2025 PGE Wildfire Mitigation Plan Update

December 31, 2024

Executive Summary

This 2025 Wildfire Mitigation Plan (WMP) Update continues PGE's implementation of a comprehensive and data-driven wildfire mitigation strategy. In 2024, Oregon experienced an unprecedented and record-breaking wildfire season. According to the Oregon Department of Forestry, Oregon's 1,956 fires burned 1,937,512 acres and included six megafires. The 1.9 million total acres burned in 2024 represents a 302 percent increase above Oregon's 10-year average of 640,000 acres underscoring the need for PGE to continue to reduce risk and invest in additional wildfire mitigation measures.

PGE's planning continues to focus on five key principles:

1. Reduce the risk of wildfire caused by PGE assets.
2. Increase the resilience of PGE assets to wildfire damage.
3. Engage with communities to understand and limit customer impacts from Public Safety Power Shutoffs (PSPS) and other mitigation efforts, focusing on impacts to our most vulnerable customers.
4. Collaborate with local, regional, and national partners to implement mitigations and minimize community impact.
5. Develop data-driven risk reduction strategies, including vegetation management, undergrounding and other system hardening measures, and protection settings.

Major Changes in the 2025 WMP Update

Our 2025 WMP Update discusses significant changes from the 2024 WMP in detail. Generally, these changes focus on incorporating learnings and improvements:

- As evidenced by an increased frequency of large and plume-dominated fires in the Pacific Northwest, the effects of climate change are accelerating. PGE updated its risk model climate change modifiers in accordance with industry studies, reflecting a 45 percent increase in climate impacts on PGE's system compared to 2024.
- Fire behavior in PGE's service territory and nearby areas demonstrated the steadily escalating effects of climate change. For example, given fuel/weather conditions at the time of ignition, the SW Laurel and Lee Falls Fires behaved well outside the behavior predicted by 2024 modeling. PGE updated its fire behavior models to reflect location-specific risk impacts in Zone 9.
- PGE identified elevated fire risk mid-fire season in the Chehalem Mountains area, consistent with risks and mitigation needs seen in other High Fire Risk Zones (HFRZ). Risk indicators included observed fire behavior and wind, limited egress, longer fire agency response times, and the presence of critical communications infrastructure. As a result, PGE defined and designated a new HFRZ covering this area (HFRZ 12).
- Across all HFRZs, PGE observed an unprecedented, exponential increase in tree mortality compared to the previous four years. These findings confirmed the need to increase PGE's vegetation management program as forecasted in 2024 and continuing in 2025.

- Annual vegetation patrol and clearance mitigation is most effective during the growing season, and identification of specific rapid growth trees facilitates efficient mitigation. Starting in 2025, PGE will focus its Advanced Wildfire Risk Reduction (AWRR) efforts on rapid growth species during peak growing season while maintaining full-scope patrol and mitigation for all HFRZs every two years.
- Risk Spend Efficiency (RSE) methodology can be utilized to measure the effectiveness of operational programs like vegetation management and ignition prevention inspection, enabling utilities to balance risk mitigation costs with customer price impacts. PGE expanded the application of Risk and Value Spend Efficiency (RSE/VSE) beyond system hardening investments to include operational programs.
- Neural Network Learning algorithms more effectively predict complex geographic risk elements compared to linear regression algorithms. PGE updated its geo-probability model associated with vegetation and weather impacts with Neural Network Learning to improve model accuracy by 16 percent.

Summary of 2025 Plan Benefits

Based upon PGE's current wildfire risk modeling, full implementation of its 2025 Wildfire Mitigation Plan is projected to deliver significant benefits for customers and stakeholders:

- Capital investments planned for the next three to four years will be in service for over 50 years and are estimated to reduce total risk in HFRZs by approximately 40 percent for the life of the projects.
- Operational programs are estimated to deliver roughly 40 percent reduction in total risk in HFRZs over the next 1-2 years through vegetation management, inspection, and correction practices if implemented as outlined.
- Overall, ignition prevention measures in HFRZs will result in approximately 250 avoided ignitions annually.
- Deployment of weather stations and AI cameras will enable rapid detection of wildfire hazards.
- Community engagement, customer programs, and continuous PSPS readiness improvements should reduce customer wildfire and PSPS vulnerability.

Summary of 2024 Accomplishments

PGE successfully implemented its 2024 WMP initiatives. Based upon PGE's current wildfire risk modeling, PGE's 2024 accomplishments include:

- Effective execution of operational programs, including AWRR vegetation management, ignition prevention inspection and correction, and enhanced powerline safety settings. The advancements in AWRR execution are estimated to reduce total risk by over 30 percent within HFRZs for the next two years. Execution of AWRR over the last several years on Mt. Hood has materially reduced outages and ignition risk events during fire season by over 70 percent.
- Execution of system hardening projects, including conversion of 8.7 overhead line-miles to underground, reconductor of 15 line-miles, and installation of 37 distribution automation devices yield multi-year risk reductions and decrease PGE ignitions.

- Execution of situational awareness projects, including the addition of four AI cameras and five weather stations, as well as deployment of Early Fault Detection (EFD) sensors on nine circuits. EFD helps PGE prevent both ignitions and outages; investments to date are estimated to prevent roughly 50 ignitions annually.
- Continued improvement of PSPS Readiness, promoting effective decision-making and shorter customer restoration times. While PGE did not execute a PSPS event in 2024, improvements included a resource-driven estimated restoration time calculator, a PSPS damage assessment process to run in parallel with non-damage restoration work and expanded notification training for employees.
- Robust community engagement through more than 40 Wildfire Ready community events and other forums for public engagement, support of vulnerable customers through the Medical Battery Support pilot, and ongoing partnership with Public Safety Partners (PSP).

Resilience Benefits of Wildfire Mitigation

While the focus of PGE's WMP is to mitigate wildfire risk, the investments made through this program deliver wide ranging benefits to PGE customers. Meteorologists provide daily weather briefings using weather station data to inform operations year-round, improving PGE's responsiveness to storms, heat events, and other weather-related incidents. Grid hardening investments, vegetation management, and inspections improve reliability throughout the year, particularly during storms. System reliability is further improved through innovation fueled by PGE's WMP, including early fault detection, geo-probability modeling, and damage prediction tools. In 2025, PGE is also evaluating the use of weather station data in the Dynamic Line Rating methodology that will enable PGE to maximize use of existing transmission capacity.

Implementation of New Update Guidelines

PGE appreciates the efforts of all stakeholders, most notably OPUC Staff, to clarify and streamline WMP development and requirements. Per OPUC UM 2340 Order 24-326, this WMP Update focuses on changes from 2024 and serves as a companion to PGE's 2024 Wildfire Mitigation Plan (WMP). PGE is hopeful that the Phase One Guidelines adopted by the Commission will allow for a more efficient review of this 2025 WMP Update, and that subsequent WMP Guidelines will continue to provide greater clarity and efficiency. Additional details about this transition can be found in the Introduction.

The Challenge of Climate Change

As our climate continues to change, the challenges of safely operating PGE's electric system escalate. PGE updated its risk models to address the evolving climate change impacts in the Pacific Northwest, reflecting a 45 percent increase in climate impacts on PGE's system compared to 2024. Tree health is declining, summers are hotter, droughts are more frequent, and winter storms are more intense. These factors increase risk related to PGE's system; mitigation efforts address risks highlighted in prior plans while adapting to these new and growing impacts.

PGE's 2024 WMP and this 2025 WMP Update respond to the identified risks based upon the best available science and projections for future climate change. However, the state of global climate science continues to evolve, and the impacts on Northwest forests remain dynamic. Future WMPs and WMP Updates will consider how PGE's strategy needs to adapt should the state of our environment continue to change.

Conclusion

Customers count on PGE to provide safe and reliable electricity while we create a cleaner and more resilient energy future. Wildfire risk is one of the key challenges PGE faces as we deliver this future for our customers, and this 2025 WMP Update reflects a reasonable balance of mitigation cost with wildfire risk reduction, consistent with Commission requirements.[1] This 2025 WMP Update is a comprehensive, data-driven strategy responsive to customer needs and the changing risks across the region.

[1] OAR 860-300-0020.

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Acronyms

AGP: Active Growth Period + Mitigation

API: Application Programming Interface

AWRR: Advanced Wildfire Risk Reduction (vegetation management program within HFRZs)

CBTA: Condition-Based Tree Assessment

CDTA: ESRI's Create Drive Time Areas tool

CFCI: Communicating Faulted Circuit Indicator

CI: Conditional Impact

EDDI: Evaporative Drought Demand Index

EFD: Early Fault Detection

EFR: Enhanced Fire Risk

EPSS: Enhanced Powerline Safety Settings

ETL: Extract, Transform, and Load

EVM: Enhanced Vegetation Management

FCI: Faulted Circuit Indicator

FITNES: Facilities Inspection and Treatment to National Electric Safety Code

FPI: Fire Potential Indices

FSPM: Full Scope Patrol + Mitigation

HPA: Heat Per Unit Area

HVRA: High-Valued Resource and Asset

IAM: Institute of Asset Management

ICPM: Inter-cycle Patrol + Mitigation

IPI: Ignition Potential Index

ISA: International Society of Arboriculture

IWRMC: International Wildfire Risk Monitoring Consortium

LANDFIRE: Landscape Fire and Resource Management Planning Tools

LBNL: Lawerence Berkley National Laboratory

NICC: Northwest Interagency Coordination Center

NOAA: National Oceanic and Atmospheric Administration

NREL: National Renewable Energy Laboratory

NWS: National Weather Service

OLS: Ordinary Least Squares regression model

PCA: Principal Component Analysis

PSAP: Public Safety Answering Point

PSP: Public Safety Partner

PSPS: Public Safety Power Shutoff

RAIL: Risk Associated with Ignition Location

RCP: Representative Concentration Pathway

RF: Random Forest Regression

RFW: Red Flag Warning

RMSE: Root Mean Squared Error

ROW: Right-of-Way

RSE: Risk Spend Efficiency

RVM: Routine Vegetation Management

VOS: Value of Service

VSE: Value Spend Efficiency

WCCCA: Washington County Consolidated Communications Agency

WRMA: Wildfire Risk Mitigation Assessment

WTI: Wildfire Threat Index

XGB: Extreme Gradient Boosting

1 Introduction

As required by OPUC UM 2340 Order 24-326, PGE's 2025 program is detailed in the previously published 2024 Wildfire Mitigation Plan (WMP) and this companion 2025 Wildfire Mitigation Plan Update (2025 WMP Update). In accordance with the order, PGE's 2025 WMP Update focuses primarily on changes from the 2024 WMP and includes additional information relevant to stakeholders.

As part of ongoing efforts to align utility WMPs, PGE's 2025 WMP Update also uses standard WMP **Initiative Categories** to detail various program components. The table below converts the Operations and Maintenance (O&M) and Capital Cost Areas detailed in PGE's 2024 Wildfire Mitigation Plan (WMP) to the new Initiative Categories used in PGE's 2025 WMP Update (and future WMPs). All existing PGE initiatives are documented in the Existing Initiative Updates section, even if the 2025 updates do not meet the thresholds requiring an update. PGE expects future WMP Updates to focus on significant updates according to the thresholds.

Table 1: 2024 WMP Cost Area to 2025 WMP Update Initiative Category Mapping

2024 WMP Cost Area	2025 WMP Update Initiative Category
Wildfire Mitigation Program & Compliance	Industry Engagement
	Wildfire Mitigation Strategy Development
	Overview of the Service Territory
Risk Mapping & Simulations	Risk Methodology & Assessment
	Situational Awareness & Forecasting
Grid Operations & Protocols	Grid Operations & Protocols
Wildfire Mitigation (Capital)	Grid Design & System Hardening
PSPS Program	PSPS / Emergency Preparedness
WMP Engagement, Public Awareness & Education, and Public Safety Partner Coordination	Community Outreach & Public Awareness
Asset Management & Inspections	Inspect / Correct
Wildfire-Related Utility Asset Management (Capital)	
Vegetation Management & Inspections	Vegetation Management
Investment O&M	Discontinued

Table 2 compares PGE's 2024 WMP costs mapped to their corresponding 2025 Initiative Categories as well as the 2025 WMP Update forecast. 2024 WMP Cost Areas have been split as required to align with the updated Initiative Categories per the table above.

Table 2: 2025 Wildfire Cost Comparison[2]

Initiative Category	2025 Forecast (2024 WMP)		2025 Forecast (2025 WMP Update)		Difference	
	Capital	O&M	Capital	O&M	Capital	O&M
Community Outreach & Public Awareness	$0	$837	$0	$1,050	$0	$213
Grid Design & System Hardening	$69,840	$0	$63,862	$200	($5,978)	$200
Grid Operations & Protocols	$0	$701	$140	$680	$140	($21)
Industry Engagement	$0	$100	$0	$100	$0	$0
Inspect / Correct	$5,800	$3,700	$3,992	$4,125	($1,808)	$425
Overview of the Service Territory	$0	$0	$0	$0	$0	$0
PSPS / Emergency Preparedness	$0	$1,095	$460	$1,420	$460	$325
Risk Methodology & Assessment	$0	$794	$1,050	$5,490	$1,050	$4,696
Situational Awareness & Forecasting	$1,750	$794	$3,286	$2,260	$1,536	$1,466
Vegetation Management	$0	$39,270	$70	$37,000	$70	($2,270)
Wildfire Mitigation Strategy Development	$0	$2,611	$0	$2,585	$0	($26)
Total	**$56,600 to $78,300**	**$48,000 to $50,000**	**$56,600 to $78,300**	**$53,260 to $56,560**	**$0**	**$5,008**

[2] Cost provided in thousands, including direct loadings per OPUC Order 23-370, Appendix A Page 10

2 Wildfire Mitigation Plan Compliance Index

The goal of the WMP Regulatory Compliance Index is to allow stakeholders and Staff to quickly identify where current information is located for each WMP requirement articulated in the Oregon Administrative Rules (OARs).

Table 3: OAR Reference Location

Rule Citation (OAR)	Initiative / Topic	2025 WMP Update location	2024 WMP location
860-024-0018(1)	Inspect/Correct (de-energized equipment)	p. 98-104, 110	p. 130
860-024-0018(2)	Inspect/Correct (tree attachments)	p. 141, 268-269	p. 66
860-024-0018(3)(a)	Inspect/Correct (risk)	p. 97-104, 137, 267-269	p. 62-71
860-024-0018(3)(b)	Inspect/Correct (transmission)	p. 104-111, 267-269	p. 62-71
860-024-0018(4)	Inspect/Correct Vegetation Management (annual patrol)	p. 253, 255-257, 267-268	p. 65, 76
860-024-0018(5)(a-c)	Inspect/Correct Vegetation Management (correction timeframes)	p. 262-263, 268-269	p. 65
860-024-0018(6)	Inspect/Correct (Joint Use)	Addressed in 2024 WMP	p. 65-66
860-024-0018(7)	Inspect/Correct (Joint Use)	Addressed in 2024 WMP	p. 65-66
860-024-0018(8)	Note to Utility about obligation of Operator related to Joint Use		
860-024-0018(9)	Note to Utility about obligation of Operator related to Joint Use		
860-024-0018(10)	Note to Utility about rule intentions		
860-300-0020(1)(a)(A-B)	Risk Methodology & Assessment (HFRZ)	p. 26-87	p. 17-18, 21-24, 34-40
860-300-0020(1)(b)	Risk Methodology & Assessment (RSE) Wildfire Mitigation Strategy Development	p. 90-96	p. 32-33
860-300-0020(1)(c)	Grid Operations & Protocols Grid Design and System Hardening Inspect/Correct Situational Awareness & Forecasting PSPS/Emergency Preparedness Vegetation Management (wildfire risk reduction)	p. 112-113, 123-131, 132-133, 135-141, 143-145, 148-153, 154-160	p. 14, 17, 36-52, 62-66, 72-77, 78-81

Rule Citation (OAR)	Initiative / Topic	2025 WMP Update location	2024 WMP location
860-300-0020(1)(d)	Community Outreach & Public Awareness (PSP re: EPSS and PSPS)	p. 74, 122, 168-170, 175, 274-275	p. 53-61, 104
860-300-0020(1)(e)	Grid Operations and Protocols PSPS / Emergency Preparedness (EPSS and PSPS)	p.132-133, 143-145, 171-174, 175	p. 41-52
860-300-0020(1)(f)	Community Outreach & Public Awareness PSPS / Emergency Preparedness	p. 122, 171-174, 176-177, 178-179, 276-282	p. 53-61
860-300-0020(1)(g)	Inspect / Correct	p. 135-141, 267-269	p. 62-66
860-300-0020(1)(h)	Vegetation Management	p. 154-160, 248-267	p. 72-77
860-300-0020(1)(i)	Risk Methodology & Assessment Wildfire Mitigation Strategy Development	p. 20-21, 88-89, 92-94, 98-104, 120, 161	p. 82-85
860-300-0020(1)(j)	Industry Engagement	p. 74-82, 92-94, 134, 188-190, 207, 208	p. 86-88
860-300-0020(1)(k)	Inspect / Correct	p. 97-104, 135-141, 267-269	p. 62-71
860-300-0020(2)	Plan and supplement filing requirement		
860-300-0020(3)	Plan approval by Commission		
860-300-0020(4)	Note regarding plan approval		
860-300-0030(1)(a)(A)	Risk Methodology & Assessment (baseline)	p. 26-87	p.-17-31
860-300-0030(1)(a)(B)	Risk Methodology & Assessment (seasonal)	p. 247-248	p. 23
860-300-0030(1)(a)(C)	Risk Methodology & Assessment (residential)	Addressed in 2024 WMP	p. 23, 105-110
860-300-0030(1)(a)(D)	Risk Methodology & Assessment (PGE assets)	Addressed in 2024 WMP	p. 21, 24, 105-110
860-300-0030(1)(b)	Risk Methodology & Assessment (updates)	p. 26-87	p. 17-20, 22-25, 105-112
860-300-0030(1)(c)(A-B)	Risk Methodology & Assessment (topography & weather sources)	p. 62-70, 237-247	p. 22-23, 105-110
860-300-0030(1)(d)(A)	Risk Methodology & Assessment (PSPS)	p. 90-91, 247	p. 45
860-300-0030(1)(d)(B)	Risk Methodology & Assessment (Vegetation Management)	p. 90-91, 97-104	p. 71-72

Rule Citation (OAR)	Initiative / Topic	2025 WMP Update location	2024 WMP location
860-300-0030(1)(d)(C)	Risk Methodology & Assessment (System Hardening)	p. 74, 90-95	p. 78-81
860-300-0030(1)(d)(D)	Risk Methodology & Assessment (investments)	p. 74, 90-96	p. 32-33
860-300-0030(1)(d)(E)	Risk Methodology & Assessment (operational decisions)	p. 247	p. 17-33, 41-44
860-300-0030(1)(e)	Risk Methodology & Assessment (updates)	p. 26-111	p. 18-21
860-300-0030(2)	Risk Methodology & Assessment (agencies)	p. 74-82, 82-87	p. 18-21, 36-39
860-300-0040(1)(a)(A-B)	Community Outreach & Public Awareness (engagement forums)	p. 74, 114-115, 122, 168, 175, 274-275, 276-282	p. 53, 58-61, 104, 128-129
860-300-0040(1)(b)	Community Outreach & Public Awareness (engagement accessibility)	Addressed in 2024 WMP	p.58
860-300-0040(2)(a)(A-D)	Community Outreach & Public Awareness (awareness content)	Addressed in 2024 WMP	p. 53-56
860-300-0040(2)(b)(A-C)	Community Outreach & Public Awareness (awareness plan)	p. 171-174	p. 53-57, 93
860-300-0040(3)	Community Outreach & Public Awareness (metrics)	p. 171-174, 178-179	p. 113-127
860-300-0040(4)(a-c)	PSPS / Emergency Preparedness (PSP coord)	p. 168, 169, 170, 274-275	p. 59-61,104, 129
860-300-0050(1)(a)	PSPS / Emergency Preparedness (notifications)	p. 171-174	p. 49-52
860-300-0050(1)(b)(A-H)	PSPS / Emergency Preparedness (PSP notification)	p. 170, 171-174	p. 49-52
860-300-0050(1)(c)(A-E)	PSPS / Emergency Preparedness (critical facility notification)	p. 171-174	p. 49-52
860-300-0050(1)(d)	Note about ESF-12 notification responsibilities		
860-300-0050(2)(a)(A-C)	PSPS / Emergency Preparedness (customer web notifications)	p. 171-174	p. 45-52
860-300-0050(2)(b)(A-G)	PSPS / Emergency Preparedness (customer direct notifications)	Addressed in 2024 WMP	p. 49-52

Rule Citation (OAR)	Initiative / Topic	2025 WMP Update location	2024 WMP location
860-300-0050(3)(a-c)	PSPS / Emergency Preparedness (notification timeline)	Addressed in 2024 WMP	p. 47, 50
860-300-0050(4)	Note to Utility that this rule does not replace emergency alerts.		
860-300-0050(5)	Note to Utility that this rule allows for additional communication beyond stated rule.		
860-300-0060(1)	PSPS / Emergency Preparedness (website)	p. 171-174	p. 45-46
860-300-0060(2)	PSPS / Emergency Preparedness (website)	p. 171-174	p. 49-52
860-300-0060(3)	PSPS / Emergency Preparedness (website)	Addressed in 2024 WMP	p. 45-46
860-300-0060(4)	PSPS / Emergency Preparedness (website)	p. 171-174	p. 45-46
860-300-0070(1)	In the event of a PSPS event, PGE will file with OPUC an annual report(s) on de-energization lessons learned, no later than December 31.		
860-300-0070(2)	The non-confidential versions of PGE's annual report filed with the OPUC will be made available on PGE's website.		

3 Significant Risk Model Updates

3.1 Wildfire Risk Mitigation Assessment Annual Update

3.1.1 Risk Model Annual Update Process

PGE conducts an annual Wildfire Risk Mitigation Assessment (WRMA) to determine baseline risk within its service territory and associated with outlying generation and transmission assets. The annual process incorporates changes to PGE's transmission and distribution system design as well as new modeling, datasets, scientific findings, and external agency feedback to update current HFRZ boundaries and evaluate the need for new HFRZs. The figure below provides a high-level overview of this process:

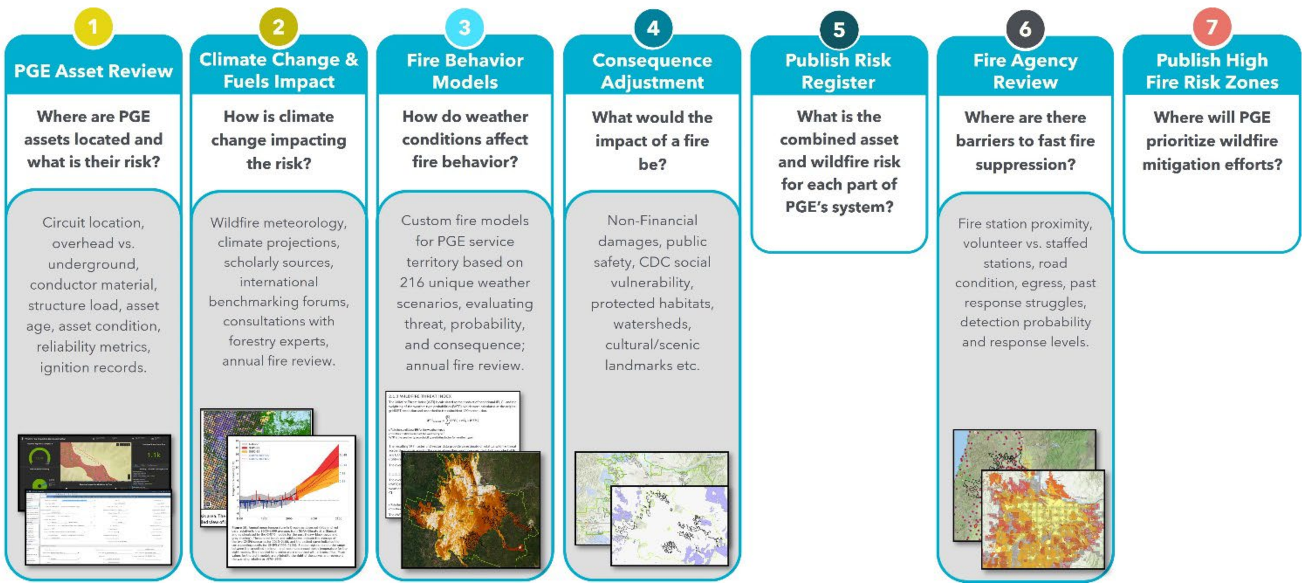

Figure 1: Annual PGE HFRZ Update Process

PGE's HFRZ boundaries are based upon wildfire risk associated with PGE infrastructure, enabling prioritization of mitigation activities directly related to ignition prevention as well as resulting customer PSPS vulnerability. To inform PGE's broader operations, including increased focus on fire safe work practices and fire safe design standards, PGE utilizes a wildfire risk map not directly associated with existing PGE infrastructure. The wildfire risk map was developed utilizing the Climate Change Impact and Fire Behavior Models, as well as the Fire Agency Review processes described in the sections below.

3.1.2 Reliability and Wildfire Risk Methodology Summary

PGE has spent much of the last decade developing and improving its wildfire- and reliability-focused modeling, to improve the maturity and accuracy of its risk-informed decision-making. To make prudent customer-focused investment decisions, PGE quantifies both wildfire risk and reliability risk in its analysis supporting mitigation actions. This integrated approach to risk modeling is central to PGE's WRMA efforts. Reliability events, such as asset failures and vegetation impacts, could result in an ignition and/or wildfire under different environmental conditions. As such, wildfire risk assessment requires analysis of a broad range of risk events.

Reliability risk is the product of asset failure probability and reliability consequences. Wildfire risk is the product of ignition probability, fire growth potential, and vulnerability. For both risk streams, PGE analyzes outage risk and ignition risk from traditional equipment failures and geographical factors, such as vegetation and weather, that can contribute to asset failure. Please refer to the Asset Reliability and Wildfire Risk Methodology subsection of the Program Sharing section of this document for additional details.

PGE has been recognized as a national utility industry leader in wildfire program management and risk modeling through its ability to assess risk at the individual pole and corresponding attachment level. By calculating risk down to the individual asset, PGE can roll up or aggregate risk values to the protected section (the section of the distribution circuit protected by a fault-interrupting device), feeder, substation, and/or transmission line level. The following figure shows the various components of asset-level structure risk, which includes traditional asset failure risk as well as geographic risk.

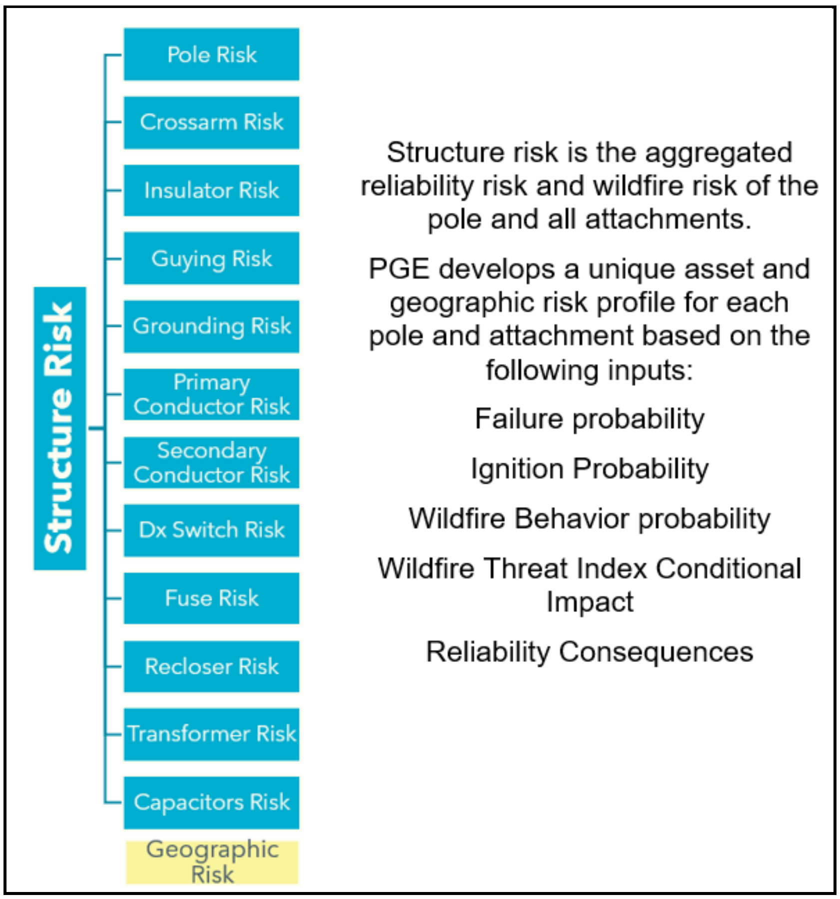

Figure 2: Structure Risk Factors

3.1.3 2024 WMP Baseline Risk

PGE created two baseline risk maps for the 2024 WMP, enabling comparison to 2025 risk model updates:

- **Total Risk**: Aggregated wildfire risk and reliability risk for each protected section
- **Wildfire Risk**: Wildfire risk by protected section

PGE segmented these datasets into percentiles to show which protected sections carry the highest risk, and which have the highest likelihood of vegetation- or weather-related outages (geo-probability). This analysis also identified which protected sections changed their percentile rankings in response to data or methodological updates, and what factors drove each change. All maps and analyses reference the protected section dataset and corresponding percentiles:

- 95th Percentile
- 90th-95th Percentile
- =<90th Percentile

Figure 3 illustrates total risk by protected section, segmented by percentile illustrating risk is throughout the entire service territory.

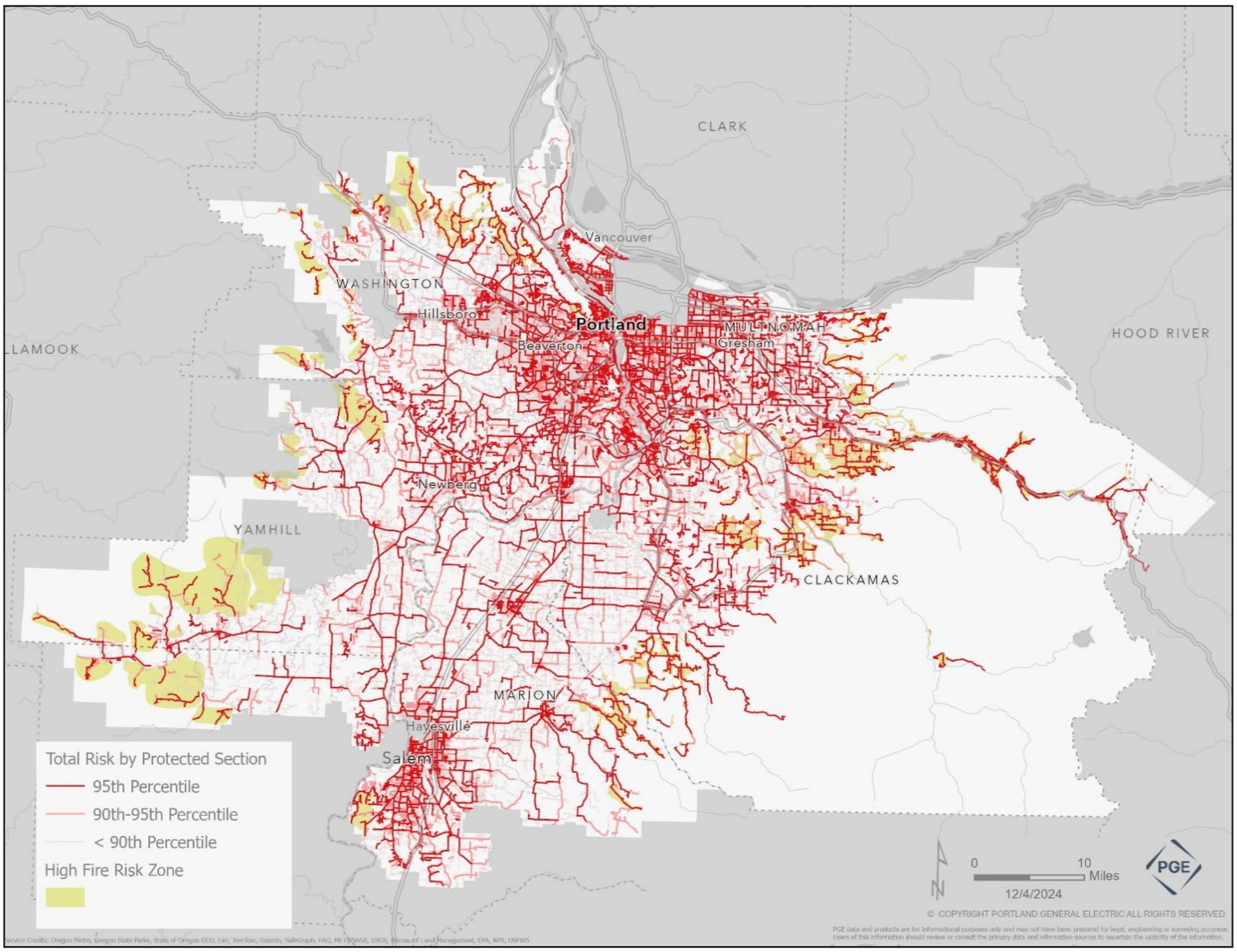

Figure 3: 2024 Wildfire Mitigation Plan Total Risk

Figure 4 illustrates wildfire risk on the system by protected section and percentile segment. This map shows that approximately 70 percent of the wildfire risk is concentrated within PGE HFRZs. The remaining 30 percent is spread out across locations that in 2023 did not reflect observed fuel, weather, and fire behavior consistent with an HFRZ designation. The exclusion of these areas from

PGE's HFRZs has been vetted with the fire agencies; calculated detection times, response times, and egress in those locations are favorable, limiting fire growth potential.

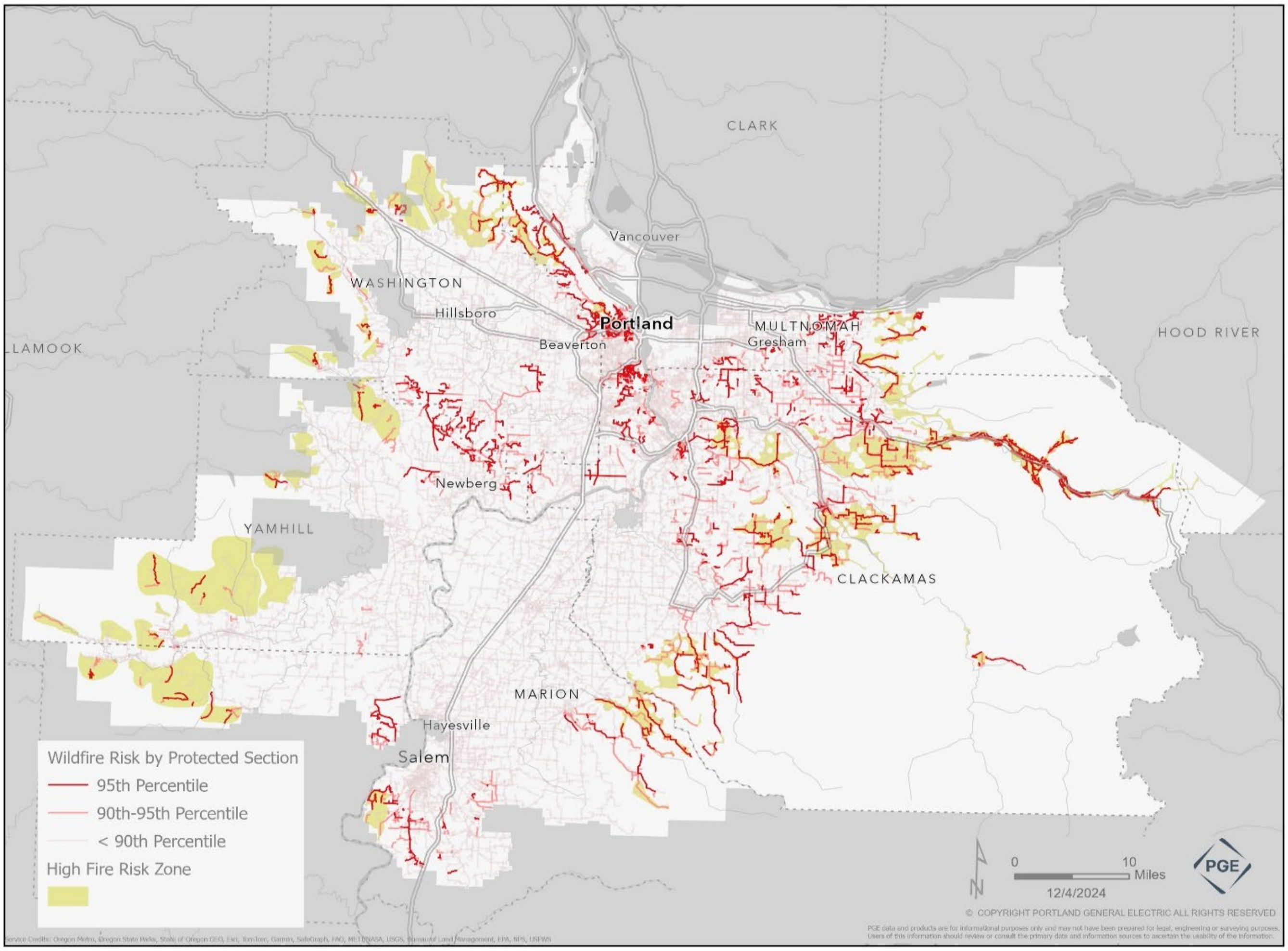

Figure 4: 2024 Wildfire Mitigation Plan Wildfire Risk

3.1.4 2025 WMP Baseline Risk

The risk model updates include changes associated with Asset Review Inputs, Asset Review Methodology, Climate Change Impacts, and Fire Behavior Modeling. Each of these updates are described in detail in the following sections.

Figure 5 displays the resulting 2025 total risk by protected section, segmented by percentile after completing the update process. This modeling shows that total risk on PGE's system increased by 25 percent compared to 2024. The increase was driven by an increase in wildfire risk primarily due to Climate Change Impacts, partially offset by a decrease in reliability risk due to improvements to PGE's Geo-Probability model which reflect the benefits of PGE's vegetation management programs.

While risk modeling indicates that PGE's vegetation management programs have reduced the probability of an outage or ignition, the likelihood of such an event resulting in a wildfire has increased, primarily due to Climate Change impacts. While risk modeling indicates that PGE's vegetation management programs have reduced the probability of an outage or ignition, the likelihood of such an event resulting in a wildfire has increased, primarily due to Climate Change Impacts.

