeling probability of spread with current vegetation and existing terrain.

2. **Relevant terms** – Anderson fuel model, Fosberg Fire Weather Index, ELMFIRE, ground truth, Point layer: raster data, gridded at 20 m
3. **Data elements** – LANDFIRE fuel data, Anderson fuel models, weather re-analysis data.
4. **Methodology** – Randomly ignited cells modeled fire spread based upon historic fire weather days (where FFWI >50), model run for six hours of fire weather days, with volume of acres burned from modeled ignitions accumulated for each 20 m grid. Data evaluated by SMEs and inference drawn re elevated areas, upon which iUTI was subsequently founded. This gridded raster dataset was overlaid on circuit ZOPs and length-weighted for the ZOP iUTI score.
5. **Timeline** – 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.
6. **Application and results** – Historic fire spread, as a proxy for long-term fire spread risk has been integrated into the model.

C. Contemporary Fire Weather Risk

1. ***Purpose of model*** – Create a normalized relative ranking for the fire weather risk at a zone of protection using recent historical gridded outputs. The main goal is to use the High Resolution Rapid Refresh (HRRR) model (3km resolution) to identify zones that have a high frequency of strong winds, high Fosberg, and frequent droughts (measured by KBDI). We then combine 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*** – The High Resolution Rapid Refresh is a NOAA real time 3-km resolved weather forecasting model which is updated every hour.
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. ***Methodology*** – First our circuitry is broken up into zones of protection defined as the lines downstream from a protective device (like a fuse or recloser) to the next protective device. The first goal is to obtain a localized and accurate weather history for each zone of protection. Historically we have relied on weather stations for this task, but for most locations across PacifiCorp the density of weather stations in our service territory is not high enough to enable sub-circuit analysis. To remediate this, we used the hourly HRRR 3km data which provides high quality historical weather throughout California and the United States. We then overlay the zones of protection over the HRRR data and extract the hourly wind speed, wind gust, precipitation, relative humidity, and temperature going back to 2016. From this we can extract most fire weather indices that are utilized in industry, and importantly the ones used at PacifiCorp: Fosberg & KBDI. We now have a detailed weather history for each zone of protection from which we just need to extract a ranking.
    a. There are many complicated ways to do this, but we went with a straightforward solution that is easily explainable – take the sum of the weather indices during the wildfire season at each location normalized by the number of years. This is essentially a measure of the exposure to each weather variable at each zone of protection and creates an easy way to rank them relatively. We then apply a min-max scaling to put all the exposure measures onto the same 0-1 scale. The final piece is the fuel density measure which we obtain by simply overlaying the zones of protection shapefile over the Total Available Fuel sublayer from the FCCS and mapping it to a 0-1 scale. Now for each zone of protection we have a measure of the wind gust, Fosberg, and KBDI intensity along with the fuel density.

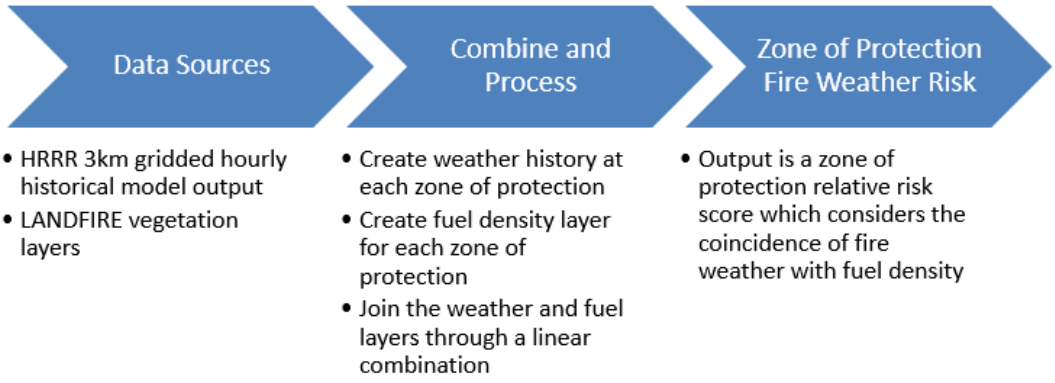
b. Now that we have all the pieces we must now combine the weather and fuel scores to get the final Fire Weather Risk Score. We chose to do a simple linear combination of each sub-score multiplied by its own respective coefficient shown as:

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

c. Where x_i is the relative ranking between 0-1 for each sublayer (Fosberg, KBDI, gust, and fuel) and c_i is the respective chosen coefficient to each variable. There is subjectivity in choosing the coefficients and after a few iterations we settled on the weather variables having a coefficient of 1 and the fuel component having a coefficient of 2, so essentially the weather variables carry 60% of the weight and the fuel carries 40%.

5. ***Timeline*** – We plan on updating the Fire Weather Risk layer after each wildfire season is concluded. The metrics are calculated on a per year basis and as a result we can identify trends across our service territory as they emerge.
6. ***Application and results*** – Using the Fire Weather Risk Score we can identify zones of protection that have a high frequency of fire weather coincident with dense fuel. We have been able to create a ranking of the zones of protection and circuits based on this risk score and are using it in conjunction with the other layers in the LRAM. The weather components of this risk score, namely wind gust, Fosberg, and KBDI, are exactly the variables we look at when decide the necessity of a PSPS event. Consequently, the Fire Weather Risk score can also be thought of as the relative frequency of weather conditions which necessitate a PSPS event. If we look at it through the PSPS lens, we can then combine this risk score with downstream customers from each zone of protection and essentially get the PSPS risk at a zone of protection (probability * consequence).

Figure 4.5-3: Flowchart outlining the process of creating the Fire Weather Risk layer.



D. Tree Canopy Coverage

1. **Purpose of element** – Find locations with highest demands for vegetation maintenance by determining the extent of tree coverage along circuits and circuit segments.
2. **Relevant terms** – Point layer: GIS layer consisting of individual points with location information and vegetation attributes.
3. **Data elements** – NLCD Tree Canopy coverage and internal distribution GIS data. NLCD data has $30m^2$ resolution and extracted data layers maintain that resolution.
4. **Methodology** - A point layer was created from distribution line GIS files with 30m spacing. The point layer was clustered to avoid oversampling at line intersections. Data was extracted from

the NLCD Tree Canopy Cover raster layer at each point, then aggregated per circuit or sub-circuit segment. This provided distribution functions and statistical values for the tree canopy cover along each segment.

5. **Timeline** – Data analysis will be refreshed based on updates to the NLCD Canopy Cover Layer, which is anticipated at 3 to 5-year intervals. In addition, major changes to PacifiCorp asset locations would require a refresh in analysis.
6. **Application and results** – 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.

E. Vegetation Outage Rate

1. **Purpose of element** – Find locations with highest historic vegetation outage rates corresponding to greatest risk of ignitions from vegetation.
2. **Relevant terms** – PROSPER, outage record database**.**
3. **Data elements** – Historic outage records and circuit information.
4. **Methodology** – Vegetation outages have a primary or secondary cause of 'vegetation' or any case where trees or vegetation are mentioned in the outage comments. The vegetation outage rate is determined by counting the outages per zone of protection and then normalizing by length and time. The general framework is very flexible so that an outage rate can be extracted for any outage type (car hit pole, animal contact, etc.) across all zones of protection.
5. **Timeline** – Historic vegetation outages have been incorporated into the risk model in late 2020 and will continue to be updated periodically.
6. **Application and results** – Vegetation outage frequencies normalized by line length have been incorporated into the risk model.

F. Utility Fault Rate Ignition Risk

1. **Purpose of model** – To review and assess the relationship between outages and ignitions, augmenting outage fault rates with specifics regarding types of components and outage causes. The resulting data provides areas of concern and hot spots when historical events occurred as broken down by cause category. This output is not only used to model high risk outage areas, but it is additionally used in the informing prioritization efforts.
2. **Relevant terms** – PROSPER, outage record database.
3. **Data elements** – The historical outage data is housed in PROSPER and joined with additional facility and asset data.
4. **Methodology** – All outage events records are reviewed based on the company's internal process for recording and categorizing outage events. After an initial review to determine if the event qualifies as an ignition risk event the data is correlated and analyzed consistent with methods developed in response to the CPUC's Wildfire Safety Division's Wildfire Mitigation Plan Template requirements, outlined in the table below. Outage causes are correctly captured to support segmentation. Certain unrecorded equipment type may be inferentially identified in a module and the assumptions for such associations are correct. Changes in circuit topology and environmental impacts can yield substantially different incident rates

from the suspecting initiating events. Sub-module changes can result in substantial variations in ignition risk over time and may not be easily back-cast for comparison purposes.

Figure 4.5-4: PacifiCorp's process to map ignition drivers to outage causes.

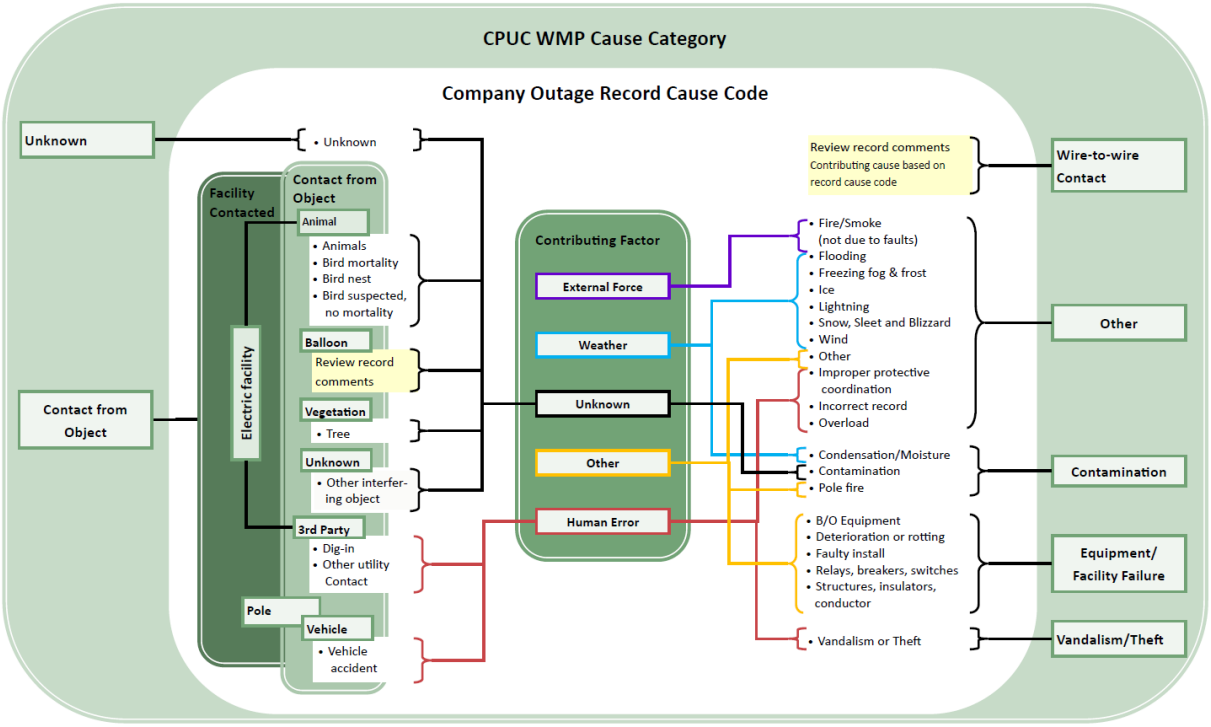
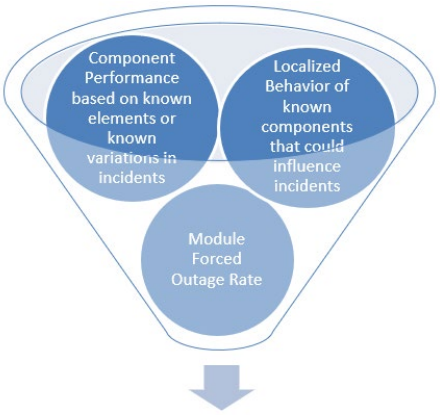


Figure 4.5-5: Fault Rate Ignition Risk process



5. **Timeline** – Annually.
6. **Application and results** – 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.

G. Available Probabilistic Arc Energy Risk

1. **Purpose of model** – The pilot uses simulations of the distribution system model 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 circuit topology, length, and materials used. Line sections, and ultimately protective zones and circuits, were scored based on arc energy values and line length (exposure). The score is a gauge of relative ignition risk and can be used for the purpose of identifying 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. **Methodology** - The 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 may 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 zone of protection were evaluated for composite scoring by arc flash results and line length. 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 4.5-6: Available Probabilistic Arc Energy Risk

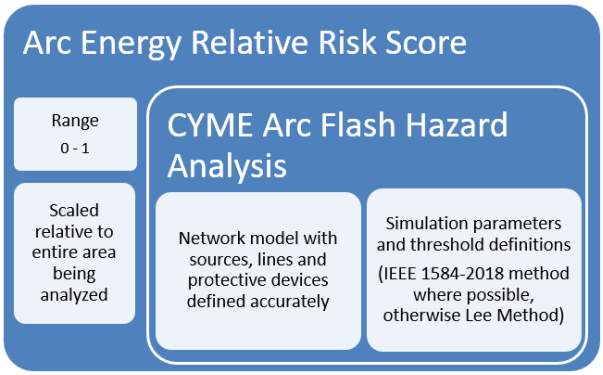


Figure 4.5-7: Example CYME Arc Flash Analysis input

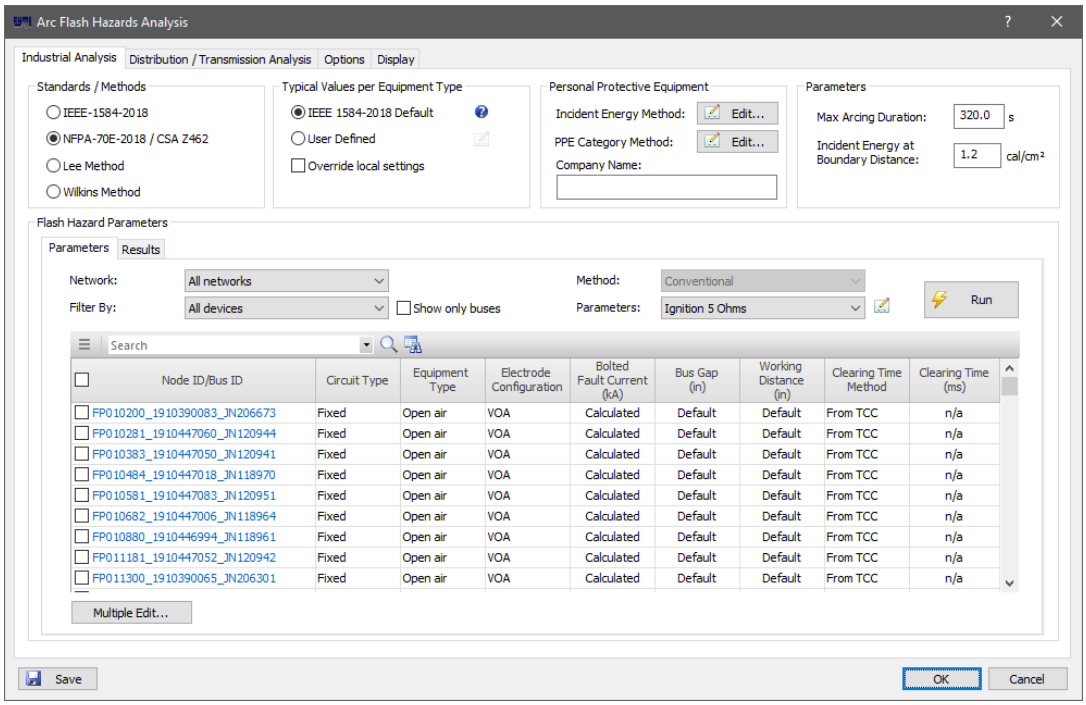
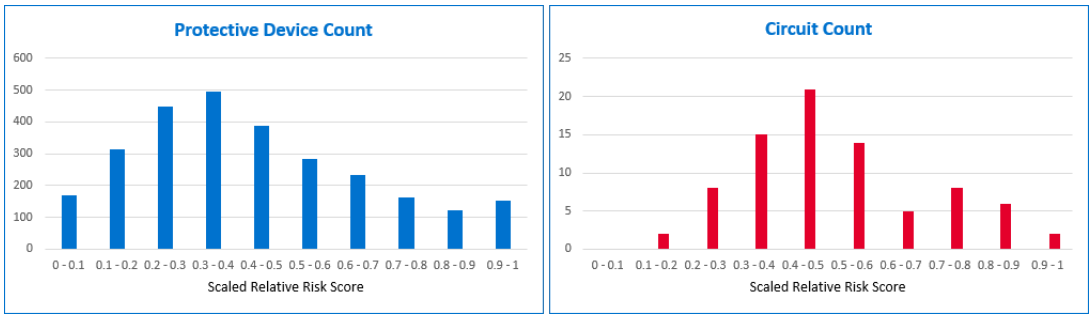


Figure 4.5-8: Summary of arc energy risk scores (scaled to the range 0..1)



5. **Timeline** – 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.
6. **Application and results** – The results of the pilot were used to identify locations where the potential fault (based on the similarity to modeled configurations) reflected a higher risk of damaged conductor or ignition. PacifiCorp used the modeling results to identify locations where there was a higher risk of ignition from a fault condition. Use of this information allows for system network changes to preempt such a risk condition.

H. Component Damage or Mechanical Failure from Short Circuit Current

1. **Purpose of model** – Identify areas where system improvements (including but not limited to additional protective devices, neutral extensions, reconductors) are warranted in order to reduce ignition risk associated with component damage or mechanical failure from short circuit current. Available fault current varies across the system due circuit topology, length and materials used, and changes over time as system improvements and configuration changes are implemented. This metric may or may not be combined directly with other composite scoring methodologies.
2. **Relevant terms**

   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 conductors comprised of copper, aluminum and steel, these properties can be modeled in a two-dimensional 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.

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

   Source details: A numerical representation, 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.

   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/long for each node in the model	Not used	The system model includes source, line and protective device details.

4. **Methodology** - Throughout the distribution system, identify components where high current flow and/or heat from a short circuit event is predicted to damage overhead components based on simulation results. Initially the focus will be on overhead conductor, but insulators and other devices may be included in the future. The metric will initially be associated with spans of overhead conductor and their protective devices. Simulations will be performed in CYME and possibly other tools yet to be determined.

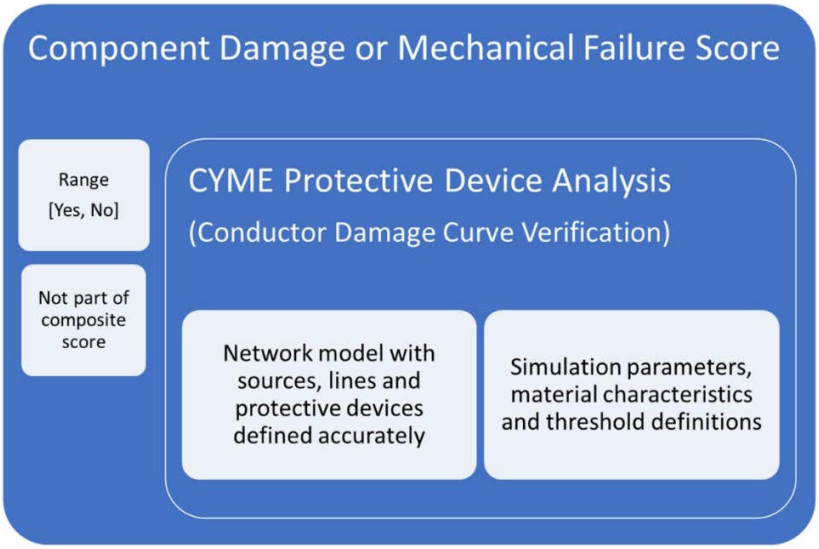
   Available short circuit current magnitude varies throughout the distribution system and can be estimated by the CYME model. The time for a clearing device (fuse, recloser, breaker, etc.) to clear a given fault can also be determined from the CYME model. Materials used for conductor, insulators and other devices have temperature withstand ratings, and when they sustain too high a temperature for sufficient time duration, mechanical damage and/or failure can result. Consequences can include a line down event, risking ignition.

   Small overhead conductors are expected to present the greatest risk for two reasons. First, their original material capacities (represented visually by a time-current-characteristic damage curve) are more susceptible to high current than are today's standard conductors. Second, by virtue of their vintage and service life, they are more likely to have sustained some annealing or loss of life from operational events. This further degrades their ability to sustain high current without damage. In the majority of locations, fast operating fuses provide adequate protection for small conductors, but the power system is constantly growing. System improvements can increase available fault current, and this metric will help to identify components whose protection is no longer adequate.

   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."

Figure 4.5-9: Component damage or mechanical failure from short circuit current methodology

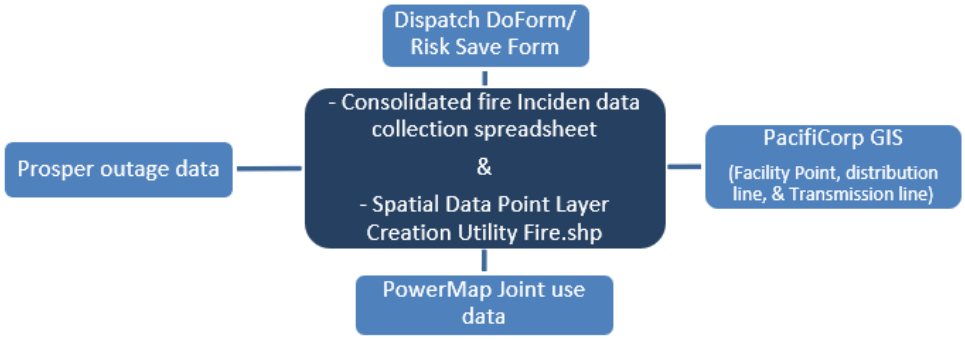


5. **Timeline** – PacifiCorp completed the pilot CYME analysis for bare overhead conductors in its California service territory in 2021. Other components were not simulated for damage risk, but they may be added in the future. The yes/no output is not expected to be combined directly with other measures for composite risk scoring, but it 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.
6. **Application and results** – 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.

I. Utility Fires

1. **Purpose of model** – To review and compare utility caused fire details and locations, to determine what causes and risks contribute to utility equipment ignition.
2. **Relevant terms** – PROSPER, Outage record database. PowerMap, internal company mapping system. Dispatch Do Form/Risk Save, internal form created at the onset of a fire risk event.
3. **Data elements** – 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.
4. **Methodology** – All the above data elements are combined to create a recorded dataset of utility caused fires. In addition, a detailed review of the various data sources is preformed to consolidated the data into a single source. Data location based on GIS equipment location at the time of the incident.

Figure 4.5-10: Process graphic for consolidation of Fire Ignition events



5. **Timeline** – *data records are reviewed on a monthly basis. The model initiation and development progress over time.*
6. **Application and results** – 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.

Timeline

As PacifiCorp continues to utilize the LRAM it expects to continuously improve and periodically update the model as the individual layers are updated or new layers are added. The company will additionally archive and evaluate the model yearly and update all the layers with the most up to date information at that time. The annual re-evaluation period will also establish a baseline going forward, and the company plans to compare future scores to those dating to the inception of the model. This approach will allow for a current versus future comparison, recognizing model and network improvements, and enable 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 for long term monitoring of the climate as measured through the weather components of the Fire Weather Risk Layer (KBDI, Fosberg, and wind gust). The company will then be able to combine these identified trends with California's 4th Climate Change Assessment to get an informed view of the macro trends of the climate within PacifiCorp's service territory, to support effective planning and prioritization.

Figure 4.5-11: LRAM annual refresh process summary.

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

LRAM Validation

Upon completion of the detailed framework the company conducted stress testing for the weightings of each of the models. 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. It determined using subject matter experts evaluating model results that only the Probabilistic Arc Energy should be weighed at a lower value. This was rationalized that utility adjustments to arc energy are responses to relatively low frequency fault events, and according them equal weight with fire weather and fuel available to spread a fire improperly tips the scale. As a result, arc energy was accorded half weighting.

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. It will be applying methods developed by PG&E, SDG&E and SCE. These products are anticipated to be developed within the first half of 2021.

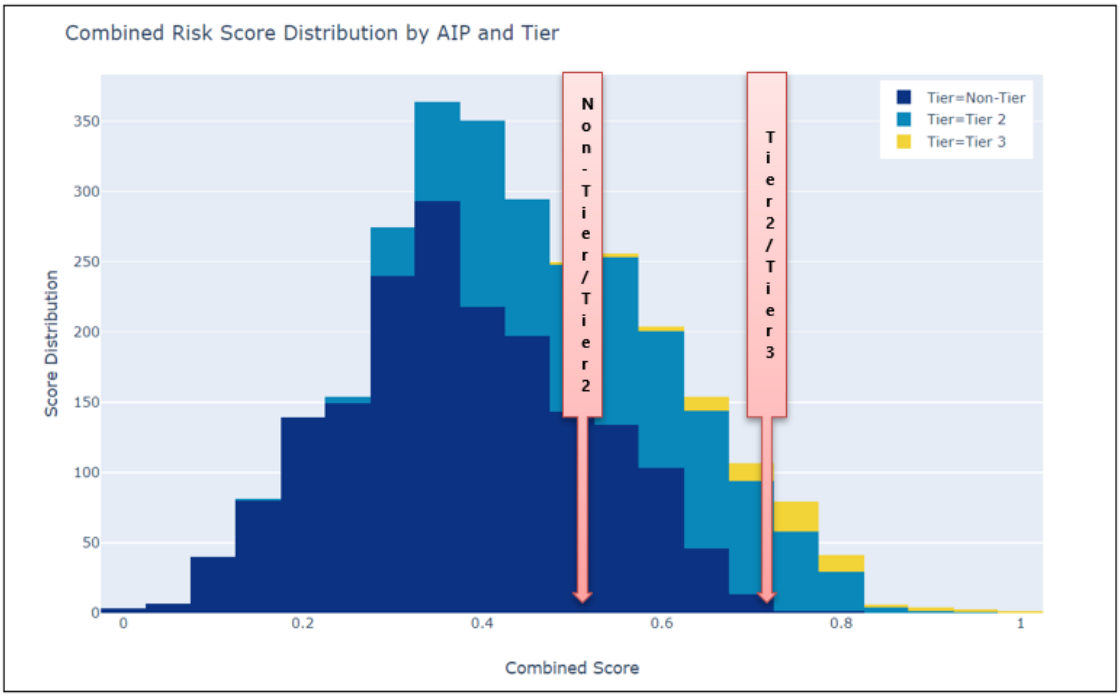
Now that the LRAM model is functional, PacifiCorp can use these products, notably ZOP (zone of protection) and circuit scores to strategically guide our wildfire mitigation activities going into the future. Using this methodology, we can get a deep understanding of the risk profile at the zone of protection level throughout our service territory. It also allows us to begin restarting our wildfire mitigation efforts in a more surgical manner. A large majority of ignition risk drivers have specific countermeasures that help remediate that risk. However, historically it has not been trivial to identify exactly where the mitigation efforts will be the most effective, and this is exactly where the LRAM model comes in and shows its utility. For example, as we look at resources and attempt to optimize the mitigations against the costs, the LRAM allows us to tackle this issue in an informed and methodical manner. As an approach, we can filter the zones of protection to the top 25% (or some other value) of fire weather scores, and from this subset we can then sort by a combination of tree outage frequency and tree canopy cover. These identified overhead line have a combination of frequent fire weather, outages, and dense tree canopy and consequently are prime candidates for vegetation management. This example illustrates the way which PacifiCorp intends to deliver on its commitment to calculate a risk spend efficiency, noted previously. Further it is expected the use cases will grow as the model is exercised and integrated it into the company's decision-making process.

As the company has responded to the deficiencies noted by the WSD, 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 multiyear 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 Section 4.2.7 the company outlined its proposed modifications to the current HFTD. In the charts below the company displays material applying its LRAM results at the ZOP and aggregated to the circuit that served to broadly categorize the ranges of combined scores currently designated as Tier 3, Tier 2 and Non-Tier. Visually 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 generally observed that combined scores of below 0.55 separates Non-Tier and above 0.70 separates Tier 3 from Tier 2. Previously, PacifiCorp used the Tier 3 designation as an indicator of population warranting development of a designated PSPS area, however these results afford the company the means to establish PSPS areas for other isolated areas of fire risk.

Figure 4.5-12: Distribution of the Combined Risk Score among the zones of protection in California. The two arrows demonstrate where we see choose risk boundaries between Non-Tier/Tier 1 and Tier 1/Tier 2.

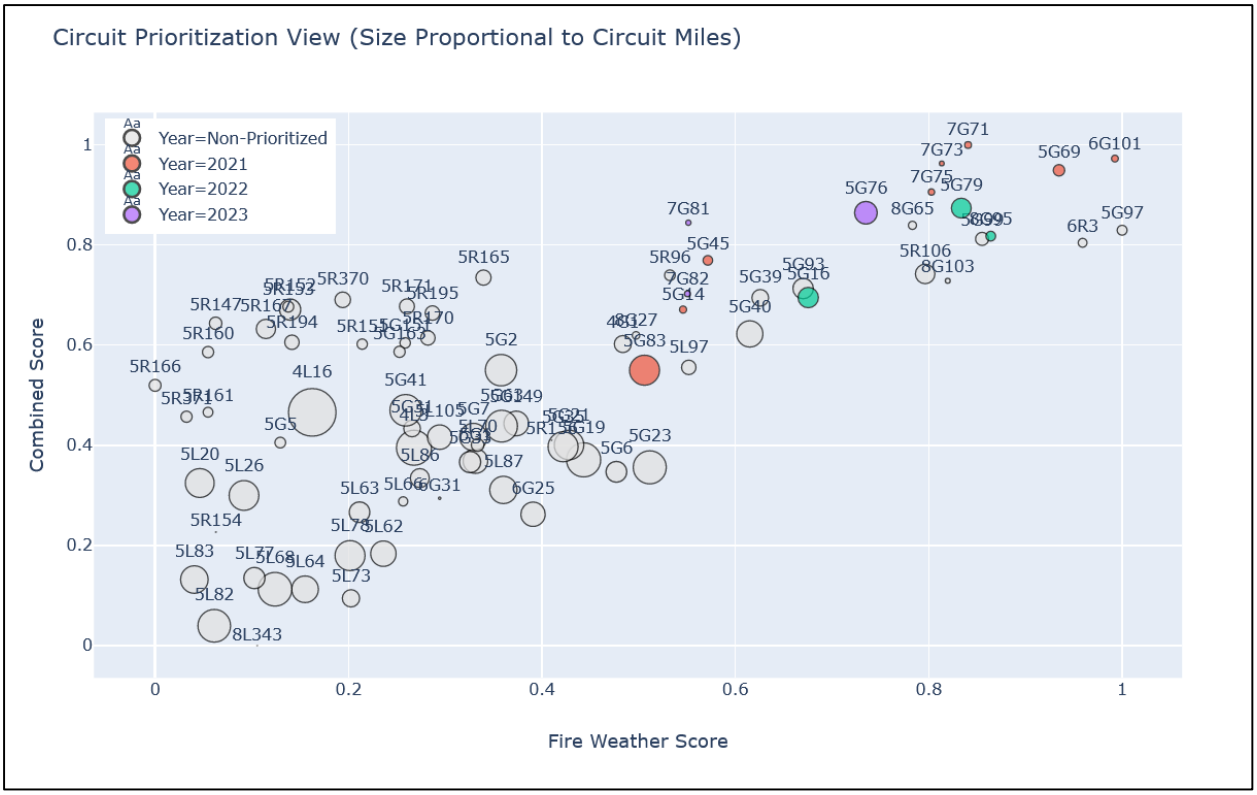


2) Comparing to Prioritization Efforts

The next order of model usage focuses on the assessment and modification, where appropriate, of circuit priorities. In its original prioritization the company used the HFTD Tier Designation and the customer impacts from PSPS as its criteria to establish priorities of mitigation. With the LRAM, PacifiCorp is now able to calibrate mitigation prioritizes at a finer level and with more risk elements consideration. In the chart below the 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, and the size of the point corresponds to the length overhead conductor on that circuit. This product demonstrates several aspects to inform the company's WMP. First, it has combined risk in areas not previously designated as mitigation candidates for measures in addition to the plans for modification of protection control equipment (i.e. substation relays and recloser controls). Rather the company needs to evaluate the need for additional mitigation measures to limit the risk that PSPS would be a needed operational strategy. Second, it provides the company the ability to correct priorities of work currently in development.

Now that each zone of protection and circuit has a combined fire risk associated with it PacifiCorp can begin to systematically prioritize future grid upgrades relative to those high risk areas. One of the upgrades that has the largest impact on grid resilience is the installation of covered conductor. This comparison is underway and, as appropriate mitigations, including covered conductor installation schedule will be adjusted to areas that deliver improvements.

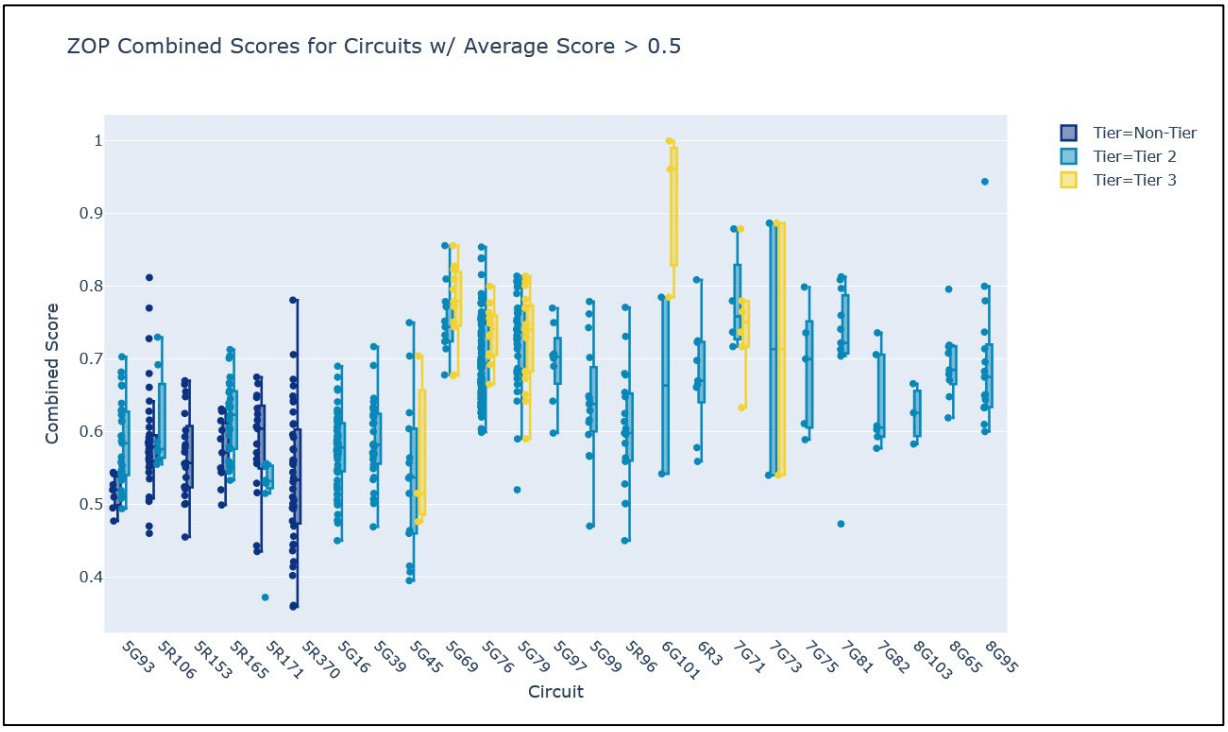
Figure 4.5-13: Pre-LRAM priority is shown by color using the projected year of construction, the climate risk is shown on the x-axis, the combined score (which integrates utility ignition risk with fire climate risk) is shown on the y-axis.



3) Circuit Wide vs. Targeted Efforts

This approach is further extensible to evaluate specific ZOPs within circuits, particularly those which may not be located within specific fire threat areas but are of substantial combined risk level to warrant targeted mitigation efforts. These specific zones of protection which warrant mitigation, regardless of HFTD classification are shown in the box plot view as seen below. The chart focuses on circuits having a combined weighted average score in excess of 0.5 for readability. 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 4.5-14: Box plot for the combined score of each circuit colored by HFTD designation, where each point is the score for a specific zone of protection.



Circuits with a relatively low combined risk score, with outlier zones of protection, tend to highlight the necessity for targeted alternative mitigation techniques. These techniques encompass a broad spectrum including protective device coordination, equipment inspection, vegetation inspection, etc. Many of these techniques are utilized by Pacific Power in its general reliability planning efforts to minimize impacts from faults.

Such alternative mitigation techniques focus on various ignition drivers, with specific methods aimed at mitigating the risk. These techniques are intrinsically linked, sharing the common goal of reducing ignition risks, but have varying degrees of mitigation effectiveness based on the driver. It's important to develop a comprehensive understanding of the conditions, fault history, and topology attributes (tree canopy exposure, arc energy, etc.) in selecting the appropriate mitigation.

The tables below identify the extensive methodologies, programs, and techniques Pacific Power utilizes to mitigate ignition risks. These mitigation efforts are conclusive to the logical steps identified earlier in Section 4.2, which may be grouped together to produce a strategy targeting the risk driver(s).

Table 4-5: Identified methodologies, programs, and techniques Pacific Power utilizes 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 4-6: Identified methodologies, programs, and techniques Pacific Power utilizes 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 4-7: Identified methodologies, programs, and techniques Pacific Power utilizes 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

While many circuits are included in our reconductoring mitigation efforts (most of which touch or border Tier 3 areas), several circuits may fit the profile for mitigation techniques, including alternatives up to and including reconductoring. Some examples we will discuss below are: 5L97, 8G27, and 5R370.

Circuit examples:
Each example's accompanying screen capture depicts the Arc Energy Risk score overlaid by the zonal Fault per Mile Rate (for previous four plus years). This depiction was chosen for the examples to highlight the correlation of faults and the relative energy involved during the fault, but many renditions could be used. The Arc Energy Risk score is depicted as a scaled step from zero to one ranging from white to dark blue. Zonal Fault per Mile Rates are depicted in steps from zero to two, with the final range being a catch all above two.

- **Circuit 5L97**
  5L97 is a 12.47kV-LL circuit having a large service footprint to the town of Cedarville, CA, but also possessing a westerly tap. The circuits zones of protection generally have a low combined risk score of about 0.5, but the tap extending west out of town has a noticeably higher score of 0.7. Of the scores which factor into the combined score, arc energy, Fosberg intensity, wind gusts, and tree canopy density stand out, all of which score close to 1.0. Additionally, the western portion of the circuit is surrounded by vegetation but serves few customers, most of whom appear to be winter seasonal loads.

  Outage history on this circuit indicate there are fewer outages during the dryer months. Most outages occur during wetter months when ignition probability is at its lowest. The history includes vegetation and equipment related outages.

  Mitigation efforts on 5L97 would involve a circuit-wide assessment but would further focusing on the west tap. Not only is the western tap encompassed by Tier 2, but it also has several outlier overall risk scores. The efforts may consist of:
  - Perform a full circuit coordination for protective devices
  - Replace any legacy protective equipment (relays, reclosers, etc.) to gain coordination capability
  - Installation of additional protective equipment capable of enhanced fault detection
  - Pole protection along roadways
  - Interim (fire season) vegetation patrols

Figure 4.5-15: 5L97 with zonal Faults per Mile Rate overlaid with zonal Arc Energy score



- **Circuit 8G27:**
  8G27 is a single phase 4.16kV-LL circuit served out of PacifiCorp's Hamburg substation. The rural circuit primarily extends west of the substation and is one such example with a median risk score of 0.56. While the circuit is encompassed within Tier 2, it doesn't have as high of a combined risk score comparative to its neighboring circuits or to circuits that fall into a covered conductor level of mitigation. Nor does it have a very high PSPS risk associated to it, as measured by customers impacted should a PSPS be considered. But while its risk is lower compared to other circuits, it still demonstrates combined risk. Of the scores which factor into the combined score, arc energy, tree canopy density, and Fosberg intensity stand out, all being above 0.7.

  Outage history on this circuit indicate there are few outages in general, with most outages occurring during wetter months when ignition probability is at its lowest. It's important to understand the fact this circuit is also underbuild on a 69kV transmission line along a substantial portion of the circuit.

  Mitigation efforts on 8G27 would involve a look at the entirety of the circuit, with special care to focus on the west tap from the substation. The efforts may consist of:
  - Perform a full circuit coordination to ensure protective devices are well coordinated
  - Replace any legacy protective equipment (relays, reclosers, etc.) incapable of sophisticated coordination
  - Installation of additional protective equipment capable of enhanced fault detection, particularly since native soil conditions may limit ability to detect fault conditions
  - Pole protection along roadways
  - Interim vegetation patrols
  - Analysis for covered conductor and/or spacer cable

Figure 4.5-16: 8G27 with zonal Faults per Mile Rate overlaid with zonal Arc Energy score



- **Circuit 5R370:**
  5R370 is a 12.47kV-LL circuit serving customers north of Crescent City, CA to the California-Oregon state border. Most of the circuit is in a non-tier designated area, however the risk score identifies outlier portions or the circuit. Of the scores which factor into the combined score, arc energy, tree canopy density, and ignition risk stand out.

  Outage history on this circuit indicate there are fewer outages during the dryer months, with most involving some form of equipment damage. Most outages occur during wetter months when ignition probability is at its lowest, i.e. Pacific coast storm related. This circuit is exposed to coastal conditions which are prone to adverse equipment contamination and deterioration.

  Mitigation efforts would involve a look at the entire circuit, while focusing on the main line and northern taps. Most of the circuit has a relatively low risk score associated to it. The efforts may consist of:
  - Perform a full circuit coordination to protective devices
  - Replace any legacy protective equipment (relays, reclosers, etc.)
  - Installation of additional protective equipment capable of enhanced fault detection
  - RF/IR/Resistance Detection of Connectors
  - Animal guarding
  - Pole protection along roadways
  - Interim vegetation patrols
  - Analysis for covered conductor and/or spacer cable

Figure 4.5-17: 5R370 with zonal Faults per Mile Rate overlaid with zonal Arc Energy score



4) Prioritization in the Context of PSPS

Using the fire weather risk score the company can also begin to gauge PSPS risk at any given zone of protection or circuit in the context of prioritization. The fire weather risk score incorporates the gust, FFWI and KBDI intensity at any given location and those are the exact variables we use when evaluating the need for a PSPS event. Consequently, the fire weather risk score can be thought of as a frequency (or probability) of weather which necessitates a PSPS event. The second component of the PSPS risk is the number of customers that would be affected by a PSPS event (customer count is calculated programmatically, however AFN and medically vulnerable or critical services are evaluated after the count of customers impacted). Together these two components make up the probability of a PSPS event occurring and the consequence (fire weather score X customers affected) which we denote PSPS risk. Below are two figures which create a circuit prioritization view in the context of PSPS. The x axis on the figures is either the Fire Weather Score or the PSPS risk, the y axis represents the number of customers on the circuit, the size of the point corresponds to the overhead circuit miles, and the color corresponds to the year work covered conductor work is scheduled. Using this view, we can logically identify the circuits that need to be prioritized for reconductoring. Ideally, the company will target circuits that have both a high fire weather score and have many downstream customers connected (top right corner of the figure). We can also identify circuits that either have a low priority (like 5G76 – purple dot top right) that might need to have their priority increased or circuits with a high priority (like 5G69 – red dot bottom right) that might need to have their priority lowered. Leveraging the LRAM model in this manner will allow our subject matter experts to prioritize future covered conductor (and other improvements) a data-driven manner.

Figure 4.5-16: Circuit prioritization view where the Fire Weather Score is on the x-axis, and the Combined Risk Score is on the y-axis, the color corresponds to the prioritization year, and the size to the overhead line miles.

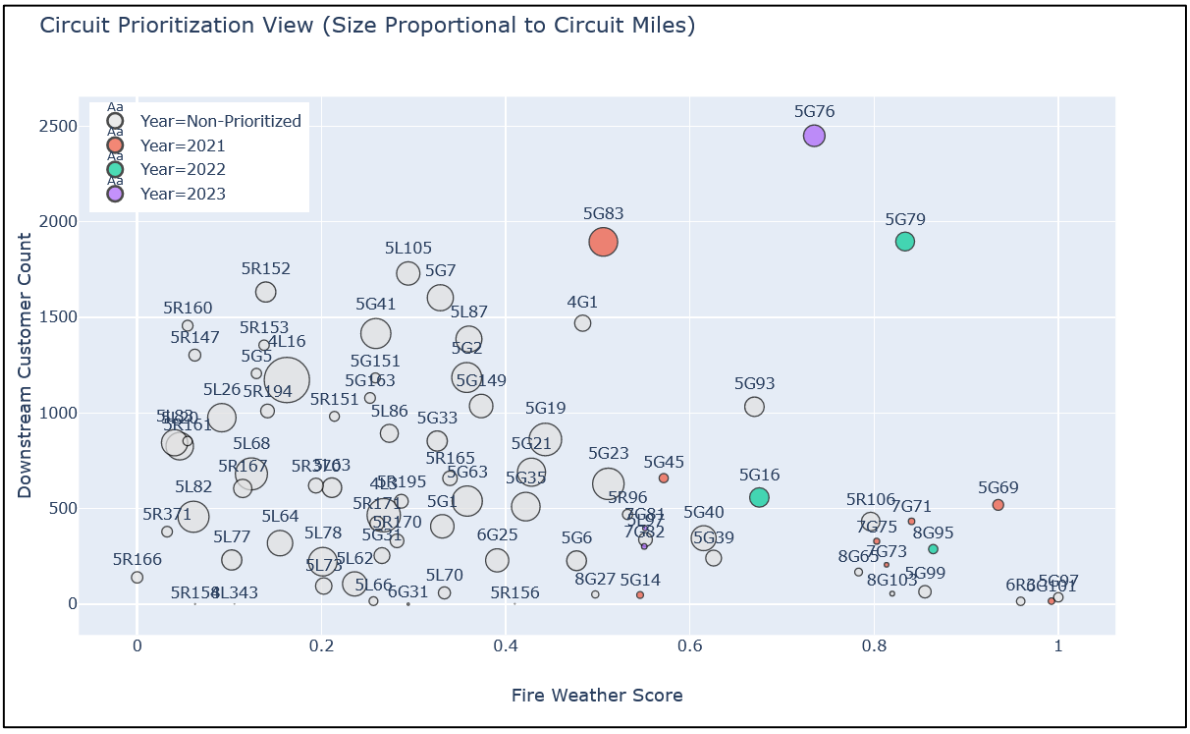
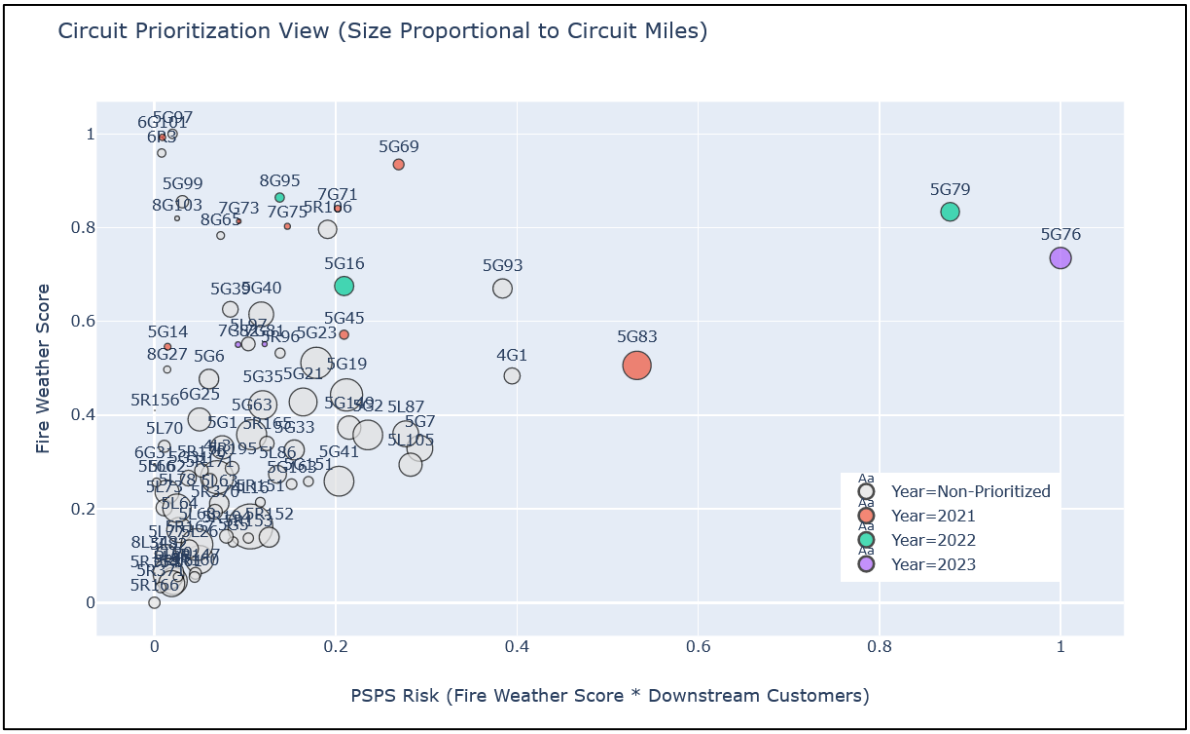


Figure 4.5-19: Circuit prioritization view where the PSPS risk is on the x-axis, and Fire Weather Risk Score is on the y-axis, the color corresponds to the prioritization year, and the size to the overhead line miles.



5) Climate Change and the LRAM Model

PacifiCorp has utilized materials prepared by California's 4th Climate Change Assessment through CalAdapt to assess the impacts of climate change throughout the service territory. A general summary of the climate impacts, historical trends, and future projections are summarized in the table below. The primary metric that is used at PacifiCorp to gauge wildfire risk and the necessity of a PSPS event is KBDI, and it increases based on the lack of rainfall and the increase is more rapid during higher temperatures. If we reference the table, we can see that the temperature is projected to increase with a very high confidence and the drought frequency is also projected to increase with a medium-high confidence. Based on these two macro trends we can confidently say that we expect the KBDI intensity to increase over the long term throughout our service territory. Consequently, if wind intensity stays the same or increases, the risk of utility caused catastrophic wildfires would increase which would lead to more frequent PSPS events.

Now that these macro trends have been considered it is important to dive into the data and analyze these climate trends at a more refined scale. This is accomplished by overlaying circuitry (broken up by zone of protection) over the downscaled projected climate forecasts provided through the CapAdapt website. Now each zone of protection has a climate projection of temperature, precipitation, wind, and rainfall from which we can extract the fire weather indices that we rely on - namely Fosberg and KBDI. This was done for both climate scenarios, RCPs 4.5 and 8.5, and used the HadGEM2-ES, CANESM2, CRNM-CM5, and MIROC5 models which address the largest possible variability in the future climate.

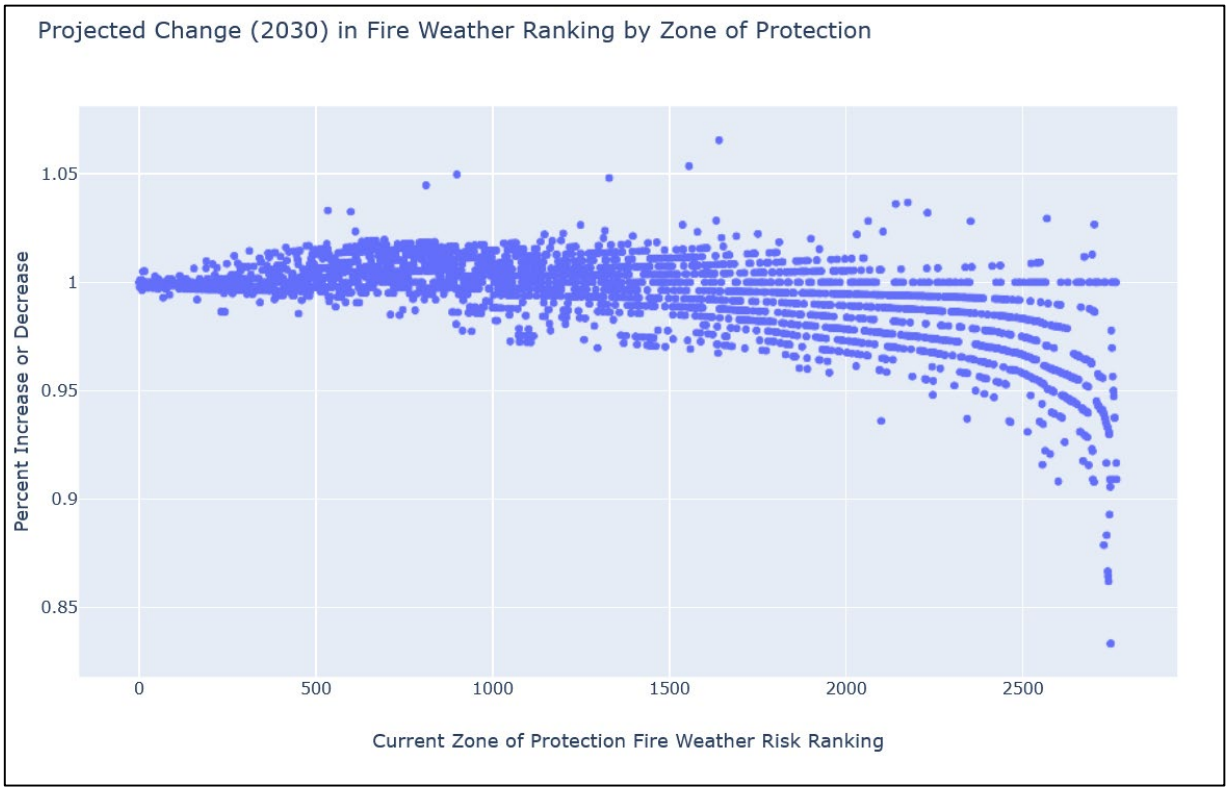
Table 4-8: A qualitative summary of historical and expected future climate trends

CLIMATE IMPACT	HISTORICAL TRENDS	FUTURE DIRECTION OF CHANGE	CONFIDENCE FOR FUTURE CHANGE
Temperature	Warming (last 100+ years)	Warming	Very High
Sea Levels	Rising (last 100+ years)	Rising	Very High
Snowpack	Declining (last 60+ years)	Declining	Very High
Annual Precipitation	No significant trends (last 100+ years)	Unknown	Low
Intensity of heavy precipitation events	No significant trends (last 100 years)	Increasing	Medium-High
Frequency of Drought	No significant trends (last 100+ years)	Increasing	Medium-High
Frequency and intensity of Santa Ana Winds	No significant trends (last 60+ years)	Unknown	Low
Marine Layer Clouds	Some downward trends; mostly not significant (last 60+ years)	Unknown	Low
Acres Burned by Wildfire	Increasing (last 30+ years)	Increasing	Medium-High

For each zone of protection and climate scenario PacifiCorp then took the average of the four models and created an average forecasted KBDI and Fosberg forecast to 2030. Thereafter PacifiCorp performed a linear regression fit to these average fire weather indices between May and October. From the linear regression fit we obtain the slope, grab the fitted intensity in 2020 and 2030, and calculate a percent increase or decrease by 2030 at each zone of protection. At this time the company propagated the percent change of KBDI/Fosberg though the LRAM model to identify how the Fire Weather Risk Score and the Combined Risk Score will be impacted by 2030. Using these forecasted risk scores we can identify zones of protection that are forecasted to cross the identified thresholds from non-tier to Tier 2, or Tier 2 to Tier 3 which in in turn will help inform the company's long term prioritization strategy.

A figure summarizing the projected change to the Fire Weather Risk Score at the zone of protection can be seen summarized below. On the y-axis is the percent change to the Fire Weather Risk Score by 2030 and on the x-axis is the current Fire Weather Risk Score ranking. From this figure one can see that the zones of protection with the lowest Fire Risk Score (right side of figure) are projected to continue decreasing in fire weather. We can also see that the higher risk zones have more variability where some increase and some decrease, and there are actually some zones that increase by as much as 5%. This is PacifiCorp's first pilot into incorporating the CapAdapt climate data, and we expect to integrate it into our long-term wildfire mitigation strategies. This aspect is particularly noteworthy as the company continues the future of mitigation efforts beyond those that were targeted toward Tier 3 and PSPS reduction.

Figure 4.5-20: Current Fire Weather Risk Score ranking for the zone of protection is on the x-axis and the y-axis has the projected change in the Fire Weather Risk Score by 2030.



Assessment of the Effectiveness of Covered Conductor

PacifiCorp was directed to provide an assessment of the effectiveness of covered conductor. It is notable that PacifiCorp has adopted the application of spacer cable which combines covered conductor with structural members retaining the phase conductors. This convention was adopted due to the experience with large limb/tree contacts to which the company's equipment is exposed. The content below explains the company's response explaining its experience with covered conductor, specifically spacer cable, effectiveness.

This effectiveness methodology was developed with the expectation it will be replicated for the primary mitigation measures the company has outlined, including but not limited to advanced protection, small diameter reconductoring, strategic equipment replacement and contact events, including animals, vegetation and vehicular. First, the company identified areas in which spacer cable had been installed. It identified the pre-installation period and compared to post-installation, evaluating the number of outages recorded. This information was factored based upon the percentage of the zone of protection that had been reconductored to gauge the zonal impact for reduced outages. The data was plotted and is shown below.

Figure 4.5-21: Percent improvement in Faults per Mile versus the percentage of covered conductor in a Zone of Protection.

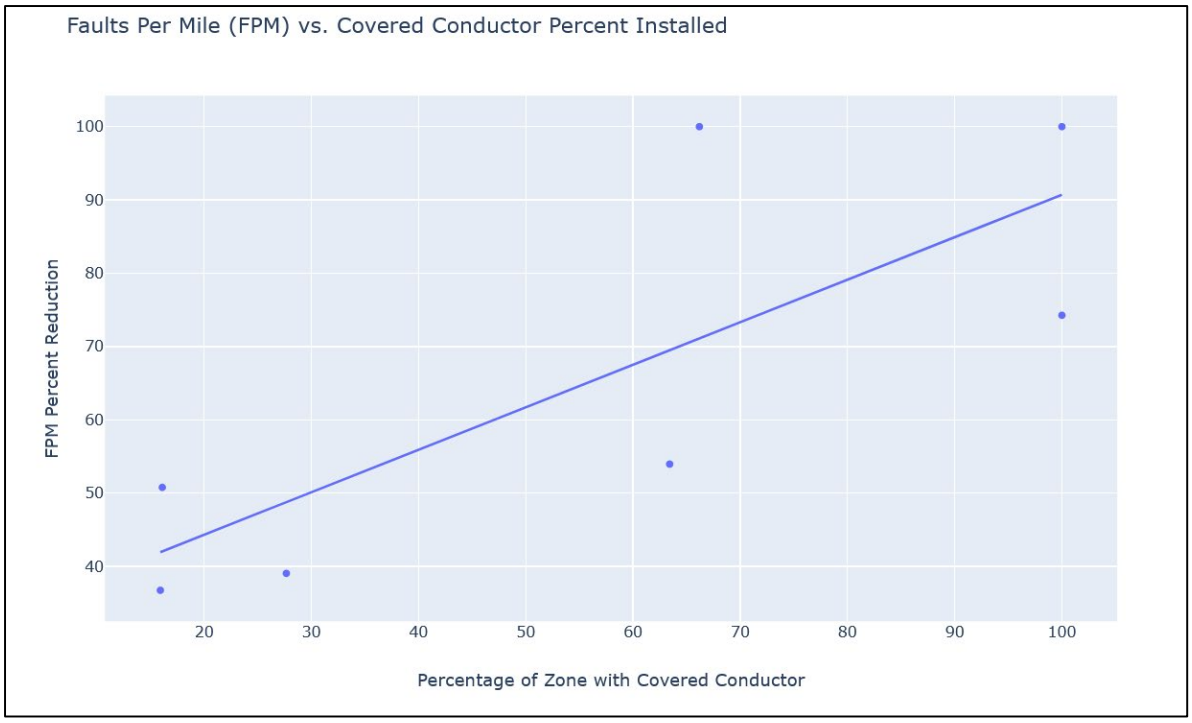
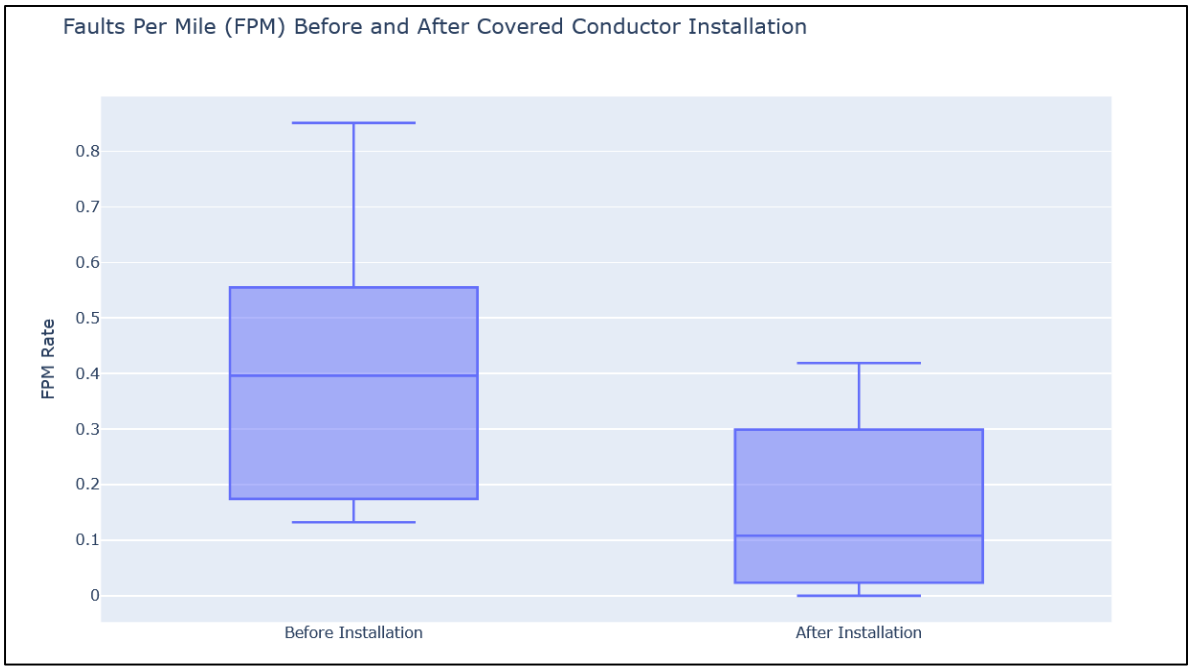


Figure 4.5-22: The reduction in Faults per Mile Rates before and after covered conductor is installed.