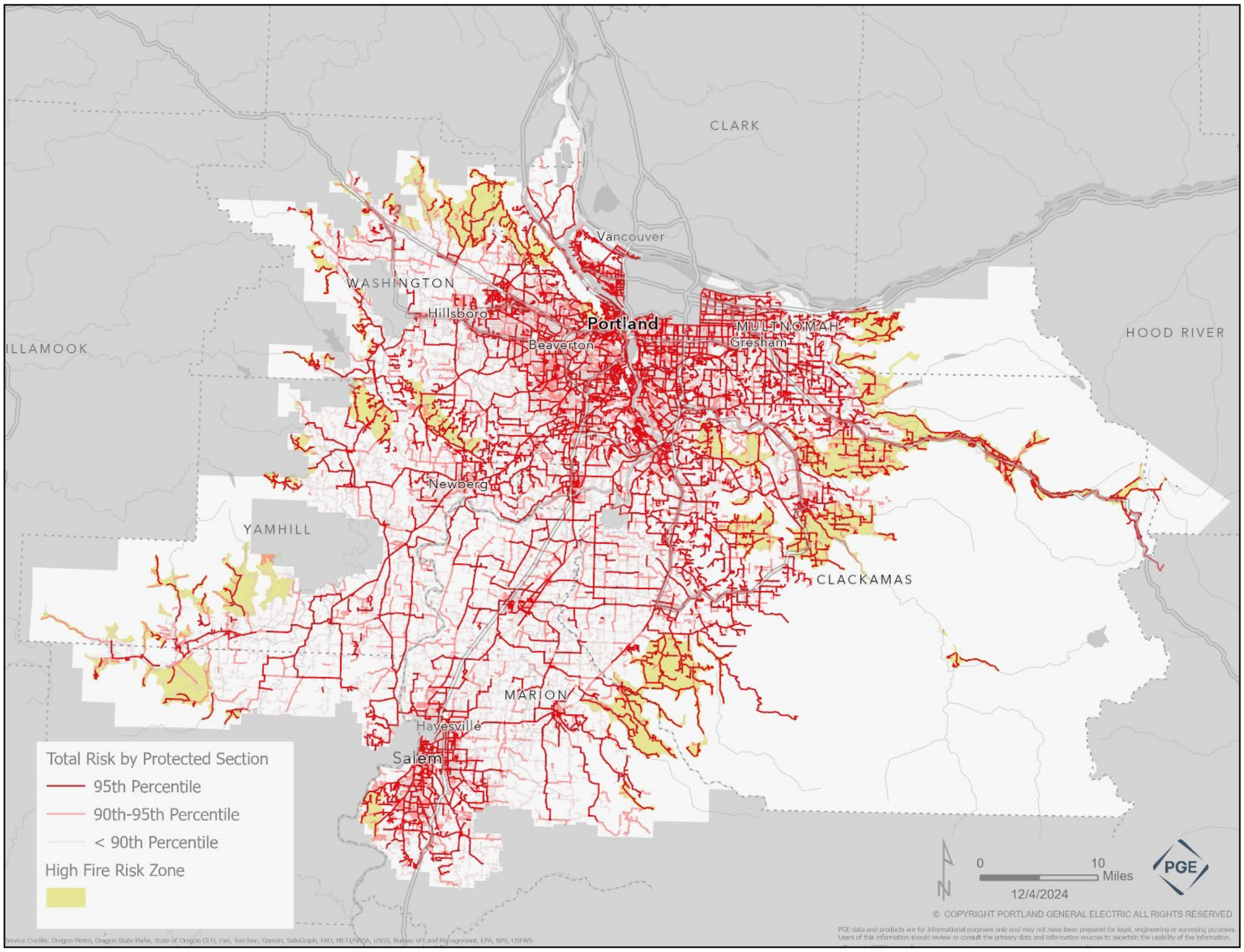

Figure 5: 2025 Wildfire Mitigation Plan Total Risk

Focusing on the impact to wildfire risk, the figure below shows wildfire risk on the system by protected section and percentile segment after completing the respective risk model updates. Overall, the 2025 risk model estimates that wildfire risk on PGE's system increased by approximately 55 percent compared to 2024 modeling, driven by Climate Change Impacts and Fire Behavior Modeling. The 2025 modeling estimates that approximately 55 percent of the wildfire risk is concentrated within PGE HFRZs with the remaining 45 percent of wildfire risk spread across locations that in 2024 did not reflect observed fuels, weather, and fire behavior consistent with an HFRZ designation. Fire agency detection and response times limit fire growth potential in these areas.

For visualization of protected sections with risk shifts of 10 percent or more, refer to Appendix C, Significant Risk Model Updates 10% Change Maps.

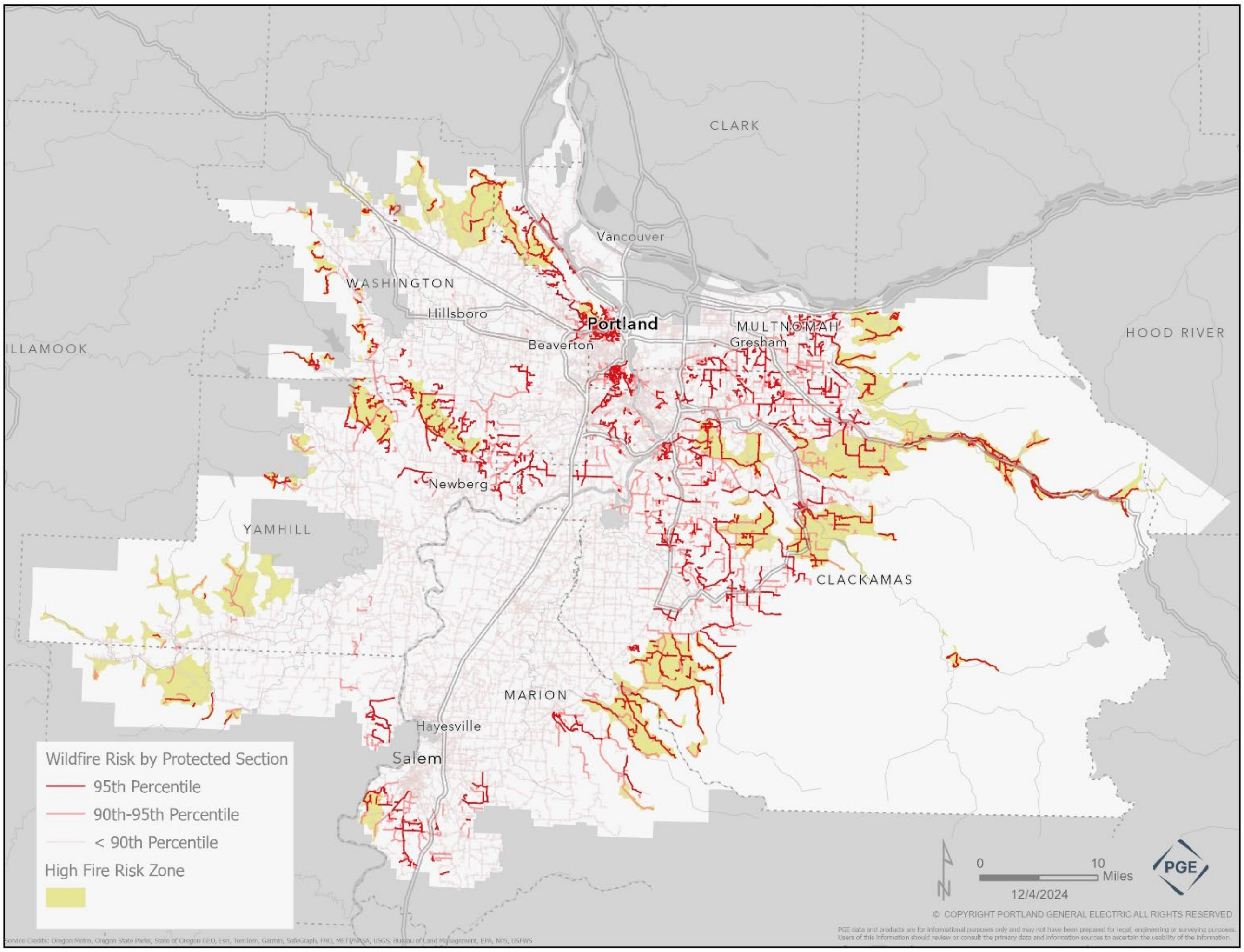

Figure 6: 2025 Wildfire Mitigation Plan Wildfire Risk

3.2 Asset Review Input Updates

PGE updates the following risk model inputs annually to reflect changes in infrastructure, costs, and system performance:

- Asset Characteristic Data
- Loads
- Costs
- Ignitions
- Failures

3.2.1 Asset Characteristic Data

For 2025, PGE updated the characteristic data for all assets on its system across its service territory. These asset changes are driven by a range of investments, including wildfire mitigations, as well as asset management activities. Asset characteristic data, derived from enterprise source systems, has three primary functions:

- Identify new in-service assets that have been added to PGE's grid.

- Validate/update characteristic data for new and existing in-service assets on the grid. Asset characteristics inform calculations of:
  - Asset failure and ignition probability
  - Reliability consequences cost
- Identify assets that have been removed from the grid.

3.2.1.1 New and Retired Assets

In 2024, PGE's system investments resulted in overall net increase of 2 substations, no significant change in transmission line-miles, and a net decrease of 11 distribution overhead line-miles. PGE also added Constable, a new Battery Energy Storage System (BESS) facility within its service territory, and the Clearwater Wind Energy Center, a wind generation facility located in Montana. These changes inform both the risk updates and the initiative updates described in this WMP Update.

3.2.1.2 Asset Failure and Ignition Probability Updates

PGE updated the following asset characteristics for 2025, resulting in revised asset failure and ignition probability values:

- **Age:** Age of the pole and attachments or other associated equipment is derived from the manufacturer or install year of the structure. PGE uses Weibull failure curves to determine the base annual probabilities of failure, which increases as a function of age.
- **Asset Type & Material:** Asset type identifies whether the structure is a Transmission or Distribution asset. Known or derived assumption for pole material, which can be wood, ductile iron, or steel, is used to determine material assumptions for any attachments to identify the corresponding Weibull failure curve.
- **Inspection year:** Inspection year identifies when the asset was last inspected, either via Ignition Prevention Inspection or Facilities Inspection and Treatment to National Electric Safety Code (FITNES) inspection. The longer the timespan between inspections, the higher the likelihood of an asset being in violation condition as defined by OAR 860-024-0001(1). A higher likelihood of violation results in a higher likelihood of asset failure and ignition potential. From a modeling perspective, an asset may be in good, violation, or unknown condition based upon the results of the most recent inspection.

3.2.1.3 Asset Failure Consequence Updates

The following asset characteristic datasets were updated, resulting in revised reliability consequences:

- **Feeder Configuration and Feeder Class:** Feeder configuration identifies whether an asset serving distribution customers is radial or looped, impacting the duration associated with the outage. Customers in a looped configuration may be restored more quickly through switching, while radial customers will be without power until repairs are made, resulting in a longer average outage duration for downstream customers. Feeder class (urban, rural, or remote) impacts the customer outage duration assumptions in the consequence scenarios.

3.2.2 Loads

Annual average load (kW) by customer class is an input into customer outage impact costs, used to quantify consequences associated with asset failure and other reliability events. The larger the load impacted by asset failure, the higher the reliability consequence cost. Using a rolling twelve-month average, PGE updated the annual average downstream load (kW) and associated load (kW) of each modelled asset across our entire service territory. Weather impacts, conservation efforts, and net new load growth can all cause fluctuations in customer load. Following the rolling twelve-month average update, PGE's load saw the following shifts by customer class:

- Residential load: 5 percent decrease from last rolling average
- Commercial load: 10 percent increase from last rolling average
- Industrial load: over 30 percent increase from last rolling average

3.2.3 Costs

PGE updated its financial and cost estimates for 2025, impacting reliability risk and business case analyses in a several ways:

- **Reliability Risk**: Value of Service (VOS) measures customer outage impact costs due to asset failure. A higher consequence cost of failure results in increased reliability risk for individual assets and systemwide.
- **Economic Decisions**: Other cost changes, including escalations and updated discount rate, impact baseline outputs used to justify projects economically, including cost of ownership and recommended years to intervention. Reduction in cost of ownership is a key component to determine the benefit-to-cost ratio of proposed projects. Years to intervention is a metric used to identify the remaining number of years left to optimally operate the existing asset before it becomes more economical to proactively replace it.

3.2.3.1 Cost Escalations and Discount Rate

PGE updated underlying financial and cost estimates used in the risk modeling calculations. These updated values reflect current costs incurred in 2024 to complete inspections, average costs in 2024 to replace structures, Q2 2024 discount rate assumptions from Corporate Finance and escalating VOS values to 2024 dollars.

- **Inspections**: Annual average FITNES and Ignition Prevention Inspection costs per structure are detailed in Confidential Appendix E: Sensitive Data.
- **Intervention**: Table 4 indicates the updated average cost to replace a pole and attachments. Cost escalations between years are driven primarily by increases in the price of materials. The cost increase was steeper for steel poles compared to other structures in 2025 due to updated data on the commodity cost of steel. This higher commodity cost, combined with more complex engineering projects, resulted in 2025 steel pole replacement cost estimates 2.5 times higher than PGE's 2024 estimates.

Table 4: Transmission and Distribution Structure Replacement Cost Comparison[3]

Structure	2024 WMP	2025 WMP
Transmission Pole- Replace with Wood Pole	$17,000	$19,700
Transmission Pole- Replace with Steel Pole	$28,300	$57,800
Transmission Pole- Replace with Ductile Iron Pole	$23,900	$29,300
Distribution Pole- Replace with Wood Pole	$11,600	$12,400
Distribution Pole- Replace with Steel Pole	$13,900	$19,900
Distribution Pole- Replace with Ductile Iron	$13,300	$15,700

- **VOS**: Table 5 indicates the change in VOS values from 2023 to 2024 dollars using the U.S. Bureau of Labor Statistic Consumer Price Index Calculator.

Table 5: VOS Comparison

VOS Values	2024 WMP	2025 WMP
Residential Interruption ($/kw)	$12.93	$13.33
Residential Duration ($/kw*h)	$6.78	$6.99
Commercial Interruption ($/kw)	$57.03	$58.79
Commercial Duration ($/kw*h)	$164.44	$169.52
Industrial Interruption ($/kw)	$424.35	$437.47
Industrial Duration ($/kw*h)	$38.46	$39.65

- **Discount Rate**: PGE updated its pre-tax real cost of capital discount rate assumptions from 5.35% in 2024 to 5.49% in 2025.

3.2.4 Ignitions

PGE updated the ratio of asset-caused and vegetation-caused ignitions to reflect updated 2024 empirical ignition data, based on real-world observations of PGE's system. In comparison to the values used in the 2024 WMP, PGE observed a 2 percent shift from vegetation-caused ignitions to equipment-caused ignitions. These ignition events did not result in any wildfires, and vegetation still represents the most common cause of PGE-recorded ignitions.

For the first time, PGE used a 24-month rolling average, rather than a 12-month calendar year, to calculate the ratio of asset-caused to vegetation-caused ignitions. Based on seasonality and potential discrepancies in reporting, PGE determined that a dataset spanning a longer period more accurately reflects the drivers of ignition risk on its system. PGE recognizes that annual ignition reporting does have varying levels of confidence depending on the situation. For example, a fire agency may respond to a fire that burns a pole without notifying PGE; when the pole is later inspected, PGE may incorrectly conclude that it was an ignition event caused by PGE equipment when it was in fact caused by an external source.

[3] The replacement costs shown in the table are rough order magnitude estimates and assume internal resources.

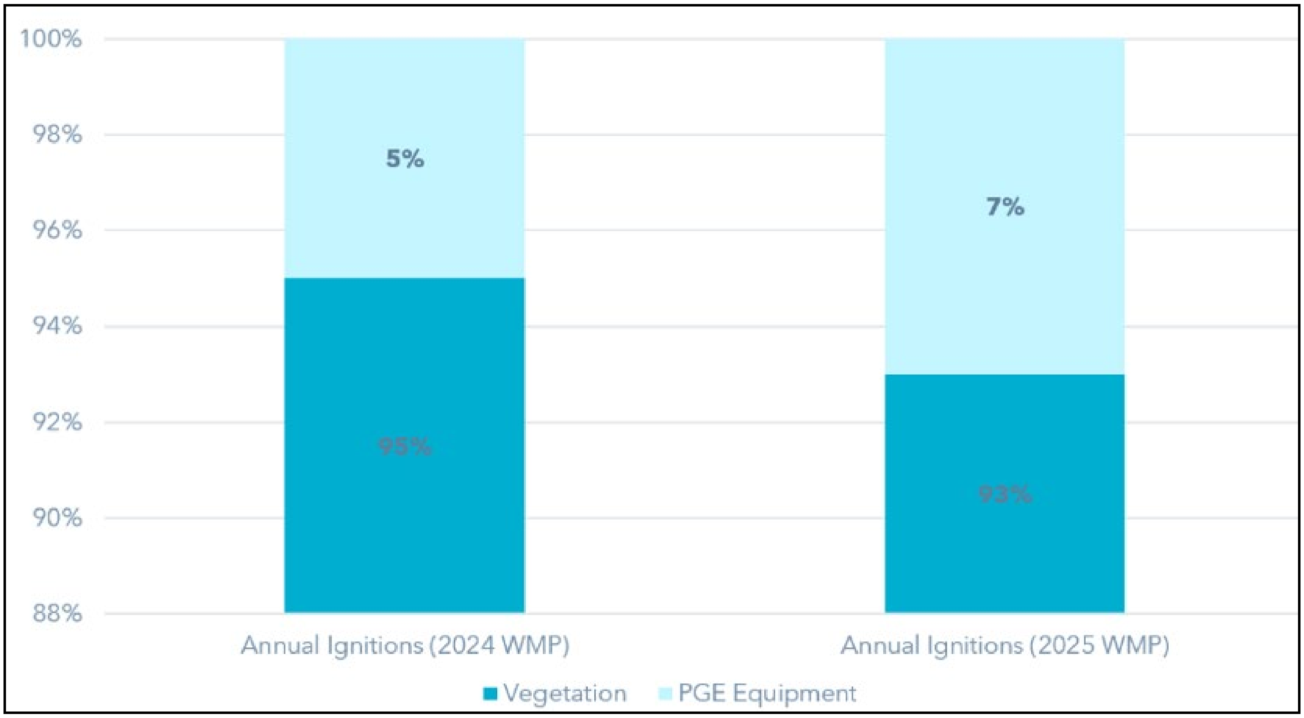

Figure 7: Change in Annual Ignition Cause Distribution

3.2.5 FAILURES

In 2024, PGE made a multitude of updates to its probability of failure calculations, ranging from the incorporation of new asset failure data to the development of a new modeling approach for quantifying the annual likelihood of a vegetation/weather-related customer outage at the individual protected section level.

3.2.5.1 Probability of Asset Failure

PGE reviewed inspection and failure data for structures (pole and the corresponding attachments) to assess potential updates to modeling assumptions regarding the probability and consequences of failure. As a result, PGE updated the scale parameters for its Weibull distribution curves along with the corresponding relative likelihood of outage failure scenarios for poles, crossarms, insulators, guying, and grounding. As noted in the table below, updates from the 2024 WMP to the 2025 WMP risk modeling are modest, indicating that data used for prior WMPs was accurate and reliable.

Table 6: Asset Failure Scale Parameter Changes

Scale Parameter	2024 WMP	2025 WMP
Pole	82	80
Crossarm	75	73
Insulator	85	82
Guying	82	80
Grounding	82	80

The total number of outages remained relatively flat compared to the values used in the prior year's model. PGE reviewed its historical dataset of annual average percent of inspections resulting in capital work orders to replace rejected PGE and foreign owned poles, which reflected a rate of approximately 11.1 percent. Given the high concentration of aging poles in certain parts of PGE's service territory, subject matter experts validated the use of this reject rate percentage to recalibrate failure curves and corresponding relative likelihoods. This small increase in modeled non-outage failures resulted in a slight decrease in the modeled likelihood that a given failure will result in customer outages. This update had an almost imperceptible impact on PGE's calculation of overall reliability risk on its system:

Table 7: Changes to PGE Failure Probability Curve for Poles

Relative Likelihoods	2024 WMP	2025 WMP
Pole		
Replacement after Inspection	99.23%	99.27%
Failure with Outage	0.77%	0.73%
Crossarm		
Replacement after Inspection	99.52%	99.55%
Failure with Outage	0.48%	0.45%
Insulator		
Replacement after Inspection	99.41%	99.51%
Failure with Outage	0.59%	0.49%
Guying		
Replacement after Inspection	99.69%	99.14%
Failure with Outage	0.34%	0.94%

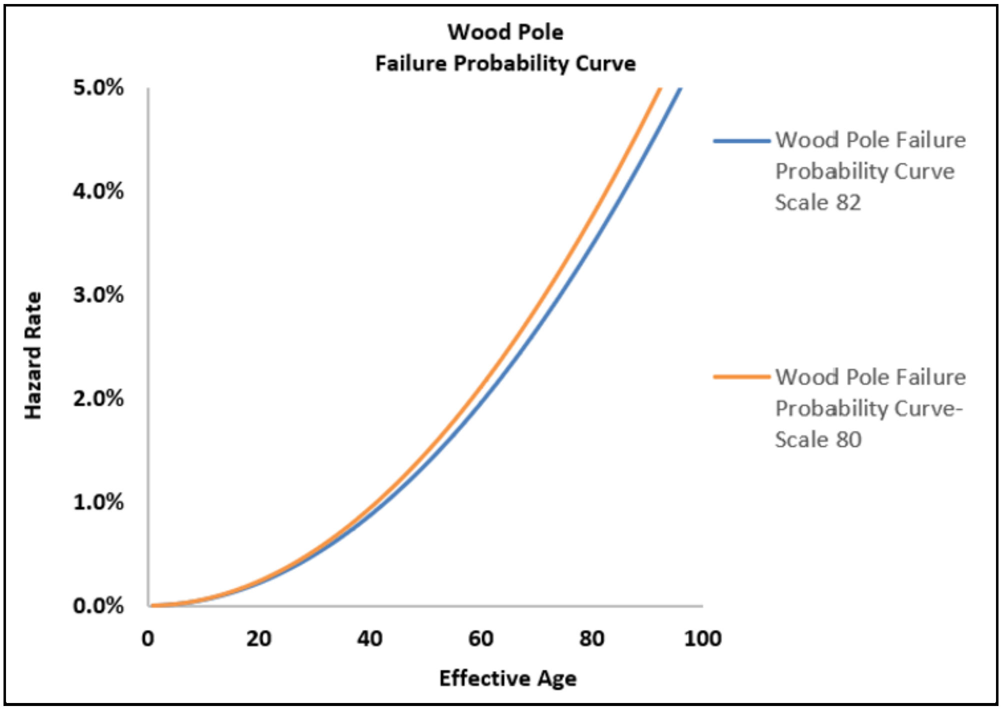

Figure 8: Change in Failure Probability Curve for Poles

3.2.5.2 Probability of Geographic Risk Event

For its 2025 analysis, PGE updated three of the data inputs used to model the probability of a vegetation- or weather-related outage (geo-probability) for its reliability risk and wildfire risk calculations.

- **Outage data**: PGE uses a rolling window of the previous six years of outage data, adding the most current full year of outage data and dropping the oldest full year of outage data.
- **Protected section data**: All circuit and protected section data is stored in PGE's GIS, which is updated daily. PGE pulls protected section data at the time of modeling to ensure that it is using the most current protected section characteristics.
- **Wind data**: PGE used a multiyear (2007-2013) average wind speed dataset[4] from the National Renewable Energy Laboratory (NREL) for wind inputs to its 2024 WMP modeling. For 2025, PGE used a more current data set from Weather Source[5] showing average wind speeds across PGE's service territory from 2023.

3.2.5.3 Probability of a Geographic Risk Event: New HFRZ 12

PGE analyzed the outage history in the new Chehalem Mountains HFRZ in the form of trends over the past seven years. Figure 9 illustrates HFRZ 12 outage counts by protected section, 2017-2020.

[4] Source: National Renewable energy Laboratory (NREL) Wind Speed Raster
[5] PGE Weather station network

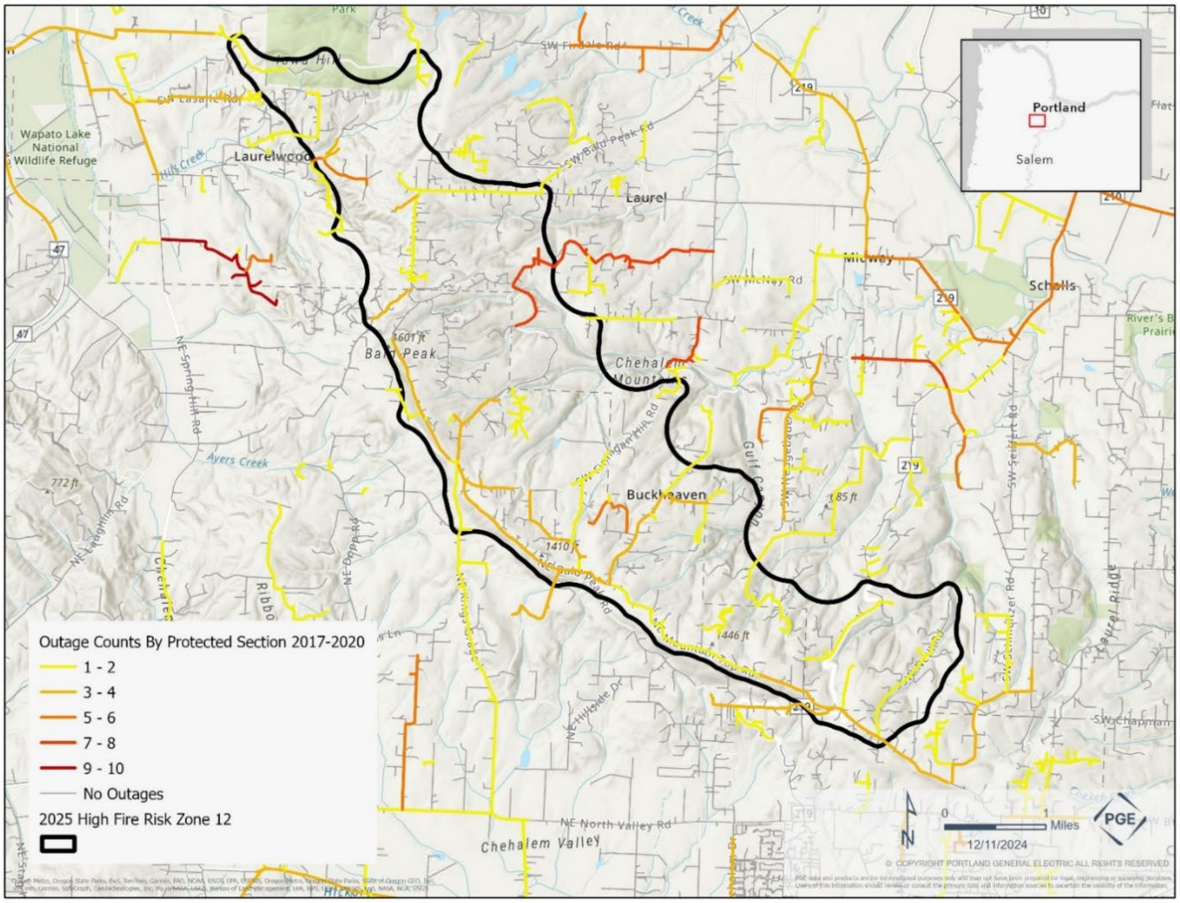

Figure 9: Chehalem Mountains HFRZ Outage Counts by Protected Section, 2017-2020

Figure 10 illustrates outage performance by protected section from 2020-2024. Outage counts by protected section increased nearly 60 percent from 2020 to 2024.

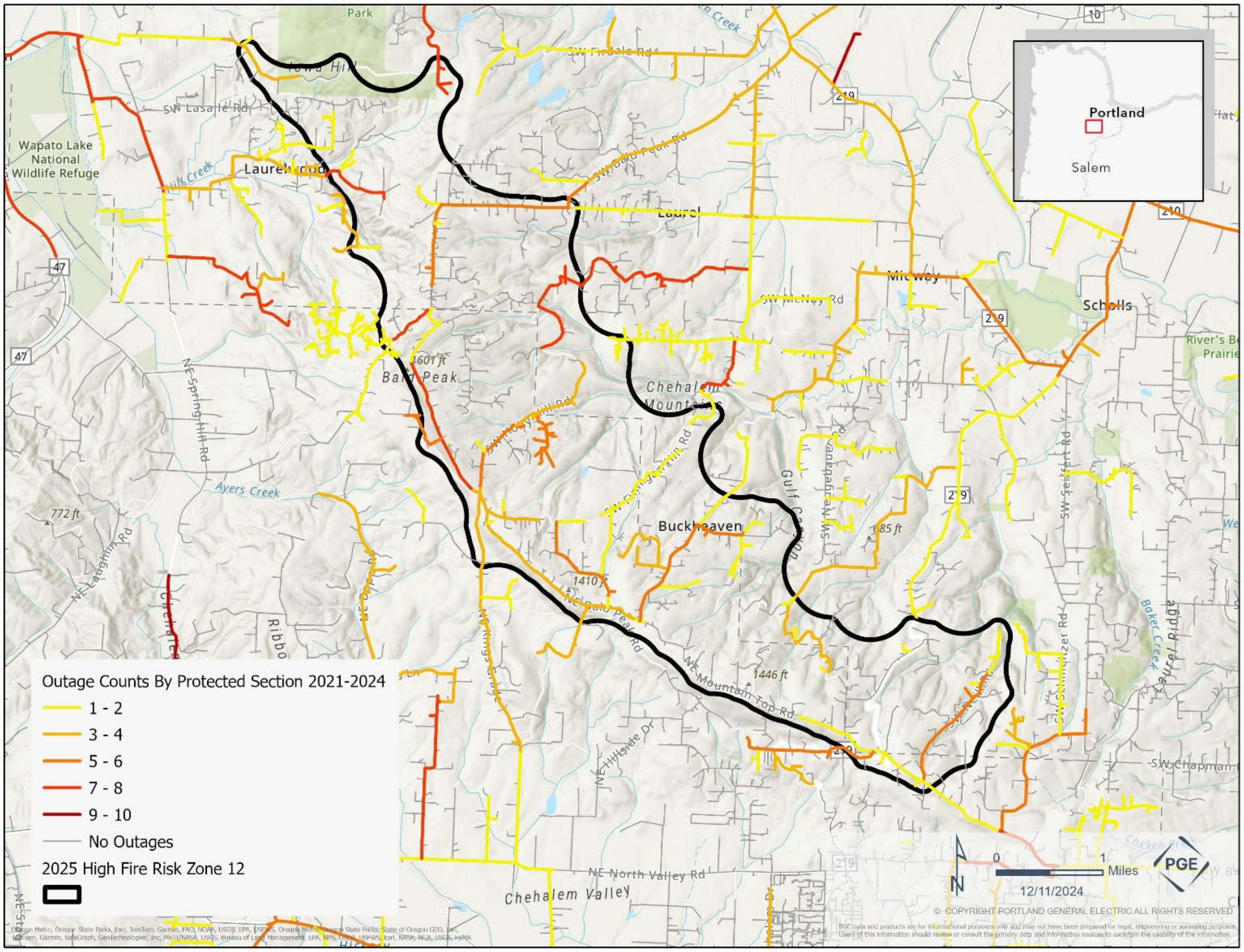

Figure 10: Chehalem Mountains HFRZ Outage Counts by Protected Section, 2021-2024

3.3 Asset Review Methodology Update

PGE is committed to continuous evaluation and improvement of its WRMA and modeling. In 2024, PGE updated its modeling approach from a linear regression to a neural network model to estimate the annual likelihood of a geographic risk event.

PGE created its first geo-probability model using a linear regression algorithm but has since refined its approach through the evaluation of additional geo-probability prediction models incorporating advanced modeling techniques. The following sections summarize the changes to PGE's geographic risk methodology and their impacts on model outputs.

3.3.1 2024 Geo-Probability Model: Linear Regression

PGE utilized a Multivariate Ordinary Least Squares (OLS) regression model for its initial statistical approach to model the likelihood of a vegetation- or weather-related outage (geo-probability) at the protected section level. This approach offered the following advantages:

- Provides a good starting point for more advanced analysis and represents an improvement over the use of historical averages only.
- Relatively straightforward execution and interpretation of results, while still providing a comprehensive understanding of the likelihood of an event.
- The model can incorporate multiple input or explanatory variables to influence events. PGE incorporated variables including vegetation threat trees, outage counts, protective device type, and protected section length.
- This approach produces more accurate estimations of likelihood in scenarios where outcomes are interrelated or influenced by common factors. In PGE's case, vegetation threat types and weather-caused outages are closely related and must be considered in tandem.

The initial phase included an evaluation of input variables, which revealed multi-collinearity between the explanatory variables. To address the high levels of multi-collinearity, the data was pre-processed using Principal Component Analysis (PCA). Performing PCA improved the fit of the OLS regression model; however, it decreased PGE's ability to understand the impact of each explanatory variable on model results. PGE decided to use the PCA for a model with a better fit. The overall modeling process with input explanatory variables, PCA, and OLS regression is illustrated in the Figure 11.

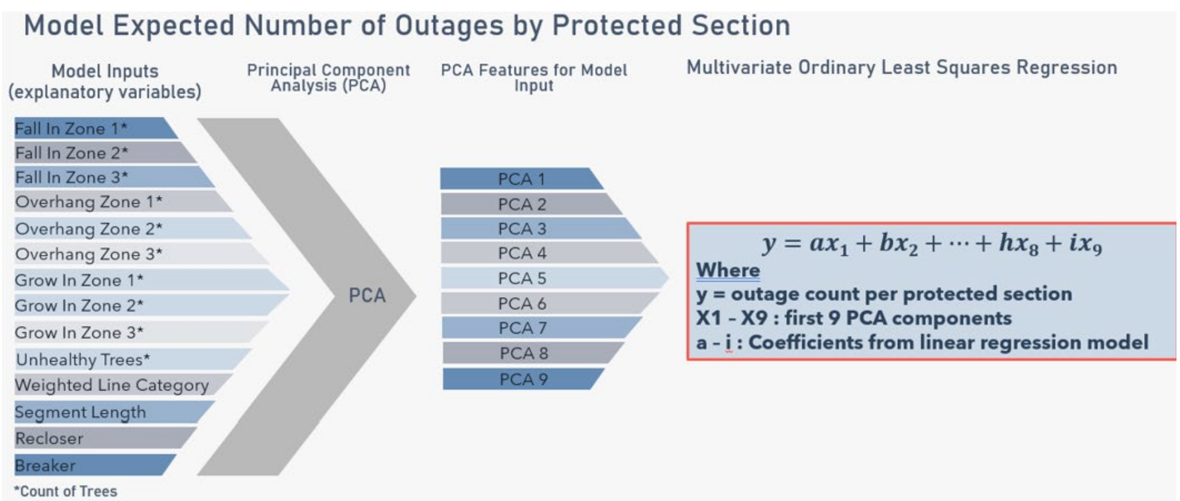

Figure 11: Linear Regression Model and Process

Because wildfires are most likely to occur in dry windy conditions, PGE scaled the results from the OLS regression model by wind. To understand the windiest areas, PGE looked at the average wind speed across its service territory. PGE used average wind speed from 5 km grids then applied the average wind speed squared to the predicted annual outage per protected section.

PGE used average wind speed squared because wind speed has a non-linear relationship with the force of wind exerted on structures. Additionally, average wind speed accounts for variability that would not be accounted for if maximum wind speed or gusts were used. The average wind speed squared is a relative factor that helps PGE understand which areas of its system have a higher likelihood of vegetation- or weather-related outages in relation to higher or lower wind areas, regardless of actual wind speed during any particular time period. Figure 12 illustrates the average wind speed in miles per hour using 5 km grids.

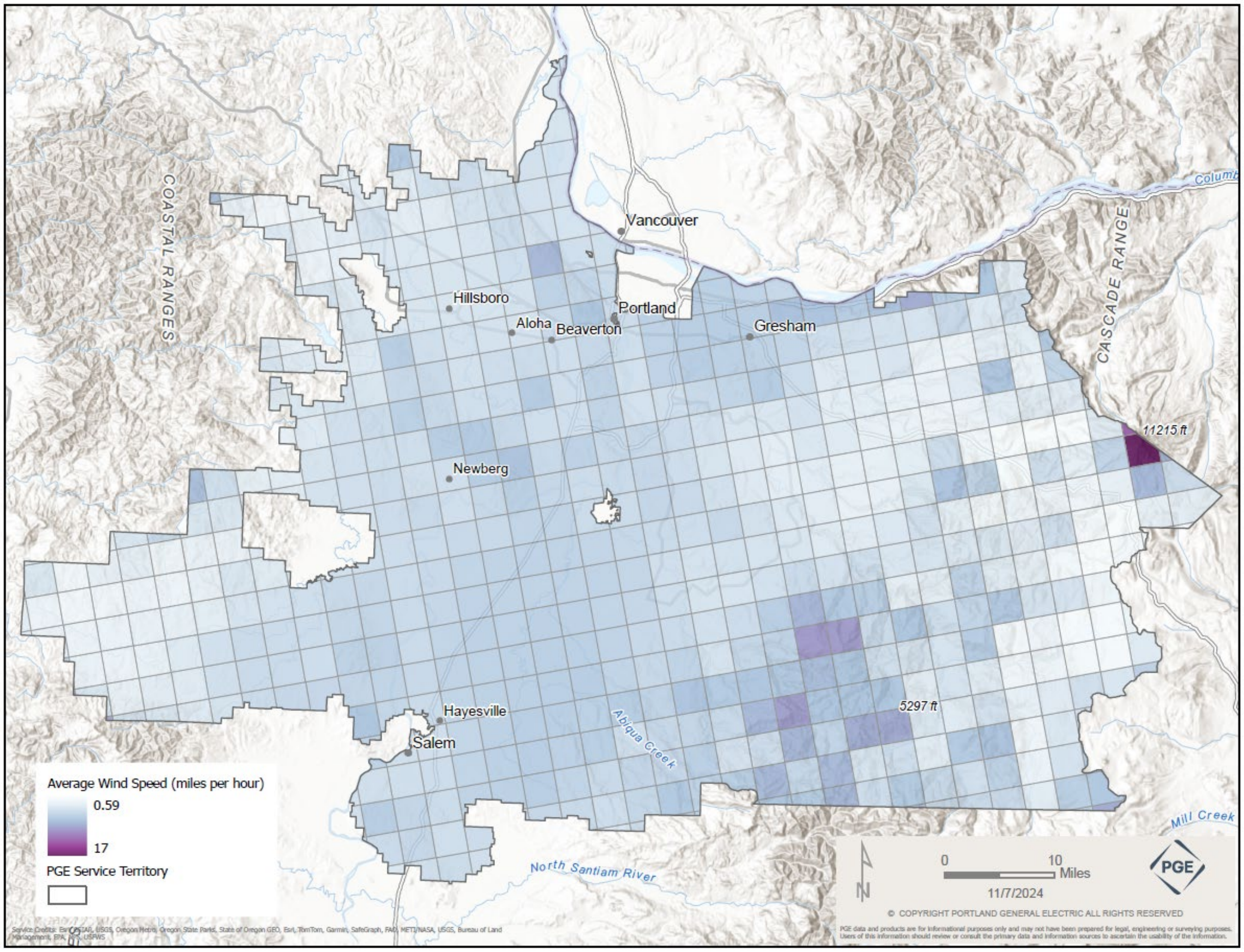

Figure 12: Weather Source Average Wind Speed

After applying the average wind speed relative factor, PGE then scaled it so that the total probability of all protected sections is equal before and after weighting, as shown in the Figure 12 equation.

Figure 13: Probability of Section Being Equal Before and After Weighting

Figure 14 shows geo-probability from the OLS regression model by protected section. The probability of outages is segmented by percentiles to show which protected sections have the highest geo-probability of outages. As the map illustrates, protected sections with elevated probability of outages are spread throughout PGE's service territory.

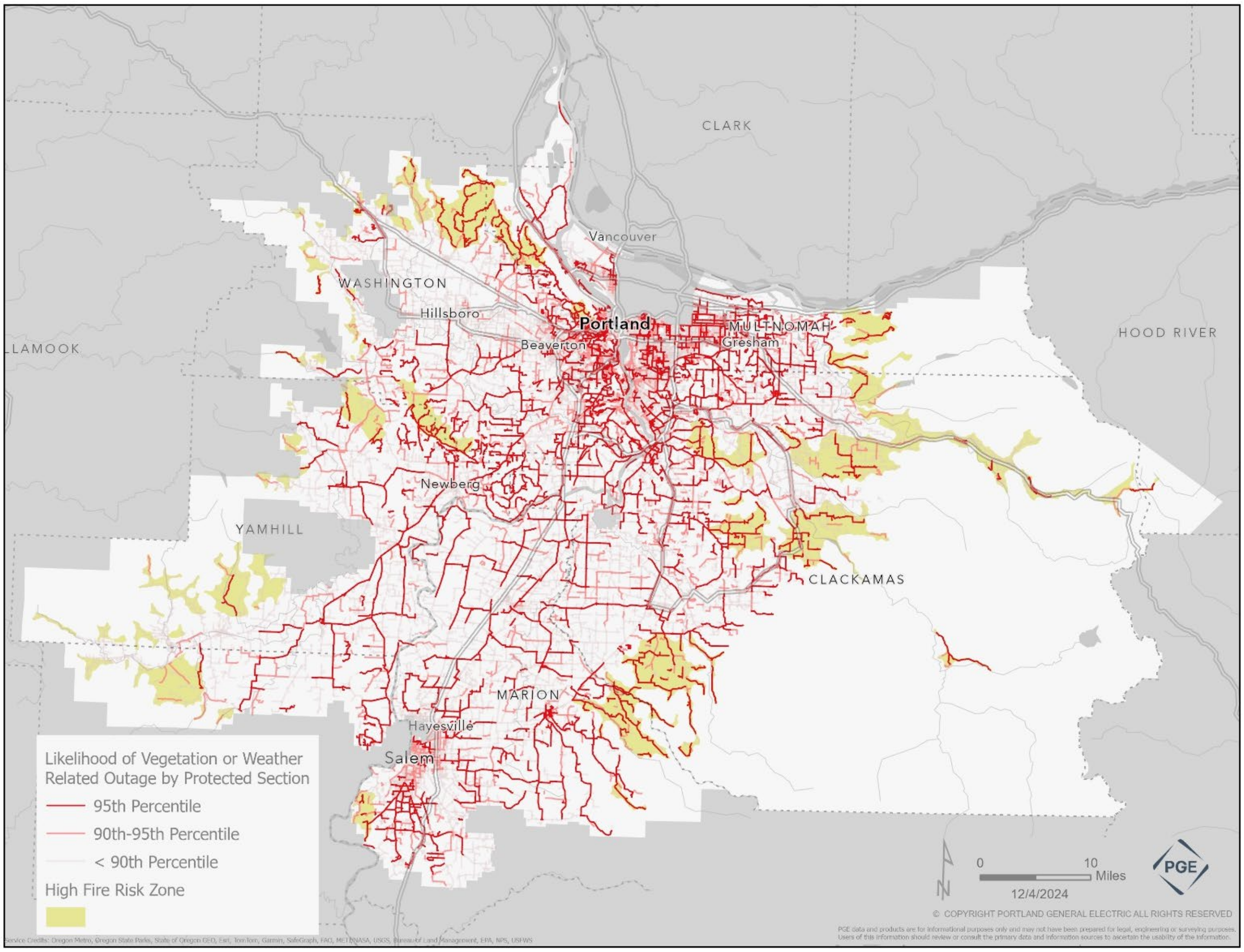

Figure 14: Geo-probability by Protected Section Using Linear Regression Model

3.3.2 2025 GEO-PROBABILITY MODEL: NEURAL NETWORK LEARNING

In response to feedback from the OPUC Staff at a risk analysis workshop on 5/29/2024, PGE upgraded to a more sophisticated regression-matching algorithm: a Neural Network Learning model with geo-probability regression fitting. While PGE's original OLS linear regression model offered several advantages, real-world outage data illuminated the need to apply more advanced modeling techniques. When predicting vegetation-caused outages, non-linear algorithms (e.g., Random Forest Regression or Neural Networks) are preferred over linear regression algorithms due to their ability to capture complex, non-linear relationships between factors, including:

- Different types of vegetation
- Conductor length
- Weather variations

In 2024, PGE updated the outage prediction model using Neural Network Learning because the linear regression approach is limited by the assumption that the variables have strong linear relationships. The Neural Network Learning model is better suited for simulating complex non-linear variables and their relationships, thus producing a more accurate geographic risk event prediction.