One key difference between the legacy projects discussed and these wildfire mitigation projects is the extent to which re-conductoring was performed. Generally, these projects have been more targeted and often haven't involved entire zones of protection.

Thus, we lack the history that is ideal for increased confidence in post-installation outage experience to fully demonstrate how effective our wildfire mitigation covered conductor installations are expected to be. While these results strongly suggest 90% reduction in outages, or risk events, there simply has not been enough time to declare without a doubt the efficacy of the strategy. However, there are two positive signs in the analysis of our reliability focused samples, as well as additional reliability focused projects not included in the sample.

As the company can add more projects, time, and operating experience it expects to improve these estimates, however, in conclusion, the company's analysis gauges the effectiveness of covered conductor/spacer cable to yield approximately 90% reduction in faults. This is a striking improvement and highly beneficial to fire risk avoidance, since outages are risk events with ignition probability. As time progresses and confidence in our outage history grows, we will be able to more confidently narrow and highlight the range of effectiveness. Additionally, as time progresses, we will gain a better understanding of the effectiveness of how covered conductor/spacer cable effectiveness coalesces with or is otherwise complementary to other mitigation measures, for example the use of enhanced fault detection devices or continuous monitoring technologies.

Identification of future elements for inclusion and development of the model
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 position 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.

Further, as it becomes clear the requirements of the SMJUs, the company anticipates integrating categorical risks from assets, as was provided in its 2018 GRC.

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. Utilities must cite all data sources used in calculating the metrics below.

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. Calculated as the number of circuit miles that were under an RFW multiplied by the number of days those miles were under said RFW. Refer to Red Flag Warnings as issued by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings[10]. Detail the steps used to determine if an overhead circuit mile was under a Red Flag Warning, providing an example of how the RFW OH circuit mile days were calculated for a Red Flag Warning that occurred within utility territory over the last five years.*

   First the shapefiles for the Red Flag Warnings (RFW) are obtained from the Iowa State University of Iowa archive of NWS watches and warnings. Next the distribution and transmission assets in California were intersected against Tier 2, Tier 3, Zone 1, and non-High Fire Threat District boundaries. Then, for each RFW and HFTD combination and designation the sum of the line

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

lengths within the affected area were 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.

2. **High Wind Warning overhead circuit mile days**[11]*– Detail the steps used to calculate the annual number of High Wind Warning (HWW) overhead circuit mile days. Calculated as the number of overhead circuit miles that were under an HWW multiplied by the number of days those miles were under said HWW. Refer to High Wind Warnings as issued by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings. Detail the steps used to determine if an overhead circuit mile was under a High Wind Warning, providing an example of how the OH HWW circuit mile days were calculated for a High Wind Warning that occurred within utility territory over the last five years.*

   First the shapefiles for the High Wind Warnings (HWW) are obtained from the Iowa State University of Iowa archive of NWS watches and warnings. Next the distribution and transmission assets in California were intersected against Tier 2, Tier 3, Zone 1, and non- High Fire Threat District boundaries. Then, for each HWW and HFTD combination and designation the sum of the line lengths within the affected area were 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.

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,*[12] *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.*

   PacifiCorp uses two primary methods to establish AFN populations. First, the direct assignment of a customer as a medical baseline customer. In addition, the company identifies customers as medical needs customers who may not qualify for MBL rate status (due to the requirements for specific equipment) but have self-identified. As the company continues to reach out to customers to understand methods to properly support them in the event of a wildfire or PSPS risk, it records the customer as medically-vulnerable in its CSS.

4. ***Wildlife Urban Interface*** *– Detail the steps to calculate the annual number of circuit miles and customers in Wildlife 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)*[13]*.*

[11] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml
[12] Guidance on calculating number of households with limited or no English proficiency can be found in D.20-04-003
[13] Paper can be found here - https://www.fs.fed.us/pnw/pubs/journals/pnw_2005_radeloff001.pdf with the latest WUI map (from 2010) found here - http://silvis.forest.wisc.edu/data/wui-change/

The annual number of circuit miles in the WUI is calculated by intersecting geospatial overlays of OH distribution and transmission circuits against WUI polygons and calculation of total overhead circuit lengths in miles within the WUI. The sources of data used in the calculation of this information include CalFIRE's WUI GIS data layer and PacifiCorp's GIS circuit data.

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):*
    - *Highly rural – In accordance with 38 CFR 17.701, "highly rural" shall 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" shall be defined as census tracts.*
    - *Rural – In accordance with GO 165, "rural" shall 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" shall be defined as census tracts.*
    - *Urban – In accordance with GO 165, "urban" shall 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" shall be defined as census tracts.*

    Population densities were calculated at the census tract level based on ACS 5-year estimates. (The ACS 1-year estimate data is only created for regions with a population of 65,000 or more, well above the populations in PacifiCorp's territory. 5-year estimates are released every year for each census tract and are so named because they are based upon more than one year's survey data.) The census tracts overlapping PacifiCorp territory were then assigned a population density category based upon the provided thresholds of 7 or 1000 persons per square mile. These tract level population calculations were then combined with census tract shapefiles for additional calculations.

4.6 PROGRESS REPORTING ON PAST DEFICIENCIES

Report progress on all deficiencies provided in the 2020 WMP relevant to the utility. This includes deficiencies in Resolution WSD-002.

Response: *Summarize how the utility has responded and addressed the conditions in the table below. Reference documents that serve as part of the utility's response (e.g. submitted in the utility's Remedial Compliance Plan, location in 2021 WMP update, etc.). Note action taken by the WSD for Class A and B deficiencies (e.g. response found sufficient, response found insufficient and further action required, etc.).*

Abbreviations are used for referenced documents as follows:

- PacifiCorp's 2020 Wildfire Mitigation Plan Remedial Compliance Plan, dated July 27, 2020 ("**RCP**")
- PacifiCorp's Quarterly Report on 2020 Wildfire Mitigation Plan for June 12, 2020 through September 9, 2020, dated September 9, 2020 ("**First QR**")
- Wildfire Safety Division Draft Evaluation of PacifiCorp's Remedial Compliance Plan, December 30, 2020 ("**RCP Action Statement**")
- Wildfire Safety Division Draft Evaluation of PacifiCorp's First Quarterly Report, dated January 21, 2021 ("**QR Action Statement**")

Table 4-9: List of utility deficiencies and summary of response, 2020

Deficiency number	Deficiency title	Utility response (brief summary)	Referenced documents	WSD Action
Guidance-1	Lack of risk spend efficiency (RSE) information	PacifiCorp has completed LRAM which affords before-mitigation fire risk and combined risk values; with model now functional the company is in a position to begin to objectively quantify the benefits of specific mitigations at specific locations with estimated improvements in performance, as discussed in 4.5.1.	First QR QR Action Statement	Deemed Insufficient
Guidance-2	Lack of alternative analysis for chosen initiatives	PacifiCorp, in its First QR outlined alternatives analysis. In Section 4.5.1 it further builds upon this alternative approach for mitigation options available at specific locations that will be able to be modeled within the LRAM and thus support ability for location specific mitigations to be modeled.	First QR QR Action Statement	Deemed Sufficient
Guidance-3	Lack of risk modeling to inform decision-making	In Section 4.5 substantial risk analysis is undertaken which is built upon through Section 4.5.1 with details of the company's recently-developed LRAM.	RCP RCP Action Statement	Deemed Insufficient
Guidance-4	Lack of discussion on PSPS impacts	In Section 4.5.1 PacifiCorp demonstrates how it evaluates PSPS to prioritize mitigation efforts; in Section 8 it outlines how the company developed PSPS plans and the countermeasures it employs to notify and minimize customer impacts.	First QR QR Action Statement	Deemed Insufficient
Guidance-5	Aggregation of initiatives into programs	PacifiCorp disaggregated all programs into individual initiatives and included these details in the company's First QR.	First QR QR Action Statement	Deemed Sufficient
Guidance-6	Failure to disaggregate WMP initiatives from standard operations	PacifiCorp provided initiative level detail in the First QR, including the designation of "standard" vs "augmented" for each initiative. The designation "standard" was used to reflect programs with costs already included in a prior rate case that adhere to existing regulation, and "augmented" was used for new programs that exceed regulatory requirements and require supplemental funding.	First QR QR Action Statement	Deemed Sufficient
Guidance-7	Lack of detail on effectiveness of "enhanced" inspection programs	PacifiCorp agreed that "enhanced" inspections are separate from other standard or "routine" inspections contemplated in GO 165 and adopted the term "enhanced" inspection moving forward to reflect the company's IR Transmission Inspection Program. PacifiCorp provided detail regarding these IR inspections and will continue to update in the WMP.	First QR QR Action Statement	Deemed Sufficient

Deficiency number	Deficiency title	Utility response (brief summary)	Referenced documents	WSD Action
Guidance-8	Prevalence of Equivocating Language – failure of commitment	PacifiCorp has avoided using equivocating language in this 2021 WMP Update.	[Class C]	[Class C]
Guidance-9	Insufficient discussion of pilot programs	PacifiCorp provided pilot program detail in the First QR, outlining the progress achieved to date, in addition to anticipated implementation and timing as they become mature.	First QR QR Action Statement	Deemed Sufficient
Guidance-10	Data issues - general	As the reporting of GIS data is expected to be on-going, initial efforts were focused on the development of an architecture and framework to ensure consistent and sustainable delivery of the data. Since the First QR, PacifiCorp made significant progress on the development of a data extraction and translation process to deliver data consistent with the WSD GIS Data Schema Requirements on a quarterly basis and provided 45% of the asset data requested in the company's December 2020 quarterly report. In addition, a significant portion of the requested PSPS Event and Risk Event data was further incorporated in to 2021 WMP. PacifiCorp is adapting the newly created processes to meet the forthcoming structure changes to the GIS Data Schema requirements.	First QR QR Action Statement	Deemed Insufficient
Guidance-11	Lack of detail on plans to address personnel shortages	PacifiCorp does not have a personnel shortage that would frustrate completion of the planned wildfire mitigation activities in its California service territory. (Nor is it forecasting any personnel shortage.) The company is confident that it has adequate current personnel to accomplish the planned mitigation initiative objectives in the WMP, and it will update appropriately if that assessment changes.	First QR QR Action Statement	Deemed Insufficient
Guidance-12	Lack of detail on long-term planning	PacifiCorp outlines its development of a modeling basis upon which it is able to conduct long term fire risk planning, including the integration of a variety of external factors that will enable better long-term planning.	First QR QR Action Statement	Deemed Insufficient
PC-1	PacifiCorp's WMP does not report adequate planning for climate change	PacifiCorp has leveraged work developed through CalAdapt and its newly developed LRAM modeling platform to evaluate climate change within its service territory.	First QR QR Action Statement	Deemed Insufficient
PC-2	PacifiCorp has not demonstrated effective weather	PacifiCorp provided methodology, criteria and coverage of weather stations, which may further inform how weather systems are	First QR QR Action Statement	Deemed Sufficient

Deficiency number	Deficiency title	Utility response (brief summary)	Referenced documents	WSD Action
	station utilization	moving across its service territory. Consistent with Action PC-21, PacifiCorp is supplying additional cost/benefit analysis.		
PC-3	PacifiCorp did not explain how it would track effectiveness of its covered conductor initiative	PacifiCorp explains the method for quantifying current experiences in effectiveness with covered conductor in section 4.5.1.6 which it expects to update as further reconductor projects are completed. The findings show there is a strong positive correlation to the percent of the overhead mileage being converted to covered conductor and the improvement in fault rate per mile of exposure. This positive correlation is illustrated earlier in this document in charts 4.5-23 and 4.5-24 in section 4.5.1.6.	First QR QR Action Statement	Deemed Insufficient
PC-4	PacifiCorp's WMP lacks a QA/QC program for inspections	PacifiCorp does not have a separate wildfire mitigation QA/QC program but does incorporate elements of wildfire mitigation into existing QA/QC programs which include on-site auditing of inspections to ensure all fire risk conditions are identified and classified properly to reflect risk and requirements for correction. As requested, PacifiCorp will begin reporting on the specifics of the company's program, including spend.	First QR QR Action Statement	Deemed Insufficient
PC-5	PacifiCorp's WMP does not report sufficient information on the risk reduction outcomes of its automatic recloser program	PacifiCorp has not yet created a metric to quantify the benefits of automatic recloser replacement program that afford more sophisticated device operation, particularly during periods of elevated fire risk. It intends to emulate its covered conductor effectiveness analysis (in Section 4.5.1) and provide such effectiveness measures for this program and other mitigations in future updates.	[Class C]	[Class C]
PC-6	PacifiCorp does not have a specific data governance wildfire mitigation program	Considerable data is stored in regularly maintained systems, which are used for a variety of functions. It may be technically feasible to translate and extract all data relevant to wildfire mitigation initiatives from these systems into a centralized repository to support WMP efforts; however, a narrowly and precisely defined data structure will reduce flexibility in evaluating alternative correlations within data sets going forward. PacifiCorp's approach is to provide a data governance across existing internal databases that can be queried to provide the desired	First QR QR Action Statement	Deemed Insufficient

Deficiency number	Deficiency title	Utility response (brief summary)	Referenced documents	WSD Action
		data structure as an output without modifying the underlying data storage.		
PC-7	PacifiCorp's stakeholder cooperation and community engagement needs further detail	The company has added to its community outreach as outlined in 7.3.9 and 8.4, including incorporating outreach through its newly created Wildfire Advisory Board, leveraging CBOs, collaborating with SMJUs in assessing community awareness of wildfire mitigations, including PSPS and evaluating additional support for communities and vulnerable populations.	[Class C]	[Class C]

With respect to ongoing deficiencies, where WSD has determined that prior responses were deemed "Insufficient," there are specific "Action" items, as identified in the RCP Action Statement and the QR Action Statement (e.g. "Action PC-1" and so on). The brief summary above summarizes PacifiCorp's response to the referenced deficiency and does not attempt to specifically address each individual action item. Detailed responses to the action items are made throughout this WMP Update, and cross-references to specific section action numbers are provided in Section 2 above.

5 INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WMP

5.1 GOAL OF THE WILDFIRE MITIGATION PLAN

The goal of the Wildfire Mitigation Plan is shared across WSD 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 Access and Functional Needs populations and marginalized communities) of both wildfires and the mitigations employed to reduce them, including PSPS.

In the following sub-sections report utility-specific objectives and program targets towards the WMP goal. No utility response required for section 5.1.

5.2 THE OBJECTIVES OF THE PLAN

Objectives are unique to each utility and reflect the 1, 3, and 10-Year projections of progress towards the WMP goal. Objectives are determined by the portfolio of mitigation strategies proposed in the WMP. The objectives of the plan shall, at a minimum, be consistent with the requirements of California Public Utilities Code §8386(a) –

Each electrical corporation shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.

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

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*

PacifiCorp's 2021 WMP Update builds upon the work performed in 2019 and 2020 to extend the logical approach to mitigating wildfire risk within its service territory. At the heart of this plan is the recognition that a broad range of solutions, in the form of situational awareness, inspection and correction, focused and timely vegetation management, operational acuity and strategic system hardening are required to deliver the best risk managed program to its customers at the best cost. While PacifiCorp began its risk modeling framework behind the large three IOUs in the state it has listened to their pioneering efforts and attempted to cascade these learnings into the model it outlined in Section 4.5. Further, it stands ready to leverage these learnings further throughout its system and the industry, in order to advance broadly this awareness and develop these tools. In the sections below the company outlines its short-term and longer-term vision. Section 7.1 also provides a specific breakdown of WMP initiatives in the requested timeframes of before the next Annual WMP update, within the next 3 years, and within the next 10 years.

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, such as number of trees trimmed, or miles of power lines hardened.

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 and 2020 performance, a numeric target value that is the projected target for end of year 2021 and 2022, 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 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 targeted preventive strategy and program.

In PacifiCorp's 2021 WMP Update it pivots from the prior work done in 2019 and 2020 and incorporates many new aspects as directed by the WSD and other stakeholders. While previously the company was not yet positioned to implement aspects that had been required of the Large IOUs, the company's efforts aligned with the intent behind those requirements, rather than specifically creating the capacity to fully fulfill them. In the 2021 WMP update this approach has shifted and demonstrates its commitment to the substantial efforts articulated by WSD in its Action Statements.

Table 5.43-5-1: List and description of program targets, last 5 years

Program target	2019 performance	2020 performance	Projected target by end of 2021	Projected target by end of 2022	Units	Underlying assumptions	Update frequency	Third-party validation
Weather Station Installations	11	2	22	14	Stations	Targeting high risk/PSPS locations; Potential to expand	Annual	Physical Site Visit
Enhanced Inspections (Transmission IR Inspections)	1,474	866	700	700	Line Miles	Continue annual inspection of all OH transmission lines in the HFTD	Annual	Review of Records
Standard Inspections	3,444	3,542	3,400	3,400	Line Miles	Continue standard inspection programs consistent with regulatory required cycles normalized consistent with Table 1 and 2 metrics	Annual	Review of Records
Installation of Covered Conductor	0	1.4	85.2	52.4	Line Miles	Focus hardening on PSPS locations to reduce risk and the likelihood/ frequency of PSPS events	Annual	Physical Site Visit
Replacement of Cu Conductor	0	0	0	17.3	Line Miles	Replaced as part of the covered conductor program where coincident but tracked separately. Stand-alone projects begin in 2022.	Annual	Review of Records
Installation of System Automation Equipment	10	28	27	3	Projects	Number of projects which may include multiple component and vary in scope	Annual	Physical Site Visit
Proactive Wood Pole Replacement	0	29	128	272	Poles	Pole replacements in 2020-2022 coincide with other hardening work such as installation of covered conductor but are tracked and measured separately.	Annual	Review of Records
Patrol inspections on distribution and transmission (Vegetation	1,170	1,107	1,717	1,717	Line-Miles	Incremental to cycle program work Increased assumption in 2021 to cover fluctuations in underlying cycle program work which changes the volume requiring an incremental inspection.	Annual	Physical Site Visit
Radial Pole Clearing (Component of Fuel Management)	626	2,164	3,047	3,047	Poles	Incremental to regulatory mandated pole clearing (SRA). Full annual cycle assumed starting in 2021.	Annual	Physical Site Visit

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 perform relevant 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 for the 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. Utilities will explain how they are developing more robust outreach and onboarding training programs for new electric workers to identify hazards that could ignite wildfires.*

5.4.1 *TARGET ROLE: VEGETATION INSPECTIONS*

PacifiCorp conducts various types of inspections and/or patrols to identify vegetation maintenance actions to be performed in accordance with the company's Transmission and Distribution Vegetation Management Program Standard Operating Procedures (Vegetation SOP).

Table 5.4-1 presents PacifiCorp worker titles and associated minimum qualifications target roles who conduct work in PacifiCorp's service territory in California.

Table 5.54-2-1: 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 Forester and Utility Forester positions are required to be International Society of Arboriculture (ISA) Certified Arborists with specialty certification as Utility Specialists. Both Senior Utility and Utility foresters are required to perform post-work audits against PacifiCorp's program standards (e.g. conductor to line clearance specifications) for work conducted along distribution

rights-of-way, investigate vegetation-related outages, and identify work required and review work conducted along transmission rights-of-way.

Table 5.4-2 presents contractor worker titles and associated minimum qualifications target roles who conduct work in PacifiCorp's service territory in California.

Table 5.54-2-2: 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 employs contractors to assist with implementing the vegetation management program, including pre-listers and general forepersons.

Pre-listers conduct patrols and/or inspections to identify vegetation work needed in accordance with PacifiCorp's program standards and conduct post-audit inspections. Minimum qualification is to have a current ISA Arborist certification or the ability to obtain within 6 months of hire date.

General Forepersons are considered front line mangers of the independent contractors retained by PacifiCorp and are required at a minimum to be ISA Certified Arborists with specialty certification as Utility Specialists.

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

PacifiCorp strives for continuous improvement. Senior Utility Foresters and Utility Foresters are encouraged to obtain ISA Board Certified Master Arborist credentials, tree risk assessment certifications, participate in arboriculture-related seminars/conferences and complete other related certifications from accredited education institutions. PacifiCorp Senior Utility Foresters and Utility Foresters provide training, hold regular performance-related discussions with pre-listers and other contractor-filled positions to review expectations and job requirements to identify areas for improvement and ensure consistency in execution of duties, and review post-audit findings. PacifiCorp works with contract positions that do not currently have ISA certifications, to obtain these certifications and will continue to require these certifications.

PacifiCorp also provides environmental awareness training to both company employees and contractor positions to minimize potential for negative impacts to sensitive environments and increase general understanding of environmental considerations.

5.4.2 *TARGET ROLE: VEGETATION MANAGEMENT PROJECTS*[14]

PacifiCorp seeks to collaborate with communities and agencies to partner in the implementation of projects with defined scopes to promote wildfire resiliency, such as 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 is applicable.

5.4.3 *TARGET ROLE: ASSET INSPECTIONS*

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

Field Inspection Specialist within the Field Inspection Support group inspect, evaluate and document inspection data and information on overhead (distribution, transmission, communications, municipality and private-ownership) and underground facilities. Inspection activities 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, visual/safety inspections. An individual in this position is familiar with the National Electric Safety Code and PacifiCorp Construction Standards and apply this knowledge to recommend appropriate corrective actions. Collection of data will require the use of measuring sticks and wheels, binoculars, and handheld electronic devices. An Inspection Specialist is proficient in the use of maps, data sheets, work requests and engineered drawings.

Field Inspector: In addition to the Field Inspection Specialist position, Pacific Power contracts inspectors to perform either Visual Assurance or full Detailed inspections including pole testing as determined by cycle requirements. These inspectors are trained to identify all code compliance conditions (NESC and GO95). The condition inspection process is comprehensive without regard to the type of risk (public safety, worker safety, reliability, fire threat, etc.).

<u>Plans to improve qualifications of workers relevant to wildfire and PSPS mitigation</u>

As part of the annual training for the Field Inspection Support group any changes or focus areas related to the wildfire mitigation plan efforts will be documented and incorporated into the ongoing training to ensure all inspectors are aware of possible new equipment and the related construction standards. Additional elements of this annual training, which include a focus on wildfire mitigation and continuous improvement, are included in 7.3.4.14

[14] PacifiCorp interprets Vegetation Management Projects as referring to components of program vegetation maintenance activities or projects with a specific scope and duration.

5.4.4 *TARGET ROLE: GRID HARDENING*

PacifiCorp's grid hardening initiatives generally involve the retrofitting of existing overhead lines and substation components with more fire resilient materials, including covered conductor, fiberglass poles, relays/reclosers, and advanced communication devices. Once installed, PacifiCorp employees and contractors are required to work on and around these new devices as either part of planned maintenance and inspections or emergency response efforts. The details below reflect information regarding front line workers that will maintain or repair equipment associated with the Grid Hardening program target.

Worker Titles	Minimum Qualifications relevant to 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 poles and wires and respond to emergency outages or PSPS events. Responsible for performing construction and maintenance work on overhead and underground facilities. Pacific Power Journeyman linemen are qualified electrical workers and must have: (1) working experience as a lineman or (2) and graduated from a sanctioned apprenticeship program and must also have successfully passed a pre-hire physical assessment. Skills and abilities required by this job are of a level normally acquired by completion of job-related high school courses and the apprenticeship program for Lineman.

Highline Transmission Patrolman are journeyman lineman that are responsible for patrolling, inspecting and ensuring assigned transmission lines are properly maintained. Pacific Power highline patrolmen have knowledge of: (1) equipment, tools, techniques, and methods employed 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 of a level comparable with those normally 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 provided and trained in the use of detection equipment that locates static or voltage leakage used during visual inspection patrols of assigned transmission lines.

Meter Relay Technicians perform routine maintenance of protection and control devices and advise on operation during emergency response. Meter relay techs have a working knowledge of Company substation protection and control schemes. As assigned, installs, maintains, adjusts, tests, troubleshoots and repairs substation protection and control equipment which includes but is not limited to apparatus, meters, relays, controls and remote control equipment.

<u>Plans to improve qualifications of workers relevant to wildfire and PSPS mitigation</u>

Beginning in 2019, PacifiCorp's training program included, as a component, annual training to review operating practices that reduce wildfire risk while performing routine work and confirming the availability

of fire mitigation / suppression tools before fire season. This refresher training has continued into 2020 and 2021 and has been successful to raise awareness of PSPS events, wildfire risk, and how procedures must change to adapt to that risk.

While effective, this training has been procedural and the full incorporation of Grid Hardening into the company's formal training program is an area planned for improvement. Specifically, this improvement will aim to enhance existing programs to ensure workers are properly trained to work around materials such as covered conductor, fiberglass poles, and advanced protection and control devices. PacifiCorp is also constructing a training yard in Bend, Oregon (to be completed in 2021) where consistent standard training is provided to employees to aid in the onboarding training programs for new employees; including training specific to the identification of hazards that could ignite wildfires.

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. PacifiCorp has developed a series of operational triggers which serve as "watchlist" items for which operational team members are notified of the need for a specific follow-up action. This tool, titled FIRE (frequent interrupters requiring evaluation) notifies employees on the following business day that an investigation needs to be completed. These thresholds can be modified based on a variety of parameters for which the company can modulate the triggers, i.e. vegetation outages are notified to foresters the day after a tree caused outage is completed. The company is evaluating whether additional investigative processes should be implemented to ensure that all relevant investigations are completed.

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 2020 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 THE PROGRESS METRICS, LAST 5 YEARS[15]

Table 1: Recent performance on progress metrics last 5 years – reference only, fill out attached spreadsheet to correct prior reports

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

Table 1 includes PacifiCorp's recent performance on progress metrics over the last 5 years. PacifiCorp implemented its HFTD mapping as well as fire threat condition programs in 2019. Therefore, grid condition findings per HFTD were available in 2019 and 2020. PacifiCorp has included the number of grid condition findings for 2015-2018 assuming that the HFTD zones are equivalent to those in 2019/2020. Additionally, PacifiCorp plans, tracks, and reports inspections and corrections per facility point[16] as opposed to per line mile. However, equivalent inspection miles were extrapolated in years 2015-2020 assuming little to no changes in grid topology. While these values reflect best estimates or equivalent line-miles, slight difference may exist when comparing to other data sets.

When an inspector completes an inspection of a facility, the inspection includes all assets at that facility location, as well as any applicable and adjacent line miles. This method allows PacifiCorp to level load resources and distribute work as evenly as practical across each year where appropriate. While a strong correlation can be made between number of facilities and line-miles when discussing inspections, it is expected that the number of equivalent line-miles inspected in any given year will vary, often significantly, as the number of facilities to be inspected vary each year and not all spans are the same length across the entire system. To meet the needs for Table 1, equivalent line miles were extrapolated from PacifiCorp's inspection records and should be viewed as generally reflective of the scope of work completed.

Additionally, as is expected with multi-year inspection programs, the actual topology and system inspected will significantly change from year to year, to include variations in voltage, type of installation, span length, geographic location, and environmental conditions. Therefore, PacifiCorp cautions against drawing conclusions regarding annual trends when reviewing inspection and correction metrics as

[15] Table references are to 2021 WMP Update Attachment 1 (Tables 1-12) - 2021 Performance Metrics Data Templates (Excel).

[16] "Facilities" refers to a location where PacifiCorp has one or more assets installed. Usually, this would mean a pole or structure but could also be pad-mounted switchgear, a substation, or a switching station. These facilities were included in the GIS data requested in Section 6.8.

included in the document. Instead, PacifiCorp recommends using the full data set provided to calculate qualitative multi-year averages, identify the relative range of values that can be expected, and understand qualitative relative order of magnitude for comparison to other utilities.

Furthermore, the evolution of PacifiCorp's electronic database requires extrapolation when determining condition findings per inspection type. However, PacifiCorp's programmatic inspection results were generally extrapolated and categorized as either "Detailed" or "Safety" inspection results. "Other" inspection types might include the results of internal audits or administrative changes.

Table 1 also presents PacifiCorp's 2020 performance metrics regarding vegetation clearance findings. PacifiCorp currently does not track number of spans with non-compliant conditions, but rather identifies areas where vegetation management actions are needed in order to maintain clearances as identified in PacifiCorp's Vegetation Management Transmission and Distribution Standard Operating Procedures. As such, the number of trees pruned per mile is presented, indicating number of trees identified to be prune per mile in order to maintain clearances as indicated in PacifiCorp's standards/specifications. Totals presented in Table 1 for metric 2.a are for distribution lines and include prunes conducted on cycle, interim, and patrols prior to height of fire season. Totals for metric 2.b are also for distribution lines and include prunes conducted on distribution lines within HFTD as a result of patrols prior to the height of the fire season.

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

Table 2: Recent performance on outcome metrics, last 5 years – reference only, fill out attached spreadsheet to correct prior reports

In the attached spreadsheet document, report performance on the following metrics within the utility's service territory over the past five years as needed to correct previously-reported data. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in "Comments" column.

Provide a list of all types of findings and number of findings per type, in total and in number of findings per circuit mile.

Table 2 includes PacifiCorp's recent performance on outcome metrics over the last 5 years.[17] As PacifiCorp's WMP and associated programs were developed in 2019, all data reported before 2019 represents the company's interpretation of historic data in light of current programs, risk mapping, and circuit topography.

As included in the following tables, PacifiCorp interprets a fire threat (risk) condition (table 2; metric 1.a) to be a discovered finding that could be interpreted to reflect an increased probability of ignitions; in

[17] The cause and origin of the Slater Fire remains under investigation. Accordingly, statistics related to the Slater Fire, which may or may not involve PacifiCorp electrical facilities, are not currently included in Table 2. If the Slater Fire is eventually determined to be a utility-ignited wildfire, PacifiCorp will update the 2020 figures in Table 2 in future data submissions.

company standards this attribute is designated as a Fire Risk Condition and is one which based on the inspection guidelines could be expected to pose a future fire risk if not corrected in a timely fashion.

As included in PacifiCorp's 2019 WMP[18] and further contemplated in the company's Data Collection for WMPs Report[19], PacifiCorp concluded that a circumstance where the potential exists for a fault creating a spark, which could result in the ignition of a fire if it lands in an adequate fuel bed, is considered a potential electric utility ignition event based on both the company's review of primary causes of fires in California and available CALFIRE data sets. PacifiCorp's outage records, which document the frequency, duration, and cause of outages experienced on energized circuits, represent the most accurate depiction of how often these potential ignitions may have occurred within the company's service territory. These records were applied using the methodology outlined in Figure 4.2-2: PacifiCorp's process to map ignition drivers to outage causes.

Since the approval of PacifiCorp's 2019 WMP, the company has developed additional data collection processes consistent with conditions of the approval, including the establishment of a Fire Incident Data Reporting process and wires down events, PacifiCorp has improved its data collection methods. These efforts have likely resulted in identifying more events that could be categorized as "fires potentially involving utility equipment" or "wires down," causing an increase event counts prior to its development in 2019. Prior years' data was reliant on interpretation of comments contained generally in outage records and was likely not a comprehensive listing of the more minor occurrences; noteworthy occurrences were captured through other company processes, such as claims management procedures.

As discussed above, when reviewing this data, as well as any other data included in this plan, it is critical to understand that PacifiCorp identifies, tracks, and reports inspection based on facilities[20] as opposed to line miles. Additionally, as discussed in Section 6.1, PacifiCorp cautions against drawing conclusions regarding annual trends when reviewing inspection and correction metrics as included in the document. Instead, PacifiCorp recommends using the full data set provided to calculate qualitative multi-year averages, identify the relative range of values that can be expected, and understand qualitative relative order of magnitude for comparison to other utilities.

6.3 Description of Additional Metrics

Table 3: List and description of additional metrics, last 5 years – reference only, fill out attached spreadsheet to correct prior reports

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

[18] See Section III.D.2 at page 24 of the Initial 2019 WMP of PacifiCorp filed 2/6/2019 pursuant to Senate Bill 901, Rulemaking (R.)18-10-007.
[19] See PacifiCorp (U 901 E) Data Collection for Wildfire Mitigation Plans Report filed 7/30/19 pursuant to Senate Bill 901, and the California Public Utilities Commission Rulemaking (R.)18-10-007, Decision (D.)19-05-036.
[20] "Facilities" refers to a location where PacifiCorp has one or more assets installed. Usually, this would mean a pole or structure but could also be pad-mounted switchgear, a substation, or a switching station. These facilities are included in the GIS data requested in Section 2.7.

Provide a list of all types of findings and number of findings per type, in total and in number of findings per circuit mile.

In 2019, PacifiCorp proposed the addition of a series of metrics that were aligned to performance such that, as time passed, the metric results could be reasonably correlated to actions taken by the company in the execution of its WMP. Some of these additional metrics were included as part of the Standard Data Request, while others are more significantly different, but are reasonably correlated to better wildfire resilience of the utility equipment.

As noted in previous filings, PacifiCorp will make data available upon request to pertinent entities or individuals, such as universities or researchers including for validation purposes. PacifiCorp also includes progress reports regarding any WMP programs or initiatives on the company's public website. PacifiCorp viewed participation in regulatory proceedings, discovery requests, and workshops as opportunity to present data, engage third parties, solicit feedback, and, where appropriate, seek validation or make necessary changes to any program or initiative. This general approach has been applied to all metrics or data sets.

6.4 DETAILED INFORMATION SUPPORTING OUTCOME METRICS

Table 4: Fatalities due to utility wildfire mitigation initiatives, last 5 years – reference only, fill out attached spreadsheet to correct prior reports

Instructions for Table 4: *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 five 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.*

There are no fatalities associated with utility wildfire mitigation initiatives over the prior five years, as shown in Table 4.

Table 5: OSHA-reportable injuries due to utility wildfire mitigation initiatives, last 5 years – reference only, fill out attached spreadsheet to correct prior reports

Instructions for Table 5: *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 five 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) shall be included, even if those incidents are not reported to OSHA due to the identity of the victims.*

For OSHA-reportable injuries caused by 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.

PacifiCorp tracks all safety statistics including, but not limited to, accidental deaths, OSHA-reportable, or near misses. While the use of the term reportable OSHA events slightly mischaracterizes the information the company may have available to report upon such metrics the company has attempted to comply with the intent behind the data requested and provided it consistent with its understanding of such a classification. (Because PacifiCorp is early in its WMP implementation, certain historic safety statistics should not be misconstrued; specifically, wildfire mitigation initiatives, as currently defined, were not in place prior to 2019, and so OSHA reporting data from such period could appear understated.).

6.5 Mapping Recent, Modelled, and Baseline Conditions

Underlying data for recent conditions (over the last five years) of the utility service territory in a downloadable shapefile GIS format, following the schema provided in the spatial reporting schema attachment. All data is reported quarterly, this is a placeholder for quarterly spatial data.

Both confidential and non-confidential geodatabases are being submitted through the CPUC's Kiteworks system.

Further, PacifiCorp appreciates the willingness of the WSD to consider some of the logistical challenges it has worked through to provide GIS data. Since the company's last quarterly report filed on December 10, 2020, PacifiCorp has been working to make progress in its delivery of data consistent with the WSD GIS Data Schema requirements published by the WSD on February 4, 2021. Submission of PacifiCorp's data consistent with these specific requirements is expected to be on-going and requires a substantial amount of data extraction and translation to achieve. Therefore, much of PacifiCorp's initial efforts prior to the September 2020 update centered around the development of an architecture and framework to ensure consistent and sustainable delivery of the data as part of these on-going requirements. During the fourth quarter of 2020, PacifiCorp then focused on extracting and translating data currently available in GIS format to the new WMP data schema using this architecture and framework and, as a result, was able to deliver approximately 45% of the asset data in the requested format in the company's' December 2020 update consistent with other utilities who also delivered data in 2020. As indicated in the December 2020 update, PacifiCorp planned to move toward more complex datasets not currently in GIS format and, while the company anticipated making progress, cautioned that this progress could be slow and iterative.

PacifiCorp was able to meet some of these growth targets, namely in the areas of PSPS Event and Risk Event data sets by providing approximately 50% of the requested data in these respective focus areas. However, with the release of the updated GIS Data Schema requirements on February 2, 2021, PacifiCorp redirected some efforts to restructure existing processes to accommodate these new requirements and deferred the total planned growth of the data set until the May 2021 quarterly report. At the advice of the WSD, PacifiCorp's March 2020 quarterly update includes the GIS data previously submitted in December of 2020 augmented with the additional PSPS and Risk Event data consistent with the 2020 GIS Data Schema Requirements. Additionally, consistent with the Wildfire Safety Division (WSD) Geographic Information System (GIS) Data Reporting Requirements and Schema for California Electrical Corporations, PacifiCorp has prepared its WSD GIS Data Schema Report, which is provided as Attachment 2-2021 Utility GIS Data: WSD GIS Data Schema Status Report – March 2021.

PacifiCorp now plans to move toward more complex datasets, such as further evaluation of risk event, PSPS event data as well as initiative data such as inspections not currently in GIS format and, while the company anticipates making progress, cautions that this progress could be slow and iterative. Where significant effort and dedicated resources are required to develop and implement further data extraction and translation, PacifiCorp anticipates additional dialogue with the WSD regarding how compliance can be accomplished in the most efficient manner. Along the same lines, efforts focused to inventory assets or compile additional data will follow.

6.6 RECENT WEATHER PATTERNS, LAST 5 YEARS

Table 6: Weather patterns, last 5 years – reference only, fill out attached spreadsheet to correct prior reports

Instructions for Table 6: *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.*

Table 6 provides a five-year history, where applicable, of weather patterns as defined by the Guidelines. The shapefiles for the Red Flag Warnings (RFW) and High Wind Warnings (HWW) are obtained from the Iowa State University archive of NWS watches and warnings. The RFW circuit-mile days are based on all overhead distribution and transmission circuits that traverse through the NWS FWZ between 2015 and 2020. The overhead lengths of distribution and transmission circuits are calculated within each FWZ polygon (area divided geospatially into over approximately 1,000 space areas). All circuit lengths within that FWZ polygon are then multiplied by the number of days (or fraction of days) that a particular polygon had an RFW in effect.

The Guidelines require that PacifiCorp use RFW circuit mile days to normalize data required in other tables. PacifiCorp recommends the WSD consider using alternate methods to normalize. The company believes the year-to-year comparison with RFW circuit mile days as the normalizing method demonstrates the concern for this metric as a normalizing method. Several other utilities have suggested the use of the NFDRS, which all fire agencies use to determine daily fire danger risk, instead of RFW data. NFDRS is a system that allows fire managers to estimate today's or tomorrow's fire danger for a given area, and the fire danger ratings describe conditions that reflect the potential, over a large area, for a fire to ignite, spread, and require suppression action. PacifiCorp recommends that an assessment of state-wide normalizing methods be conducted in an objective and results-oriented manner to ensure accurate calibration for the expression of the risks over time. It would actively participate and stress test any potential normalizing metric to ensure its climatic risks comport with results in other parts of the state.

6.7 RECENT AND PROJECTED DRIVERS OF IGNITION PROBABILITY

Table 7.1: Key recent and projected drivers of ignition probability, last 5 years and projections – reference only, fill out attached spreadsheet to correct prior reports

In the attached spreadsheet document, report recent drivers of ignition probability 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 five 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 2020 ignition data compiled by the WMP deadline shall indicate in the 2020 columns that said information is incomplete.

Table 7.1 provides a five-year history of risk events as defined by the Guidelines, using the cause category. PacifiCorp's outage records, which document the frequency, duration, and cause of outages experienced on energized circuits, represent the most accurate depiction of how often these potential ignitions may have occurred within the company's service territory. These records were applied using the methodology outlined in Figure 4.2-2: PacifiCorp's process to map ignition drivers to outage causes.

Since the approval of PacifiCorp's 2019 WMP, the company has developed additional data collection processes consistent with conditions of the approval, including the establishment of a Fire Incident Data Reporting process and wires down events, PacifiCorp has improved its data collection methods. These efforts have likely resulted in identifying more events that could be categorized as "fires potentially involving utility equipment" or "wires down", causing an increase event counts prior to its development in 2019. Prior years' data was reliant on interpretation of comments contained generally in outage records and was likely not a comprehensive listing of the more minor occurrences; noteworthy occurrences were captured through other company processes, such as claims management procedures.

In addition, the company differentiated this history via its designation of fire season and not fire season in supplemental Tables 7.1-fire season and 7.1 not fire season. It extrapolated future risk events based upon the trends it calculated, recognizing that until 2022 is compete, limited asset hardening will have taken place. The outage rates were forecasted out to 2022 using the historical average outage rates grouped by cause category and fiscal quarter over the previous five years. This is a rather conservative estimate which assumes a persistence of trends from historic outage rates. As we continue to complete and leverage our wildfire mitigation improvements, programs, and technologies, we contend the outage frequency will continue its downward trend. In certain areas the improving trends could be accelerated based on the findings on effectiveness of covered conductor in subsection 4.5.3.

Table 7.2: Key recent and projected drivers of ignition probability by HFTD status, last 5 years and projections – reference only, fill out attached spreadsheet to correct prior reports

Table 7.2 provides a five-year history of ignition events as defined by the Guidelines and company methodology described for table 7.1. The ignition history dataset is sparse, with over 70% of the data coming from years 2019 and 2020. This limited data set inhibits our forecasting of future ignition rates, and will take time to build confidence in our forecast. As a result, the projections for the future ignitions are left at zero as at this moment we are unable to asses any statistically defendable ignition frequency. Going forward we plan on performing correlation studies between gridded climate reanalysis data with ignition events, so that we may begin investigating the relationship between the two.

6.8 Baseline State of Equipment and Wildfire and PSPS Event Risk Reduction Rlans

6.8.1 Current Baseline State of Service Territory and Utility Equipment

Table 8: State of service territory and utility equipment – reference only, fill out attached spreadsheet to correct prior reports

Instructions for Table 8*: 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.

The baseline status of service territory and utility equipment was included in Table 8. The 2019 data provided in Table 8 mirrors Table 13 of the company's 2020 WMP. The 2020 data reflects a refresh to the 2019 data submitted in the 2020 WMP. Pre-2019 data was not able to be populated as this data pre-dates the requirement. However, for the purposes of this filing, 2019 values assumed to reflect the pre-2019 years. No substantial changes to the company's overall topology occurred during that time period. To ensure a complete data set could be provided, the 2019 values were submitted for all years 2015-2018

6.8.2 Additions, Removal, and Upgrade of Utility Equipment By End of 3-Year Plan Term

Table 9: Location of actual and planned utility equipment additions or removal year over year – reference only, fill out attached spreadsheet to correct prior reports

Instructions for Table 9: *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 were 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".*

Planned projects at the distribution level (4 kV to 34.5 kV) are derived from the regional distribution studies conducted approximately every five years as well as a complementary reliability analysis. These distribution studies include a review of historical system loading, an evaluation of projected systematic growth over a five year period, and a determination of the required system improvements to accommodate the projected load. Specific distribution system improvements may also be identified as required in customer requested system impact studies of large new load and large new generation facilities. There is one new substation being constructed in the HFTD (Tier 2) in 2022 that will utilize the

latest wildfire mitigation construction standards where applicable.

Local transmission follows a similar approach to that of distribution. Planned projects at the sub-transmission level (69 to 115 kV) are derived from the regional transmission studies conducted every three to five years, which project five years of systemic load growth and describe the consequentially required transmission system improvements in detail as well as discuss the general direction proposed for longer term transmission improvement plans. Similar to distribution projects, specific transmission system improvements may also be identified as required in customer requested system impact studies of large new load and large new generation facilities.

At the main grid transmission level (115 kV and above) planned projects are primarily derived from the transmission planning assessments performed every year in accordance with the North American Electric Reliability Corporation (NERC) Standard TPL-001-4 and Western Electricity Coordinating Council (WECC) Criterion TPL-001-WECC-CRT-3.1. This assessment is comprised of the steady-state, transient stability and short circuit studies that evaluate the performance of the Bulk Electric System over a wide range of system conditions throughout the 10-year planning horizon. When the analysis identifies an inability of the system to meet the required level of performance, a corrective action plan is developed to identify transmission system improvements necessary to resolve the identified system deficiencies and ensure compliance with NERC and WECC reliability standards.

As a result of these studies, one new transmission substation with corresponding overhead interconnection is planned for 2022 located within Tier II, non-WUI, rural area. The approximately 0.9 mile overhead interconnection is also located within a rural Tier II area but is split between the WUI and non-WUI areas. This project and corresponding breakdown were included in Table 9.

Table 10: Location of actual and planned utility infrastructure upgrades year over year – reference only, fill out attached spreadsheet to correct prior reports

Instructions for Table 10: *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.

Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.

Table 10 includes the locations of planned utility infrastructure upgrades consistent with the grid hardening initiatives included in Section 7.3.3 and the table requirements. In the company's 2020 WMP, specific details were not available beyond the 2020 as the full scope of the three-year WMP had yet to be completed. However, detailed and location specific plans have now been included for years 2020-2022 where 2020 reflects actuals and 2021-2022 reflect planned upgrades. This data maps back to grid design and system hardening programs such as the installation of covered conductor, replacement of small

diameter copper conductor, installation of weather stations, and installation of system automation to facilitate advanced protection and control schemes.

As evident in the data, a significant portion of the company's hardening efforts focus on locations that fall within Tier II, Tier III, and the WUI consistent with the company's risk assessment and prioritization. As the company's risk model evolves, PacifiCorp anticipates slight changes and prioritization to grid hardening efforts could impact location specific activity planned in late 2021 and throughout 2022. However, the company does not anticipate significant changes to the overall scope through this period. The company notes, however, that its mitigation efforts may be more extensive than originally proposed, because updated risk modeling indicates that expansion of geographic areas with the potential for PSPS is justified. Consequently, additional grid design and system hardening mitigation efforts are also justified to help reduce risk in those areas and reduce the potential of PSPS in such areas.

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 report:

1. *By June 1 of current year*
2. *By Sept 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 shall:

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

b) *Include a summary of what major investments and implementation of wildfire mitigation initiatives achieved over the past year, any lessons learned, any changed circumstances for the 2020 WMP term (i.e.,2020-2022), and any corresponding adjustment in priorities for the upcoming plan term. Organize summaries of initiatives by the wildfire mitigation categories listed in Section 7.3.*

c) *List and describe all challenges associated with limited resources and how these challenges are expectedto evolve over the next 3 years.*

d) *Outline how the utility expects new technologies and innovations to impact the utility's strategy and implementation approach over the next 3 years, including the utility's program for integrating new technologies into the utility's grid. Include utility research listed above in Section 4.4.*

The following subsections include PacifiCorp's organization-wide wildfire mitigation strategy and goals for each of the following time periods.

7.1.1 BY JUNE 1 OF CURRENT YEAR

Situational Awareness and forecasting

- Ensure PacifiCorp's full weather station fleet is fully functional and integrated to promote the best situational awareness for the upcoming fire season
    - Complete calibration and integration of existing 12 weather stations;
    - Complete installation with calibration of an additional 9 new weather stations (2 RAWS and 7 microstations);
- Perform verification and validation of forecast vs actual fire weather data from 2020 to improve forwarding looking forecast;

Grid Design and system hardening

- Re-prioritize programs needed before the next fire season and annual update based on the evolution of risk modelling to ensure inclusion in the CY2022-2023 execution plan;

- Continued deployment of an RF network where appropriate to facilitate remote implementation of fire season settings on newly installed field reclosers;
- Complete the installation and commissioning of 16 system automation devices with advanced protection and control capabilities;
- Complete the installation and commissioning of advanced protection pilot at Weed substation (circuits 5G45 and 5G83) with mirrored bits (transfer/trip) protective coordination;

Asset management and inspections:

- Complete the CY2021 planned inspections within the HFTD;
- Complete transmission line IR inspections scheduled in Q2 targeting peak loading or near peak leading conditions;

Vegetation management and inspections:

- Complete incremental Tier III visual vegetation inspections within the HFTD;
- Continue piloting new electronic planning, mapping, and record keeping system regarding vegetation management within the HFTD;

Grid operations and protocols:

- Review existing operating protocols and ensure preparedness for 2021 fire season;
- Develop a plan to evaluate the impacts of newly installed alarm based high impedance fault detection during an entire fire season, with the intent leverage new data analytics and inform operating procedures and protocols;

Stakeholder cooperation and community engagement

- Improve 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;

7.1.2 By September 1 of Current Year

PacifiCorp's wildfire mitigation strategy and goals to be accomplished before September 1 of the current year include:

Situational Awareness and forecasting:

- Collaborate with USFS and NFIS regarding value of additional RAWS stations to complement utility and fire professionals' situational awareness;
- Complete installation of additional 11 weather stations to meet the combined program target of 20 installations in 2021;
- Substantially advance the company's capabilities with regard to risk modelling and inform prioritization of work in 2022-2023;

Grid Design and system hardening:

- Plan corrective work identified through the pole loading infrastructure hardening program;

- Construct and commission 11 additional transmission and distribution system automation devices to meet the program target of 27 in 2021;
- Complete initial construction of an additional 8 transmission and distribution system automation devices for commissioning in early 2022;
- Nearing completion of approximately 81 miles of covered conductor installation;

Asset management and inspections:

- Plan corrective work identified through the pole loading infrastructure hardening program;
- Construct and commission 11 additional transmission and distribution system automation devices to meet the program target of 27 in 2021;
- Complete initial construction of an additional 8 transmission and distribution system automation devices for commissioning in early 2022;
- Nearing completion of approximately 81 miles of covered conductor installation;

Vegetation management and inspections

- Review 2021 fire season operating protocols and evaluate areas for improvement in 2022;
- Leverage data analytics to evaluate the impact of alarm based high impedance fault detection observed through the 2021 fire season

Grid operations and protocols:

- Review 2021 fire season operating protocols and evaluate areas for improvement in 2022;
- Leverage data analytics to evaluate the impact of alarm based high impedance fault detection observed through the 2021 fire season

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;

7.1.3 Before the Next Annual WMP Update

PacifiCorp's wildfire mitigation strategy and goals to be accomplished before the next annual update include:

Situational awareness and monitoring

- Complete installation of and integration of the aggregate 20 additional weather stations included in the 2021 plan and be on track to install 14 additional stations in 2022;

Grid Design and system hardening

- Complete the 2021 scope of work planned;
- Complete full detailed scope for specific programs in years CY2022 and CY2023 (if not yet completed);
- Be on track to deliver the CY2022 plan;

Asset management and inspections

- Complete the CY2021 planned inspections within California;
- Complete the CY2021 planned IR inspections and evaluate effectiveness;
- Review research project results and incorporate new techniques if appropriate;

Vegetation management and inspections

- Evaluate and, if applicable, be prepared to implement a new tree density inventory system targeted initially within the HFTD to inform risk assessment and prioritization of efforts;
- Evaluate for continued use the newly piloted electronic planning, mapping, and record keeping system regarding vegetation management within the HFTD;
- Establish longer term strategy/efficacy regarding the use of LiDAR as it pertains to vegetation management and inspections applications;

Grid operations and protocols

- Review existing operating protocols and ensure preparedness for 2022 fire season;
- Leverage RF network where available to facilitate remote implementation of fire season settings on newly installed field reclosers;
- Implement the final plan to leverage new high impedance fault detection capabilities and data analytics to inform operating procedures and protocols;

Stakeholder cooperation and community engagement:

- Continue applicable improvements to internal and external customer and community facing forecast of PSPS status (website);
- Continued alignment with regulatory requirements regarding customer identification, outreach and communication;
- Continue partnering with public safety partners in communities throughout California regarding wildfire and PSPS preparedness;

7.1.4 WITHIN THE NEXT 3 YEARS

PacifiCorp's wildfire mitigation strategy and goals to be accomplished within the next 3 years include:

Situational awareness and monitoring:

- Complete installation of all program weather stations and continue improvement of real time weather monitoring capability;
- Evaluate benefits and costs of distribution fault anticipation (DFA) technology in normal system operations;
- Full integration of the company's newly evolved risk model including elements to address climate change;

Grid Design and system hardening:

- Complete CY2020 – CY2022 system hardening program scope per Table 12 and additional work or scope developed in CY2023

- Evaluate the use of additional new technologies as it relates to grid design and system hardening programs;

Asset management and inspections:

- Complete annual scope of planned inspections in CY2021-CY2023 within California;
- Evaluate potential incorporation of risk assessment software solutions to inform asset management and inspections programs and augment existing risk based decision making framework;
- Memorialize findings regarding evaluation of potential line equipment maintenance programs as a result of research projects and, where appropriate, new programs into the long term asset management strategy;

Vegetation management and inspections:

- Evaluate overall workforce management strategies and structures to augment existing programs;
- If implemented, incorporate lessons learned though tree inventory system analytics to inform risk assessment and prioritization of efforts;
- Incorporate lessons learned from pilot project and fully implement new electronic planning, mapping, and record keeping system regarding vegetation management within the HFTD;

Grid operations and protocols:

- Review existing operating protocols and ensure preparedness for 2024 fire season;
- Expand capability of RF network to facilitate remote implementation of fire season settings on newly installed field reclosers;
- Validate effectiveness of high impedance fault detection in both day to day and extreme weather condition operations;

Stakeholder cooperation and community engagement:

- Continue applicable improvements to internal and external customer and community facing forecast of PSPS status (website);
- Continued alignment with regulatory requirements regarding customer identification, outreach and communication;
- Incorporate three years of data, enhanced real time weather monitoring capability, and system hardening progress to, where appropriate, evaluate PSPS methodology and protocols and potential reduce the potential scope or impact of PSPS events;
- Continue partnering with public safety partners in communities throughout California regarding wildfire and PSPS preparedness;

7.1.5 Continue Partnering with Public Safety Partners in Communities Throughout California Regarding Within the Next 10 Years

PacifiCorp's general goal within the next 10 years is to complete the work included in this plan to mitigate wildfire risk and continue the vigilance of discovery, technology, shared information and program improvements and further grow the programs in areas identified from data collection and analysis. At this time, it is challenging to set additional specific goals on a 10-year planning horizon, except to the

extent that certain programs can be delivered within the WMP term. However, as PacifiCorp progresses with program implementation and lessons learned are incorporated, the company anticipates firming up these longer-term goals in future updates to the plan. Specific target areas to improve capability include risk modelling coupled with situational awareness to inform both short term decision making and long-term planning, continued evaluation and incorporation of new technology to improve resilience, and overall reduction in PSPS impacts.

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.

PacifiCorp's WMP reflects a broad and thorough approach to wildfire mitigation proportional to 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, and, while the utilities have always needed to mitigate the potential for a wildfire sparked by an electric facility, this exhaustive approach reflects a new way for PacifiCorp to tackle this elevated risk.

As is true with any plan or program, monitoring and auditing the implementation of the plan is just as critical as the plan elements itself. PacifiCorp's WMP is not different. PacifiCorp uses a combination of company processes, tools, and physical site work to monitor program activities and individual departments have oversight and responsibility to deliver applicable portions of the plan. A few of these key areas include local operations management, emergency management, construction activity management, and non-construction program management such as inspections and maintenance.

The Emergency Management department is responsible for ensuring annual review of preparedness of on-going tasks and processes such as; Wildfire Prevention Practices for operational employees and PSPS processes. Part of this review includes the use of desktop exercises and after event reports for lessons learned that can inform and improve future plans as included and further described in Section 7.3.9.

To facilitate the implementation of PacifiCorp's WMP construction projects (generally reflected in the system hardening programs) a focused wildfire mitigation project management office has been established. It is the responsibility of this department to monitor all aspects of construction (engineering, permitting, standards, estimating, materials, and post audit quality assurance) to ensure the plan deliverables are achieved. PacifiCorp uses a combination of company processes, tools, and physical site work to monitor these activities. For example, coordination meetings are held weekly and costs and progress are tracked and monitored monthly to ensure adherence to plan. Additionally, internal engineering reviews all contracted design work as a type of audit and verification to ensure projects are being designed to deliver necessary scope and meet company and industry standards.

The non-construction aspects of the WMP are overseen by existing program offices such as Vegetation Management, Asset Management, and Customer Advocacy, etc. that will have the responsibility of collecting 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 have auditing and monitoring capabilities for individual elements of the company's WMP, PacifiCorp has identified a gap that exists as the WMP lacks a clear plan and process to audit and monitor implementation as a collective plan. This gap has become more evident during plan implementation in 2020 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.

In 2021, PacifiCorp is 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. Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies.

Deficiencies in the plan are generally identified as a result of self-audits, after action reviews, and progress updates. As described above, each department generally has the capability to monitor and audit progress and identify deficiencies. For example, the Emergency Management department is responsible for conducting after action reviews which include, as a component, action items to close gaps encountered. Audits conducted following asset inspections include detailed reports on findings which are then incorporated into annual training for inspectors.

One area currently identified for improvement at PacifiCorp and identified by the WSD is data governance. PacifiCorp has been working diligently to make progress in its delivery of data consistent with the WSD GIS Data Schema requirements published by the WSD. 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. PacifiCorp intends to reconfigure this data consistent with the newly established requirements and expand further to include initiative data such as inspections in the company's next quarterly filing, scheduled for May 9, 2021.

However, this effort requires the extraction and translation of non-spatial data into GIS format. Similar to 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. While individual departments may have policies, processes, and procedures that determine how to manage key data for operations, 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.

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.

Therefore, the effectiveness of these programs at reducing operating risk as planned, which includes wildfire risk, relies upon the quality of the inspection itself as well as the proper characterization of any findings. PacifiCorp monitors and audits the effectiveness of inspections through its quality assurance and quality control program. This program generally includes desktop audits and field audits catered to identify gaps in the inspection programs, inspector capability, and corrective actions, thereby increasing inspection result accuracy and reliability. This accuracy and reliability are critical to ensure effectiveness and enable the planned risk reduction associated with the company's planned inspections.

To perform QA/QC of inspections, PacifiCorp utilizes 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 activities is a cost-effective

means to minimize the risk that inspection results are inaccurate or unreliable. 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 inspections of facilities with a focus fire threats and Tier II and Tier III prioritization (885 physical field audits performed in 2020)
- Software controls which prohibit freeform condition assignment, allowing for result controls, minimizing the amount of human error possible
- A quarterly review of already audited results as a secondary check
- Annual training with inspectors to address audit findings and improve inspection reliability and accuracy

Additional details regarding these components, program management, spend, evolution, and new enhancements to reduce wildfire risk in recognition of PC-4 are included in Section 7.3.4.

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, and annual compliance assessment.

PacifiCorp has taken the guidance provided by the WSD and attempted to reconcile its programs to legacy identifiers, as requested in prior updates. Where realignment of programs has occurred, the company has referred to the legacy identifier as well as the current identifier. This genealogy is still in the formative stages, but as the company and stakeholders evaluate its plan and become familiar with the programs, it is hoped that it becomes clearer how the programs are evolving and aligning with directions provided by stakeholders.

7.3 DETAILED WILDFIRE MITIGATION PROGRAMS

In this section, describe how the utility's specific programs and initiatives plan to execute the strategy set out in Section 7.1. The specific programs and initiatives are divided into 10 categories, with each providing a space for a narrative description of the utility's initiatives and a summary table for numeric input in the subsequent tables in this section. The initiatives are organized by the following categories provided in this section:

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

7.3.a Financial data on mitigation initiatives, by category

In the following section is a list of potential wildfire and PSPS mitigation activities which fit under the 10 categories listed above. While it is not necessary to have initiatives within all activities, all mitigation initiatives will fit into one or more of the activities listed below. Financial information—including actual / projected spend, spend per line-miles treated, and risk-spend-efficiency for activity by HFTD tier (all regions, non-HFTD, HFTD tier 2, HFTD tier 3) for all HFTD tiers which the activity has been or plans to be applied—is reported in the attached file quarterly. Report any updates to the financial data in the spreadsheet attached in Table 12.

7.3.b Detailed information on mitigation initiatives by category and activity

Report detailed information for each initiative activity in which spending was above $0 over the course of the current WMP cycle (2020-2022).

For each activity, organize details under the following headings:

1. ***Risk to be mitigated / problem to be addressed***
2. ***Initiative selection ("why" engage in activity)*** *– include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives*
3. ***Region prioritization ("where" to engage activity)*** *– include reference to a risk informed analysis in allocation of initiative (e.g., veg clearance is done for trees tagged as "high-risk")*
4. ***Progress on initiative*** *(amount spent, regions covered) and plans for next year*
5. ***Future improvements to initiative***

List of initiative activities by category - Detailed definitions for each mitigation activity are provided in the appendix

7.3.1 Risk Assessment and Mapping

1. *Risk to be mitigated*

In Section 4.3 PacifiCorp explained its evolution toward a comprehensive risk modeling approach in which various inputs afford it the opportunity to evaluate a variety of fire risks in the context of its network overlaid on the appropriate land features; it also creates an extensible model for estimating the impacts of various mitigation measures on future fire risks. When it estimated the costs to develop such modeling it assumed proportionate cost estimates for each subcomponent of the modeling function, which led to repetition of the same cost estimate (a percentage of the labor costs for the data scientists and engineers developing these tools). As it unfolded that approach, it created a single modeling tool through its LRAM which addresses utility ignition, climate risks (historic, current and forecast), the impacts of fire spread and the consequences of PSPS. As result, it has consolidated all aspects of the risk assessment mapping into a new initiative ID, RA-1. RA-1 (which was previously identified as Initiative AH-3.1-3.4) 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, WSD and other stakeholders criticized the lack of risk-spend efficiency 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 to inform its risk identification on both a short-term and long-term basis. The company has previously reminded that its obligations through S-MAP and RAMP are not yet articulated (they are still under development in R.18-10-007, but in order to achieve the needed outcome with regard to moving its WMP forward it leapfrogged forward its risk modeling activities and will later integrate non-fire risk elements into the LRAM as necessary for alignment with the outcomes of this rulemaking.

3. *Region prioritization*

PacifiCorp designed the LRAM, in its enabling function, to be broadly extended throughout its electrical network. With regard to prioritization and validation of its model, it utilized a Tier 3 area, 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 in which it plans further development, including the incorporation of equipment/components and their ignition probability. It further intends to integrate various aspects of asset health and the inclusion of the 10 RAMP Elements that were part of the 2018 GRC from the company's risk-based decision-making framework. It further anticipates more direct and transparent cost quantification to support extensible RSE metrics.

7.3.2 Situational Awareness and Forecasting

7.3.2.1 Advanced weather monitoring and weather stations

1. Risk to be mitigated

A key component of fire risk mitigation revolves around knowing when, where, how and why to take abnormal action. With proper awareness, operational strategies can be employed that can reduce the probability that fault operations will result in utility ignitions; for instance, resetting reclosers to minimize test energizing after a fault is detected by the equipment. The first line of defense then, involves creating an understanding of the metrics that are key to recognizing the need to be on a higher level of awareness. Thus, mitigating the risk involves creating an understanding of when weather creates increased risk of wildfire. As outlined in Section 4.2 in the company's risk assessment, this is particularly important due to the bimodality of the fire risk environment in which the company's system exists. During late fall, early spring and winter periods (when there is heavy moisture, higher relative humidity, lowered temperatures and dried out fuels) the wildfire risk is reduced. However, during periods of elevated temperature accompanied with dryness, such risks increase. Thus, the company investigated the climate history of its service territory, established fire weather indicators appropriate for its territory and has begun the development of its weather network. PacifiCorp has not established a target density for weather stations but has identified areas where it has "blind spots" to weather phenomenon and as it uncovers these locations continues to infill within its territory. Weather stations serve at least two purposes, notably creating a view of routine weather patterns within a specific area, in addition to providing data that can be mined to determine when extreme periods of risk are being experienced.

2. Initiative selection

PacifiCorp outlined in its September 9, 2020 Quarterly Reporting filing the process it had engaged to begin building out its weather network. 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. PacifiCorp's service territory, especially its territory in the HFTD, is sparsely populated, and much of the area is state, federal and tribal lands. There is limited amount of developed infrastructure, including weather stations. Prior to the siting of PacifiCorp's 2019 station installations, only a handful of National Weather Station and National Interagency Fire Stations existed, and they weren't generally located proximate to the populations which would have been impacted by PSPS. As result, peppering those stations in the vicinity to support situational awareness for PSPS was deemed highest priority.

The company engaged REAX to provide input regarding the best placement of stations, considering topography and climate trends. After the target locations were established, PacifiCorp reviewed those locations with the National Weather Service 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.

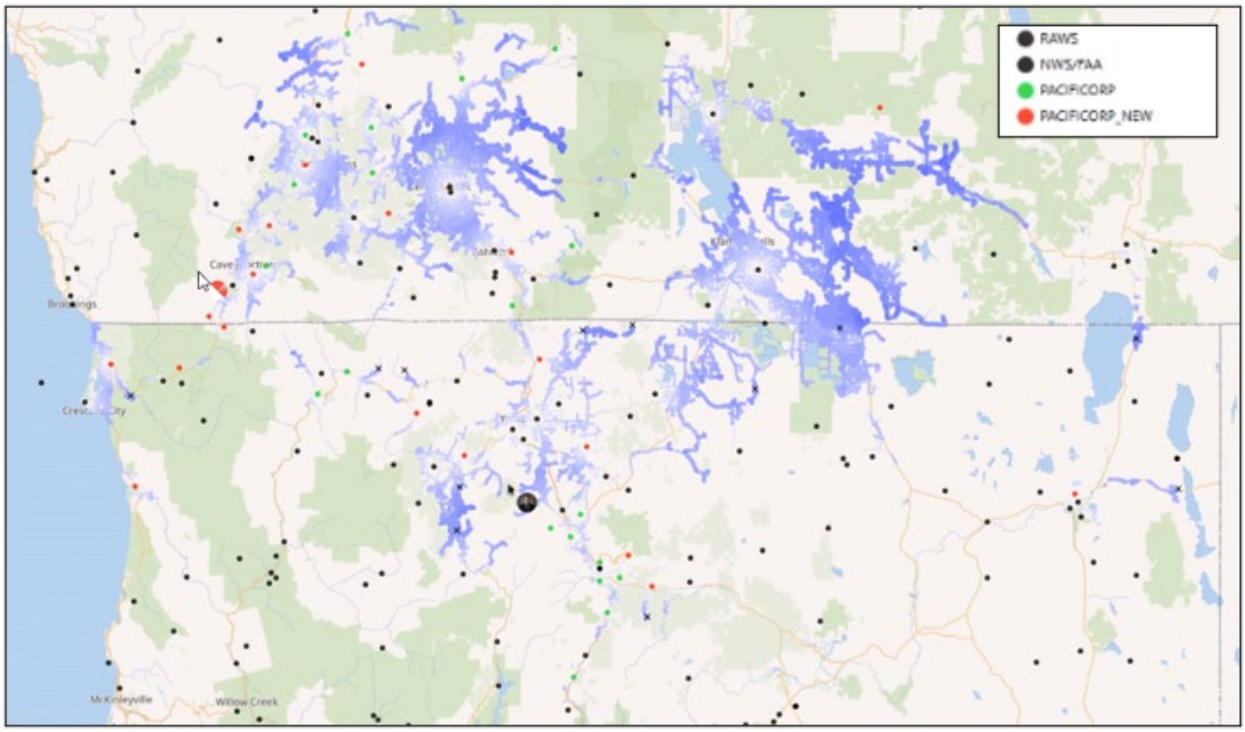
Going into 2020, PacifiCorp's perspective was very similar to comments expressed in PC-2, and PacifiCorp has focused on better coverage across its whole service territory and near populated communities bordering Tier 2 areas. PacifiCorp is expanding the system to establish a more macro understanding across its service territory, including outside the PSPS areas. PacifiCorp has continued to work with REAX to determine the most efficient locations. The analysis uses distance and elevation change from a particular circuit zone of protection to the closest weather stations in the area to determine locations reflecting data gaps. Thereafter, the company engaged weather experts, including those at the National Weather Service and participants of the Pyregence project, and fire response professionals, including at the Bureau of Land Management (BLM) and the National Interagency Fire Center, to consider the proposed locations. The company is also integrating the use of BLM's RAWS network (by installing 10 stations throughout California, Oregon and Washington) to provide information within its operational awareness rubric, in addition to informing the National Interagency Fire Council's understanding of weather inputs.

At the end of 2020, with substantial fires being experienced, the pace of weather station installations was slowed substantially, and recognizing many of the stations would be subject to winter weather risks of damage, the company held back those in more remote areas; their installations are planned in early spring, ready for the beginning of 2021 fire season. The location of those weather stations is shown below in Figure 7.3-1. As displayed in the map, the second phase of stations targeted Scott's Valley, Hornbrook and the greater Yreka operating area. Other population clusters near Tier 2 boundaries are addressed, including Alturas. The expansion of the weather station network is solely intended to expand PacifiCorp's general situational awareness, improve risk modeling efforts in those areas, and, as suggested by the WSD, develop a better understanding of how weather systems are moving across the entire territory. As the company evaluated the feedback regarding establishing cost-benefit analysis to support the expansion of its weather network, the company has been unable to device a means for quantifying the proper level of weather station density, however it plans to further this rationale.

3. Region prioritization

The company utilized its new LRAM model to identify areas where climate-driven fire risk and utility equipment risks resulted in elevated combined scores, after which it calculated distances to available weather stations, using elevation and absolute measurements to score those areas having risk but limited weather. It calibrated those locations using recently added meteorology talent to refine target locations.

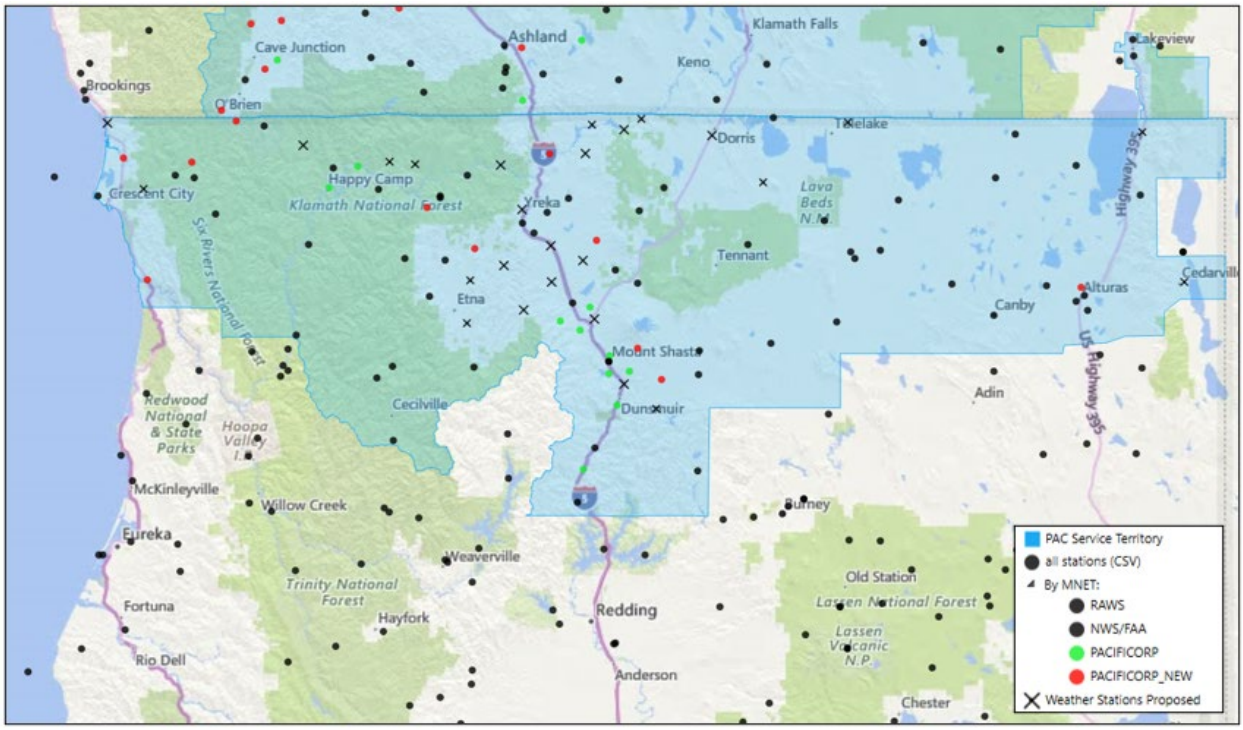
Figure 7.3-1: areas where climate-driven fire risk (shown by blue intensity) and utility equipment risks resulted in elevated combined scores.



4. <u>Progress on initiative</u>

PacifiCorp intends to complete the installations of the 2020 stations in addition to another 12 stations during 2021, complemented by another 14 stations in 2022. Their target locations in the California serviced territory are shown below, where an x marks the proposed location, the green shows the existing network and the red shows the most recent network additions.

Figure 7.3-1: Targeted locations for future weather stations



5. Future improvements to initiative

As the company's newly added meteorology manager gains an understanding of the steps taken to date, there are expected to be enhancements in the areas such as computing, data quantification and risk analysis and advancement of real-time metrics critical for operations and maintenance of the system, particularly during periods of elevated fire risk. Micro-stations cost approximately $13,000 capital and are estimated to require $1,500/year of OMAG, with an expected 10 year life, and RAWS stations are approximately two times the cost, the company hasn't yet established a target density for its network, but has established that as a needed step for the maturing of the program.

Continuous Monitoring Sensors (Distribution Fault Anticipation, SA-3)

DFA technology is intended to function as full-time wave form analysis sensing machine, using relays that continuously sample the wave form, comparing it against a library of potential event forms that are indicative of a circuit anomaly, and alerting when it detects such an abnormality. Previously the company had categorized this activity as part of grid modernization but is adopting SA-3 as its corrected initiative number. This project and its results are also being reporting in the company's pilot projects area, in Section 4.4.1, Pilot 1.

1. Risk to be mitigated

As discussed in Section 4.2.1, 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. To the extent that continuous monitoring of waveforms enables the identification of an incipient condition, it allows the utility to act pre-emptively, avoiding the fault event.

2. Initiative selection

DFA equipment is intended to serve as a continuous inspection tool that applies machine-learning processes. While the company continues to look for opportunities to improve its inspection process there are situations which may not be visibly or detectable using some of the newly-adopted tools that are part of the enhanced inspection program at the time that the inspections are conducted. DFA is anticipated to fill in that full-time monitoring function that complements the role of routinely patrolled and inspected equipment.

3. Region prioritization

The company began development of a DFA pilot program in 2019 in which DFA devices are scheduled to be commissioned on two of the highest priority circuits in 2021. After assessment using the LRAM, these circuits still rise to the top in terms of fire risk and customer impacts, supporting the need to continue the assessment. In addition, as the opportunity arises to utilize this technology at locations, particularly those having high combined fire risk scores, with high customer impacts in the event of PSPS, where the substation equipment lends itself to placement of the DFA devices and where communication networks exist, the company would extend the application of this pilot technology. Such is the case at the soon to be installed Lassen substation, where two additional DFA devices will be placed coincident with the substation construction (which replaces the company's legacy Mt. Shasta substation).

4. Progress on initiative

PacifiCorp intends to complete the installation of DFA devices on two circuits out of Weed substation (5G45 and 5G83) and two additional circuits out of Lassen substation (5G77 and 5G79) during 2021 covering PacifiCorp's Weed and Mt. Shasta service areas. Based upon the experience at these locations additional substation circuits will be targeted.

5. Future improvements to initiative

The use of waveform analysis is under research development through the Department of Energy's Grid Modernization Lab Consortium efforts. As the company and Texas A&M continue to evaluate this technology and data mine legacy relay records such wave form libraries may serve as repositories that fuel further analysis for incipient faults. Reconciling these libraries and extending the use of this data will substantially alter how the industry is able to pre-emptively address the changing network health.

Fault Indicators for detecting faults on electric lines and equipment

Fault indicators are part of PacifiCorp's standard equipment and either installing new ones or augmenting additional locations is generally being incorporated into Grid Design and System Hardening, particularly as it relates to installation of relays having advanced detection and diagnosis capabilities.

1. Risk to be mitigated

As discussed in Section 4.2.1, utility ignition risks are correlated with fault events. Rapid fault detection and operation increases reliability for customers. Absent this capability system operators may be challenged to effectively and reliably operate the system.

2. Initiative selection

Fault indicators are generally installed in response to experienced fault events and may be more in need in areas where access is particularly challenging.

3. Region prioritization
Fault indicators are installed in more remote areas.

4. Progress on initiative
Continuation of a variety of fault detection approaches is part of the company's focus within the Grid Design and System Hardening area.

5. Future improvements to initiative
Continued exploration of the use of intelligent electric devices is part of the company's approach in Grid Design and System Hardening.

7.3.2.2 Forecast of a fire risk index

PacifiCorp hasn't developed plans to analyze the construct of a fire risk index. It explores risk analysis and fire climate indicators in 4.5.2.

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

PacifiCorp trains and deploys personnel during periods of elevated fire risk, activating what it has called "watches" or "activations" depending on the extent to which fire climatology indicates elevated fire risk. These personnel perform readiness patrols, 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, utility ignition risks are correlated with fault events. Fault events are more probable during periods of high wind. Coincidence of this with dry conditions can lead to ignitions that spread.

2. Initiative selection
Personnel being deployed in the manner described occur during periods of elevated climate risk in areas designated as having high fire risk (i.e. Tier 3, Tier 2).

3. Region prioritization
Prioritization has been focused on areas designated as high fire threat district. Application of the newly constructed combined fire scores at zones of protection will introduce additional areas to be considered.

4. Progress on initiative
Processes and personnel have become trained on the protocols. The emergency action center has established procedures for on-alert status to be recognized and activated.

5. Future improvements to initiative
As after actions are assessed improvements will be identified.

7.3.3 Grid Design and System Hardening

PacifiCorp's electrical infrastructure is engineered, designed, and operated in a manner consistent with prudent utility practice, enabling the delivery of safe, reliable power to all customers. When installing

new assets, PacifiCorp is committed to incorporating new technology and engineered solutions. When conditions warrant, PacifiCorp may engage in strategic system hardening, which PacifiCorp interprets to mean replacement of existing assets (or, in some circumstances, modifying existing assets using a new design and additional equipment) to make the assets more resilient. Specific to PacifiCorp's 2020 Wildfire Risk Mitigation Plan, grid design and system hardening are the use of enhanced programs or non-standard designs to specifically manage the electrical distribution and transmission system in high fire threat geographic locations to mitigate wildfire risk.

PacifiCorp's wildfire mitigation system hardening programs are designed in reference to the equipment on the electrical network which could be involved in the ignition of a wildfire or could be suspect to a wildfire event, such as a brush fire, and, therefore, require greater resilience in design. In general, system hardening programs attempt to reduce the occurrence of events involving the emission of sparks (or other forms of heat) from electrical facilities or enhance resilience to survive a fire event. No single program mitigates all wildfire risk related to all types of equipment. Individual programs address different factors, different circumstances, and different geographic areas. For example, one program might specifically focus on reducing the potential of arcing between two lines. Another program, however, might involve a systematic reconstruction of an entire line in a particular geographic area of concern, including use of non-wood poles, to support restoration efforts. Each program described below, however, shares the common objective of reducing overall wildfire risk associated with the design and type of equipment used to construct and operate electrical facilities.

Examples of such programs which are covered in greater detail in this section include installation of non-standard covered conductor, installation of advanced protection, control, and isolation schemes, and use of non-standard pole material specifications and parameters such as fiberglass in place of wood. For each program requested, PacifiCorp focused on wildfire mitigation specific components or initiatives that required additional funding, development, or tracking. Where an existing program was deemed sufficient or where PacifiCorp did not have a wildfire mitigation specific program, notes were included.

7.3.3.1 Capacitor maintenance and replacement program

Capacitor maintenance and replacement is a key component of the company's detailed inspection of overhead distribution line program described in Section 7.9.4.1. Equipment deficiencies such as loose connections or fire risks such as leaks are identified during these inspections and corrective work is planned consistent with the assigned risk or priority level. For example, a capacitor actively leaking oil would be identified and corrected consistent with a Priority A (level 1) condition and reduce wildfire risk.

While this component of the company' detailed inspection of overhead distribution line program reduced wildfire risk, it is considered a standard program with no incremental funding and was included in the company's most recent General Rate Case. For more information, see Section 7.9.4.1.

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

Circuit breakers (or station reclosers functioning as breakers) are generally installed for all distribution circuits and transmission lines to detect fault current and protect equipment if a fault is detected. Circuit breakers are maintained under both the company's existing substation inspection and circuit breaker maintenance standard programs. Circuit breakers are visually inspected and may be identified for corrective work consistent with substation inspections described in Section 7.9.4.15. Additionally, circuit breaker minor and major maintenance activities are performed on either an annual or bi-annual basis

depending on type and operating voltage to facilitate proper operation and inherently reduce wildfire risk. These maintenance activities are important to facilities proper operation and may identify the need for correction maintenance or replacement based on a diagnosed condition. While PacifiCorp's circuit breaker maintenance program inherently reduces wildfire risk, it is considered a standard program with no incremental funding and was included in the company's most recent General Rate Case. However, to support the WSD's desire for increased granularity in data and reporting consistent with Guidance-5, the standard program spend and units were included in Table 12.

Conversely, as outlined in the company's 2018 GRC, PacifiCorp is proactively replacing any circuit breakers to accommodate the advance protection and control schemes, prioritized toward the high fire threat areas, as part of the augmented program described in Section 7.9.4.9.

7.3.3.3 Covered conductor installation

PacifiCorp currently engineers, constructs, and operates overhead conductor consistent with company standards which account for the necessary electrical loading as well as structural competence under standard operating conditions. However, as demonstrated in the risk assessment, overhead distribution conductor can be susceptible to incidental contact with foreign objects or phase to phase contact which, under certain conditions, can result in a fault scenario.

1. *Risk to be mitigated*

During fire season, these fault scenarios pose wildfire risk, because arcing associated with the fault could ignite a fire. During extreme weather scenarios this becomes particularly critical when considering when and where to implement a PSPS event. Therefore, PacifiCorp's covered conductor installation program seeks to retrofit existing distribution and local transmission lines in the highest risk locations and PSPS zones with more resilient technology such as covered conductor and spacer cable.

2. *Initiative Selection*

PacifiCorp's covered conductor installation 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 cable has less susceptibility to incidental contact with foreign objects such as branches or Mylar balloons. While insulated cable 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. Therefore, PacifiCorp's program includes installing insulated cable on all single-phase overhead conductor circuits within the HFTD.

Spacer Cable Installation: As previously described, overhead three phase conductors can be susceptible to external factors, such as impact loads from tree branches which can result in phase to phase contact and a potential fault scenario. Spacer cable can be installed on multi-phase installations to provide additional resilience, hold the multiple phases apart, and reduce the probability that phase to phase contact can occur. Therefore, PacifiCorp's program includes installing spacer cable on multi-phase overhead conductor circuits within the HFTD.

PacifiCorp's covered conductor program includes all necessary components to install the preferred solution such as but not limited to engineering and design, material design and procurement, circuit

coordination review, hardware design and procurement, and construction/installation. This program also includes the construction and installation of spacer cable consistent with NESC requirements.

3. Region prioritization

This program extends over the full WMP term with initial efforts focused on engineering and program start-up and a general prioritization on PSPS designated areas to reduce risk and work toward eliminating the need for PSPS events. Furthermore, the prioritization of this program aligns with the evolution of the company's risk modeling to ensure efforts and spend target the highest risk areas first.

4. Progress on initiative

Progress has been reported in Table 12 of Attachment 1-2021 Performance Metrics Data Template. While not evident in the data provided in Table 12, significant efforts in 2020 focused on engineering and construction standards as well as procurement of materials should allow PacifiCorp to now ramp up construction quickly. Additionally, the detailed scoping efforts to finalize the yearly initiative elements, should support continued progress beyond 2021 as well as the detailed data requirements in Table 10.

5. Future improvements to initiative

At this time, PacifiCorp does not have firm plans to augment this initiative. Future changes to the initiative may come in the form or reprioritization and bundling of projects to better reflect the evolution of the company's risk modelling.

7.3.3.4 Covered conductor maintenance

See Section 7.9.4 which includes maintenance of overhead distribution and transmission lines. Covered conductor maintenance is included as a part of these maintenance programs.

7.3.3.5 Crossarm maintenance, repair, and replacement

See Section 7.9.4 which describes the maintenance of overhead distribution and transmission lines, including adjacent structures, facilities, and equipment. Crossarm maintenance, repair, and replacement is one element identified through these programs and the replacement component is tracked separately. While details on these maintenance programs can be found in Section 7.9.4, units and cost have been tracked and reported separately in Table 12 to support the WSD's to desire to disaggregate initiatives into programs and PacifiCorp's continued adherence to recommendations of Guidance-10.[21] For example, $272,000 was spent in 2020 replacing 136 crossarms at a unit cost of $2,000 per crossarm.

7.3.3.6 Distribution pole replacement and reinforcement, including with composite poles

As part of PacifiCorp's standard inspection and maintenance programs, poles may be identified for replacement or reinforcement within PacifiCorp's service territory, consistent with state specific requirements and prudent utility practice. When a pole is identified for replacement, typically through routine inspections and testing, major weather events, or joint use accommodation projects, a new pole consistent with engineering specifications suitable for the intended use and design is installed in its place. Engineering specifications typically reflect the use of wooden poles which is consistent with prudent

[21] See Section 4.6.

utility practice and considered safe with structural capacity to support overhead electrical facilities during standard operating conditions. However, alternate non-wooden construction such as fiberglass or fire wrapping can provide additional structural resilience during wildfire events and, therefore, aid in restoration efforts.

1. Risk to be mitigated

In addition to the installation of non-wooden solutions as a part of standard replacement programs or mechanisms, the proactive reinforcement of wooden poles and the accelerated replacement of wooden poles with non-wooden solutions within the HFTD can improve vintage diversity for adjacent pole loading, improve overall structural resilience, reduce wildfire risk, and support faster restoration efforts should a wildfire event happen.

Therefore, PacifiCorp's WMP pole replacement/reinforcement program seeks to identify and proactively address poles most likely to experience a brush fire or other wildfire event in locations that are challenging to access where restoration of electrical components can be lengthy, as well as locations adjacent to roadways where electric utility components, if not reinforced, have the potential to structurally fail during a wildfire event and block egress/ingress routes, delaying non-electric utility restoration activities. Different than many other wildfire mitigation techniques leveraged, PacifiCorp's WMP pole replacement/reinforcement program mitigates wildfire risk through a focus on restoration and control of a wildfire event as opposed to prevention of a spark. PacifiCorp's pole replacement/reinforcement program also includes both transmission and distribution poles.

2. Initiative selection

PacifiCorp included, as a component of the company's system hardening efforts, this proactive wooden pole replacement program in both the 2019 and 2020 WMP filings to contemplate proactive replacement or reinforcement of the company's wooden poles with more fire resilient materials. In the company's 2019 WMP, PacifiCorp proposed establishing criteria to assess certain structures at key locations for targeted transition from wood to steel or targeted reinforcement through the application of pole cladding/wrapping. While not specifically known at the time the 2019 WMP was filed, PacifiCorp proposed plan included addressing approximately 4,000 poles to promote greater resilience to wildfire events and support rapid restoration.[22] At this time, no specific breakdown was proposed regarding distribution and transmission poles but was notionally thought to be 60/40 respectively. Additionally, PacifiCorp also proposed developing internal engineering standards and specifications to facilitate the installation of non-standard wildfire risk reducing materials, such as steel or fiberglass poles.

When PacifiCorp began the development of these internal engineering and company standards in 2019, an assessment of optimum material specification was performed and, as a result, steel was determined to be not preferable due to lightning environment, strength reduction when in high heat environment and costs; rather fiber reinforced polymer (FRP) poles or fire wrapped poles.[23]

Therefore, PacifiCorp's 2020 WMP distribution and transmission pole replacement and reinforcement program included both the incorporation of new engineering fiberglass specification for new construction/installations within the HFTD as well as accelerated proactive

[22] See PacifiCorp's 2019 WMP at page 42.
[23] See PacifiCorp's 2020 WMP at page 89.

replacement/reinforcement of existing wooden structures within the HFTD outside of existing inspection and replacement program. PacifiCorp's 2020 WMP proposed accelerated replacement/reinforcement of approximately 4,000 poles and incorporated a 60/40 split between distribution and transmission poles.

PacifiCorp's 2020 WMP also included further development and expansion of the prioritization method referenced in the company's 2019 WMP for pole replacement/reinforcement of the 4,000 poles proposed, incorporating factors such as pole location topography, geographic wildfire tier designation, pole condition, composition, and type, age, and age diversity.

This methodology was developed and applied in 2020 to all wooden poles within Tier II and Tier III to further refine the scope of this program and, as a result, identified 4,326 specific high priority poles that require mitigation to either support ingress/egress or promote faster restoration during a wildfire event. High priority poles less than the average age of all wooden poles within Tier II or Tier III in California (less than 40 years old) were selected for reinforcement or wrapping. PacifiCorp has historically had success with pole cladding, wrapping and fireproof spray coating in advance when fires have threatened its equipment. Conversely, poles with an above average age (40 years or older) were selected for accelerated replacement by the company's preferred non-wooden solution for deployment within the HFTD, fiberglass. This approach intended to balance cost effectiveness to specifically target older poles for accelerated replacement to promote age diversity while simultaneously reducing risk of newer, younger poles. The following table describes the refined scope and update to PacifiCorp's proactive pole replacement program.

Table 7-1: PacifiCorp's 2021 WMP Pole Replacement/Reinforcement Refined Scope

Type of Poles	Total Poles to be Addressed by Program	Replace	Reinforce/ Wrap
Transmission (poles)	1,321	432	889
Distribution (poles)	3,005	1,632	1,373
Total (poles)	4,326	2,064	2,262

3. Region prioritization

Specific to the execution of this program, PacifiCorp first prioritizes pole replacement coincident to other planned programs or projects such as the installation of covered conductor to promote efficiency and fully mitigate the risk in these extreme risk locations. Beyond where coincident with other programs, PacifiCorp will seek to align prioritization of this program with the evolution of the company's risk model to identify where pole replacement should take place as a stand-alone project beyond CY2021.

4. Progress on Initiative

When originally proposed in 2019, PacifiCorp assumed that the program would heavily favor transmission pole replacement and assumed a 60/40 split. However, after applying the prioritization methodology developed to identify poles in hard to access locations to support restoration or adjacent to roadways to support ingress/egress, the program has shifted to focus on distribution pole replacement.

The table below reflects progress made in 2020 as well as planned work through the remaining 3-yr WMP term. Additional information can be found in Table 12 of Attachment 1-2021 Performance Metrics Data Template.

Table 7-2: PacifiCorp's 2021 WMP Pole Replacement/Reinforcement Revised Annual Scope

Year	Total Program	2019[24]	2020	2021	2022	2023[25]
Transmission (poles)	1,321	0	0	51	41	1,229
Distribution (poles)	3,005	0	29	77	231	2,668
Total (poles)	4,326	0	29	128	272	4,054

5. Future improvements to initiative

At this time, PacifiCorp does not have any firm plans to evolve or change this program. However, as the company's risk modeling efforts evolve, PacifiCorp anticipates that changes to the scope of phasing of this program are possible. The specifics of this program and scope may also be augmented as PacifiCorp accumulates additional experience in working with fire resilient materials.

Additional transmission poles are being assessed and potentially replaced as a part of PacifiCorp's pole loading infrastructure hardening and replacement program in Section 7.3.3.13.

7.3.3.7 Expulsion fuse replacement

Overhead expulsion fuses serve as one of the primary system protection devices on the overhead system. The expulsion fuse has a small metal element within the fuse body that is designed to melt when excessive current passes through the fuse body, interrupting the flow of electricity to the downstream distribution system. Under certain conditions, the melting action and interruption technique will expel an arc out of the bottom of the fuse tab. To reduce the potential for ignition as a result of fuse operation, PacifiCorp has identified alternate methodologies and equipment that do not expel an arc for installation within the HFTD.

PacifiCorp's overhead expulsion fuse replacement program includes incorporation of a new engineering standard to be applied to new construction projects throughout the HFTD as well as proactive replacement of existing in-service expulsion fuses along with other system hardening projects throughout the HFTD (such as covered conductor or pole replacements). The new engineering standard is complete and has been incorporated into new construction projects or expansion projects.

Replacement of in-service overhead expulsion fuses requires installation of new overhead equipment tend to not be isolated projects. As expulsion fuses coordinate with other devices on a given circuit, the scope required to replace an expulsion fuse can be quite large. Therefore, as opposed to initiating a separate program, PacifiCorp is incorporating this element into other system hardening programs to embrace maximum planning and spend efficiency (pole replacement, covered conductor replacement, advanced coordination, etc.).

PacifiCorp will continue to evaluate the need for an additional, stand-alone overhead expulsion fuse program should necessary fuse replacements not be sufficiently addressed through other programs. At that time, these fuses will most likely be evaluated and prioritized based on geographic location and

[24] 2019 efforts focused on development of engineering standard and detailed scoping.
[25] While not explicitly requested in supplemental tables, the 2023 scope was provided to provide context for the total program values.

overall wildfire risk (Tier 3/II/Zone 1 or the application of the company's new fire risk combined score) for replacement.

Additionally, radial pole clearing, as included in the company's 2019 WMP and expanded in the 2020 WMP, continues to be an alternative way to materially mitigate the same risk as expulsion fuse replacements. This supplemental vegetation management program helps mitigate the potential risk and impact of overhead expulsion fuses by reducing the available fuel at the base of the pole, along with similar risks from other overhead equipment, within the HFTD until alternate devices can be installed as a part of the broader programs.

7.3.3.8 Grid topology improvements to mitigate or reduce PSPS events

The totality of the company's wildfire mitigation programs include, as a component, improvements to mitigate or reduce PSPS events. Examples of such programs include the application of advanced protection schemes, installation of covered conductor, installation and operation of weather stations, or enhanced inspections and corrections. While the company's many wildfire mitigation programs are designed and focused to reduce the overall wildfire risk, PacifiCorp anticipates that, as these programs evolve, an additional benefit will be realized through the reduction of potential PSPS events.

However, PacifiCorp interprets the grid topology improvements to mitigate or reduce PSPS events to be specific program components which mitigate either the frequency, duration, or overall impact of PSPS events not included in other wildfire mitigation programs such as those noted above.

As many of PacifiCorp's points of delivery (customers) reside within the HFTD and PSPS zones, it is challenging to mitigate or reduce the entire existence of a PSPS event through grid topology improvements alone. Therefore, efficient and effective grid topology improvements mitigate or reduce PSPS events in the company's service territory to focus on augmentation or evaluation of existing circuitry as opposed to complete relocation of assets.

While PacifiCorp only implemented one PSPS event in the state of California during the 2020 fire season, PacifiCorp did monitor elevated risk conditions throughout the year and when required was vigilant while still retaining the processes and capacity to implement a PSPS event. During these time periods, PacifiCorp learned that the ability to efficiently and effectively implement a PSPS event within the company's service territory in a manner that keeps the impact to customers and communities as low as practical is about flexibility, system knowledge, and the capability to make informed decisions based on accurate information to task appropriate action in the moment.

As a result, PacifiCorp's grid topology improvements to mitigate or reduce PSPS events will focus on the evaluation of various scenarios within the company's pre-defined PSPS zones to understand what projects may be able to promote this flexibility and inform decision making. PacifiCorp anticipates that the planned asset hardening projects provide the system flexibility that as weather patterns and specific risks change the company will have the capability to implement reactive switching or isolation points during an event; minimizing customer impact.

While opportunity for additional equipment installations outside the other asset hardening programs may exist, PacifiCorp assumes these projects will be limited in scope and expenditure and will be considered on a case by case basis. At this time, no specific scope or budget has been set aside for this program.

7.3.3.9 Installation of system automation equipment

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. Previously it had outlined certain forms of automation equipment within the area of situational awareness (i.e. relays functioning as fault locators/detectors) however it has combined all such similar devices within this initiative area.

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 expedite restoration efforts. Currently, the scope of this program includes 68 projects throughout the HFTD over four years, with completion of

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

PacifiCorp does not currently have a specific grid design and system hardening wildfire mitigation program focused on maintenance, repair, and replacement of connectors, including hotline clamps. Replacement of connectors, where applicable, is included in other programs such as installation of covered conductor.

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

PacifiCorp does not currently have an additional 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 5.3.3.8.

Both of these programs are combined as relevant grid topology improvements pertaining to grid design and system hardening that reduce PSPS events inherently also mitigate the impact on customers. Furthermore, 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 and Section 5.6.2.

7.3.3.12 Other corrective action

PacifiCorp's other correction action initiative is also known as the small diameter conductor replacement initiative.

1. *Risk to be mitigated*

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.

2. *Initiative selection*

The scope of this program includes the replacement of small diameter copper and iron conductors of distribution voltage throughout PacifiCorp's California service territory with aluminum stranded conductor.

3. *Regional prioritization*

Replacement of this small diameter conductor can happen alongside verification of protection control systems (as modeled in the company's probability arc energy methods, described in Section 4.5.2) or installation of system automation equipment to facilitate advanced protection and control schemes or coincident to installation of covered conductor. While critical to reducing wildfire risk, these stand-alone projects are generally located in lower fire risk locations when compared to those of other programs such as covered conductor installation that specifically targets PSPS zones. Therefore, these projects are assigned a lower priority and are not targeted for construction until 2022 and later except where coincident with other programs as describes above.

4. *Progress on initiative*

A high-level summary of the program scope is included below of the both the planned replacements coincident with other projects such as the installation of covered conductor as well as standalone projects not coincident with other line-miles or reconductoring. Specifically, 3.78 and 2.54 miles of coincident work occurs in 2021 and 2022 and 100 miles are proposed for evaluation as stand-alone replacements in 2023 and beyond.

Table 7-3: Small Diameter Conductor Replacement

Component	Total Program	2019	2020	2021	2022	2023
Distribution (line-miles)	106.43	0	0	3.78	2.65	100[26]

Additional details regarding progress can also be found in Table 12 of Attachment 1-2021 Performance Metrics Data Template

[26] Approximation of scope to be refined/evaluated in 2022 for potential execution beginning in 2023 as stand alone work.

5. Future improvements to initiative

As this program evolves, PacifiCorp anticipates continuing to evaluate lower ampacity conductors for coordination risk. As previously indicated, at this time, approximately 100 line-miles have currently been identified for evaluation in 2022 and potential replacement beginning in 2023 as stand-alone projects.

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

Over the years, transmission construction and design standards have evolved to reflect improvements in both engineering and modeling, resulting in higher strength and more robust installations. However, as standards evolved, lines are not necessarily rebuilt or replaced until the condition warrants a rebuild or replacement, typically diagnosed proactively during an inspection or performed reactively as a result of equipment mis-operation.

1. Risk to be mitigated

As an expected result, the potential exists for older installations to not meet 2021 design and strength standards. Less than adequate strength margins pose wildfire risk as these lines may become susceptible to extreme weather events. However, modelling and evaluating the strength of older installations can prove challenging as modern datasets such as exact pole height, diameter, lean, and attachment height and characteristics, may not be available.

2. Initiative selection

LiDAR data collection, which allows for highly accurate 3- Dimensional (3D) depictions of pole assets, can be used to supplant existing models and assumptions to identify real time pole loading concerns of poles already in-service. This enhanced analysis can also be used to recommend, and schedule prioritized corrective work such as pole or insulator replacements and pole reinforcement. The specific objectives of PacifiCorp's pole loading LiDAR pilot project in CA were to:

- Identify any transmission poles at risk for structural integrity and recommend corrective action;
- Determine what improvements or accuracy can be made to structural modeling through the collection of LiDAR data;
- Observe differences between CA Heavy (installations > 3000ft elevation) and CA Light (installation < 3000ft elevation) Structural Modeling Cases; and
- Inform additional program funding or risk assessment of other transmission lines.

3. Regional prioritization

Therefore, in recognition of the growing wildfire risk, PacifiCorp has piloted the use of LiDAR to create structural models to calculate pole leading capacity on a subset of the company's transmission lines, namely 4 miles of 1978 vintage line and 19 miles of a 1920/1950 vintage line.

4. Progress on initiative

Regarding objective number one, to date, LiDAR data has been collected and analyzed on a total of 23 transmission line miles in CA to determine the effective remaining strength. PacifiCorp observed positive results through improved identification of poles with pole loading concerns and corrective action to address 134 high priority pole locations is currently being planned. At this time, the detailed correction at each location, which may include pole replacement or reinforcement depending on the nature of the reduced strength, has yet to be completed. Additionally, many of these locations are

coincident to other hardening programs and efforts which may require a change to correction scope. Regardless, PacifiCorp intends to complete this detailed scope, plan, and complete corrective action in 2021/2022. See Table 10 in Attachment 1-2021 Performance Metrics Data Template for more information.

5. Future improvements to initiative

Additionally, PacifiCorp intends to evaluate objectives 2-3 in 2021 to evaluate and quantify program benefits and inform program expansion and funding beyond the pilot project phase. The company anticipates providing a more detailed update in future filings as work on the pilot project progresses. More information can also be found in Section 4.4.

7.3.3.14 Transformers maintenance and replacement

Similar to capacitor maintenance, overhead transformer maintenance and replacement is a key component of the company's detailed inspection of overhead distribution line program described in Section 7.9.4.1. Equipment deficiencies such as loose connections or fire risks such as leaks are identified during these inspections and corrective work is planned consistent with the assigned risk or priority level. For example, a transformer actively leaking oil would be identified and corrected consistent with a Priority A level condition and reduce wildfire risk.

While this component of the company' detailed inspection of overhead distribution line program reduces wildfire risk, it is considered a standard program with no incremental funding and was included in the company's most recent General Rate Case. For more information, see Section 7.9.4.1.

7.3.3.15 Transmission tower maintenance and replacement

Transmission tower maintenance and replacement is considered a part of PacifiCorp's asset management and inspections program, specifically the company's detailed inspections of overhead transmission lines described in Section 7.9.4.2.

7.3.3.16 Undergrounding of electric lines and/or equipment

PacifiCorp recognizes that value may exist in installation of underground electrical equipment. However, in PacifiCorp's experience, undergrounding of electric utility lines tends to be less economical as compared to the installation of overhead electric lines, including the installation of covered conductor. Therefore, at this time, PacifiCorp does not have any grid design and system hardening wildfire mitigation programs specifically focused on undergrounding of electric lines and/or equipment. It will continue to consider this as an option as it works with communities to identify locations where that approach is an effective mitigation for the more significant cost that is estimated.

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 wildfire mitigation programs focus on updates to grid topology to minimize risk of ignition in HFTDs. PacifiCorp recognizes that, as weather patterns change and overall modeling and assessments evolve, updates to grid topology is something to continue to evaluate.

Other grid design and system hardening programs include, as a component, grid topology improvements to minimize the risk of ignition in the HFTD. Similar to the company's grid topology improvement to mitigate or reduce PSPS events described in Section 5.3.3.8, PacifiCorp recognizes that it is challenging to mitigate wildfire risk through grid topology changes alone. Therefore, PacifiCorp focuses more on augmentation of existing circuitry through system hardening efforts included throughout Section 5.3.3.

7.3.4 ASSET MANAGEMENT AND INSPECTIONS

PacifiCorp maintains its system and assets consistent with the California General Orders through a range of inspection and maintenance programs. Generally, these programs focus on inspection and correction of overhead energized electric lines, but also extend to intrusive pole testing, substation inspections, and pilot projects to deploy enhanced or alternate diagnostic technology. While the specifics of each asset management and inspection program may be unique, certain themes, namely the risk to be mitigated, the rationale for initiative selection, and regional prioritization, progress, and future improvements are common throughout. In support of the WSD's desire to avoid using equivocating language and reduce repetitive language and discussion, these common themes are specifically discussed below.

1. *Risk to be mitigated*

PacifiCorp's asset management and inspection programs Inspection and correction programs are tailored to identify conditions that could result in premature equipment failure or potential fault scenarios, including situations in which the infrastructure may no longer be able to operate per code or engineered design, or may become susceptible to external factors, such as weather conditions. More specifically, these programs are designed to mitigate the risk associated with equipment mis-operation and failure as well as the susceptibility and vulnerability of the infrastructure to external factors. These programs align with GO95, GO165, and GO 174 and, in certain instances, exceed the regulatory requirements.

2. *Initiative selection*

With the exception of initiatives that exceed regulatory requirements, PacifiCorp's asset management and inspections initiatives are selected to align with GO95, GO165, and GO174 and are often considered standard operations which evolve with the applicable regulation. PacifiCorp's enhanced inspection program, which exceeds regulatory requirements, is discussed in more detail in Section 7.3.4.5.

3. *Region prioritization*

As PacifiCorp's asset management and inspections initiatives are aligned with regulatory requirements and are cyclic, where the scope of each program is required to comply with regulation and is spread across a given inspection or maintenance cycle. For example, the company performs a detailed inspection of overhead distribution facilities on a 5-year cycle. To accomplish this cycle, a portion of the company's overhead distribution facilities are inspected each year to level load resources and manage work. The annual scope of work is also required to ensure alignment with proscribed cycles. Given this compliance related requirements to perform the work, no prioritization is applied at the initiative level. However, within each initiative, prioritization to accomplish the year's require scope is often applied to facilities to preference locations within high risk regions, namely PSPS zones, during certain intervals. For example, the company targets completion of its planned work within PSPS regions prior to the beginning of fire season each year. The scope and phasing of the company's enhanced inspection program is included in Section 7.3.4.5.

4. Progress on initiative

PacifiCorp has included initiative specific progress and spending in Table 12 of Attachment 1-2021 Performance Metrics Data Template. PacifiCorp has fully incorporated the new wildfire mitigation elements into the company's asset management and inspections programs consistent with new regulation. Additionally, high level findings and trends, where applicable, have been included in the detailed subsection for each initiative.

5. Future improvements to initiative

PacifiCorp anticipates that as the research and pilot projects discussed in Section 4.4 progress, existing asset management and inspection programs may be augmented to incorporate lessons learned and, potentially, new techniques. However, PacifiCorp does not have any firm plans at this time.

In addition to the common themes described above, certain elements and protocols are also consistent throughout PaciCorp's asset management and inspection programs and, to provide context, are discussed below.

Utilities protocols relating to maintenance or any electric lines that could directly, or indirectly relate to wildfire ignition

Inspection and correction programs are the cornerstone of a resilient system. These programs are tailored to identify conditions that could result in premature failure or potential fault scenarios, including situations in which the infrastructure may no longer be able to operate per code or engineered design, or may become susceptible to external factors, such as weather conditions.

PacifiCorp performs inspections on a routine basis as dictated by both state specific regulatory requirements and company-specific policies. When an inspection is performed on a PacifiCorp asset, inspectors use a predetermined list of condition codes (defined below) and priority levels (defined below) to describe any noteworthy observations or potential non-compliance discovered during the inspection. Once recorded, the company uses condition codes to establish the scope of and timeline for corrective action to make sure that the asset is in conformance with National Electric Safety Code (NESC®) requirements, state-specific code requirements such as California General Orders, and/or company specific policies. This process is designed to correct conditions while reducing impact to normal operations.

Key terms associated with PacifiCorp's Inspections & Corrections Program are defined as follows:

- **Detailed Inspection** – a careful visual inspections accomplished by visiting each structure, as well as inspecting spans between structures, which is intended to identify 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 which need to be corrected in order to maintain reliable and safe service.
- **Pole Test & Treat** – an inspection of wood poles to identify decay, wear, or woodpecker damage, which may include pole-sounding, inspection hole drilling, and excavation tests to assess the pole condition and identify the need for any treatment, repair, or replacement.
- **Patrol / Visual Assurance Inspection**– a brief visual inspection performed by viewing each facility from a vantage point allowing reasonable viewing access, which is intended to identify damage or defects to the transmission and 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.

- **Enhanced Visual Inspection** – Visual Assurance Inspection paired with additional data collection such as infrared, ultraviolet, or LiDAR technology to further evaluate and categorize the current status of electric utility assets and inform the need for a prioritization of corrective actions.
- **Condition** – The state of something with regard to appearance, quality, or working order which can sometimes be used to identify potential impact to normal system operation or clearance, which is typically identified by an inspection.
- **Condition Codes** – Predetermined list of codes for use by inspectors to efficiently capture, categorize, and communicate observations and inform the scope of and timeline for potential corrective action.
- **Correction** – Scope of work required to remove a Condition within a specified timeframe.
- **Priority Level** – the level of risk assigned to the condition observed, as follows:
  - Priority A – Risk of high potential impact to safety or reliability which includes, as a subset, imminent threats equivalent to Level 1 conditions;
  - Priority B – Any other risk of at least moderate potential impact to safety or reliability, equivalent to Level 2 conditions;
  - Priority C – Any other risk of at least low potential impact to safety or reliability, equivalent to Level 3 conditions;

PacifiCorp's asset inspection program involves three primary types of inspections: (1) Visual Assurance Inspection; (2) Detailed Inspection, and (3) Pole Test & Treat. Inspection cycles, which dictate the frequency of inspections, are set by PacifiCorp asset management and reflect both industry best practices and state specific requirements. In general, Visual Assurance Inspections are conducted more frequently, to quickly identify any obvious damage or defects which could affect safety or reliability, and Detailed Inspections are performed less frequently as detailed inspections are more thorough or intrusive. The frequency of Pole Test & Treat is typically dictated based on state specific requirements and, where applicable, is conducted in conjunction with certain Detailed Inspections.

Regardless of the type of inspection, the inspector conducting the inspection will notate any Conditions and assign a Condition Code and Priority Level in PacifiCorp's Facility Point Inspection (FPI) system. Corrections are then scheduled and completed within the correction timeframes established by PacifiCorp asset management, which typical reflect industry best practices or state specific requirements. In all cases, the timeline for Corrections takes into account the Priority Level of any identified Condition. Not surprisingly, a Priority A Condition is addressed on a much shorter timeframe than a Priority B Condition.

Wildfire Mitigation Inspection and Correction Program Enhancements – Fully Implemented

While 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 ignite a fire. Nonetheless, recognizing the growing risk of wildfire and recent changes to California General Orders, PacifiCorp designed and incorporated additional elements to supplement the company's standard inspection and correction programs, mitigate the growing wildfire specific operational risks, and create greater resiliency against wildfires. These elements were developed in 2018, fully implemented in 2019, and are now considered part of the company's standard operations.

There are four primary elements to these improvements now considered standard operation: (1) creating a fire risk Condition Code; (2) increasing inspection frequencies in Fire High Consequence Areas; (3)

narrowing Correction timeframes for Fire Risk Conditions; and (4) piloting new technologies to facilitate Enhanced Inspections.

Fire Risk Conditions

PacifiCorp currently designates certain Conditions as "Fire Risk Conditions." Each Condition is still assigned a Condition Code (i.e. CONDFRAY for a damaged or frayed primary conductor) – but certain Condition Codes are categorically designated as a Fire Risk Condition. Accordingly, if a Condition is designated under a particular Condition Code associated as a fire risk, the Condition will also be designated as a Fire Risk Condition. To this end, a review was performed on all existing Condition Codes to determine whether the Condition Code could have any correlation with fire ignition. Condition Codes reflecting an appreciable risk of fire ignition were designated as Fire Risk Conditions. For example, if a damaged or frayed primary conductor was observed during an inspection, the inspector would record condition code CONDFRAY, which is designated as a Fire Risk Condition because the Condition could eventually result in an ignition under certain circumstances. In contrast, the observation of a missing or broken guy marker would result in the condition code GUYMARK, which is not designated as a Fire Risk Condition.

Inspection Frequency

Consistent with California General Order 165 and California General Order 95, PacifiCorp increased the frequency of all three inspections types for assets located in Tier 2 and Tier 3 of the HFTD. Consistent with industry best practices, inspections are PacifiCorp's preferred mechanism to identify Conditions, including those considered to be Fire Risk Conditions. Therefore, an increase in the frequency of inspections should result in more timely identification of potential Fire Risk Conditions.

Table 7-4: Relevant wildfire mitigation inspection frequencies are included in the table below

Asset Classification	Inspection Name	Minimum Frequency
Main Grid Transmission	Safety/Visual Assurance	Every year
	Detailed Inspection	Every 2 years
	Detailed / Pole Test and Treat	Every 10 years
OH Local Transmission	Safety/Visual Assurance	Every year
	Detailed Inspection	Every 5 years
	Detailed / Pole Test and Treat	Every 10 years
OH Distribution	Safety/Visual Assurance	Tier 2 & 3 - Every year Non-Tier - Every 2 years
	Detailed Inspection	Every 5 years
	Detailed / Pole Test and Treat	Every 20 years

Correction Timeframe

Reducing the time allowed for Correction of Fire Risk Conditions, as identified through regular inspections, results in reduced exposure to the wildfire risk. PacifiCorp uses a state specific approach to determine an appropriate scope and timeframe for Corrections of Conditions, including Fire Risk

Conditions. These timeframes reflect a balance between local operation risk from wildfire threats and prudent utility practice. Fire Risk Conditions identified within Tier 2 and Tier 3 within the HFTD are assigned a higher risk level than those outside of the HFTD, and, therefore, are corrected within a shorter timeframe to reduce operational risk. Wildfire mitigation related correction timeframes are consistent with CA GO 95 Rule 18A and are included in the table below:

Table 7-5: Wildfire mitigation related correction timeframes

Priority	Location	Correction Timeframe
A - imminent	Any	Immediately
A	Any	30 days
B	Tier 3	6 months
	Tier 2	12 months
	Non-tier	36 months
B-worker safety	Any	12 months
C	Any[27]	5 years

Piloting New Technologies to Facilitate Enhanced Inspections

PacifiCorp also pilots new technology such as IR that facilitates additional data collection to supplement existing programs and facilitate enhanced inspections. Pilot projects that demonstrate value grow into separate enhanced inspection programs. One example of which is the IR inspection of transmission lines and equipment described in Section 7.3.4.8. Other emerging research projects are described in Section 4.4.

7.3.4.1 Detailed inspections of overhead distribution electric lines and equipment

PacifiCorp's detailed inspection program includes a careful visual inspection accomplished by visiting each structure, as well as inspecting spans between structures, which is intended to identify 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 which need to be corrected in order to maintain reliable and safe service. During a given calendar year, PacifiCorp prioritizes inspections of facilities located within the HFTD to occur earlier in the year, specifically Tier 3.

During an inspection, an inspector will document any potential violations or noteworthy observations including potential fire threats, by assigning a Condition Code and Priority Level in PacifiCorp's system of record. The Priority Levels are assigned to align with GO 95, Rule 18, and the conditions codes are specifically designed to categorically pre-determine fire threat conditions as well as other types of conditions. In a typical year, PacifiCorp performs approximately 13,000 detailed inspections of electric distribution facilities and identifies approximately 7,000 conditions that require corrective action. The top

[27] PacifiCorp defines a Fire Risk Condition as having at least moderate potential impact to safety or reliability and, as a result, only assigns a condition code priority of A or B to this subset of Conditions. Therefore, accelerated correction timeframes for Fire Risk Conditions which include specific rules based on geographic wildfire risk location cannot apply to C conditions.

five types of corrective actions required as a result of detailed inspections of distribution electric lines and equipment in 2020 were:

Table 7-6: The top five types of corrective actions required as a result of detailed inspections of distribution electric lines and equipment in 2020

Condition- Description	Fire Risk Condition?	Type of Corrective Action	Quantity (2020)	% of identified in 2020[28]
GO95MLD - MOLDING BROKEN, MISSING OR LOOSE	No; safety condition	Fully Attach or Replace Molding	2,146	27%
GO95HV - HIGH VOLTAGE SIGN MISSING	No; safety condition	Install HV sign	1,312	17%
SVCDEFLC - SERVICE WIRE DEFLECTED OR ABRADED BY VEGETATION (conductor and insulation remain intact)	No[29]; reliability	Clear vegetation; install mucket or guard	587	7%
BIRDDMG – WOODPECKER OR NEST IN PRIMARY	No[30]; reliability	Evaluate for nest's impact to pole strength; pole replacement/repair	554	7%
GO95TCH - GO95-NEED 3" GAP SVC TO POLE/XARM	Yes, if conductor's insulation may be compromised	Create needed clearance	546	7%

PacifiCorp's detailed inspections of distribution electric lines and equipment is a critical program required to maintain regulatory compliance with California General Order 165 and 95. However, the presence of conditions identified during an inspection demonstrates that this standard program provides value beyond strictly maintaining compliance. Table 1 in Attachment 2.3 includes a more extensive breakdown of conditions identified and effectiveness.

7.3.4.2 Detailed inspections of overhead transmission electric lines and equipment

PacifiCorp's detailed inspection program includes a careful visual inspection accomplished by visiting each structure, as well as inspecting spans between structures, which is intended to identify 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 which need to be corrected in order to maintain reliable and safe service.

During a given calendar year, PacifiCorp prioritizes inspections of facilities located within the HFTD to occur earlier in the year, specifically Tier 3. 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.

[28] Reflects the percentage of all findings as a result of detailed inspections of overhead distribution lines in CA in 2020.
[29] If conductor is abraded sufficiently that insulation is compromised, an alternative condition is used which would be a fire risk.
[30] If damage is significant enough to compromise structural integrity, an alternate condition is used which is a fire risk

During an inspection, an inspector will notate any potential violations or noteworthy observations including potential fire threats, by assigning a Condition Code and Priority Level in PacifiCorp's system of record. The Priority Levels are assigned to align with GO 95, Rule 18, and the conditions codes are specifically designed to categorically pre-determine fire threat conditions as well as other types of conditions. In a typical year, PacifiCorp performs approximately 3,000 detailed inspections of electric transmission facilities and identifies approximately 500 conditions that require corrective action. The top five types of corrective actions required as a result of detailed inspections of transmission electric lines and equipment in 2020 were:

Table 7-7: Top five types of corrective actions required as a result of detailed inspections of transmission electric lines and equipment in 2020

Condition- Description, Type of Corrective Action	Fire Risk?	Type of Corrective Action	Quantity	% of Identified Conditions Identified in 2020[31]
GO95HV - HIGH VOLTAGE SIGN MISSING	No; safety	Install HV sign	215	30%
BIRDDMG - WOODPECKER OR NEST IN PRIMARY	No[32]; reliability	Evaluate for nest's impact to pole strength; pole replacement/repair	90	13%
GUYNOINS - No guy insulator or is not effectively grounded,	No, safety	Install guy insulator and/or ground	66	9%
GO95STUB - hollowed out butt in pedestrian area or in pedestrian area and less than 8.5' high	No; safety	Remove stub	20	3%
POLEREPL – DAMAGED POLE,	Yes; when located in high fire risk area	Replace pole	15	2%

PacifiCorp's detailed inspections of transmission electric lines and equipment is a critical program required to maintain regulatory compliance with California General Order 165 and 95. However, the presence of conditions identified during an inspection demonstrates that this standard program provides value beyond strictly maintaining compliance. Table 1 in Attachment 2.3 includes a more extensive breakdown of conditions identified and effectiveness.

7.3.4.3 Improvement of inspections

PacifiCorp has incorporated improvements to its standard inspection programs with full implementation in 2019 based on changes to regulatory requirements and California General Order 165. These primary improvements included (1) creating a fire risk Condition Code; (2) increasing inspection frequencies in Fire High Consequence Areas; (3) narrowing Correction timeframes for Fire Risk Conditions; and (4) piloting new technologies to facilitate Enhanced Visual Inspections.

[31] Reflects percentage of all findings as a result of detailed inspections of OH transmission lines in CA in 2020.
[32] If damage is significant enough to compromise structural integrity, an alternate condition is used which is a fire risk.

Additional enhanced inspections are discussion in Section 7.9.4.5.

7.3.4.4 Infrared inspections of distribution electric lines and equipment

PacifiCorp does not have an infrared of distribution electric lines and equipment program at this time.