Non-linear models handle feature interactions, non-uniform impacts, and outliers more effectively than linear regressions, and for this reason are generally believed to generate more accurate predictions. Random Forest (RF) regressions offer insights into feature importance, while Neural Networks excel in modeling non-linear boundaries and incorporating multiple outputs. In contrast, linear regression assumes a direct, linear relationship, which oversimplifies the complexity of real-world outage risk assessment.

PGE applied the same wind speed modifier to the annual geo-probability values generated by the Neural Network Learning model as it did to the linear regression model.

3.3.3 Geo-Probability Model Comparison

To determine the optimal predictive model, PGE evaluated the following linear and non-linear algorithms:

- Ordinary Least Squares (OLS) Regression
- Random Forest (RF) Regression
- Extreme Gradient Boosting (XGB) Regression
- Two Neural Network Learning models (NN1 and NN2)

To measure model performance, PGE calculated two statistical metrics:

- Root Mean Squared Error (RMSE), a standard measure for regression analysis; lower RMSE values represent higher accuracy.
- The coefficient of determination (R^2); higher R^2 values reflect better predictive capabilities.

Figure 15 compares predictive model performance using RMSE and R^2:

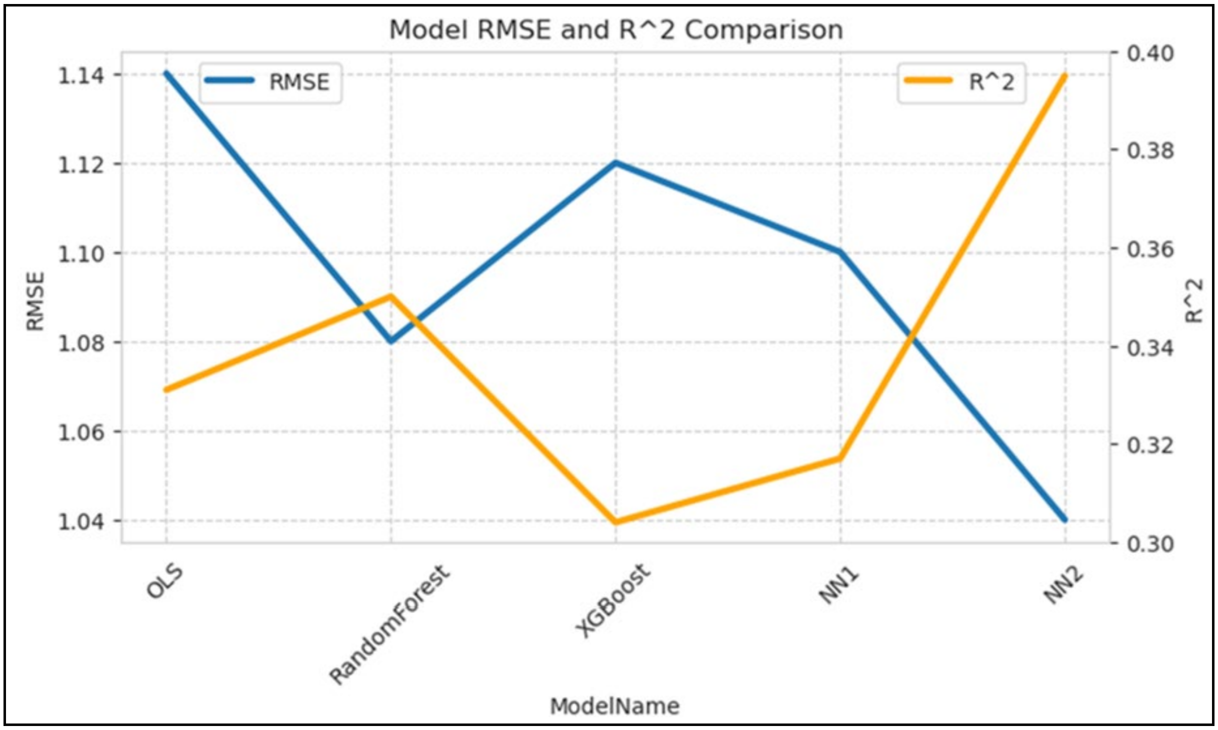

Figure 15: Comparison of Predictive Model Performance

The results of this comparative analysis indicate that the NN2 model is the most suitable model for the datasets, achieving the lowest RMSE (1.04) and highest R^2 (0.395). This suggests that NN2 was able to capture complex relationships in the data and make more accurate predictions when compared to the other models. In contrast, the linear OLS model had the highest RMSE (1.14) and lowest R^2 (0.33). Both Random Forest Regression and XGB Regression performed moderately well, with Random Forest Regression slightly exceeding XGB effectiveness. Overall, the NN2 model selected by PGE performed better than OLS by 16% in terms of R^2 and by 9% in terms of RMSE.

3.3.4 Resulting Risk Shift

Geo-probability predicted outages are a foundational input to the calculation of PGE's wildfire and total risk. Both the linear regression and Neural Network Learning models show that protected sections with high geo-probability predicted outages are geographically spread across PGE's service territory. However, PGE's incorporation of the Neural Network Learning approach to geo-probability modeling, which produced a net 16% accuracy improvement, resulted in an overall decrease in outage probability for all protected sections both inside and outside of the HFRZs. The modeled decrease is smaller for the protected sections within HFRZs than for protected sections outside of the HFRZs.

Figure 16 illustrates the resulting map using the NN2 model to calculate geo-probability values by protected section, segmented by percentile.

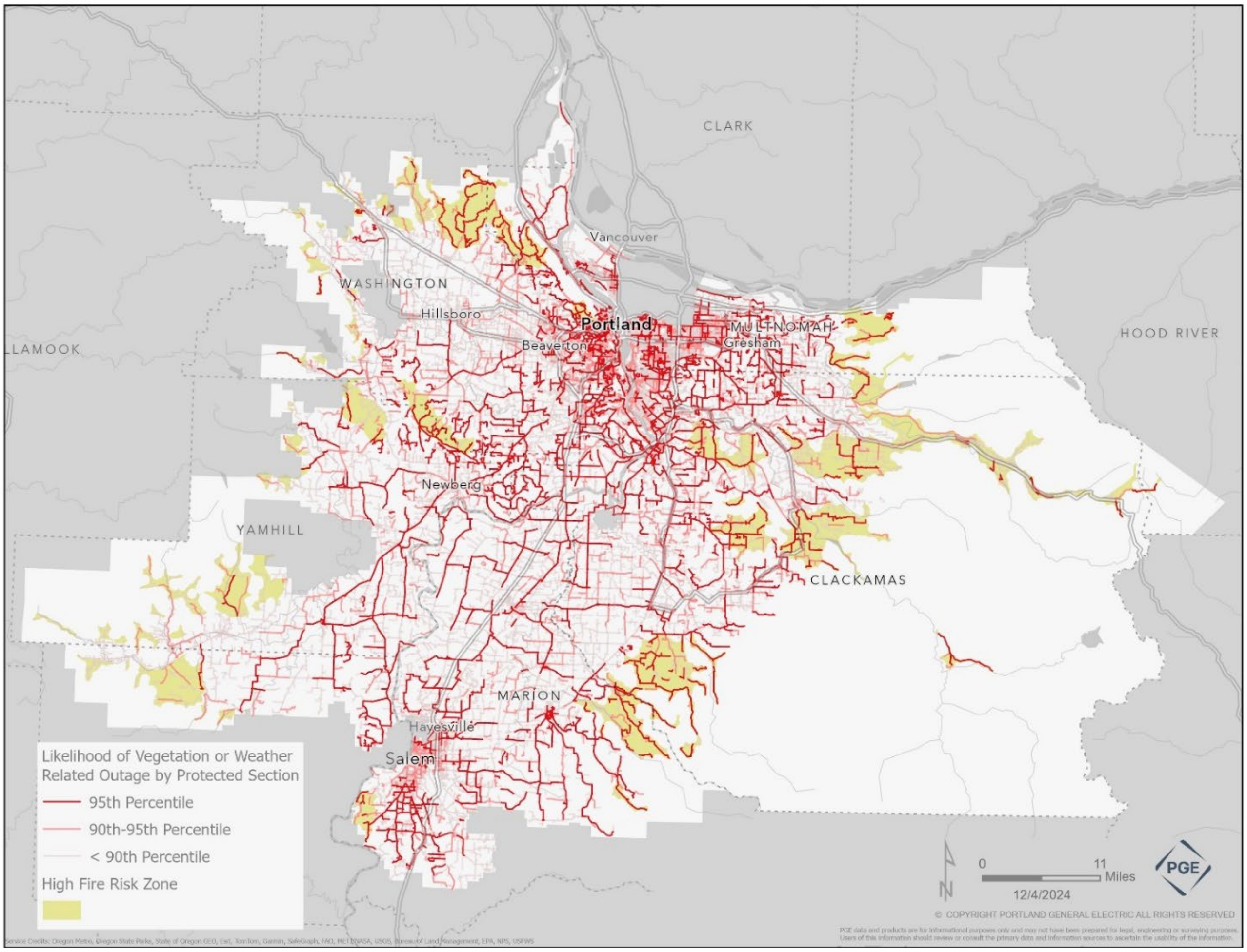

Figure 16: Geo-probability by Protected Section Using the Neural Network Model

The map below in Figure 17 shows all the protected sections where the modeling methodology change resulted in a geo-probability shift of 10 percent or more. In general, the results from the more sophisticated and accurate Neural Network modeling approach show an approximate 40 percent decrease in the number of predicted vegetation - or weather-related outages across PGE's system, compared to results from the linear regression model. This includes an approximate 25 percent decrease in predicted outages across HFRZs and an approximate 45 percent decrease in predicted outages on all protected sections outside of the HFRZs. Factors driving these decreases include:

- The more generalized linear regression model results overestimated predicted outages.
- The predicted outage results are consistent with the decreasing trend in vegetation- and weather-related outages PGE has observed since 2021.

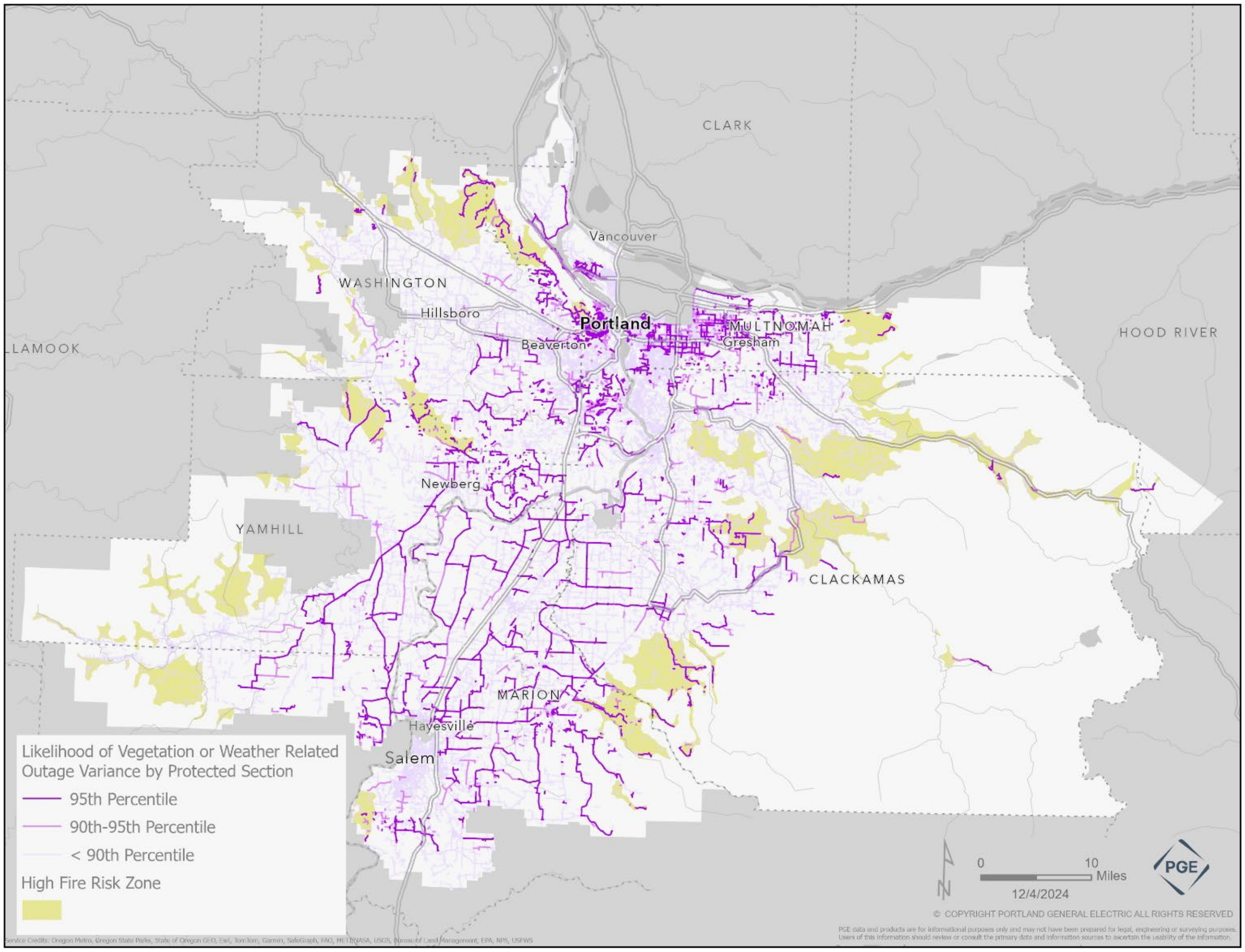

Figure 17: Geo-probability Change >= 10% 2024 to 2025

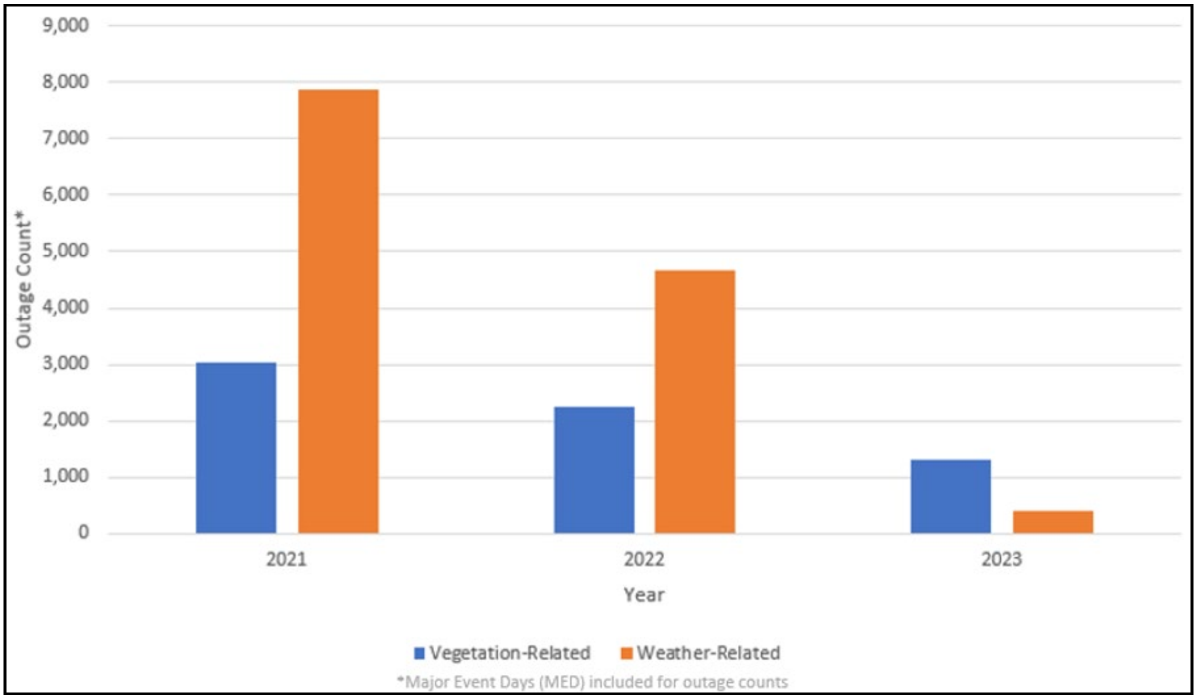

Figure 18: Vegetation vs. Weather-Related Outage Counts

PGE analyzed the movement of protected sections added to or removed from the 90th and 95th percentiles based on its updated geo-probability modeling. This analysis evaluated the change in percentiles for all protected sections across PGE's service territory, including both HFRZ and non-HFRZ areas, from the linear regression geo-probability to the Neural Network geo-probability. Overall, this analysis revealed a higher percentage change for protected sections outside the HFRZs in each percentile; approximately 80 percent of the protected sections that shifted were located outside PGE's HFRZs.

The following figure shows the protected sections that moved into or out of the 90th percentile based on outage geo-probabilities generated by the new Neural Network model:

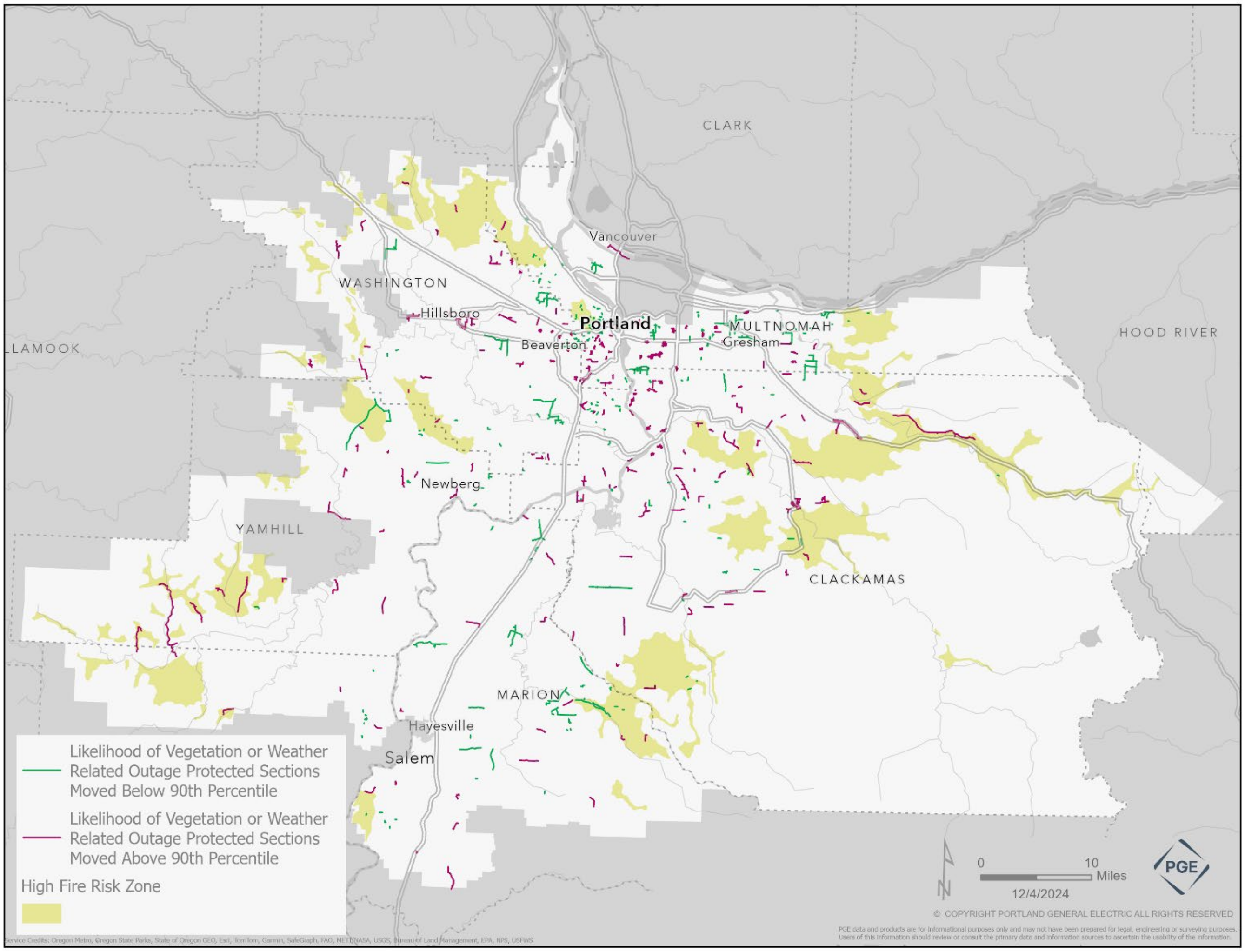

Figure 19: Geo-Probability 90th Percentile Protected Section Movement 2024 to 2025

Results from PGE's updated geo-probability model show that approximately 90 percent of the protected sections remained in the 95th percentile; the roughly 10 percent shift in protected section percentile assignment occurred primarily in protected sections located outside of PGE's HFRZs. This 10 percent shift resulted in an overall change in predicted outage counts across the system of approximately 4 percent.

Figure 20 shows the protected sections that moved into or out of the 95th percentile based on outage geo-probabilities generated by the new Neural Network model.

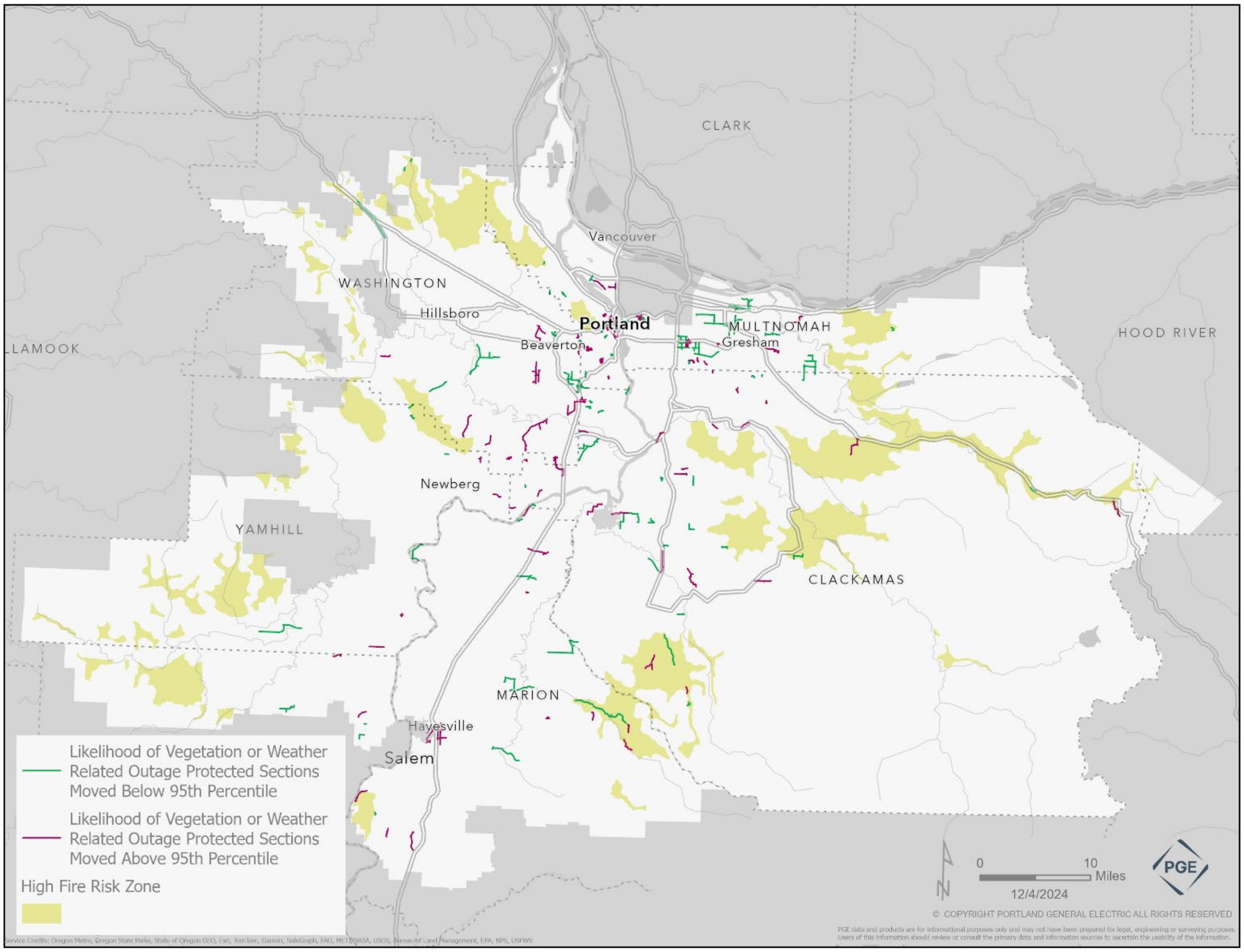

Figure 20: Geo-Probability 95th Percentile Protected Section Movement 2024 to 2025

PGE models vegetation-and weather-related outages because these risk events could, under certain environmental conditions, cause an ignition. Both Neural Network and linear regression models show a relatively high probability of outages due to geographic factors across PGE's service territory. However, PGE's most recent modeling shows an overall decrease in outage probability due to geographic factors for all protected sections both inside and outside of the HFRZs.

In summary, this model advancement shows that outages on the PGE system are most influenced by external geographic factors such as vegetation and wind.

3.4 Resulting Overall Asset Review Risk Shift

3.4.1 Total Risk Shift

The Asset Review input and methodology updates are critical to understanding the shift in risk due to changes in infrastructure, costs, and system performance.

Figure 21 illustrates the resulting 2025 total risk on PGE's system by protected section, segmented by percentile, after completing the Asset Review updates.

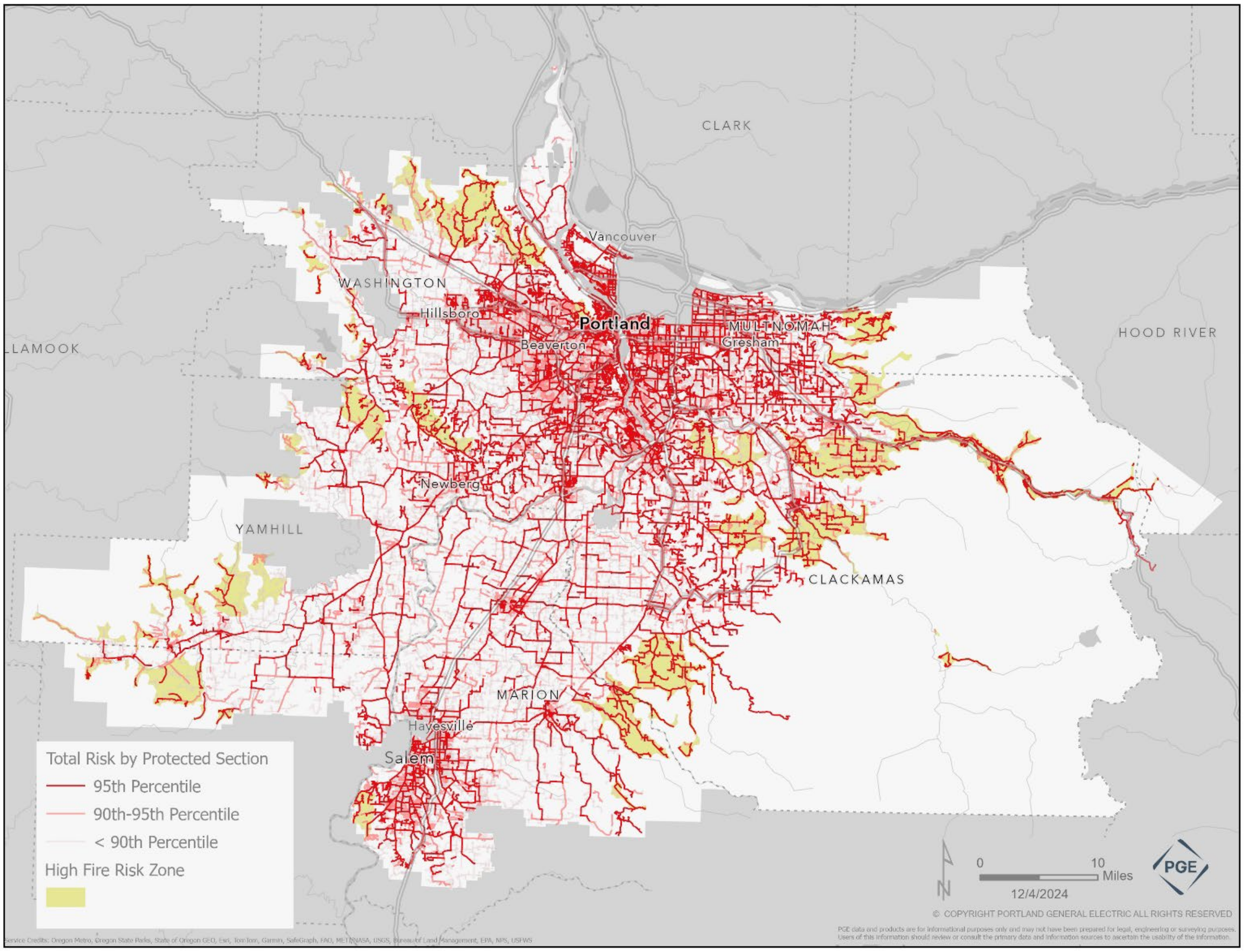

Figure 21: Asset Review Updates: Total Risk by Protected Section and Percentile

The Asset Review updates resulted in a reduction in total risk across PGE's system of approximately 5 percent compared to the 2024 WMP. This was primarily due to an approximate 10 percent reduction in calculated systemwide reliability risk, driven by PGE's new geo-probability algorithm that more accurately reflects the positive impacts of PGE's vegetation management programs. The updated geo-probability model predicts fewer vegetation- and weather-related outages, resulting in lower overall reliability risk on PGE's system.

The decrease in PGE's system-wide reliability risk, driven by geographic risk, was partially offset by an increase in asset risk. This increased asset risk was driven by a combination of factors:

- Slightly higher average asset age
- Minor increase in asset failures
- Increase in the customer outage impact driven by higher customer load.

For a visual representation of protected section with risk shifts of 10 percent or more, refer to Appendix C, Significant Risk Model Updates 10% Change Maps.

The figures below show the protected sections that moved into or out of the 95th and 90th percentile after incorporating the Asset Review updates. This process evaluated the change for all protected sections across PGE's service territory, for both HFRZ and non-HFRZ areas, from the 2024 WMP after incorporating Asset Review Input and Asset Methodology Updates. Overall, this analysis revealed that approximately 80 percent and 85 percent of the protected sections remained in the 95th and 90th percentiles, respectively.

The shift of the other sections was driven primarily by PGE's updated geo-probability algorithm, which redistributed geographic wildfire and reliability risk from the HFRZs to areas in the valley of PGE's service territory. Of the 20 percent and 15 percent of protected sections moving out of the 95th and 90th percentiles approximately 50 percent and 35 percent, respectively, were sections located within the HFRZs. The most notable movement of protected sections moving out of the 95th and 90th percentiles was found in Zone 1, driven by the decrease in geographic wildfire risk due to PGE mitigations like extensive AWRR work completed in that area coupled with PGE's shift to the Neural Network model.

Comparatively, of the protected sections added to the 95th and 90th percentiles, approximately 85 percent were located outside of the HFRZs, further illustrating the redistribution of risk.

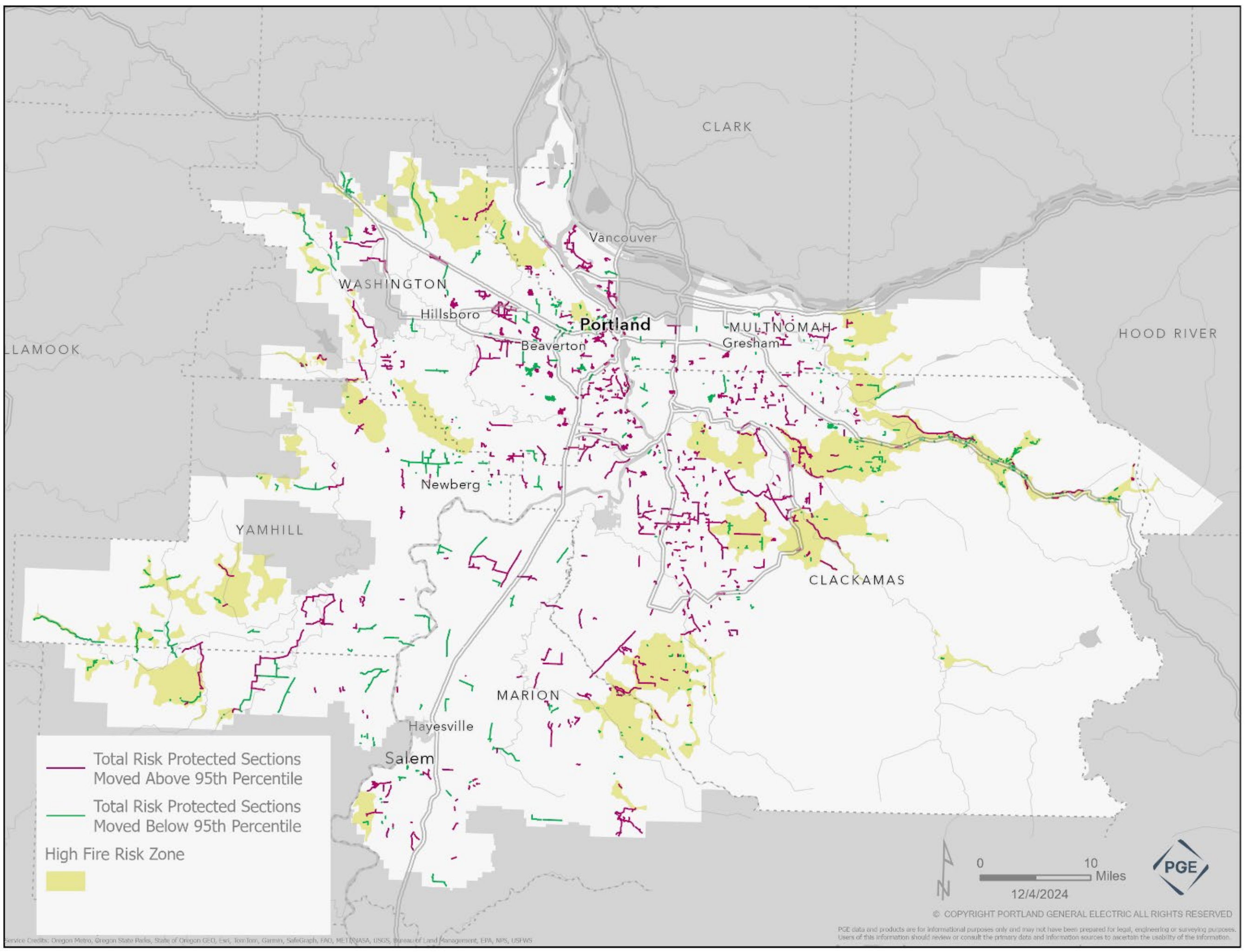

Figure 22: Total Risk 95th Percentile Protected Section Movement 2024 to 2025

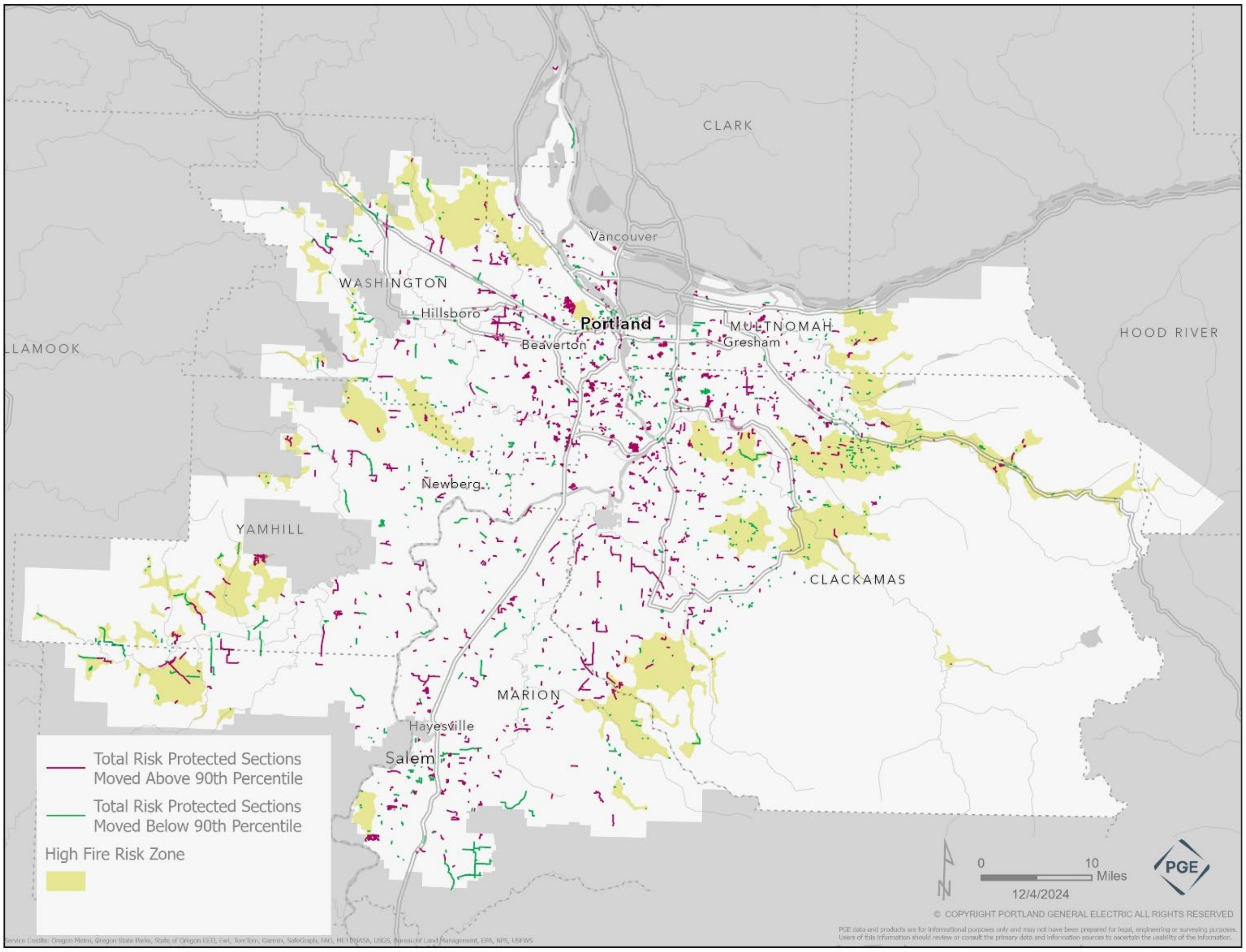

Figure 23: Total Risk 90th Percentile Protected Section Movement 2024 to 2025

3.4.2 WILDFIRE RISK SHIFT

Wildfire risk exists across PGE's service territory, with the most populous and densely vegetated areas, and highest risk protected sections, found within PGE's HFRZs.