7.3.4.5 Infrared inspections of transmission electric lines and equipment

PacifiCorp's infrared inspections of transmission electric lines and equipment is considered an Enhanced Inspection, the thoroughness exceeds the requirements of traditional detailed or visual inspections and is entirely supplemental to existing programs. PacifiCorp's current IR inspection program evolved from the 2019 IR inspection pilot program described in PacifiCorp's 2020 CA Wildfire Mitigation Plan (WMP), uses a new technology to proactively identify equipment failure, and aligns with California's Wildfire Mitigation Plan (WMP) guidelines for wildfire mitigation strategy.

1. *Risk to be mitigated*

Effective inspections of PacifiCorp equipment and facilities evaluate conditions which impact reliability and safety and initiate corrective.

The purpose of PacifiCorp's IR (infrared) 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*

As included in the company's 2019 California WMP, PacifiCorp proposed implementing new enhanced transmission line inspections with a focus on proactive identification and prevention of equipment failure. When developed, and included in the 2019 WMP, these inspections were thought to be an annual inspection performed via either helicopter or UAS technology on all overhead transmission lines in the state of California. PacifiCorp also noted in the Company's 2019 WMP that the frequency of proposed programs/inspections reflected PacifiCorp's reasonable best estimate based on available knowledge and prudent utility practices and that PacifiCorp anticipated using data collected during these new inspections to further inform required frequency and anticipates changing the frequency at a future date to better reflect a risk-based approach.

3. *Regional Prioritization*

PacifiCorp implemented an initial pilot project in 2019 to serve as a proof of concept to further evaluate and inform an infrared inspection program. Initially, inspections were planned and prioritized based on risk to ensure that all Tier II, Tier III, and PSPS locations were inspected during Q2, prior to the beginning of fire season. Based on initial successes and lessons learned, which included ensuring a focus on phasing and targeting peak loading conditions during the inspections, this initial pilot was followed up with a second pilot project in 2020 to refine inspection frequency as well as program management and documentation efforts. As a result, IR inspections in 2020 were prioritized and planned to target peak loading or near peak loading conditions as opposed to seasonal

or time based in order to optimize the detection capabilities and effectiveness of the inspections. The prioritization and planning demonstrated positive results and has continued to be a critical component to the inspection program.

4. Progress on Initiative

Since the initial pilot project in 2019, the IR transmission inspection program has identified 5 hot spots specifically using IR technology, primarily at jumper splice/connections. These reflect conditions not typically detectable through a traditional visual inspection. An additional 3 conditions were identified through a simultaneous visual inspection as an incremental benefit to the program. All of the hot spots prioritized as "urgent" have all been corrected, thereby reducing wildfire risk. Other medium to low risk conditions are planned for corrective action. The following table describes the program evolution as well as number of findings and cost effectiveness of findings. Additional information regarding progress can be found in Table 12 of Attachment 1-2021 Performance Metrics Data Template.

Table 7-8: Program evolution findings and cost effectiveness findings

Program Year	Goals / Description	Line-Miles	Cost	# of Findings	$/ findings	Finding/ Line Mile
2019 Pilot Program	☐ Demonstrate capability to detect hot spots through IR inspections ☐ Test the capability of IR technology at base loading as compared to peak loading conditions	1,474	$237k	1	$237k/ finding	1 finding per 1,474 line-miles
2020 Pilot Program	☐ Refine inspection frequency requirements and prioritization ☐ Optimize program management/ documentation	866	$167k	7	$24k/ finding	1 finding per 124 line-miles
On-Going Program (in progress)	☐ Execute newly developed program management processes ☐ Continue to evaluate cost effectiveness and inspection frequency requirements ☐ Gather data on loading baseline recommendations for siting hot spots ☐ Gather data on contributing variables to hot spot identification	700	$80k	TBD	TBD	TBD

5. Future improvements to initiative

Currently, the scope of PacifiCorp's Enhanced Inspection program includes an annual IR inspection via helicopter of all overhead transmission lines within the company's California service territory. PacifiCorp intends to continue to implement this annual program and evaluate its effectiveness which

can be determined based on the number of findings each year. In the future, PacifiCorp may augment the scope of the inspection cycle based on the effectiveness as well as the evolution of the company's risk model.

7.3.4.6 Intrusive pole inspections

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. While PacifiCorp's intrusive testing can be performed as a stand along inspection, it is most often performed in conjunction with a detailed inspection described in Sections 7.9.4.1 and 7.9.4.2.

PacifiCorp's intrusive poles inspections are performed consistent with the cycle proscribed in California General Order 165. However, the presence of conditions identified during an inspection demonstrates that this standard program provides value beyond strictly maintaining compliance. Specifically, PacifiCorp consistently observes between a 2% and 4% reject rate across its entire service territory as a result of the intrusive pole inspection program. In 2020, approximately 25 poles were identified for replacement as a result of this program.

7.3.4.7 LiDAR inspections of distribution electric lines and equipment

LiDAR data collection allows for highly accurate 3D modeling of assets and any objects within a range of those assets. This model can be used to calculate asset specific pole lean, identify potential compromised clearance or encroachments, evaluate threats and verify exact locations of assets. The identification of these hazards can help prevent fault scenarios and reduce ignition risk.

However, full deployment and application remains unclear. Therefore, PacifiCorp developed and implemented a pilot project to scan and model a select subset of assets using LiDAR technology. Effectiveness of the pilot project was to be determined through the identification of recommended corrective or proactive work not typically identified through traditional visual inspections or processes.

In 2019, PacifiCorp performed LiDAR (Light Detection and Ranging) data collection, analysis, and system modeling on the PacifiCorp network in four select areas of Northern California consisting of 924 line-miles and 12,803 structures. Assets inspected include both transmission and distribution in rural and suburban environments. Contractor services were utilized for data collection via fixed wing aircraft, data processing, and system modeling.

Refer to the below chart and map for details on the assets and geographic areas where this pilot program was implemented:

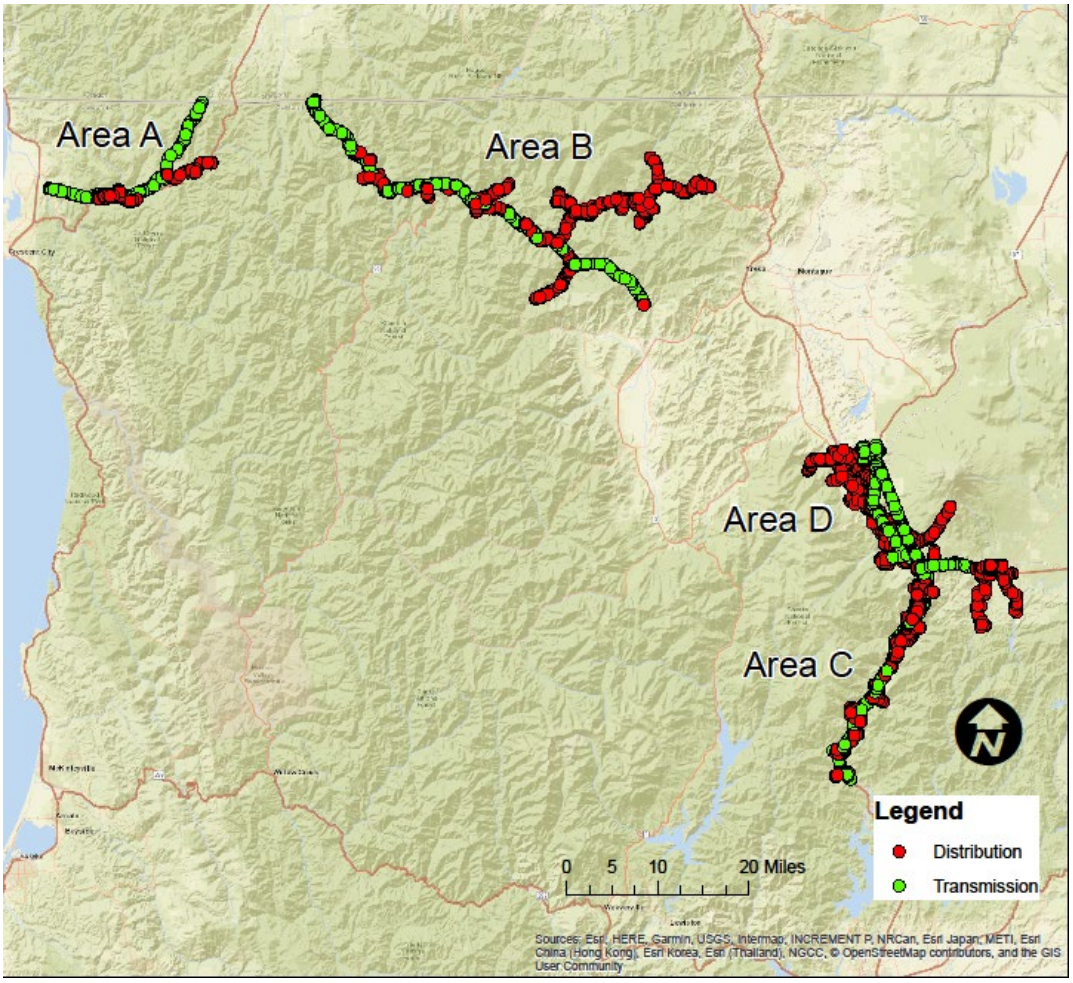
Table 7-9: Asset details where LIDAR pilot program was implemented

Area of Interest	Description	Total OH Line-Miles	Distribution		Transmission	
			Line-Miles	Voltage(s)	Line-Miles	Voltage(s)
A	NW CA Del Norte Substation to Oregon State Line	132	18	12.47 kV	114	115kV

B	Klamath National Forrest Line 33 - Oregon State Line to Junction	174	104	4.16 kV, 12.47 kV	70	69kV
C	North Central CA Line 2 - Shasta to South End	266	99	2.4kV, 4.16kV, 12.47kV, 20.8kV	167	69kV, 115kV
D	Shasta to Weed	352	155	2.4kV, 4.16kV, 12.47kV, 20.8kV	197	69kV, 115kV

TOTAL	***A, B, C, D***	***924***	***376***	***2.4kV, 4.16kV, 12.47kV, 20.8kV***	***548***	***69kV, 115kV***

Figure 7.3-2: Areas where LIDAR pilot program was implemented



PacifiCorp, in conjunction with the service provider, used the collected data to model and, as a paper exercise, identify imminent threats, assess current status and risk, map vegetation densities, and inform future vegetation clearing cycles.

While the collection of data and computer visualization looked promising, field verification of desktop analysis fell short of expectations. It was challenging to turn the data and evaluation into action and meet the original needs of the project and the company found it was dispatching resources to address clearance risks that did not exist, detracting from other critical wildfire mitigation work. PacifiCorp attributes these challenges to the maturity of the technology in this specific application. LiDAR data collection, interrogation, and interpretation is mature in the clearance and strength modeling applications of traditional transmission and distribution overhead assets, but lacks maturity in the segmentation, vegetation fall in risk, and vegetation clearance calculation application. However, PacifiCorp believes there could be future value in the collection of LiDAR to inform asset and vegetation management is evaluating additional methods for implementing this technology in the best manner possible given the sparsely populated service territory. This evaluation is part of Pilot Project 3 discussed further in the research section.

7.3.4.8 LiDAR inspections of transmission electric lines and equipment

See Section 7.9.4.7.

7.3.4.9 Other discretionary inspection of distribution electric lines and equipment, beyond inspections managed 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 mandates by rules and regulations

At this time, PacifiCorp does not have any specific asset management and inspections wildfire mitigation programs focused on other discretionally inspection of transmission lines not included in other programs.

7.3.4.11 Patrol inspections of distribution electric lines and equipment

PacifiCorp's patrol inspection program includes a brief visual inspection performed by viewing each facility from a vantage point allowing reasonable viewing access, which is intended to identify damage or defects to the transmission and 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 distribution electric lines and equipment is a critical program required to maintain regulatory compliance with California General Order 165 and 95. PacifiCorp's patrol inspection program is also critical to reducing wildfire risk through the identification of conditions. As a patrol inspection is less thorough than a detailed inspection, it is expected that fewer findings are identified. For

example, 142 findings were identified in 2020 as a result of patrol inspections compared to 7,909 identified during detail inspections. Nonetheless, the identification of any conditions during a patrol inspection demonstrates that this standard program provides value beyond strictly maintaining compliance. Table 1 in Attachment 2.3 includes a more extensive breakdown of conditions identified and effectiveness.

7.3.4.12 Patrol inspections of transmission electric lines and equipment

PacifiCorp's patrol inspection program includes a brief visual inspection performed by viewing each facility from a vantage point allowing reasonable viewing access, which is intended to identify damage or defects to the transmission and 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 transmission electric lines and equipment is a critical program required to maintain regulatory compliance with California General Order 165 and 95. PacifiCorp's patrol inspection program is also critical to reducing wildfire risk through the identification of conditions. As a patrol inspection is less thorough than a detailed inspection, it is expected that fewer findings are identified. For example, 75 findings were identified in 2020 as a result of patrol inspections compared to 709 identified during detail inspections. Nonetheless, the identification of any conditions during a patrol inspection demonstrates that this standard program provides value beyond strictly maintaining compliance. Table 1 in Attachment 2.3 includes a more extensive breakdown of conditions identified and effectiveness.

7.3.4.13 Pole loading assessment program to determine safety factor

At this time, PacifiCorp does not have a specific asset management and inspections wildfire mitigation program focused on pole loading assessment to determine safety factor of in-service assets. Instead, PacifiCorp uses engineering standards and compatible units for various scenarios and grades with inherent safety factors to ensure that the strength of the pole installed is sufficient for the intended use with the applicable safety factors. Inherent to using compatible units and engineering standard equipment is the completion of strength calculations to ensure the pole has sufficient strength for the application. Therefore, the pole loading calculations are performed at the time of installation. Additionally, inherent to the intrusive testing is a measurement of remaining strength. Alternatively, pole loading calculations can be performed to accommodate joint user requests. Therefore, this activity is accomplished as a function of other programs such as new construction or intrusive pole testing.

7.3.4.14 Quality assurance/ quality control of OH inspections

As previously described, inspection and correction programs are the cornerstone of a resilient system. PacifiCorp's programs are tailored to identify conditions that could result in premature failure or potential fault scenarios, including situations in which the infrastructure may no longer be able to operate per code or engineered design, or may become susceptible to external factors, such as weather conditions. Specific to mitigating wildfire risk, these programs identify and correction certain conditions which, if uncorrected, could ignite a fire.

1. Risk to be mitigated

Effective inspections of PacifiCorp equipment and facilities evaluate conditions which impact reliability and safety and initiate corrective actions prescribed in GO95, including fire risk conditions. Therefore, the effectiveness of these programs at reducing operating risk as planned, which includes wildfire risk, relies upon the quality of the inspection itself as well as the proper characterization of any findings. Quality assurance and quality control at PacifiCorp aims to ensure this effectiveness and thereby enable the planned reduction of risk through implementation of the company's inspection programs. Quality assurance and quality control at PacifiCorp generally includes desktop audits and field audits catered 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 utilizes 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 activities is a cost-effective means to minimize the risk that inspection results are inaccurate or unreliable. 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 II and Tier III prioritization
- Software controls which 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, spend, and evolution consistent with feedback from the WSD 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 as per GO95 priority levels, including an expedited correction time period for conditions classified as a fire risk and in the Tier II and Tier III districts. PacifiCorp emphasizes audits in wildfire risk areas by prioritizing Tier II and Tier III regions for inspection in the first half of the year, which also leads to these regions going through the QA/QC process first. After a physical audit is completed, the audit results are compared with the original inspection results to determine whether or not they conform to the set criteria for reporting of conditions, data entry, and performance of work in accordance with company specifications. Non-conforming results are sent to the inspection contractor for re-inspection along with the required re-inspection time period. As an example, 885 physical audits were performed in 2020 which reflects approximately 6.4% of planned inspections.

Software Controls

In recent years, PacifiCorp has migrated to the use of mobile technologies to record inspection records and findings. A renewed focus to the QA/QC of inspections in 2020 led to the enhancement

of the inspection programs and structure along with the addition of software controls to better ensure inspections and findings are recorded consistent with internal procedures. Non-conforming 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 findings, an inspector is not able to enter a C Priority. This ensures that findings are not accidentally mischaracterized with a lower priority level than the program is designed to accept.

Quarterly Desktop Reviews

7,802 desktop audits were performed in 2020, which reflects approximately 57% of PacifiCorp's planned inspections of facilities in CA. Additionally, 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 included a heightened focus on wildfire mitigation by prioritizing review of "fire risk" conditions and conditions in Tier II and Tier III regions for QA/QC and correction.

To support these on-going reviews, a new internal tool was developed and used to evaluate inspection results, automatically isolate open fire risk conditions in plots, facilitate quick data exportation, provide insight about trends, and drive a deeper understanding of the fire risk conditions. Historically, desktop reviews may have 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 will continue to utilize 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 to inspection results is projected to address the issue while it is fresh in the minds of inspectors, drive continuous improvement and learning opportunities, and increase the accuracy of records and reliability of the inspection results.

PacifiCorp intends to continue quarterly desktop reviews, which typically include a deep dive into trends and risk, bit will add a monthly desktop review of conditions for misalignment with program requirements in 2021.

Annual Training

Annually, PacifiCorp field inspection support conducts annual training for field inspectors in January of each year. 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 priority, and ensure effectiveness of an inspection and facilitate corrective action. In January 2021, 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 II and Tier III planned inspections in California and the potential challenges and risks associated with the high fire threat areas. 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 II and Tier III 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 II and Tier III has scaled with the increased volume of inspections within Tier II and Tier III.

4. Progress on initiative

For the 2020 inspection cycle, approximately $36k was spent on physical audits, desktop audits and updating inspector training. The entirety of the 2020 fulfilled QA/QC inspection plan included all of California, including the Tier II and Tier III fire risk areas. PacifiCorp has included initiative specific progress and spending in Table 12 of Attachment 1-2021 Performance Metrics Data Template

5. Future improvements to initiative

In 2021, 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 2021, 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 future plans for the QA/QC of inspection results to include evaluating methodologies which further expedite QA/QC in fire risk regions through prioritization of field audits in tier II and tier III regions.

7.3.4.15 Substation inspections

PacifiCorp performs substation inspections on a routine basis consistent with CA General Order 174 requirements. As a part of this program, qualified personnel inspects PacifiCorp's substations in California on a monthly basis which includes the assessment of physical safety, security, and performance of substation components, including fencing, grounding, and major equipment, as well as the performance of minor housekeep tasks to ensure safe and reliable service. These inspections are considered standard operations that provide incremental reduction to wildfire risk. The following table describes the types on inspections performed as a part of this program and planned frequency for each.

Table 7-10: 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	Bi-Annual (24 months)
Substation & Security Inspection[33]	Bulk Transmission	Monthly
	Other Transmission	At least 8 times per year
	Distribution	At least 8 times per year

[33] On average, substation and security inspections are typically performed on all substations on a monthly basis. However, internal policies require that non bulk transmission substations are to be inspections at least 8 times per year.

7.3.5 VEGETATION MANAGEMENT AND INSPECTIONS

PacifiCorp's vegetation management program is modeled on the industry's 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 and 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 identified within the company's Vegetation SOP thereby minimizing and/or eliminating safety and reliability risks posed by trees and other incompatible vegetation that has the potential to encroach upon or grow near power lines. These risks are minimized through implementing vegetation inspection and maintenance activities. The overall objective of the vegetation management program is to minimize vegetation related faults, including any faults which 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 centers on cycle work. In areas located outside of the HFTD, vegetation management work circuit is done 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, however, vegetation management work is conducted annually. Where scheduled program work has not been completed prior to the fire season, an incremental patrol is conducted to identify and correct potential wildfire ignition risks. See Section 7.3.1.11.

Vegetation management conducted on or adjacent to transmission line corridors focus on maintaining extended clearances and employing industry practices such as integrated vegetation management (IVM), to promote cover-type conversion thereby preventing any future incompatible vegetation growth disrupting clearances. Because of the nature of transmission lines, wider rights-of-way allow PacifiCorp to generally maintain clearances well in excess of 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 PRC § 4292, PacifiCorp requires a ten-foot cylinder of clear space from pole top to bare ground around "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 ten-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 the work is conducted. Impacts may be expressed in both the planning and implementation phases of the work.

2. Initiative selection

As a customer courtesy, at least five business days in advance of vegetation management work, customers are notified. 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. Where customers refuse to allow PacifiCorp to conduct required vegetation management work, attempts are made to further coordinate with the customer to resolve concerns. If resolution cannot be achieved by PacifiCorp's contracted representative, PacifiCorp's Senior Utility and/or Utility Forester will coordinate with the customer to attempt to resolve concerns and acquire customer consent. If this coordination is unsuccessful, PacifiCorp will determine course in conducting the required work.

Through this customer interaction, PacifiCorp will take opportunities to provide or present through discussion, a variety of 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 in order 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 and coordinated with.

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.

In order to minimize environmental impacts and impacts to other sensitive resources, PacifiCorp conducts environmental reviews (biological and cultural) of vegetation management activities where warranted. Supporting fieldwork and environmental surveys are also conducted where applicable to protect sensitive resources. To facilitate these reviews, minimize timeframe to acquire agency approvals and ensure consistent implementation of process between PacifiCorp and federal land managing agencies, PacifiCorp will continue develop Operations and Maintenance Plans (O&M Plan) in accordance with applicable regulation and guidance that precipitated from joint efforts with the Edison Electric Institute, utilities, and federal agencies to develop a Memorandum of Understanding on Vegetation Management for Powerline Rights-of-Way (dated September 29, 2016) and subsequent 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. This legislation 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.

O&M Plan(s) will 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 upon 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 will outline measures to be implemented by PacifiCorp for the protection of sensitive resources based on maintenance activity type, including vegetation management activities. The O&M Plan will also include agreed upon roles and responsibilities of PacifiCorp and the applicable land managing agency to support PacifiCorp's rapid response to correct conditions identified in a timely manner. Development of these plans also serves as an outreach opportunity 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, take 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 upon 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*

In response to unprecedented wildfires experienced in PacifiCorp's service territory, PacifiCorp conducted focused outreach to customers within the footprint of PacifiCorp's vegetation management emergency response activities. This outreach included automated callouts, increased field presence to coordinate with and inform customers, and establishing a hotline customer could call seeking additional information.

Development of O&M Plans will be a multi-year effort. PacifiCorp is currently coordinating with the Klamath National Forest (KNF) to develop an O&M Plan. Development of this plans was delayed in 2020 due to COVID-19 and significant wildfire response actions requiring the attention of the KNF. The O&M Plan with the KNF will be completed in 2021. PacifiCorp coordinated with other land managing agencies regarding operational activities, including vegetation management throughout 2020. PacifiCorp also implemented process improvements (standardized biological and cultural reviews) with respect to environmentally screen and evaluate 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 plans to improve and expand the environmental screening process to include a broader scope of project activities in 2021. After completing the O&M Plan with the KNF, PacifiCorp will engage with other land managing agencies within its service territory in 2021 to initiate O&M Plan development with them. In support of this effort, PacifiCorp is also hiring an

additional staff resource to oversee development and long-term implementation of the O&M Plans and associated environmental screening process.

7.3.5.2 Detailed inspections of vegetation around distribution electric 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 adjacent to 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 comply PacifiCorp's program standards/specifications. These pre-work inspections are typically conducted within weeks to 1-2 months by contractors prior to the scheduled program work. Inspectors/pre-listers utilize tablets to record vegetation conditions to be corrected.

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 HFTD, efficient workload distribution, weather conditions, and resource availability.

4. *Progress on initiative*

In 2020, PacifiCorp completed rollout of the electronic planning and tracking system, Section 7.3.1.6, with few exceptions that will be addressed in 2021. 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. In 2021, PacifiCorp expects to inspect over 1,500 miles of distribution line associated with routine vegetation management.

6. *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 timeframe. PacifiCorp will continue to implement use of its electronic planning and tracking system by incorporating all pole clearing activities we conduct in California and will continue to identify improvements to the system. PacifiCorp will also continue to investigate and evaluate other technologies such as LiDAR to augment distribution inspections.

7.3.5.3 Detailed inspections of vegetation around Transmission electric lines and equipment

PacifiCorp's vegetation management inspections associated with transmission line are similar to inspections of vegetation around distribution lines. PacifiCorp's detailed inspections of vegetation around transmission electric lines and equipment, like distribution inspections, focus on maintaining clearances, but with transmission, the clearance distances are much greater. Because of the nature of transmission

lines, wider rights-of-way generally allow PacifiCorp to maintain clearances well in excess of the required minimum clearances set forth in the "Minimum Vegetation Clearance Distance" (MVCD).[34] Accordingly, work is scheduled on an as-needed basis, depending on the results of regular inspections and specific local conditions. To determine whether work is needed, an "Action Threshold" is applied, meaning that work is done if vegetation has grown within the action threshold distance. Additionally, PacifiCorp employs IVM practices to prevent vegetation growth from violating clearances. Inspections of transmission lines are both ground and aerial based. In 2020, 129 miles of main grid transmission were inspected throughout our service territory in California and PacifiCorp plans to inspect 129 miles in 2021.

7.3.5.4 Emergency response vegetation management due to red flag warning or other urgent 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 red flag warnings, however, does adhere with local requirements and restrictions to mitigate ignition risk. During red flag warnings, PacifiCorp may move resources to work in other areas that are not impacted by the red flag warning 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, utilizing a fire watch following work, and using equipment that minimize potential to cause sparks.

PacifiCorp, however, does have emergency response procedures and programs, such as those related to PSPS events. Prior to initiating a PSPS event and to further inform PacifiCorp T&D Operations of current vegetation conditions, PacifiCorp vegetation management may perform patrols to identify and address potential ignition risks due to vegetation. These 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 PDZs where the weather event is occurring.

4. *Progress on initiative*

In 2020 vegetation management conducted several PSPS alert patrols in support of potential PSPS events.

5. *Future improvements to initiative*

Currently tracking of vegetation identified and addressed during PSPS related patrols is embedded within other production data. PacifiCorp will identify ways to improve tracking of vegetation

[34] See Table 2 of FAC-003-04, available at https://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-003-4.pdf

management actions taken relative to PSP events, to quantify number of inspections conducted, miles inspected, and findings corrected.

7.3.5.5 Fuel management and reduction 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 six 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 utilizes a lop and scatter and chipping practices to reduce the volume of available fuel within the right of way and adheres with land managing agency requirements.

An integral component of PacifiCorp's vegetation program that influences fuel management and reduction of slash is 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 utilizes 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.

4. *Progress on initiative*

In 2020, 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 2021, 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 2021, PacifiCorp will continue to seek opportunities to partner with communities and/or agencies to support fuel reduction projects. In addition, PacifiCorp will continue to implement IVM to promote compatible low-growing vegetation to minimize ignition risks, slash management, and expanded pole clearing activities.

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.

7.3.5.5.1 Expanded Pole Clearing

1. Risk to be mitigated

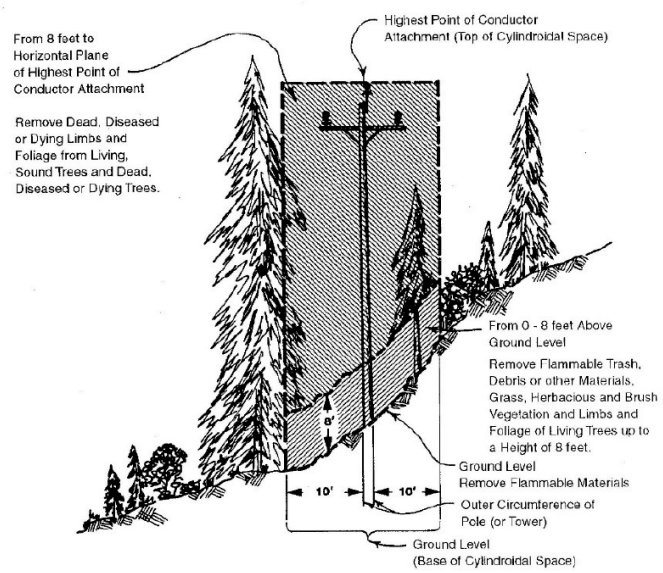
Vegetation at the base of and around poles may provide fuel to a spark from electrical equipment and/or propagate wildfire.

2. Initiative selection

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.

Pole clearing involves the removal of all vegetation within a ten-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 below[35].

Figure 7.3-3: 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, similar to "slash management", pole clearing is designed to reduce 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 which have fuses, air switches, clamps or other devices that could create sparks.

[35] 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

After a pole has been cleared, a spark falling within the 10-foot radius would be much less likely to ignite a fire.

3. Region prioritization
Expanded pole clearing activities take place Local Response Areas.

4. Progress on initiative
In 2020, PacifiCorp conducted vegetation clearing at 2,164 poles as part of the expanded pole clearing program. In 2021, PacifiCorp plans to clear vegetation at 3,047 poles under the expanded pole clearing project.

5. Future improvements to initiative
In order to more efficiently manage the expanded pole clearing project, PacifiCorp will track this activity electronically to develop an inventory of poles to be cleared.

7.3.5.6 Improvement of inspections

1. Risk to be mitigated
Vegetation may not be appropriately identified to be addressed or may not be pruned in accordance with PacifiCorp's Vegetation SOP and vegetation may grow faster and encroach upon conductor clearances.

2. Initiative selection
PacifiCorp has initiated incremental inspections prior to the height of the fire season, see Section 7.3.1.11. In addition, PacifiCorp conducts post audit inspections of completed work and addresses any conditions that do not conform with the vegetation program standards/specifications; see Section 7.3.1.13.

These audits not only serve as quality control but provides opportunities for PacifiCorp Senior Utility and Utility foresters to discuss required specifications and engage with the vegetation management contractors performing the work to strive to improve execution of inspections.

3. Region prioritization
Audits and contractor coordination/review is conducted throughout PacifiCorp's service territory

4. Progress on initiative
In 2020, PacifiCorp foresters increased engagement and interaction 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 5.4.1.

PacifiCorp continues to seek opportunities for improving inspection quality and the use of technology to augment inspections and determine modifications that may be needed in implementing inspections. In 2020, inspections have been improved through the use of an electronic planning and tracking system. See Sections 7.3.1.19 and 7.3.1.20. Historically, PacifiCorp has tracked vegetation management activities at the local level, generally relying on paper forms, maps, documents, and local knowledge. In recognition of growing wildfire risk, and to move toward improved transparency, efficiency, and data analytics, PacifiCorp has incorporated the use of a work planning and tracking system. Inspectors utilize tablets to document vegetation maintenance activity requirements by

location (e.g. parcel or parcels). This information is then available to the contractors conducting the maintenance work, which allows for improved planning and documentation. Once the work is completed it is recorded in the program in the field via tablets utilized by tree crews. Post-audits are then conducted with findings identified within the system. 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

In 2020 PacifiCorp completed initial rollout and implementation of the planning and tracking system and will continue to utilize and improve this system in 2021 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 LiDAR Inspections of vegetation around distribution lines and equipment

1. Risk to be mitigated

Vegetation contact with conductors creates an ignition risk. 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 are the means of mitigating these contact risks, but LiDAR inspections have the potential to determine where mitigation should be performed, quantify the relative risk for vegetation issues between areas, and aid in developing a vegetation inventory.

2. *Initiative selection*

PacifiCorp has been evaluating LiDAR use for vegetation around both distribution and transmission lines through pilot programs utilizing data collected other purposes and small, low-cost demonstrations.

3. Region prioritization

Since the initiative primarily uses repurposed data, most regions were not specially selected by vegetation criteria. For one additional case, the flight path was selected based on helicopter availability and an expectation of high volume of strike trees.

4. Progress on initiative

PacifiCorp completed initial evaluations of LiDAR data analysis from three separate vendors in 2020 and early 2021. These results contained large numbers of false positives for both grow-in and fall-in risks. Use of LiDAR or Hyperspectral data for species identification also produced limited results in initial demos, with either only basic classification of tree type (conifer v deciduous) or large numbers of misidentified tree species. Identification of individual trees through LiDAR data also had large numbers of false positives. In some cases, artificial structures (lamp posts, fences) were identified as trees; and in others, single trees were identified as multiple separate ones. In 2021, PacifiCorp hopes to improve initial LiDAR analysis results through additional work with vendors to reduce false positives and improve tree species classifiers.

5. Future improvements to initiative

PacifiCorp plans to continue working with vendors to improve LiDAR analysis results and make them more viable for integration with vegetation maintenance. PacifiCorp is also exploring additional

technologies or techniques that may be able to perform similar functions to LiDAR. These include vegetation mapping generated from a combination of satellite imagery and LiDAR training data.

7.3.5.8 LiDAR Inspections of vegetation around transmission lines and equipment

Use of LiDAR inspections are being evaluated See Section 7.3.5.7 and Section 4.4.1.

7.3.5.9 Other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations

At this time, PacifiCorp does not have any other discretionary inspection of vegetation around distribution electric lines and equipment.

7.3.5.10 Other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations

At this time, PacifiCorp does not have any other discretionary inspection of vegetation around transmission electric lines and equipment.

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*

For the purpose of further mitigating wildfire risk in the HFTD, PacifiCorp vegetation management has 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.

Beginning in 2019, PacifiCorp implemented “readiness patrols” of overhead lines in HFTD. This initiative facilitates removal and or pruning of vegetation that may pose an ignition risk, such as hazard trees. Prior to the height of the fire season, PacifiCorp conducts these readiness patrols of overhead distribution lines located within HFTD Tier II and Tier III, where program cycle work has not been completed or is not scheduled. Consistent with existing procedures, a Level 1 assessment (ANSI A300 Part 9) is conducted to identify any trees which may have become hazard trees over the course of the prior year and target these trees for removal. In addition, the inspector will identify for pruning or removal of fast-growing vegetation which is likely to violate minimum clearance distances prior to 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 HFTD.

4. Progress on initiative

In 2020, PacifiCorp inspected 1,059 miles of distribution line in HFTD. In 2021, 1,369 miles of distribution line are planned to be patrolled.

5. Future improvements to initiative

PacifiCorp will continue investigating use of technology such as LiDAR to augment these patrols.

7.3.5.12 Patrol inspections of vegetation around transmission electric lines and equipment

PacifiCorp conducts an additional vegetation management inspection of overhead lines in HFTD. For transmission, this inspection is specific to the segments of line that are within the HFTD. Refer to Section 7.3.5.11 for additional inspection detail.

In 2020, PacifiCorp inspected 323 miles of distribution line in HFTD. In 2021, 348 miles of transmission line are planned for this incremental inspection.

7.3.5.13 Quality assurance / quality control of inspections

1. Risk to be mitigated

Vegetation may not be appropriately identified to be addressed or may not be pruned in accordance with PacifiCorp's Vegetation SOP presenting a risk of contact with conductors.

2. Initiative selection

Audits are critical to ensure vegetation requiring work (pruning and/or removal) are properly identified and the work is subsequently conducted in accordance with vegetation program standards/specifications.

PacifiCorp's Vegetation SOP includes the company's standard procedures and protocols for performing vegetation management audits.

In general, this standard includes routine tree crew audits of transmission, distribution and pole clearing activities where the primary purpose is an assessment of quality assurance. Each audit may include a Forester, crew leader, and the Supervisor. During these audits, observations are documented in the planning and tracking system indicating the required corrective work. During the audit observations are discussed and feedback provided to the vegetation management contractor. Similar to PacifiCorp's other programs, if during the course of the audit, an exception is identified that violates either federal or state law or poses as imminent safety or reliability risk, the audit will be temporarily suspended, the crew may be shut down, and the corrective work will be performed immediately.

3. Region prioritization

Audits are performed on program cycle work and incremental work conducted as a result of annual patrols.

4. Progress on initiative

In 2019, PacifiCorp hired four Utility Foresters with a primary task of conducting post-inspection/audits of vegetation management work completed by PacifiCorp's vegetation management contractors throughout the service territory, prioritizing work within HFTD.

PacifiCorp has also initiated a QA process to require documentation of specific milestones through the course of vegetation management actions including contractor accepted work release, work completed documentation, contractor signed completed work release, post-audit completion and audit findings or exceptions addressed and corrected.

These audits benefit both PacifiCorp and the vegetation management contractor and are considered a best management practice (American National Standards Institute 2006).

5. Future improvements to initiative

In 2021, PacifiCorp plans to post-audit all cycle work and all corrective work as a result of patrols conducted prior to height of fire season.

7.3.5.14 Recruiting and training of vegetation management personnel

PacifiCorp's general approach to recruiting and training of vegetation management personnel can be found in the company's Vegetation SOP. In general, PacifiCorp takes advantage of training that is provided by the company and arboriculture industry and issues materials as needed to educate inspectors on proper identification of defective trees that have the potential to strike the facilities.

7.3.5.15 Remediation of at-risk species

1. Risk to be mitigated

Vegetation contact with conductors creates an ignition and outage risk. At-risk species, with fast growth rates, can increase the risk of contact through vegetation growth.

2. Initiative selection

Remediation of at-risk trees is a subset to the company's vegetation management to achieve clearances around electric lines and equipment program. A PacifiCorp vegetation maintenance program objective is to prevent vegetation from growing-into and making contact with power lines. PacifiCorp has established post work clearance specifications categorized by tree growth rates (see Section 7.3.5.20) in effort to prevent grow-ins as an element, the company's practices and procedures. Vegetation inspections categorize growth by species as: slow, moderate, fast (cycle-buster). Within 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.

3. Region prioritization

At-risk species inspection is performed along with other vegetation maintenance inspections. These are performed annually in the HFTD, and bi-annually in other areas.

4. Progress on initiative and plans for next year

PacifiCorp completed vegetation inspection, including at-risk species, on all HFTD areas in 2020, and will continue to inspect these areas annually.

5. Future improvements to initiative

PacifiCorp is accumulating additional information on at risk species with the introduction of digital records and vegetation inventory systems in 2020. We are currently investigating the feasibility of using remote sensing to augment our identification of at-risk tree species. PacifiCorp is conducting

pilot studies (refer to Section 4.4, pilots 3 and 4) 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 fast growing tree species or "cycle busters", to develop a future program incremental to the existing program. High-risk trees include those trees that are otherwise healthy however prone to failure or pose other mode of risk to electrical infrastructure that are incremental (otherwise would not be assessed by) to PacifiCorp's current program. PacifiCorp is continuing to pursue this tactic through implementation of these pilot studies to support strategic efforts.

7.3.5.16 Removal and remediation of trees with strike potential to electric lines and equipment

1. *Risk to be mitigated*

Trees which are large enough to hit powerlines when uprooted create a risk of ignition or outages. Hazard trees, (dead, dying, diseased, deformed, or unstable) have an increased risk of failure, and therefore a higher strike likelihood.

2. *Initiative selection*

PacifiCorp identifies hazard trees based on visual inspection by certified arborists. Identified trees are removed, topped, or pruned.

3. *Region prioritization*

All areas within the HFTD are inspected for hazard trees and mitigation performed annually. Non-fire areas within our service territory are inspected and mitigated along with regular cycle or interim work.

4. *Progress on initiative and plans for next year.*

PacifiCorp completed hazard tree inspections in HFTD in 2020 and will continue to inspect annually. Tier 3 areas are completed by June 1, and Tier 2 is completed by end of August.

5. *Future improvements to initiative*

PacifiCorp is accumulating additional information on hazard trees and removal or trimming with the introduction of digital records and vegetation inventory systems in 2020. We are also collecting data on potential strike trees as part of our LiDAR and remote sensing pilots. We are currently investigating the feasibility of using remote sensing techniques to augment our traditional identification of hazard trees. Additionally, as presented in Section 7.3.5.15, PacifiCorp is conducting pilot studies (refer to Section 4.4, pilots 3 and 4) 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.

7.3.5.17 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 inspections of substations for vegetation along with regular cycle and interim vegetation maintenance.

3. Region prioritization
Substation inspections for vegetation 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 has no current plans to change substation inspection practices.

7.3.5.18 Substation Vegetation Management

1. Risk to be mitigated
Vegetation contact with conductors creates an ignition risk, and a risk of fire damage to substation equipment. Removal of vegetation encroachments mitigates this risk.

2. Initiative selection
PacifiCorp performs removals or pruning of any vegetation identified in the substation inspection.

3. Region prioritization
Substation vegetation management is performed throughout our service territory.

4. Progress on initiative and plans for next year.
PacifiCorp completed substation vegetation removals and overhang trimming for all fire areas in 2020 and will continued to perform annual mitigation.

5. Future improvements to initiative
PacifiCorp has no current plans to change substation vegetation management practices.

7.3.5.19 Vegetation Inventory System

1. Risk to be mitigated
Vegetation contact risks are primarily mitigated through trimming or removals. Maintaining clear and complete records of both vegetation work both needed and performed helps accomplish thorough and accurate mitigation of vegetation risks throughout the company's service territory. Refer to Section 4.4., pilot 5.

2. Initiative selection
In 2020, PacifiCorp has adopted and implemented a new records system which includes GIS data and more detailed records for vegetation work following successful implementation of this system in other states. Accumulation of data through this system will provide the backbone for the vegetation inventory.

3. Region prioritization

PacifiCorp is using one system of vegetation records management throughout the company's service territory. 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 fire threat areas.

4. Progress on initiative

PacifiCorp began implementing more detailed records system in 2020. 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 augment our vegetation data using remote sensing technologies, particularly as a means for growth forecasting. At this time, none of these initiatives have entered the pilot stage, the company may evaluate the feasibility of a pilot related to growth forecasting through remote sensing in late 2021.

7.3.5.20 Vegetation management to achieve clearances around electric lines and equipment

1. Risk to be mitigated

Contact of vegetation with energized conductors and equipment due to vegetation growth or failure.

2. Initiative selection

In order to minimize risk of wildfire, PacifiCorp's vegetation management program conducts cycle maintenance to achieve clearances around electric lines and equipment consistent with Appendix E Guidelines of GO 95, Rule 35, identifies and removes hazard trees and conducts patrols of lines in HFTD where cycle maintenance has not been completed.

PacifiCorp has adopted expanded post work minimum clearance distances, of at least twelve (12) feet for all distribution lines and at least twenty (25) feet for transmission lines under 115 kV and thirty (30) feet for any transmission lines of 115 kV – 230 kV. These minimum clearance distances are consistent with the recommendation in the Appendix E Guidelines of GO 95, Rule 35.

In addition, PacifiCorp 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 minimum clearance of twelve (12) feet 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 vertically faster 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 almost always prunes beyond the minimum required distances because of the physical structure of the tree. PacifiCorp uses natural target pruning for all prune work. 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 (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.)

Through conducting patrols of lines in HFTD, see Section 7.3.5.11, PacifiCorp maintains minimum clearance distances and increases frequency of hazard tree identification and removal. More frequent inspections will necessarily improve the identification of hazard trees. Hazard trees identified during annual inspections will, of course, be removed or pruned sufficiently to eliminate the hazard (unless a property owner prevents such work). As a result, some hazard trees will be identified and removed earlier than under the existing program (i.e. which would have then occurred during the next regular cycle).

PacifiCorp's existing Standard Operating Procedures 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." (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."). Furthermore, the existing Standard Operating Procedures encourage removal 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. To accomplish removal when a property owner objects to removal, 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 2020 and will implement this initiative in 2021.

5. Future improvements to initiative

PacifiCorp will continue to review opportunities to utilize technology to augment inspections (such as LiDAR) and plan and track work. PacifiCorp previously identified a tactic to further increase overhang clearances within HFTD. This tactic was incorporated minimally into work executed in 2019 and 2020. At a future point in time, PacifiCorp may implement a pilot study to support this tactic.

7.3.6 GRID OPERATIONS AND PROTOCOLS

7.3.6.1 Automatic recloser operations

The way an electrical system is operated can mitigate wildfire risk. PacifiCorp has specific policies to address system operations during fire season. This policy is designed to reduce the potential for ignition of a fire from sparks emitted when a line is re-energized after a disturbance on the line. Recognizing the increasing magnitude of wildfire risk, PacifiCorp's policies were significantly revised in June 2018 to incorporate more conservative procedures designed to reduce the potential of ignition because of a fault on PacifiCorp's electrical network. From a practical perspective, there are two primary subject areas addressed with these revisions: (a) settings for automatic reclosers and (b) line testing after lock-out.

Furthermore, 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.

Automatic reclosers are currently deployed on various transmission lines and distribution circuits throughout PacifiCorp's service territory. When a line trips open, an automatic recloser may operate to close the circuit very quickly, so long as the cause of a momentary trip has cleared. The reclosing function in an important feature as it allows PacifiCorp to maintain service on a line that has tripped, rather than opening the circuit and de-energizing the line. In general, automatic recloser operation is beneficial, because it reduces outages and improves customer reliability. The actual operation of recloser equipment does not directly present wildfire risk, as the recloser equipment itself does not emit sparks or otherwise pose an ignition risk.

The operation of automatic reclosers, however, indirectly implicates some degree of ignition risk. When a fault is detected on the line, a recloser will trip and reclose based on pre-determined settings in an attempt to re-energize the line. If the cause of the fault is no longer present when the device recloses, the line will re-energize, resulting in limited outage impact to customers. If the cause of the original fault still remains when the device recloses, however, the original fault scenario will be experienced a second time and, depending on the circumstances, potentially result in arcing or an emission of sparks. As a result, in some limited circumstances, the second fault scenario could lead to a fire ignition. Accordingly, automatic recloser settings can have a significant impact on wildfire mitigation.

The issue with line-testing is very similar. If a breaker has "locked-out" – meaning that it has opened and no longer conducts electricity – a system operator will sometimes "test" the line. To test the line, the system operator will close the device, thereby allowing the line to be re-energized. If the fault has cleared, then the system will run normally. If the fault has not cleared, the device will lock-out again. If the device locks again, the system operator then knows that additional investigation or work will be required before the line can be successfully re-energized. Because faults are often temporary, line-testing can be an efficient tool to maintain customer reliability. At the same time, line-testing can result in the emission of sparks if a fault has not yet cleared when the line is tested. Accordingly, a "no-test" policy reduces the risk of ignition, and a "no-test" policy is applicable in certain circumstances during fire season. In addition, PacifiCorp further restricts these operations during extreme fire weather conditions throughout additional line devices by either remotely or manually modifying these settings. This practice and its role in fire mitigation during designated "watch" periods is further discussed in Chapter 8.

Therefore, PacifiCorp has designed and developed its automatic reclosing operations wildfire mitigation program to include more restrictive system operating procedures during when wildfire conditions are more elevated to reduce this risk.

7.3.6.2 Crew-accompanying ignition prevention and suppression resources and services

Pacific Power maintains firefighting equipment which may be used to respond to small ignitions. These resources may be moved into affected areas as needed to support other districts, i.e. Medford, OR resources are available for use in Yreka, CA. The following is a list of resources and their location:

Table 7-11: 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

7.3.6.3 Personnel work procedures and training in conditions of elevated fire risk

Pacific Power Emergency Management conducts daily checks of the fire hazard for its service areas and reports those findings to the field employees as appropriate. This includes, but is not limited to, Industrial Fire Protection Level status, weather forecast, wind predictions and other fires in the area. The Pacific Power GIS department also maintains fire detection and notification capability to alert operations and emergency management personnel of a potential fire within a specified distance (five miles, as of this time) of Pacific Power assets. Pacific Power maintains clearance around facilities and powerlines in order to lower the risk of fire damage or ignition. These clearances are consistent with state regulations or, where no state requirements exist, the company's vegetation policies are followed. Pacific Power field employees are trained in detection, prevention and response to fires. Current policies and practices have been put in place with the sole intention of preventing fire ignition or damage. Vehicles are designed and maintained to prevent ignition from high temperature areas and are required to be regularly inspected for grass and debris accumulation which could create an ember and start a fire.

7.3.6.4 Protocols for PSPS re-energization

PacifiCorp describes its PSPS process, including "all clear" designation to facilitate re-energization in Chapter 8. It further describes its emergency plans including restoration actions in Section 7.3.8.9.

7.3.6.5 Stationed and on-call ignition prevention and suppression resources and services

PacifiCorp has not developed plans or procedures for on-call ignition prevention and suppression resources. At this time it coordinates with public safety partners to ensure alignment between utility and emergency sector operations.

7.3.7 DATA GOVERNANCE

7.3.7.1 Centralized repository for data

Deficiencies in the plan are generally identified as a result of self-audits, after action reviews, and progress updates. As described above, each department generally has the capability to monitor and audit progress and identify deficiencies. For example, the Emergency Management department is responsible for conducting after action reviews which include, as a component, action items to close gaps encountered. Audits conducted following asset inspections include detailed reports on findings which are then incorporated into annual training for inspectors.

One area currently identified for improvement at PacifiCorp and identified by the WSD is data governance. PacifiCorp has been working diligently to make progress in its delivery of data consistent with the WSD GIS Data Schema requirements published by the WSD. To date, the company has been able to deliver a substantial portion of the asset data in the format requested and intends to expand this data to include risk events, PSPS, and inspections data in the company's next quarterly filing, scheduled for May 9, 2021.

However, this effort requires the extraction and translation of non-spatial data into GIS format. Similar to 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. While individual departments may have policies, processes, and procedures that determine how to manage key data for operations, PacifiCorp does not have a single, overarching data governance plan. However, the company recognized the need to develop a plan to close this gap, whose progress will continue to be reported in quarterly updates.

Further, the company has identified its intention to build methods to make its operational data sets extensible by proper data mapping into appropriate taxonomy, such that it does not require the creation and maintenance of parallel sets of systems to support both operational and regulatory needs. As described above, these data relationships have begun through the establishment of GIS datasets and are expected to be layered upon through the use of other datasets. As an example, in Section 4.2.1 the company leveraged its legacy outage database, Prosper, to render data consistent with the definition of risk events. This demonstrates the concepts behind this approach, which will continue to be explained as such actions are taken.

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. 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

PacifiCorp does not develop company-specific calculations, with the exception of its newly developed LRAM metrics. These calculations and all supporting data are contained in Section 4.5.

7.3.7.4 Tracking and analysis of risk event data

PacifiCorp has leveraged existing data sources to produce metrics supporting its WMPs, some of which are its data sources while others may be external data sources. In a small number of situations that 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 the new applications to be fed from existing sources (to the extent possible). The core data relates to outage data, which is collected and categorized consistent with IEEE 1366 & IEEE 1782 as well as Commission Decisions D.96-09-045 and D.16-01-008, while circuit equipment is derivative of the company's Geographic Information System. In Section 4.2.1 the company demonstrates the data mapping required of its outage data to render risk event data.

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, 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 efforts in prioritization, 2) establishment of non-traditional resource pools and 3) reassessment of scheduled work. Of first priority is compliance-based activities, which is viewed as one form of a risk; thereafter, others are prioritized based on geographic wildfire Tier (Tier 2 vs Tier 3) and overall availability of materials. As opposed to prioritizing a certain type of program, PacifiCorp prioritizes the location of work to be completed 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 and avoid working in the same location multiple times. 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.

PacifiCorp's general strategy for recruiting, training and retaining is outlined below. The company's annual GO 166 report outlines resources stationed in California and outlines resources available outside but proximate to provide support in California, should such need arise. The company relies upon a strategy of fulltime employee staffing based upon a persistent and steady workload analysis and augments through contracting venues for line service work as well as turnkey project delivery contracting.

Table 7-12: California field resources and staffing strategy

Employee Type	Employee count	Vacancy	Recruitment training retention strategy
Apprenticeship	1	0	PacifiCorp's recruitment and training strategies for key positions rely on collaboration with stakeholders, including local management, labor relations and community relationships. With respect to the recruitment and training of craft personnel, PacifiCorp has multi-year apprenticeship programs. This approach ensures that a pipeline of trained employees are ready to either backfill vacant positions or expand the internal workforce as needed. An apprenticeship includes classroom and job site training, with mandatory assessments before successfully completing the program.
Line Worker	31	2	To aid in providing ongoing training opportunity for line workers a training yard is being built in Bend, Oregon during 2021. This will provide consistency in training modules and processes which will also aid in retention as an investment the skill progression and knowledge of line workers.
Vegetation Management	2	0	With respect to vegetation management, PacifiCorp's recruitment and training strategies focus on management of the contractual relationship with independent contractors. PacifiCorp's vegetation management program is a 100% contracted front-line resource, managed by internal management and the Company's utility foresters. PacifiCorp requires that its utility foresters are certified arborists and certified utility specialists by the International Society of Arboriculture (ISA). PacifiCorp is not directly responsible for the training of the vegetation management workforce, who are employees of an independent contractor.

7.3.8.2 Risk spend efficiency analysis – not to include PSPS

In Section 4.2 the company outlines its intention for developing methods using its LRAM to create risk spend efficiencies; it has complied with the adopted methodology per D.19-04-020, and adhered to the 10 RAMP elements as part of its 2018 GRC. Further, the company offers that it intends to continue to participate in R.18-10-007 in which the SMJUs are being incorporated into the development of S-MAP and

RAMP frameworks, whereupon it will be sufficiently aligned with these procedures to calculate such products.

7.3.9 EMERGENCY PLANNING AND PREPAREDNESS

PacifiCorp's emergency planning and preparedness wildfire mitigation programs and overall WMP were developed in support of the company's overall Emergency Response Plan and integrate fully with the Utilities Code section 786.6 and GO-166. This Emergency Response Plan includes the tactics, policies, and procedures which are used in response to any emergency incident or planned event which impacts or has the potential to impact assets or customers within PacifiCorp's service territory. High level elements of this plan include but are not limited to:

- Elevated risk situational awareness notification processes in preparation of a potential emergency;
- Standardized hazard analysis;
- Emergency internal and external communication methods, protocols, and requirements during an emergency;
- Emergency notification protocols and processes;
- Resource availability and predetermined response times between areas of operation;
- Mutual assistance protocols and capability;
- Authority, governance, and key contacts; and
- After action reporting requirements to identify gaps and incorporate lessons learned.

PacifiCorp's Emergency Response Plan follows the National Incident Management System (NIMS) and the Incident Command System (ICS), and it is the foundation for the company's response to all crisis and emergencies. Consequently, PacifiCorp's Emergency Response Plan follows the all-hazards approach, which includes coordinating with other utilities and all levels of government. The plan supports an organized and efficient response to a wide variety of events of differing magnitudes. The all-hazard plan is a management tool providing a scalable response, organizational structure, procedures for information management, operational activities, a smooth transition to restoring normal services and the implementation of post-incident actions.

As previously described, PacifiCorp's emergency planning and preparedness wildfire mitigation programs and overall 2020 WMP were developed in support of the company's overall Emergency Response Plan and integrate fully with the Utilities Code section 786.6 and GO 166.

While PacifiCorp follows an all-hazards approach to emergency management, PacifiCorp recognizes that the specifics of emergency management for wildfire events can vary from other types of emergency management in terms of both preparation and response. For example, the governmental emergency responders with whom PacifiCorp will coordinate will be different in a wildfire as compared to other types of events. For small wildfires, PacifiCorp personnel will likely work directly with firefighters; for larger wildfires, PacifiCorp management will likely coordinate with an incident command center which could involve representatives of both state and federal agencies, likely including the Bureau of Land Management or the National Forest Service. Furthermore, preparation activities, fire precaution levels and relevant tools may differ significantly.

Where appropriate, PacifiCorp's emergency response plan components specific to Fire Prevention, Preparedness and Response not contemplated in the company's Emergency Response Plan have been

included in the Fire Prevention, Preparedness, and Response Plan filed per GO 166 Attachment E. Since originally filed in 2018, PacifiCorp has incorporated additional elements and details such as incorporation of risk assessment, system resilience, and situational awareness aspects from the WMP into the company's Fire Prevention, Preparedness, and Response Plan in an attempt to make the Fire Prevention Plan more analogous to a playbook describing the operational readiness and response in the event of a wildfire.

As with all of PacifiCorp's emergency planning and preparedness programs, the company intends to continue implementation of these programs, incorporate new elements such as training, resources, tools, and processes where appropriate, and translate lessons learned or effectiveness into long term program modification and evolution.

a. Plans to prepare for and restore service, including workforce mobilization (including mutual aid and contractors) and prepositioning equipment and employees

As with any response, PacifiCorp will attempt to preposition personnel and equipment into impacted areas in a proactive manner. However, PacifiCorp understands not every event supports a proactive approach but still maintains the ability to move personnel and equipment into impacted areas after the start of an event. Depending on the size and type of event, PacifiCorp will first deploy its internal workforce and then supplement the workforce with contractors. Should the event grow beyond the ability of the internal and contract workforce, PacifiCorp would reach out to others via mutual assistance agreements.

Electric utilities could call upon other electric companies for emergency assistance, in the form of personnel, material or equipment, to aid in maintaining or restoring electric service when such service has been disrupted by acts of the elements, sabotage or equipment malfunctions. PacifiCorp is a member of several regional and national mutual assistance agreements with electric service providers. Parties to these agreements can request or provide assistance and resources to other members to support the restoration of electrical service when it cannot be restored in a timely manner by the affected company alone. Details regarding membership, activation, notification, resource departure and arrival are all included in PacifiCorp's Emergency Response Plan. PacifiCorp intends to leverage these same programs and elements for emergency management of wildfire events.

b. Emergency communications, including community outreach, public awareness, and communications efforts before, during, and after a wildfire in English, Spanish, and the top three primary languages used in California other than English or Spanish, as determined by United States Census data

Dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management. Communications efforts are listed in the WMP, Emergency Response Plan and PSPS Playbook which provide both messaging and cadence for public and stakeholder communications throughout the preparation, response and restoration cycle. The outage restoration call-back program is an automated system that simultaneously initiates call backs to hundreds or thousands of customers providing updated estimated times for restoration and to verify service has been restored. Communication with customers, key internal and external

stakeholders and all levels of management as early as possible is key. The PacifiCorp Joint Information System consists of processes and tools to facilitate communication with the public, news organizations, government entities and external stakeholders through social media, website restoration information, press releases and notification protocols while ensuring the messaging is consistent and comprehensive.

c. Showing that the utility has an adequate and trained workforce to promptly restore service after a major event, considering mutual aid and contractors

PacifiCorp has dedicated resources in the California service territory available to respond as needed to events. In addition to the resources in California, PacifiCorp has internal resources from Oregon and Washington that can be deployed. In the event these resources are insufficient, mutual assistance agreements can also be deployed. The table below provides the approximate count of construction / response craft positions available to support California operations. While this count is relatively representative of available resources, these numbers may fluctuate as personnel change. Additionally, in the event these resources are insufficient, mutual assistance agreements can also be deployed as described in the previous section.

7.3.9.1 Adequate and trained workforce for service restoration

To ensure the identified workforce have the proper wildfire mitigation training, each year refresher training is provided to applicable field employees within the HFTD. This involves reviewing operating practices that reduce wildfire risk while performing routine work and confirming the availability of fire mitigation / suppression tools before fire season.

To ensure adequate workforce levels are available when required, PacifiCorp has access to additional resources in other service territory areas that can be deployed as needed. Additionally, PacifiCorp is a member of mutual assistance agreements with partnering utilities that provides access to even more resources if required when responding to an event.

When an emergency or major event occurs, it is critical the resources tasked with rebuilding infrastructure to restore service are sufficient and work in such a way as to not escalate risk. Similar to when performing planned or routine work, PacifiCorp field operations are able to mitigate some wildfire risk by utilizing specific operating procedures during fire season in heightened fire risk areas.

While PacifiCorp is experienced with and prepared to respond to emergency events, responding to an emergency involving a wildfire event 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 to use specialized tools or monitor and react to changing weather patterns.

In certain situations, the required resources to respond to an event, or restore after an event can be more than what is available in the local district on a daily basis. For these cases where an event exceeds the local district's capability to respond, PacifiCorp needs to be able to have access to additional resources to ensure adequate resources can be deployed to mitigate or respond to the wildfire event.

While access to available resources is a system wide program the specific wildfire mitigation training is prioritized for staff actively working within the HFTD zones in California. However, as the company may pull from additional resources during an emergency, PacifiCorp provides the training to all applicable employees that might respond to a wildfire event.

In general, as part of the 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. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.

An effective response to any event is determined by the ability to implement a coordinated response for restoration and recovery activities, which includes, as a component, the availability of an adequate and trained workforce. This determination would be evaluated as part of the post event lessons learned process.

7.3.9.2 Community outreach, public awareness, and communications efforts

Dissemination of timely, accurate, accessible and actionable information to the public is important in all phases of PacifiCorp's incident management. The outage restoration call-back program is an automated system that simultaneously initiates call backs to hundreds or thousands of customers providing updated estimated times for restoration and to verify service has been restored. Communication with customers, key internal and external stakeholders and all levels of management as early as possible is key. The PacifiCorp Joint Information System (JIS) consists of processes and tools to facilitate communication with the public, news organizations, government entities and external stakeholders through social media, website restoration information, press releases and notification protocols while ensuring the messaging is consistent and comprehensive.

Regional Business Managers
PacifiCorp regional business managers maintain company relationships with local government jurisdictions and community organizations. Regional business managers are the primary contact for local leadership and critical customers in their area of responsibility.

District Operations Managers
District operations managers maintain relationships and exchange contact information with local first responders. In the event of a wildland fire, district managers deploy to the jurisdictional agency's Incident Command Post (ICP) to ensure electric safety awareness. The district operations manager acts as the liaison between the ICP and PacifiCorp's Control Center and Emergency Operations Center.

Emergency Managers
PacifiCorp's emergency management team interfaces and maintains relationships with federal and state emergency responders and mutual assistance groups. The 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 dispatch centers for fire-related emergency response.

Training, Exercises and Continuous Improvement
An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities. It is critical individuals having responsibility for functions within the incident command system are familiar with their responsibilities and have practiced 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. The incident command system is activated periodically throughout the year in the normal course of operations. An annual exercise is conducted to ensure that individuals otherwise not involved in incident management on a regular basis are practiced in responding.

PacifiCorp has a goal of continuous incident management improvement. 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-action incident reviews. Lessons learned may be implemented for inclusion in PacifiCorp's response and restoration procedures and incorporated in the emergency response document.

7.3.9.3 Customer support in emergencies

In reporting outages, PacifiCorp will continue its use of the company's customer outage management protocols and its real time outage map to inform customers regarding the presence and location of outages as well as the estimated restoration plans, consistent with standard operating practices. 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 5.3.6.4.

PacifiCorp has also implemented a variety of consumer protections and procedures to assist the company's customers when a disaster impacts their communities, consistent with 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. In considering which of these protections to implement and the duration of the relief so provided the type, scale, and size of the event are evaluated and a program is developed commensurate with 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.

Specific details regarding these programs are included below.

Outage reporting
Specific to wildfire mitigation, PacifiCorp intends to enhance outreach through customer contact center to provide impacted customers with information regarding service interruptions, restoration efforts, along with relief support by adding to the 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 12-month period has lapsed or potentially longer;
- Contact all community outreach contractors, community-based organizations who assist in enrolling hard-to reach low-income customers, to better inform customers of these eligibility changes; and
- Partner with program administrator 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's billing adjustments include the ability to pro-rate monthly bill and any charges to the date of the emergency or subsequent damage to customer premises and recalibrate approach for estimating energy usage during when premises are unoccupied as a result of the disaster to avoid estimating errors.

Deposit waivers
In the event of a wildfire emergency, PacifiCorp can waive deposit and late fee requirements for one year from the declared emergency.

Extended payment plans
In the event of a wildfire emergency, affected customers with existing service or those seeking to establish service at a new residence, who have prior arrearage, are offered a payment plan with 20 percent due, with equal installments for the remainder for no less than twelve billing cycles with no interest.

Suspension of disconnection and nonpayment fees
In the event of a wildfire emergency, PacifiCorp may suspend disconnection for non-payment and associated fees, and eliminate reporting to credit reporting agencies or any collection services for unpaid

Repair processing and timing
Immediately after the emergency, an assessment is made to identify the premises of affected customers whose utility service had been disrupted or degraded and, if applicable, the meter is removed.

Access to utility representatives
In the event of a wildfire emergency, 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
Pacific Power has obtained logistical support for deployment of Community Support Centers should the need arise during a Public Safety Power Shutoff event. Community Support Centers will be established upon recommendation of the Unified Command. The center(s) will be open from 8am to 8pm with the potential to stay open longer based on community needs.

The Community Support Center tent (if needed) is approximately 33ft x 18ft and able to sustain winds of 55mph gusting to 65mph.

Pacific Power personnel will staff the center(s) to assist and provide information to community members.

<u>Siskiyou County</u>

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.
- Adherence with any existing local, county, state or federal public health orders

Locations:

- 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

7.3.9.4 Disaster and emergency preparedness plan

While described in the company's overall Emergency Response Plan, this basic approach is applicable with respect to any type of emergency event including wildfire events ranging from a relatively small wildfire that a local fire suppression agency is able to control, to the larger wildfire events which require a coordinated interagency response. As a result, PacifiCorp's internal response structure is organized for a wildfire event in a manner substantially identical to any other incident requiring an emergency response.

Executive Policy Group
The PacifiCorp Executive Policy Group consists of executives and administrators from key internal organizations and is activated based on the severity of the incident and need for strategic support. As part of the structure, the group collects and analyzes information, makes high-level strategic and procedural decisions, assists in the continuation of critical business processes, and helps facilitate cross-platform incident coordination in support of those responsible for managing the incident. Concerns for public safety is a key consideration in determining the need to activate the Executive Policy Group.

Emergency Operations Center (EOC)
Bringing representatives from various PacifiCorp organizations together in an Emergency Operations Center (EOC) optimizes unity of effort and enables staff to share information, provide policy guidance to on-scene personnel, plan for contingencies, deploy resources efficiently, and generally provide any support necessary. The composition of the team may vary depending on the nature and complexity of the incident.

7.3.9.5 Preparedness and planning for service restoration

Activation of the response function takes place according to the escalating threat, human impacts or severity of the incident. Most local incidents can be handled at the district operating level; but some incidents, like some wildland fires, require resources and support beyond the capabilities and authority of the district or regional operating area. Incidents that threaten the company as a whole (e.g. contagious disease, cyber-attacks), or place the company's stability at risk, may require high level management,

strategic policy and financial decisions, crisis communications or other crisis management functions. Typically, even a relatively large wildfire would not threaten the company as whole, but a large, uncontrolled wildfire threatening catastrophic damage to people and property could require such crisis management functions. Operations return to normal as soon as practical, which typically occurs when the incident no longer needs the support and coordination functions provided by the EOC. If support functions can be managed by individual organizations through normal procedures, operations may return to normal.

If an event is anticipated or advanced warning is received (i.e. a winter storm warning), pre-incident activities may be implemented in advance of an actual event. Forecasts of extreme wildfire conditions may warrant pre-incident activities. These activities may include deploying additional response personnel and resources, customer and stakeholder advanced notification, and situational monitoring of wildfire conditions, such as wind speed, temperature, humidity and fuel conditions (all of which might contribute to the ignition and/or spread of a wildland fire).

The level of response is dictated by the seriousness of the incident. Incidents may be localized, or they may require support from an Emergency Operations Center. Moderate outage events and localized incidents require localized plan activation. In general, however, localized incidents can be quickly resolved with internal resources. These incidents have little or no impact on the public or normal operations and are managed by supervisors in the impacted district or area.

More complex outage events and potential threats which are beyond the scope of local management often require coordination of a considerable amount of resources, extended involvement and contact with internal business units and external stakeholders, and the potential for the incident to expand rapidly. This type of incident disrupts a significant number of customers, includes extended restoration time, or a perceived threat to service exists beyond the level where normal operating practices and local resources are sufficient to respond, and requires Emergency Operations Center activation. This type of incident might include, for example, a wildland fire, severe weather forecasts, or a security threat. Additional personnel from surrounding operations districts may be required to respond.

7.3.9.6 Mutual Assistance

Electric utilities have the ability to call upon other electric companies for emergency assistance, in the form of personnel, material or equipment, to aid in maintaining or restoring electric service when such service has been disrupted by acts of the elements, sabotage or equipment malfunctions. PacifiCorp is a member of several regional and national mutual assistance agreements with electric service providers. Parties to these agreements can request or provide assistance and resources to other members to support the restoration of electrical service when it cannot be restored in a timely manner by the affected company alone.

7.3.9.7 Protocols in place to learn from wildfire events (Lessons Learned)

PacifiCorp leverages existing systems and processes included in the company's Emergency Response Plan to learn from wildfire events in the same manner PacifiCorp 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.

An effective response to any incident is determined by the ability to implement a controlled incident command structure and to assume responsibility for restoration and recovery activities. It is critical that

individuals having responsibility for functions 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.

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.

PacifiCorp has a goal of continuous incident management improvement. 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.

7.3.10 Stakeholder Cooperation and Community Engagement

7.3.10.1 Community engagement

PacifiCorp employs a multi-pronged approach to community engagement and outreach with the goal to provide clear, actionable and timely information to customers, community stakeholders and regulators. The company uses a variety of channels and tactics to maximize its customer reach including its website, bill inserts, emails, community events, social media, printed materials such as brochures and flyers, radio advertisements, messaging collaboration with local agencies and press releases/pro-active media engagement. Due to current limitations amidst the COVID-19 pandemic, the company has utilized webinars and video content to reach customers and community stakeholders in lieu of in-person community events. It is the company's hope that in-person wildfire safety and preparedness events will resume once it is safe to do so.

PacifiCorp also conducts outreach with local government and community-based organizations and routinely provides collateral, such as brochures and safety checklists for distribution through these organizations to customers. As indicated in PacifiCorp's May 15, 2020 filing,[36] the company performs outreach in prevalent languages – which includes Chinese traditional, Chinese simplified, Tagalog, Vietnamese, Mixteco, Zapoteco, Hmong, German and Spanish – and continues its efforts to identify and reach medical baseline and access and functional needs customers in its service territory.

Communication Tactics
PacifiCorp provides wildfire safety and preparedness and Public Safety Power Shutoff (PSPS) targeted public outreach and education through a variety of methods. Targeted areas include communities in Tier 3 designated fire high consequence areas with some overlap into Tier 2 areas depending on media market and distribution channel. The following list of tactics is not meant to be rigid or exhaustive as the company maintains a flexible and dynamic communications plan that is informed by customer survey data, community stakeholder input or community needs:

- Targeted wildfire safety radio, digital, and social ads;

[36] Advice Letter 615-E Regarding Compliance with Ordering Paragraph 1 of Decision 20-03-004.

- Letters to elected officials in high fire threat districts providing updates regarding PacifiCorp's wildfire mitigation plan and community outreach activities;
- Geo-targeted social media posts promoting wildfire safety and preparedness;
- Wildfire safety-related press releases sent to local and regional media outlets; subject matter interviews provided as needed;
- Customers in potential de-energization zones receive wildfire safety and PSPS-specific bill messages;
- Targeted social media and print ads promoting wildfire safety webinars;
- Webinars are recorded and made available on the company's website;
- Wildfire safety and preparedness resource and information center on website;
- Webtools to help customers identify if an address is located within a PSPS area and weather forecasting tools.

In order to ensure that outreach is provided in identified prevalent languages, PacifiCorp has taken the following steps:

- Wildfire safety-specific communications including brochures, handouts, and bill messages are translated into Spanish;
- A message in nine languages – which includes Chinese traditional, Chinese simplified, Tagalog, Vietnamese, Mixteco, Zapoteco, Hmong, German and Spanish – is included on bill messages, press releases, and on the company's wildfire safety website pages that states "A customer care agent can speak with you about wildfire safety and preparedness. Please call 888-221-7070."
- Customers with specific language needs can contact the company's customer care number and request to speak with an agent that speaks their language. PacifiCorp employs Spanish-speaking customer care professionals and contracts with a 24/7 translation service that translates communications in real-time over the phone in Chinese, Cantonese, Mandarin, Tagalog or Vietnamese and a variety of other languages and dialects;
- The company's customer care agents have access to and training with wildfire safety and preparedness and PSPS-related communications and can facilitate a conversation between the customer and translation service to ensure the customer receives the wildfire safety and preparedness and PSPS-related information they need.

Regional Business Manager Community Stakeholder Engagement and Collaboration

PacifiCorp regional business managers (RBM) serve as an essential conduit for company wildfire mitigation and PSPS information and often collaborate with community stakeholders around this topic. In the course of daily business, RBMs frequently interact with key community stakeholder groups including business chambers, city councils, large industrial and commercial customers, critical facility customers (e.g.; hospitals, city water, MUD/PUDs), municipal and rural Fire & Rescue, nursing and hospice centers, school districts, community Firewise groups, tribal emergency management, Rotary and Kiwanis clubs and many other community groups. Their vital role in this ongoing conversation with the communities the company serves cannot be understated.

In these interactions with community stakeholders, the company wildfire mitigation plan might be the focus of the conversation or just an informal update. At times, the RBM will give presentations on the topic to an audience of key stakeholders from a variety of sectors for efficiency sake and to foster greater collaboration. Once initial presentation schedules are set (typically prior to or early into the wildfire season), interval update emails or phone calls and impromptu update meetings may and often do occur based on the stakeholder level of engagement. On occasion, financial support to fund wildfire safety-related equipment or support may be requested by community groups. Constructive stakeholder

feedback has helped evolve and tailor content in brochures and on company wildfire safety webpages. Community stakeholder feedback is consistently encouraged by RBMs.

Topics discussed during RBM wildfire safety and preparedness presentations, meetings or conversations include:

- General wildfire mitigation planning updates;
- Previous wildfire season review;
- System hardening and tree trimming high level overview, sharing work planned and completed;
- Customer outreach and engagement update providing information on communication methods and explore ways to collaborate on messaging and additional customer outreach through alternative methods
- Review company PSPS maps, webpages, print materials and timelines of communications to general public and key stakeholders;
- Set expectations on frequency of information receipt and preferred methods. (Example: Quarterly in person presentations);
- Liaison with local emergency managers to reinforce partnerships and collaboration;
- Updates and overview of community, customer outreach during PSPS event, as needed.

Access and Functional Needs, Medical Baseline Population Engagement
PacifiCorp provides additional PSPS notifications to individuals classified as medical baseline customers in PacifiCorp's customer service system and to individuals who self-identify as having access and functional needs (AFN). Having key messages across all channels and materials asking AFN customers to self-identify with the company is a central component to the community engagement and customer outreach strategy. PacifiCorp has engaged a vendor to survey AFN population to help inform the company's communication outreach related to those customers, this includes assessing the need and type of communications for people with disabilities who may not be able to use standard forms of communication. Survey data has informed the overall strategy and the company has adjusted and expanded where key messages are disseminated to increase AFN self-identification.

One method used by the company to increase the likelihood AFN populations receive relevant information is by partnering with local and regional agencies that frequently interact with that segment. An example is Del Norte Senior Center and Great Northern Services partnering with the company to distribute wildfire safety brochures to households in Crescent City and Weed. The brochures are provided in English and Spanish and a key message encourages customers to contact the company to self-identify as having medical needs dependent on electricity. PacifiCorp has also engaged in meet and confer sessions planned with the parties in this proceeding to coordinate outreach efforts related to CBOs. In 2021,

Additionally, PacifiCorp, through a third party vendor, MDC Research, conducts annual online and phone surveys with customers, including independent living, assisted living and skilled nursing centers and AFN representatives and CBOs (Family and Community Resource Center of Weed, Mount Shasta CRC, Dunsmuir CRC, Happy Camp Family/CRC, Yreka CRC, HUB Communities, Tulelake/Newell FRC, Scott Valley CRC, Helping Right Now, among others) located in potential PSPS areas regarding the company's PSPS and wildfire safety communications.

In-depth interviews conducted with CBOs in PacifiCorp's California service area took place in Fall 2020. The interviews lasted 30 minutes and were conducted virtually. Key findings include:

- CBOs often do receive communications and resources from Pacific Power related to CARE and providing low-income residents with support for paying their electric bills.
- Most communications and resources received about wildfires (from any organization, including government or fire agencies) have been focused on evacuation preparedness, with limited information about general safety or preparation for PSPS events.
- Most report that wildfire safety, preparedness, and PSPS communications are outside the scope of their charter; they would be willing to help spread the word, but typically do not have the available resources to do so without further support.
- The most common methods CBOs currently use to communicate with the community are social media, in-person visits or meetings, and through handing out flyers when clients visit the office.
- General fire safety information is least impactful, as other agencies are already providing information about brush clearing and steps required to mitigate fire risk.
- Special attention should be paid to those with medical needs and limited transportation options; they are most at risk during a PSPS event.

These findings help to inform and evolve how PacifiCorp utilizes CBO communication channels without adding extra burden to these organizations. Thus, the company is seeking additional messaging avenues outside of its currently defined outreach strategy. This involves working with community partners to find appropriate places and spaces to add AFN-specific messages to existing platforms such as CBO emails, brochures, webpages and/or social media pages. This work is ongoing and is carried out by RBMs collaborating with their community stakeholders or direct outreach to community organizations by company corporate communications staff.

Public Safety Power Shutoff Communication Overview

PacifiCorp's Public Safety Power Shutoff event communication and notification plan has two primary systems. First, direct communications, through pre-identified channels, are used to provide detailed notices to key stakeholders, namely public safety partners and critical facilities and critical infrastructure. Second, a series of automated notices (email, text and direct phone calls) to customers, together with published information on the company's website, social media channels, and proactive media outreach, are employed to provide notice to the general public at critical stages of the PSPS process, including for pre-event warnings, an actual event, and re-energization. Medical baseline and access and functional needs customers are provided additional notices. Targeted media outlets that cover identified PSPS areas include:

Media Outlet	City
Weed Press, The	Mount Shasta
Dunsmuir News	Mount Shasta
Mount Shasta Herald	Mount Shasta
Saturday Magazine - KVIP-AM	Redding
Record Searchlight	Redding
KVIP-AM	Redding
KRCR-TV	Redding
KQMS-AM	Redding
Modoc County Record	Alturas
Lassen County Times	Susanville
KCFJ-AM	West Covina

KPOD-AM	Crescent City
Del Norte Triplicate	Crescent City
KCMX-AM	Medford
KDRV-TV	Medford
KFTS-TV	Medford
KMED-AM	Medford
KMVU-TV	Medford
KOBI-TV	Medford
KSYS-TV	Medford
KTVL-TV	Medford
Medford Mail Tribune	Medford
KDKF-TV	Klamath
KFLS-AM	Klamath
Klamath Falls Herald and News	Klamath
KOTI-TV	Klamath

To ensure that the public can access timely and detailed information about both potential and actual PSPS events relevant to a particular location, PacifiCorp has modified its main PSPS webpage, available at www.pacificpower.net/psps. A web-based tool allows members of the public to enter an address into a search bar to determine if that address is in an area which may be subject to a PSPS. An additional online tool is available for members of the public to see the "Public safety power shutoff forecasting" for that area over the following week. The status indicates whether the area is operating as "Normal," whether there is a PSPS "Watch," or whether there is an actual PSPS "Event." Additionally, the company is in the process of building out the weather section of this page to give visitors more insight into real-time weather monitoring through its network of field weather stations. This will consist of language on the page explaining the company weather station network and a link to the MesoWest page.

PacifiCorp has ensured that it has the bandwidth to manage its PSPS website, even under the extremely remote potential that all proactive de-energization zones in PacifiCorp's service territory would be de-energized at the same time. When there is an event, transmission & distribution operations Emergency Operations Center personnel takes on the role of updating the PSPS website. The company's PSPS website is fundamentally a content only (with PSPS area polygons imposed on maps) static site with no dependency on any backend applications. The Pacific Power website performed well serving content during the September 2020 windstorm event where a significant surge in web visits – 200,000+ web visitors with 1.6M+ web page views. This event demonstrated capable broadband performance.

Measuring Community Engagement and Communication Success

In accordance with the Ruling, PacifiCorp and the other small and multijurisdictional utilities (SMJUs) worked together to coordinate survey questions, and prior to formulating and conducting the 2020 surveys, the survey questions and methodology were shared during a meet and confer hosted collectively by the SMJUs.

PacifiCorp and the SMJUs worked closely with MDC Research to develop a twenty-question survey on the effectiveness of its 2020 wildfire preparedness and public safety power shut-off outreach to identify areas of improvement for ongoing outreach. MDC Research is the same organization that developed and conducted the Spring 2020 survey on behalf of the company and will continue to administer surveys on behalf of the company in 2021.

To reduce self-selection and bias, this survey was conducted using a mix of online and phone surveys (515 completed web surveys / 80 completed phone surveys) and were available to customers in English and Spanish. A total of 595 surveys, including 30 from critical customers, were completed between October 27 and November 25, 2020. Additionally, MDC Research conducted interviews with four community-based organizations (CBOs) that operate within PacifiCorp's California service area.

The overall objective of this research was to measure the public's awareness of messaging related to wildfire preparedness and safety. Specific research objectives include:

- Measure awareness of Pacific Power messages related to wildfire preparedness;
- Identify recall of specific message topics;
- Identify recall of message channels;
- Measure recall and understanding of Public Safety Power Shutoff or PSPS;
- Evaluate sources customers are most likely to turn to for information about PSPS;
- Evaluate PSPS experience;
- Explore actions taken by customers to prepare for wildfire season; and
- Measure awareness of Pacific Power's efforts to reduce the risk of wildfires.

Survey Results

A key takeaway from the 2020 survey is that 68 percent of respondents are aware of wildfire safety communications from the company, up from 60 percent in May 2020. Pacific Power remains the primary source for wildfire preparedness information. Additionally, 71 percent recall seeing, hearing or reading the phrase "Public Safety Power Shutoff or PSPS," which is up significantly from May 2020. Additional key findings include:

a. Messaging: Personal preparedness and vegetation management remain the most common messages recalled. Approximately 78 percent of respondents understand the following statement about PSPS: "for areas at a higher risk of fast-spreading catastrophic wildfires, the utility will proactively shut off power during extreme and dangerous weather."

b. Communications Channels: Social networking and television news are the most commonly recalled channels for wildfire preparedness communication. Three in five respondents recalled seeing messages about wildfire preparedness on social media networks or television news at least five times during the last six months. Television news remains the main source of information for those age 65 and older, and also remains the main source of PSPS communication recall. However, compared to May 2020 (58 percent), significantly fewer respondents (45 percent) mention this channel, as well as newspaper, while more recall seeing PSPS information on social media. Approximately 44 percent stated they would first turn to the Pacific Power website for information about a PSPS event, consistent with May results. The Pacific Power website was also rated as the most useful and clear source of wildfire information by those surveyed.

c. Awareness of Wildfire Mitigation Efforts: Recallers, or individuals who remember the information, remain more likely than non-recallers to be aware of Pacific Power's efforts to reduce the risk of wildfire with 62 percent being aware of Pacific Power's efforts to prune vegetation around power lines in higher-risk areas, in line with the May survey findings.

d. Customer Contact and Notification: Approximately 60 percent of respondents are aware they can update their contact information with Pacific Power, and three in five of those stated they have

done so. Over a quarter know whether their address is in a PSPS area and 26 percent are aware of a PSPS map on Pacific Power's website, a significant increase since May 2020 (13 percent).

e. Access and Functional Needs and Language Prevalence: Among respondents reporting that they rely on electricity for medical needs, a third are aware of additional notices from Pacific Power, up significantly from May (15 percent vs 35 percent). All but four respondents for whom English is not the primary language, prefer to receive communications in English. Approximately 99 percent of those surveyed (in both English and Spanish) indicated it would not be helpful to receive communication in another language.

The results of this independent survey demonstrate that PacifiCorp deployed a comprehensive strategy for engaging customers regarding wildfire preparedness and PSPS in 2020. The report further identifies areas for improvement. The company takes these findings into consideration to improve its engagement with community partners, agencies and other CBOs for customer wildfire preparedness and PSPS outreach and engagement efforts in 2021.

The company plans to increase awareness of resources on Pacific Power's website, including how to determine whether a customer's residential or business address is located in a PSPS area and educate more customers of the ability to update contact information and/or identify as AFN-related electricity needs in a residence. Based on the survey results and interviews with CBOs, the company tailoring messaging to highlight important and actionable information for AFN population and engage directly with CBOs in the event of a PSPS. Additionally, the company is seeking AFN messaging opportunities with community partners outside of its traditional communication channels such as placing key messages and call-to-actions on CBO websites, newsletters, emails and printed materials.

7.3.10.2 Cooperation and best practice sharing with agencies outside CA

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. Through our lessons learned we have been able to develop processes and procedures which are being adopted in other states in coordination with other agencies and jurisdictions.

7.3.10.3 Cooperation with suppression agencies

Similar to PacifiCorp's general approach to emergency management, The Emergency Response Plan has procedures for the integration of utility personnel into the public sector response structure for an incident or event requiring electric utility support and coordination. If the public sector requests personnel to the Emergency Operations Center they will be made available.

PacifiCorp's emergency management team interfaces and maintains relationships with federal and state emergency responders and mutual assistance groups. The 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 dispatch centers for fire-related emergency response. District operations managers also maintain relationships and exchange contact information with local first responders regularly. In the event of an incident where emergency operations are established, such as a wildland fire, 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. The district operations manager

or identified company representative acts as the liaison between the ICP and PacifiCorp's Control Center and Emergency Operations Center. Furthermore, PacifiCorp regional business managers maintain company relationships with local government jurisdictions and community organizations. Regional business managers are the primary contact for local leadership and critical customers in their area of responsibility

In preparation throughout the year, PacifiCorp also participates in various regulatory proceedings, town hall meetings, and open house events to engage other industry leaders, community leaders and members, and local emergency response management organization. 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.

7.3.10.4 Forest service and fuel reduction cooperation and joint roadmap

PacifiCorp uses a multi-faceted effort to communicate information regarding wildfire prevention and response to customers. Communication methods include the following: targeted radio public service announcements; social media posts on Facebook and Twitter; informative banners on website homepage, wildfire safety landing page on website; targeted bill messages; press releases posted to our website and distributed to local media; news articles for local chamber publications; prepared talking points for regional business managers; pre-determined outreach to local community authorities and organizations to participate in prevention and preparedness focused town halls; and live informative Facebook events. Additional information regarding PacifiCorp's community outreach, public awareness, and communication efforts can be found in Section 5.3.9.2. The following subsection include detailed descriptions of PacifiCorp's emergency planning and preparedness wildfire mitigation initiatives. Each of these programs is ultimately governed by PacifiCorp's Emergency Response Plan and Fire Prevention, Preparedness, and Response Plan.

8 PUBLIC SAFETY POWER SHUTOFF (PSPS), INCLUDING DIRECTIONAL VISION FOR PSPS

8.1 DIRECTIONAL VISION FOR NECESSITY OF PSPS

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

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

PacifiCorp has only utilized a Public Safety Power Shutoff once; therefore, doesn't have a large background of experience to draw from when exploring lessons learned. However, it is the intention that as the WMP initiatives are implemented over the coming years that the need and possibility of utilizing a PSPS will be greatly reduced. It is expected that the culmination of initiatives will result in more granular situational awareness against a hardened system that would provide better insights as to when (if at all) a Public Safety Power shutoff should be utilized and where to minimize impacts to customers. The following section describe in greater detail the PSPS protocols and projected changes in the coming years.

Instructions for Table 8-1:
Rank order the characteristic of PSPS events (in terms of numbers of customers affected, frequency, scope, and duration) anticipated to change the most and have the greatest impact on reliability (be it to increase or decrease) over the next ten years. Rank in order from 1 to 9, where 1 means greatest anticipated change or impact and 9 means minimal change or impact on ignition probability and estimated wildfire consequence. To the right of the ranked magnitude of impact, indicate whether the impact is to significantly increase reliability, moderately increase reliability, have limited or no impact, moderately decrease reliability, or significantly decrease reliability. For each, include comments describing expected change and expected impact, using quantitative estimates wherever possible.

Table 8-1: Anticipated characteristics of PSPS use over next 10 years

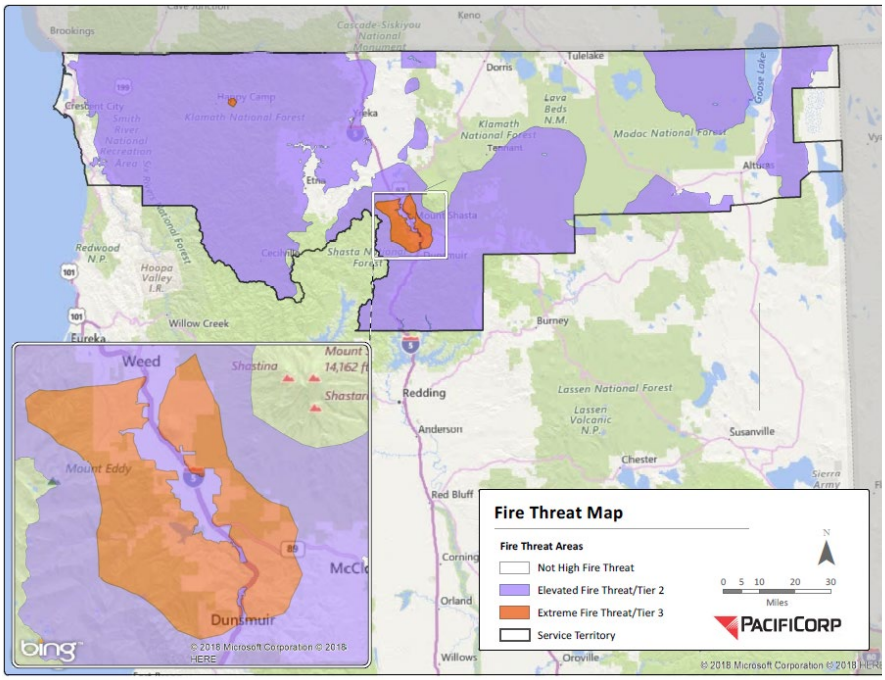
Rank order 1-9	PSPS characteristic	Significantly increase; increase; no change; decrease; significantly decrease	Comments
5	Number of customers affected by PSPS events (total)	Decrease	As mitigation efforts are finished it will remove the exposed circuit segments and those customers served from those segments that are subject to PSPS risk.
6	Number of customers affected by PSPS events (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	As mitigation efforts are finished it will remove the exposed circuit segments and those customers served from those segments that are subject to PSPS risk.
3	Frequency of PSPS events in number of instances where utility	Decrease	As grid configurations and communication technologies are

	operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability (total)		introduced into the system the ability to remotely reconfigure the network's system protection will remove risk, which will reduce 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	As grid configurations and communication technologies are introduced into the system the ability to remotely reconfigure the network's system protection will remove risk, which will reduce 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 performs continues to build out its weather network, enhance its LRAM modeling and perform its 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 performs continues to build out its weather network, enhance its LRAM modeling and perform its asset hardening projects the scope of events will reduce.
7	Duration of PSPS events in customer hours (total)	Decrease	As additional modularization occurs within the network, including advancement of grid technologies the duration of PSPS events will reduce.
8	Duration of PSPS events in customer hours (normalized by fire weather, e.g., Red Flag Warning line mile days)	Decrease	As additional modularization occurs within the network, including advancement of grid technologies the duration of PSPS events will reduce.

The following section addresses the regulatory requirements of PSPS events, the methodology applied to identify candidate PSPS zones, the potential impact to customers and communities, triggers for activation, subsequent communications and protocols, as well as lessons learned from 2020 and planned evolution of the program as a whole. Fundamentally this area of the planned is little changed, however the introduction of Vapor Pressure Deficit as a trigger to confirm the need for PSPS is incorporated, based on advancements of its data analytics associated with climate triggers that signal elevated fire risk.

Methodology to Identify Candidate PSPS Zones

PacifiCorp, consistent with other California investor owned utilities, generally constrains PSPS events to Tier 3 areas and has established its plans consistent with regulatory requirements pursuant to Decision D. 12-04-024 (applicable to PacifiCorp pursuant to Resolution ESRB-8) and as adopted in the current PSPS Rulemaking, R.18-12-005. PacifiCorp has two Tier 3 areas within California, as shown in the graphic below.



A Tier 3 designation itself does not require the development of a PSPS plan, rather it identifies high threat locations requiring further evaluation to determine if a PSPS event should be considered for mitigating fire risk.

Nor must the PSPS zone be fully contained within the Tier 3 area; the shape instead is a result of similar risk levels given the weather history and other environmental factors in combination with associated electrical equipment in the area.

PacifiCorp reviewed fire threat, terrain, fire history, fuel characteristics and weather in determining the company's PSPS zones. It also considered wildland urban interface, defensible space, impacts to customers and facilities to establish its proactive de-energization zones. Additional details can be found in Annex A of the company's California Proactive De-Energization Plan.

PSPS Zones & Potential Impact to Customers

PacifiCorp, through its review, identified two primary zones where a PSPS event might be applicable in its California service territory. The two primary zones were further subdivided into smaller areas (shown outlined in the graphic) minimizing customer impact where appropriate based on weather monitoring capability and circuit topology. This approach resulted in five discrete PSPS areas with a mix of circuit topology and customer impacts as summarized in the below table. PacifiCorp has not identified a need for transmission system de-energization as part of its PSPS plans. Should such an action become relevant to its PSPS plans, and it would affect customers not served by the distribution system's PSPS areas it would conduct outreach to the delivery point customers who may be impacted and develop specific plan elements for such actions.

Approximately 20% of PacifiCorp's California customers are located or are electrically-connected to the designated Tier 3 area within its service territory. Thus, it is challenging to mitigate the impacts of PSPS, until sufficient hardening efforts have been delivered to minimize the ignition risk during environmentally favorable periods described in Section 5.3.3. However, as included in Section 5.3.3.8, PacifiCorp continues to evaluate opportunities within the company's pre-defined PSPS zones where projects can promote flexibility, enhance quality and quantity of localized data to inform decision making, and mitigate the impact of potential PSPS events. At this time, the following table includes the five discrete zones and potential customer impact associated with a PSPS events.

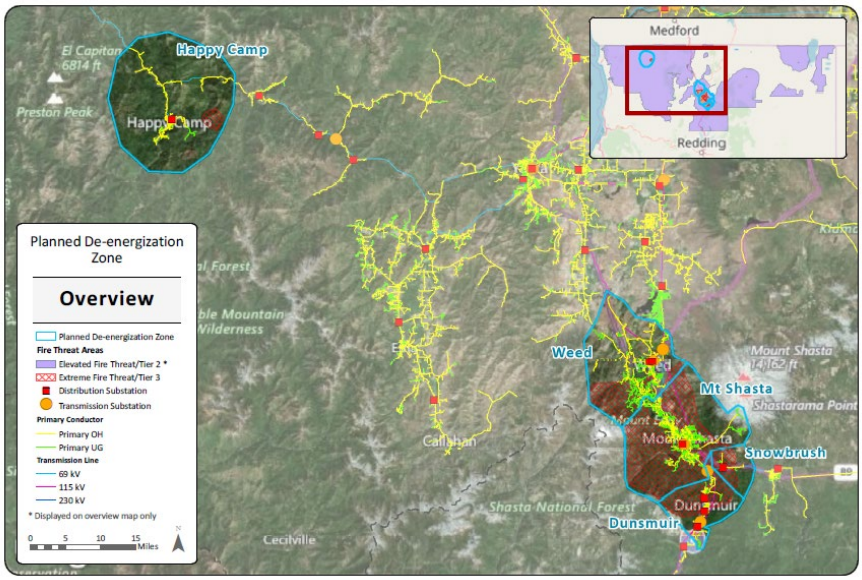


Table 8-2:PSPS area, circuits and customers impacted

	PSPS Name	Substation	# of Circuits	Customers	Distribution OH	Distribution UG
1	Happy Camp	Seiad, Happy Camp	3	865	48.4	5.9
2	Weed	Weed, International Paper	5	2,589	90.5	62.1
3	Mt. Shasta	Mt. Shasta	6	5,074	86.4	76.7
4	Dunsmuir	N & S Dunsmuir, Nutglade	5	1,806	30.0	8.6
5	Snowbrush	Snowbrush	1	17	4.2	1.2
	Total	**9 Substations**	**20**	**10,351**	**259.5**	**154.5**

Setting PSPS Triggers

In order to establish PSPS triggers the company conducted substantial analysis correlating key metrics which are measures of long-term drying (relating to fuel that would be the source of spreading an ignition), climate variables significant in hosting ignitions, and weather that would lead to utility fault events and could spread a fire. From that set of criteria, it established use of KBDI[37] as the metric of fuel

[37] The Keetch-Byram Drought Index (KBDI) which assesses the risk of fire by representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency.

dryness, FFWI6[38] as a fire-supportive climatic metric and wind gusts and speeds to recognize impacts to fault events and fire spread potential. Since its initial analysis setting triggers for its 2019 and 2020 WMPs, the company has performed additional analysis and recognized correlation with a short-term drying measure, vapor pressure deficit (VPD) which measures the departure from normal dryness in an area over the more recent time period (thus complementing KBDI). As mitigations are completed, and other variables become more relevant thresholds will be modified as necessary.

PSPS Triggers – Watch Event

- KBDI Mainly: KBDI >= 622
- KBDI & VPD: KBDI >= 575 & Localized VPD > 94th
- VPD Mainly: Localized VPD >= 97th & KBDI >= 480
- FFWI6 >= 30 and
- Wind gusts >=25 mph OR
- Sustained wind >=16

PSPS Triggers – Activation

- KBDI & VPD: KBDI >= 650 & Localized VPD > 94th
- FFWI6 >= 30 and
- Wind gusts >= 31 mph

To successfully identify, activate, and implement a PSPS event within PacifiCorp's service territory in California, the company monitors weather information from the PSPS areas, uses a list of pre-determined and measurable triggers for activation of a watch event, incorporates additional local knowledge and data to potentially active a PSPS event, and then facilitates continuous monitoring of system conditions to determine when elevated risk conditions subside.

The main process outline is summarized below.

- PacifiCorp utilizes weather systems monitoring to generate a seven-day forecast each business day; based on the criteria, and a potential PSPS activation is triggered.
- When a potential activation is triggered a Public Safety Power Shutoff Event Proposal is prepared and provided to the Vice President of System Operations and the Vice President of T&D Operations which contains the timing details, area, and forecasted duration of the event.
- The Vice President of System Operations and the Vice President of T&D Operations evaluate all relevant information as described in the following subsections, including input from public safety partners to properly characterize and consider impacts to local communities.
- The Vice President of System Operations and the Vice President of T&D Operations decide whether to implement a PSPS event.
- If activated, the company's notification and activation protocols are followed, including activation of the company's emergency management system and customer/public notifications.
- Conditions are continuously monitored during the PSPS event and when elevated risk conditions no longer exist, lines are patrolled for damage, and re-energized, ending the PSPS event.

[38] Hourly Fosberg Fire Weather Index (FFWI) which uses temperature, relative humidity, 10-minute wind-speed factored into a single weather index which is correlated to influence on fire spread, accumulated over a 6 hour period (FFWI6).

Criteria Inputs

Building upon work completed in developing the California state-wide fire map in D. 17-12-024, PacifiCorp utilized weather data, geographic topography, fire probability and ignition data and historic fire data to determine the criteria for triggering proactive de-energization in each of the five PSPS area. While the primary triggers are the same – meaning that a candidate event will be identified based on the same thresholds – it is expected that localized topography and weather conditions will be evaluated in real time prior to making a determination to de-energize any power lines; by using microclimatology information, there may be an opportunity for de-energizing smaller areas at a time. For these reasons, it will be rare for proactive de-energization to be simultaneously activated in multiple PSPS areas. PacifiCorp uses the following measurements as inputs to the PSPS watch criteria.

- Hourly Fosberg Fire Weather Index (FFWI) which uses temperature, relative humidity, 10-minute wind-speed factored into a single weather index which is correlated to influence on fire spread, accumulated over a 6 hour period (FFWI6).
- The Keetch-Byram Drought Index (KBDI) which assesses the risk of fire by representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency.
- Forecasted wind speeds and potential sustained gusts.

Each business day a seven-day forecast is generated internally of the above measurements for PSPS areas highlighting any areas meeting the following levels:[39]

Table 8-3: PSPS threshold levels

PSPS Watch Level 1	PSPS Watch Level 2
☐ KBDI Mainly: KBDI >= 622 ☐ KBDI & VPD: KBDI >= 575 & Localized VPD > 94th ☐ VPD Mainly: Localized VPD >= 97th & KBDI >= 480 ☐ FFWI6 >= 30 and ☐ Wind gusts >=25 mph OR ☐ Sustained wind >=16	☐ KBDI & VPD: KBDI >= 650 & Localized VPD > 94th ☐ FFWI6 >= 30 and ☐ Wind gusts >= 31 mph

While these general values are used to identify PSPS watch conditions, localized criteria and up to date information are incorporated when a determination is made to implement an actual PSPS event as described in the following subsection.

Criteria to Activate

After the first notification is delivered, PacifiCorp actively monitors weather conditions and endeavors to provide customers with additional notifications. During this time PacifiCorp begins actively engaging Public Safety Partners to ensure any relevant input is incorporated from these professionals. When Watch Level 2 levels are forecasted (or measured in actual conditions), PacifiCorp's Emergency Operation Center (EOC) is activated. The Watch Level 2 forecast is confirmed and continuously monitored throughout the potential PSPS event. Customer lists in the subject PSPS area are assembled, and a communication plan is implemented according to the details in Section 4.4.3. PacifiCorp also

[39] While Red Flag Warnings provide the public awareness of heightened fire risk conditions and are considered by PacifiCorp when evaluating any candidate event, such warning do not sufficiently correlate to warrant inclusion as a key input to activation of the proactive de-energization process.

deploys additional resources in the subject PSPS area to monitor local environmental and asset conditions on the ground in real time.

Based on all of the information available to the EOC, the EOC Director, which under normal operation conditions will be the Vice President of T&D Operations, may make a decision to implement a PSPS. In general, barring other unique circumstances, a PSPS would not be implemented unless Watch Level 2 conditions are extremely likely in forecasted weather conditions. At the same time, realization of Watch Level 2 conditions does not necessarily mean that a PSPS is warranted. The EOC Director will consider all available information, including real time feedback from other EOC participants, local field input, recent fire activity, and other pertinent information provided by local emergency management professionals to determine whether PSPS is appropriate. As a matter of practical reality, the EOC Director cannot know if a PSPS will prevent a utility related ignition or not. 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 which would have otherwise occurred was prevented.

8.2 PROTOCOLS ON PUBLIC SAFETY POWER SHUT-OFF

Describe protocols on Public Safety Power Shut-off (PSPS or de-energization), highlighting changes since the previous WMP report:

1. *Strategy to minimize public safety risk during high wildfire risk conditions and details of the considerations, including but not limited to list and description of community assistance locations and services provided during a de-energization event.*
2. *Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization (e.g., decision tree).*
3. *Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol.*
4. *Company standards relative to customer communications, including consideration for the need to notify priority essential services – critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies. This section, or an appendix to this section, shall include a complete listing of which entities the electrical corporation considers to be priority essential services. This section shall also include 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.*
5. *Protocols for mitigating the public safety impacts of these protocols, including impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies.*

PacifiCorp uses an internal escalation process to ensure that it concurrently addresses fire risk mitigation in combination with limiting community impacts from potential de-energization effects. To ensure the highest possible service for customers, the Company established "internal watches" during which the company:

1) Activated the Emergency Action Center,
2) Conducted pre-risk period patrols,
3) Interrogated relays to identify any recent events,
4) Altered system protection control settings,
5) Developed granular forecasts for periods of concurrent elevated risk,
6) Pre-positioned line staff and vegetation personnel to monitor at key locations,
7) Notified public safety partners of elevated concern and the company's mitigation efforts,
8) Actively monitored the network during the period and
9) Upon all-clear notice restored system settings and terminated the EAC.

The company believes that approach best served its customers. As a result, the company intends to conduct its readiness activities similarly in 2021. However, should the conditions escalate sufficiently that PSPS is the most appropriate response, its communication process is outline below.

Proactive De-Energization Customer Communication Process

The process below is specific to notifications prior to an event and is not intended to comply with outreach prior to the wildfire season.

All messaging must be developed and use a common nomenclature that integrates the notification and communication protocols developed for California Statewide Alert and Warning Guidelines.

To meet this requirement, the messages need to include: (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) What is the expected duration of the event.

Communications must also point customers towards education and outreach materials disseminated in advance of each wildfire season.
The plan will deliver notification to customers no matter where the customer is located, deliver clear and understandable information, communicate to customers in different languages, and in a way that addresses different access and functional needs using multiple modes/channels of communication. The required languages are English, Spanish, Chinese, and Tagalog.
The warnings will communicate the possibility of a de-energization event, the estimated start date and time, the estimated duration of the event, and estimated time to restore power. The warnings will also include when customers can expect additional notification and will coincide with the timelines outlined in Table 1.

Timelines
The following timelines may be reduced if changing conditions do not allow for advance notification. In these cases, the company will notify customers as soon as possible and need to include a summary of the circumstances prohibiting compliance to the regulatory requirements in the final report.

Table 8-4: 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 organization-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 Annual WMP Update*

By June 1 of the current year
The company intends to continue development of its situational awareness capability, including enhanced time and spatial precision of forecasts for periods of elevated fire threat, leveraging its growing weather network. It will reevaluate PSPS thresholds in light of its new model to determine any needed modifications of areas or other threshold levels.
By September 1 of the current year
The company will have completed a significant first step in its covered conductor installation by September 2021 which will limit impacts from PSPS away from one of its more populated, elevated fire threat areas, near the central portion of Mt Shasta. In the area near the town of Weed it will also have several months of advanced protection and continuous monitoring experience (DFA) which will provide greater information to recognize utility risks that might precipitate the need for PSPS.

By next Annual WMP Update
By the next annual update, PacifiCorp will have had experience in the practical application of its LRAM in managing contemporary risk and anticipates further "dashboard" functionality supporting situational awareness. Greater information, through risk assessment, situational awareness and system monitoring information will enable more strategic application of all mitigation measures, including PSPS.

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*[40] *(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 Section 7.3.12.

8.5 PSPS-SPECIFIC METRICS

PSPS data will be reported quarterly.

***Instructions for PS*PS table:**
In the attached spreadsheet document, report performance on the following PSPS metrics within the utility's service territory over the past five years as needed to correct previously-reported data. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in the "Comments" column.

See Attachment 1-2021 Performance Metrics Data Template, Table 11.

[40] See Cal. Government Code § 53112

9 APPENDIX

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 modelling based on various relevant weather scenarios	Development and use of tools and processes to estimate incremental risk of foreseeable climate scenarios, such as drought, across 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.
	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 risk-spend efficiency 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 shall inform operational decision-making.
	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 shall 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.
	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).
	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 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 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.
	Infrared inspections of distribution electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using infrared (heat-sensing) technology and cameras that can identify "hot spots", or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
	Infrared inspections of transmission electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using infrared (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 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).
	LiDAR inspections of transmission 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).
	Other discretionary inspection of distribution 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.
	Other discretionary inspection of transmission electric lines and equipment, beyond	Inspections of overhead electric transmission lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations,

	inspections 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 in the course of 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 in the course of 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 shall 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 subcontractors, 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 to plan and execute vegetation management work or promotion of fire-resistant planting practices
	Detailed inspections of vegetation around distribution electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
	Detailed inspections of vegetation around transmission electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
	Emergency response vegetation management due to red flag warning or other urgent 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 reduction of “slash” from vegetation management activities	Plan and execution of fuel management activities that reduce the availability of fuel in proximity to potential sources of ignition, including both reduction or adjustment of live fuel (in terms of species or otherwise) and of dead fuel, including "slash" from vegetation

		management activities that produce vegetation material such as branch trimmings and felled trees.
	Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
	LiDAR inspections of vegetation around distribution electric lines and equipment	Inspections of 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 vegetation around transmission electric lines and equipment	Inspections of 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).
	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 in the course of 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 in the course of other company business.
	Quality assurance / quality control of vegetation inspections	Establishment and function of audit process to manage and confirm work completed by employees or subcontractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
	Recruiting and training of vegetation management personnel	Programs to ensure that the utility is able to identify and hire qualified vegetation management personnel and to ensure that both full-time 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.
	Remediation of at-risk species	Actions taken to reduce the ignition probability and wildfire consequence attributable to at-risk vegetation species, such as trimming, removal, and replacement.
	Removal and remediation of trees with strike potential to electric lines and equipment	Actions taken to remove or otherwise remediate trees that could potentially strike electrical equipment, if adverse events such as failure at the ground-level of the tree or branch breakout within the canopy of the tree, occur.

	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 inventory system	Inputs, operation, and support for centralized inventory of vegetation clearances updated based upon inspection results, including (1) inventory of species, (2) forecasting of growth, (3) forecasting of when growth threatens minimum right-of-way clearances ("grow-in" risk) or creates fall-in/fly-in risk.
	Vegetation management to achieve clearances around electric lines and equipment	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.
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.
	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 were 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 local 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 modelling capabilities for different risk reduction scenarios based on wildfire mitigation initiative implementation; analysis and application to utility decision-making.
	Risk spend efficiency 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 Access and Functional Needs 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	Strategy and actions taken to identify and contact key community stakeholders; increase public awareness and support of utility wildfire mitigation activity; and design,

community engagement		translate, distribute, and evaluate effectiveness of related communications. Includes specific strategies and actions taken to address concerns and serve needs of Access and Functional Needs 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.
	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).

PacifiCorp has complied with this standard throughout the 2021 WMP Update.

Application No. 22-05-006
Exhibit PAC/1803
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Supplemental Testimony of

Allen Berreth

Final Distribution Security Plan

April 2023

PACIFIC POWER
A DIVISION OF PACIFICORP

825 NE Multnomah, Suite 2000
Portland, Oregon 97232

July 12, 2021

VIA ELECTRONIC FILING

Edward Randolph, Director
Energy Division
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102-3298
edward.randolph@cpuc.ca.gov

RE: PacifiCorp's (U 901 E) Final Distribution Security Plan Pursuant to Decision 19-01-018

PacifiCorp d/b/a Pacific Power hereby submits its Final Distribution Security Plan which implements the requirements of Senate Bill 699 and Decision 19-01-018 in Rulemaking 15-06-009.

Please direct any questions regarding this filing to Pooja Kishore, Regulatory Affairs Manager, at (503) 813-7314.

Sincerely,

Shelley McCoy
Director, Regulation

cc:

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PACIFIC POWER
A DIVISION OF PACIFICORP

Final Distribution Security Plan

PacifiCorp

Implementing Requirements of Senate Bill 699 and California Public Utilities Commission Rulemaking 15-06-009

7/12/2021

PACIFIC POWER
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Document Control

Plan Revision Log

Date of Changes	Section(s) with changes	Summary of Changes	Changes Made by
7/12/2021	All	Initial Release	Sheila Andreatta, Asset Management

Plan Review Log

Date of Review	Name of Reviewer	Summary of Findings

PACIFIC POWER
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Executive Summary

PacifiCorp d/b/a Pacific Power (PacifiCorp or company) hereby submits its Final Distribution Security Plan which implements the requirements of Senate Bill (SB) 699 and Decision (D.) 19-01-018 in Rulemaking (R.) 15-06-099.

In response to physical security breaches of electric supply substations[1] experienced in the state of California, the California Public Utility Commission (Commission) issued an Order Instituting Rulemaking (OIR) on June 11, 2015 to establish policies, procedures, and rules for the regulation of physical security risks to the electric supply facilities of electrical corporations. Following a multi-year collaborative effort between Staff, stakeholders, and utilities in this rulemaking, on January 10, 2019, the Commission adopted D.19-01-018, which required electric utilities to identify electric distribution assets that may merit special protection and measures to lessen identified risks and threats and mitigate the risk of long-term outages to distribution facilities serving a specific subset of critical loads.

Per D.19-01-018, Ordering Paragraph 2, the Commission directed Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco to prepare and submit to the Commission a Final Security Plan Report within 30 months of decision adoption.[2]

To meet this requirement, PacifiCorp first applied the methodology outlined in D.19-01-018 and the Joint Utility Proposal to identify critical loads and designate each corresponding substation as a Covered Facility.[3] As a result, PacifiCorp identified 22 critical loads served by 13 substations considered to be either loads critical for regional drinking and wastewater services or regional public safety establishments such as state level penitentiaries, state level emergency response offices, and multi-county level fire protection offices/facilities. The 13 substations serving these 22 loads were then designated as Covered Facilities and considered in scope for additional assessments and potential mitigation measures. All other distribution facilities were determined to be low or negligible risk and, consistent with the Joint Utility Proposal described in D.19-01-018, were not further evaluated.

Next, PacifiCorp applied a general risk assessment methodology including the assessment of both the likelihood and consequences of a top event occurring and evaluated whether or not existing mitigation measures in place at each location properly prevented or controlled the event to a LOW effective level of risk.

Consistent with D.19-01-018 and the Joint Utility Proposal, PacifiCorp's final assessment recognizes that distribution systems are not subject to the same physical security risks and associated consequences, including threats of physical attack by terrorists, as the transmission system. Therefore, only theft, vandalism, and ballistics attacks resulting in a successful physical security breach of the Covered Facilities and prolonged outage to critical loads were considered.

[1] Specific events are described in D. 19.01.018 beginning at 3.
[2] D.19-01-018 became effective January 10, 2019.
[3] Per D.19-01-018 at 26, "Covered" is the utility working group term employed to describe those assets that are applicable, or that should be subject to physical security. Covered Facilities are also considered assets that require a subsequent assessment.

To perform the assessment, PacifiCorp grouped each criterion included in the Joint Utility Proposal[4] into either being indicative of a prevention or a control mitigation measure and then evaluated the effectiveness of each measure at the 13 Covered Facilities. The combination of these measures and an on-site physical security assessment performed in conjunction with an independent assessor were then leveraged to determine the effective risk level, as depicted visually in Figure 1 below.

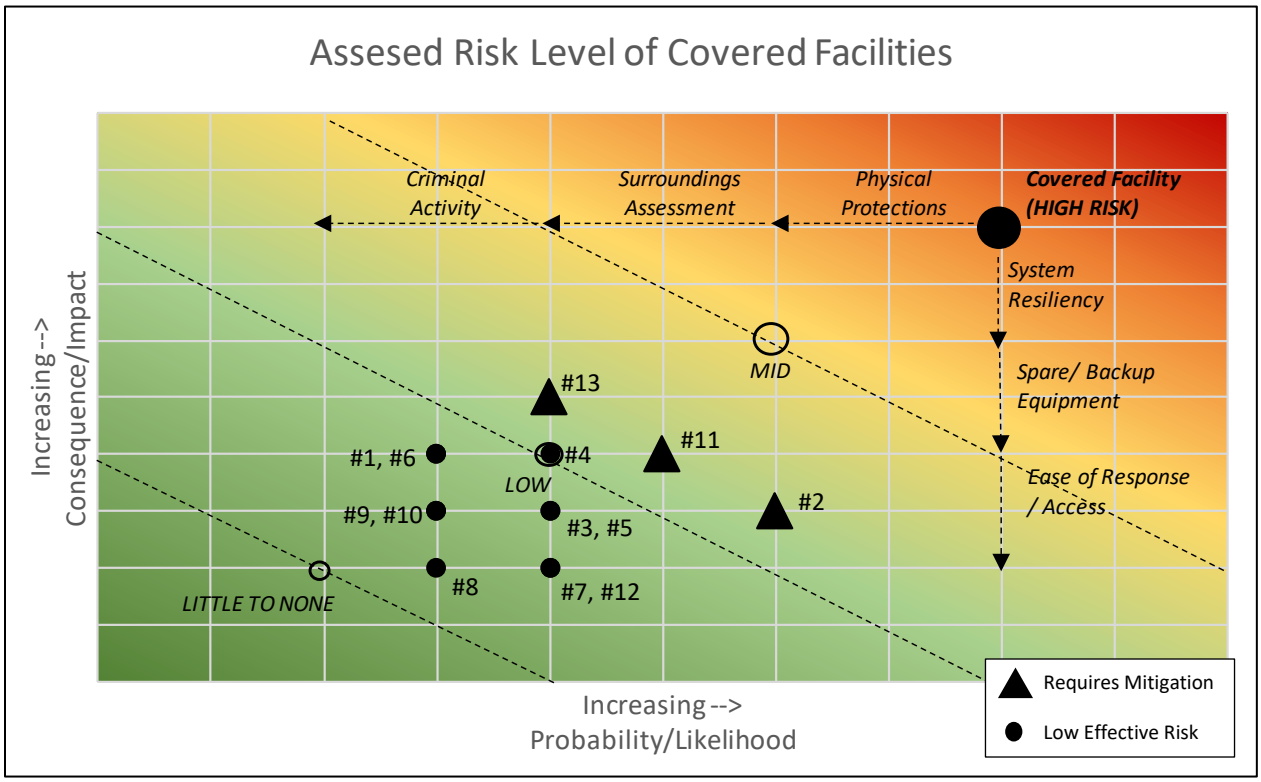


Figure 1: Assessed Risk Level of Covered Facilities

As a result, 10 of the 13 Covered Facilities were assessed to have a LOW effective risk level. As it is PacifiCorp's goal to operate the grid at a risk level as low as practical, the risk of a successful physical security breach on these Covered Facilities was determined to be properly mitigated at these 10 locations. However, as indicated in Table 1 below, three Covered Facilities were assessed to be a MID level of risk, indicative that additional mitigation measures may be needed to properly reduce the effective risk level to LOW.

[4] *See* D. 19-01-018 at 26-27.

Table 1: Assessment Summary of Covered Facilities that Require Mitigation Measures

Substation Name	Number of Critical Loads	PREVENTION MEASURES			CONTROL MEASURES				ASSESSED RISK LEVEL
		Criteria #3: Existing Physical Protections	Criteria #5: Physical Surrounding Assessment	Criteria #6: Criminal History	Criteria #1: Existing Resiliency / Redundancy	Criteria #2: Spares and Mobile Assessment	Criteria #4: Ease of Assess / Response Capability	*Criteria #7 - #9 (Already incorporated or not specifically considered)*	
Substation 2	**1**	**In Place / Partly Effective**	**In Place / Partly Effective**	**Not in Place / Not Effective**	**In Place / Partly Effective**	**Fully Effective**	**Fully Effective**		**MID**
Substation 11	**2**	**In Place / Partly Effective**	**Fully Effective**	**Not in Place / Not Effective**	**Not in Place / Not Effective**	**Fully Effective**	**Fully Effective**		**MID**
Substation 13	**1**	**In Place / Partly Effective**	**In Place / Partly Effective**	**Fully Effective**	**Not in Place / Not Effective**	**Fully Effective**	**In Place / Partly Effective**		**MID**

After completing the assessment, PacifiCorp worked alongside a third-party assessor to develop a list of mitigation projects at Substations 2, 11, and 13 to address existing vulnerabilities and reduce the effective risk level from MID to LOW. These projects, key target areas for improvement, high level cost estimates, and anticipated completion dates are included in Table 2 below.

Table 2: Summary of Final Mitigation Projects, Cost, and Timeline

Substation	Key Target Areas for Improvement	Description of Mitigation Projects / Measures	Estimated Incremental Spend ($)	Estimated Timeline
Substation 2	**Existing Physical Protections:** Given the high crime rate and prevalence for trespassers, the physical protections in place may not be sufficient. **History of Criminal Activity / Trespassers**: Substation 2 is located in a higher crime rate area with *observed presence of trespassers on site* identified during the physical site assessment	**Improvements to physical security above and beyond standard protocols:** Installation of additional fencing and gates alongside and behind substation in addition to existing barriers to prevent unauthorized vehicle traffic and trespassing behind the substation **Relocation of Active Trespassers:** PacifiCorp worked with local city officials to relocate existing trespassers to a safer location away from the substation	$15, 000	EOY 2021
Substation 11	**Existing Physical Protections:** Given the high crime rate and prevalence for trespassers, the physical protections in place may not be sufficient.	**Improvements to physical security above and beyond standard protocols:** Installation of additional fencing fabric with slats to enhance existing perimeter fencing to elevate level of deterrent.	$35,000	EOY 2022

Substation	Key Target Areas for Improvement	Description of Mitigation Projects / Measures	Estimated Incremental Spend ($)	Estimated Timeline
	Note: Substation 11 is located in a higher crime rate area but no specific observation of trespassers (Criminal History – Criteria #6)			
Substation 13	**Existing Physical Protections:** Given the vulnerability of the physical location and remote nature, existing physical protections in place may not be sufficient **Access Constraints:** Seasonal flooding could limit the ability for expedited restoration following an event.	**Improvements to physical security above and beyond standard protocols:** Installation of additional lights and fencing fabric with slats to enhance existing perimeter and elevate level of deterrent due to remote nature of the substation. **Removal of Seasonal Access Constraints:** Existing substation improvement project kicked off in 2020 at PacifiCorp to remove the seasonal access constraint (not incremental to this proposal).	$55,000	EOY 2023

The following depicts the future impact of executing the projects identified above to reduce the effective risk level from Mid to Low for Substation 2, 11, and 13.