The 2025 WMP wildfire risk on PGE's system remained relatively flat compared to the 2024 WMP after incorporating Asset Review updates, which is the first of seven steps in the model update process. These Asset Review updates primarily impact reliability risk while wildfire risk is more greatly impacted by the subsequent steps. The proportion of wildfire risk driven by geographic factors (vegetation and weather) decreased slightly from 98 percent to 95 percent, due to a minor increase in ignitions caused by PGE equipment. The increase in risk caused by PGE equipment was almost fully offset by the decrease in wildfire geographic risk reflecting the positive impacts of PGE's vegetation management programs. Additionally, PGE's change from a linear regression model to a Neural Network model has shifted the distribution of calculated geographic wildfire risk between HFRZ and non-HFRZ areas, which is illustrated in the below figures.

For a visual representation of protected section with risk shifts of 10 percent or more, refer to Appendix C, Significant Risk Model Updates 10% Change Maps.

Figure 24, below, shows the resulting wildfire risk on PGE's system, by protected section, segmented by percentiles, after completing the Asset Review updates.

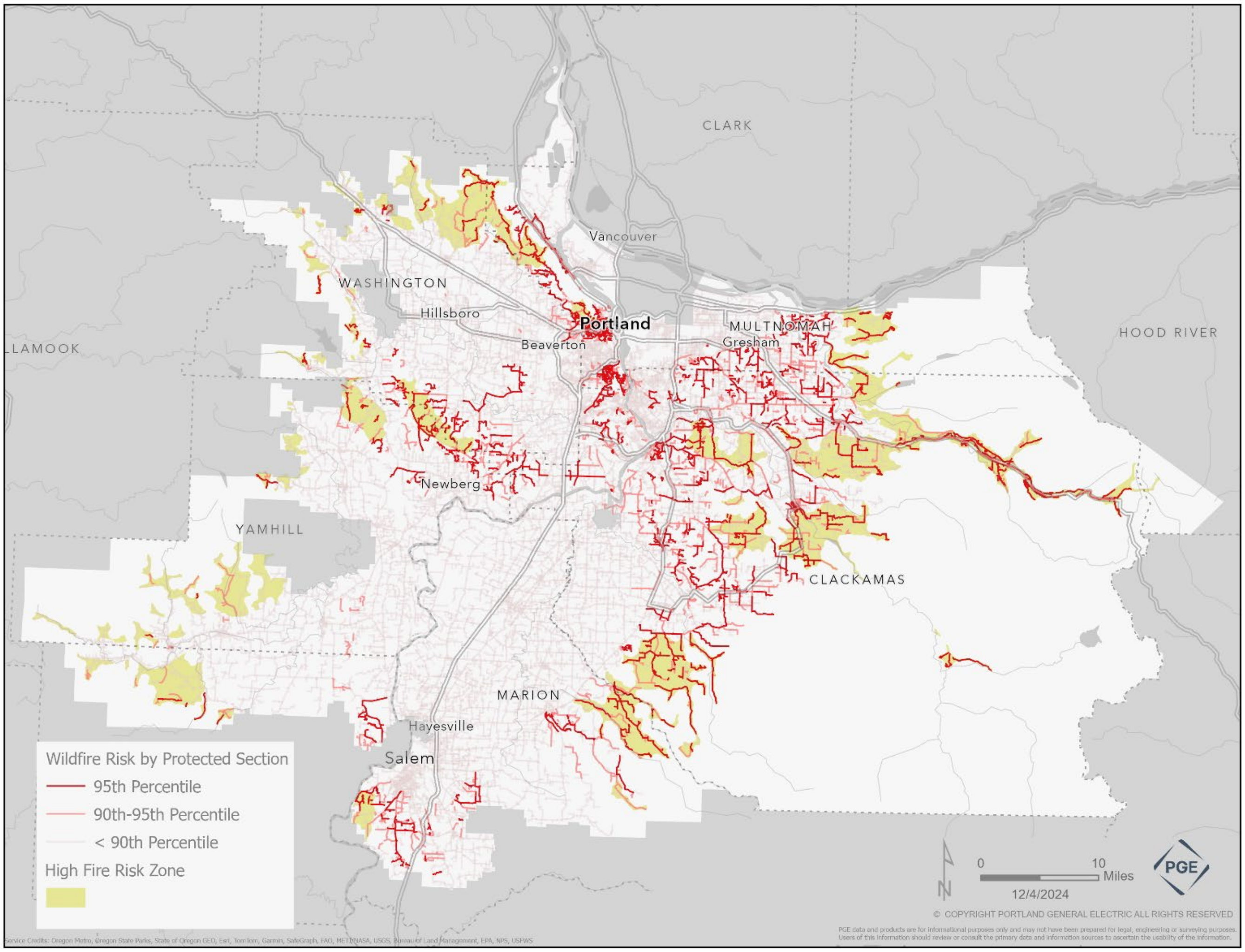

Figure 24: Asset Review Updates: Wildfire Risk by Protected Section and Percentile

The figures below show the protected sections that moved into or out of the 95th and 90th percentile based on the updated wildfire risk in the 2025 WMP model. After incorporating Asset Review and Asset Methodology updates, approximately 70 percent and 80 percent of the protected sections remained in the 95th and 90th percentiles, respectively.

Out of the 30 percent and 20 percent of protected sections that moved out of the 95th and 90th percentiles, respectively, approximately 70 to 65 percent were located within the HFRZs. As noted previously, shift in risk among protected sections was driven primarily by the updated geo-probability algorithm's redistribution of geographic wildfire risk.

The most notable movements were protected sections in HFRZ 1 moving out of the 95th and 90th percentiles due to both the updated algorithm and extensive AWRR work completed in that area. Some HFRZ 5 protected sections also moved into the 95th and 90th percentiles, primarily due to the updated geo-probability algorithm.

Comparatively, of the protected sections added to the 90th and 95th percentiles, approximately 70 percent and 80 percent, respectively, were located outside of the HFRZs, further illustrating the redistribution of risk.

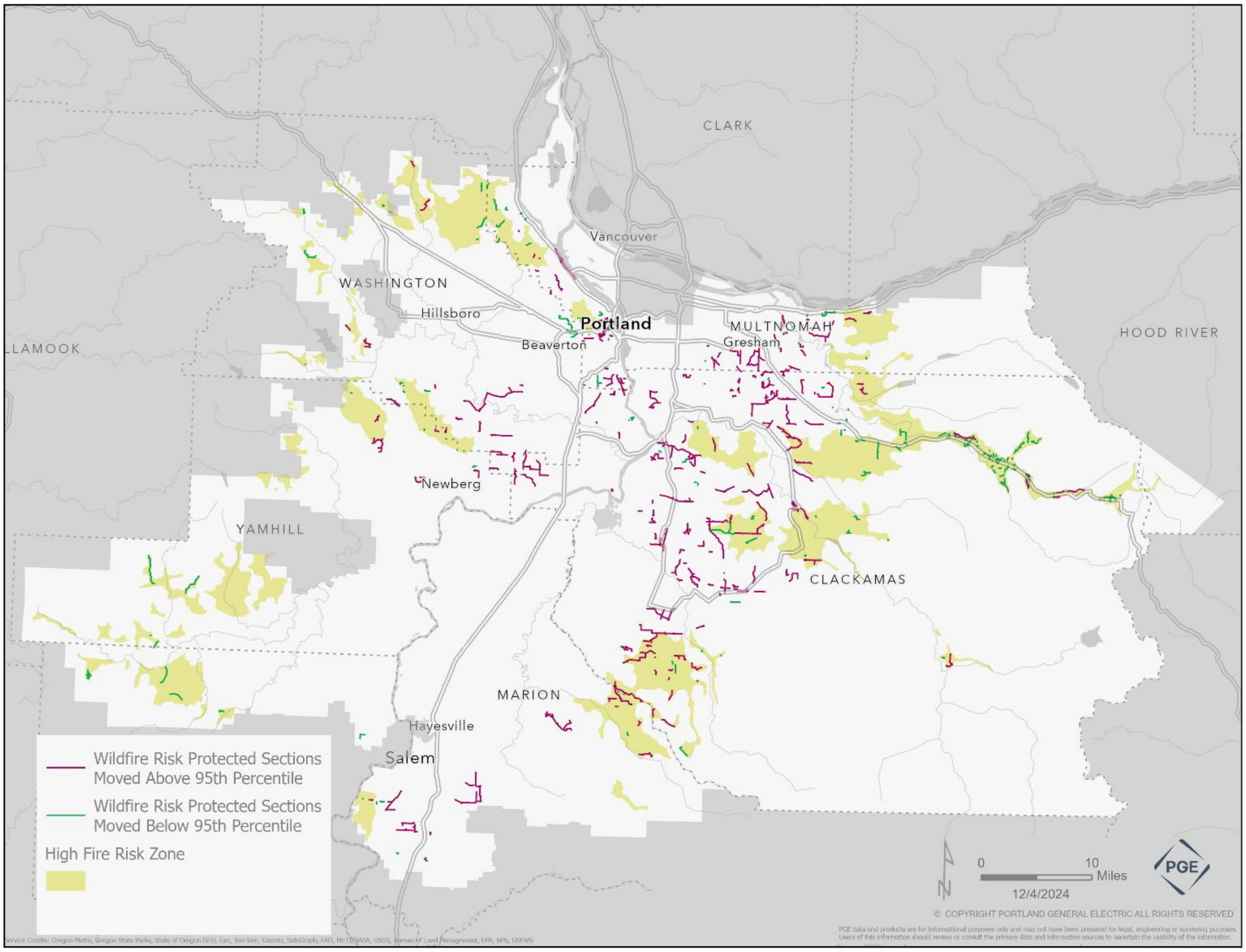

Figure 25: Wildfire Risk 95th Percentile Protected Section Movement 2024 to 2025

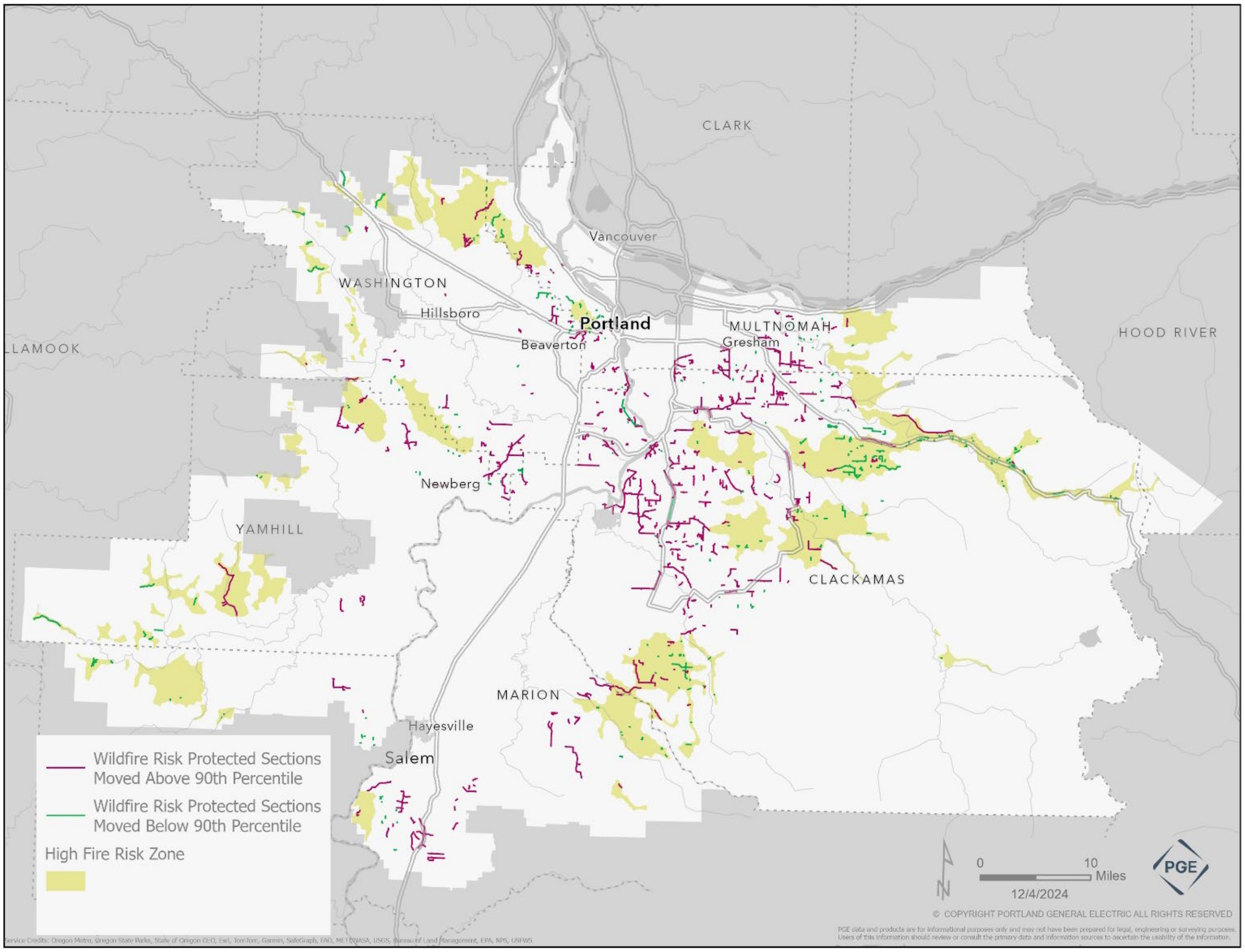

Figure 26: Wildfire Risk 90th Percentile Protected Section Movement 2024 to 2025

3.5 Climate Change Impacts

PGE adjusted climate change modifiers in response to climate change and fuels impact studies.

3.5.1 Findings

The Pacific Northwest faces significant and multifaceted challenges under the Representative Concentration Pathway (RCP) 8.5 climate scenario,[6] which projects the most severe outcomes of greenhouse gas emissions. Several studies[7] have demonstrated the profound impacts of warming on both terrestrial and marine ecosystems in this region. For instance, high-resolution regional climate models reveal substantial waring and shifts in precipitation patterns, particularly noticeable

[6] Representative Concentration Pathway (RCP) 8.5 is a worst-case climate change scenario that assumes continually increasing carbon emissions and global temperatures.

[7] See PGE 2024 WMP Table 6, "Bibliography of Risk Valuation Research, Reports, and Studies."

in the increased warming of the interior during both summer and winter, coupled with substantial reductions in snowpack.[8]

These changes will likely exacerbate water scarcity issues, as snowpack declines reduce the availability of meltwater crucial for summer water supplies. Similarly, the future carrying capacity of coniferous forests is projected to decrease significantly under RCP 8.5, with reductions of up to 11.4% in Douglas-fir dominated forests by the 2080s, indicating that forest ecosystems will struggle to maintain current densities as temperature extremes increase.[9]

The cumulative effects on ecosystems underscore the importance of considering RCP 8.5 as a valid and necessary scenario for climate modeling in the Pacific Northwest. This scenario captures the severe potential outcomes of unchecked emissions and provides critical insight into the urgency of mitigation and adaptation strategies necessary to preserve the region's ecological and socioeconomic systems.

In addition, studies by Dr. William Hammond of the Department of Plant Biology, Ecology, and Evolution at the University of Florida offer critical insights into tree mortality and forest resilience, which are particularly relevant to discussions on climate change and its effects on ecosystems like those in the Pacific Northwest. As climate-induced stressors such as drought and heat become more frequent and intense, forests are increasingly vulnerable to large-scale mortality events. Hammond demonstrates that hydraulic failure, where trees lose the ability to transport water due to embolisms in their xylem, is a primary driver of climate-induced tree death.[10]

This is especially alarming for the Pacific Northwest, where trees play a crucial role in maintaining biodiversity, carbon sequestration, and ecosystem stability. Hammond’s work illustrates that such breakdowns in physiological processes can lead to irreversible tipping points, making recovery difficult or impossible, particularly in forests already stressed by ongoing climatic shifts.

Further, Hammond's 2020 study introduces the concept of alternative stable states, explaining how trees, once severely affected by drought, may not return to their pre-stress conditions even if the environmental factors improve.[11] This is significant for the Pacific Northwest and other forested regions, as it suggests that repeated climate stresses could fundamentally alter the structure and function of these ecosystems over time. Climate change is significantly impacting wildfire risk within PGE's service territory, particularly in the Coast and Cascade ranges. Recent studies, including collaborations with the Oregon Climate Change Research Institute and Oregon State University, project substantial increases in wildfire risk, burn probability, fire size, and plume-dominated behavior.

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[8] Reyes L, Kramer M, *High-elevation snowpack loss during the 2021 Pacific Northwest heat dome amplified by successive spring heatwaves* (Climate and Atmospheric Science Dec. 2023).

[9] R. Heiderman and M. Kimsey Jr., *Pacific Northwest conifer forest stand carrying capacity under future climate scenarios* (2023).

[10] W. Hammond, *What Kills Trees? Drivers, mechanisms, and timing of climate-induced tree mortality* (University of Central Oklahoma, 2016).

[11] W. Hammond, *A Matter of Life and Death: Alternative Stable States in Trees, From Xylem to Ecosystems* (Frontiers in Forests and Global Change, 2020).

Key findings include:

- The RCP 8.5 scenario simulations indicate a shift towards more frequent and intense fire regimes in the Pacific Northwest.
- Both the Coastal and Cascade ranges are expected to see significant increases in wildfire risk, including higher burn probabilities and shorter intervals between large fires.
- Large fires (>40,000 acres) are increasingly occurring in historically cooler and wetter parts of the Pacific Northwest.
- Plume-dominated fires, as seen in recent events like the Park Fire in California and the Bootleg Fire in Oregon (2021), are becoming more common across various ecosystems.
- Longer, hotter summers with both higher low and high temperatures are exacerbating fire behavior in areas that historically had favorable summer precipitation.
- The number of fires per decade is projected to increase exponentially in both the Coastal and Cascade ranges through 2064.

These trends are not unique to PGE's service territory but reflect a global phenomenon of increasing wildfire risk due to climate change. The changes observed and projected have significant implications for infrastructure planning, maintenance schedules, and emergency response protocols for utilities like PGE. The table below, from the paper "Simulated Future Shifts in Wildfire Regimes in Moist Forests of Pacific Northwest, USA," (January 2024) provides some insight into the likely effects of changes in burn probability and fire rotation interval:

Table 2

Annual Burn Probability for the Contemporary Baseline (1992–2020), Where Burn Probability Is Calculated as the Average of All Pixels Within the Pyrome, and Future Mid-21st Century (2035–2064), Where Burn Probability Is Calculated as the Average of All Pixels Within the Pyrome After Taking the Per-Pixel Mean of All 12 GCM-Based Simulations (as Shown in Figure 1)

	Annual burn probability	Fire rotation	Proportional change in burn probability (%)
Olympics and Puget Lowlands			
Contemporary Baseline (1992–2020)	0.009%	11,111 years	
Mid-21st Century (2035–2064)	0.052%	1,235 years	+478%
WA North Cascades			
Contemporary Baseline (1992–2020)	0.214%	467 years	
Mid-21st Century (2035–2064)	0.913%	110 years	+327%
WA West Cascades			
Contemporary Baseline (1992–2020)	0.092%	1,087 years	
Mid-21st Century (2035–2064)	0.164%	610 years	+78%
OR West Cascades			
Contemporary Baseline (1992–2020)	0.705%	142 years	
Mid-21st Century (2035–2064)	1.544%	65 years	+119%
OR Coast Range			
Contemporary Baseline (1992–2020)	0.102%	980 years	
Mid-21st Century (2035–2064)	0.235%	426 years	+130%

Note. The fire rotation is a transformation of burn probability and estimates how many years would be required for the entire landscape to burn, that is, to achieve a burn probability of 100%. The proportional change relative to contemporary is shown; note that a positive proportional change indicates an increase in burn probability accompanied by a decrease in fire rotation.

Figure 27: Proportional Change in PGE Service Territory Burn Probability, 1992-2064

Plume- dominated fires are now occurring across ecosystems at an alarming rate; areas that historically have enjoyed favorable precipitation during the summer season are now facing longer periods of elevated high and low temperatures, exacerbating the fire behavior. Plume- dominated fires are now occurring across ecosystems at an alarming rate; areas that historically have enjoyed favorable precipitation during the summer season are now facing longer periods of elevated high and low temperatures, exacerbating the fire behavior.

Under the RCP 8.5 scenario, the number of fires per decade increases exponentially in both the Coastal and Cascade ranges. The figure below from the fire regime study illustrates the projected increases in both number of fires and average fire size.

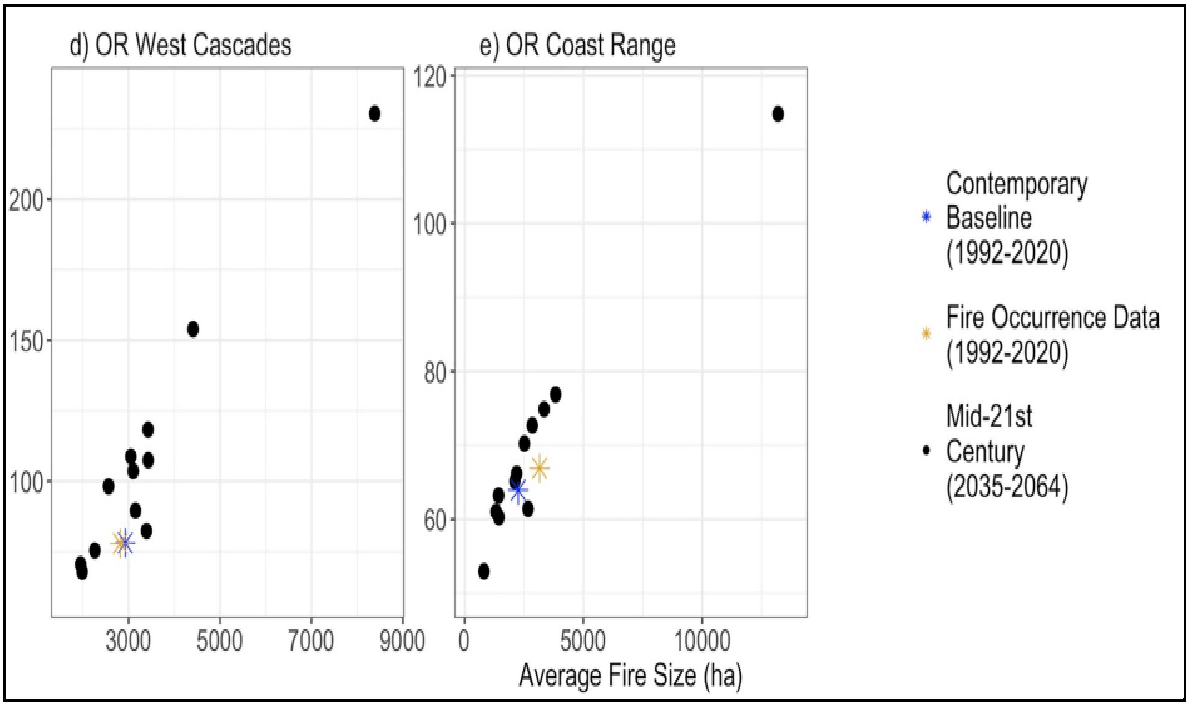

Figure 28: Fires Per Decade and Average Fire Size (Projected), Oregon Forest Areas 2025-2064

PGE has engaged with the authors of this study, fire scientists (including Pyrologix) and NASA and ODF representatives to understand and discuss the findings of projected climate change impacts. As referenced in the 2024 Wildfire Season Review section, above, the fire behavior of the August 8, 2024, Lee Falls fire was analyzed by PGE, ODF and third-party fire behavior experts. All agreed that cumulative climate stress impacts played a significant role in increasing the size of that fire to approximately 25 times larger than the predictive model would have forecast given ignition and fuel/weather conditions at the time of the fire.

3.5.2 Updates

As a result of these findings, PGE has updated its previous climate change modifier to account for fire risk increasing before 2035 (assumed in PGE's 2024 model to be the year in which fire risk increased). The updated modifier reflects increases in burn probability and consequence, whereas a static modifier across all assets leads to forecasted steadily increasing risk, increasing exponentially in 2035 based upon the ecology forecast studies referenced. It is worth noting that the modifier of 14 means that some parts of the PGE service territory, including the Coast Range, will see a potential burn probability increase of 1,400 percent.

PGE has adjusted its climate change modifier to reflect the previously referenced findings of the cumulative impacts of climate change on trees, increased fire behavior and fuel conditions within the PGE service territory. The model updates have been tested with fire agencies in different ecologies, confirming that it adequately reflects the stresses to both live and dead fuel resulting from increased drought and temperature.

Figure 29 shows the results of applying the updated climate risk modifier to PGE's total risk model assuming current assets remain on the grid with risk slowing increasing until 2050.

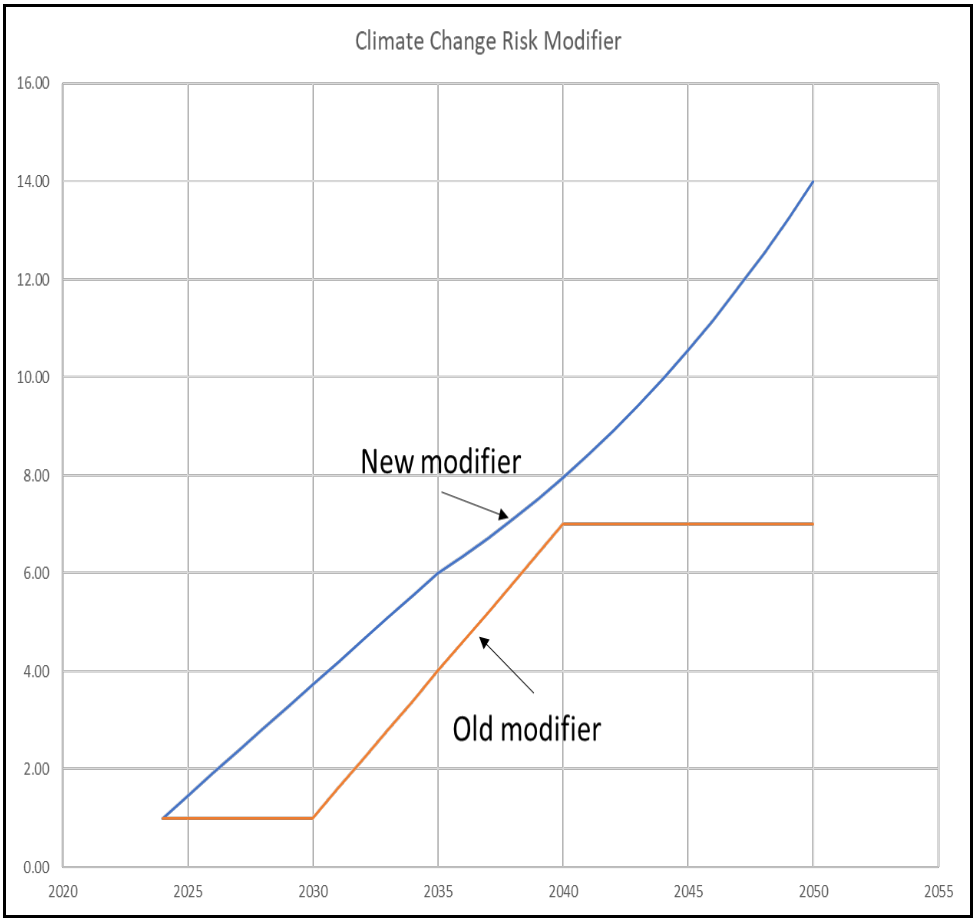

Figure 29: 2025 WMP Total Risk Before Climate Change Update 2050

3.5.3 RESULTING RISK SHIFT

Incorporating the updated 2025 climate change modifier of 1.45 resulted in a 45 percent increase in Wildfire Risk across PGE's system. Figure 30 shows the resulting 2025 total wildfire risk by protected section, segmented by percentile after the respective update. As this analysis demonstrates, approximately 55 percent of the wildfire risk is concentrated within PGE HFRZs. The remaining 45 percent of wildfire risk is spread across locations that in 2024 did not reflect observed fuels, weather, and fire behavior consistent with an HFRZ designation.

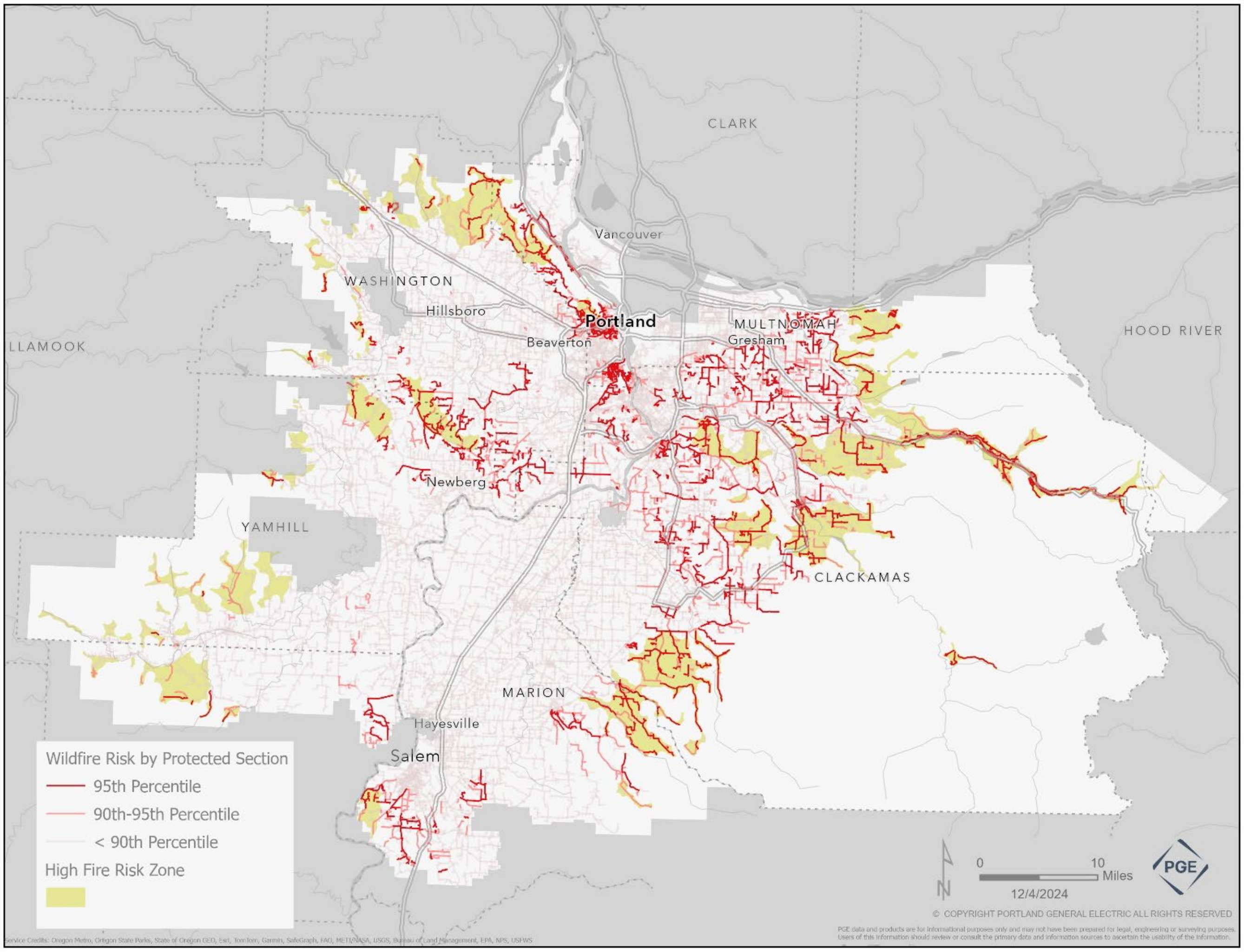

Figure 30: Climate Change Update 2025: Wildfire Risk

Figure 31 illustrates the magnitude of the impact of the Climate Change Update across PGE's service territory. Each protected section with existing wildfire risk was re-assessed using the climate change modifier, driving an increase in wildfire risk on the system. There was no change in the segmentation of protected sections within the 95th and 90th percentiles before and after the Climate Change Impact update because every protected section was subjected to the same multiplier.

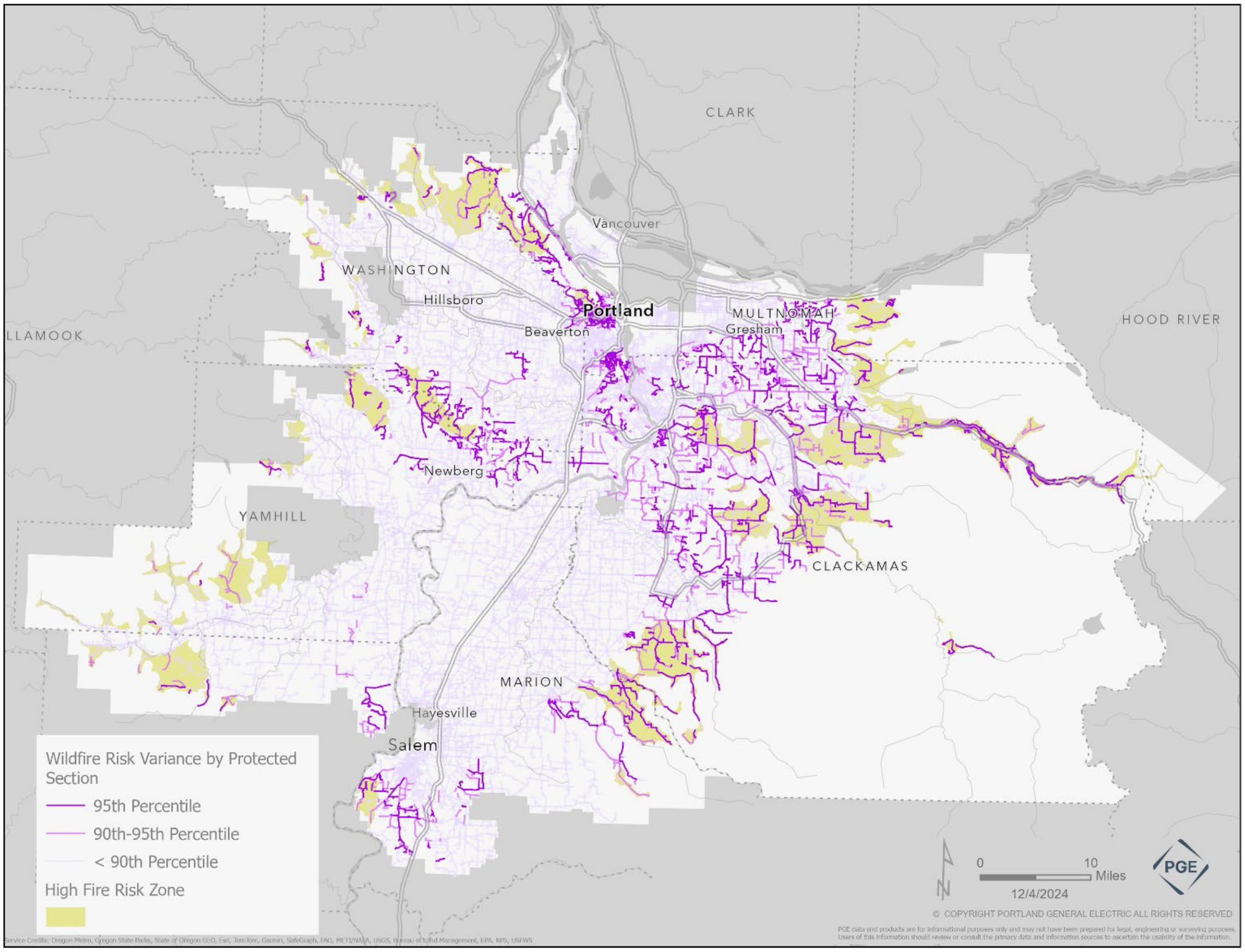

Figure 31: Protected Sections 10% Change >= Modifier Applied

For illustrative purposes only, assuming no new risk mitigation capital investments occur in 2025 and beyond, PGE's wildfire risk would increase by a factor of 9.4 times by 2050. The figure below shows the resulting wildfire risk on the system in 2050 given the assumption above, with risk segmented into percentiles. This scenario shows increased risk throughout PGE's service territory, with the highest concentrations of risk located within the HFRZs.

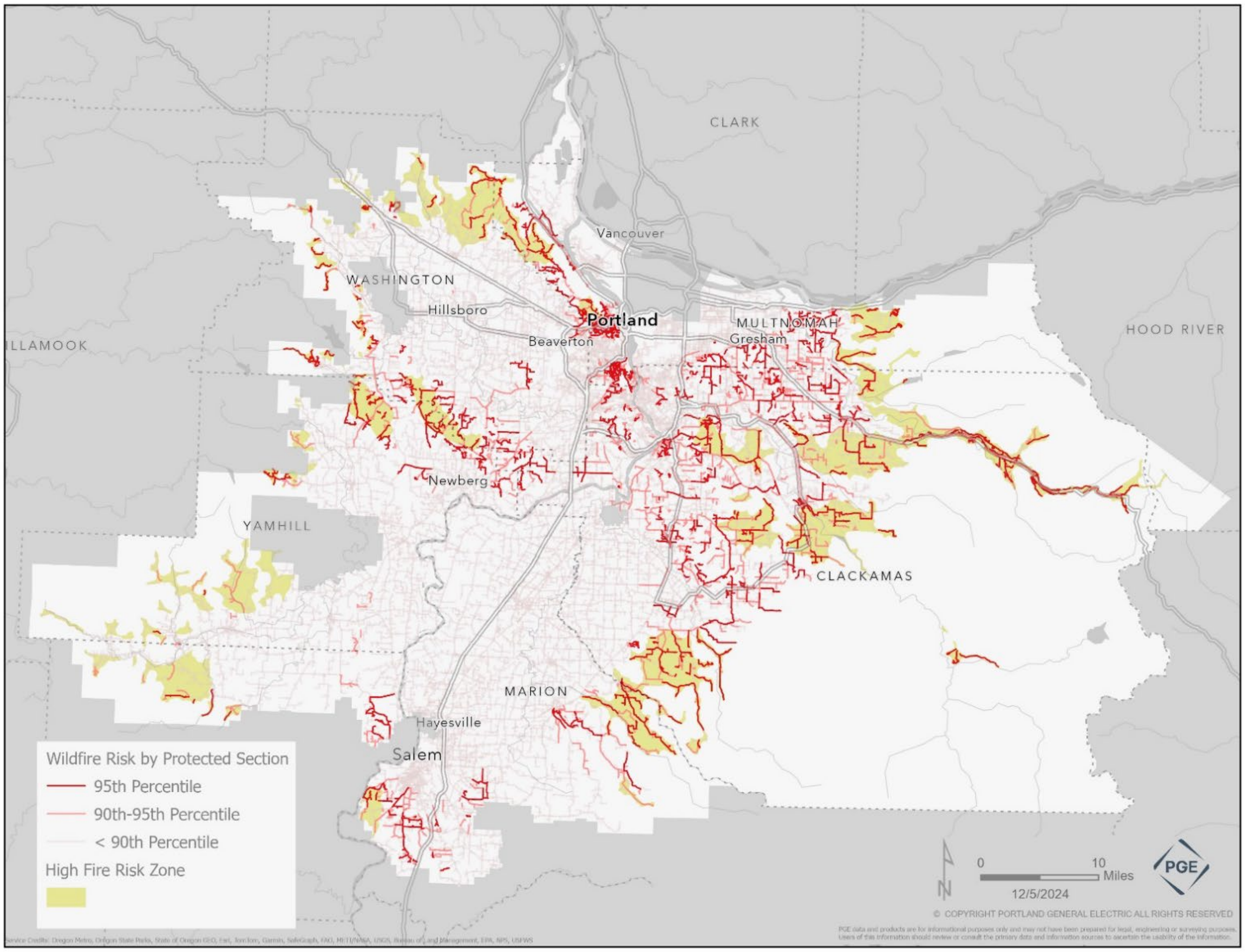

Figure 32: Climate Change Update 2050: Wildfire Risk

3.6 Fire Behavior Model Updates

PGE updated its fire behavior models to reflect updated fire weather scenarios and observed fire behavior. Additional details on the methodology can be found in the Program Sharing section's Fire Behavior Modeling Methodology subsection.