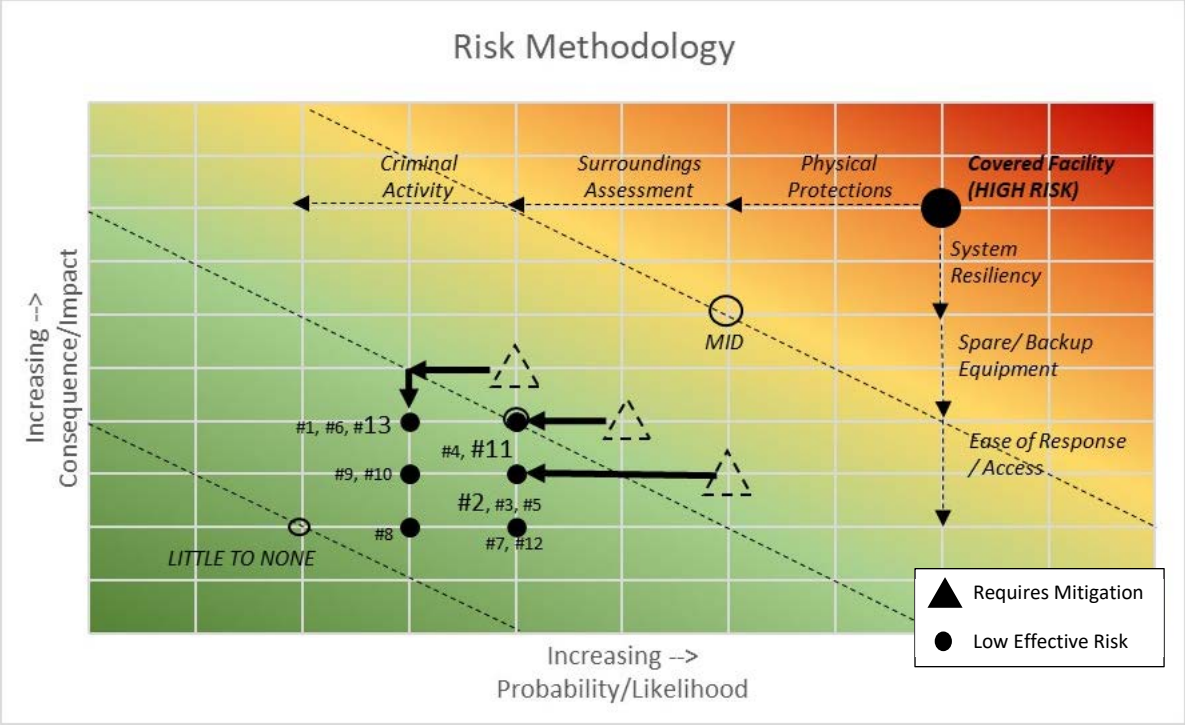


Figure 2: Impact of Mitigation Projects on Future Risk Assessed Levels

The following document, PacifiCorp's Final Distribution Security Plan, developed to meet the requirements in D.19-01-018, reflects the result of this effort to identify new mitigation measures as well as to document existing asset management, construction, and emergency response programs and protocols that support distribution physical security. Additional key plan elements, which can be found in the body of the document include plan management, ownership, and revision protocols, as well as record keeping and reporting requirements.

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1. Introduction & Background

In response to the physical security breaches of electric supply substations in the state of California documented in D.19-01-018, the Commission issued an OIR (R.15-06-099) on June 11, 2015 to establish policies, procedures, and rules for the regulation of physical security risks to the electric supply facilities of electrical corporations consistent with Public Utilities (Pub. Util.) Code §364[5] (Phase I) and to establish standards for disaster and emergency preparedness plans for electrical corporations and regulated water companies consistent with Pub. Util. Code § 768.6 (Phase II).

To address Phase I referenced above, SB 699 amended Pub. Util. Code § 364 and required that the Commission develop rules for addressing physical security risks to the distribution systems of electrical corporations. During Phase I of R.15-06-099, multiple pre-hearing conferences were conducted in 2015 and 2017 and, as a result, a Scoping Memo and Ruling was issued on March 10, 2017 requiring that 14 specific issues be addressed in the proceeding. In a Ruling dated July 12, 2017, the assigned Administrative Law Judge asked that parties file a consensus straw proposal or alternatives. On August 31, 2017, the joint utilities filed a Straw Proposal for Physical Security Regulations (Joint Utility Proposal) to begin addressing the issues raised in the Scoping Memo. [6]

A technical working group was then formed consisting of subject matter experts at the various utilities involved in the proceeding. The Joint Utility Proposal was subsequently developed through a series of four Safety & Enforcement Division's Risk Assessment & Safety Advisory (RASA)-led workshops and collaboration between RASA and the technical working group from May to September 2017. The Joint Utility Proposal was amended through workshops and adopted by the Commission in D.19.01.018 on January 10, 2019. As included in D.19-01-018, this Proposal describes how a utility should establish a Distribution Security Program[7] consisting of the following: (1) Identification of distribution facilities, 2) Assessment of physical security risk on distribution facilities, 3) Development and implementation of security plans, 4) Verification, 5) Record keeping, 6) Timelines, and 7) Cost recovery.

Per D.19-01-018, Ordering Paragraph 1, "Within 18 months of this decision being adopted, Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall prepare and submit to the Commission a preliminary assessment of priority facilities for their distribution assets and control centers." Additionally, through subsequent communications, Staff requested that utilities include pertinent methodologies used to complete the identification and preliminary assessment along with this submission.

---

[5] Pub. Util. Code §364 was subsequently amended by SB 697, effective January 1, 2016 as described in D.19-01-018 at 4.

[6] The parties to the Joint Utility Proposal are: Bear Valley Electric Service, California Municipal Utilities Association, Los Angeles Department of Water & Power, Liberty CalPeco, National Rural Electric Cooperative Association, PacifiCorp, Pacific Gas & Electric Company, Sacramento Municipal Utility District, San Diego Gas & Electric Company, and Southern California Edison Company.

[7] The Joint Utility Proposal defines Distribution Substation as an electric power substation associated with the distribution system and the primary feeders for supply to residential, commercial and/or industrial loads. A Distribution Control Center is defined as a facility that has responsibility for monitoring and directing operational activity on distribution power lines and Distribution substations. *See* D.19-01-018 at 23.

Consistent with D.19-01-018, Ordering Paragraph 1, additional requirements in D. 19.01.018, subsequent communications with Staff, and the overall guiding principles of the Joint Utility Proposal, the PacifiCorp 2020 Preliminary Assessment Report was submitted on July 10, 2020 and included PacifiCorp's identification and preliminary assessment of Covered Facilities including pertinent methodologies leveraged, and draft mitigation measures recommended.

The PacifiCorp 2020 Preliminary Assessment Report and PacifiCorp's overall progress were reviewed with Commission Staff during an interactive workshop on July 22, 2020 along with supporting sensitive and confidential documents. As a result, PacifiCorp was able to incorporate valuable comments and constructive feedback into the company's identification and preliminary assessment and move toward procuring third party services to complement this review and assist with a physical site assessment of the company's Covered Facilities.

After completing a competitive bidding process, a contract was awarded on October 1, 2020 to perform an unaffiliated third-party review of the company's methodology and plan within 27 months of January 10, 2019 consistent with the Joint Utility Proposal. The third-party reviewer (Reviewer) provided PacifiCorp with valuable feedback during a series of workshops conducted in the fourth quarter of 2020 culminating in physical site assessments in early 2021. As a result, PacifiCorp was able to incorporate recommendations from the Reviewer to refine the company's assessment criteria and methodology as well as mitigation project identification and scope to develop a Final Security Plan.

This document, PacifiCorp's Final Distribution Security Plan, developed to meet the requirements in D.19-01-018, is the result of these efforts.

2. PacifiCorp's California Assets

PacifiCorp is a multi-jurisdictional utility that operates in California, Idaho, Oregon, Utah, Washington, and Wyoming.[8] In Northern California, PacifiCorp serves approximately 45,000 retail customers in a large, rural area via 63 transmission and distribution substations and 3,300 miles of transmission and distribution lines across nearly 11,000 square miles. 44 of these substations meet the definition of Distribution Substation[9] as each is considered an electrical power substation associated with the distribution system and the primary feeders for supply to residential, commercial and/or industrial loads over approximately 2,500 circuit miles of distribution level voltage feeders.

Figure 3 below includes a high-level snapshot of PacifiCorp's distribution substations and circuits within PacifiCorp's northern California service territory.

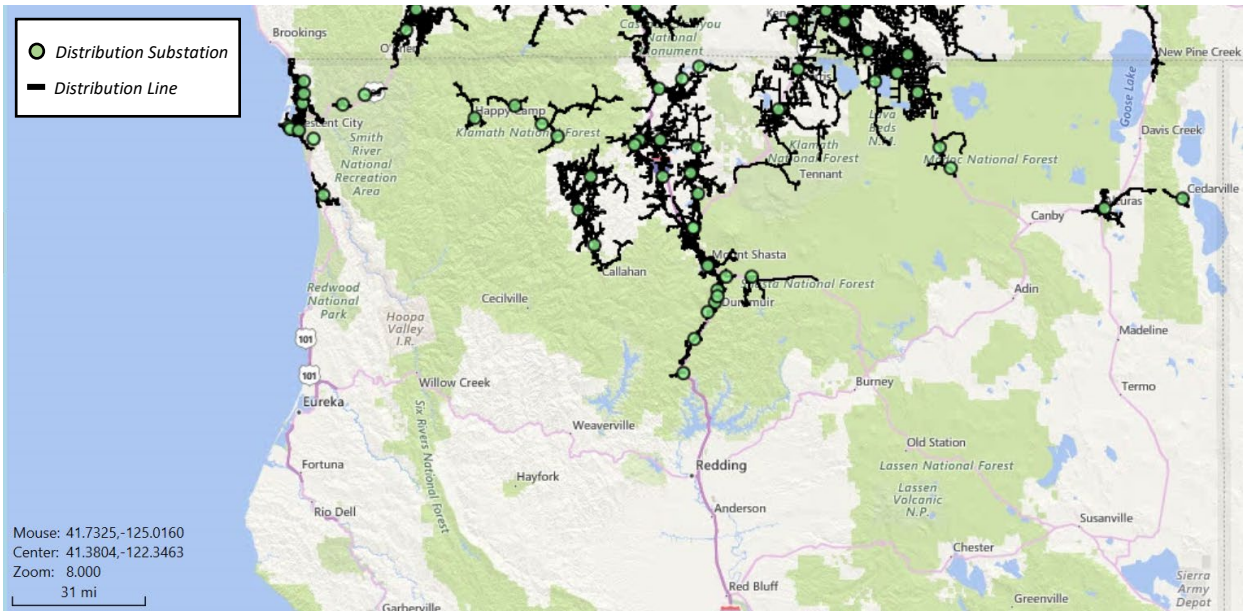


Figure 3: PacifiCorp's California Distribution Assets

At this time, PacifiCorp does not currently have any facilities located within the company's service territory in California meeting the definition of Distribution Control Center.[10] Therefore, only Distribution Substations were considered and evaluated in the company's Distribution Security Program.

[8] In California, Oregon and Washington, PacifiCorp provides service as Pacific Power. In Utah, Idaho, and Wyoming, PacifiCorp provides service as Rocky Mountain Power.

[9] D.19-01-018 at 23.

[10] Per D.19-01-018 at 23, "A Distribution Control Center is defined as a facility that has responsibility for monitoring and directing operational activity on distribution power lines and Distribution substations."

3. Distribution Security Plan Contents and Management

The following subsections describe PacifiCorp's overall plan contents and how these plan contents meet the pertinent requirements of D.19-01-018, as well as PacifiCorp's overall plan management, reporting, and record keeping requirements.

3.1 Requirements and Structure

Ordering Paragraph 8: Subsequent changes to the security plan requirements deemed beneficial and necessary, shall be enabled by one of the following: 1) Commission Resolution or Decision; 2) Ministerially, by Safety and Enforcement Division (or successor entity) director letter.

Ordering Paragraph 9: In carrying out any future changes to the security plan requirements, Safety and Enforcement Division shall confer with utilities about any recommended modifications to the plan requirements.

The components of PacifiCorp's Final Security Plan align with and meet the requirements set forth in D.19-01-018. Any subsequent changes to the security plan requirements deemed beneficial and necessary, shall be enabled by one of the following:

1) Commission Resolution or Decision; or

2) Ministerially, by Safety and Enforcement Division (or successor entity) director letter.

To the extent possible, PacifiCorp will confer, as requested, with the Safety and Enforcement Division regarding any recommended modifications to the plan requirements.

The following table describes the current requirements of the Final Security Plan as documented in D.19-01-018 and where detail can be found in this document to meet the specific requirement outlined.

Table 3: Decision Requirements and Corresponding Plan References

#	Ordering Paragraph	Corresponding Section in Plan
1	Within 18 months of this decision being adopted, Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall prepare and submit to the Commission a preliminary assessment of priority facilities for their distribution assets and control centers.	*PacifiCorp's Identification and Preliminary Assessment of Covered Distribution Facilities was submitted on July 10, 2020*
2	Within 30 months of this decision being adopted, Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall submit each utility's Final Security Plan Report.	*See current document*
3	Within 30 months of this decision being adopted, the Publicly Owned Utilities shall provide the Commission with notice of final plan adoption.	*N/A as PacifiCorp is an investor-owned utility*
4	The Publicly Owned Utilities' notice of final plan adoption may consist of a copy of a signed resolution, ordinance or	*N/A as PacifiCorp is an investor-owned utility*

#	Ordering Paragraph	Corresponding Section in Plan
	letter by a responsible elected- or appointed official, or utility director.	
5	All California Electric Utility Distribution Asset Physical Security Plans shall conform to the requirements outlined within the Joint Utility Proposal, as modified by this decision (rules and requirements collectively known as "security plan requirements").	*See Section 7 at page 28*
6	The Investor Owned Utilities and Publicly Owned Utilities shall adhere to the Safety and Enforcement Division's Six-step Security Plan Process.	*See Section 7 at page 28*
7	The Six-step Plan Process consists of the following: Assessment; Independent Review and Utility Response to Recommendations; Safety and Enforcement Division Review (for Investor Owned Utilities s); Local Plan Review (for Publicly Owned Utilities); Maintenance and Plan overhaul/new review.	*See Section 7 at page 28*
8	Subsequent changes to the security plan requirements deemed beneficial and necessary, shall be enabled by one of the following: 1) Commission Resolution or Decision; 2) Ministerially, by Safety and Enforcement Division (or successor entity) director letter.	*See Section 3.1 at page 14*
9	In carrying out any future changes to the security plan requirements, Safety and Enforcement Division shall confer with utilities about any recommended modifications to the plan requirements.	*See Section 3.1 at page 14*
10	Prior to the submittal of the Security Plan, Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall each have their respective plan reviewed by an unaffiliated third-party entity.	*See Section 8 at page 51*
11	The unaffiliated third-party reviewer shall have demonstrated appropriate physical security expertise.	*See Section 8 at page 51*
12	California electric utilities shall, within any new or renovated distribution substation, design their facilities to incorporate reasonable security features.	*See Section 4 at page 22*
13	Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement an asset management program to promote optimization, and quality assurance for tracking and locating spare parts stock, ensuring availability, and the rapid dispatch of available spare parts.	*See Section 5.2 at page 24*
14	Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement a robust workforce training and retention program to employ a full roster of highly-qualified service technicians able to	*See Section 5.3 at page 25*

#	Ordering Paragraph	Corresponding Section in Plan
	respond to make repairs in short order throughout a utility's service territory using spare parts stockpiles and inventory.	
15	Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement a preventative maintenance plan for security equipment to ensure that mitigation measures are functional and performing adequately.	*See Section 5.1 at page 23*
16	Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement a description of Distribution Control Center and Security Control Center roles and actions related to distribution system physical security.	*See Section 0 at page 27*
17	Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall each document all third-party reviewer recommendations and specify recommendations that were accepted or declined by the utility.	*See Section 8 at page 51*
18	Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall each provide justification supporting its decision to accept or decline any third-party recommendations.	*See Section 8 at page 51*
19	Physical Security-related information is bifurcated into two categories. Recurring and routine utility compliance work products and ongoing utility updates required by this decision are not subject to the Reading Room approach but shall be transmitted to the Commission. All other physical security data requested by Commission Staff on an ad hoc basis shall be made available to the Commission on utility property in a manner agreed to by the Safety and Enforcement Division, or its successor, until such time that the Commission finalizes its rules for the handling, sharing, and inspection of confidential information.	*See current filing.*
20	If a Publicly Owned Utility has an existing blanket Security Plan that has been adopted by its Board of Directors or City Council within three years prior to the date of this decision, the requirement to have a plan adopted may be waived by the Commission.	*N/A for PacifiCorp*
21	In the event that a Publicly Owned Utility's (POU) Security Plan has not been adopted in time as required by this decision, the POU shall provide the Director of the Commission's Safety and Enforcement Division with a notice [30] days prior to the deadline with information on the nature of the delay and an estimated date for adoption.	*N/A for PacifiCorp*

#	Ordering Paragraph	Corresponding Section in Plan
22	Prior to Security Plan adoption, Publicly Owned Utilities in California shall have their plan reviewed by a third party.	*N/A for PacifiCorp*
23	Such third-party reviewer may be another governmental entity within the same political subdivision, so long as the entity can demonstrate appropriate expertise, and is not a division of the publicly owned utility that operates as a functional unit (*i.e.,* a municipality could use its police department if it has the appropriate expertise).	*N/A for PacifiCorp*
24	Publicly Owned Utilities shall conduct a program review of their Security Plan and associated physical security program every five years after initial approval of the Security Plan by their Board of Directors or City Council. Notice of such approval action shall be provided to the Commission's Safety and Enforcement Division within 30 days of Plan adoption by way of copy of signed resolution or letter by a responsible elected- or appointed official, or utility director.	*N/A for PacifiCorp*
25	Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall conduct a program review of their Security Plan and associated physical security program every five years after Commission review of the first iteration of the Security Plan.	*See Section 3.2 at page 19*
26	A summary of the program review shall be submitted to the Safety and Enforcement Division within 30 days of review completion.	*See Section 3.3 at page20*
27	In the event of a major physical security event that impacts public safety or results in major sustained outages, all utilities shall preserve records and evidence associated with such event and shall provide the Commission full unfettered access to information associated with its physical security program and the circumstances surrounding such event.	*See Section 3.3 at page 20*
28	An Exemption Request Process shall be available to utilities whose compliance would be clearly inappropriate or inapplicable or whose participation would result in an undue burden and hardship.	*N/A for PacifiCorp*
29	Utilities shall provide to the Director of the Safety and Enforcement Division and Energy Division copies of OE-417 reports submitted to the United States Department of Energy (U.S. DOE) within two weeks of filing with U.S. DOE.	*See Section 3.3 at page 20*
30	Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco (collectively, IOUs) shall seek recovery of costs associated with their respective Distribution Security Programs in each IOU's general rate case.	*See Section 7.3.3 at page 50*

#	Ordering Paragraph	Corresponding Section in Plan
31	The utilities shall submit an annual report by March 31 each year beginning 2020, reporting physical incidents that result in any utility insurance claims, providing information on incident, location, impact on infrastructure and amount of claim. The insurance claim disclosure reporting, as described in this decision, should be included within a utility's broader annual Physical Security Report to the Commission due every March 31, beginning in 2020.	*See Section 3.3 at page 20*
32	As appropriate, the requirements set forth in Phase I of this proceeding shall apply to Alameda Municipal Power, City of Anaheim Public Utilities Department, Azusa Light and Water, City of Banning Electric Department, Biggs Municipal Utilities, Burbank Water and Power, Cerritos Electric Utility, City and County of San Francisco, City of Industry, Colton Public Utilities, City of Corona, Eastside Power Authority, Glendale Water and Power, Gridley Electric Utility, City of Healdsburg Electric Department, Imperial Irrigation District, Kirkwood Meadows Public Utility District, Lathrop Irrigation District, Lassen Municipal Utility District, Lodi Electric Utility, City of Lompoc, Los Angeles Department of Water & Power, Merced Irrigation District, Modesto Irrigation District, Moreno Valley Electric Utility, City of Needles, City of Palo Alto, Pasadena Water and Power, City of Pittsburg, Port of Oakland, Port of Stockton, Power and Water Resources Pooling Authority, Rancho Cucamonga Municipal Utility, Redding Electric Utility, City of Riverside, Roseville Electric, Sacramento Municipal Utility District, City of Shasta Lake, Shelter Cove Resort Improvement District, Silicon Valley Power, Trinity Public Utility District, Truckee Donner Public Utilities District, Turlock Irrigation District, City of Ukiah, City of Vernon, Victorville Municipal Utilities Services, Anza Electric Cooperative, Plumas-Sierra Rural Electric Cooperative, Surprise Valley Electrification Corporation, and Valley Electric Association.	*See current document*
33	This proceeding shall remain open so that the Commission may address the issues presented in Phase II of this proceeding.	*PacifiCorp is actively participating in the proceeding which remains open*

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3.2 Plan Management and Ownership

Ordering Paragraph 25. "Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall conduct a program review of their Security Plan and associated physical security program every five years after Commission review of the first iteration of the Security Plan. "

While the plan contains elements executed by various departments, PacifiCorp's Final Distribution Security Plan is owned and maintained by the Asset Management Department within the Transmission and Distribution (T&D) Operations Organization. Asset management is responsible for the plan content and accuracy as well as the coordination of a review every 5 years with pertinent Subject Matter Experts as described below. The plan review and any subsequent modifications will be documented in the Document Control section on page 6.

Initial Plan Adoption Date:	July 12, 2021
Plan Owner:	Asset Management, T&D Operations
SME Reviewing Departments:	Substation Operations, T&D Operations Field Engineering, T&D Operations Security & Information Protection
Review Cycle:	5 years
Next Review Date:	Estimated Third Quarter of 2026[11]

[11] Pending Commission review and adoption of initial Security Plan.

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3.3 Reporting

Ordering Paragraph 26: A summary of the program review shall be submitted to the Safety and Enforcement Division within 30 days of review completion.

Ordering Paragraph 27: In the event of a major physical security event that impacts public safety or results in major sustained outages, all utilities shall preserve records and evidence associated with such event and shall provide the Commission full unfettered access to information associated with its physical security program and the circumstances surrounding such event.

Ordering Paragraph 29. Utilities shall provide to the Director of the Safety and Enforcement Division and Energy Division copies of OE-417 reports submitted to the United States Department of Energy (U.S. DOE) within two weeks of filing with U.S. DOE.

Ordering Paragraph 31: The utilities shall submit an annual report by March 31 each year beginning 2020, reporting physical incidents that result in any utility insurance claims, providing information on incident, location, impact on infrastructure and amount of claim. The insurance claim disclosure reporting, as described in this decision, should be included within a utility's broader annual Physical Security Report to the Commission due every March 31, beginning in 2020.

PacifiCorp's Final Distribution Security Plan includes four main elements to ensure all reporting requirements are met.

1. First, to meet the requirement described in Ordering Paragraph 29 of Decision 19-01-018, PacifiCorp provides to the Director of the Safety Enforcement Division and Energy Division copies of OE-417 reports submitted to the United States Department of Energy (U.S. DOE) within two weeks of filing with the U.S. DOE.

2. Second, as described in Ordering Paragraph 31, PacifiCorp submits annually by March 31 each year beginning in 2020, a report of physical incidents that resulted in any utility insurance claims, providing information on incident, location, and impact of infrastructure and amount of claim. Claim notifications to insurers are made in compliance with internal policy notification obligations. PacifiCorp notifies insurers of claims when property damage at insured sites is likely to exceed half of the retention. This annual report also includes a summary of any ODOE 417 reports submitted during the reporting time period as described above. A summary of these reports filed since 2020 is included below.

Reporting Time Period	Report Date	Summary of OE 417 Reports	Summary of Insurance Claims
April 1, 2019 – March 31, 2020	March 31, 2020	No OE-417 reports	No claims
April 1, 2020 – March 31, 2021	March 31, 2021	No OE-417 reports	No claims

3. Third, as described in Ordering Paragraph 27, PacifiCorp shall, in the event of a major physical security event that impacts public safety or results in a major sustained outage, preserve records and evidence associated with such event and shall provide the Commission full unfettered access to information associated with its physical security program and the circumstances surrounding such event.

4. And finally, consistent with Ordering Paragraph 26, upon completion of the five-year plan review as described in Section 3.2 on page 19, PacifiCorp will submit a summary of the program review to the Safety Enforcement Division within 30 days and document the review in the Document Control Section on page 5.

3.4 Record Keeping

Consistent with the Joint Utility Proposal (JUP), electronic copies of this Distribution Security Program Implementation will be retained for not less than five (5) years. As such records are extremely confidential, these records will be maintained in a secure manner at the Operator's headquarters. The records maintained by an Operator will be available for inspection at its headquarters or San Francisco offices by Commission Staff upon request.

These records will include, at a minimum:

1) The Operator's Identification of Distribution Facilities requiring further assessment;

2) Each Operator's Assessment of the potential threats and vulnerabilities of a physical attack and whether existing grid resiliency, customer-owned back-up generation and/or physical security measures appropriately mitigate the risks on each of its identified Distribution Facilities;

3) Each Operator's Mitigation Plans covering each of its Covered Distribution Facilities under Section 4;

4) The unaffiliated third-party evaluation of the Operator's Identification and Assessment evaluations and Mitigation Plans performed and developed by the Operator; and

5) If applicable, the Operator's documented reasons for not modifying its Mitigation Plans consistent with the unaffiliated third-party's evaluation.

4. New Substation Construction

Ordering Paragraph 12: "California electric utilities shall, within any new or renovated distribution substation, design their facilities to incorporate reasonable security features. "

PacifiCorp relies on the application of baseline substation security standards for all new and/or renovated distribution substations to ensure consistent security posture across all of PacifiCorp's distribution facilities. The baseline identifies the minimum physical security requirements for new substation construction and consist of Preventive, Access, and Detective Controls which are inspected and maintained as part of PacifiCorp's Substation Security and Inspection Program further described in Section 5.1 on page 23.

While the specific control measures can vary from site to site depending on voltage class, location, and application, each substation typically includes at least one of each type of the controls listed below.

Table 4: PacifiCorp's Baseline Substation Security Controls

Control Type	**Implemented Controls**
Preventive Controls	Fence and Gates
	Security Signage
	Security Lighting
Access Controls	Locks/Keys
	Key Management System
Detective Controls	Door Position Remote Switch

Substation physical security design and application for construction of new build specifications is outlined in internal company engineering handbooks and standards. These handbooks and standards, which include specifications for fencing and gates, support National Electrical Safety Code or state specific compliance are leveraged for design and construction activities.

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5. Substation Asset Management & Emergency Response Programs

As it pertains to substation physical security and PacifiCorp's Final Security Plan, PacifiCorp has three key asset management and emergency response /restoration programs and approaches: (1) Substation security inspection, (2) Critical Spare Inventory Management, and (3) Workforce Adequacy. PacifiCorp's substation security inspection program is critical to ensure that substation security preventions and controls are in place and maintained in good, working condition. Additionally, PacifiCorp's spare inventory management strategy and workforce adequacy are critical to ensure quick recovery to mitigate the longer-term impacts to customers and communities should a potential physical security breach or incident occur. These programs are described below in future details.

5.1 Substation Security Inspection Program

Ordering Paragraph 15: "Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement a preventative maintenance plan for security equipment to ensure that mitigation measures are functional and performing adequately."

PacifiCorp's preventative maintenance program includes the performance of substation inspections on a routine basis consistent with California General Order 174 requirements. As part of this program, qualified personnel inspect PacifiCorp substations in California which includes the assessment of physical safety, overall security of the substation, identify safety hazards, including fencing, grounding, and major equipment, as well as the performance of minor housekeeping tasks to ensure safe and reliable service. These inspections are considered standard operations that provide incremental reduction of risk due to defects in equipment or breakdowns in substation security mitigation measures. Table 5 describes the types of inspections performed as a part of this program and planned frequency for each.

Table 5: PacifiCorp's Programmatic Distribution Substation Inspection Cycles

Type of Inspection	Voltage Class	Frequency
Substation Inspection (including IR)	Distribution	Bi-Annual (24 months)
Substation & Security Inspection[12]	Distribution	At least 8 times per year (4 major, 4 minor)

A total of eight substation and security inspections are performed per year at each distribution substation.

Minor Substation & Security Inspection: At least four minor inspections are performed per year which generally include a visual inspection of key substation security features and the functional test of the control house remote alarm. For example, the doors and windows are visually inspected, and any spare equipment and PT fuses are verified to be in good, working condition. Additionally, the remote alarm on the Control House is functionally tested and verified with dispatch.

Major Substation & Security Inspection: Four major inspections are completed per year. In addition to the general visual inspection components included in the minor inspection, major inspections also include more detailed measurements and assessments such as fencing height, fencing climb ability, clearance of

[12] On average, substation and security inspections are typically performed on all substations on a monthly basis. However, internal policies require that inspections be performed at least 8 times per year.

climbable vegetation to fencing, existing gap between gate and finished grade, and general condition of masonry walls, other barrier conditions, tension and barbed wire condition. Additionally, major inspections include functional testing of entry lock, substation lighting, and remote alarms. Finally, major substation inspections include verification that only substation or critical equipment is stored within the fence at required distanced to deter attacks of "opportunity" for theft of material items.

5.2 Critical Spare Inventory Management

Ordering Paragraph 13: "Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement an asset management program to promote optimization, and quality assurance for tracking and locating spare parts stock, ensuring availability, and the rapid dispatch of available spare parts."

Asset management is responsible for the implementation of the broader strategy as well as purchasing and records management of key spare equipment throughout the company's service territory. Electronically, key spares are noted and tracked in SAP, PacifiCorp's System of Record for larger capital assets. Asset management takes a wholistic view to ensure spares are located throughout the company's service territory at a combination of local Service Centers and designated storage hubs. PacifiCorp maintains the capability to purchase or move spare inventory as needed to support operations. While asset management maintains responsibility for the overall strategy, local operations is responsible for assessing and mobilizing key spares in the event of an emergency or unplanned outage, which would include an outage as a result of a physical security breach.

Figure 4 depicts this general critical spare inventory management process.

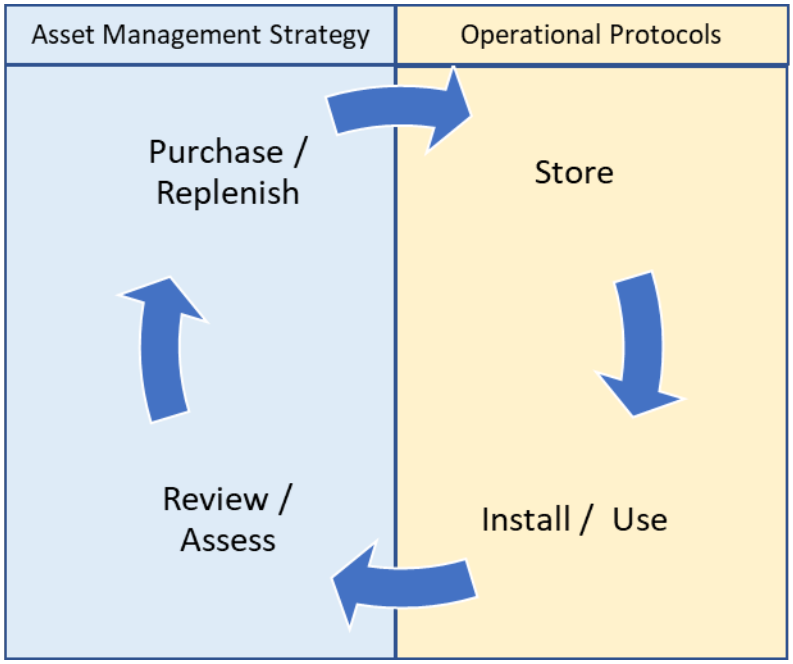


Figure 4: Critical Spare Inventory Management High Level Process

Purchase: As a part of routine evaluation or the result of an unplanned outage, asset management reviews existing inventory levels to identify gaps and recommend the purchase of new strategic spares. Where needed, asset management initiates this process to purchase spare equipment.

Storage: Spare equipment is stored at a combination of local Service Centers and designated storage hubs to ensure dispersion through the company's service territory and support rapid response and recovery. PacifiCorp visually inspects stored spare equipment at these facilities to correct identified deficiencies. Additionally, all new equipment is tested or inspected upon delivery consistent with manufacturer recommendations or warranty requirements.

Use: Local operations oversee the day-to-day usage and near-term decision making during an outage restoration effort and/or equipment failure. When an outage occurs, the initial outage restoration process utilizes alternate feeds and/or spare mobile substation installation to address the near-term need and restore service. Asset Management is contacted during an outage to determine which inventory spare to deploy and transport for installation and service restoration longer term. Transportation contracts are in place to quickly and safely transport mobile substations and spare equipment for customer restoration at the direction of either local operations or asset management.

PacifiCorp's robust equipment inventory and replacement program provides system spare availabilities for each district specific to equipment and voltage needs. To ensure additional availability, equipment purchased for specific projects is also placed in reserved status and can be used if needed during an outage or other unplanned emergency.

Review / Replenish: As spare equipment is installed to restore customer power as a part of this overall process, a subsequent process is initiated to evaluate and assess the need to purchase or replenish any spare inventory installed. Major equipment removed from service is evaluated for repair and, where appropriate, are refurbished and returned to spare inventory by PacifiCorp's Technical Support Department. Where not possible, the equipment is scrapped, and a replacement is purchased.

5.3 Workforce Adequacy and Capability

Ordering Paragraph 14: "Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement a robust workforce training and retention program to employ a full roster of highly-qualified service technicians able to respond to make repairs in short order throughout a utility's service territory using spare parts stockpiles and inventory."

Should a physical security breach occur that results in physical asset damage and a prolonged outage, PacifiCorp's emergency planning and preparedness capabilities support rapid response and recovery from the incident. An adequate and capable workforce is a component of this overall preparedness.

Key personnel responsible for emergency restoration, including substation restoration are typically journeyman/lineman or meter relay technicians.

> **Substation Journeyman Wireman** are qualified electrical workers and must have: (1) working experience as a Journeyman Wireman or (2) and graduated from a sanctioned apprenticeship program and must also have successfully passed a pre-hire physical assessment. Skills and abilities required by this job are of a level normally acquired by completion of job-related high school courses and the apprenticeship program for Journeyman Wireman.
>
> **Meter Relay Technicians** have a working knowledge of Company substation protection and control schemes. As assigned, they 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.

External Journeyman new hires with limited substation experience take part in a two-year substation specific Core Module program. Meter/Relay apprentice must meet required criteria and pass an administered test prior to an interview invite, and train in a three-year program to qualify for a Technician position. A Federal Communications Commission license is required for Communication Technicians and Assistant positions.

In addition to these inherent qualifications, PacifiCorp implements training, tools, work processes, and procedures to support maintaining a workforce capable of installing/repairing equipment during an unplanned outage to restore service, which includes outages caused by potential physical security breaches. Initial Safe Entry Training is required for all workforce personnel. Safety and environmental training is also required and refreshed annually alongside a review of mobile substation and emergency generator installation procedures. Furthermore, PacifiCorp's Technical Support and Relay Support Departments host annual craft seminar training for Substation Journeyman and Meter/Relay Technicians covering topics such as equipment maintenance procedures and operating practice, includes hands on training and use of test equipment for maintenance and repair of major equipment such as circuit breakers, transformers, and batteries.

Workforce levels are routinely reviewed by the director of Substation Operations for available and necessary support within each operating district, which includes PacifiCorp's service territory. Additionally, PacifiCorp's California assets and workforce represent a small percentage of the company's overall resources. Should the need present itself, PacifiCorp has access to additional resources located in Southern Oregon and throughout the company's entire service territory which can be deployed to California should the need arise. Furthermore, PacifiCorp is a member of mutual assistance agreements with partnering utilities that provide access to resources if required when responding to an event.

6. PacifiCorp's Distribution Control Center

Ordering Paragraph 16. "Utility security plans shall include a detailed narrative explaining how the utility is taking steps to implement a description of Distribution Control Center and Security Control Center roles and actions related to distribution system physical security."

PacifiCorp's central security control center is responsible for immediate triage of physical security incidents impacting PacifiCorp transmission and distribution assets. Operators monitor alarms where security technology and controls are deployed. Upon notification of an alarm or incident, operators will notify local law enforcement for immediate response. PacifiCorp's corporate security department provides post incident investigation support, security coordination and ensures all appropriate internal and external offices are notified based on the impact to the site and security threat identified. Operations personnel routinely perform substation inspections and identify security impact and concerns. All findings are reported to security for additional coordination and remediation. Reporting procedures are provided as part of new hire and annual security training requirements referenced in Section 5.3 of this Plan. Key security contact numbers and other security notification tools are provided to all employees.

Operation of PacifiCorp's assets are monitored remotely from a central Distribution Control Center. This center provides a full accompaniment of security protections and controls to ensure the safe monitoring and operation of the 44 identified Distribution Facilities within the company's California service territory. These include preventive controls such as barriers, climb-resistant fencing, visible security presence, and security signage. Detective capabilities incorporate a state-of-the-art intrusion detection system, video monitoring, 24x7 onsite security presence plus 24x7 remote security monitoring and alarms. Additionally, the center includes 24x7 on-site security and active engagement with law enforcement.

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7. PacifiCorp's Distribution Security Program

Ordering Paragraph 5: All California Electric Utility Distribution Asset Physical Security Plans shall conform to the requirements outlined within the Joint Utility Proposal, as modified by this decision (rules and requirements collectively known as "security plan requirements").

Ordering Paragraph 6: The Investor Owned Utilities and Publicly Owned Utilities shall adhere to the Safety and Enforcement Division's Six-step Security Plan Process.

Ordering Paragraph 7: The Six-step Plan Process consists of the following: Assessment; Independent Review and Utility Response to Recommendations; Safety and Enforcement Division Review (for Investor Owned Utilities s); Local Plan Review (for Publicly Owned Utilities); Maintenance and Plan overhaul/new review.

As described in the introduction, the Joint Utility Proposal was developed through a series of four RASA-led workshops and collaboration between RASA and a technical working group from May to September 2017. The Joint Utility Proposal was initially filed on August 31, 2017, amended through workshops and adopted by the Commission in D.19-01-018.

As described in D.19-01-018, the intent of the Joint Utility Proposal is to implement a risk management approach toward distribution system physical security, with appropriate considerations of resiliency, impact, and cost.[13] In order to accomplish this risk-based approach, general principles were derived from information described and evaluated during the workshops to guide the utility's overall evaluation of Distribution Facilities. These principles note the following:

1. Distribution systems are not subject to the same physical security risks and associated consequences, including threats of physical attack by terrorists, as the transmission system.
2. Distribution utilities will not be able to eliminate the risk of a physical attack occurring, but certain actions can be taken to reduce the risk or consequences, or both, of a significant attack.
3. A one-size-fits-all standard or rule will not work. Distribution utilities should have the flexibility to address physical security risks in a manner that works best for their systems and unique situations, consistent with a risk management approach.
4. Protecting the distribution system should consider both physical security protection and operational resiliency or redundancy.
5. The focus should not be on all Distribution Facilities, but only those that risk dictates would require additional measures.
6. Planning and coordination with the appropriate federal and state regulatory and law enforcement authorities will help prepare for attacks on the electrical distribution system and thereby help reduce or mitigate the potential consequences of such attacks. [14]

The Joint Utility Proposal also describes how a utility should establish a Distribution Security Program consisting of the following key elements: 1) Identification of distribution facilities, 2) Assessment of

[13] D.19-01-018 at 24.
[14] *Id.*

physical security risk on distribution facilities, 3) Development and implementation of security plans, 4) Verification, 5) Record keeping, 6) Timelines, and 7) Cost recovery.[15]

Figure 5 below depicts PacifiCorp's general approach to develop a Final Utility Security Plan consistent with the guiding principles above, the Joint Utility Proposal, and required key elements, and other requirements set forth in D.19-01-018.

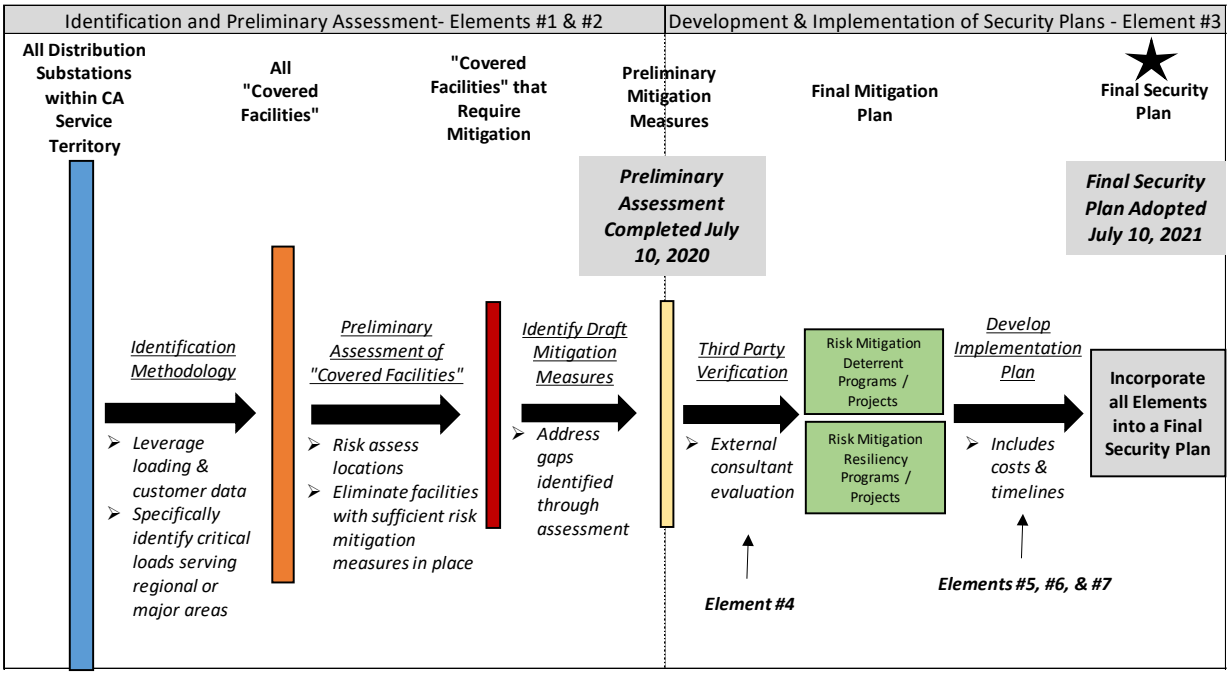


Figure 5: PacifiCorp's General Approach to Develop a Final Utility Security Plan

As identified above, PacifiCorp's general approach to address the six key elements includes five important steps or phases: (1) Identification of Covered Facilities, (2) Assessment of Covered Facilities, (3) Identification of Preliminary Mitigation Measures, (4) Third Party Verification, and (5) Development/Implementation of a Final Security Plan. These pertinent steps align with the key elements in D.19-01-018 and are further described in Table 6 below.

Table 6: High Level Description of Steps Pertinent to PacifiCorp's General Methodology

#	Process Step	PacifiCorp's Approach/General Description
1	Identification of Covered Facilities	The evaluation of electrical system and customer information to identify distribution facilities, defined as Covered Facilities, serving high risk critical loads (as defined by the criteria included in the Joint Utility Proposal and D.19-01-018) that require further risk assessment and, potentially, implementation of risk

[15] *Id.* at 23.

#	Process Step	PacifiCorp's Approach/General Description
		mitigating measures due to the potential impacts of a successful physical attack on the facility.
2	Assessment of Covered Facilities	A risk assessment associated with a probable and successful physical attack of Covered Facilities, including an evaluation of existing prevention and control mitigating measures in place (such as spare equipment, alternate feeds, and physical deterrents) and gap identification.
3	Identification of Preliminary Mitigation Measures	The preliminary identification of the prevention and/or control risk mitigating measures needed to address any gaps identified in Step #2 and reduce the risk of a potential and successful physical attack on a Covered Facility to a reasonable level.
4	Third Party Verification	The procurement of third-party expertise to review the company's preliminary assessment and draft mitigation measures, including an on-site assessment of security risks.
5	Development of Implementation Plan	Incorporation of third-party review and recommendations and refinement of mitigation project scope, budget, and timeline.

Consistent with Ordering Paragraph 1 of D.19-01-018, PacifiCorp filed a 2020 Preliminary Assessment Report on July 10, 2020, which included a discussion of company's general approach and methodology reflected in this section, as well as draft content to meet steps 1 through 3 above. The following subsections revisit these topics, include any modifications or enhancements made as a result of Commission Staff feedback and the external third-party review, and provide new information regarding the final mitigation plan including costs and an implementation timeline.

7.1 Identification

As described in the Joint Utility Proposal memorialized in D.19-01-018 and the general methodology described in the previous section, the identification of Distribution Facilities represents PacifiCorp's first step toward the establishment of a Distribution Security Program to meet the requirements of SB 699. This section includes PacifiCorp's general approach and methodology as well as the results of applying this methodology to its California Distribution Facilities to determine a list of facilities considered to be Covered Distribution Facilities[16] and, therefore, included in scope of subsequent steps and the assessment.

[16] Per D.19-01-018 at 26, "covered is the utility working group term employed to describe those assets that are applicable, or that should be subject to physical security."

7.1.1 Identification Methodology

Consistent with the general principles outlined in the section above and D.19-01-018, the Joint Utility Proposal suggested that not all Distribution Facilities require a full assessment and set forth the following as facilities that do require a subsequent assessment:

1. Distribution Facility necessary for crank path, black start or capability essential to the restoration of regional electricity service that are not subject to the California Independent System Operator's (CAISO) operational control and/or subject to North American Electric Reliability Corporation (NERC) Reliability Standard CIP-014-2 or its successors;
2. Distribution Facility that is the primary source of electrical service to a military installation essential to national security and/or emergency response services (may include certain air fields, command centers, weapons stations, emergency supply depots);
3. Distribution Facility that serves installations necessary for the provision of regional drinking water supplies and wastewater services (may include certain aqueducts, well fields, groundwater pumps, and treatment plants);
4. Distribution Facility that serves a regional public safety establishment (may include County Emergency Operations Centers; county sheriff's department and major city police department headquarters; major state and county fire service headquarters; county jails and state and federal prisons; and 911 dispatch centers);
5. Distribution Facility that serves a major transportation facility (may include International Airport, Mega Seaport, other air traffic control center, and international border crossing);
6. Distribution Facility that serves as a Level 1 Trauma Center as designated by the Office of Statewide Health Planning and Development; and
7. Distribution Facility that serves over 60,000 meters.[17]

In order to identify which of the 44 Distribution Facilities within PacifiCorp's California service territory provide electricity to critical loads meeting one or more of these definitions, PacifiCorp pulled all of the company's loading and customer information in California, mapped this data back to the electric supply source facility (Distribution Facility), and then categorized the customer information according to the seven definitions above. Consistent with the guiding principles and the criteria above, any customers with full back up generation at their site, operational fail-over capability, or alternate feeds were excluded from the list as any physical security incident at the substation would not have a significant impact to reliability for that customer.

Table 7 below includes PacifiCorp's specific approach to applying the six screening criteria defined in D.19-01-018 to company-specific critical loads/customers.

[17] D.19-01-018 at 25-26.

Table 7: Identification Screening Criteria Detailed Approach

#	Screening Criteria	PacifiCorp's Specific Approach
1.	Distribution Facility necessary for crank path, black start or capability essential to the restoration of regional electricity service that are not subject to the California Independent System Operator's (CAISO) operational control and/or subject to North American Electric Reliability Corporation (NERC) Reliability Standard CIP-014-2 or its successors;	PacifiCorp reviewed system operations, grid operations, and area planning to identify any crank path or black start essential facilities within PacifiCorp's California service territory. As PacifiCorp does not currently have any black start facilities in the state of California, no loads or facilities were expected to meet this criteria.
2.	Distribution Facility that is the primary source of electrical service to a military installation essential to national security and/or emergency response services (may include certain air fields, command centers, weapons stations, emergency supply depots);	PacifiCorp reviewed customer and load attributes to identify those specifically critical to national security, excluding administrative or recruiting facilities. Upon review of PacifiCorp's critical load/customer load database, no pertinent facilities essential for national security were identified and, therefore, no facilities were selected based on this criteria.
3.	Distribution Facility that serves installations necessary for the provision of regional drinking water supplies and wastewater services (may include certain aqueducts, well fields, groundwater pumps, and treatment plants);	Through collaboration with other utilities, PacifiCorp reviewed critical customer/loading information to identify in scope locations serving regional drinking water supplies and wastewater supplies that has the potential for a major impact, scaled to fit PacifiCorp's unique service territory. In performing this evaluation, PacifiCorp eliminated localized facilities and individual pump locations which have the potential to impact small portions of small communities and, instead, focused on major hub facilities with the potential to impact wastewater treatment or water delivery to larger region or system of facilities. This "hub and spoke" approach allowed PacifiCorp to focus on the major and regional facilities consistent with the risk-based approach contemplated in the Joint Utility Proposal. As a result, PacifiCorp identified and included 11 points of delivery with the potential to impact a significant portion of communities.
4.	Distribution Facility that serves a regional public safety establishment (may include County Emergency Operations Centers; county sheriff's department and major city police department headquarters;	PacifiCorp reviewed critical customer/loading information to identify in scope locations such as major county fire service headquarters or state

#	Screening Criteria	PacifiCorp's Specific Approach
	major state and county fire service headquarters; county jails and state and federal prisons; and 911 dispatch centers);	and federal prisons meeting one of the following definitions: Given the rural and small footprint of PacifiCorp's service territory within northern California, it is reasonable and expected that no distribution facility is likely to provide electricity to a major state or city facility. However, similar to screening criteria #3, PacifiCorp scaled this approach to fit the company's unique service territory and included facilities critical to regional wildfire protection and restoration that may not have met the strict definition above. As a result, 11 critical points of delivery were identified, mostly consisting of state level penitentiaries, state level emergency response offices, and multi-county level fire protection offices/facilities.
5.	Distribution Facility that serves a major transportation facility (may include International Airport, Mega Seaport, other air traffic control center, and international border crossing);	PacifiCorp reviewed critical customer/loading information to identify major transportation facilities. Given the rural and small footprint of PacifiCorp's service territory within northern California, it is reasonable and expected that no distribution facility is likely to provide electricity to a major transportation facility in northern California.
6.	Distribution Facility that serves as a Level 1 Trauma Center as designated by the Office of Statewide Health Planning and Development;	PacifiCorp reviewed current listings of Level 1 Trauma Centers and cross referenced with the company's service territory and customer information. No Level 1 Trauma Centers were found to be located within PacifiCorp's California service territory.
7.	Distribution Facility that serves over 60,000 meters.	PacifiCorp identified distribution substations providing electrical service to more than 60,000 meters, equivalent to approximately 60,000 customers. PacifiCorp only serves 45,000 customers throughout the company's California service territory. Therefore, as expected, no substation was identified as providing service to more than 60,000 customers/meters.

7.1.2 Identification Results – List of Covered Facilities

As a result of applying the methodology and general approach set forth by the Joint Utility Proposal to the 44 identified Distribution Facilities within the company's California service territory, PacifiCorp identified 22 critical customers/services/loads served by 13 different substations to be included in the development of the company's Distribution Security Program and, therefore, assessed for physical security risk. See the high level summary in Table 8 below of the identified Distribution Facilities.

Table 8: Identification of Covered Distribution Facilities Summary

Substation Generic Name[18]	# of In Scope Critical Facilities[19]	*Distribution Substation Serves as the Primary Supply of Electricity For:*						
		Crank Path, Black Start	Military Installation Essential to National Security	Regional Drinking or Wastewater Services	Regional Public Safety Est.	Major Transp. Facility	Level 1 Trauma Center	Over 60,000 Meters
Substation 1	3	-	-	-	X	-	-	-
Substation 2	1	-	-	-	X	-	-	-
Substation 3	1	-	-	-	X	-	-	-
Substation 4	1	-	-	-	X	-	-	-
Substation 5	4	-	-	X	-	-	-	-
Substation 6	2	-	-	-	X	-	-	-
Substation 7	2	-	-	X	-	-	-	-
Substation 8	1	-	-	X	-	-	-	-
Substation 9	1	-	-	-	X	-	-	-
Substation 10	1	-	-	-	X	-	-	-
Substation 11	2	-	-	X	-	-	-	-
Substation 12	2	-	-	X	-	-	-	-
Substation 13	1	-	-	-	X	-	-	-

As indicated above, all 22 of the critical loads identified were considered regional public safety establishments such as state level penitentiaries, state level emergency response offices, and multi-county level fire protection offices/facilities or loads critical for regional drinking or wastewater services. These thirteen Covered Facilities were then considered in scope for additional assessments and potential mitigation measures. All other distribution facilities were determined to be low or negligible risk and, consistent with the Joint Utility Proposal described in D.19-01-018, were not further evaluated.

[18] To protect information that is critical to either maintaining the security of the electrical grid or confidentiality of the customer(s), the Covered Facilities have been assigned generic names which are used throughout this filing.
[19] Number of facilities used in this context refers to the number of points of delivery.

7.2 Assessment

Consistent with the Joint Utility Proposal and D.19-01-018, after PacifiCorp identified 13 Distribution Facilities requiring additional assessment, the company moved from the Identification of Covered Distribution Facilities to the company's Preliminary Assessment to determine whether or not existing risks are appropriately mitigated. This represents PacifiCorp's second step toward the development of a Final Security Plan. The following section includes PacifiCorp's general approach and methodology as well as the results of applying this methodology to its California Covered Distribution Facilities.

7.2.1 Assessment Methodology

PacifiCorp defines risk as a combination of probability (also referred to as likelihood) that an event or type of event might occur and the consequences (also referred to as impact) of that event occurring. The presence of risk relies on both probability and consequences and, therefore, the level of risk remains low if either probability or consequence is considered insignificant or negligible. Risk can also be categorical, such as the general risk associated with distribution substations as a category which could be located at multiple locations, or site specific, such as the risk associated with a specific distribution substation at a particular location. For the purposes of the assessment contemplated in this filing and methodology, PacifiCorp leveraged the general risk assessment approach depicted in Figure 6 below to perform site specific assessments of Covered Facilities.

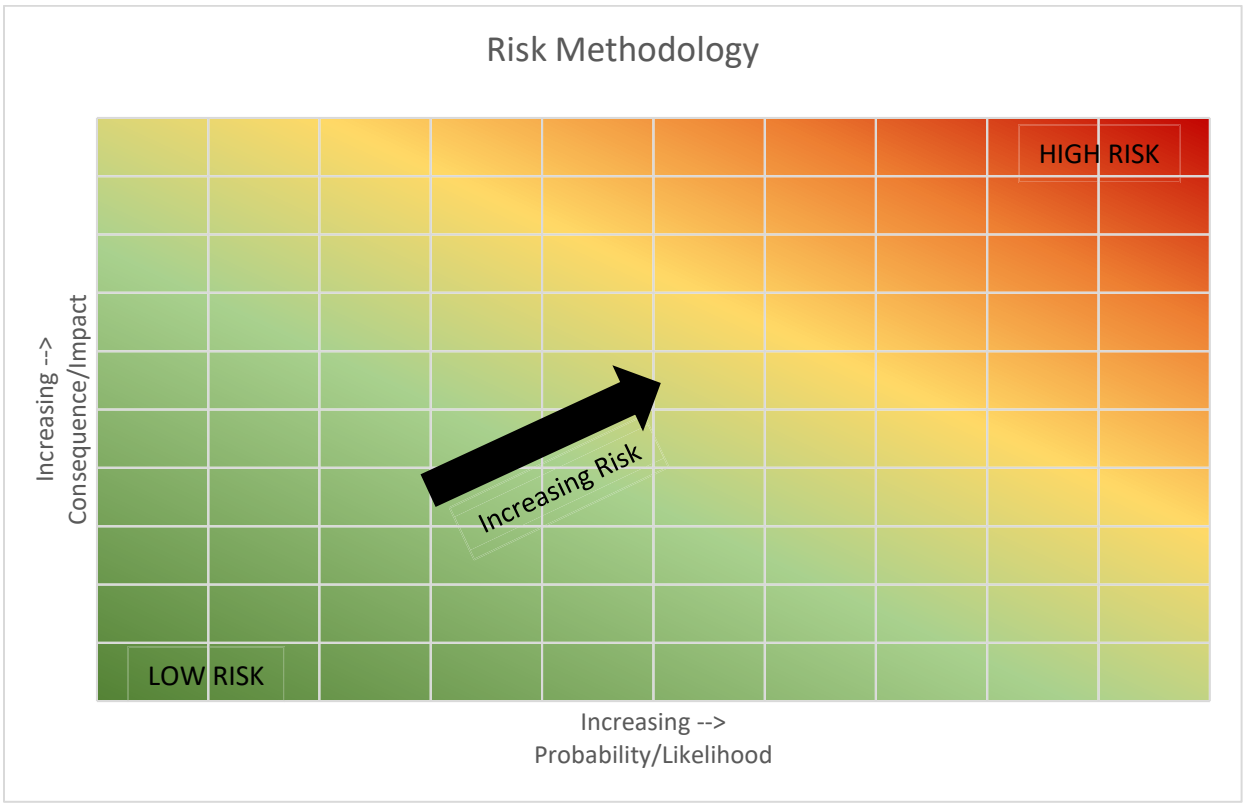


Figure 6: General Risk Methodology Visualization

As contemplated in this methodology, the level of risk assessed is qualitative and comparative in nature but is proportional to the order of magnitude of both probability and consequence. The level of risk both

increases and decreases proportionally with an increase or decrease in probability and/or consequences and, therefore, the level of risk can be changed or altered through the implementation of mitigating measures. To further explore site-specific risk assessments and how a risk level can be changed or mitigated, PacifiCorp leveraged a standard bow-tie approach, which is depicted in Figure 7 below.

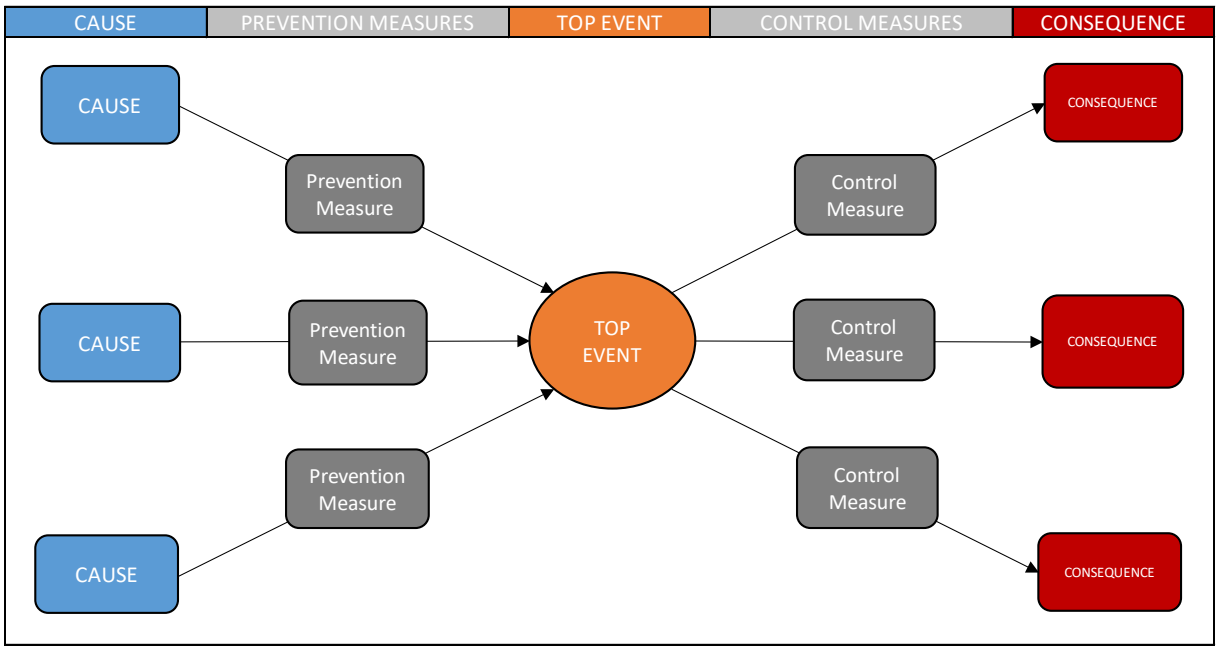


Figure 7: Risk Mitigation - Standard Bow-Tie Approach Visualization

This general bow-tie risk assessment methodology includes the identification of cause(s) for a defined top event or threat as well as the assessment of prevention measure(s) and control measure(s) in place to prevent these causes from resulting in a top event or prevent the top event from resulting in the identified negative consequence(s).

While the implementation of both prevention and control measures can effectively lower risk, each works in its own way or in combination. As indicated by the name, prevention measures prevent the top event from occurring altogether, effectively reducing the likelihood of an event, while control measures work to control the extent of an event and limit the negative impact, effectively reducing the consequences. Implementing either prevention or control measures can reduce risk. Additionally, both prevention and control measures can work together to effectively mitigate or lower the risk level.

Figure 8 below depicts the qualitative impact of prevention and control mitigation measures on risk level independently as well as how a combined program can effectively lower the level of risk.

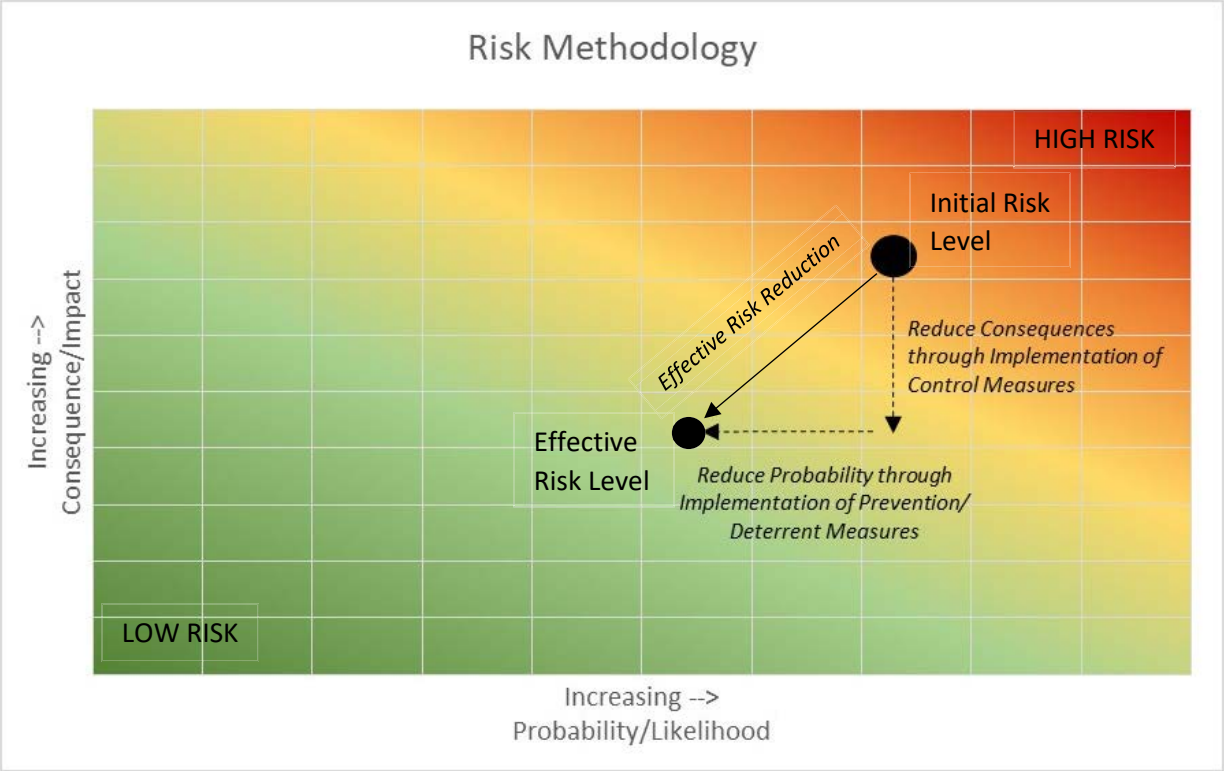


Figure 8: General Impact of Prevention and Control Measures on Risk Level

Based on this framework, PacifiCorp's assessment of Covered Facilities includes the following four main components:

1) Definition of the Top Event
2) Identification of Causes and Consequences
3) Evaluation of Prevention and Control Mitigation Measures
4) Assessing Risk Level of Locations

These components are further discussed in the following subsections.

7.2.1.1 Top Event /Threat

Consistent with D.19-01-018, SB 699, and the Joint Utility Proposal, PacifiCorp's Distribution Security Program only includes the risk assessment of a successful physical security attack on any of the company's Covered Facilities. PacifiCorp's program does not include an assessment of other Distribution Facilities or other types of top events or threats, such as a cyber security attack.

7.2.1.2 Threat Causes Considered

Consistent with D.19-01-018 and the Joint Utility Proposal, PacifiCorp's assessment recognizes that distribution systems are not subject to the same physical security risks and associated consequences, including threats of physical attack by terrorists, as the transmission system. Table 9 below summarizes all potential threat causes considered and whether or not these threat causes were considered in scope for distribution system assessments, not including those more applicable for a transmission level evaluation.

Table 9: Physical Security Breach Causes in Scope for Distribution Assets

Threat Cause	In Scope? [Yes/No]
Theft	Yes
Vandalism	Yes
Ballistic Attack – Small Arms	Yes
Improvised Explosive Device (IED)	No
Vehicle Borne Improvised Explosive Devices (VBIED)	No
Other major terrorist attacks	No

7.2.1.3 Impact/Consequences

Based on the threat causes identified, a successful physical security attack contemplated in this assessment is defined as a physical security breach due to theft, vandalism, or a small arms ballistic attack that results in damage or loss of control of up to a single transformer or other related equipment critical to provide uninterrupted service to up to one feeder or circuit from a Covered Facility and a prolonged outage to the critical loads on that circuit previously identified.

For example, this methodology considers a scenario where a physical security breach leads to significant vandalism and damage to a distribution substation transformer, rendering it inoperable and requiring that that transformer be removed and replaced prior to restoring service to the corresponding circuit or feeder. In this scenario, an unplanned prolonged outage may occur, negatively affecting the critical loads identified on that circuit.

Complete destruction or inoperability of a Covered Facility was not considered in this risk assessment due to the nature of the threat and causes contemplated and in recognition that distribution systems are not subject to the same physical security risks and associated consequences, including threats of physical attack by terrorists, as the transmission system.

7.2.1.4 Evaluation of Existing Prevention and Control Risk Mitigation Measures

As described in D.19-01-018, the following may be considered when conducting an evaluation of the potential risks associated with a successful physical attack on a Covered Distribution Facility.

1. The existing system resiliency and/or redundancy solutions (*e.g.,* switching the load to another substation or circuit capable of serving the load, temporary circuit ties, mobile generation and/or storage solutions);
2. The availability of spare assets to restore a particular load;
3. The existing physical security protections to reasonably address the risk;
4. The potential for emergency responders to identify and respond to an attack in a timely manner;
5. Location and physical surroundings, including proximity to gas pipelines and geographical challenges, and impacts of weather;
6. History of criminal activity at the Distribution Facility and in the area;

7. The availability of other sources of energy to serve the load (*e.g.*, customer owned back-up generation or storage solutions);
8. The availability of alternative ways to meet the health, safety, or security; and
9. Requirements served by the load (*e.g.*, back up command center or water storage facility). [20]

As shown in Table 10 below, consistent with the general methodology leveraged by PacifiCorp, the above assessment criteria were grouped into either being indicative of a prevention (or likelihood) or a control (consequence) mitigation measure.

Table 10: Categorization of Assessment Criteria – Prevention or Control Mitigation Measure

#	Mitigating Measure/Assessment Criteria	Prevention OR Indicative of Likelihood	Control OR Indicative of Consequences
1	The existing system resiliency and/or redundancy solutions (*e.g.,* switching the load to another substation or circuit capable of serving the load, temporary circuit ties, mobile generation and/or storage solutions);		X
2	The availability of spare assets to restore a particular load;		X
3	The existing physical security protections to reasonably address the risk;	X	
4	The potential for emergency responders to identify and respond to an attack in a timely manner;		X
5	Location and physical surroundings, including proximity to gas pipelines and geographical challenges, and impacts of weather;	X	
6	History of criminal activity at the Distribution Facility and in the area;	X	
7	The availability of other sources of energy to serve the load (*e.g.*, customer owned back-up generation or storage solutions);		X
8	The availability of alternative ways to meet the health, safety, or security; and		X
9	Requirements served by the load (*e.g.*, back up command center or water storage facility).		X

After categorizing the assessment criteria, as show in Table 11 below, PacifiCorp took the approach of assessing the presence and effectiveness of the existing prevention and control measures at each Covered Facility.

[20] D.19-01-018 at 26-27.

Table 11: PacifiCorp's Approach to Assessment of Existing Mitigating Measures

#	Mitigating Measure/Assessment Criteria	PacifiCorp's Approach to Assessment
1	The existing system resiliency and/or redundancy solutions (*e.g.,* switching the load to another substation or circuit capable of serving the load, temporary circuit ties, mobile generation and/or storage solutions);	PacifiCorp evaluated existing level or resilience and/or redundancy on the distribution system to provide an alternate source of electricity to critical loads previously identified, through either switching or alternate generation, should the primary source or electricity be compromised at the Covered Facility resulting in a prolonged outage. As a result, three Covered Facilities were found to already have the ability to switch/alternate feeds. Six Covered Facilities were found to have partial capability, with seasonal loading constraints. However, the remaining four Covered Facilities were determined to have no switching or alternate generation capabilities.
2	The availability of spare assets to restore a particular load;	PacifiCorp's existing dispatchable mobile and spare transformer inventory was evaluated (as this would be a long lead/prolonged outage) to identify the type and number of compatible spare units for each in service transformer within the Covered Facilities that functions as the primary source of electricity to the critical loads identified. As a result, all transformers at Covered Facilities serving critical loads were identified to have multiple compatible backups that could be dispatched to the Covered Facility to restore service and prevent an extended outage.
3	The existing physical security protections to reasonably address the risk;	PacifiCorp evaluated site specific physical security barriers and deterrents above and beyond standard physical security measures such as remotely monitored alarms or additional locks on equipment inside the substation fencing. While all Covered Facilities were found to have at least one or more enhanced security protections in place, only two facilities were determined to have all enhanced physical security protections in place to fully mitigate risk. All other Covered Facilities were determined to have partial mitigation measures in place.

#	Mitigating Measure/Assessment Criteria	PacifiCorp's Approach to Assessment
4	The potential for emergency responders to identify and respond to an attack in a timely manner;	Based on the recommendation from the third-party assessor, PacifiCorp mapped out the closest emergency responder to each Covered Facility which would be contacted in case of emergency to determine both distance and transport time. Each Covered Facility was then ranked based on the following criteria: Drive Time ≤ 15 mins = LOW Drive Time >15 mins & ≤ 30 mins = MID Drive Time > 30 mins = HIGH All substations were found to be within a 15-minute drive of the nearest emergency responder. This result was then layered with any known seasonal access constraints the could potential hinder assess and fast response. As a result, 2 substations were identified with seasonal access constraints and assessed as a MID level of risk.
5	Location and physical surroundings, including proximity to gas pipelines and geographical challenges, and impacts of weather;	PacifiCorp, in collaboration with the third-party assessor, performed physical site assessments of the Covered Facilities to evaluate whether or not the location and physical surrounding provided natural mitigation and deterrents that reduce risk or exposed the substation to vulnerabilities. As a result, 3 covered facilities were found to have a MID level of exposure and risk, while the remaining 10 substations were assessed as low risk.
6	History of criminal activity at the Distribution Facility and in the area;	Similar to screening criteria #5, the history of criminal activity in the area of a Covered Facility may be indicative of the probability that a physical security breach due to vandalism, theft, or ballistic attack will happen. PacifiCorp evaluated a history of criminal activity in the vicinity of each Covered Facility as compared to the national average crime rates. Covered Facilities with crime rates lower than the national average were deemed to be low likelihood, those with crime rates higher than 50 percent above the national average were considered to be high likelihood, and facilities with crime rates in between were identified as having a medium level of likelihood.

#	Mitigating Measure/Assessment Criteria	PacifiCorp's Approach to Assessment
		This data driven analysis was also layered with the results of the physical site assessment to include any observed trespassing, damage, or vandalism. As a result, 4 Covered Facilities were assessed HIGH, 2 MID, and the remaining 7 as LOW.
7	The availability of other sources of energy to serve the load (*e.g.*, customer owned back-up generation or storage solutions);	At this time, PacifiCorp has not evaluated the potential for customer owned generation at each critical load as a part of this assessment.
8	The availability of alternative ways to meet the health, safety, or security; and	At this time, PacifiCorp is not formally considering providing alternate ways to meet the needs served by the critical loads and therefore, has not considered this aspect as part of this assessment.
9	Requirements served by the load (*e.g.*, back up command center or water storage facility).	Inhered to the identification methodology considered, the critical loads and corresponding Covered Facilities were selected based on the necessity of the load and corresponding community service provided and lack of alternatives available to provide that service. Therefore, the requirements served by the load were already considered in the identification and not further contemplated as part of this assessment.

Figure 9 below depicts the culmination of this effort to define the top event and identify causes, consequences, and existing mitigation measures to perform a assessment of Covered Facilities.

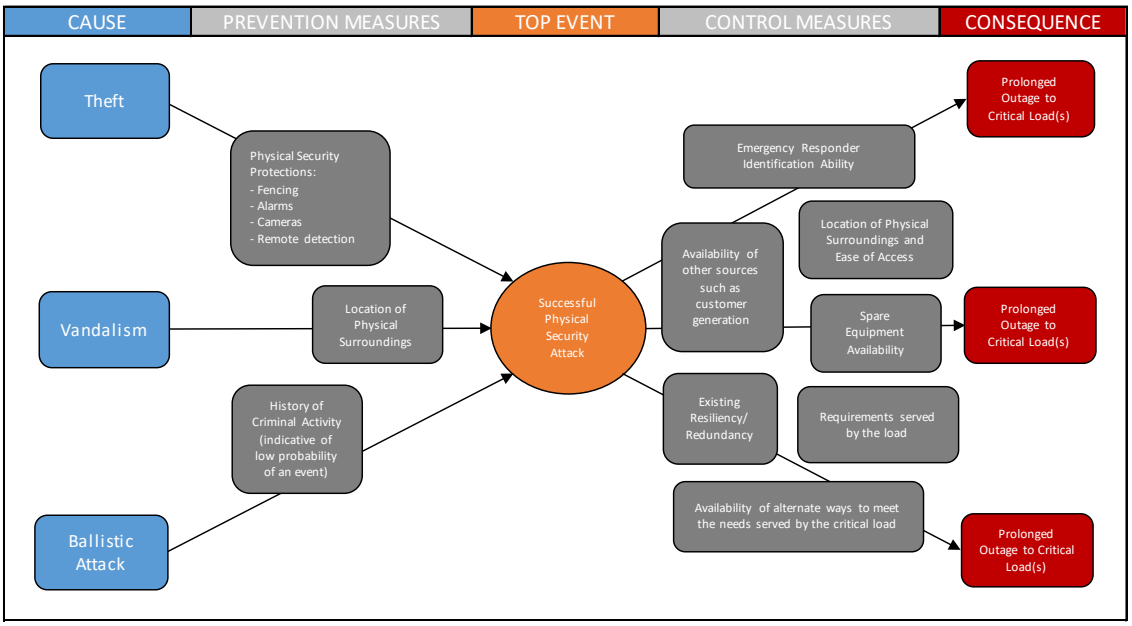


Figure 9: Preliminary Assessment of Covered Facilities Bow-Tie

Furthermore, Figure 10 below depicts how the existing prevention and control mitigation measures assessed by PacifiCorp on all Covered Facilities were used to determine an effective risk level.

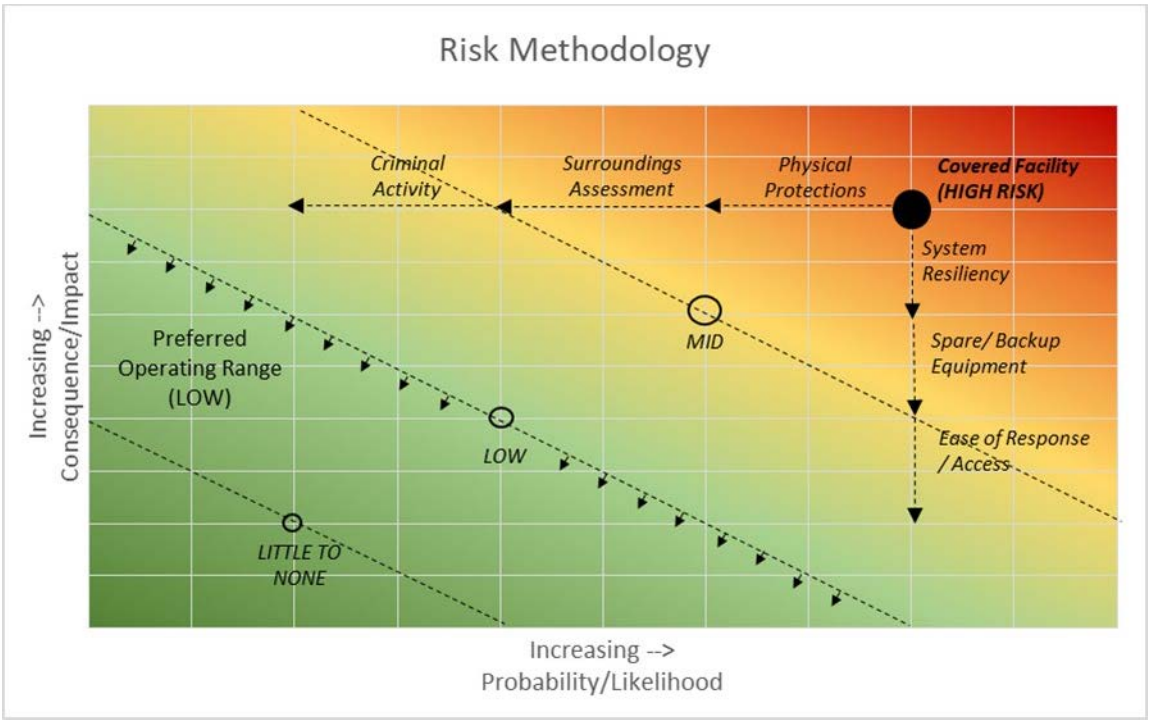


Figure 10: Preliminary Assessment of Covered Facilities Effective Risk Level Mapping

As described in the above figure above, all Covered Facilities are initially designated as high risk given the nature of the proceeding and the assessment of impact through the identification of critical loads. The assessed risk level of each Covered Facility is then a result of both the presence and the effectiveness of existing prevention and control mitigation measures in place. A greater number of or more effective measures, reduce the risk level at a greater rate than fewer or less effective measures.

The following section includes the results of applying this methodology to the 13 Covered Facilities along with the resulting assessed effective risk level.

7.2.2 Assessment Results

Table 12 below includes the results of applying the previously described methodology to the list of Covered Facilities to determine the Assessed Risk Level of each site.

Table 12: Risk Assessment of Covered Facilities Results

Substation "Name	Number of Critical Loads	PREVENTION MEASURES			CONTROL MEASURES				**ASSESSED RISK LEVEL**
		Criteria #3: Existing Physical Protections	Criteria #5: Physical Surrounding Assessment	Criteria #6: Criminal History	Criteria #1: Existing Resiliency / Redundancy	Criteria #2: Spares and Mobile Assessment	Criteria #4: Ease of Assess / Response Capability	*Criteria #7 - #9 (Already incorporated or not specifically considered)*	
Substation 1	3	In Place / Partly Effective	Fully Effective	Fully Effective	In Place / Partly Effective	Fully Effective	In Place / Partly Effective		LOW
Substation 2	**1**	**In Place / Partly Effective**	**In Place / Partly Effective**	**Not in Place / Not Effective**	**In Place / Partly Effective**	**Fully Effective**	**Fully Effective**		**MID**
Substation 3	1	Fully Effective	Fully Effective	Not in Place / Not Effective	In Place / Partly Effective	Fully Effective	Fully Effective		LOW
Substation 4	1	In Place / Partly Effective	In Place / Partly Effective	Fully Effective	Not in Place / Not Effective	Fully Effective	Fully Effective		LOW
Substation 5	4	In Place / Partly Effective	Fully Effective	In Place / Partly Effective	In Place / Partly Effective	Fully Effective	Fully Effective		LOW
Substation 6	2	In Place / Partly Effective	Fully Effective	Fully Effective	Not in Place / Not Effective	Fully Effective	Fully Effective		LOW
Substation 7	2	Fully Effective	Fully Effective	Not in Place / Not Effective	Fully Effective	Fully Effective	Fully Effective		LOW
Substation 8	1	In Place / Partly Effective	Fully Effective	Fully Effective	Fully Effective	Fully Effective	Fully Effective		LOW
Substation 9	1	In Place / Partly Effective	Fully Effective	Fully Effective	In Place / Partly Effective	Fully Effective	Fully Effective		LOW
Substation 10	1	In Place / Partly Effective	Fully Effective	Fully Effective	In Place / Partly Effective	Fully Effective	Fully Effective		LOW
Substation 11	**2**	**In Place / Partly Effective**	**Fully Effective**	**Not in Place / Not Effective**	**Not in Place / Not Effective**	**Fully Effective**	**Fully Effective**		**MID**
Substation 12	2	In Place / Partly Effective	Fully Effective	In Place / Partly Effective	Fully Effective	Fully Effective	Fully Effective		LOW
Substation 13	**1**	**In Place / Partly Effective**	**In Place / Partly Effective**	**Fully Effective**	**Not in Place / Not Effective**	**Fully Effective**	**In Place / Partly Effective**		**MID**

As included in Table 12 above, after evaluating the existing protection and control mitigation measures in place, 10 of the 13 Covered Facilities were assessed to have a LOW effective risk level. As it is PacifiCorp's goal to operate the grid at a risk level as low as practical, the risk of a successful physical security breach on these Covered Facilities was determined to be properly mitigated at these 10 locations. However, three Covered Facilities were assessed to be a MID level of risk, indicative that additional mitigation measures may be needed to properly reduce the effective risk level to LOW. See the final results plotted below in Figure 11.

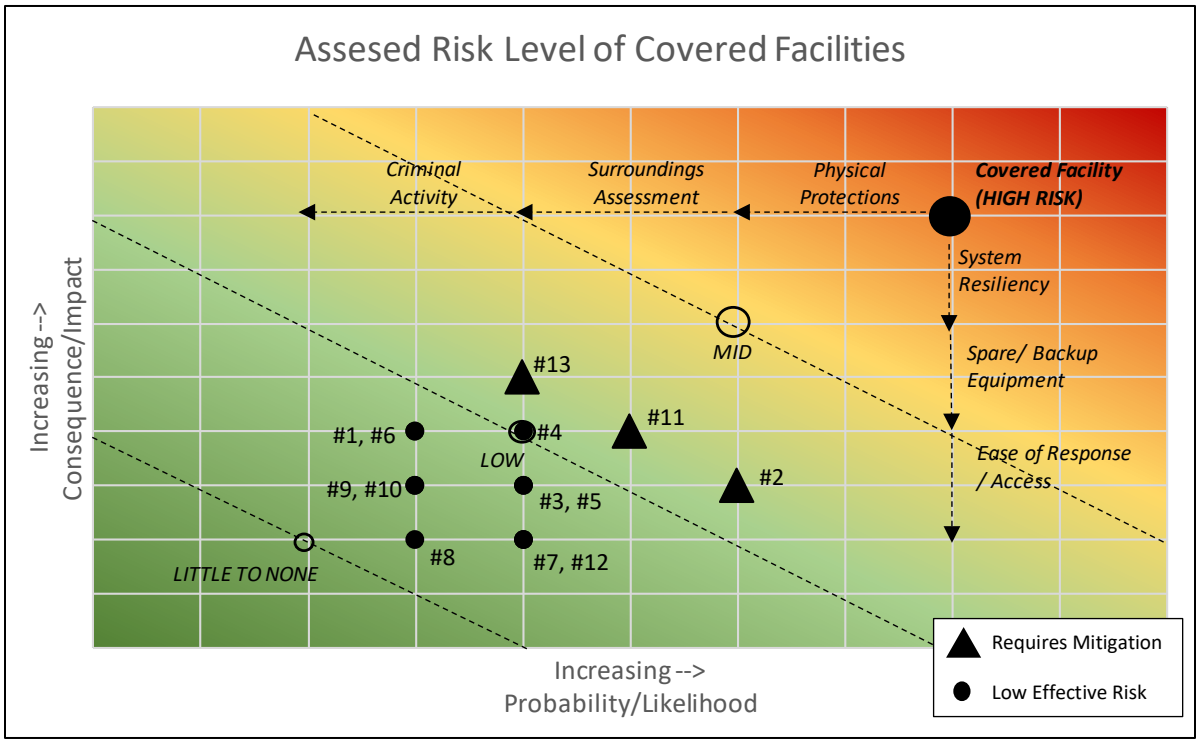


Figure 11: Final Assessment of Covered Facilities - Results

7.3 Mitigation Plan

PacifiCorp aims to operate the electrical grid with a risk level as low as practical. As a result of the Assessment, PacifiCorp identified three substations that may need additional mitigation measures to properly reduce the effective risk level to LOW. See Table 13 below and Figure 12 below.

Table 13: Risk Assessed Covered Facilities that Require Mitigation Measures

Substation Name	Number of Critical Loads	PREVENTION MEASURES			CONTROL MEASURES				ASSESSED RISK LEVEL
		Criteria #3: Existing Physical Protections	Criteria #5: Physical Surrounding Assessment	Criteria #6: Criminal History	Criteria #1: Existing Resiliency / Redundancy	Criteria #2: Spares and Mobile Assessment	Criteria #4: Ease of Assess / Response Capability	*Criteria #7 - #9 (Already incorporated or not specifically considered)*	
Substation 2	1	In Place / Partly Effective	In Place / Partly Effective	Not in Place / Not Effective	In Place / Partly Effective	Fully Effective	Fully Effective		MID
Substation 11	2	In Place / Partly Effective	Fully Effective	Not in Place / Not Effective	Not in Place / Not Effective	Fully Effective	Fully Effective		MID
Substation 13	1	In Place / Partly Effective	In Place / Partly Effective	Fully Effective	Not in Place / Not Effective	Fully Effective	In Place / Partly Effective		MID

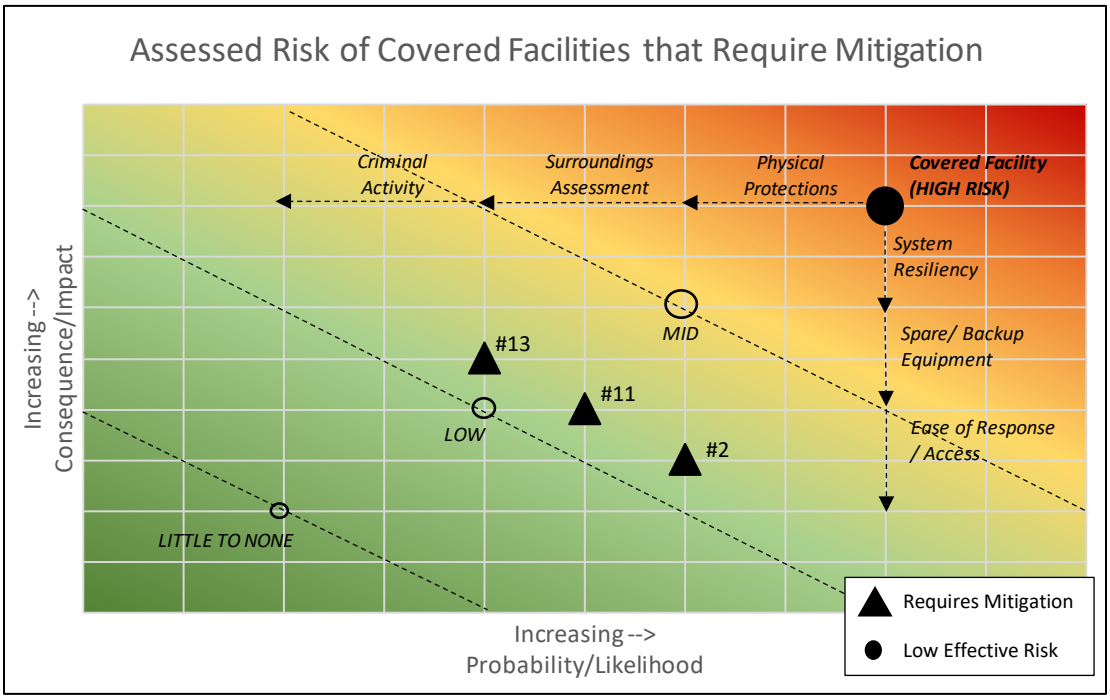


Figure 12: Assessed Risk Level of Covered Facilities that Require Mitigation

As PacifiCorp's goal is to operate the system and mitigate risk to the lowest level practical, PacifiCorp, in collaboration with the third-party assessor, developed a list of mitigation measures or projects targeted at the partly effective or not effective existing measures in order to reduce the Assessed Risk Level from MID to LOW. As a result, PacifiCorp's has preliminarily identified mitigation projects shown in Table 14.

Table 14: Mitigation Project Summary

Substation	Number of Critical Loads	Assessed Risk Level	Key Target Areas for Improvement	Description of Mitigation Projects / Measures
Substation 2	1	MID	**Existing Physical Protections:** Given the high crime rate and prevalence for trespassers, the physical protections in place may not be sufficient. **History of Criminal Activity**: Substation 2 is located in a higher crime rate area with *observed presence of trespassers on site* identified during the physical site assessment	**Improvements to physical security above and beyond standard protocols:** Installation of additional fencing and gates alongside and behind substation in addition to existing barriers to prevent unauthorized vehicle traffic and trespassing behind the substation **Relocation of Active Trespassers:** PacifiCorp worked with local city officials to relocate existing trespassers to a safer location away from the substation
Substation 11	2	MID	**Existing Physical Protections:** Given the high crime rate and prevalence for trespassers, the physical protections in place may not be sufficient. *Note: Substation 11 is located in a higher crime rate area but no specific observation of trespassers (Criminal History – Criteria #6)*	**Improvements to physical security above and beyond standard protocols:** Installation of additional fencing fabric with slats to enhance existing perimeter fencing to elevate level of deterrent.
Substation 13	1	MID	**Existing Physical Protections:** Given the vulnerability of the physical location and remote nature, existing physical protections in place may not be sufficient **Access Constraints:** Seasonal flooding could limit the ability for expedited restoration following an event.	**Improvements to physical security above and beyond standard protocols:** Installation of additional lights and fencing fabric with slats to enhance existing perimeter and elevate level of deterrent. **Removal of Seasonal Access Constraints:** Existing substation improvement project kicked off in 2020 at PacifiCorp to remove the seasonal access constraint (not incremental to this proposal).

Table 15 below depicts the risk assessed level at each substation following the implementation of these identified projects.

Table 15: Impact of Mitigation Projects on Future Assessed Risk Levels

Substation Name	Number of Critical Loads	PREVENTION MEASURES			CONTROL MEASURES				ASSESSED RISK LEVEL
		Criteria #3: Are existing physical protections in place above standard?	Criteria #5: Does the location and physical surrounding s reduce risk?	Criteria #6: Is there documented history of criminal activity?	Criteria #1: Does sufficient resiliency/re dundancy exist?	Criteria #2: Are spares or mobiles available to restore a load?	Criteria #4: Can the location be easily accessed?	*Criteria #7 - #9 (Already incorporated or not specifically considered)*	
Substation 2	1	Fully Effective	In Place / Partly Effective	In Place / Partly Effective	In Place / Partly Effective	Fully Effective	Fully Effective		LOW
Substation 11	2	Fully Effective	Fully Effective	Not in Place / Not Effective	Not in Place / Not Effective	Fully Effective	Fully Effective		LOW
Substation 13	1	Fully Effective	In Place / Partly Effective	Fully Effective	Not in Place / Not Effective	Fully Effective	Fully Effective		LOW

The impact of the mitigation projects on future assessed risk levels is plotted below in **Figure 13**.

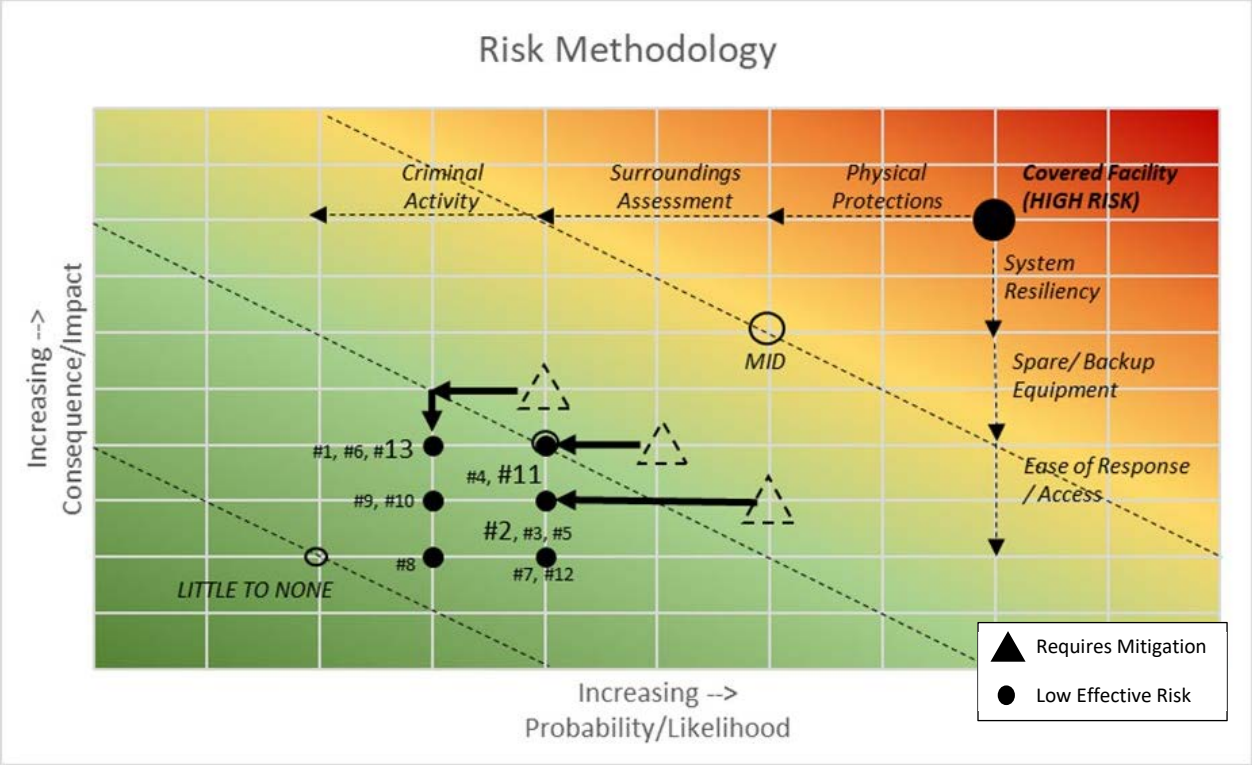


Figure 13: Impact of Mitigation Projects on Future Risk Assessment Levels

7.3.1 Mitigation Plan Implementation

PacifiCorp intends to follow a standard project pipeline process to implement these mitigation measures as described below. Currently, PacifiCorp has complete project definition, scoping, a high-level cost estimate, and project plan approval as indicated by the orange box in the diagram.



Figure 14: PacifiCorp's Planned Project Pipeline

As indicated in Figure 14 above, next steps include performing detailed engineering and estimation into order to seek final project approval and execute per plan. The high-level cost estimates and project plan timelines have been included in the following subsections.

7.3.2 Timeline

PacifiCorp's current estimated completion date of proposed projects is included in Table 16 below.

Table 16: Estimated Completion Date of Mitigation Projects

Substation	Project Name	Estimated Completion
Substation 2	Physical Security Improvements – Additional Fencing and Gates	EOY 2021
Substation 11	Physical Security Improvements – Install Fencing Fabric with Slats	EOY 2022
Substation 13	Access Improvement to Eliminate Seasonal Flooding	EOY 2023 *(Critical path constraint – Permitting)*
	Physical Security Improvements – Enhanced Lighting and Fencing Fabric with Slats	EOY 2023 *(Critical path constraint – Permitting)*

7.3.3 Costs

PacifiCorp's current estimated costs of planned projects is included in Table 17 below. PacifiCorp intends to seek recovery of these costs consistent with Ordering Paragraph 30 of D.19-01-018.[21]

Table 17: PacifiCorp's Estimated Project Costs

Substation	Project Name	Total Incremental	2021	2022	2023
Substation 2	Physical Security Improvements	$15,000	$15,000	-	-
Substation 11	Physical Security Improvements	$35,000	-	$35,000	-
Substation 13	Access Improvement to Eliminate Seasonal Flooding	Not Incremental			
	Physical Security Improvements	$55,000	-	-	$55,000

[21] Per Ordering Paragraph 30, "Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco (collectively, IOUs) shall seek recovery of costs associated with their respective Distribution Security Programs in each IOU's general rate case."

PACIFIC POWER
A DIVISION OF PACIFICORP

8. Third Party Verification

Ordering Paragraph 10: Prior to the submittal of the Security Plan, Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall each have their respective plan reviewed by an unaffiliated third-party entity.

Ordering Paragraph 11: The unaffiliated third-party reviewer shall have demonstrated appropriate physical security expertise.

Ordering Paragraph 17: "Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall each document all third-party reviewer recommendations, and specify recommendations that were accepted or declined by the utility."

Ordering Paragraph 18: "Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison, PacifiCorp, Bear Valley Electric Service, and Liberty CalPeco shall each provide justification supporting its decision to accept or decline any third-party recommendations."

As described in Section 1, PacifiCorp submitted the 2020 Preliminary Assessment Report on July 10, 2020, which included the company's identification and preliminary assessment of Covered Facilities including pertinent methodologies leveraged, and draft mitigation measures recommended. PacifiCorp's 2020 Preliminary Assessment Report and PacifiCorp's overall progress were reviewed with Commission Staff during an interactive workshop on July 22, 2020. As a result, PacifiCorp was able to incorporate valuable comments and constructive feedback into the company's identification and preliminary assessment and move toward procuring third party services to complement this review and assist with a physical site assessment of the company's Covered Facilities.

In order to procure services to perform an unaffiliated third-party review of the company's methodology and plan within 27 months of January 10, 2019 consistent with the Joint Utility Proposal, PacifiCorp conducted a competitive bidding process from August 2020 to September 2020. As a result, PacifiCorp awarded a contract on October 1, 2020 to the third-party reviewer (Reviewer) with an active ISO9001 Certification and both military and nuclear physical security expertise, consistent with the requirements in D.19-01-018.

An initial kick-off meeting was held on October 21, 2021 and, through a series of workshops conducted from November 1, 2021 and December 15, 2021, the Reviewer was able to review and conclude that PacifiCorp's general framework and methodology fully attempted to meet the regulatory intent outlined in California R.15-06-009. Specifically, the Reviewer concluded that the existing framework and preliminary assessment revealed a thorough and detailed effort to analyze and appropriately classify each of the Covered Facilities. The Reviewer was also able to recommend a few modifications to further refine the framework. PacifiCorp was able to incorporate these recommendations as further detailed in Table 18 on page 52. The Reviewer also identified areas for further evaluation to be incorporated into the physical site assessments.

Following the initial evaluation of PacifiCorp's framework, the Reviewer, escorted by representatives from PacifiCorp's Asset Management, Field Operations, and Corporate Security departments, performed on-site physical security assessments of the 13 facilities during the week of January 11, 2021.

Following the site assessments, the Reviewer submitted a site report to PacifiCorp in February of 2020 detailing the observations and assessments of the 13 covered facilities identified in PacifiCorp's preliminary assessment to determine whether existing security measures were adequate to meet the

requirements detailed in D.19-01-018. As documented in this report, the Reviewer determined that meeting the general objective of D.19-01-018 could be accomplished through risk mitigation, consequence mitigation, or a combination of the two, siting the fiscally impractical nature of relying completely on risk mitigation, particularly when attempting to defend from an attack by a determined hostile action. The Reviewer took the position that a combined methodology is the correct balanced approach achieved by employing a reasonable risk mitigation strategy enhanced with a robust consequence mitigation plan, consistent with PacifiCorp's general framework.

The Reviewer's findings reported that PacifiCorp has met this goal by employing a risk-appropriate level of industry standard physical security measures at each facility providing a reasonable level of deterrence to criminal activities and backed with an in-depth post-incident response and recovery plan that provides rapid restoration of services to PacifiCorp customers.

However, the Reviewer did note a few areas of potential enhancement for PacifiCorp to consider. These enhancements, identified in Table 18 below, were critical to informing the list of final mitigation projects and mitigation plan described in Section 7.3. In general, PacifiCorp was able to incorporate all recommendations, except the recommendations to procure additional portable generators to support restoration at Substations #11 and #13.[22]

A deeper analysis of circuit loading and the potential for generator compatibility for Substation #11 backup yielded that a portable generator large enough to support customer load is not readily available on the market. Additionally, existing mobile substations, available spare equipment, and close proximity to town provided the most viable and practical solution of restoration in the event of an outage.

Regarding Substation #13, upon review of the existing planned projects in place and existing mobile substation and spare inventory, the purchase of an additional generator did not seem necessary in order to mitigate the risk level. While a generator could be purchased, it did not seem to fit the overall balanced approach once other projects are completed.

Table 18 below further outlines the Reviewer's recommendations and how PacifiCorp incorporated these recommendations into the company's Final Security Plan.

Table 18: Summary of Reviewer's Recommendations, Incorporation, and Impact

#	Reference Document	Third Party Reviewer Recommendation	Incorporated by PacifiCorp (Yes/No)	Impact / Rationale
1	Module 1: Review Item 1	Change the assessment methodology to delineate the difference between 2 physical security enhancements from just 1 physical security enhancement.	Yes	Changed equation to incorporate additional difference as identified. Initial impacts to risk assessment as indicated in Module 1.
2	Module 1: Review Item 2	Identify the distance and/or travel time of emergency responders to better assess Criteria #4.	Yes	Removed use of populated place data and incorporated travel time as recommended, specifically focusing on 15-30 minute travel time for emergency responders.

[22] See Items 10, 13, and 16 in Table *18*.

#	Reference Document	Third Party Reviewer Recommendation	Incorporated by PacifiCorp (Yes/No)	Impact / Rationale
3	Module 1: Review Item 3	Recommend referencing a different source or methodology for Criteria #4.	Yes	See Review Item #2. Revised methodology and eliminated use of populated place data
4	Module 1: Review Item 4	Change the risk level logic tab in cells F9, F33, and E8 to LOW	Yes	Addressed calculation error to ensure that the results of the equation consistently follow the Assessed Risk threshold line
5	Module 2	General Observation: Substations could benefit from enhancements to perimeter security	Yes	Incorporated in Mitigation Plans where appropriate for MID level substations
6	Module 2: Substation 2	The use of barriers would seal off rear section and surrounding area of substation	Yes	Incorporated into Mitigation Plan to prevent unauthorized vehicle traffic
7	Module 2: Substation 13	Noted flooding concern and fence degradation at Substation #13	Yes	Mitigation Plan includes new fence structure along with access improvement project that addresses flooding
8	Module 3: Item 1	Revise Criteria #5 evaluation rating and overall score methodology	Yes	Revised Criteria #5 to move from a desktop exercise to a physical site assessment, incorporating the recommended rating factors and physical surrounding factors. This resulted in significant assessed levels at each substation for Criteria #5 which should be more representative of physical risks.
9	Module 3: Item 1	Suggested moving unauthorized traffic criterion from Criteria #5 to Criteria #6	Yes	Incorporated into Final Assessment as recommended – changed the risk ranking of Substation 2 from Mid to High for criteria #6.
10	Module 3: Item 2	Address criteria with most severe level for each substation of concern	Partially	Mitigation Plans identified for Substations #2, 11, and 13. Substation #11 – no compatible generator could be identified to support increased resiliency Substation 13 – Purchasing an additional generator did not seem balanced given other projects in place will reduced the effective risk level of the substation to Low.

#	Reference Document	Third Party Reviewer Recommendation	Incorporated by PacifiCorp (Yes/No)	Impact / Rationale
11	Module 3: Site #2	Propose installing additional fencing and gates to prevent unauthorized vehicles behind the substation	Yes	Incorporated into Mitigation Plan which includes enhancing physical security around substation addressing Criteria #3 and #5
12	Module 3: Site #11	Propose enhanced fencing, installing additional lights or cameras	Yes	Incorporated into Mitigation Plan to install additional fencing reducing potential for criminal activity.
13	Module 3: Site #11	Address resiliency/redundancy to restore power to critical loads	No	See Review Item 10. Substation #11 – no compatible generator could be identified to support increased resiliency
14	Module 3: Site #13-a	Propose addressing seasonal flooding constraint	Yes	Project underway to eliminate flooding and reduce Criteria #4 from MID to LOW
15	Module 3: Site #13-b	Propose enhanced fencing, installing additional lights or cameras	Yes	Incorporated into Mitigation plan to enhance physical security protections through the installation of new fencing and lighting
16	Module 3: Site #13-c	Consider addressing sufficient redundancy Criteria	No	See Review Item 10. Substation 13 – Purchasing an additional generator did not seem balanced given other projects in place will reduced the effective risk level of the substation to Low.

Application No. 22-05-006
Exhibit PAC/1804
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Supplemental Testimony of

Allen Berreth

Direct Testimony of Brett S. Allsup from A.18-04-002

April 2023

Application No. 18-04-___
Exhibit PAC/1000
Witness: Brett S. Allsup

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Direct Testimony of Brett S. Allsup

Implementation of a Risk-Based Investment Decision Making Framework

April 2018

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ATTACHED EXHIBITS

Exhibit PAC/1001 – Six Impact Groups and the Seven Impact Level Scores

Exhibit PAC/1002 – Risk Templates for Top 10 Risks

Q. Please state your name, business address, and present position with PacifiCorp d/b/a Pacific Power (PacifiCorp).

A. My name is Brett S. Allsup. My business address is 825 N.E. Multnomah, Suite 1600, Portland, Oregon 97232. My present position is Director–Engineering Strategy and Cost Control, a department within the Transmission Services and Asset Management business unit.

I. QUALIFICATIONS

Q. Please briefly describe your education and business experience.

A. I am a professional engineer, licensed in the states of California and Oregon. I received a Bachelor of Science in Electrical Engineering from California State University Sacramento in 1986 and a Master of Science in Electrical Engineering from San Diego State University in 1991. I have been employed by PacifiCorp since 1991, during which time I have held numerous positions including Lead Engineer–Substation Engineering, Engineering Services Manager, Manager–Field Engineering, Acting Director–Distribution System Engineering, Director–Asset Policy, Managing Director–T&D Operations and Maintenance, Managing Director–T&D Engineering, and Vice President–T&D Engineering and Asset Management. Before working for PacifiCorp, I held positions in District Engineering, Substation Engineering, and Generation Engineering with San Diego Gas and Electric Company.

Q. Please describe your present duties.

A. My primary responsibilities include assessing risk and developing strategies for transmission and distribution assets, developing and maintaining inspection and maintenance policies, assisting the prioritization of capital and maintenance

investments, and conducting special studies and analyses in response to changing internal and external requirements and conditions.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe the risk management process PacifiCorp developed to implement a risk-based investment decision making framework in its general rate case (GRC) application filing as required by the Commission in its December 4, 2014 issuance of Decision (D.) 14-12-025.[1] I will further discuss how this approach evolves to incorporate new risks that are identified, including, for example, wild fire risk which was the subject of D.17-12-024.

III. PACIFICORP'S RISK ASSESSMENT OVERVIEW AND DEVELOPMENT OF NEW FRAMEWORK

Q. Before D.14-12-025, did PacifiCorp have a process for assessing risk for its transmission and distribution asset base and, if so, please describe this process?

A. Yes. In addition to conducting core asset management processes, such as inspection and maintenance programs, PacifiCorp historically performed annual risk assessments of its key transmission and distribution asset base (which includes pole inventory, substation transformers, and substation breakers). These assessments were performed using the company's asset serviceability review (ASR) procedures. Using the ASR process, PacifiCorp identified the issues, investment drivers, and risks affecting its existing assets and was able to target a number of short-term and long-term areas of potential risk to the business for strategic analysis of available options.

[1] *See* D.14-12-025 at page 18–19.

This process informed the company's capital, maintenance, and operational spending decisions.

In 2014, PacifiCorp began using the Berkshire Hathaway Energy Company (BHE) Asset Health Index (AHI) methodology combined with certain key components of the ASR methodology, including asset utilization analyses, system reliability assessments, and asset condition inspections.

Using these combined methodologies, the company was able to assess the comparative health of assets such as substation transformers, circuit breakers, relays, and transmission and distribution poles. The BHE AHI is a relative index used to compare the assets against each other and to establish a baseline to determine the relative changes in health of individual units as well as the total population over time. The BHE AHI score assigned to an asset does not indicate or predict end of asset life or imminent failure; however, units identified with poor BHE AHI scores are generally targeted for further risk evaluation. Such evaluations result in a recommendation that takes into account options for contingency plans, including developing remedial actions, ensuring availability of spares and/or advancing equipment replacements. The first edition of the BHE AHI developed in 2014 served as a baseline against which the condition of the assets has since been evaluated.

Q. Please provide a brief overview of PacifiCorp's new risk-based investment decision-making framework developed in compliance with D.14-12-025.

A. As discussed in more detail below, PacifiCorp's new risk-based investment decision-making framework consists of a six-step investment planning process that integrates

an algorithm known as a risk evaluation tool (RET). Specifically, PacifiCorp's investment planning process includes the following six steps:

- Risk identification (Step 1);
- Risk analysis (Step 2);
- Risk evaluation and prioritization (Step 3);
- Mitigation plan development (Step 4);
- Risk-informed investment decisions and risk mitigation implementation (Step 5); and
- Risk monitoring (Step 6).

The RET, applied in Step 3, uses frequency and impact scores for each specific risk event or scenario, *e.g.*, a substation transformer failure, *etc.* (Risk Event) to calculate an overall risk score for the Risk Event (Risk Score). As discussed in detail below, the primary variables that impact the Risk Score for a specific Risk Event are the frequency and impact scores established for the specific Risk Event in Step 2. PacifiCorp then focuses on its Risk Events with the highest Risk Scores in Steps 4 through 6.

Q. Please summarize the process PacifiCorp implemented in its efforts to develop a risk-based investment decision-making process in compliance with the requirements of D. 14-12-025.

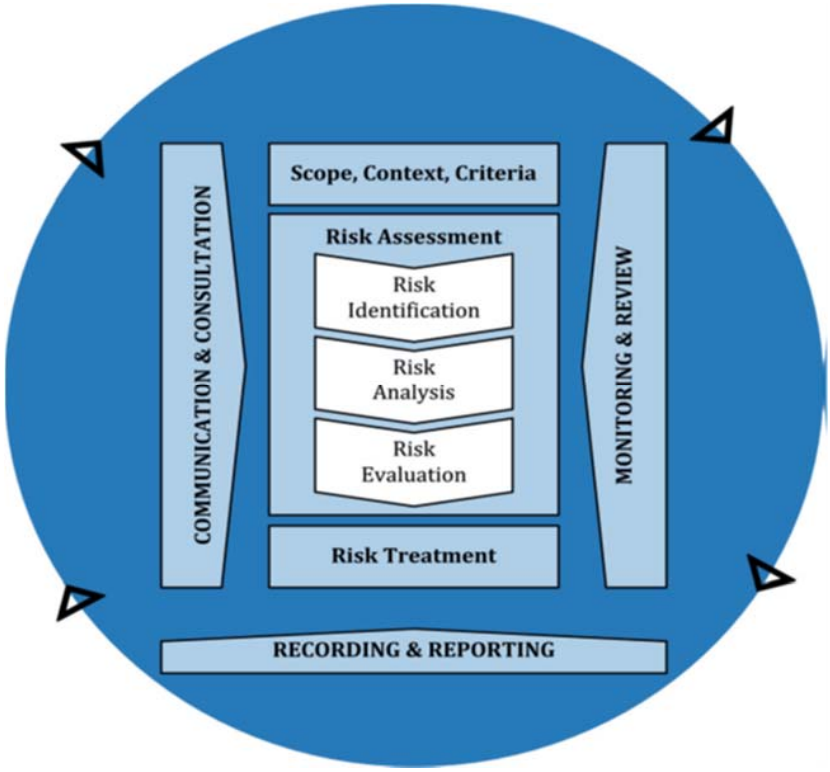
A. PacifiCorp reviewed the documents filed by Pacific Gas & Electric Company (PG&E), San Diego Gas and Electric Company, and Southern California Edison (large California utilities) in their risk-based decision making proceedings. PacifiCorp also reviewed the filing by Bear Valley Electric Service (BVES).

PacifiCorp took note of the comments the Safety and Enforcement Division (SED) provided in those proceedings. PacifiCorp leveraged this information, along with input from its business units, to develop its own risk-based investment decision-making process.

Like the large California utilities, PacifiCorp included some of the basic principles of the International Standardization Organization's "Risk Management—Principles and Guidelines" (ISO 31000)[2] into its six-step risk management methodology, including the ISO 31000 principles. Specifically, Clause 6 of ISO 31000 explores the systematic application of policies, procedures and practices for establishing the context and assessing, treating, monitoring, reviewing, recording, and reporting risk, as shown in Figure 1 below.

[2] ISO 31000 is an internationally recognized standard for risk management, and adopting the principles and guidelines of ISO 31000 positions an organization to be able to achieve objectives, improve the identification of risks, and more effectively allocate resources for risk reduction.

Figure 1: ISO 31000 Risk Management Process



PacifiCorp's six step process includes all of the elements of Clause 6 of ISO 31000 as depicted above.

Similarly, like other utilities' risk-based decision frameworks and consistent with the Commission's guidance, PacifiCorp tracks the principles and processes developed by Cycla Corporation (Cycla) in the company's six-step risk management program. The Cycla approach has been introduced in earlier proceedings and has been endorsed by the Commission.[3]

Q. What is Cycla's Risk-Informed Resource Allocation Process?

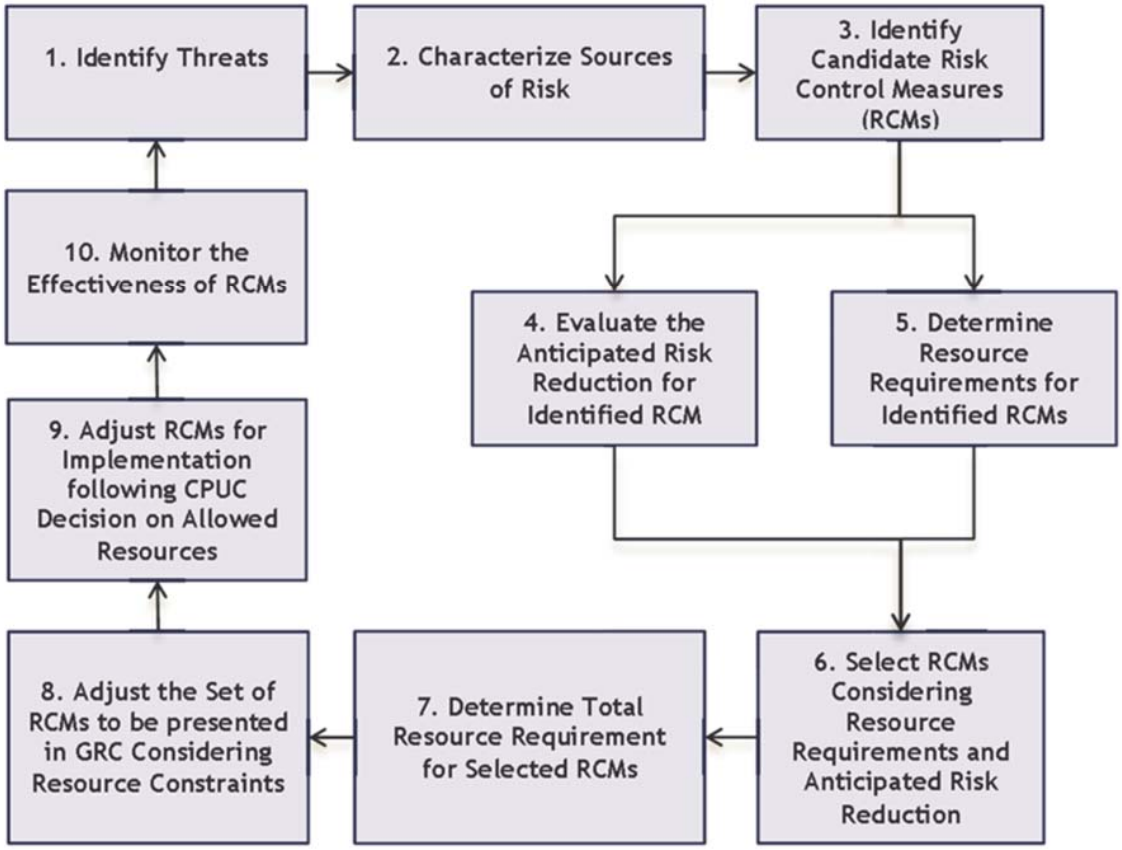
A. There are 10 distinct elements of Cycla's risk-informed process. As illustrated in

[3] In D.16-08-018, the Commission approved the 10-step Cycla model as a "common yardstick of the maturity" of risk assessment and mitigation models. p. 18.

Figure 2 below, the Cycla process includes the following steps:

1. Identify the threats having the potential to lead to safety risk;
2. Characterize the source of risk;
3. Characterize the candidate measures for controlling risk;
4. Characterize the effectiveness of the candidate risk control measures (RCMs);
5. Prepare initial estimates of the resources required to implement and maintain candidate RCMs;
6. Select RCMs the operator wishes to implement (based on anticipated effectiveness and costs associated with candidate RCMs);
7. Determine the total resource requirements for selected RCMs;
8. Adjust the set of selected RCMs based on real-world constraints such as availability of qualified people to perform the necessary work;
9. Document and submit the General Rate Case filing, on which the CPUC decides the expenditures it will allow, and, based on the CPUC decision, adjust the operator's implementation plan; and
10. Monitor the effectiveness of the implemented RCMs and, based on lessons learned, begin the process again.

Figure 2: Cycla's 10-Step Process Overview



Q. How does PacifiCorp's risk-informed process compare to Cycla's process?

A. PacifiCorp's new risk-based investment decision making-process is substantially similar to the Cycla process; however, PacifiCorp collapses several of the Cycla steps into single processes reducing the total number of steps from 10 to six. Table 1 below maps the steps in the PacifiCorp model to the applicable steps in Cycla's model.

Table 1: Mapping PacifiCorp Process to Cycla Process

PacifiCorp	Cycla
1. Risk Identification	Step 1
2. Risk Analysis	Step 2
3. Risk Evaluation and Prioritization	Step 2
4. Mitigation Plan Development & Documentation	Steps 3, 4, and 5
5. Risk-informed Investment Decisions and Risk Mitigation Implementation	Steps 6, 7, 8 and 9
6. Risk Monitoring	Step 10

IV. THE SIX STEPS OF PACIFICORP'S RISK-BASED INVESTMENT DECISION MAKING FRAMEWORK

Q. Please describe Step 1 (risk identification) of PacifiCorp's six-step process.

A. In order to identify risks, PacifiCorp compiled (1) a list of all of the company's transmission and distribution asset groups and (2) a list of all of the unique assets within each asset group, as shown in Table 2.

Table 2: Unique Assets Within Each Asset Group

Asset Group	Unique Assets
Transmission Substations	1. transformers, 2. circuit breakers, and 3. relays and other apparatus.
Distribution Substations	1. transformers, 2. circuit breakers, and 3. relays and other apparatus.
Overhead Transmission and Distribution Lines	1. poles, 2. wires, and 3. pole mounted equipment.
Underground Distribution Lines	1. cable, 2. subsurface equipment, and 3. pad mount equipment.

For each unique asset in each asset group, PacifiCorp identified multiple Risk Events that could occur, along with the possible consequences of the occurrence of each Risk Event, including safety, environmental, compliance, reliability, trust, or financial impacts. Examples of Risk Events associated with various unique assets include transformer failure, circuit breaker failure, bushing failure, radiator failure, relay failure, relay mis-operation, major oil spill, SF6 gas leak, pole fire, pole mounted equipment failure, age/deterioration, broken cross-arm, downed wire, etc. Consequences of the occurrence include, for example, downed wire, sustained outages, wildfires, pole failures, and transformer oil spills.

Q. Please describe Step 2 (risk analysis) of PacifiCorp's six-step process.

A. In Step 2, PacifiCorp analyzed the frequency and impact of each Risk Event. Specifically, the company gave each Risk Event both (i) a frequency factor grade, which corresponds to frequency score, and (ii) an impact score for each of six distinct impact areas. The frequency factor and impact scores for each Risk Event are used as inputs in calculating the Risk Score in Step 3. The frequency score is used to depict risk relative to PacifiCorp's top 10 Risk Events as shown in the 7x7 heat map shown in Figure 6 below.

Q. Please describe how frequency factors and frequency scores are determined in Step 2.

A. Using applicable historical data and operational knowledge, PacifiCorp assigned a frequency factor to each Risk Event based on the number of times per year a Risk Event is likely to occur, where a frequency factor of 1 equates to 1 occurrence per year. PacifiCorp then determined the frequency score for the Risk Event, on a scale

of one (remote) through seven (common), using the frequency factor ranges set forth in Table 3 below. For example, PacifiCorp assigned a frequency factor of 1, resulting in a frequency score of 5 (where frequency is in the range of once every 1-2.99 years), to PacifiCorp's substation transformer failure Risk Event, the company's Risk Event with the highest Risk Score.

Table 3: Frequency Score

Frequency Level	Description	Frequency Factor Range	Frequency Score
Remote (1)	Once every 100+ years	F =< 0.01	1
Rare (2)	Once every 30-99.99 years	F = 0.01001 - 0.03333	2
Infrequent (3)	Once every 10-29.99 years	F = 0.0333445 - 0.1	3
Occasional (4)	Once every 3-9.99 years	F = 0.1001001 - 0.3333	4
Frequent (5)	Once every 1-2.99 years	F = 0.33444816 - 1	5
Regular (6)	>1-9.99 times per year	F = 1.001 - 9.99	6
Common (7)	>= 10 times per year	F => 10	7

As shown in Table 3 above, any Risk Event with a frequency factor estimated in the range of 0.334 to 1 events per year (*i.e.*, once every 1 to 2.99 years), for example, will be assigned a frequency score of 5 for purposes of depicting frequency in the 7x7 heat map shown in Figure 6 below. However, because the specific estimated frequency factor is used as the input in the RET algorithm, and not the frequency score, as discussed in Step 3 below, the impact of frequency on the Risk Score is variable among Risk Events with the same frequency score. For example, a frequency factor that is on the higher end of the range for the given frequency score will have a higher impact on the Risk Score than a frequency factor that is on the lower end of the range for the given frequency score.