3.6.1 Fire Weather Scenarios

In 2024, PGE meteorologists continued to research fire weather scenarios within our service territory and other areas with PGE assets. PGE continues to refine our understanding of fire weather scenarios that increase the risk of fire ignition and spread, with an emphasis on wind as a primary driver of wildfire potential. Through analysis of 30 years of historical weather data and collaboration with local meteorological experts, PGE supplemented previously evaluated datasets with additional meteorological data sources, including, but not limited to:

- National Weather Service's (NWS) Wind Climate information on Portland and Salem
- Scholarly papers referencing the storms of the Pacific Northwest, including:

- C. Mass and B. Dotson, "Major Extratropical Cyclones of the Northwest United States: Historical Review, Climatology, and Synoptic Environment" (*Monthly Weather Review*, 2010)
    - P. Knapp and K. Hadley, "A 300-year history of Pacific Northwest windstorms inferred from tree rings" (*Elsevier Global and Planetary Change*, 2012)
    - D. Willson, I. Kosovitz, and C. Rockey, "Mid-Latitude "Bomb" Cyclogenesis: A Case Look at Three Intense Events" (*NOAA/NWS Forecast Office, Portland Oregon*, n.d.)
- W. Read, "The Strongest Windstorms in the Western Pacific Northwest 1950-2004" which reviewed more than 50 storms.[12]
- Northwest Interagency Coordination Center's Predictive Services Annual Fire Reports

An analysis of local wind data over the past 30 years reveals that southerly and southwesterly winds are the most common directions for strong winds, defined here by sustained speeds of 30 mph or higher and gusts of 40 mph or more. These winds often bring higher humidity and/or rain, which reduces wildfire risk.

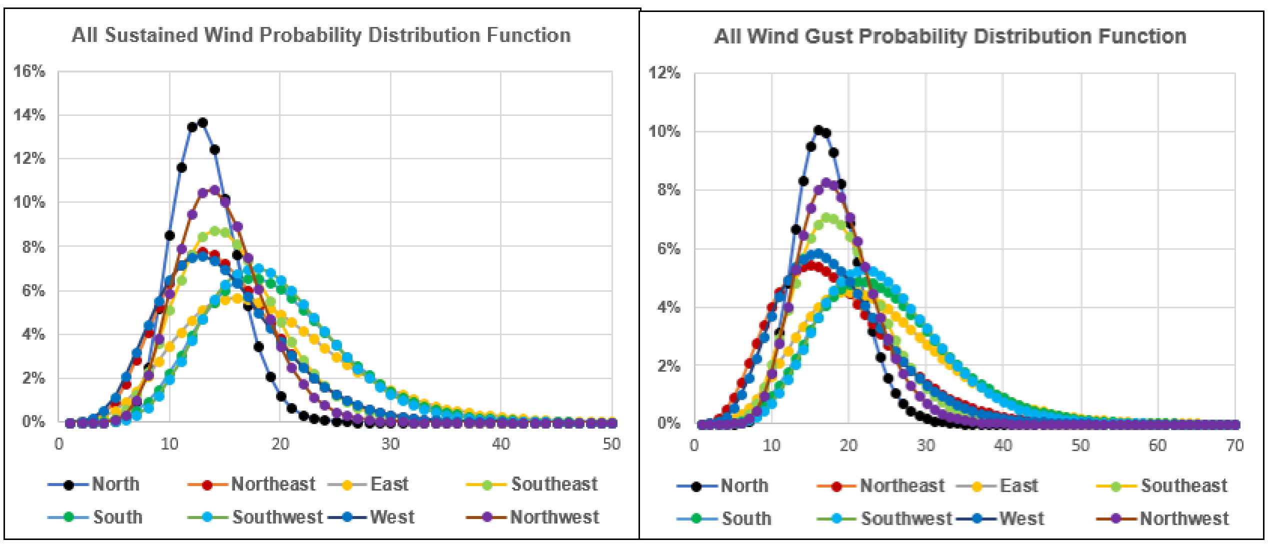

Figure 33: Wind Frequency at the Portland International Airport Weather Stations[13]

Easterly and northeasterly winds rank as the third and fourth most frequent strong wind directions. Originating from east of the Cascade Crest, these winds are typically hot and dry, contrasting with the cooler, humid winds typical from the south and southwest. As a result, easterly winds pose higher wildfire risk than others within PGE's service territory.

For winds originating from the east, the average daily maximum sustained wind speed is 19 mph, with the highest recorded sustained wind reaching 43 mph. The average daily maximum gust is 24 mph, while the highest recorded gust reached 54 mph.

[12] University of Washington: climate.washington.edu/stormking/PNWStormRanks.html
[13] KPDX

All Sustained Speed					All Wind Gusts				
Degrees	Direction	Frequency	Avg Speed	Max Speed	Degrees	Direction	Frequency	Avg Speed	Max Speed
NA	NA	0.00%	NA	0.0	NA	NA	0.00%	NA	0.0
360	North	3.70%	13.7	23.0	360	North	6.22%	17.7	38.0
45	Northeast	0.54%	15.4	28.0	45	Northeast	0.77%	18.8	51.0
90	East	17.85%	19.4	42.9	90	East	16.30%	24.2	53.9
135	Southeast	9.02%	16.1	32.0	135	Southeast	9.29%	19.7	42.9
180	South	14.27%	19.9	51.0	180	South	14.46%	25.0	67.1
225	Southwest	8.32%	19.8	42.9	225	Southwest	9.51%	24.8	55.9
270	West	12.16%	15.2	38.9	270	West	11.93%	18.9	55.0
315	Northwest	34.13%	15.1	33.1	315	Northwest	31.52%	19.0	44.1

Figure 34: Wind Speeds at Portland International Airport from Nov. 1995[14]

The KPDX weather station at PDX provides a comprehensive and reliable climate record due to strict maintenance/calibration requirements for safety required by National Transportation Safety Board. While not located within a PGE HFRZ, this location provides reliable and consistent proxy data generally applicable across PGE's service area.

3.6.2 High-Resolution Wind Modeling: New HFRZ 12

The Chehalem Mountains HFRZ is the only new PGE HFRZ for 2025. The following section provides a detailed description of PGE's wind modeling approach and modeled wind impacts to PGE assets.

The Chehalem Mountains are characterized by a sharp ridge axis oriented from northwest to east-southeast. PGE's fire weather scenarios analysis identified east winds as the direction with the highest wildfire potential. To assess the influence of the Chehalem Mountain terrain on east wind events, PGE conducted high-resolution wind modeling using WindNinja data. The purpose of the modeling was to assess the risk of vegetation-caused outages by evaluating areas expected to experience terrain-enhanced winds.

PGE used three easterly wind speed scenarios:

- 20 mph (average daily maximum over the last 30 years)
- 30 mph
- 50 mph (7 mph above the maximum recorded within the last 30 years)[15]

The results of the analysis revealed an elevated wind threat due to terrain interactions within the new HFRZ, particularly along the ridgeline. Figure 35, below, shows WindNinja high-resolution wind modeling within several HFRZs for an east wind scenario of 30 mph. Figure 36 shows WindNinja modeling for the Chehalem Mountains for the 30 mph east wind scenario. Figure 37 shows WindNinja modeling for the 50 mph east wind scenario. All three figures depict relatively higher

[14] KPDX

[15] NWS Portland has recorded higher easterly wind gusts, but PGE was not able to validate gusts above 50 mph in the Chehalem Mountain area using observed wind records.

winds along ridges, suggesting higher outage risk in these areas due to terrain-enhanced winds, as well as an increased risk of ignitions.

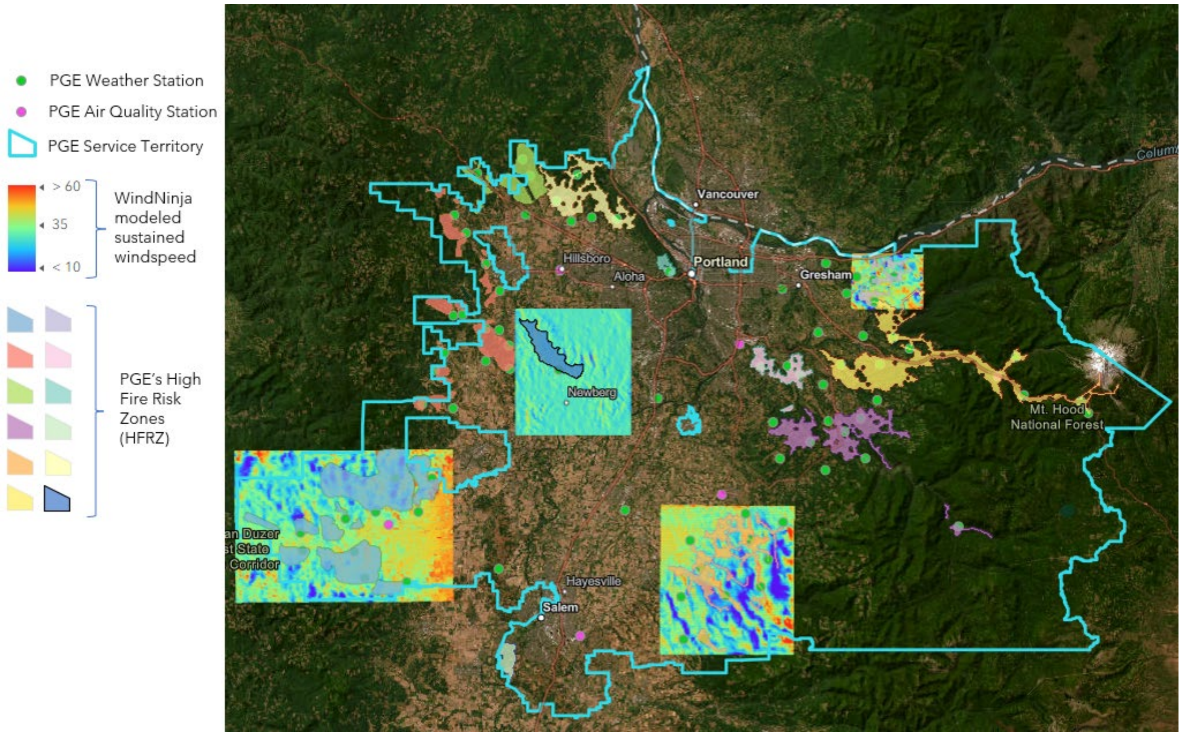

Figure 35: 30 mph Sustained Wind Across Four PGE HFRZs

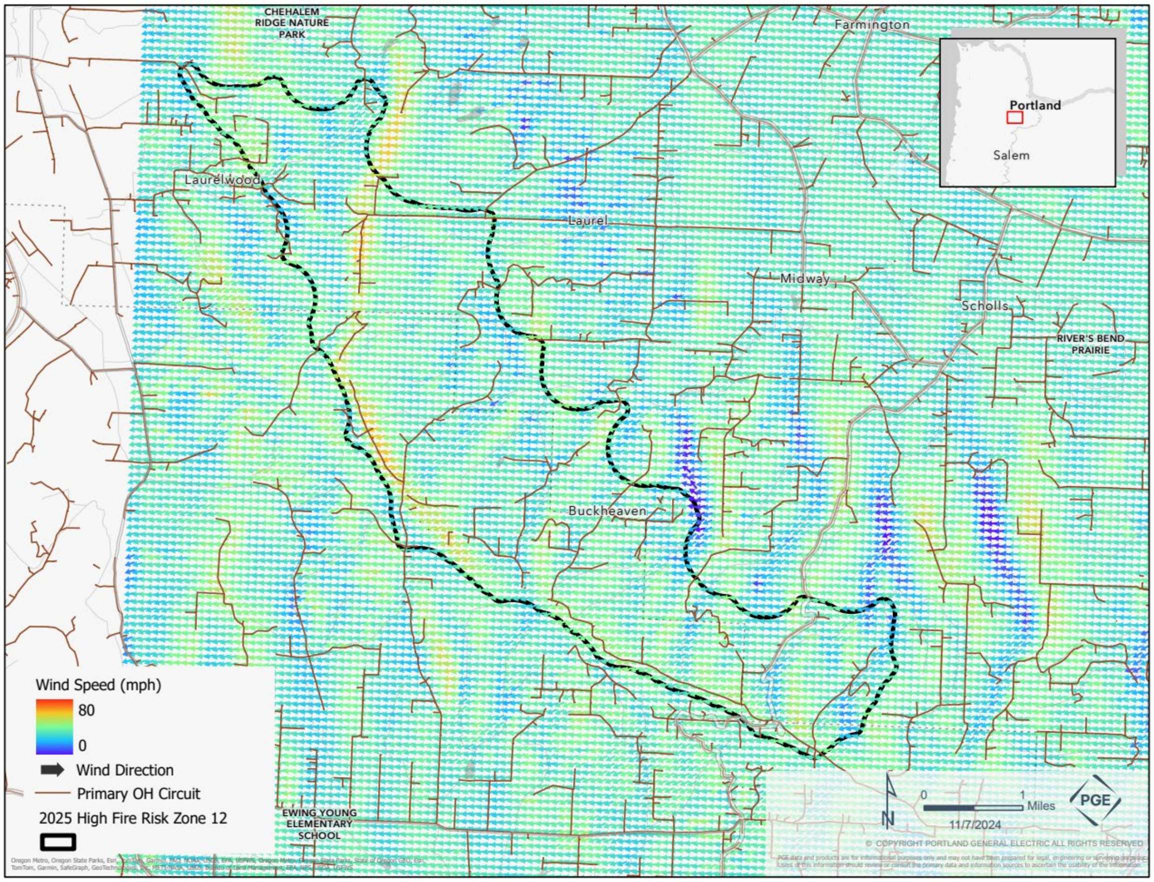

Figure 36: **East Wind at 30 mph Over the Chehalem Mountains, Showing Terrain Effects**

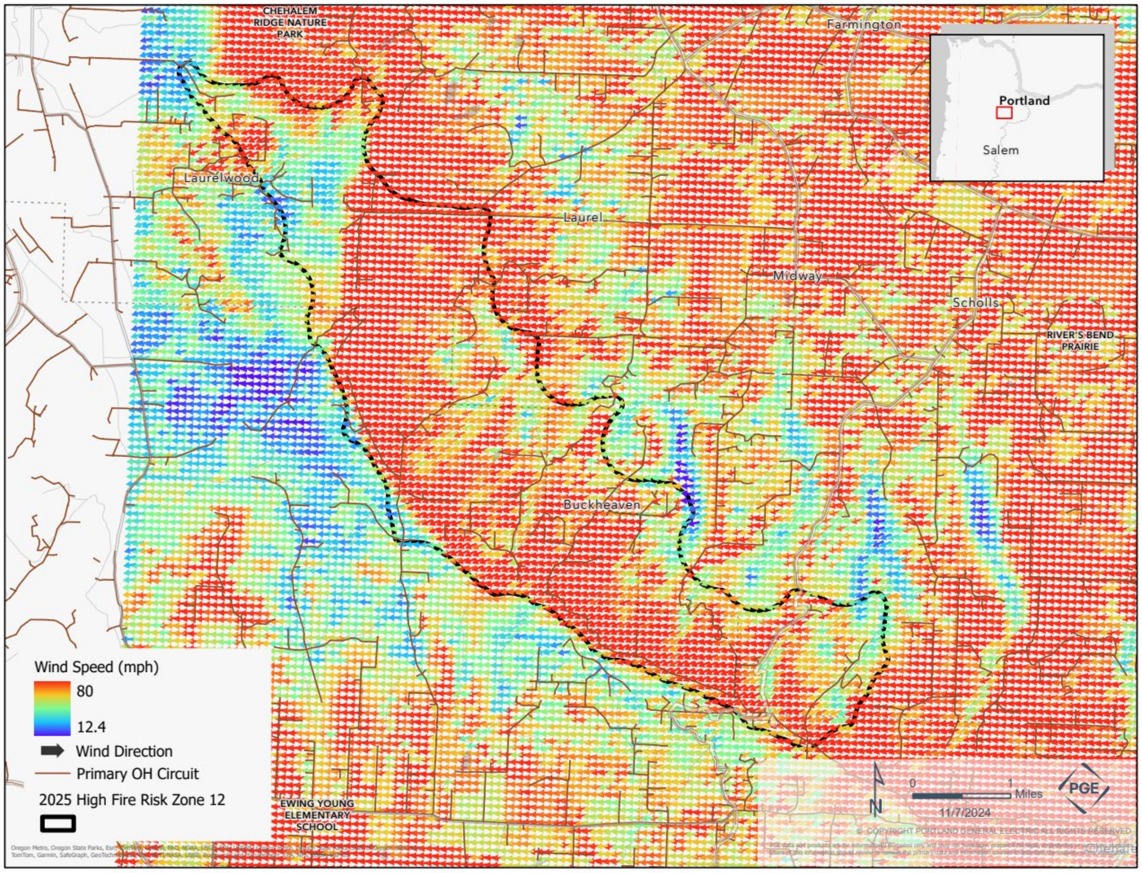

Figure 37: East Wind at 50 mph Over the Chehalem Mountains, Showing Terrain Effects

3.6.3 2024 Wildfire Season Review

The forests within the PGE service territory experienced an extreme "heat dome" event in June 2021, during an extended period of successive years of drought. While the 2021 Pacific Northwest Heat Dome was a historic event, with record-breaking temperatures exceeding previous highs by up to 16°F, and an estimated statistical rarity of 1 in 1,000 to 1 in 10,000 years, there is an underlying warmer trend to focus on as well.[16]

Within the PGE service territory, the frequency of hot weather episodes has increased quantifiably over the past decade. For example, Portland and Salem now average 23 days and 27 days, respectively, at or above 90°F, nearly double their historical averages of 13 (1938-present) and 16 days (1900-present), respectively. Days at or above 100°F have also risen by 200–300 percent at both locations.

Notably, 40–50 percent of the top 20 warmest 3-day heat events at Portland and Government Camp have occurred in the last four years. This includes overnight lows, where looking at the statistics for the most consecutive nights with low temperatures of 65°F or warmer reveals that the past four

[16] Kreider, M, Higuera, P, Parks, S, Rice, W, White, N, Larson, A, *Fire suppression makes wildfires more severe and accentuates impacts of climate change and fuel accumulation* (Nature Communications March 2024).

years have taken the top four spots in Portland. In Salem, four of the top six records have been recorded in the last 10 years.

The anomalous Northwest Heat Dome event damaged over 222,000 acres of forest, including areas of the Coast Range.[17] Because the Coast Range was experiencing only mild drought conditions at the time, the main driver of the damage was likely heat stress. These stressors have led to a sharp increase in observed tree mortality and elevated wildfire susceptibility.

In addition to climate change, land management and fire suppression history has exacerbated fire behavior and intensity. As demonstrated in multiple studies[18] by eliminating less-extreme fires, suppression efforts have inadvertently caused remaining wildfires to occur under more severe conditions, a phenomenon known as “suppression bias.” This bias leads to fires of increased severity and ecological impact; over a human lifespan, its effects can surpass those of fuel accumulation or climate change alone.

The Pacific Northwest has experienced numerous drought years during recent history. Trends in drought are visible in timeseries plots of the Evaporative Drought Demand Index (EDDI) and the Drought Monitor. The figure below presents a timeseries plot of drought conditions in the northern Cascades.

The timeseries plot show a clear signal of successive periods of drought beginning in 2014. EDDI is a common measure of short-term drought that causes rapid vegetation drying and increasing wildfire risk. The second figure presents a timeseries plot of EDDI for the PGE service territory from 1980 to 2023. The plot shows a notable trend of successive years of positive evaporative demand beginning in 2013, with 2022 the only negative anomaly. Both the Drought Monitor and the EDDI plots show successive years of drought and vegetation stress beginning in 2013 through the present, suggesting damage and decline in forest health.

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[17] Still CJ, Sibley A, DePinte D, Busby PE, Harrington CA, Schulze M, Shaw DR, Woodruff D, Rupp DE, Daly C, and Hammond WM, *Causes of widespread foliar damage from the June 2021 Pacific Northwest Heat Dome: more heat than drought* (Tree Physiol, 2023), Page G.

[18] Kreider M, Higuera P, Parks S, Rice W, White N, and Larson A, *Fire suppression makes wildfires more severe and accentuates impacts of climate change and fuel accumulation* (Nature Communications, 2024).

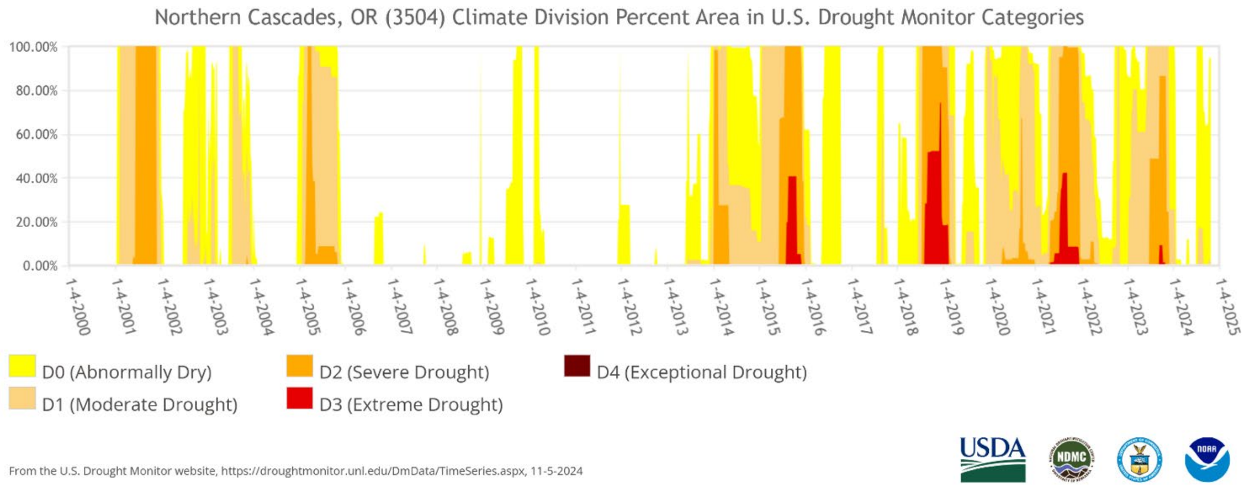


Figure 38: Plot Illustrating Successive Periods of Drought

Figure 39 shows a timeseries plot illustrating the progression of drought conditions in the Northern Cascades from 2000 to present. Data was obtained from the U.S. Drought Monitor. The x-axis represents the time, while the y-axis displays the percentage of land area affected by each drought classification.

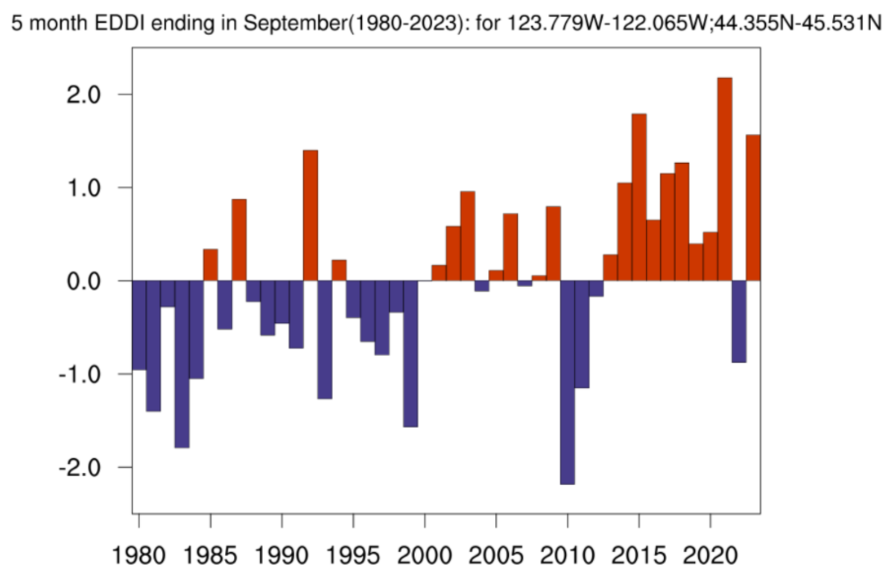


Figure 39: Dry Season (May-Sept), 1979-2024[19]

The EDDI timeseries plot shows standardized anomalies in evapotranspiration, indicating the spatial extent and severity of drought.

A 2022 study[20] jointly published by the U.S. Forest Service and the Oregon Department of Forestry (ODF) noted the connection between tree mortality and drought: "In 2022, we continued to see the

[19] Positive EDDI values indicate anomalously high evaporative demand and therefore increased drought stress.
[20] Buhl C, Ritokova G, Williams W, Stevens H, Shaw D, Ripley K, DePinte D., *Forest Health Highlights in Oregon - 2022* (Oregon Department of Forestry and United States Department of Agriculture Forest Service, 2022).

negative direct and indirect impacts of persistent droughts. Historic levels of tree mortality … were observed across the state." and "... in recent years climate change impacts such as ongoing hot droughts have increased susceptibility to opportunistic insect and disease agents." The report noted that ODF observed 2.7 million acres of tree damage and mortality in Oregon, 70 percent higher than the 10-year average.

In 2019, PGE acquired LiDAR data and used it to model future tree mortality rates within its service territory. This year, data from the U.S. Forest Service, along with new PGE-acquired LiDAR data, were compared to the 2019 projections of tree mortality rates. In Forest Park, the analysis revealed that PGE's modeled mortality rates were underpredicting by 1,310 percent compared to actuals, suggesting a possible acceleration in tree mortality. The 2024 remote sensing data captured tree mortality in all 11 PGEs HFRZs.

The likelihood of extreme heat events and long-term drought is increasing annually. More frequent and severe heat events and drought will have a negative impact on forests that will affect wildfire seasons in the future. In 2020, researchers at Portland State University modeled climate change scenarios in the northern Oregon Cascades under the RCP 8.5 that all showed significant increases in wildfire frequency and size, acres burned, and wildfire season days by 2050.[21] The scenarios projected large wildfire size increases of 14 to 91 percent, increases in acres burned of 50 to 540 percent, and eight to 32 additional wildfire days annually.

3.6.4 UPDATES

PGE continually assesses and validates its wildfire modeling predictions, with the goal of refining and updating modeling assumptions and parameters. PGE recently analyzed four 2024 wildfires that occurred within its service territory to assess model performance and challenge key assumptions. Table 8 summarizes these analytical findings, which indicate PGE's wildfire simulations underpredicted wildfire size for all four wildfires.

Table 8: PGE Wildfire Fire Size Predictions vs. Actual

Fire	Ignition Date	Distance to Nearest PGE HFRZ	WTI Fire Size (acres)	Actual Fire Size (acres)
Lee Falls	8/8/2024	Within HFRZ 9	14	280
Sandstone	8/5/2024	12 miles from HFRZ 4	Outside of model	702
Elk Lane	8/4/2024	52 miles from HFRZ 1	70	5,240
SW Laurel Road	8/4/2024	8 miles from HFRZ 12	5	80

To address the gap between modeled and actual fire size, PGE performed qualitative analysis and quantitative adjustments to Wildfire Threat Index (WTI) fire size modeling. For qualitative analysis, PGE obtained observations on wildfire behavior from both fire agencies who responded to the Lee Falls and other local wildfires and from the Northwest Interagency Coordination Center. The

[21] McEvoy, A., Nielsen-Pincus, M., Holz, A., Catalano, A. J., & Gleason, K. E. (2020). *Projected impact of mid-21st century climate change on wildfire hazard in a major urban watershed outside Portland, Oregon USA*. Fire, 3(4), 70. https://doi.org/10.3390/fire3040070

observations were consistent in noting unusually aggressive fire behavior as compared to fires that occurred under similar conditions in prior years.

PGE also conducted a computational analysis of its fire size predictions for the Lee Falls wildfire, resulting in adjustments to PGE's WTI model. Modeling for HFRZ 9 was adjusted by a factor of 7.82 to account for the observed fire size. The purpose of this adjustment is to increase model accuracy by comparing predicted fire behavior at that ignition point, under the fuel/weather conditions present at the time of ignition, to actuals, and to adjust PGE's model to more precisely reflect actual vs. modeled fire behavior. PGE shared this observation and adjustment with third parties, including ODF, Tualatin Valley Fire & Rescue, Gaston Fire District, and Yamhill Fire District, with unanimous agreement that Lee Falls fire behavior was more severe compared to historical fire behavior.

3.6.5 RESULTING RISK SHIFT

A Zone Multiplier was applied to the wildfire risk model to address the updated Fire Behavior modeling; the resulting 2025 Wildfire Risk map is shown in Section 3.1.4, 2025 WMP Baseline Risk. Applying the Zone Multiplier increased wildfire risk by 7 percent.

For a visual representation of protected section with risk shifts of 10 percent or more, refer to Appendix C, Significant Risk Model Updates 10% Change Maps.

The figures below show the protected sections with wildfire risk that moved into or out of the 95th and 90th percentiles after the application of the Zone Multiplier.

After incorporating the Zone Multiplier, approximately 95 percent of the protected sections remained in the 95th and 90th percentiles. Protected sections added to the 90th and 95th percentiles were in HFRZ 9, illustrating the impact of the Zone Multiplier.

Comparatively, there was an approximate 5 percent shift in protected sections moving out of the 95th percentile, which was relatively evenly split between protected sections located within and outside of the HFRZs. The protected sections that dropped out of the 90th percentile were primarily located outside of the HFRZs. This shift is predominately a function of adjusting the modeling to reflect the observed fire behavior to planned actuals, not a function of the asset condition itself.

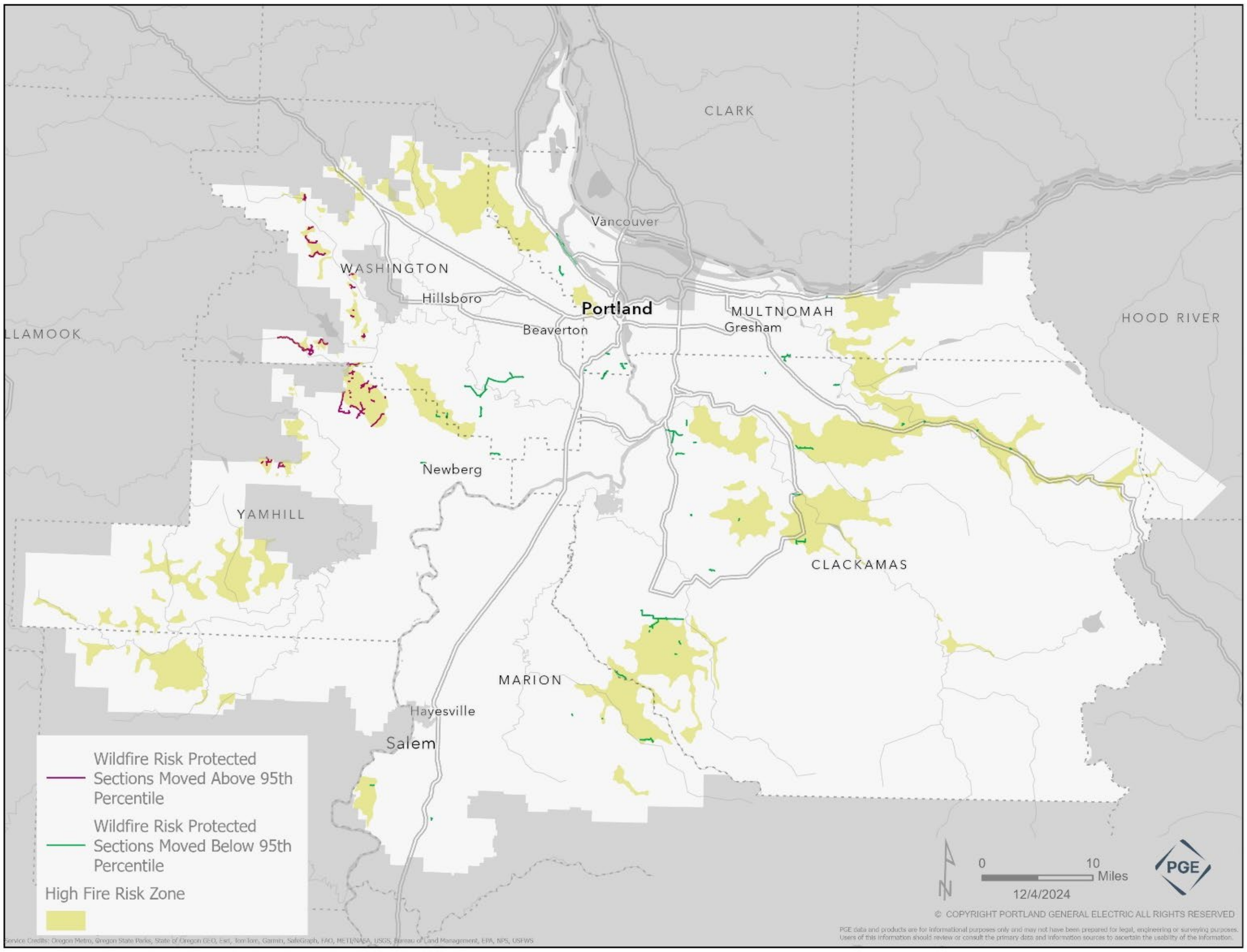


Figure 40: Wildfire Risk 95th Percentile Protected Section Movement

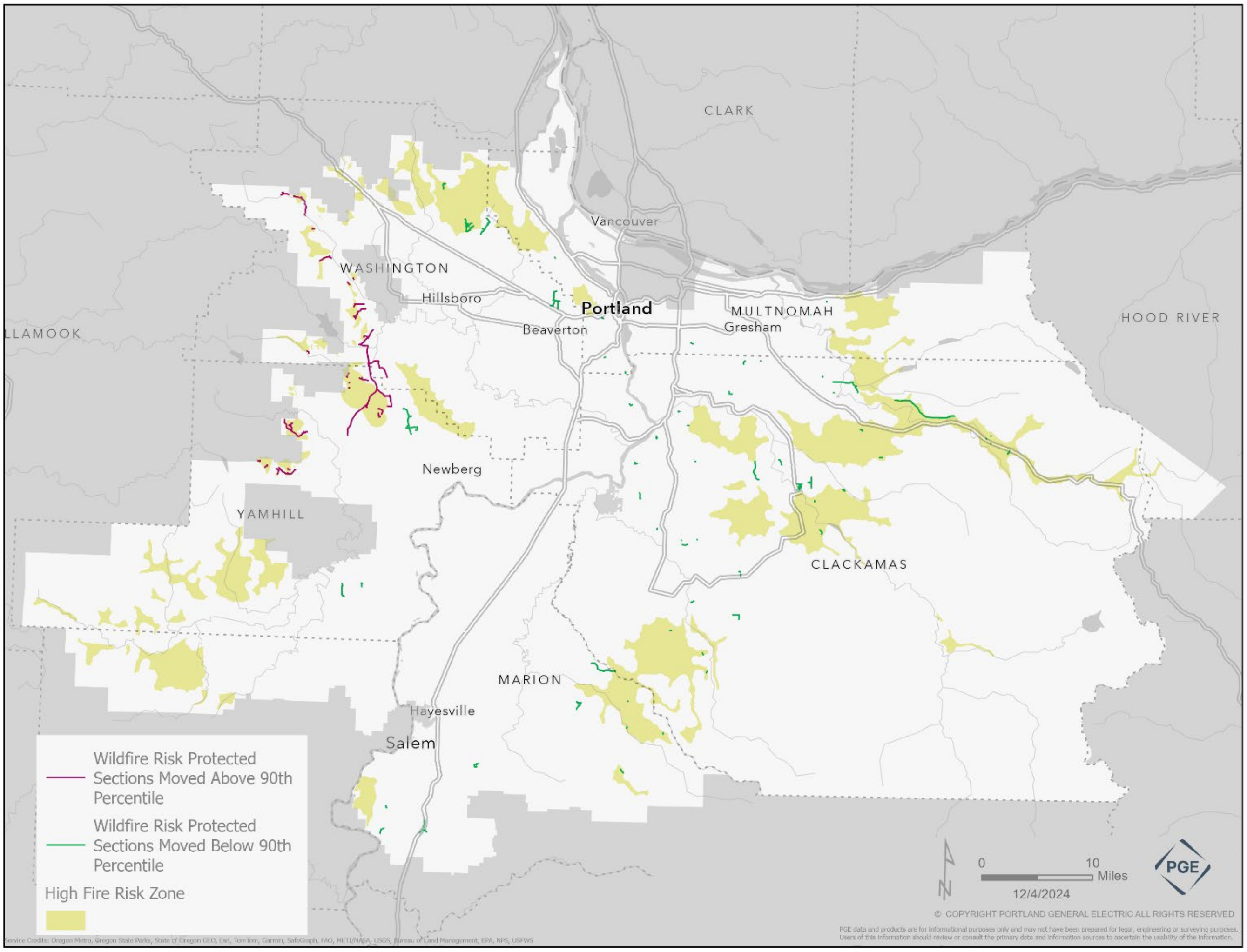


Figure 41: Wildfire Risk 90th Percentile Protected Section Movement

Wildfire behavior observations, the Oregon forest health assessment, and wildfire modeling suggest that vegetation in the PGE service territory is stressed and in poor health, potentially due to damage caused by the 2021 heat wave and successive years of drought. This poor forest health is likely the result of long-term climate and pest impacts and is contributing to changes in observed wildfire behavior and increased wildfire risk.

3.7 Consequence Adjustments

For the 2024 WMP, PGE made the following risk model adjustments to reflect consequences for customers and communities that are not quantified via risk modeling.

- All Zones: Social Vulnerability Index (Center for Disease Control)
- Zones 1 and 9: Drinking Water & Fire Suppression (Fire Agency)
- Zone 10: Cultural Resources (Tribal)
- Zone 11: Critical Infrastructure & Fire Suppression (Fire Agency)

For the 2025 WMP, PGE identified only one potential consequence adjustment of note.

3.8 Chehalem Adjustment: New HFRZ 12

PGE partnered with the Washington County Consolidated Communications Agency (WCCCA) to identify critical communications infrastructure in the newly designated HFRZ 12. WCCCA is the Public Safety Answering Point (PSAP)/911 center for Washington County and owner and operator of the area's public safety radio system. This feedback is a critical consequence in a specific location that could be impacted by a wildfire or PSPS event. PGE evaluated public safety asset locations in the Chehalem Mountains to determine whether the proposed HFRZ boundaries should be modified to include these assets; the analysis revealed that these critical communications assets are located within the proposed HFRZ boundaries with no adjustment.

This information contributed to the identification of the new Chehalem Mountains HFRZ 12 but had no identified system-wide impacts to PGE's 2024 risk.

3.9 Risk Register Update

The Risk Register is a dataset extracted from the models quantifying the aggregate reliability risk and wildfire risk for each asset and protected section on PGE's system, reflecting the updates identified in Steps 1 through 4 of the WRMA Annual Update Process. This tool allows risk to be viewed at the individual asset and protected section level; risk can also be rolled up to the feeder, substation, or transmission line level.

The Risk Register reflects baseline risk values. It is one of many key inputs used to identify potential PGE wildfire mitigation investment locations, establish execution priority, and support development of system-level metrics. It can be used as a starting point for business case evaluations, allowing assumptions to be updated throughout the year to reflect location-specific use cases.

The resulting 2025 Total Risk map is shown above in Section 3.1.4, 2025 WMP Baseline Risk, and the detailed risk register is provided with Confidential Appendix E: Sensitive Data.

3.10 Fire Agency Reviews

PGE improves risk modeling and analysis through annual engagement with fire agencies. At these engagements, fire agency representatives review risk modeling methodologies, assumptions, and results. PGE receives qualitative feedback during these engagements, which it uses to improve risk modeling methodologies and products.

Wildfire hazard and risk modeling are the foundation for PGE's Wildfire Mitigation Program. Modeling is a powerful tool for testing wildfire scenarios, predicting risk to communities and PGE's infrastructure, and for providing baseline data used to delineate HFRZs. However, modeling has inherent limitations and assumptions that require planners to critically evaluate outputs and to validate results.

Most notably, fire agencies provide critical insights about factors that impact fire growth potential. Examples of reviewed results and methodologies include drive times from fire stations to HFRZs, road network capacity and community egress challenges, wildfire detection likelihood, and wildfire modeling results.

3.10.1 Chehalem Mountains: New HFRZ 12

In 2024, PGE undertook a review of modeling and risk information for the Chehalem Mountains in Washington and Yamhill counties. This analysis showed relatively high wildfire risk due to challenging wildfire detection conditions: low population density, steep terrain, thick vegetation, longer-than-normal fire agency response times, and a complex and limited road network. All of these factors make wildfire detection and evacuations challenging within this portion of PGE's service territory.

PGE's goals for WRMA modeling include building and sustaining valuable public safety relationships and optimizing model accuracy and effectiveness. With these goals in mind, PGE collaborates with local public safety and firefighting agencies to obtain and incorporate their localized subject matter expertise into risk methodologies and analyses.

In 2024, PGE met with fire agency representatives from Washington and Yamhill counties to evaluate WRMA modeling in the Chehalem Mountains. During these engagements, fire agency representatives with extensive fire suppression experience and local area knowledge evaluated WRMA modeling assumptions and outputs to validate wildfire detection capabilities, firefighting response times, and potential community egress challenges, and to share recent wildfire behavior observations. PGE used these insights to update planning assumptions, to revise WRMA modeling and, ultimately, to create a new Chehalem Mountains HFRZ.

Table 9 provides an overview of the 2024 collaboration sessions between PGE and fire agencies that drove PGE's modeling updates:

Table 9: 2024 PGE & Stakeholder Collaborations

Zone	Participants	Date	Area of Change	Rationale	Change	Data Validation
Chehalem Mountains	Gaston Fire District, Tualatin Valley Fire and Rescue, Oregon Department of Forestry (ODF), Northwest Oregon District	10/28/2024	Increase the size of the 15-minute response time area in the northwest portion of the Chehalem Mountains	Drive times during fire responses were slower than modeled results in specific areas	Proposed revisions to the Travel Time from Fire Stations map	Firefighting response times, wildfire detection, community egress, wildfire behavior observations

Zone	Participants	Date	Area of Change	Rationale	Change	Data Validation
Santiam Canyon	ODF, North Cascades District; Confederated Tribes of the Warm Springs; U.S. Forest Service, Mt. Hood National Forest, and Willamette National Forest	11/6/2024	No change based upon feedback provided	Herbaceous fuels are increasing risk however current canopy helping with aerial suppression. Fuel stresses and fine fuel burns indicate another few years before reaching critical thresholds	No change	Climate models to burn and tree mortality. Aerial suppression limitations with increasing fire season and response.
Chehalem Mountains	Yamhill Fire Protection District, Forest Grove Fire & Rescue	11/13/2024	Increase the size of the 15-minute response time area in the northwest portion of the Chehalem Mountains	Drive times, debris encountered on Laurel fire and egress increased response times significantly	Proposed revisions to the Travel Time from Fire Stations map	Firefighting response times, wildfire detection, community egress, wildfire behavior observations

3.10.2 WILDFIRE DETECTION ANALYSIS

Fast growth and proximity to urban areas are key drivers in the development of large and destructive wildfires. Forest Grove Fire and Rescue's Chief Wineman identified a number of causes for worsening fire season conditions: "Fire seasons in Oregon have become longer, with more aggressive fire behavior. The contributing factors include hotter and drier fire seasons, the accumulation of fuels such as brush and storm debris, insufficient fuels management in forested regions, and more human-related ignitions due to increasing population in wildland-urban interface areas and poor risk management practices (e.g., fireworks, fire pits, backyard burns, cigarettes, fireplace embers)."

A recently published study[22] of wildfires from 2001 to 2020 across the contiguous U.S. found that wildfires that grow more than 1,620 hectares in one day account for 78 percent of structure damage and 61 percent of fire suppression costs. The study also found that climate change has caused the

[22] Balch, J, Iglesias, V, Mahood, A, Cook, M, Amaral, C, Decastro, A, Leyk, S, McIntosh, T, Nagy, C, Kolden, C, St. Denis, L, Tuff, T, Verleye, E, A. Williams: *The Fastest-Growing and Most Destructive Fires in the U.S. (2001 to 2020)* (*Science* Oct. 2024).

average peak daily growth rate for wildfires in the Western U.S. to increase 249% from 2001 to 2020. This represents a substantial increase in wildfire risk.

Wildfires have the potential to become large and destructive if the initial attack phase of fire suppression efforts is unsuccessful. In 2014, the U.S. Forest Service's Pacific Northwest Research Station published a study on initial attack efficacy that noted "A vigorous initial response to a wildfire, a process referred to as 'initial attack,' can greatly reduce the likelihood of the fire becoming larger and causing substantial damage."

Recognizing that the initial attack phase is critical to the prevention of large and destructive wildfires, PGE assesses factors influencing initial attack success when evaluating wildfire risk. These factors include the likelihood of rapid wildfire detection and the ease with which fire suppression resources can locate and access a wildfire.

Reports to public safety answering points such as 911 and active surveillance using wildfire camera networks are two of the key mechanisms driving new wildfire detection. To assess the likely timeline for new wildfire detection in the Chehalem Mountain area, PGE analyzed population density using both census data and customer density, with an underlying assumption that low population density results in longer detection times. The figures below depict Chehalem Mountain area population density (derived from the 2020 census) and PGE meter density within the HFRZ boundaries. These figures illustrate the relatively low population density in the Chehalem Mountain area, suggesting a lower likelihood of timely wildfire detection and elevated wildfire risk.

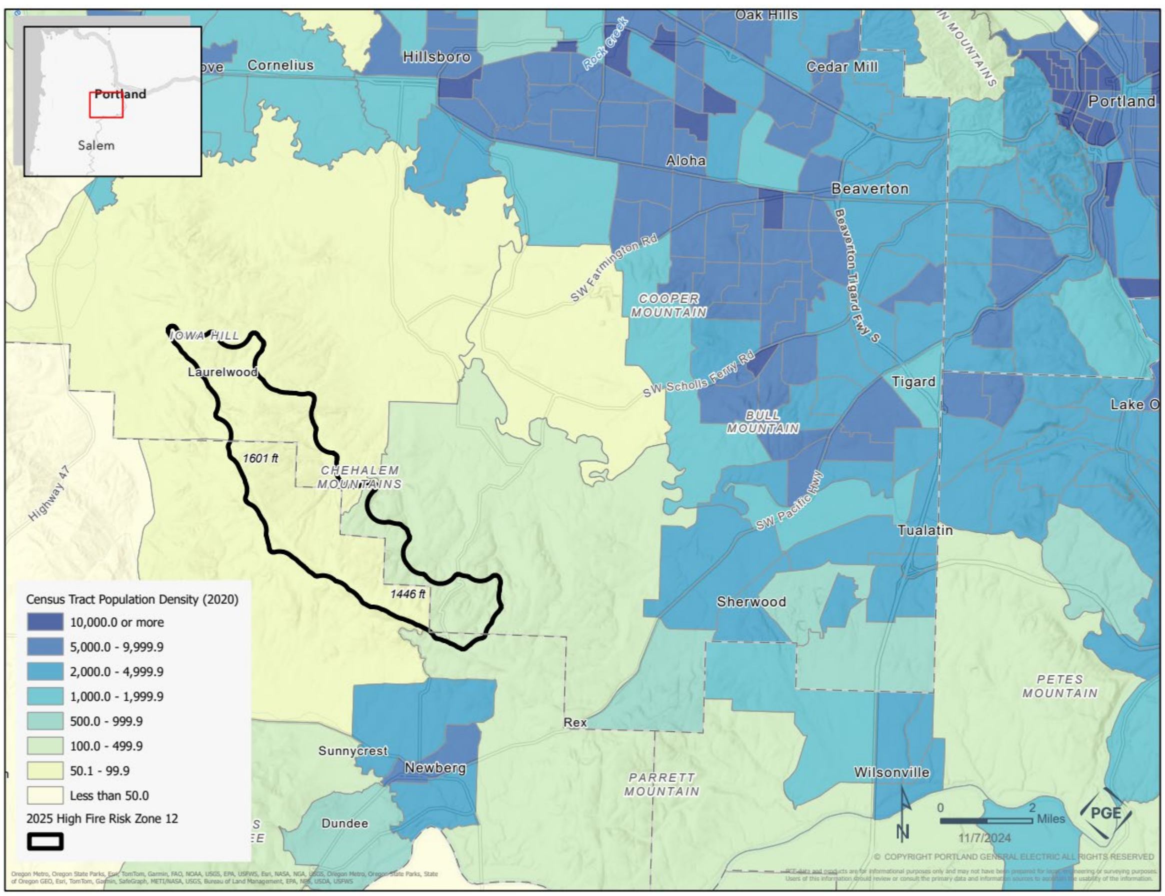


Figure 42: Census Tract Population Data for Chehalem Mountain HFRZ 12

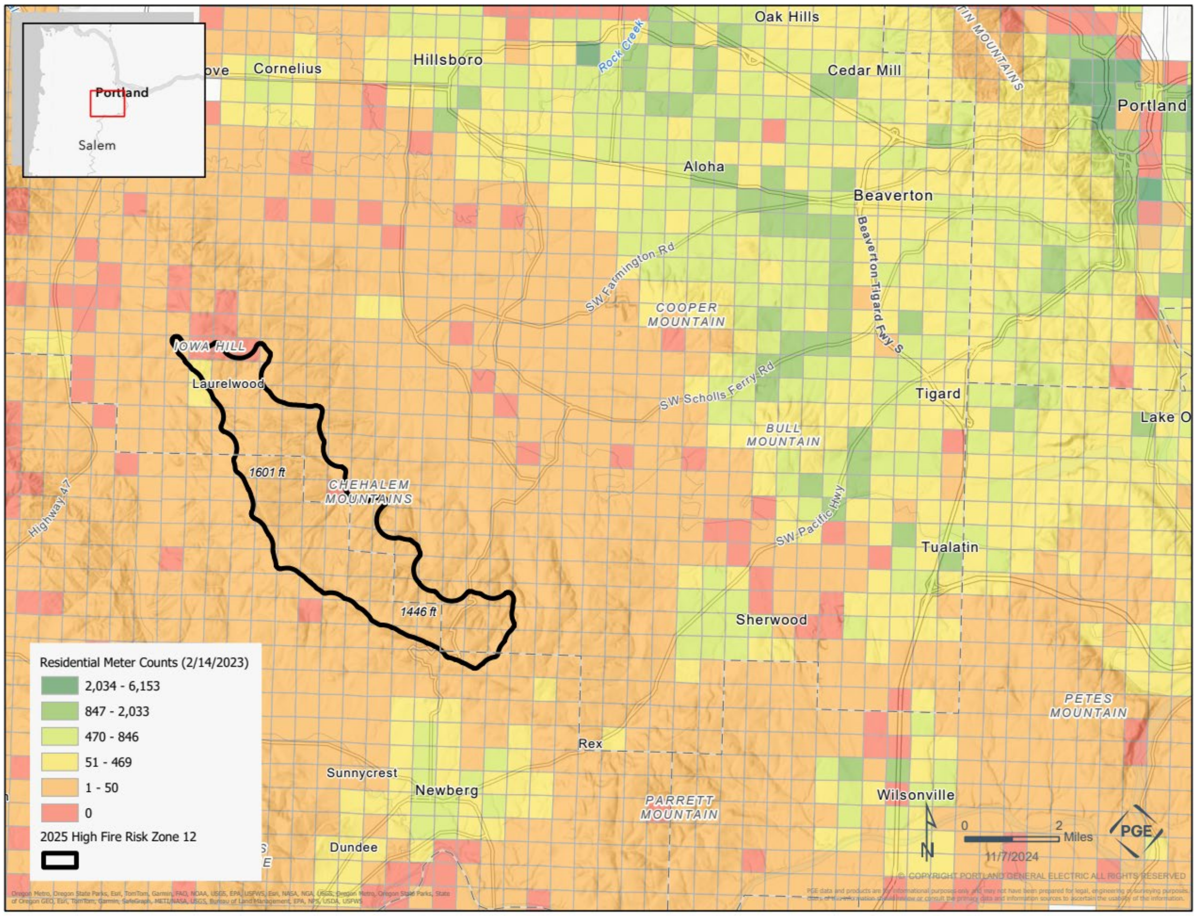


Figure 43: PGE Customer Meters in Chehalem Mountain HFRZ 12

To enhance wildfire situational awareness and decrease wildfire detection times, PGE has invested in wildfire observation cameras in the Chehalem Mountain area. These early wildfire detection camera systems improve PGE's wildfire surveillance and reporting capabilities by combining ultra-high-definition 360-degree views of the surveillance areas with advanced artificial intelligence algorithms capable of differentiating between smoke, steam, and mist. When these systems detect smoke plumes, they automatically dispatch notifications to impacted emergency response agencies to facilitate rapid detection and suppression.

PGE collaborated with Tualatin Valley Fire and Rescue and Gaston Rural Fire District to optimally site its AI-equipped high-definition camera systems within the Chehalem Mountain HFRZ. These first responders noted that detections made by PGE's wildfire cameras are often received before 911-sourced reports, illustrating the measurable improvement in detection capabilities possible through this technology.

PGE's prior collaborations with local area fire agencies identified gaps in camera coverage in the eastern section of the Chehalem Mountains HFRZ (figure below). In 2025, PGE will install two additional AI-enhanced wildfire cameras to further enhance its wildfire detection capabilities in this portion of its service territory.

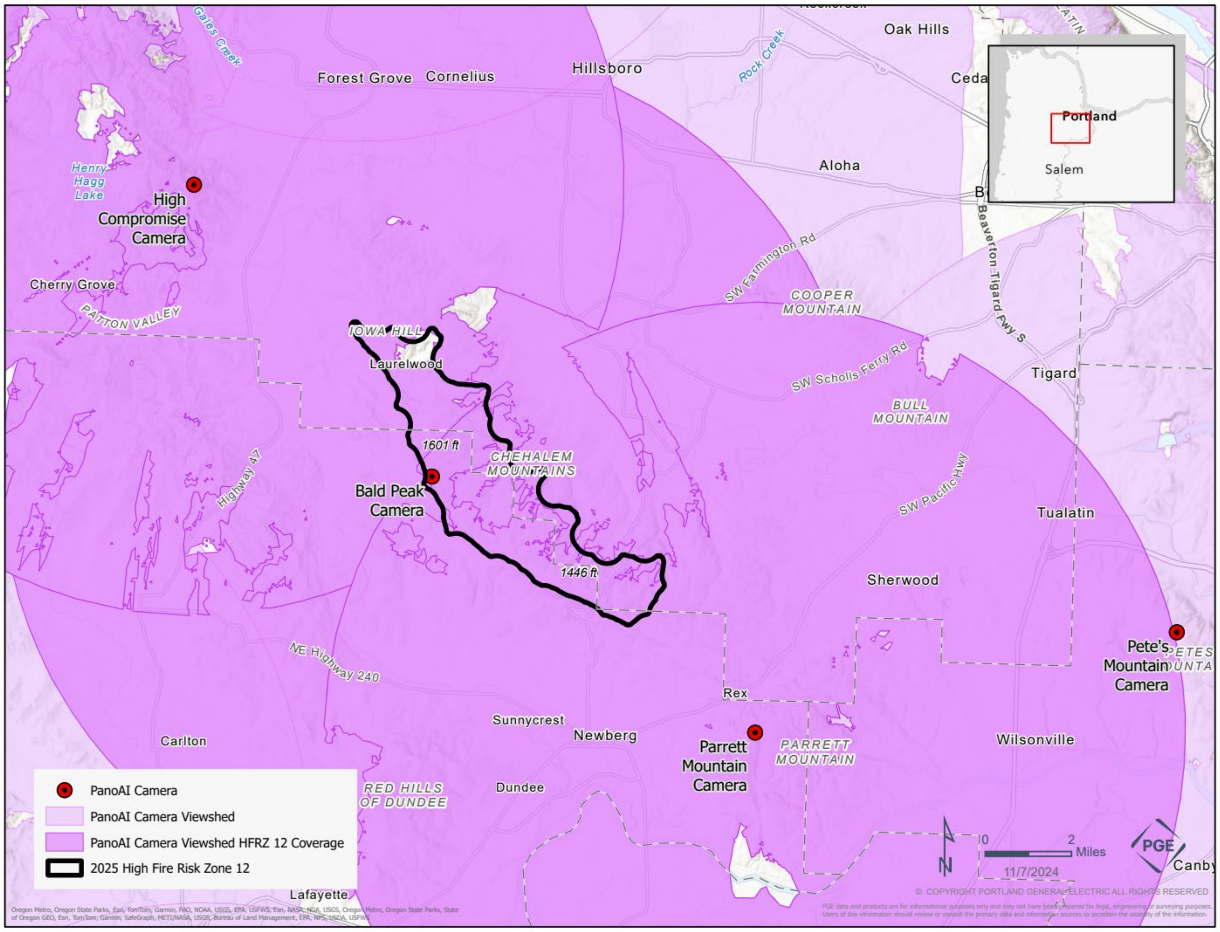


Figure 44: AI Camera Coverage Areas Around Chehalem Mountain HFRZ 12

3.10.3 Firefighting Response Times Analysis

Because firefighting response times correlate directly to increased wildfire size potential, PGE analyzes areas of its service territory to determine where long response times are most likely by creating a drive time model to predict response times. PGE collaborated with local area fire agencies to review and validate modeled response times. In 2025, PGE will partner with the WCCCA to compare actual firefighting response drive times to modeled predictions.

PGE used ESRI's Create Drive Time Areas (CDTA) tool to create its firefighting response time model. The input to this model is point locations of fire stations, obtained from the Oregon Department of the State Fire Marshal. The CDTA tool used these validated fire station locations to generate estimated drive times at 5-, 10-, and 15-minute intervals. Each fire station's modeled output by time interval was dissolved into continuous isochrones to create a continuous fire response drive time map. Given variations in fire station staffing levels at any given time, potential errors in the reported wildfire location, and variable resource availability due to other competing wildfire responses, the modeled response times are likely underestimates.

The figure below illustrates PGE's modeled fire agency response times used to determine HFRZs from the baseline risk map in Section 3.1.4, 2025 WMP Baseline Risk.

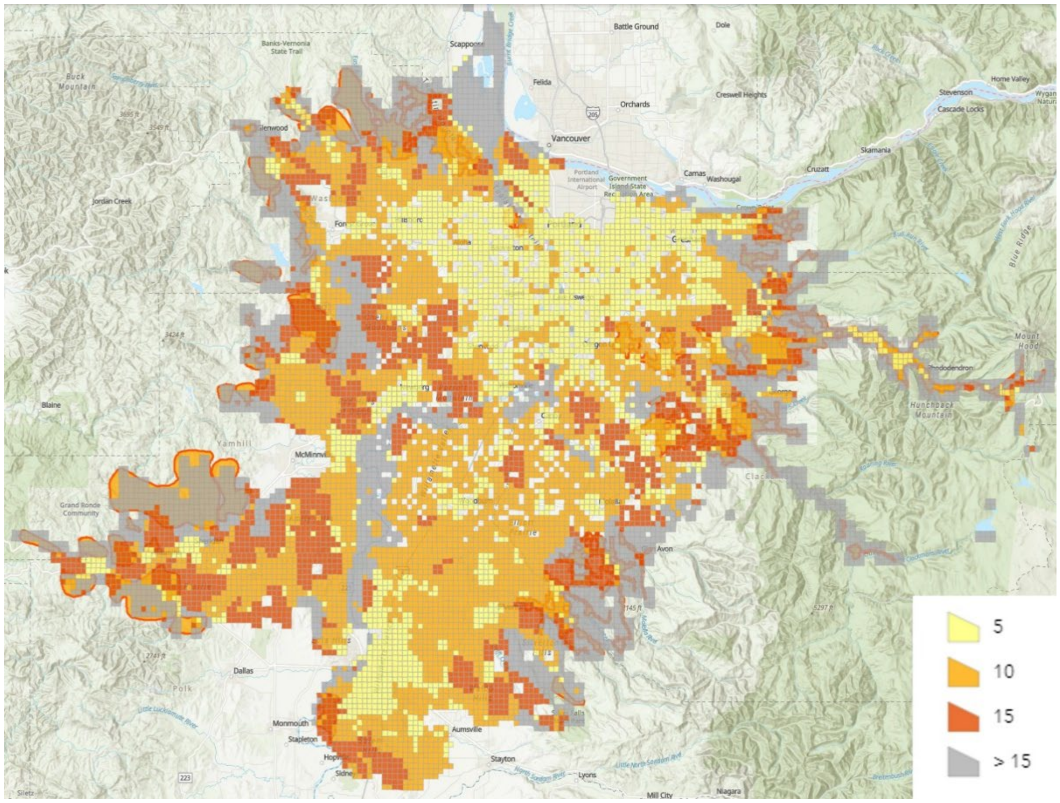


Figure 45: Modeled Fire Agency Response Times (minutes)

While collaborating with fire agency representatives to validate modeled firefighting response times, PGE learned that response times within the Chehalem Mountain area are typically longer due to visual impairment caused by steep terrain and vegetation height and density. In response to this feedback, PGE will update its 2025 maps to reflect increases above the modeled times. PGE will also collaborate with the WCCCA to conduct a second validation analysis comparing actual fire agency response times within the Chehalem Mountain HFRZ to modeled predictions.

Prior collaborations with fire agency representatives provided additional valuable insights into the drivers of large and uncontrollable wildfires. For example, areas with firefighting response times greater than 10 minutes in western areas of the PGE service territory (including the Chehalem Mountains HFRZ) have a higher likelihood of posing increased suppression challenges due to a lack of available aviation fire suppression resources. Firefighting response times for the Chehalem Mountains area are generally 15 or more minutes, which increases wildfire risk.

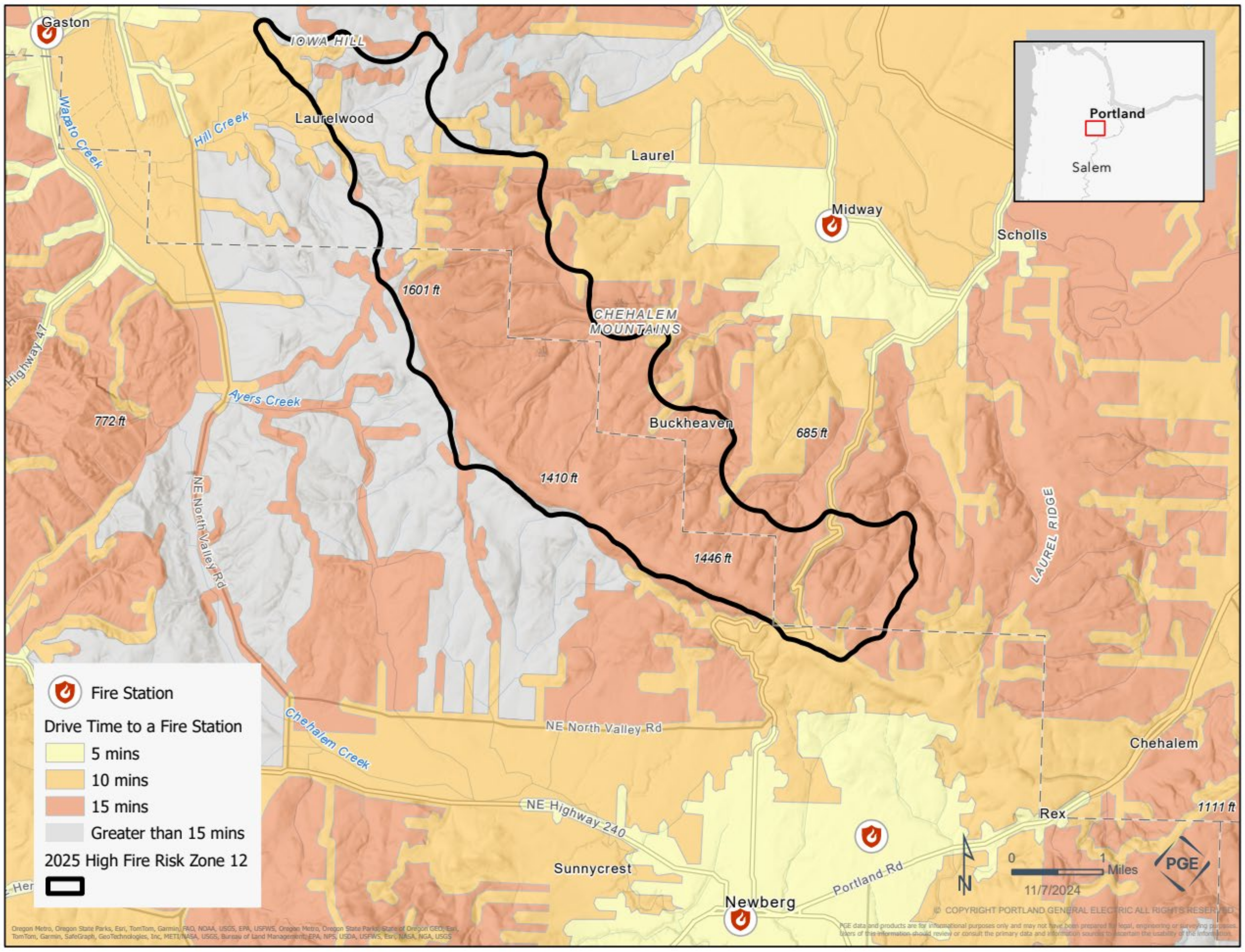


Figure 46: Modeled Drive Times in Chehalem Mountains HFRZ 12

3.10.4 Community Egress Analysis

Published wildfire research, such as the post-event studies for the 2017 Tubbs Fire[23] and 2018 Camp Fire,[24] highlight community vulnerabilities during wildfire evacuations due to limited evacuation routes, road capacity, and road network configuration, collectively referred to as egress capacity. Communities with limited egress capacity have higher wildfire risk.

To assess egress capacity-related wildfire risk within the Chehalem Mountains HFRZ, PGE conducted a road network analysis to identify areas with low egress capacity. The model overlaid a ½ mile grid on HERE road network data and computed the number of roads intersecting the boundaries of each grid cell. The figure below depicts the results of this analysis, showing widespread areas with limited egress points (poor egress capacity) and increased wildfire risk:

[23] Acevedo Loreto, L. M. (2019). *Temporal-spatial analysis of emergency evacuation traffic* (Master's thesis). Embry-Riddle Aeronautical University, Daytona Beach, FL. Retrieved from https://commons.erau.edu/edt

[24] National Institute of Standards and Technology. (2024). *The NIST Wildland-Urban Interface Fire Case Study Approach and Outlook* (NIST Technical Note 2296). U.S. Department of Commerce. https://doi.org/10.6028/NIST.TN.2296

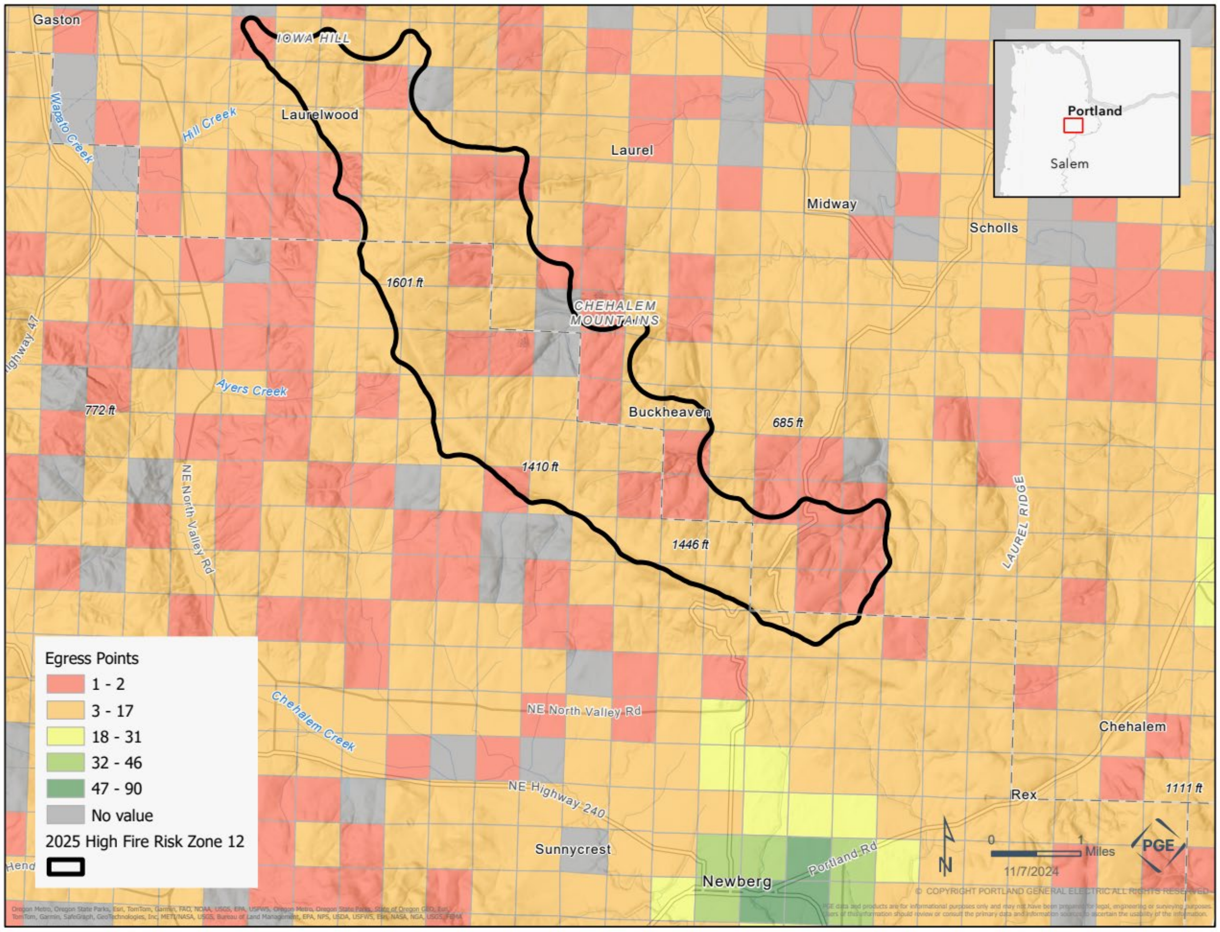


Figure 47: Egress Capacity in Chehalem Mountains HFRZ 12

3.11 High Fire Risk Zone Updates

As discussed in the sections above, PGE's 2024 risk modeling analysis resulted in the identification of a new HFRZ for 2025: HFRZ 12 (Chehalem Mountains). The new zone shown in Figure 48 has been tested and validated via modeling, field visits and fire agency review.

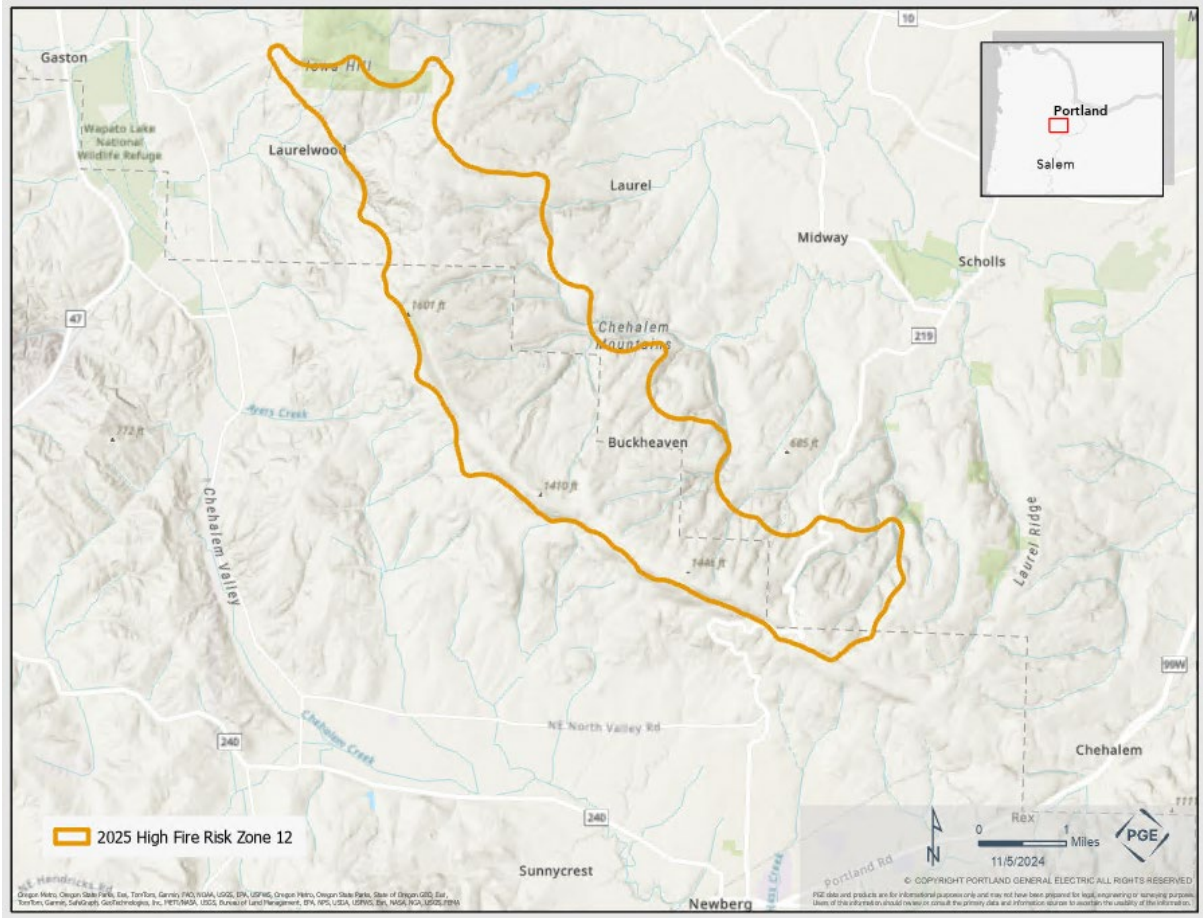


Figure 48: Chehalem Mountains New HFRZ 12

Figure 50 shows all of PGE's 2025 HFRZs. As shown in Figure 49, HFRZ 9 has been adjusted to reflect the benefits of System Hardening investments. Specifically, the Scoggins – Cherry Grove underground conversion project under Initiative GDSH-02 resulted in the removal of 8.7 line-miles of overhead conductor from HFRZ 9 in 2024.

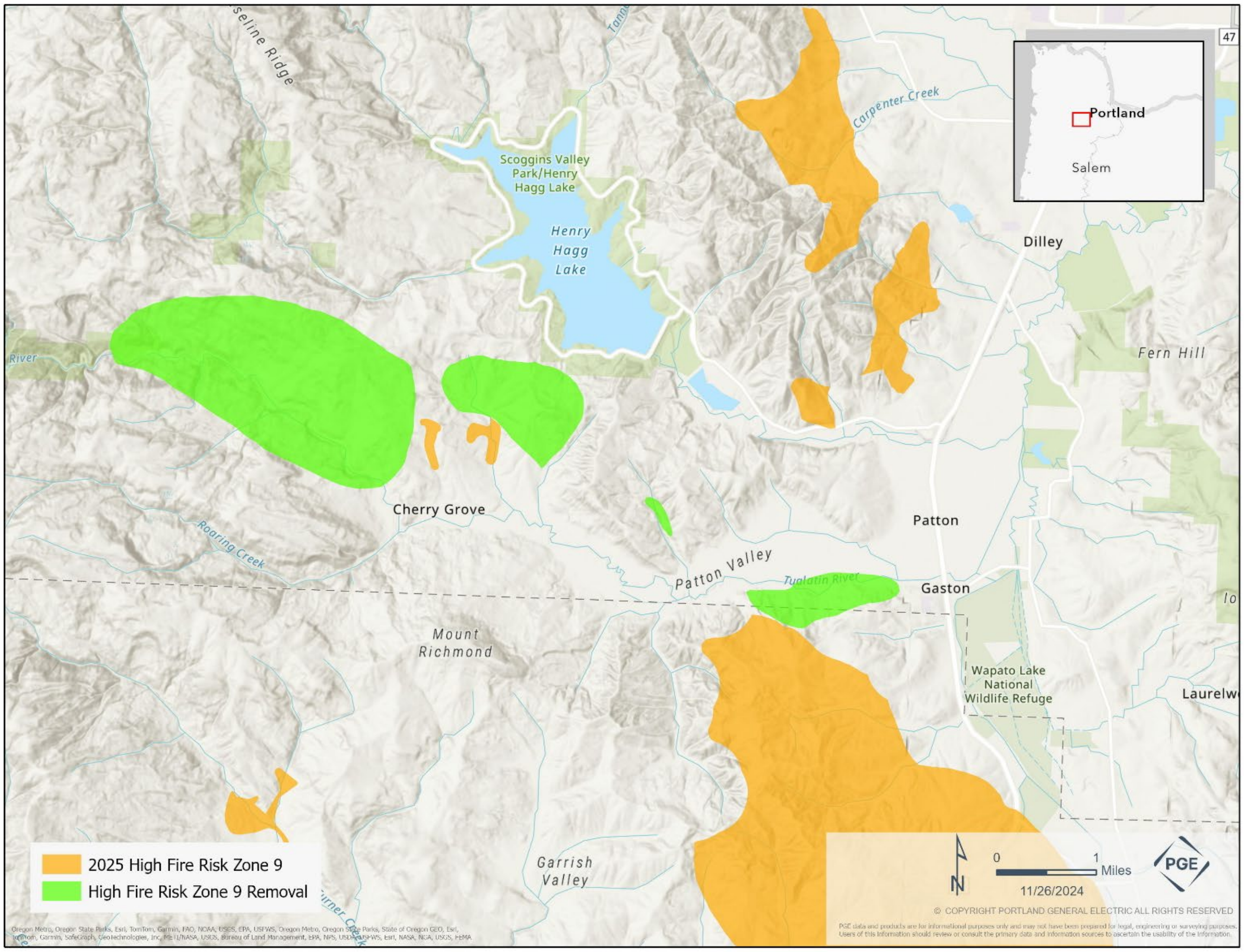


Figure 49: High Fire Risk Zone 9 Updates Due to System Hardening

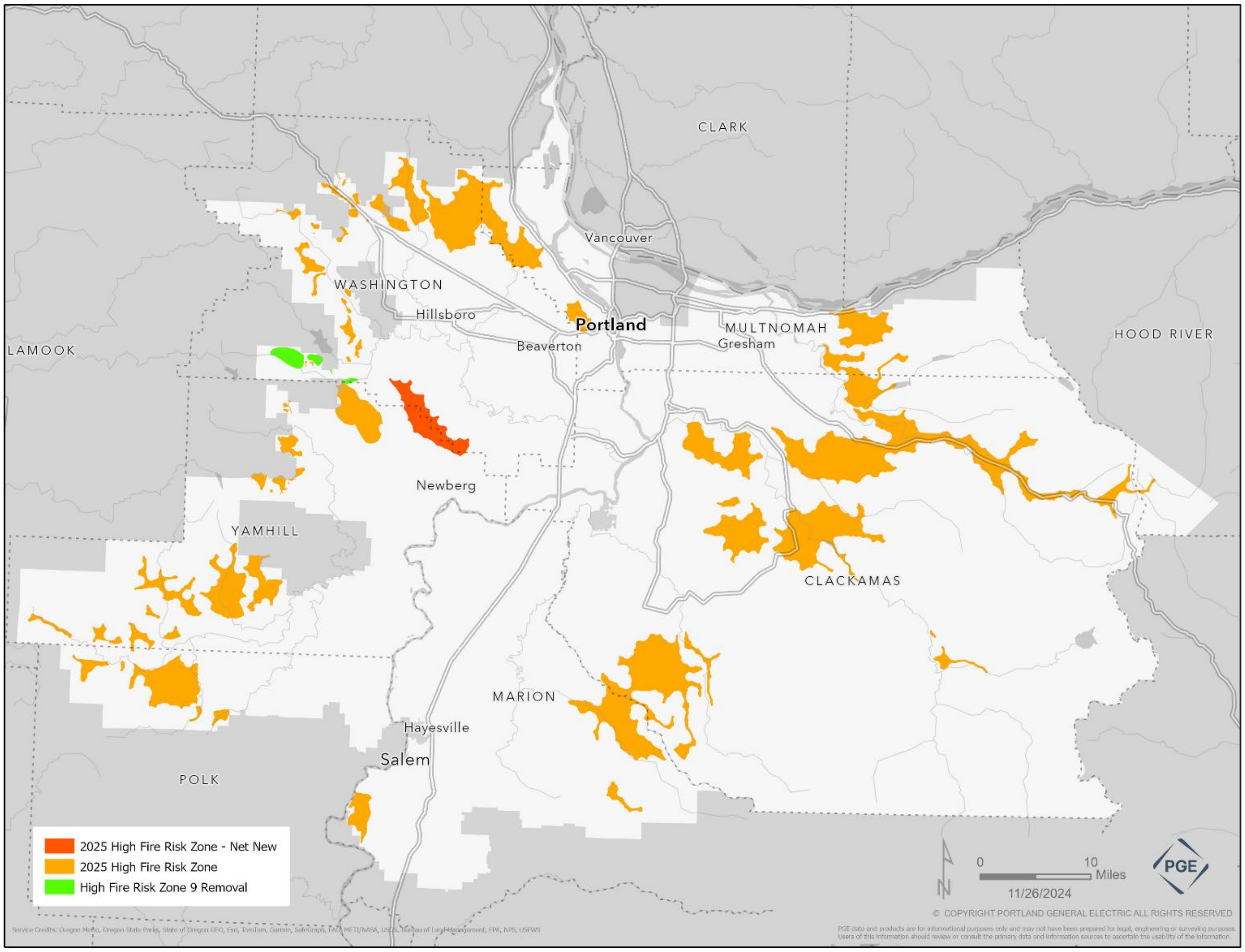


Figure 50: 2025 PGE High Fire Risk Zones

PGE updated its 2025 asset statistics for HFRZs 1–11 and calculated the asset statistics for HFRZ 12. These statistics are presented in Tables 10 and 11.