Q. Please describe the impact scoring system used in Step 2.

A. To assign metrics to the consequences of the occurrence of each Risk Event,

PacifiCorp developed an impact scoring system. Using this system, PacifiCorp assigns an impact score (on a scale of one through seven) for each of the six impact groups (Impact Groups) for each Risk Event. The Impact Groups for which each Risk Event is scored include 1) safety, 2) environmental, 3) compliance, 4) reliability, 5) trust, and 6) finance.[4]

PacifiCorp adopted descriptions that correspond to scores that range from 1 (Negligible) to 7 (Catastrophic) for each Impact Group, as shown in Exhibit PAC/1001. Thus, within the Impact Groups the impact scores are calibrated to match the severity of the impact. Impact scores are also aligned across the six Impact Groups. For example, an impact score of 5 is equivalent in severity across the six Impact Groups. To illustrate this scoring system, the descriptions for the seven impact scores for the Safety Impact Group is shown in Table 4 below. *See* Exhibit PAC/1001 which sets forth descriptions for the seven impact level scores PacifiCorp established for each of the six of the Impact Groups.

[4] PacifiCorp's six Impact Groups and corresponding score descriptions mirror those used by PG&E.

Table 4: Safety Impact Group Scoring Scale

SAFETY IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Fatalities:** Many fatalities and life threatening injuries to the public or employees.
Severe (6)	**Fatalities:** Few fatalities and life threatening injuries to the public or employees.
Extensive (5)	**Permanent/Serious Injuries or Illnesses:** Many serious injuries or illnesses to the public or employees.
Major (4)	**Permanent/Serious Injuries or Illnesses:** Few serious injuries or illnesses to the public or employees.
Moderate (3)	**Minor Injuries or illnesses:** Minor injuries or illnesses to many public members or employees.
Minor (2)	**Minor Injuries or illnesses:** Minor injuries or illnesses to few public members or employees.
Negligible (1)	No injury or illness or up to an un-reported negligible injury.

PacifiCorp applied these descriptions to assign impact scores (*i.e.*, 1 through 7) to each Impact Group for each Risk Event.

Q. Please provide an example of how impact scores are assigned?

A. Based on the descriptions corresponding to the scoring system for the safety Impact Group, shown in Table 4 above, PacifiCorp assigned the following impact scores for the substation transformer failure Risk Event shown in Figure 3 as follows:

- Safety Impact Group: The impact score of 4 (Major) was assigned for potential permanent or serious injury to occur if the substation transformer fails with company personnel or members of the public in the general vicinity at the time of failure.
- Environmental Impact Group: The impact score of 4 (Major) was assigned due to a significant volume of oil that could potentially escape the company's oil containment system.

- Compliance Impact Group: The impact score of 4 (Major) was assigned due to the assumption that the Risk Event could potentially result in new regulations as a result of the event.
- Reliability Impact Group: The impact score of 5 (Extensive) was assigned due to the potential for a substation transformer failure to result in an extensive outage impacting a large percentage of PacifiCorp's customer base in California.
- Trust Impact Group: The impact score of 5 (Extensive) was assigned due to the potential for an outage caused by this Risk Event to lead to customer satisfaction survey deterioration.
- Financial Impact Group: The impact score of 4 (Major) was assigned due to the potential for this Risk Event to cause a financial impact of $5 million or higher in recovery costs.

After the frequency and impact scores were initially assigned to each Risk Event, the company reviewed the scores to ensure consistency across the Risk Events and Impact Groups. Figure 3 below shows the substation transformer failure Risk Event scoring populated with the frequency score and impact scores that are used to develop the 7x7 heat map shown in Figure 6 below (and as inputs in the RET calculation performed as part of Step 3).

Figure 3: Top Risk Event Scoring Sheet with Frequency Score and Impact Score

Risk Event:	**Substation Transformer Failure**		**Risk Plot Key:**	**A**
Reasonable Worst Case:	Substation transformer fails, releasing all oil in the transformer, resulting in a prolonged outage to all customers that requires the transformer to be replaced.			
Controls:				
Risk Scoring				
Frequency Score	**Impact Scores**			
5	**Safety**	4		
	Environmental	4		
	Compliance	4		
Frequency Factor	**Reliability**	5		
1	**Trust**	5		
	Financial	4		
Total Risk Score:				
Additional Mitigations Considered:				

Q. Please describe Step 3 (risk evaluation and prioritization) of PacifiCorp's six-step process.

A. In Step 3, the company uses the inputs developed in Step 2 to calculate Risk Scores to rank and prioritize Risk Events. The Risk Score is expressed in the following RET equation:

$$RS_{(Event)} = K^{[0.5 \text{ Log } (F_{(Event)}) + I_{(Event)}]}$$

Where:

$RS_{(Event)}$ is the Risk Score for the Risk Event
$F_{(Event)}$ is the number of occurrences expected to happen in a year (frequency factor) for the Risk Event

K is the scalar/index value fixed at 3.16 (the square root of 10)
0.5 is the standard factor used to calculate the variance of the aggregate impact of uncorrelated events
$\mathbf{I_{(Event)}}$ is the weighted impact score for the Risk Event calculated as follows:

$$I_{(Event)} = \text{Log}\left(\sum_{j=1}^{6} W_j * 10^{Ij}\right)$$

Where:

I_j = the impact score for the applicable Impact Group (1-6) for the Risk Event
W_j = the weight applied to the impact score for the applicable Impact Group (1-6) as determined by reference to the table shown in Table 5 below.
j = the applicable Impact Group Category Number (1-6)

Table 5: Impact Group Weighting[5]

Impact Groups	Weight	Category Number
Safety	30%	1
Environmental	5%	2
Compliance	5%	3
Reliability	25%	4
Trust	5%	5
Financial	30%	6
Total	100%	

The RET Risk Score calculation provides a net score that factors in the weighted impact of events over a range of potential outcomes that occur at differing frequencies. This facilitates the ranking and prioritization of Risk Events. The "k" scalar is used to calibrate risk scores over a range of 1 to 10,000 to create adequate

[5] The Impact Group weightings are subjective in nature and are subject to change in future general rate case risk assessments as PacifiCorp continues to evolve and improve its processes.

separation between risk events to facilitate management discussion and decision making.

Q. Please provide an example of how PacifiCorp calculates Risk Score for a Risk Event.

A. Using the RET equations shown above, PacifiCorp calculates the Risk Score for the substation transformer failure Risk Event as follows:

1. The first step is to calculate the weighted Impact Score (I_{Event}) for the event using the steps shown in Table 6 below. Table 5 Impact Group Weighting percentages are used and identified as W_j for each of the six Impact Groups. The calculations were performed in Excel using the equations shown in tabular form in Table 6 as follows:

Table 6: Weighted Impact Score Calculation for Substation Transformer Failure

$I_{Event} = Log(Sum(W_j*10^{\wedge Ij}))$						
Impact Groups	**Weight (W_j)**	**Impact Scores (I_j)**	**Impact Factor ($10^{\wedge Ij}$)**	**Weighted Impact (W_j*10^{Ij})**	**Sum Weighted Impacts ($Sum(W_J*10^{\wedge Ij})$)**	**Weighted Impact Score (I_{Event})**
Safety	0.30	4	10000	3000	37000	4.6
Environmental	0.05	4	10000	500		
Compliance	0.05	4	10000	500		
Reliability	0.25	5	100000	25000		
Trust	0.05	5	100000	5000		
Financial	0.30	4	10000	3000		

Another way to show the weighted impact score calculation is as follows:

$I_{Event} = Log[(0.30*10^4)+(0.05*10^4)+(0.05*10^4)+(0.25*10^5)+(0.05*10^5)+(0.30*10^4)] =$ 4.6

PacifiCorp's substation transformer failure impact score is: $I_{Event} = 4.6$

2. The Risk Score (RS_{Event}) for the event can now be calculated using the weighted Impact Score (I_{Event}) calculated above and the number of occurrences expected to happen in a year (frequency factor) for this Risk Event. The estimated frequency factor (F_{Event}) for substations transformers system wide is one failure per year. So for this case, $F_{Event} = 1$.

The Risk Score (RS) is calculated using the equation $RS_{Event} = k^{[0.5*\log(F_{Event})+I_{Event}]}$, where $k = \sqrt{10}$, $I_{Event} = 4.6$, and $F_{Event} = 1$. The Risk Score calculation for the substation transformer failure event is as follows:

$$RS_{Event} = \sqrt{10}^{\,*\,[0.5*\log(1)+4.6]} = 192.35$$

Completing the equation with the applicable impact score and frequency factor as shown above resulted in PacifiCorp's substation transformer failure event having a Risk Score of 192.35.

Figure 4 below shows the Risk Event Scoring sheet for the substation transformer failure Risk Event populated with the applicable Risk Score.

Figure 4: Top Risk Event Scoring Sheet Populated with Risk Score

Risk Event:	**Substation Transformer Failure**		**Risk Plot Key:**	**A**
Reasonable Worst Case:	Substation transformer fails, releasing all oil in the transformer, resulting in a prolonged outage to all customers that requires the transformer to be replaced.			
Controls:				
Risk Scoring				
Frequency Score	**Impact Scores**			
5	**Safety**	4		
	Environmental	4		
	Compliance	4		
Frequency Factor	**Reliability**	5		
1	**Trust**	5		
	Financial	4		
Total Risk Score:	192.35			
Additional Mitigations Considered:				

Q. Please describe Step 4 (mitigation plan development & documentation) of PacifiCorp's six-step process.

A. PacifiCorp documented its top 10 Risk Events using the Risk Event scoring sheets shown in Figures 3, 4, and 5 and Exhibit PAC/1002. The Risk Event scoring sheets include the following information:

- Risk Event
- Risk Plot Key
- Reasonable Worst Case
- Controls
- Risk Scoring

- Frequency Score
- Impact Scores
- Total Risk Score
- Additional Mitigations Considered

PacifiCorp developed mitigation plans for Risk Events with the highest Risk Scores. These plans were developed by identifying existing controls in place and considering what additional mitigation measures could be taken to reduce or eliminate inherent risk (*i.e.*, the level of risk that exists without risk controls or mitigations) and residual risk (*i.e.*, the risk remaining after current controls) so that only planned risk (*i.e.*, the risk expected to remain after planned mitigations are implemented) remains.

For the substation transformer failure Risk Event, PacifiCorp's Risk Event with the highest Risk Score, controls and mitigation plans are documented in the scoring sheet as shown in Figure 5 below:

Figure 5: Top Risk Event Scoring Sheet Populated with Controls and Mitigations

Risk Event:	**Substation Transformer Failure**		**Risk Plot Key:**	**A**
Reasonable Worst Case:	Substation transformer fails, releasing all oil in the transformer, resulting in a prolonged outage to all customers that requires the transformer to be replaced.			
Controls:	• Preventive maintenance monitoring of the condition of transformers. • Install and maintain spill prevention devices. • Purchase spare transformers.			
Risk Scoring				
Frequency Score	**Impact Scores**			
5	**Safety**	4		
	Environmental	4		
	Compliance	4		
Frequency Factor	**Reliability**	5		
1	**Trust**	5		
	Financial	4		
Total Risk Score:	192.35			
Additional Mitigations Considered:	• Develop emergency generator deployment contract with service suppliers. • Increase number of mobile substations to minimize outage times. • Add redundant transformers at stations.			

Q. Please describe Step 5 (risk-informed investment decisions and risk mitigation implementation) of PacifiCorp's six-step process.

A. If the results of Steps 1 through 4 indicate that investments in any mitigation measures may be warranted, PacifiCorp will evaluate the cost of implementing a mitigation measure against the expected risk reduction. The results of that analysis would be weighed based on PacifiCorp's top Risk Events as determined in Steps 1 through 4.

Q. Please describe Step 6 (risk monitoring) of PacifiCorp's six-step process.

A. PacifiCorp monitors its risk mitigation measures using a number of tools within the business for planning and executing specific risk controls included in its annual

transmission and distribution capital and maintenance plans. In addition, PacifiCorp conducts periodic reviews to monitor the effectiveness of those measures. A number of different business units within PacifiCorp are responsible for monitoring risk controls for their respective transmission and distribution operations. These include, but are not limited to asset risk and strategy, asset maintenance planning, reliability performance, operational performance management, work planning, investment delivery, field inspections, operational performance management, safety, and environmental business units.

Q. Please discuss how PacifiCorp's Risk Assessment Process will evolve as new information becomes available.

A. The risk assessment process is an iterative process. As new information becomes available, it is evaluated in the context of risk and PacifiCorp incorporates this information into the six step process. For example, wildfire risk, which recently resulted in the state-wide fire threat map and fire safety regulations adopted in Rulemaking (R.) 15-05-006, will be integrated into PacifiCorp's six-step process and inform the future risk assessment processes.

V. PACIFICORP'S TOP RISK EVENTS AND INVESTMENT DECISIONS FOR THE GENERAL RATE CASE

Q. What are PacifiCorp's top 10 Risk Events identified using the RET?

A. The 10 top Risk Events that PacifiCorp identified using RET, *i.e.*, those with the highest Risk Scores, including the following events:

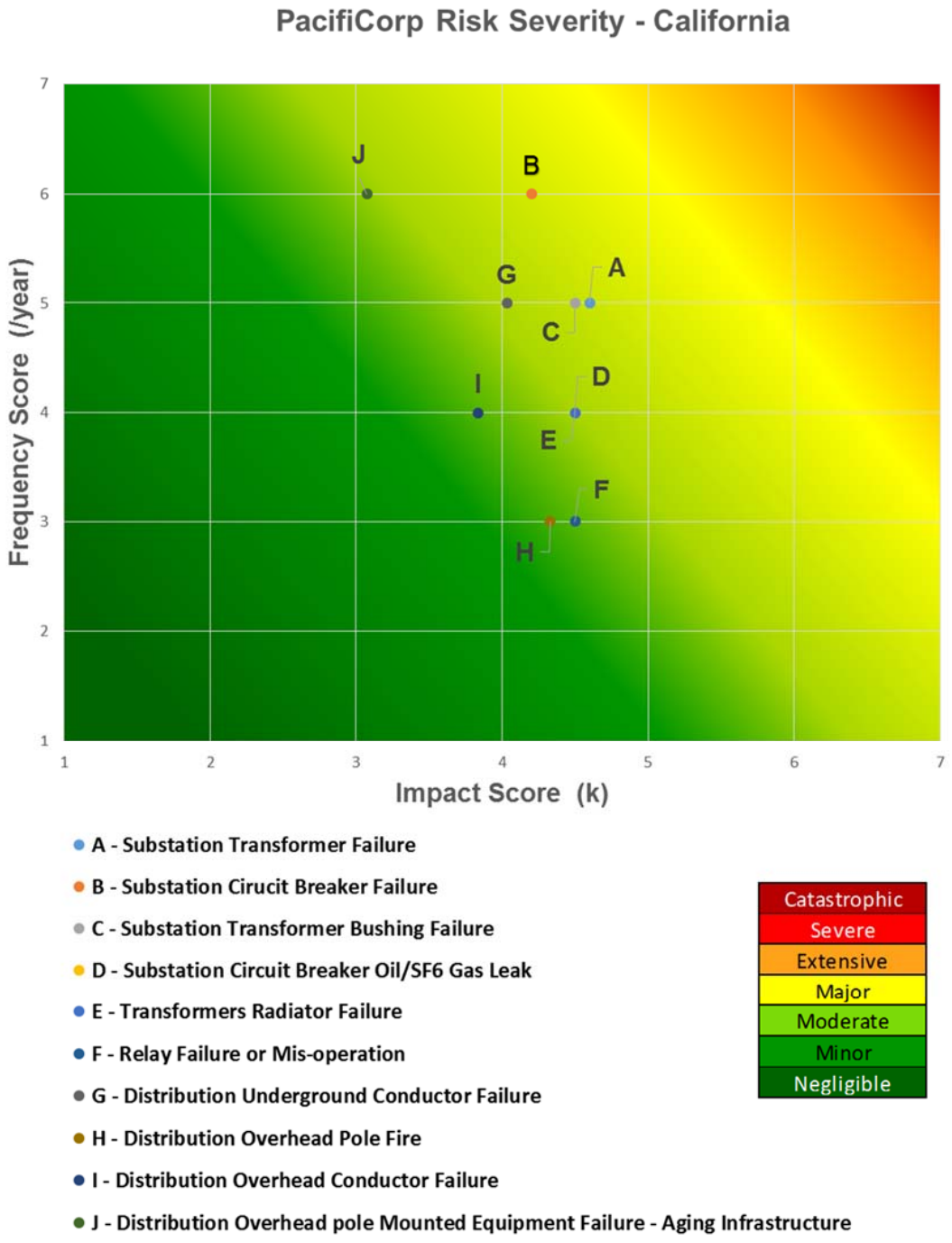
1. Substation Transformer Failure
2. Substation Circuit Breaker Failure
3. Substation Transformer Bushing Failure

4. Substation Circuit Breaker Oil/SF6 Gas Leak
5. Transformer Radiator Failure
6. Relay Failure or Mis-operation
7. Distribution Underground Conductor Failure
8. Distribution Overhead Pole Failure
9. Distribution Overhead Conductor Failure
10. Distribution Overhead Pole Mounted Equipment Failure – Aging Infrastructure

The Risk Event scoring sheets for these Risk Events are attached as Exhibit PAC/1002.

In addition to the scoring sheets in Exhibit PAC/1002, PacifiCorp developed a 7x7 heat map to portray the frequency and impact scores of the 10 top Risk Events, as shown in Figure 6 below. Each Risk Event is identified by the risk plot key (Risk Plot Key) "letter" that represents the intersecting point on the heat map. The top Risk Event is identified as Risk Plot Key "A" and proceeds in descending order to the tenth top risk that is identified as Risk Plot Key "J". The y-axis on the heat map represents the frequency score, while the x-axis represents the weighted impact score. The upper right hand corner of the heat map represents the highest risks and the lower left hand corner represents the lowest risks.

Figure 6: Heat Map for PacifiCorp's Top 10 Risk Events



Q. What controls does PacifiCorp currently have in place to mitigate the impacts of its top scoring Risk Event?

A. The primary controls in place to mitigate the impact of a substation transformer failure that could result in all its oil being released are the inspection and maintenance programs that include preventative maintenance monitoring of transformer conditions, the Spill Prevention, Control and Countermeasure (SPCC) program that assess adequacy of SPCC plans and installs and maintains preventative systems and devices, and purchase of pre-capitalized spare transformers.

Q. Are additional mitigation measures going to be implemented to further mitigate the risk of substation transformer failures and their associated impacts?

A. No, the controls in place are considered to be sufficient at this time.

Q. What additional mitigation measures were considered should the current control measures prove to be insufficient?

A. The additional mitigation measures that were considered are as follows:

- Develop emergency generator deployment contract with service suppliers;
- Increase the number of mobile substations to minimize outage times; and
- Add redundant transformers at substations.

Q. What are some of the areas PacifiCorp identified through its risk-based investment decision making process requiring further improvement?

A. By implementing the new risk-based investment decision making process required by D. 14-12-025, PacifiCorp has identified the need to make improvements related to this process that will enable it to more effectively and efficiently identify top risks, monitor RCMs, detect changing conditions that would trigger re-evaluation of risks,

and measure the cost effectiveness of its RCMs to control or reduce the impact of top risks.

Q. Is PacifiCorp proposing additional revenue requirements in its GRC based on the outcome of its risk-based investment decision making process?

A. No. Based on the outcome of its risk-based investment decision making process, completed in 2017, PacifiCorp is not proposing additional revenue requirements in its GRC. Current controls in place include, but are not limited to, program funding to perform transmission and distribution inspections and maintenance, pole test and treat, vegetation management, asset replacements, planned capital construction, and targeted reliability improvements. The top risks will be monitored and additional mitigation measures will be implemented should conditions change.

VI. ADDITIONAL RISK MITIGATION ACTIVITIES

Q. Other than as an outcome of the risk-based investment decision making process described in this testimony, is PacifiCorp undertaking any programs designed to increase safety and minimize risks within its system?

A. Yes. First, PacifiCorp continues its legacy programs that increase safety and minimize risks within its system. For example, PacifiCorp has well-established inspection, maintenance, and vegetation management programs, which in addition to particular operational practices, serve to maximize safety. Many of these programs are required by general orders or are otherwise dictated by accepted good practice.

Second, in addition to these legacy programs, PacifiCorp has implemented new operational practices as part of its California Drought Mitigation Plan, in effect since 2014. The details of this program are discussed below.

Third, PacifiCorp intends to implement new mitigation plans, the costs of which are included in this application, for its California Fire Prevention Program addressing implementation of regulation changes and Reliability-Based Vegetation Management/Reduced Risk Programs.

Q. Please describe PacifiCorp's California Drought Mitigation Plan.

A. PacifiCorp's California Drought Mitigation Plan was implemented in response to direction received from the California Public Utilities Commission's (Commission) then-Acting Director of the Safety Enforcement Division (SED), in a letter dated February 18, 2014, to take all practicable measures necessary to reduce the risk of fires. The Commission was responding to Governor Edmund G. Brown Jr.'s proclaimed State of Emergency on January 17, 2014, directing state officials to take all necessary actions to prepare for conditions that could result from the drought. PacifiCorp developed and implemented a drought mitigation plan in accordance with SED's instructions, and provided quarterly reports on progress. On April 7, 2017, after record-setting precipitation levels, Governor Brown ended the drought declaration on the portion of California in which PacifiCorp operates. As a result, PacifiCorp provided a final quarterly update on its drought-related fire hazard mitigation measures on May 1, 2017.

PacifiCorp's drought-related fire hazard mitigation actions included incremental safety patrols on transmission lines not scheduled in the annual inspection plan, re-inspected existing targeted conditions based upon Geographic Information System (GIS) overlay of drought-ridden areas and existing Facility Point Inspection (FPI) conditions and accelerated repairs if necessary, performed additional

(off cycle) inspections of distribution facilities in high hazard areas, accelerated vegetation management for distribution and transmission circuits in potentially elevated areas of concern, evaluated the possibility of temporary or permanent relay upgrades for fault detection purposes, and outfitted field resources in areas of elevated fire threat with additional means for fire protection.

Q. Please describe PacifiCorp's new California Fire Prevention Program addressing implementation of regulation changes.

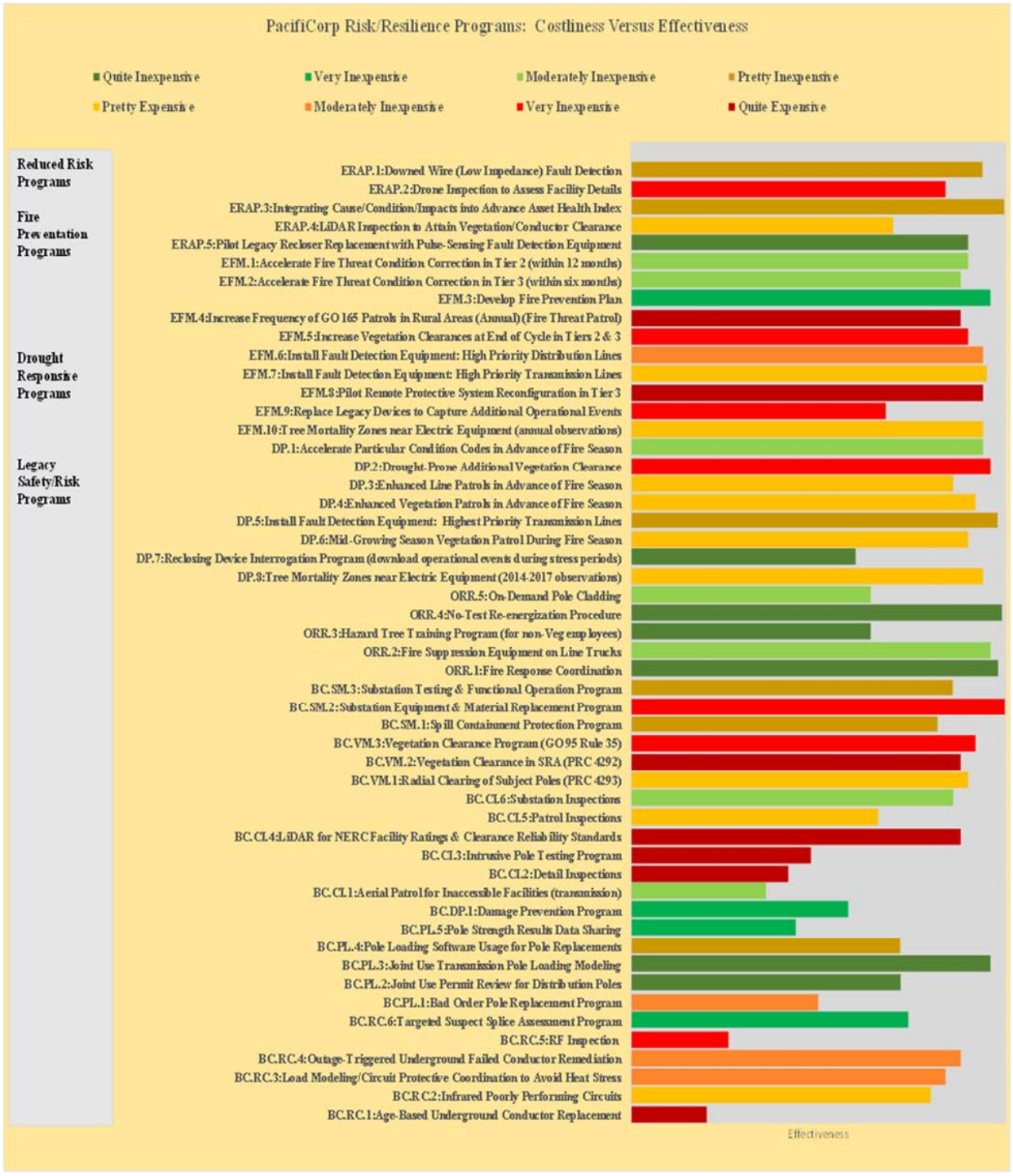
A. PacifiCorp's new California Fire Prevention Program is being implemented to comply with the modified rules adopted by the Commission in response to D.17-12-024, focused on enhancing fire safety of overhead equipment. Among other things, the Fire Prevention Program includes PacifiCorp's strategies and programs to reduce the risk of fire from its electrical lines and equipment. It specifically addresses steps required to gain compliance with newly adopted rules which are intended to mitigate the risk of wildland fires. Some of these rule changes include increasing vegetation clearance requirements at the end of vegetation cycles within Fire Threat Districts, more frequent patrol of overhead equipment in rural California, more rapid correction of inspection conditions that may be considered to be fire threats and the development of a fire safety plan.

Q. Can you provide a graphic summary depicting the costs versus benefits of the legacy and new safety/risk mitigation programs?

A. Yes. The four categories of risk mitigation programs described above are depicted in Figure 7 below. The effectiveness of the program in enhancing safety and minimizing risk is measured by the length of the bar, while the costliness of the

program is identified by the color of the bar. Programs which are high cost and offer limited safety/risk benefit require additional review, while those which are low cost and high safety/risk benefit advance rapidly.

Figure 7: Four Categories of Risk Mitigation Programs



Q. Are there other ways to show the risk mitigation value versus the costs of these programs?

A. Yes. Shown below in Figure 8 is a scatter chart wherein the graphic provides another perspective enabling identification of programs and the order of costs versus safety/risk effectiveness provided. Each program is shown as a dot, and based on the placement illustrate effectiveness versus cost. Those dots which fall toward the right side of the chart that are also toward the x axis yield little benefit for their cost, while those which are distant from the x axis offer substantial benefit and warrant the program cost.

Figure 8: Scatter Chart Depicting Risk Mitigation Value Versus Cost of Programs



Q. Does this conclude your direct testimony?

A. Yes.

Application No. 18-04-___
Exhibit PAC/1001
Witness: Brett S. Allsup

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Direct Testimony of

Brett S. Allsup

Six Impact Groups and the Seven Impact Level Scores

April 2018

SAFETY IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Fatalities:** Many fatalities and life threatening injuries to the public or employees.
Severe (6)	**Fatalities:** Few fatalities and life threatening injuries to the public or employees.
Extensive (5)	**Permanent/Serious Injuries or Illnesses:** Many serious injuries or illnesses to the public or employees.
Major (4)	**Permanent/Serious Injuries or Illnesses:** Few serious injuries or illnesses to the public or employees.
Moderate (3)	**Minor Injuries or illnesses:** Minor injuries or illnesses to many public members or employees.
Minor (2)	**Minor Injuries or illnesses:** Minor injuries or illnesses to few public members or employees.
Negligible (1)	No injury or illness or up to an un-reported negligible injury.

ENVIRONMENTAL IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Duration:** Permanent or long-term damage greater than 100 years; or
	Hazard Level/Toxicity: Release of toxic material with immediate, acute and irreversible impacts to surrounding environment; or
	Location: Event causes destruction of a place of international cultural significance; or
	Size: Event results in extinction of a species.
Severe (6)	**Duration:** Long-term damage between 11 years and 100 years; or
	Hazard Level/Toxicity: Release of toxic material with acute and long-term impacts to surrounding environment; or
	Location: Event causes destruction of a place of national cultural significance; or
	Size: Event results in elimination of a significant population of a protected species.
Extensive (5)	**Duration:** Medium-term damage between 2 and 10 years; or
	Hazard Level/Toxicity: Release of toxic material with a significant threat to the environment and/or release with medium-term reversible impact; or
	Location: Event causes destruction of a place of regional cultural significance; or
	Size: Event results in harm to multiple individuals of a protected species.
Major (4)	**Duration:** Short-term damage of up to 2 years; or
	Hazard Level/Toxicity: Release of material with a significant threat to the environment and/or release with short-term reversible impact; or
	Location: Event causes destruction of an individual cultural site; or
	Size: Event results in harm to a single individual of a protected species.
Moderate (3)	**Duration:** Short-term damage of a few months; or
	Hazard Level/Toxicity: Release of material with a moderate threat to the environment and/or release with short-term reversible impact; or
	Location: Event causes damage to an individual cultural site; or
	Size: Event results in damage to the known habitat of a protected species.
Minor (2)	**Duration:** Immediately correctable; or contained within a small area.
Negligible (1)	Negligible to no damage to the environment.

COMPLIANCE IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Adverse Regulatory Actions:** Action resulting in closure, split, or sale of PacifiCorp.
Severe (6)	**Adverse Regulatory Actions:** Cease and desist orders are delivered by regulators. Critical assets and facilities are forced by regulators to be shutdown.
Extensive (5)	**Adverse Regulatory Actions:** Governmental, regulator investigations, and enforcement actions, lasting longer than a year. Violations that result in multiple large non-financial sanctions; or
	Increased Regulatory Oversight: Regulators force the removal and replacement of management positions. Regulators begin Company monitoring activities.
Major (4)	**Adverse Regulatory Actions:** Violations that result in significant fines or penalties above and beyond what is codified or a regulator enforces non-financial sanctions; or
	Expanded Regulations: Significant new and updated regulations are enacted as a result of an event.
Moderate (3)	**Adverse Regulatory Actions:** Violations that result in fines or penalties.
Minor (2)	**Adverse Regulatory Actions:** Self-reported or regulator identified violations with no fines or penalties.
Negligible (1)	No compliance impact up to an administrative impact.

RELIABILITY IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Location:** Impacts an entire metropolitan area, including critical customers, or is systemwide; and
	Duration: Disruption of service of more than a year due to a permanent loss to a nuclear facility, hydro facility, critical gas or electric asset; or
	Customer Impact: Unplanned outage (net of replacement) impacts more than 1 million customers; or
	EO: 14 million total customer hours, or more than 1 million mega-watt hours (MWh) total load; or
	GO: 10 million total customer hours, or reduction of capacity greater than or equal to 2.1 Bcf/d for seven months; or
	ES: 40 percent of utility-owned generating fleet unavailable for one year
Severe (6)	**Location:** Impacts multiple critical locations and critical customers; or
	Duration: Substantial disruption of service greater than 100 days; or
	Customer Impact: Unplanned outage (net of replacement) impacts more than 100k customers; or
	EO: 1.2 million total customer hours, or more than 100 thousand MWh total load; or
	GO: one million total customer hours, or reduction of capacity greater than 1.2 billion cubic feet per day (Bcf/d), but less than for seven months; or
	ES: 20 percent of utility-owned generating fleet unavailable for one year'.
Extensive (5)	**Location:** Impacts multiple critical locations or customers; or
	Duration: Disruption of service greater than 10 days; or
	Customer Impact: Unplanned outage (net of replacement) impacts more than 10k customers; or
	EO: 100 thousand total customer hours, or more than 10 thousand MWh total load; or
	GO: 100 thousand total customer hours, or reduction of capacity greater than or equal to 0.6 Bcf/d for seven months; or
	ES: 10 percent of utility-owned generating fleet unavailable for one year.
Major (4)	**Location:** Impacts a single critical location; or
	Duration: Disruption of service greater than one day; or
	Customer Impact: Unplanned outage (net of replacement) impacts more than one thousand customers; or
	EO: 8 thousand total customer hours, or more than one thousand MWh total load; or
	GO: 10 thousand total customer hours, or reduction of capacity greater than or equal to 0.3 Bcf/d for seven months; or
	ES: 2 percent of utility-owned generating fleet unavailable for one year.
Moderate (3)	**Location:** Impacts a small area with no disruption of service to critical locations; or
	Duration: Disruption of service of up to one full day; or
	Customer Impact: Unplanned outage (net of replacement) impacts more than 100 customers; or
	EO: 600 total customer hours, or more than 100 MWh total load; or
	GO: one thousand total customer hours, or reduction of capacity greater than or equal to 0.1 Bcf/d for seven months; or
	ES: one percent of utility-owned generating fleet unavailable for one year.
Minor (2)	**Location:** Impacts a small localized area with no disruption of service to critical locations; or
	Duration: Disruption of up to three hours; or
	Customer Impact: Unplanned outage (net of replacement) impacts less than 100 customers; or
	EO: Less than 600 total customer hours, or less than 100 MWh total load; or
	GO: Less than one thousand total customer hours, or reduction of capacity greater than or equal to 0.01 Bcf/d for seven months; or
	ES: 0.1 percent of utility-owned generating fleet unavailable for one year.
Negligible (1)	No reliability to negligible impacts.

TRUST IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Duration:** Ongoing impacts for more than 10 years; and
	Media: Event is heavily reported from local through international media outlets and social media channels, with influential third parties dominating media coverage; various inaccurate information is widely reported; or
	Political: Devastating nationwide broad-based political pressure demanding intense long term outreach to policymakers and key stakeholders; or
	Customer Satisfaction: Greater than 50 percent loss of customer satisfaction through survey results; or
	Company Brand: Relationships are severed and trust is completely lost
Severe (6)	**Duration:** Ongoing impacts between 1 and 10 years; and
	Media: Event is heavily reported from local through national media outlets and social media channels, with influential third parties dominating media coverage, and various inaccurate information is widely reported; or
	Political: Extreme statewide broad-based political pressure demanding concentrated outreach to policymakers and key stakeholders; or
	Customer Satisfaction: 21-50 percent loss of customer satisfaction through survey results; or
	Company Brand: Event creates outrage and trust can't be fully recovered
Extensive (5)	**Duration:** Ongoing impacts between one quarter and one year; or
	Media: Event is widely reported in national media outlets and social media channels, with influential third parties dominating media coverage, and inaccurate information is reported; or
	Political: Severe territory wide political pressure demanding extensive outreach to policymakers and key stakeholders; or
	Customer Satisfaction: 4-20 percent loss of customer satisfaction through survey results; or
	Company Brand: Event creates serious concerns of company management while trust is severely diminished
Major (4)	**Duration:** Ongoing impacts between one week and one quarter; or
	Media: Event is heavily reported in local through national media outlets and social media channels, with influential third parties dominating media coverage, and inaccurate information is reported; or
	Political: Major territory wide political pressure demanding major outreach to policymakers and key stakeholders; or
	Customer Satisfaction: one to three percent loss of customer satisfaction through survey results; or
	Company Brand: Management is questioned and trust is diminished
Moderate (3)	**Duration:** Short term coverage for up to one week.
	Media: Event is reported in multiple local media outlets and/or social media channels, with limited exposure beyond the coverage area; or
	Political: Moderate county level political pressure demanding moderate outreach to policymakers and key stakeholders; or
	Customer Satisfaction: Less than one percent loss of customer satisfaction through survey results; or Company Brand: Event isn't anticipated and trust is impacted
Minor (2)	**Duration:** Single report of the event.
	Media: Event is reported in a single local media outlet in the location where the event took place; or
	Political: Minimal political pressure demanding minimal outreach to policymakers and key stakeholders;
Negligible (1)	No known reputation impact reported to a non-featured report.

FINANCIAL IMPACT DESCRIPTION

Impact Level	Description
Catastrophic (7)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact > $5 billion in costs; or
	Capital/Liquidity: Ability to raise capital significantly impacted. Dramatic decrease in stock price of more than 50 percent for more than one year; or
	Bankruptcy: Risk of bankruptcy is imminent.
Severe (6)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact between $500 million and $5 billion in costs; or
	Capital/Liquidity: Ability to raise capital is challenged. Dramatic decrease in stock price of more than 25 percent for more than one year.
Extensive (5)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact between $50 million and $500 million in costs; or
	Capital/Liquidity: Ability to raise capital is hindered. Dramatic decrease in stock price of more than 10 percent for up to one year.
Major (4)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact between $5 million and $50 million in costs.
Moderate (3)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact between $500 thousand and $5 million in costs.
Minor (2)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact between $50 thousand and $500 thousand in costs.
Negligible (1)	**Financial Costs:** Damage to third-party properties, loss of assets and facilities, fines, lawsuits, restitution, remediation, restoration, cost of replacement energy, redistributed customer costs, amounting to a total impact of less than $50 thousand in costs.

Application No. 18-04-___
Exhibit PAC/1002
Witness: Brett S. Allsup

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Direct Testimony of

Brett S. Allsup

Risk Templates for Top 10 Risks

April 2018

Risk Event:	**Substation Transformer Failure**		**Risk Plot Key:**	**A**
Reasonable Worst Case:	Substation transformer fails, releasing all oil in the transformer, resulting in a prolonged outage to all customers that requires the transformer to be replaced.			
Controls:	• Preventive maintenance monitoring of the condition of transformers. • Install and maintain spill prevention devices. • Purchase spare transformers.			
Risk Scoring				
Frequency Score	**Impact Scores**			
5	**Safety**	4		
	Environmental	4		
	Compliance	4		
Frequency Factor	**Reliability**	5		
1	**Trust**	5		
	Financial	4		
Total Risk Score:	192.35			
Additional Mitigations Considered:	• Develop emergency generator deployment contract with service suppliers. • Increase number of mobile substations to minimize outage times. • Add redundant transformers at stations.			

Risk Event:	**Substation Circuit Breaker Failure**		**Risk Plot Key:**	**B**
Reasonable Worst Case:	Substation circuit breaker failure causes damage to other substation equipment, resulting in prolonged outage.			
Controls:	• Use preventive maintenance activities to monitor the condition of circuit breakers. • Increase ratio of spare to in-service circuit breakers.			
Risk Scoring				
Frequency Score	**Impact Scores**			
6	**Safety**	4		
	Environmental	4		
	Compliance	4		
Frequency Factor	**Reliability**	4		
3	**Trust**	5		
	Financial	4		
Total Risk Score:	158.50			
Additional Mitigations Considered:	• Increase number of mobile substations to minimize outage times. • Develop emergency generator deployment contract with service suppliers.			

Risk Event:	**Substation Transformer Bushing Failure**		**Risk Plot Key:**	**C**
Reasonable Worst Case:	Substation transformer bushing failure destroys the transformer, resulting in a prolonged outage to all customers.			
Controls:	• Preventive maintenance monitoring of the condition of transformer and bushings. • Install and maintain spill prevention devices.			
Risk Scoring				
Frequency Score	**Impact Scores**			
5	**Safety**	3		
	Environmental	4		
	Compliance	3		
Frequency Factor	**Reliability**	5		
0.50	**Trust**	4		
	Financial	4		
Total Risk Score:	144.10			
Additional Mitigations Considered:	• Develop emergency generator deployment contract with service suppliers. • Implement a bushing testing/replacement program. • Increase number of mobile substations to minimize outage times. • Add redundant transformers at substations.			

Risk Event:	**Substation Circuit Breaker Oil/SF6 Gas Leak**		**Risk Plot Key:**	**D**
Reasonable Worst Case:	Substation circuit breaker oil/SF6 gas release results in the destruction of the circuit breaker, further resulting in a prolonged outage to all customers and an off-site release of oil or SF6 gas.			
Controls:	• Preventive maintenance monitoring of the condition of transformer. • Install and maintain spill prevention devices.			
Risk Scoring				
Frequency Score	**Impact Scores**			
4	**Safety**	3		
	Environmental	4		
	Compliance	3		
Frequency Factor	**Reliability**	5		
0.33	**Trust**	4		
	Financial	4		
Total Risk Score:	130.20			
Additional Mitigations Considered:	• Develop emergency generator deployment contract with service suppliers. • Increase number of mobile substations to minimize outage times. • Add redundant transformers at substations.			

Risk Event:	**Transformer Radiator Failure**		**Risk Plot Key:**	**E**
Reasonable Worst Case:	Substation transformer radiator failure results in oil release that also damages the transformer, resulting in a prolonged outage to all customers and an off-site release of oil.			
Controls:	• Preventive maintenance monitoring of the condition of transformer. • Install and maintain spill prevention devices.			
Risk Scoring				
Frequency Score	**Impact Scores**			
4	**Safety**	2		
	Environmental	5		
	Compliance	4		
Frequency Factor	**Reliability**	5		
0.22	**Trust**	4		
	Financial	4		
Total Risk Score:	123.40			
Additional Mitigations Considered:	• Develop emergency generator deployment contract with service suppliers. • Increase number of mobile substations to minimize outage times. • Add redundant transformers at substations.			

Risk Event:	**Relay Failure or Mis-operation**		**Risk Plot Key:**	**F**
Reasonable Worst Case:	Relay fail or mis-operate, resulting in prolonged outages to all customers.			
Controls:	• Current spare relay inventory. • Leverage donor relays from impacted substation or other substations.			
Leverage donor relays .				
Frequency Score	**Impact Scores**			
3	**Safety**	3		
	Environmental	2		
	Compliance	4		
Frequency Factor	**Reliability**	5		
0.10	**Trust**	5		
	Financial	4		
Total Risk Score:	103.40			
Additional Mitigations Considered:	• Develop emergency generator deployment contract with service suppliers. • Increase spare relay inventory.			

Risk Event:	**Distribution Underground Conductor Failure**		**Risk Plot Key:**	**G**
Reasonable Worst Case:	Public contact with underground wire resulting in multiple, permanent or serious injuries.			
Controls:	• Conduct current construction, maintenance and repairs per governing/company standards.			
Risk Scoring				
Frequency Score	**Impact Scores**			
5	**Safety**	4		
	Environmental	2		
	Compliance	3		
Frequency Factor	**Reliability**	4		
0.86	**Trust**	5		
	Financial	3		
Total Risk Score:	100.30			
Additional Mitigations Considered:	• Provide a program to test and identify underground conductor needing repair or replacement. • Increase the number of underground conductor replacement projects. • Initiate program to repair underground conductor.			

Risk Event:	**Distribution Overhead Pole Failure**		**Risk Plot Key:**	**H**
Reasonable Worst Case:	Excessive pole failures due to weather/fire resulting in 50% of customers losing power and an extended outage.			
Controls:	• Perform current pole inspection program. • Perform current intrusive pole inspection program • Perform current maintenance programs • Maintain existing mutual assistance agreements for line crews from other utilities • Maintain existing emergency support contracts for contractor line crews			
Risk Scoring				
Frequency Score	**Impact Scores**			
3	**Safety**	4		
	Environmental	5		
	Compliance	5		
Frequency Factor	**Reliability**	3		
0.0733	**Trust**	5		
	Financial	4		
Total Risk Score:	75.86			
Additional Mitigations Considered:	• Make necessary adjustments to pole inspection and maintenance programs.			

Risk Event:	**Distribution Overhead Conductor Failure**	**Risk Plot Key:**	**I**
Reasonable Worst Case:	Sustained outages resulting in significant degradation in reliability and quality of service delivered, triggering widespread customer dissatisfaction, and increased regulatory and political scrutiny.		
Controls:	• Perform current vegetation management program. • Perform current inspection and maintenance programs • Conduct current construction, maintenance and repairs per governing standards • Maintain existing circuits with reclosing capable switches/breakers • Maintain existing mutual assistance agreements for line crews from other utilities • Maintain existing emergency support contracts for contractor line crews • Execute approved capital improvement projects		

Risk Scoring		
Frequency Score	**Impact Scores**	
4	**Safety**	4
	Environmental	3
	Compliance	4
Frequency Factor	**Reliability**	4
0.2347	**Trust**	4
	Financial	3
Total Risk Score:	57.60	
Additional Mitigations Considered:	• Make necessary adjustments to pole inspection and maintenance programs. • Make necessary adjustments to the current vegetation management program.	

Risk Event:	**Distribution Overhead Pole Mounted Equipment Failure - Aging Infrastructure**	**Risk Plot Key:**	**J**
Reasonable Worst Case:	Frequent outages due to aging infrastructure resulting in 50% of customers losing power and an extended outage.		
Controls:	• Perform current inspection and maintenance programs. • Conduct current construction, maintenance and repairs per governing standards • Maintain existing circuits with reclosing capable switches/breakers • Maintain existing mutual assistance agreements for line crews from other utilities • Maintain existing emergency support contracts for contractor line crews • Execute approved capital improvement projects		

Risk Scoring		
Frequency Score	**Impact Scores**	
6	**Safety**	2
	Environmental	3
	Compliance	3
Frequency Factor	**Reliability**	3
1.81	**Trust**	4
	Financial	3
Total Risk Score:	39.84	
Additional Mitigations Considered:	• Make necessary adjustments to pole inspection and maintenance programs. • Increase the number of overhead equipment replacement projects.	

Application No. 22-05-006
Exhibit PAC/1805
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Supplemental Testimony of

Allen Berreth

Proposed Covered Conductor Project Details Spreadsheet

April 2023

Supplemental Testimony Attachment
Proposed and Completed Covered Conductor Project Details
Date 2-Mar-23

ST	District	Circuit	Project Name	Project Description	Non-Tier Miles	Tier 2 Miles	Tier 3 Miles	Total Miles	Project Status	Completed / Planned Year	Superior WBS	2021 (Actuals)	2022 (Actuals)	2023 (Planned)	2024 (Planned)	2025 (Forecast)
CA	Mt. Shasta	5G69	5G69 Radio Tower Feed	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.			1.3	**1.3**	Complete	2021	DCAL/2019/C/005	$ 1,271,617.53				
CA	Mt. Shasta	6G101	6G101 Snowbrush Distribution	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		1.3	2.9	**4.2**	Complete	2021	DCAL/2019/C/005	$ 1,017,873.91	$ 10,962.73			
CA	Mt. Shasta	7G71	7G200 Mt Bradley	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.			2.0	**2.0**	Complete	2021	DCAL/2020/C/DN2	$ 1,318,385.21				
CA	Mt. Shasta	5G76	5G77 North Ringfence	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		1.7		**1.7**	Complete	2022	DCAL/2019/C/005	$ 951,674.53	$ 545,394.90			
CA	Mt. Shasta	5G79	5G79 South Ringfence	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		1.4	0.4	**1.9**	Complete	2022	DCAL/2019/C/005	$ 1,416,602.36	$ 45,999.80			
CA	Mt. Shasta	5G69	5G69 Dunsmuir-Mott Distribution	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		0.1	4.4	**4.5**	Complete	2022	DCAL/2019/C/005	$ 1,747,755.11	$ 353,950.32			
CA	Mt. Shasta	5G69	5G69 Dunsmuir Tie Taps and Retreat	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		3.8	3.1	**6.9**	Complete	2022	DCAL/2019/C/007		$ 4,864,157.26			
CA	Mt. Shasta	7G71 & 7G73	7G200/7G73 North Dunsmuir City 1 and 2	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		4.5	1.2	**5.7**	Complete	2022	DCAL/2019/C/009		$ 5,437,250.80			
CA	Yreka	5G45	5G45 Weed Shastina Drive	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		5.7		**5.7**	Complete	2022	DCAL/2021/C/010	$ 922,032.19	$ 3,830,208.39			
CA	Yreka	5G83	5G83 Weed College of the Siskiyous	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		3.8		**3.8**	Complete	2022	DCAL/2021/C/012		$ 2,372,718.66			
CA	Mt. Shasta	5G79 &5G76 &7G81 & 7G82	Lassen Underbuild	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		1.3		**1.3**	Construction	2023	DYRE/2013/C/001			$ 1,010,100.00		
CA	Mt. Shasta	7G75	7G75 South Dunsmuir	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		3.5		**3.5**	Construction	2023	DCAL/2019/C/010			$ 3,000,000.00		
CA	Yreka	5G40	McKinney 5G40 Rebuild	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		6.6		**6.6**	Complete	2023	DYRE/2022/C/012		$ 4,110,225.74	$ 3,160,741.26		
CA	Mt. Shasta	5G14	5G14 Happy Camp East	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		4.5		**4.5**	Complete	2023	DCAL/2021/C/008		$ 2,064,628.00	$ 1,340,146.00		
CA	Mt. Shasta	5G16	5G16 Happy Camp Core	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		13.8		**13.8**	Construction	2023	DCAL/2021/C/009		$ 5,639,716.28	$ 8,060,283.72		
CA	Yreka	5G83	5G83 Weed NE Hwy 97 plus Tie	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		10.5		**10.5**	Construction	2023	DCAL/2021/C/007			$ 9,121,165.51		
CA	Yreka	5G83	5G83 Weed North Old Stage Road	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		4.8	10.5	**15.3**	Construction	2023	DCAL/2021/C/011		$ 2,287,135.46	$ 6,894,229.54		
CA	Mt. Shasta	8G95	8G95 Nutglade 2kV system	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		8.1		**8.1**	Design	2023	DCAL/2022/C/001			$ 7,592,769.00		
CA	Yreka	5G83	5G83 North Weed	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		13.9		**13.9**	Construction	2023	DCAL/2022/C/006		$ 548,157.57	$ 9,115,565.43		
CA	Yreka	5G83	5G83 Hoy Road	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		5.9		**5.9**	Construction	2023	DCAL/2022/C/014/B			$ 2,000,000.00		
CA	Yreka	5G83	5G83 Old Edgewood and West Weed	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		22.2		**22.2**	Estimating	2023	DCAL/2022/C/012			$ 14,292,002.00		
CA	Mt. Shasta	5G76	5G76 Mt Shasta Deetz Rd	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		1.7	1.4	**3.0**	Construction	2023	DCAL/2022/C/008			$ 1,816,415.00		
CA	Mt. Shasta	5G76	5G76 Mt Shasta NW Tap Line	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		14.7	1.6	**16.3**	Design	2023	DMTS/2022/C/003			$ 9,763,658.00		
CA	Mt. Shasta	5G76	5G76 Mt Shasta Rockfellow Drive	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		1.2		**1.2**	Complete	2023	DCAL/2022/C/011			$ 1,011,334.00		
CA	Mt. Shasta	5G76 & 5G79	5G76/5G79 Mt Shasta Taps	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		16.8		**16.8**	Design	2023	DMTS/2022/C/001			$ 6,658,277.00		
CA	Mt. Shasta	5G79	5G79 McCloud Ave	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.			1.4	**1.4**	complete	2023	DCAL/2022/C/010			$ 1,011,629.01		
CA	Mt. Shasta	5G79	5G79 Mt Shasta Siskiyou Lake	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		4.4	3.9	**8.2**	Construction	2023	DCAL/2022/C/009			$ 7,605,717.31		
CA	Yreka	5G39	5G39 Seiad Creek Road	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		5.8		**5.8**	Design	2023	DYRE/2022/C/003			$ 3,490,285.00		
CA	Mt. Shasta	5G79	5G79 Mt Shasta Ski Resort Part	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		6.7	3.3	**10.0**	Construction	2023	DCAL/2022/C/005			$ 9,928,893.00		
CA	Yreka	5G40	Scott Bar 1	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		15.5		**15.5**	Design	2023	DYRE/2023/C/001/B			$ 11,659,710.00		
CA	Yreka	5G40	Scott Bar 2	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		8.8		**8.8**	Design	2023	TBD			$ 6,837,600.00		
CA	Grants Pass	5R106	5R106 Obrien Redwood Hwy PT 1 Phase 2	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		2.0		**2.0**	Construction	2023	DORE/2019/C/008			$ 1,554,000.00		
CA	Crescent City	5R165	5R165 Hiouchi	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		15.4		**15.4**	Permitting	2024	DCAL/2019/C/006				$ 14,942,648.00	
CA	Yreka	5G39	5G39 Seiad	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		18.8		**18.8**	Design	2024	DCAL/2022/C/013				$ 14,578,088.00	
CA	Mt. Shasta	5G76	5G76 Mt Shasta NW Mainline	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		6.9		**6.9**	Design	2024	DMTS/2022/C/004				$ 4,139,669.00	
CA	Mt. Shasta	5G76	5G76 Mt Shasta NW Truck Village Drive	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		6.6	0.1	**6.7**	Design	2024	DMTS/2022/C/002				$ 4,007,996.00	
CA	Yreka	5G16	5G16 HC Indian Creek - Fire Area Parts 1-4 668033/01	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		9.0		**9.0**	Design	2024	DYRE/2022/C/004				$ 5,410,927.00	
CA	Yreka	5G16	5G16 HC Indian Creek - Fire Area Parts 5-8 668003/00	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		12.7		**12.7**	Design	2024	DYRE/2022/C/005				$ 7,611,655.00	
CA	Yreka	5G45	5G45 Weed Core area	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		2.1		**2.1**	Design	2024	DYRE/2022/C/006				$ 1,429,693.00	
CA	Mt. Shasta	5G79	5G79 Mt Shasta South Old Stage Rd	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		8.6	0.1	**8.7**	Design	2024	DCAL/2022/C/007				$ 5,931,608.00	
CA	Crescent City	5R151 & 5R152	5R151/5R152 Crescent City	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.	2.5			**2.5**	Design	2024	DCAL/2020/C/DMW				$ 1,950,000.00	
CA	Yreka	5G40	Scott Bar 3	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		17.1		**17.1**	Scoping	2024	TBD				$ 13,286,700.00	
CA	Yreka	5G40	Scott Bar 4	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		10.5		**10.5**	Scoping	2024	TBD				$ 8,158,500.00	
CA	Mt. Shasta	8G103	Dog Creek	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		2.1		**2.1**	Scoping	2024	DMTS/2022/C/010				$ 1,662,780.00	
CA	Mt. Shasta	5G97	Shotgun Creek	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		8.8		**8.8**	Scoping	2025	DMTS/2022/C/007					$ 6,837,600.00
CA	Mt. Shasta	8G65	Castella	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		6.0		**6.0**	Scoping	2025	DMTS/2022/C/008					$ 4,662,000.00
CA	Mt. Shasta	5G99	Shotgun Creek	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		14.9		**14.9**	Scoping	2025	DMTS/2022/C/009					$ 11,577,300.00
CA	Crescent City	5R96	Gasquet	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		10.2		**10.2**	Scoping	2025	DCRE/2022/C/004					$ 7,925,400.00
CA	Crescent City	6R3	Patricks Creek	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		7.0		**7.0**	Scoping	2025	DCRE/2022/C/005					$ 5,439,000.00
CA	Yreka	8G27	Hamburg	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		5.0		**5.0**	Scoping	2025	DYRE/2022/C/013					$ 3,885,000.00
CA	Mt. Shasta	5G93	McCloud	Overhead line rebuild with covered conductor to mitigate wildfire risk and, specifically, the risk of incidental contact with overhead lines.		37.2		**37.2**	Scoping	2025	TBD					$ 28,935,480.00
					2.5	**393.9**	**37.4**	**433.8**				**$8,645,941**	**$32,110,506**	**$126,924,521**	**$83,110,264**	**$69,261,780**

Year	Non-Tier	HFTD (Tier 2 & 3)	Total
2021	0	7	7
2022	0	30	30
2023	0	195	195
2024	3	110	113
2025	0	89	89
Total Proposed (2021-2025)	3	431	434
Total OH Distribution Miles in Service Territory	1,707	814	2,521
% of OH Distribution Service Territory in Proposal	0%	53%	17%

Application No. 22-05-006
Exhibit PAC/1806
Witness: Allen Berreth

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

PACIFICORP

Exhibit Accompanying Supplemental Testimony of

Allen Berreth

Alternatives to Initiatives (Guidance 2 worksheet)

Augmented for Proposed Programs

April 2023

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

Attachment X: Alternatives to Initiatives (Adopted from Guidance-2 Worksheet Attached to PacifiCorp's First Quarterly Progress Report filed on September 9, 2020)

INITIATIVE NAME AND DESCRIPTION				ALTERNATIVES TO INITIATIVES		
WMP Section Reference	Category	Initiative from WMP	PacifiCorp Applicable Initiative? [Yes/No]	List of alternatives Considered	Notes	Rationale for Selection
5.3.3.3	Grid Design & System Hardening	Covered conductor installation – distribution	Yes	1. Underground Infrastructure 2. Covered conductor with crossarm construction	Underground systems Good alternative where impact loads are not expected, i.e., light incidental contact only	Selection represents the lowest cost in the short/long term
5.3.3.6	Grid Design & System Hardening	Distribution pole replacement and reinforcement, including with composite poles	Yes	1. Change in Policy 2. Widespread system strength modeling program	Changes in Emergency Response practices to staff and stock additional materials and expedite restoration – expected to be high additional cost in comparison to acceleration of spend Snapshot of pole strength would quickly be outdated and generate backlog needing to be addressed	Selection represents the lowest cost in the short/long term
5.3.3.7	Grid Design & System Hardening	Expulsion fuse replacement	Yes	1. Asset Relocation 2. Installation of fast acting protective devices not operating on overcurrent, i.e., fusesaver	Remove fuses or move lines or fuses outside of the FHCA - Probably not practical given customer base and needs for P&C schemes/reliability In targeted areas expected to be optimal device, particularly when protective coordination curve options are limited	Selection best aligns with existing (or future) grid topology

5.3.3.9	Grid Design & System Hardening	Installation of system automation equipment	Yes	1. Expansion of PSPS Application	System automation equipment supports faster detection of faults to reduce risk. Alternatively, the use of PSPS events could be expanded.	Selection reduces the need for PSPS related events
5.3.5.2	Vegetation Management & Inspections	Detailed inspection of vegetation around distribution electric lines and equipment	Yes	1. Alternate Method/Technology	Current pilot project not yet viable as a replacement to visual inspections, whether LiDAR, satellite data or drone usage	Alternatives not yet technical feasible/market ready
5.3.5.3	Vegetation Management & Inspections	Detailed inspection of vegetation around transmission electric lines and equipment	Yes	1. Alternate Method/Technology	Current pilot project not yet viable as a replacement to visual inspections whether LiDAR, satellite data or drone usage	Alternatives not yet technical feasible/market ready
5.3.5.5	Vegetation Management & Inspections	Fuel management and reduction of slash (from vegetation management activities)	Yes	1. Asset Replacement 2. Biofuel	Alternatively, additional lines could be rebuilt with "fire-proof" materials As consumers of slash become more obvious may be a possible outlet of the leavings	Selection represents the lowest cost in the short/long term
5.3.5.6	Vegetation Management & Inspections	Improvement of inspections	Yes	3. None - Compliance Requirement	Compliance Requirement - No alternatives considered	Compliance Requirement
5.3.5.13	Vegetation Management & Inspections	Quality assurance/ quality control of inspections	Yes	1. None - Compliance Requirement	Supports compliance requirements - no alternatives considered	Compliance Requirement
5.3.5.20	Vegetation Management & Inspections	Vegetation management to achieve clearances around electric lines and equipment	Yes	1. None - Compliance Requirement	Compliance Requirement - No alternatives considered	Compliance Requirement
5.3.5.21	Vegetation Management & Inspections	Other/not listed - Radial Pole Clearing	Yes	2. Asset Replacement 3. Additional Pole Clearing (exempt poles)	Alternatively, additional lines could be rebuilt with "fire-proof" materials Certain locations and corridors may best be protected by fuel removal that could damage pole lines	Selection represents the lowest cost in the short/long term