Table 10: Changes in Line-Miles

	Distribution Line Miles (Primary OH Miles)			Distribution Line Miles (Primary UG)			T&D Poles (Distribution structures + Transmission poles)			Customers (meters)		
HFRZ	**2024**	**2025**	**Net Change**	**2024**	**2025**	**Net Change**	**2024**	**2025**	**Net Change**	**2024**	**2025**	**Net Change**
Zone 1	249	254	2%	166	173	4%	7,851	8,353	6%	9,535	9,966	5%
Zone 2	25	25	0%	38	39	3%	704	728	3%	458	473	3%
Zone 3	50	57	14%	36	44	22%	1,349	1,575	17%	1,800	2,151	20%
Zone 4	138	145	5%	68	72	6%	3,693	3,916	6%	2,654	2,846	7%
Zone 5	150	155	3%	50	54	8%	3,426	3,592	5%	2,005	2,192	9%
Zone 6	16	19	19%	13	20	54%	743	1,002	35%	1,121	1,543	38%
Zone 7	91	95	4%	52	55	4%	2,171	2,284	5%	1,527	1,554	2%
Zone 8	43	43	0%	28	28	0%	1,061	1,063	0%	768	768	0%
Zone 9	82	73	(-11%)	43	39	-9%	1,916	1,722	-10%	1,043	953	-9%
Zone 10	133	133	0%	84	84	0%	3,084	3,093	0%	1,724	1,716	0%
Zone 11	18	18	0%	17	17	0%	466	474	2%	425	425	0%
Zone 12	NA	36	NA	NA	49	NA	NA	936	NA	NA	940	NA
TOTAL	**995**	**1,053**	**6%**	**595**	**672**	**13%**	**26,464**	**28,738**	**9%**	**23,060**	**25,527**	**11%**

Table 11: Changes in PGE Assets

	Ductile Iron Poles			Substations			Transformers			Reclosers			TripSavers			Fuses		
HFRZ	2024	2025	Net Change	2024	2025	Net Change	2024	2025	Net Change	2024	2025	Net Change	2024	2025	Net Change	2024	2025	Net Change
Zone 1	412	609	48%	4	4	0%	4,206	4,362	4%	29	32	10%	21	16	-24%	1,802	1,881	4%
Zone 2	30	52	73%	0	0	0%	340	349	3%	1	3	200%	2	2	0%	144	156	8%
Zone 3	23	49	113%	0	0	0%	939	1,127	20%	3	6	100%	1	1	0%	428	490	14%
Zone 4	162	316	95%	3	3	0%	1,698	1,808	6%	22	23	5%	4	5	25%	839	886	6%
Zone 5	56	220	293%	0	0	0%	1,399	1,503	7%	9	10	11%	6	7	17%	768	818	7%
Zone 6	2	17	750%	0	0	0%	373	499	34%	4	6	50%	5	5	0%	168	236	40%
Zone 7	44	127	189%	0	0	0%	1,080	1,111	3%	6	7	17%	0	0	0%	530	559	5%
Zone 8	20	28	40%	0	0	0%	549	549	0%	0	0	0%	0	0	0%	304	304	0%
Zone 9	105	120	14%	0	0	0%	848	772	-9%	0	0	0%	3	2	-33%	424	389	-8%
Zone 10	89	219	146%	0	0	0%	1,408	1,399	-1%	4	2	-50%	1	1	0%	673	680	1%
Zone 11	0	2	100%	0	0	0%	310	312	1%	0	0	0%	0	0	0%	155	156	1%
Zone 12	NA	1	NA	NA	0	NA	NA	723	NA	NA	8	NA	NA	0	NA	NA	379	NA
Total	943	1,759	87%	7	7	0%	13,150	14,514	10%	78	97	24%	43	39	-9%	6,235	6,934	11%

3.12 Third-Party Validation

PGE strives to account for, understand, and forecast wildfire risk factors across our service territory and generation areas. One way we do this is by identifying and reaching out to subject matter experts across the various wildfire risk fields, such as environmental science, climate, vegetation, wildfire behavior, and risk assessment. This outreach involves consultations with academic researchers, fire behavior analysts, fire meteorologists, remote sensing scientists, climate scientists, and fuels experts. By leveraging their expertise, PGE gained deeper insights into key factors driving wildfire risk:

- Which climate scenarios to use
- How best to monitor vegetation health
- Which physics to use on locally run wind modeling
- Local weather patterns/wind behavior
- Best environmental data sources.

Table 12: PGE 2024 External Wildfire SME Outreach/Interactions

Date	Organization	Purpose	Result/Learnings
7/24/2023	Western Regional Climate Center, Desert Research Institute	Discuss the fire weather impacts expected with climate change in the PNW	Discussion and several shared papers: expect an increased likelihood of extreme fire weather during autumn due to warmer temps and drier fuels, increased fuel aridity. PGE is exploring a Forest Drought-stress Index to quantify temperature as a potent driver of tree mortality.
7/28/2023	Pyregence, Spatial Informatics Group	Discuss the compounding stress effects on trees in the PNW	Higher confidence in using RCP8.5 as a climate outlook for planning basis.
9/1/2023	Northwest Interagency Coordination Center	Discuss Fire Weather patterns as well as the effect of changing climate and multiple droughts on the area fuels	Drought impacts were seen in 2023 in southern and eastern OR, need more intel on impacts over NW OR. Fire patterns are hot/dry/windy (with winds from E or N, small percentage from S which could change with climate change) or hot/dry/unstable.
4/9/2024	USFS Rocky Mountain Research Station	Discuss physics reflected in Wind Ninja downslope wind models	Using the non-neutral stability parameterization (Conservation of Mass solver) is currently the most suitable method to account for local atmospheric stability effects.
6/19/2024	Emeritus position as Chief Information Research Scientist (Emeritus) to the Director of Earth Sciences at NASA Goddard Space Flight Center	Evaluate the use of their fire weather/behavior tools/products (Wildfire Digital Twin)	The Chief Information Research Scientist will send their climate outlooks and keep PGE updated on the progress of the Wildfire Digital Twin modeling (late 2024/early 2025). PGE is engaging local utilities that may benefit from these products.

Date	Organization	Purpose	Result/Learnings
6/27/2024	OSU Extension Fire Program	Discuss OSU assistance with fuel risk modeling and nearby partner collaboration	Validated use of social vulnerability index (SVI) as a key consideration for identifying HFRZs. Exploring potential partnership to build more granular SVI model.
7/1/2024	NASA FireSense	Build partnership with NASA to improve risk modeling, data sharing, and meteorology services	Partnering with NASA on a Pacific NW regional fire/weather service model for cooperative and municipal utilities.
7/18/2024	Pyrologix	Improve proprietary fuel/fire spread risk model and evaluate fuel model effectiveness in PGE service territory	PGE is utilizing WRF and tying it to the weather scenarios for fire spread. Offered information on MT Climate office soil moisture studies and advancing the longer fire burn times and consequence modelling. PGE updated fire regime tail risk.
9/6/2024	USFS PNW Research Station	Coordinate tree species health /mortality research projects to test PGE modeling assumptions and Pacific NW fire regime shifts	Estimated the cost of a research study over the forests of NW Oregon. Direct confirmation of PGE's climate modifier of RCP 8.5 to include increases wildfire risk from likelihood (increased burn probability) and consequence (larger fires).
9/18/2024	EPRI - Climate Resilience Analyst	Identify a fuel health metric (satellite or in-situ) for Fire Potential Indices and determine which indices are suitable for heavily forested areas[25]	PGE is partnering with EPRI on fuel/vegetation library development.
10/1/2024	NASA Prediction of Worldwind Energy Resources (POWER)	Identify solar, meteorological, and soil moisture datasets from NASA research to inform risk modeling	Scheduled several meetings to continue collaboration.
11/1/2024	University of Florida Department of Plant Biology, Ecology, and Evolution	Test PGE's AWRR risk modeling, tree mortality models, and assumptions related to tree die-off	Confirmed PGE's RSE and mortality modeling assumptions based upon fire behavior and exponential increase in tree deaths.

[25] Normalized Difference Vegetative Index (NDVI) tends to oversaturate when applied to heavily forested areas in PGE's service territory

PGE is using this data and depth of insight to establish modified thresholds for vegetation clearance, optimize infrastructure, create, or enhance predictive models for fire-prone areas, understand and recommend new wildfire risk management technologies, and ensuring that all risk mitigation efforts align with the most current scientific research and wildfire management practices. Ultimately, continued collaboration with experts, fire agencies and universities will help us to prioritize risk areas and take proactive steps to safeguard communities and infrastructure.

3.13 Resulting Changes to Mitigation Initiatives

3.13.1 WILDFIRE MITIGATION STRATEGY OVERVIEW

3.13.1.1 Wildfire Mitigation Selection Process

Risk modeling enables PGE to identify diverse mitigations to address short-term, mid-term, and long-term risks. The figure below provides a high-level overview of this process.

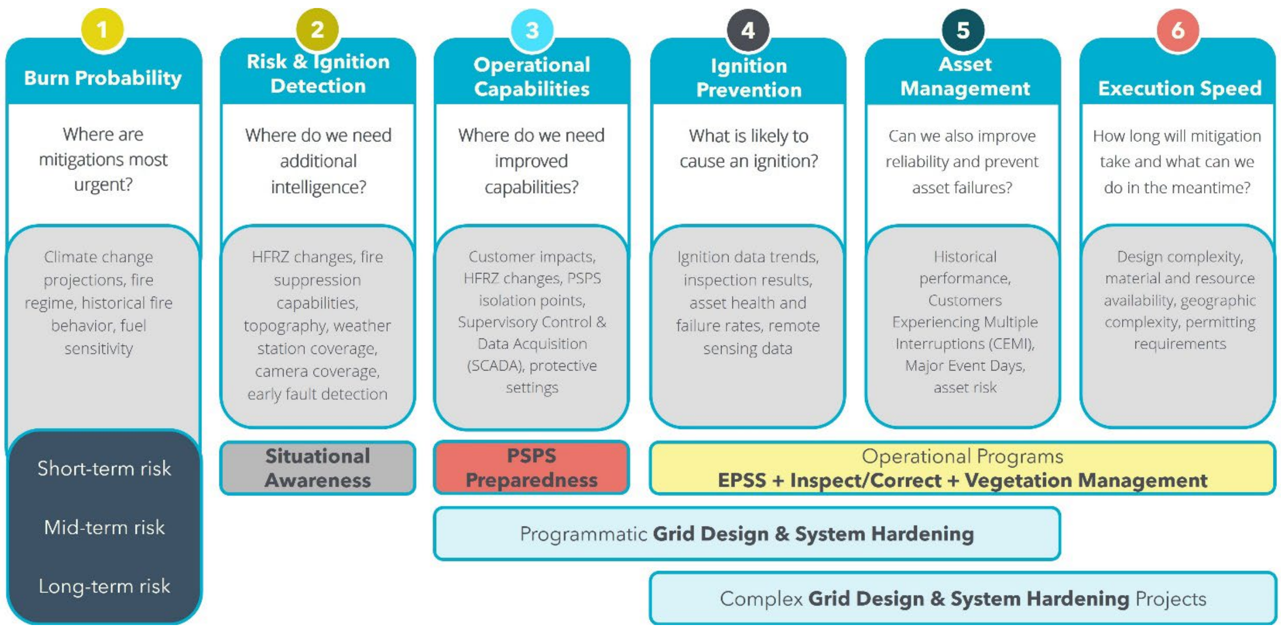


Figure 51: Wildfire Mitigation Identification Process

Burn Probability

There were no significant changes from 2024 to 2025 to PGE's relative burn probability estimates. As described in Section 3.5, Climate Change Impacts, current ecological forecasts for West of Cascades and the Coast Range indicate that the general direction of encroachment moves south to north and east to west. As a result, PGE continues to prioritize complex System Hardening investments in HFRZs 1, 2, 9, and 10. Risk modeling for the 2024 WMP identified HFRZ 4 as the next area of focus; this was confirmed by the 2025 WMP risk modeling with Zone 4 holding the second highest zonal wildfire risk. PGE began scoping the HFRZ 4 Estacada-North Fork project in 2024 for addition to the 2025 WMP.

Risk & Ignition Detection

2025 Situational Awareness investments are focused on ensuring coverage of new HFRZ 12 and outlying generation facilities. Prioritization of EFD deployment in 2025 considers the following factors:

- Number of overhead line-miles in an HFRZ
- Suitability for the use of covered conductor (not planned for underground conversion)
- Critical customer impacts of an outage
- Historical fault types and fault location capabilities

Operational Capabilities

2025 programmatic Grid Design investments are focused on PGE's new HFRZ 12 and outlying generation facilities to reduce PSPS vulnerability.

Ignition Prevention + Asset Management

To model the customer value delivered by its wildfire mitigation investments, PGE evaluates the effectiveness of multiple alternatives and selects specific initiatives or projects based upon Risk Spend Efficiency (RSE) and Value Spend Efficiency (VSE). This evaluation includes both ignition prevention and asset management principles as well as benefits associated with additional operational capabilities. In 2024, PGE expanded the application of this process beyond capital investments to include operational programs. The figure below provides an overview of this process:

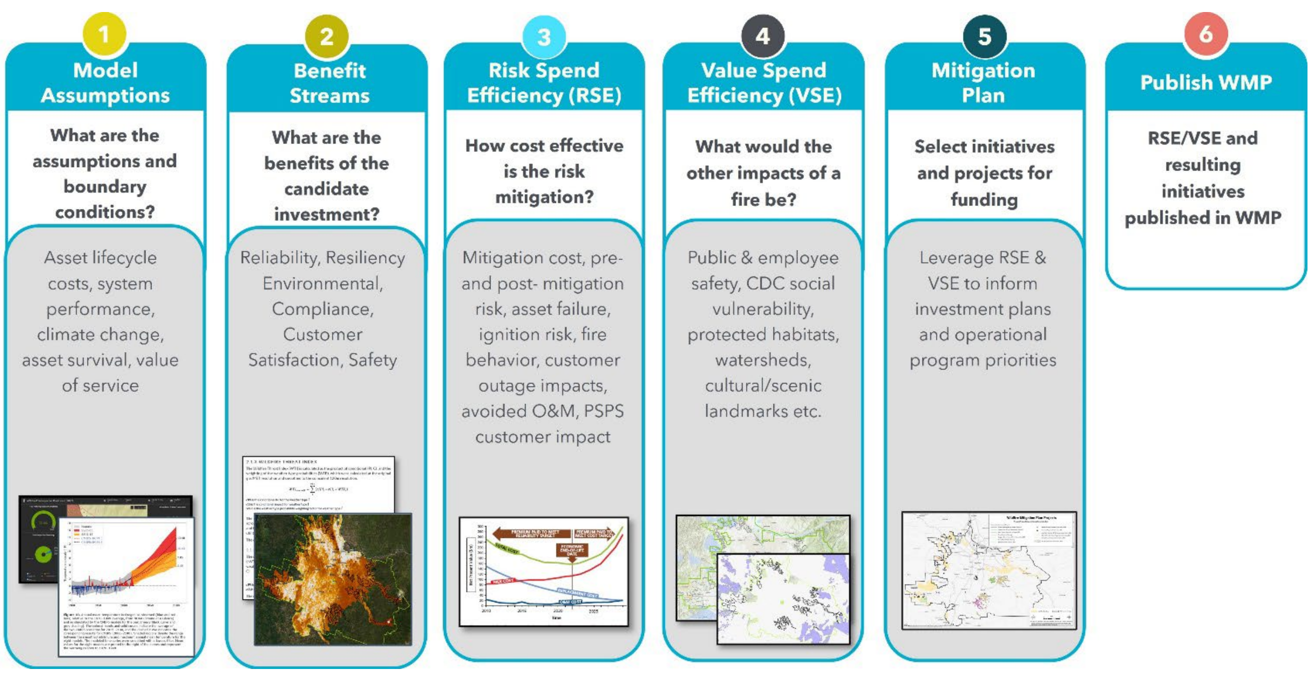


Figure 52: Risk and Value Spend Efficiency Process

3.13.1.2 Risk and Value Spend Efficiency Updates

In 2024, PGE updated RSE/VSE values for system hardening projects, calculated RSE/VSE values for situational awareness investments, matured RSE methodology for Vegetation Management, and developed RSE methodology for Ignition Prevention Inspections.

The figure below illustrates the relationship between risk, value, and mitigation impacts as detailed in Section 3.7 of PGE's 2024 WMP, Risk Informed-Decision Making.

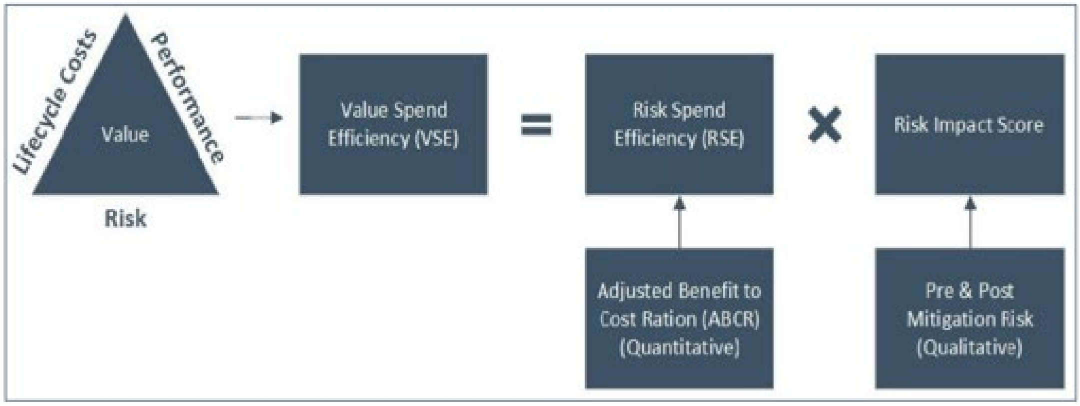


Figure 53: Risk and Value Spend Efficiency

The following sections detail the resulting RSE/VSE updates as well as estimated ignitions avoided. Totals shown in Tables 13 through 23 may not 'foot' due to rounding. Specific initiative target and expenditure updates can be found in Section 5, Existing Initiative Updates. Overall, the RSE/VSE updates did not result in significant changes to PGE's mitigation alternatives analysis for 2025.

Capital

The risk model updates detailed above resulted in adjustments to the VSE values reflected in Section 10, System Hardening, of PGE's 2024 WMP.

Based upon PGE's current wildfire risk modeling, in total, capital investments related to Grid Design, System Hardening, and Situational Awareness are estimated to reduce risk related to reliability, PSPS vulnerability, and wildfire by 40 percent for the life of the projects (over 50 years). This benefit reflects PGE's current capital investment forecast of approximately $275M for the next three to four years for identified projects. These investments yield a projected 107 avoided ignitions annually and provide an overall RSE of 79.

Operational

Development of RSE/VSE values for operational programs allows PGE to optimize programs and evaluate the tradeoffs between long-term system hardening investments and annual operational mitigations.

Based upon PGE's current wildfire risk modeling, the operational benefits of inspections and AWRR are estimated to provide 40 percent risk reduction in HFRZ over two years. These investments yield a projected 181 avoided ignitions annually and provide and overall RSE of 10.7.

3.13.2 Complex Grid Design and System Hardening

In accordance with Institute of Asset Management (IAM) principles,[26] long-term investments that require complex execution processes, including permitting with multiple agencies, must maintain

[26] IAM Risk Assessment and Management 2016 v1.1 Chapter 31

stable project schedules. As such, small changes in RSE/VSE values for long-term investments will not cause projects to start and stop. Imminent hazards can disrupt long-term investment execution with rapid re-prioritization; however, this was not a factor for the 2025 WMP Update. The underground projects identified in 2024 remain PGE's highest priority for risk reduction, as confirmed this year by incidents such as the Lee Falls fire in HFRZ 9 near PGE's Scoggins-Cherry Grove project.

3.13.2.1 GDSH-02: Underground

Due to the complex execution process associated with underground conversion projects, the following updates resulted in no major changes to PGE's 2025 system hardening mitigation plans. The updated values will be used to prioritize the investments included in PGE's 2026-2028 Multi-year WMP.

Table 13: 2024 RSE and Annual Ignitions Avoided–Underground

2024 Model						
Project	**Value Spend Efficiency (VSE)**	=	**Risk Spend Efficiency**	X	**Risk Impact Score**	**Annual Ignitions Avoided**
WF - UG Scoggins Cherry Grove (includes all sections)	234	=	3.5	X	66	1
WF - UG Grand Ronde - Agency (Grand Ronde Project)	322	=	5.6	X	57	1
WF - UG Willamina - Buell	482	=	6.8	X	71	2

Table 14: 2025 RSE and Annual Ignitions Avoided–Underground

2025 Model						
Project	**Value Spend Efficiency (VSE)**	=	**Risk Spend Efficiency**	X	**Risk Impact Score**	**Annual Ignitions Avoided**
WF - UG Scoggins Cherry Grove (Phase 1)	6,491	=	75.5	X	86	1
WF - UG Scoggins Cherry Grove (Phase 2)	213	=	8.9	X	24	<1
WF - UG Grand Ronde - Agency (Grand Ronde Project)	312	=	9.2	X	34	<1
WF - UG Willamina - Buell	791	=	8.7	X	91	1
WF - UG Orient-Oxbow	5,830	=	64.1	X	91	4
WF - UG Summit 13	12,752	=	184.8	X	69	3
WF – UG Estacada-North Fork	643	=	8.9	X	72	5

In addition to reliability and ignition prevention benefits, underground conversion capital investments result in reduced O&M expenses associated with Vegetation Management. Table 15, below, shows some of the cost benefit details. In 2025, upward cost pressures impacting the AWRR program were partially offset by an $0.8 M benefit resulting from the Scoggins–Cherry Grove and Grand Ronde–Agency underground conversions. For additional details, refer to Section 5.10.

Table 15: Capital Costs vs. AWRR O&M Savings–Underground

Project	Expected Total Capital Costs	Expected Annual AWRR O&M savings post completion
WF - UG Scoggins Cherry Grove (includes all sections)	$11M	$0.4M
WF - UG Grand Ronde - Agency	$10.1M	$0.4M
WF - UG Willamina - Buell	$32.9M	$0.6M
WF - UG Orient-Oxbow	$19.8M	$0.3M
WF - UG Summit 13	$16.2M	$0.1M
WF - UG Estacada-North Fork	$87.1M[27]	$0.9M

3.13.2.2 GDSH-03: Reconductor

Due to the complex nature and slow execution speed of reconductor projects, the following updates resulted in no major changes to PGE's 2025 system hardening mitigation plans.

Table 16: 2024 RSE and Annual Ignitions Avoided–Reconductor

2024						
Project	Value Spend Efficiency (VSE)	=	Risk Spend Efficiency	X	Risk Impact Score	Annual Ignitions Avoided
WF – RC North Plains – Mason Hill	719	=	72	X	10	10

Table 17: 2025 RSE and Annual Ignitions Avoided–Reconductor

2025						
Project	Value Spend Efficiency (VSE)	=	Risk Spend Efficiency	X	Risk Impact Score	Annual Ignitions Avoided
WF–RC North Plains–Mason Hill	98	=	9.8	X	10	1
WF–RC Rock Creek-Newberry	12.5	=	2.5	X	5	<1

[27] Estacada-North Fork project will include both underground and covered conductor mitigation; costs shown are for undergrounding estimate only.

3.13.2.3 GDSH-04: Covered Conductor

Due to the complex execution process required to complete covered conductor projects, the following updates resulted no major updates to PGE's 2025 system hardening mitigation plans.

Table 18: 2024 RSE and Annual Ignitions Avoided-Covered Conductor

2024						
Project	**Value Spend Efficiency (VSE)**	**=**	**Risk Spend Efficiency**	**X**	**Risk Impact Score**	**Annual Ignitions Avoided**
WF-RC Leland-Carus	132	=	8.8	X	15	9

Table 19: 2025 RSE and Annual Ignitions Avoided-Covered Conductor

2025						
Project	**Value Spend Efficiency (VSE)**	**=**	**Risk Spend Efficiency**	**X**	**Risk Impact Score**	**Annual Ignitions Avoided**
WF – RC Leland - Carus	239	=	15.9	X	15	8
WF – Estacada – North Fork	69	=	6.9	X	10	2

3.13.3 Programmatic Grid Design and System Hardening

Prioritization of programmatic system hardening investments is driven primarily by changes in HFRZs, the need for additional operational capabilities, and inspection findings. As such, the following updates resulted in no major changes to the 2025 system hardening mitigation plans.

- GDSH-05: Distribution Pole Replacement
- GDSH-06: Transmission Structure Replacement
- GDSH-07: Points of Isolation
- GDSH-08: Fire Safe Fuses

Table 20: 2024 RSE and Annual Ignitions Avoided-Programmatic

2024 Model						
Project	**Value Spend Efficiency (VSE)**	**=**	**Risk Spend Efficiency (RSE)**	**X**	**Risk Impact Score**	**Annual Ignitions Avoided**
Points of Isolation	1,332	=	66.6	X	20	0
Fire Safe Fuses	59	=	1.5	X	38	<1

Table 21: 2025 RSE and Annual Ignitions Avoided-Programmatic

2025 Model						
Project	**Value Spend Efficiency (VSE)**	**=**	**Risk Spend Efficiency (RSE)**	**X**	**Risk Impact Score**	**Annual Ignitions Avoided**
Distribution Pole Rpl.	30	=	1.0	X	30	<1
Transmission Structure Rpl.	22	=	1.2	X	19	<1
Points of Isolation	98	=	32.7	X	3	0
Fire Safe Fuses	3	=	1.1	X	3	<1

3.13.4 SITUATIONAL AWARENESS

Prioritization of programmatic situational awareness investments is driven primarily by changes in HFRZs and gaps in risk awareness. In 2024, PGE calculated RSE and VSE values for the Early Fault Detection (EFD) initiative SA-04 assuming operational response over the life of the asset. This update justified transitioning the 2024 EFD pilot to an ongoing program.

Table 22: 2025 RSE and Annual Ignitions Avoided–Situational Awareness

2025 Model						
Project	**Value Spend Efficiency (VSE)**	=	**Risk Spend Efficiency (RSE)**	X	**Risk Impact Score**	**Annual Ignitions Avoided**
WF–Early Fault Detection (2023 scope)	50,910	=	5,091.0	X	10	32
WF–Early Fault Detection (2024 scope)	19,320	=	1,932.0	X	10	15
WF–Early Fault Detection (2025 scope)	17,833	=	1,783.3	X	10	35

3.13.5 OPERATIONAL PROGRAMS

Prioritization of operational programs is primarily driven by changes in HFRZs. In 2024, PGE developed RSE and VSE methodologies for two operational programs, allowing analysis of various program designs and comparison with longer term mitigation investments. The RSE methodology enabled PGE to evaluate seven different AWRR program structures across each individual HFRZ. The results indicated that continuation of the 2024 plan, with program updates described in Section 5.10, Vegetation Management, provided the best risk mitigation while balancing customer price impacts. See Section 3.13 for additional details related to Vegetation Management Risk Updates.

- IC-01 through IC-03 Inspect/Correct
- VM-01 through VM-05 Vegetation Management AWRR

Table 23: 2025 RSE and Annual Ignitions Avoided-Operational Programs

2025 Model						
Project	**Value Spend Efficiency (VSE)**	**=**	**Risk Spend Efficiency (RSE)**	**X**	**Risk Impact Score**	**Annual Ignitions Avoided**
Inspect/Correct	86		8.6	X	10	7
Vegetation Management	356	=	14.3	X	25	174

3.14 Vegetation Management Risk Updates

3.14.1 RISK-BASED PRIORITIZATION AND OPTIMIZATION

As part of its foundational risk-based wildfire planning strategy, PGE has leveraged advancements in risk modeling and remote sensing data to inform PGE's AWRR program. PGE's risk modeling informs how AWRR patrols are prioritized, which uses empirical data and sophisticated models to provide a span-by-span risk ranking of line-miles across all of PGE's HFRZs.

Prioritization of AWRR patrols considers the historic vegetation outage data at the protected section level of a feeder overlaid across the Ignition Potential Index (IPI). As described in Section 8.3, Fire Behavior Modeling, IPI is a calculated value run across 216 weather scenarios to create approximately 85,000 simulations.

Figure 54 shows the vegetation-related outages across all HFRZs during fire season. This analysis directly informs PGE's AWRR inspection prioritization, as all 12 PGE HFRZs receive annual vegetation patrols.

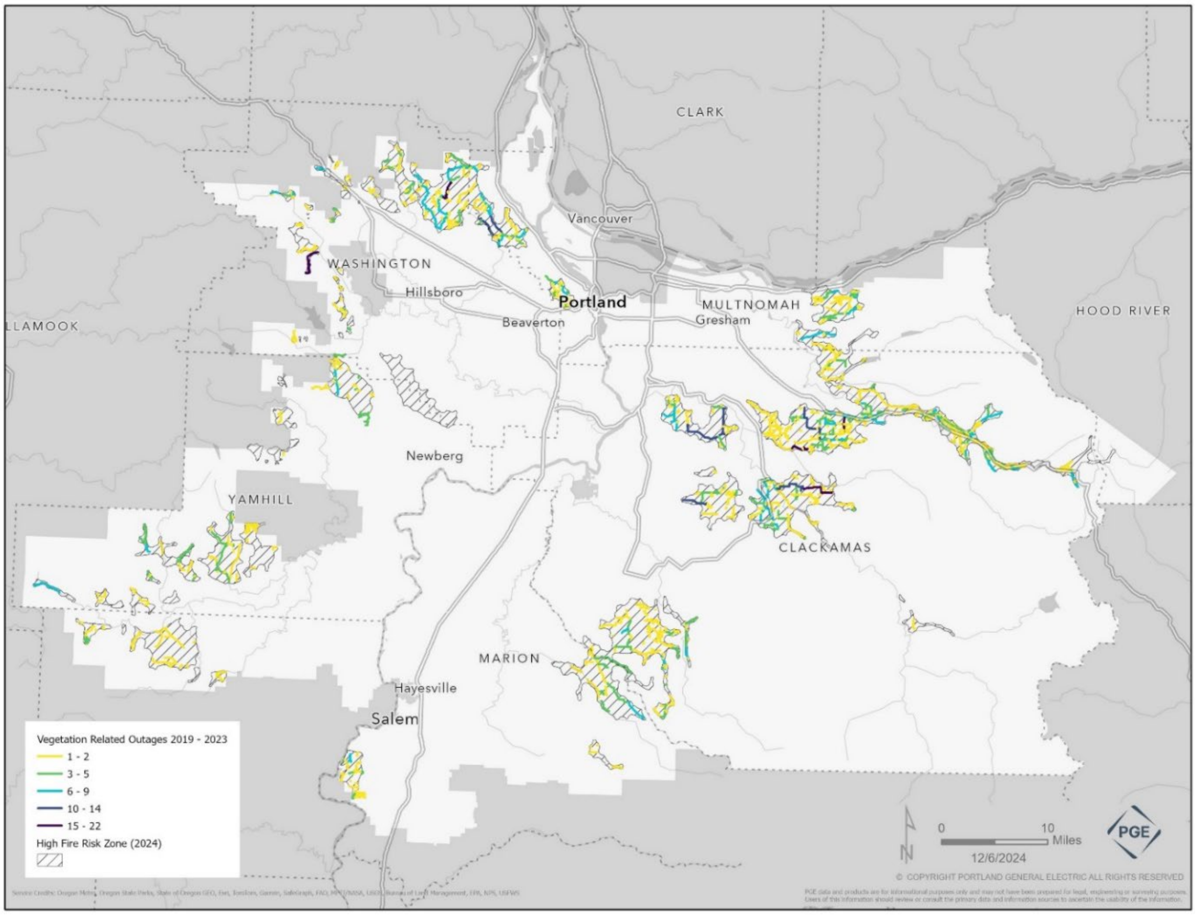


Figure 54: Vegetation-Caused Outages Across PGE HFRZs, 2019-2023

The goal of using PGE's IPI analysis is to ensure that the highest priority sections are inspected first, prior to the start of fire season. The scenarios are ranked 1-5, where 5 reflects the highest outage count and the highest IPI. Overlaying the vegetation-caused outage data with the IPI results in the risk prioritized locations shown in Figure 55.

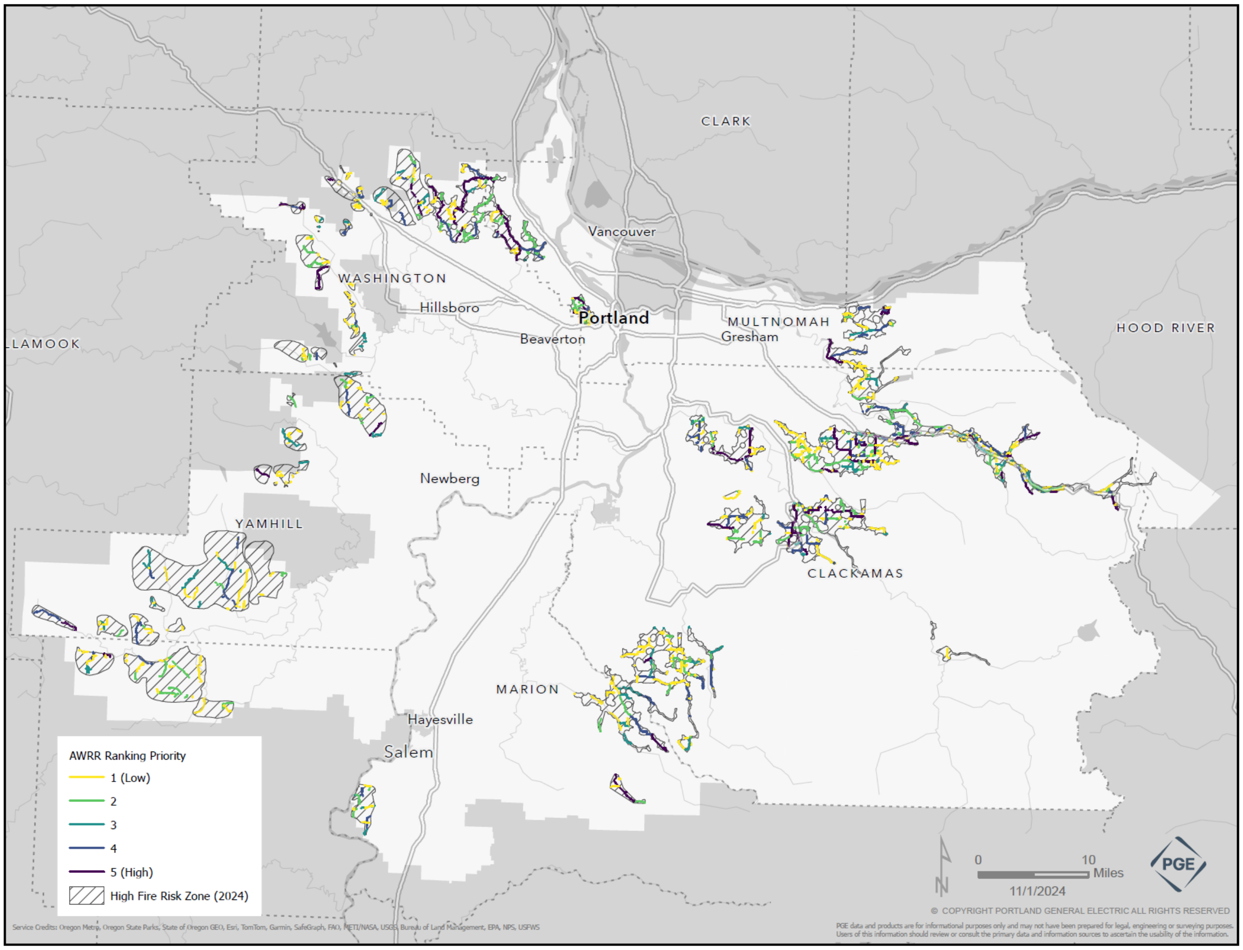


Figure 55: Combined Risk Overlay, Worst-Case Outages, Overlaid to 75th IPI Percentile

This overlay allows AWRR crews to conduct inspections across all PGE HFRZs, including locations with the highest chance of a fault (ignition event) during the typical fire season window (June – October) at a selected IPI scenario (75th percentile).

3.14.2 AWRR Risk Spend Efficiency (RSE)

In 2024, PGE matured the RSE methodology for its vegetation management program. In response to direct feedback from the OPUC, PGE became the first utility in Oregon to pilot an RSE methodology for Vegetation Management. PGE is providing the details of the Vegetation RSE and mortality models in which climate change and fire behavior come together to understand how different AWRR programs and prioritizations are designed.

Since the initial pilot in early 2024, PGE incorporated additional OPUC feedback, including an updated fall-in risk algorithm. The historical linear best-fitting method has been updated to train a Neural Network Machine Learning model. Details on these algorithm updates are provided in Section 3.3, Asset Review Methodology Update.

PGE has shared its methodology at the International Risk Workshops and Modeling Conference (IRWMC) to validate assumptions, modeling techniques, and findings, as well as share learnings with utility members worldwide. PGE's work was acknowledged as industry-leading by several utilities, including those in California, looking to adopt similar methods for optimizing their vegetation management programs.[28]

3.14.2.1 Tree Mortality

Key concepts of this work rely on understanding tree mortality. As shared in the Climate Change and Fuels Impact section, climate change is causing significant, sometimes exponential, tree death across all ecoregions, not just in PGE's service territory. This phenomenon involves multiple complex factors, including pests (e.g., beetles), soil moisture (e.g., water budget), and increasing temperature extremes and drought conditions. For example, the Evaporative Drought Demand Index (EDDI) for PGE's service territory shows that PGE has had relative drought conditions for most of the last 20 years.

The temperature projections under RCP 8.5 (previously shared PGE's 2024 WMP) resulted in a down-scaled temperature model for PGE created by Oregon State University.

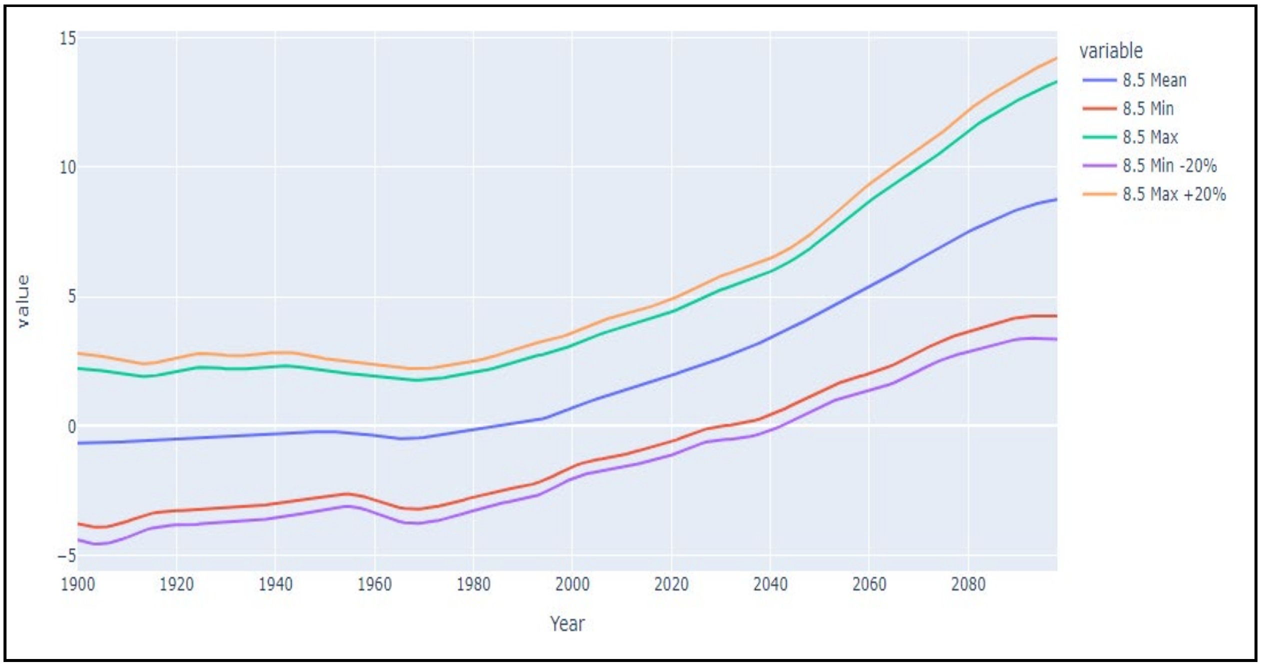


Figure 56: Temperature Projections Under RCP 8.5

[28] IWRMC Executive & Utility Risk Sharing Sessions 10-15-24, 10-17-24

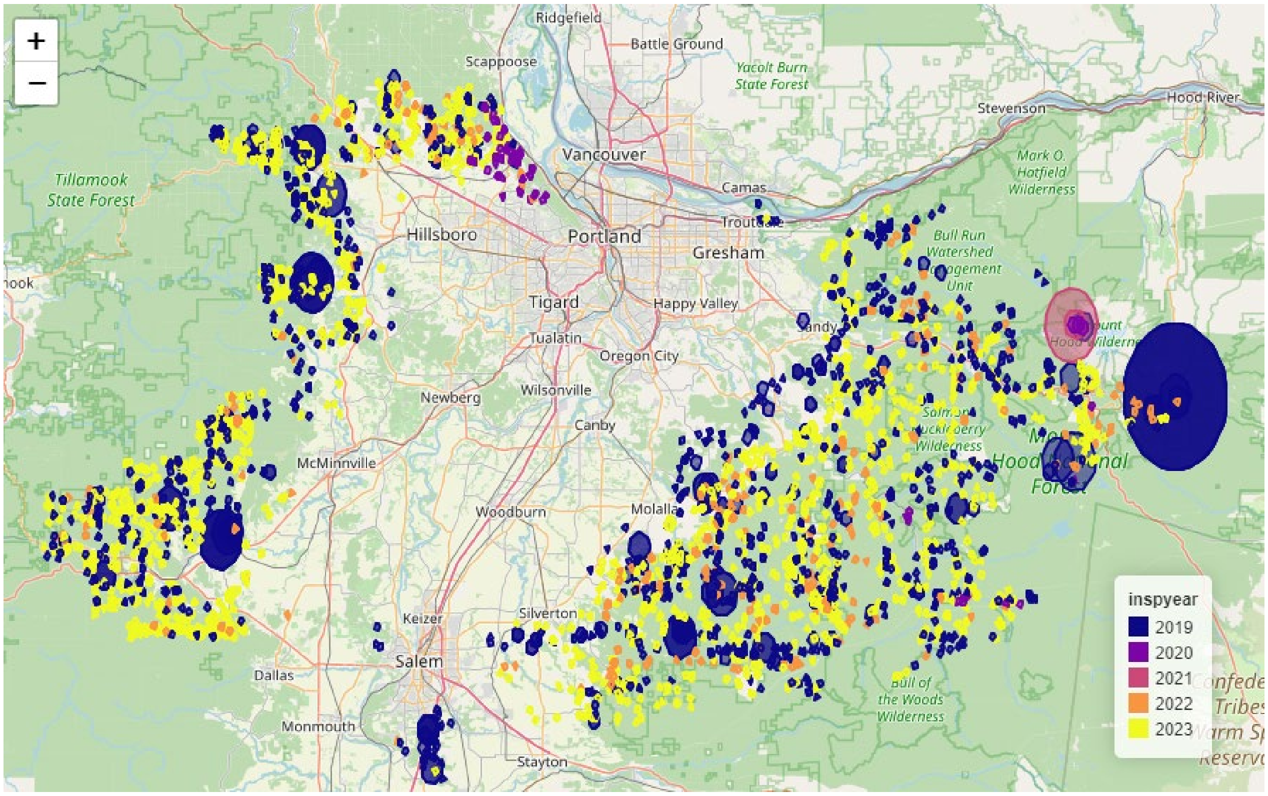


Figure 57: PGE & USFS Remote Sensing Data, 2019-2023

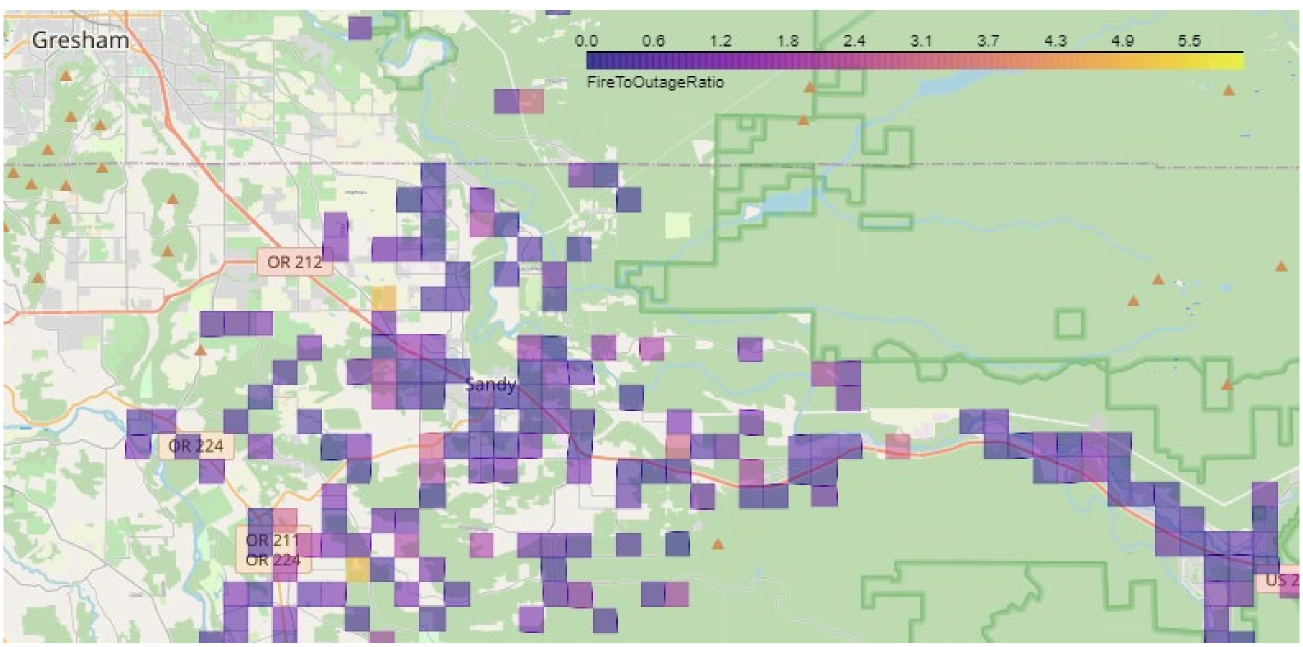


Figure 58: PGE Vegetation-Caused Outage Data Visualization, HFRZ 1

These data inputs, including drought, temperature, and PGE vegetation outages, resulted in a tree mortality model that was fitted for a linear and exponential function projection. While the exponential function was the higher statistical fit (R^2 value), PGE used the linear model which was used for hazard tree removal rate planning. While the exponential function was a higher statistical match, PGE used the linear model as a best-case scenario for mortality. This assumption, after the 2024 remote sensing data was captured, proved to be overly optimistic.

This mortality model was compared to actuals from a 2024 remote sensing capture (satellite and drone imagery), visualized in the figure below. The actual total tree mortality count identified through remote sensing exceeded the model prediction on an exponential scale.

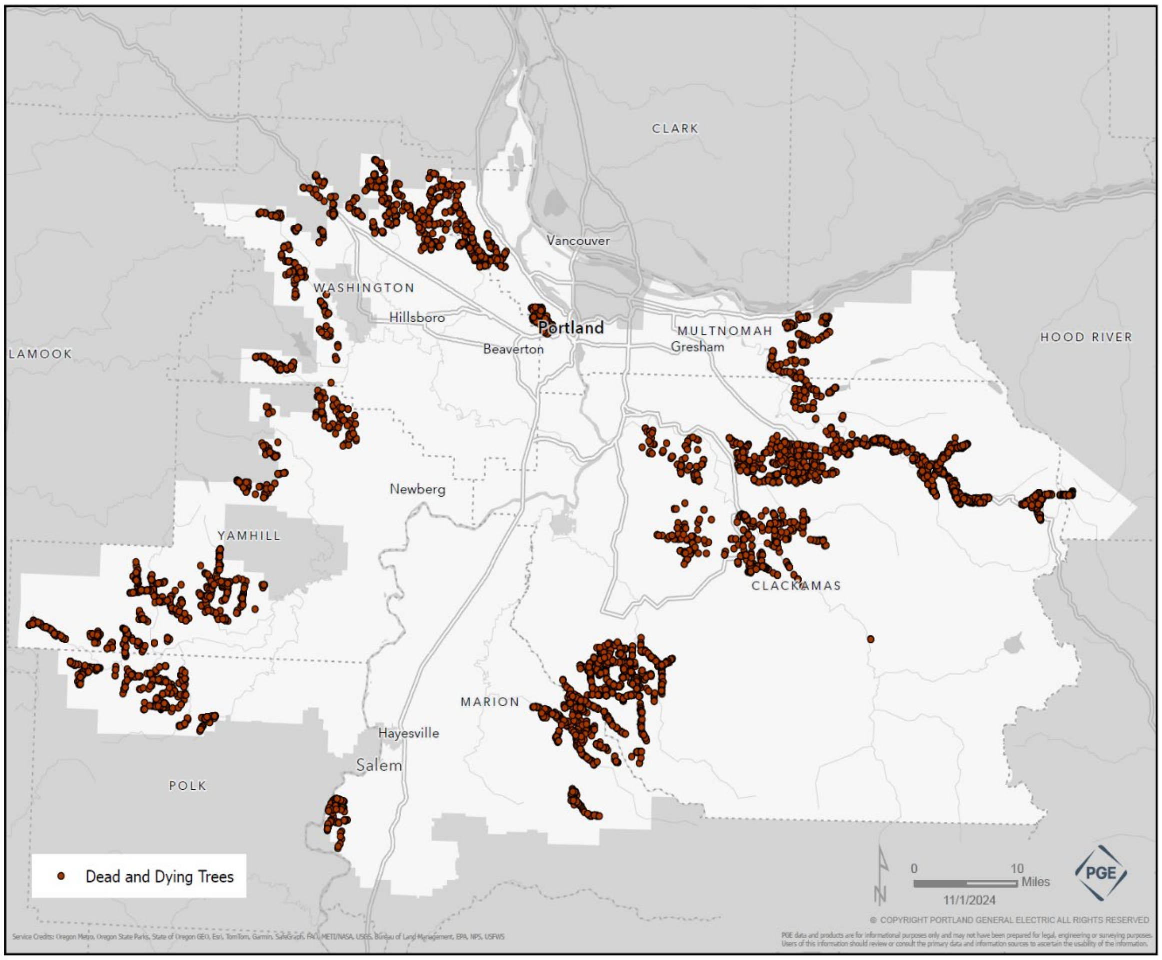


Figure 59: 2024 Tree Mortality Remote Sensing Actuals

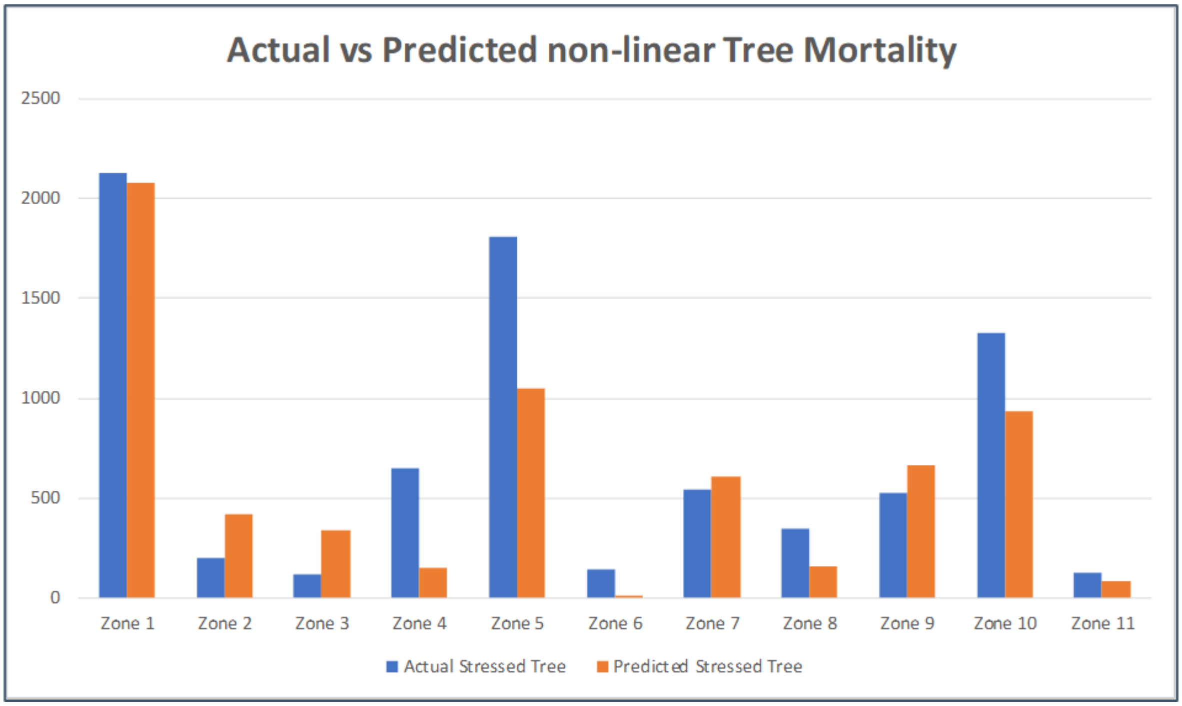


Figure 60: Actual Data Compared to 2019-2023 Mortality Model Projection

The figure above compares actual to predicted tree mortality by zone. HFRZs that have the highest mortality rates are also the zones PGE has designated for its large overhead-to-underground conversion projects:

- HFRZ 1: Summit–Summit 13 & Summit–Meadows (Microgrid vs UG alternatives analysis)
- HFRZ 4: Estacada–North Fork
- HFRZ 9: Scoggins–Cherry Grove
- HFRZ 10: Grand Ronde–Agency & Willamina-Buell

This data supports PGE's vegetation practices, particularly where aggressive tree removal was used to maintain the rate of actual tree mortality across PGE's service territory. These findings are not unique to PGE. Data from the International Tree Mortality Network confirms that tree mortality is occurring at alarming rates across all ecosystems and biomes. These recent analytical findings confirm that the data supports PGE's operational subject matter expertise that was relied on to inform its tree removal program.

3.14.2.2 **Third Party Validation**

As discussed in PGE's 2023 WMP, climate change will have different volatility impacts to different ecoregions across the globe. Regions such as the Pacific Northwest, which historically have enjoyed favorable snowpack and sustained moisture during the fire season, will not adapt as quickly as eastern Oregon Ponderosa/Juniper species, for example, which have been exposed to drought for centuries.

These findings have been tested with USFS, ODF, NASA, OSU, and IWRMC. Dr. William Hammond shed light on what PGE and others are seeing empirically, noting that forests and trees worldwide are seeing a variety of cumulative impacts attributable to climate change.[29]

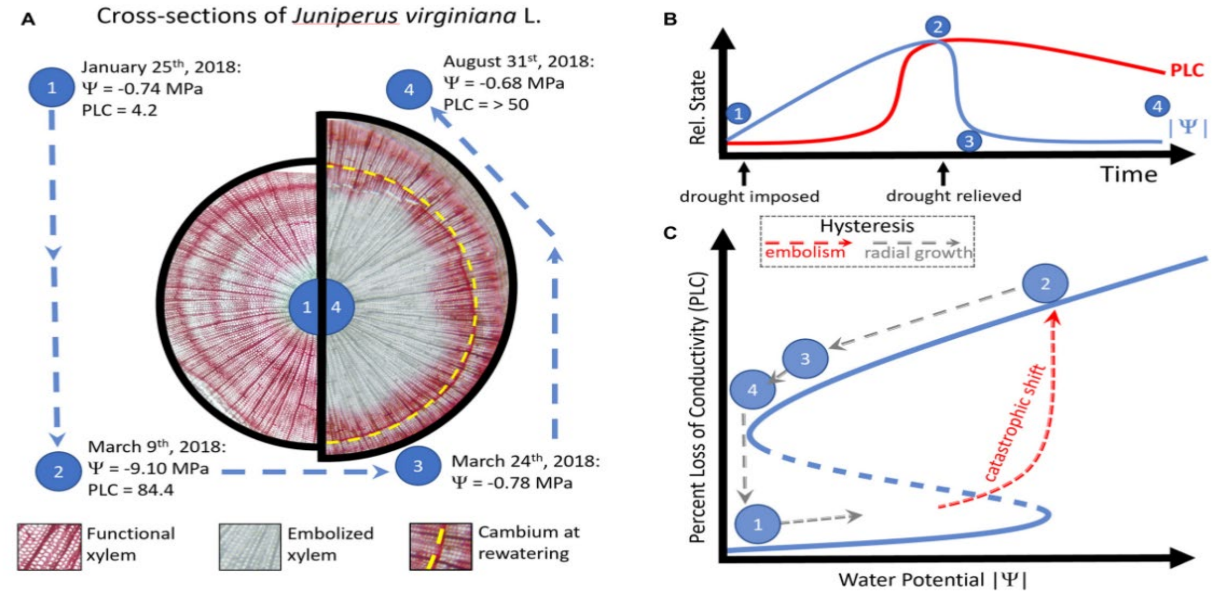


FIGURE 1 | In panel **(A)**, cross-sections taken from a single *Juniperus virginiana* L. tree at time point (1) and (4) are shown on the left and right, respectively. Physiological measures of drought stress (Ψ, percent loss of conductivity—PLC) are shown for four time points during the drought-rewatering experiment from the same tree (points 1–4, data from Hammond et al., in prep). Panel **(B)** shows the relationship between the relative state of PLC (red line) or the absolute value of water potential (|Ψ|, blue line) during the duration of the experiment. While |Ψ| rapidly resumes the pre-drought condition after drought is relieved, PLC remains high as the xylem is in an alternative stable state. The transition between (1) and (2) is shown in panel **(C)** as a catastrophic shift, where once a large portion of the xylem is embolized, function cannot be restored by the simple relaxation of xylem tension. Arrows indicate the direction of hysteresis, with counterclockwise arrows indicating hysteresis. Red arrows represent a catastrophic shift to an alternative, embolized stable state, which requires radial growth (gray arrows) to return to the previous state.

Figure 61: Physiological Measures of Drought Stress in Trees

Hammonds' findings, in summary, support the following observations:

- Trees cannot return to pre-drought physiological function once drought is relieved.
- Months to years of radial growth is necessary to recover the water transport/storage and nutrient delivery systems of a tree,
- Even as trees survive, they may be significantly different as individuals and as members of a forest population until recovery can occur.
- This trend is a vicious cycle as the impacts of a warming climate and localized drought stress has and will continue to impact the forest population.
- This methodology suggests that changes in forest physiology, mortality, and rapid decline in ability to withstand drought stress are likely outcomes.

To fully leverage these findings, PGE is working with NASA, Oregon State University, ODF and USFS ecologists, as well as others, to gain insight into how well existing mortality models can project the impacts of stressed and dying trees across its service territory to better inform risk velocity and mitigation practices, such as system hardening and vegetation management. These findings vividly

[29] Hammond WA, *A Matter of Life and Death: Alternative Stable States in Trees, From Xylem to Ecosystems* (Frontiers in Forests and Global Change, 2020).

illustrate the importance of looking at RSE and mortality in tandem to better understand the impacts of tree mortality on PGE's AWRR program activities.

3.14.2.3 Conclusion

PGE believes that the scientific evidence, substantiated by international and regional experts, shows that mortality from climate change and drought stress is an incredibly complex and critical variable that must be factored into vegetation management strategy. Tree die-off results in both increased likelihood of ignition and increased consequences of ignition. In certain instances, PGE has documented evidence of complete root system failure in "green" trees that appear healthy, but fall into conductor on calm, cool, and near-windless days.

Oregon's plume-dominated Bootleg Fire in 2022, the third-largest wildfire in state history, was significantly exacerbated by abundant, drought-fueled dead fuel, demonstrating the consequences of climate change-driven drought and wildfires.

While system hardening investment deliver longer term risk reduction benefits, vegetation management programs play a critical role addressing risk in the short term. Complex projects, such as underground conversions, take several years to implement and often encounter permitting or other environmental obstacles.

3.15 Ignition Prevention Inspection Risk Update

3.15.1 Risk-Based Prioritization and Optimization

To help improve its Ignition Prevention Inspections program, PGE has processed historical ignition and inspection data through a risk methodology to help prioritize inspection patrols. While these advancements are based on risk framework principles, the results are the first steps in a risk-based prioritization and optimization capability that do not yet fully capture all operational challenges. For example, while HFRZ 1 may show the highest inspection priority, access to much of this HFRZ is limited early in the year due to snow. Additionally, PGE will prioritize inspection of the new HFRZ 12 in 2025.

Recognizing the important role of ignition drivers and historic ignition data in informing inspection and correction activities, in 2025, PGE will implement a new prioritization method for determining the sequencing of inspection and correction operations within its HFRZs.

To develop this prioritization method, PGE collected and assessed ignition factors within each HFRZ; detailed calculations are shown in the figure below.

- **Infrastructure factors** included the number of transmission and distribution structures and the total line-miles.
- **Ignition factors** included the number of ignitions in 2024 and the spatially aggregated mean of the 75th percentile of the Ignition Potential Index.
- **Corrections factors** included the total number of identified corrections in 2024, the number of active corrections from 2023 and 2024, and the current number of urgent or imminent corrections.

PGE normalized and categorized all factors for each HFRZ into percentiles using the top and bottom 15 percent and the middle 70 percent. PGE created a rubric to score factors within each HFRZ by assigning a score of one to values in the bottom 15 percent, a score of two for values in the middle 70 percent, and a score of three for values in the top 15 percent. PGE then summed and ranked the scores for all factors within each HFRZ, then used this data to prioritize Ignition Prevention Inspections for each HFRZ from highest to lowest scores. When HFRZs tied in scoring, higher prioritization was given to HFRZs based on the total number of active corrections.

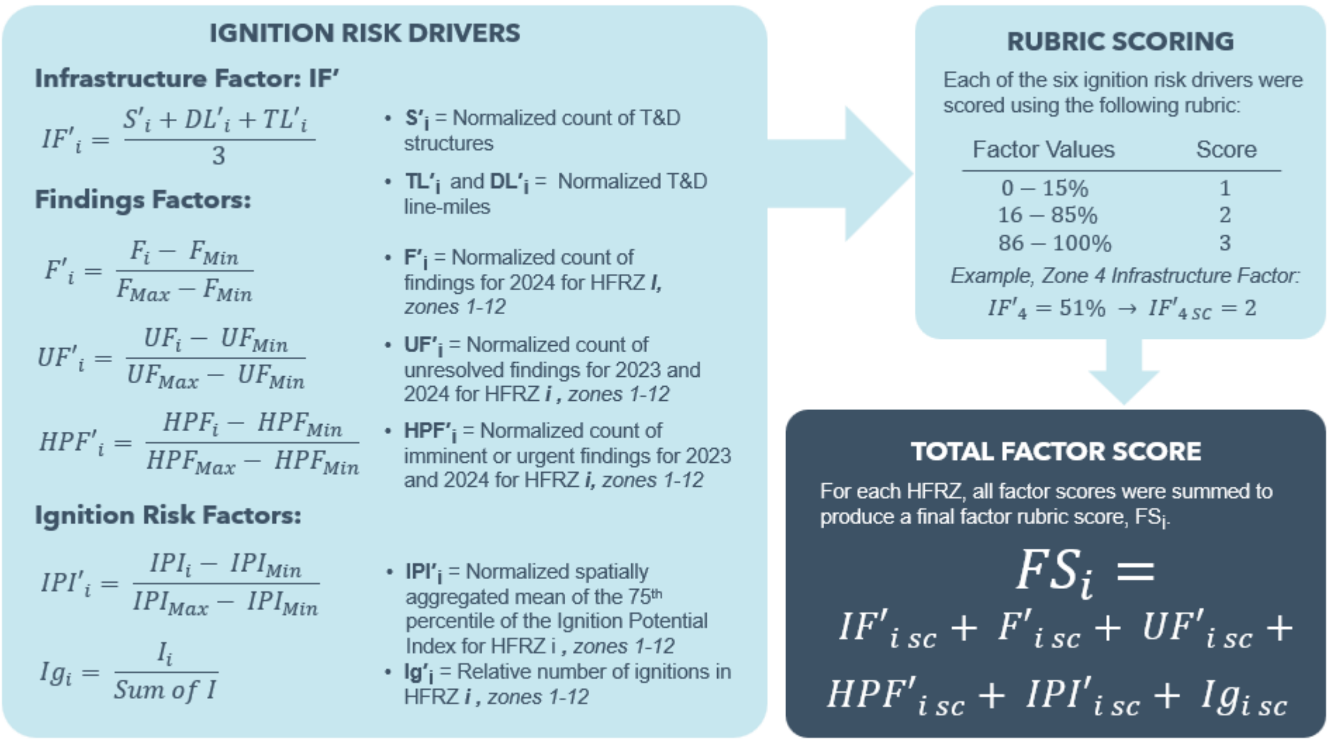


Figure 62: Ignition Prevention Inspection Risk Factors

The figure below shows the results of this work, a visual representation of PGE's risk rankings for inspections and corrections. These risk rankings will inform Ignition Prevention Inspection scheduling, with consideration for other limiting factors.

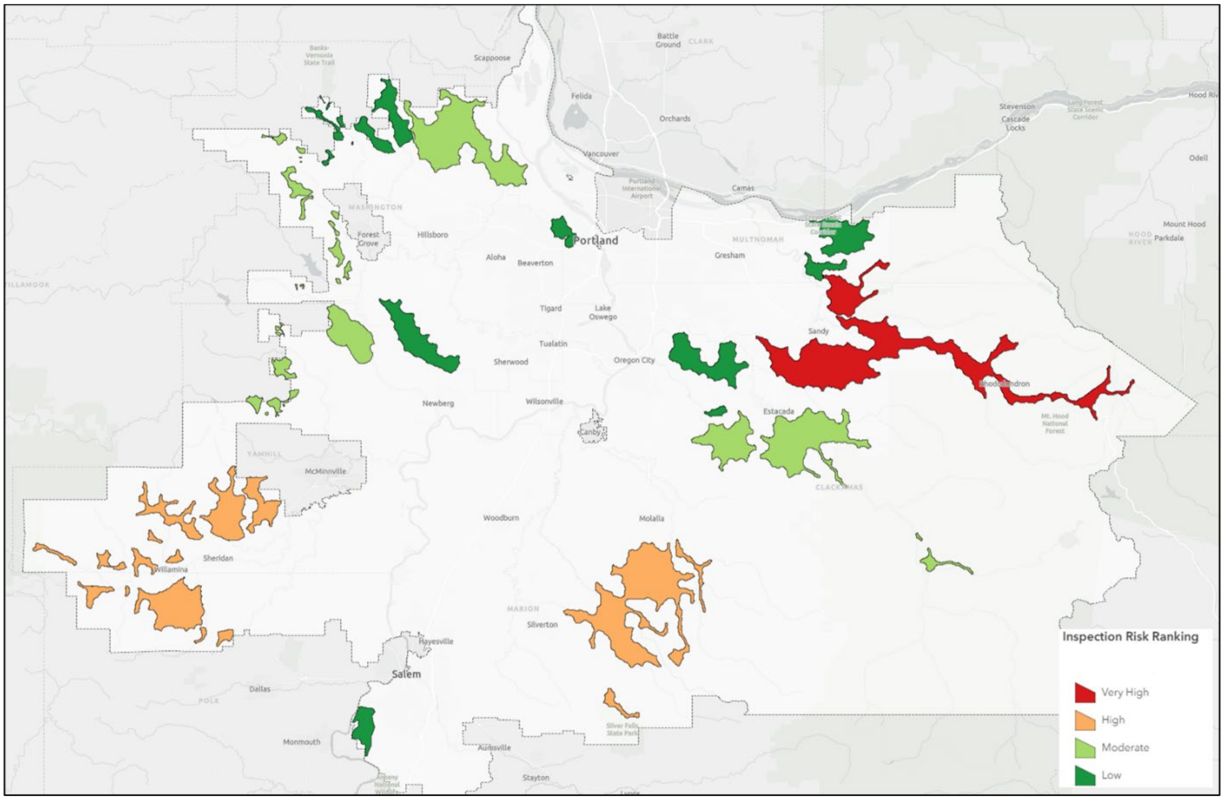


Figure 63: Ignition Prevention Inspection Risk Ranking

3.15.2 Inspection Risk Spend Efficiency (RSE)

PGE analyzed the benefits associated with its 2024 Ignition Prevention Inspections, comparing reliability and wildfire risk mitigated to the cost of the program. The analysis did not focus on the optimal cadence of the program; rather it focused on validating inspection effectiveness and determining benefits achieved from PGE's 2024 activities to inform the 2025 plan.

3.15.2.1 Inspection Findings

Approximately 80 percent of the conditions identified during Ignition Prevention Inspections were directly related to ignition prevention. Figure 64 shows the types of ignition prevention findings from PGE's 2024 Ignition Prevention Inspections program.

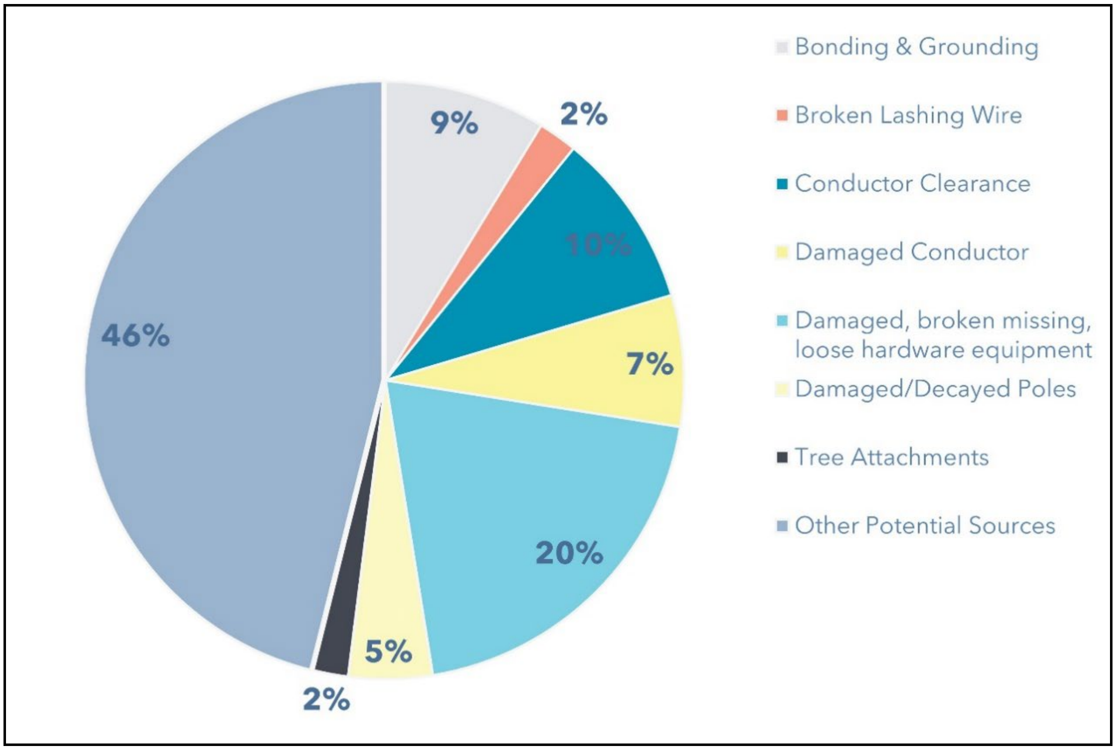


Figure 64: 2024 Ignition Prevention Inspection Violations

3.15.2.2 Ignition Risk Drivers

PGE evaluates the effectiveness of the inspection program through the Ignition Management and Root Cause Analysis program, as described in Section 8.9 of PGE's 2024 WMP. The figure below illustrates the comparison of inspection codes to ignition root causes.

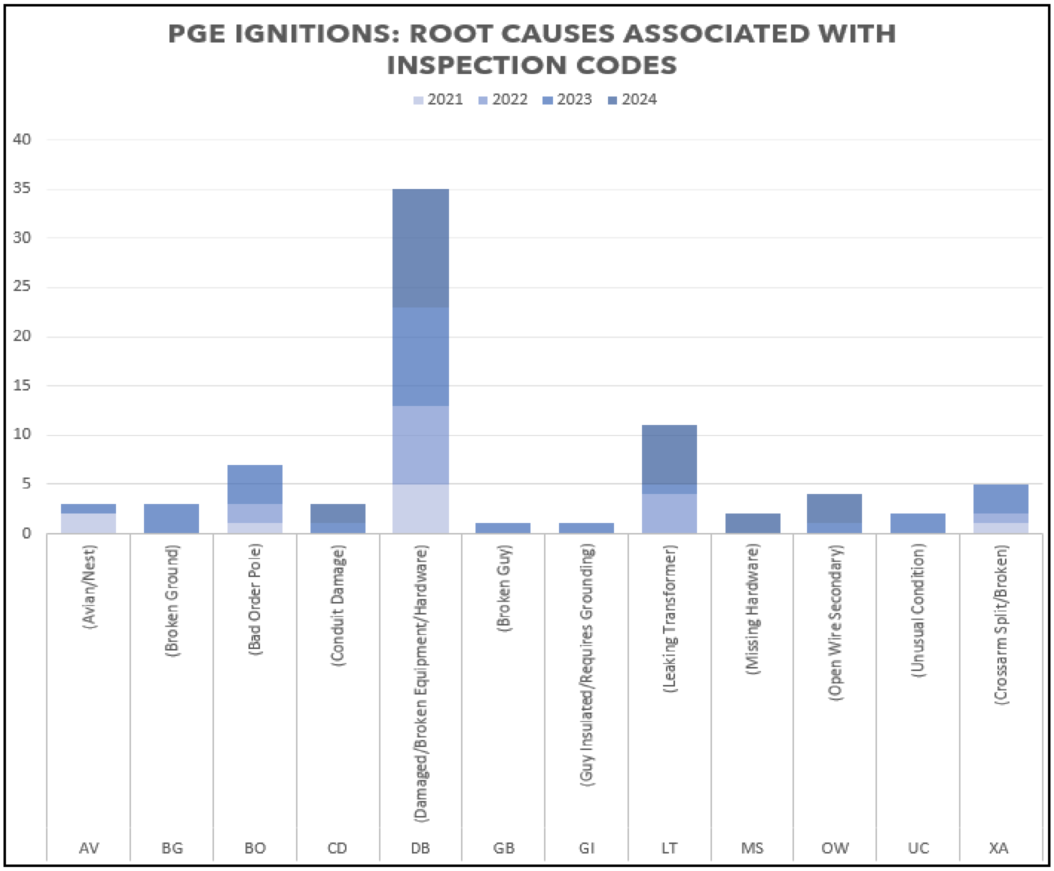


Figure 65: PGE Ignition Root Causes

Table 24 shows validation of inspection criteria through comparison of inspection codes to PGE ignition records.

Table 24: PGE Ignition Root Causes with Inspection Codes

Inspection		PGE Ignition Presenting Root Causes				
Code	**Condition**	**2021**	**2022**	**2023**	**2024**	**Special Investigations**
AV	Avian/Nest	2	-	1	-	-
BG	Broken Ground	-	-	3	-	2 (2023)
BO	Bad Order Pole	1	2	4	-	1 (2022) 1 (2023)
CD	Conduit Damage	-	-	1	2	1 (2023)
DB	Damaged/Broken Equipment/Hardware	5	8	10	12	1 (2021) (2022) 3 (2023) 4 (2024)
GB	Broken Guy	-	-	1	-	-
GI	Guy Insulated/Requires Grounding	-	-	1	-	-
LT	Leaking Transformer	-	4	1	6	1 (2023) 4 (2024)
MS	Missing Hardware	-	-	-	2	2 (2024)
OW	Open Wire Secondary	-	-	1	3	1 (2023) 3 (2024)
UC	Unusual Condition	-	-	2	-	1 (2023)
XA	Crossarm Split/Broken	1	1	3	-	-
	TOTAL	**9**	**15**	**28**	**25**	**28**

PGE also reviews utility-caused ignitions outside the service territory, leveraging industry learnings to improve inspection correction programs. Although not every Equipment Inspection Code finds precedent in a related equipment-caused ignition within PGE service territory, each does point to a preventable source of utility-caused ignitions nation-wide.

Table 25: Non-PGE Ignitions with Inspection Codes

Inspection		non-PGE Ignitions			
Code	**Condition**	**Year**	**Fire Name**	**Fire Extent**	**Region and/or Assoc. Utility**
AB	Abandoned Equipment	2019	Kincade Fire	77,758 Acres. Damage to 174 homes, 190,000 residents evacuated	California / PG&E
MH	Midspan Horizontal	2002	Unnamed	Pole fire and outage	California / SDG&E
MV	Midspan Vertical	2010	Unnamed	Structure fire	Georgia / Georgia Power Company
OL	Overloaded Pole	2017	Malibu Canyon Fire	3836 Acres	California / SCE
PL PD	Pole Leaning Pole Dug/Washed Out (among other causes)	2023	Lahaina Fire	17,000 Acres 102 fatalities	Hawaii / Hawaii Electric
WP	Woodpecker Holes	2017	Tubbs Fire	37,000 Acres	California / Private electrical system

Table 26: Nationwide Fires Associated with Inspection Codes

Inspection		Nationwide Fires			
Code	**Condition**	**Year**	**Fire Name**	**Fire Extent**	**Region and/or Assoc. Utility**
BO	Bad Order Pole	2024	Smokehouse Creek Fire	1.06 Million Acres. Largest wildfire on TX state record.	Texas / Xcel Energy
XA	Crossarm Split/Broken	2024	Valley Fire	10,000 Acres.	Idaho / Idaho Power
GI	Guy Insulated Requires Grounding	2018	Woolsey Fire	96,949 Acres.	California / SCE
DB	Damaged/Broken Equipment/Hardware	2018	Camp Fire	153,336 Acres. Deadliest fire in CA state history.	California / PG&E
GB	Broken Guy	2017	Rye Fire	6,049 Acres.	California / SCE

3.15.2.3 Conclusion

PGE's Ignition Prevention Inspection program effectively addresses identified ignition risks. Corrections are addressed in Section 8, Program Sharing. PGE utilized negotiated inspection unit pricing as detailed in Confidential Appendix ED: Sensitive Data.

PGE estimated a 2024 Ignition Prevention Inspection RSE of 8.6, demonstrating a positive risk reduction for customers and the region. The 2024 Ignition Prevention Inspection RSE was calculated by analyzing the risk reduction benefit of mitigating identified ignition prevention conditions, excluding benefits for correcting safety and other non-ignition violations identified as part of the program and corrections that were addressed on separate capital projects. For the specific subset of structures analyzed, PGE mitigated approximately $31.1M of risk in 2024:

- $14.5M from asset conditions and $16.6 M due to vegetation and clearance condition presenting ignition and reliability threats.
- The cost to complete the inspections & corrections within the program for the respective analysis was approximately $3.6M.

PGE believes this RSE and corresponding risk mitigation reflects only a portion of the benefits of the broader program as demonstrated in the industry. In 2025 and beyond PGE plans to mature its understanding of the benefit of inspections and will be further analyzing ignition and failure data from PGE equipment.

3.16 Battery Storage Energy Storage System (BESS) Risk Update

PGE's WMRA process includes assessment of risk associated with PGE assets. In compliance with the Energy Facility Siting Council (EFSC) OAR 345-022-0115(1)(b) requirement for Wildfire Prevention and Risk Mitigation, this process includes BESS locations shown in Table 27.

Table 27: PGE Battery Energy Storage Systems (BESS)

Plant/Program	Location	Size (Max Output, Facility Rating)	Commercial Operation Year
Coffee Creek	Sherwood, OR	17 MW, 34 MWh	2024
Seaside	North Portland, OR	200 MW, 800 MWh	2025
Constable	Hillsboro, OR	75 MW, 300 MWh	2024
IOC Battery	Tualatin, OR	2 MW, 4 MWh	2024
Salem Smart Center Repower	Salem, OR	3.9 MW, 7.8 MWh	2026
Daimler Electric Island	North Portland, OR	0.75 MW, 1 MWh	2024
Port Westward	Clatskanie, OR	5 MW, 10 MWh	2021
ARC	Salem, OR	0.5 MWh, 1 MWh	2022
Beaverton	Beaverton, OR	0.25 MW, 1 MWh	2021

PGE analyzed the annual likelihood of failure and ignition probability of the respective batteries identified in the table above by leveraging "Insights from EPRI's Battery Energy Storage Systems Failure Incident Database." The incidents of failure shown in this study were dominated by installations prior to 2020; manufacturing quality and monitoring have improved significantly since tracking began in 2018.

The batteries used at these locations leverage advancements in imminent failure detection. Historical battery failure rates as described in the study above demonstrate that the potential for ignition failure exists. However, the installation standards for these assets require them to be located in buildings with fire suppression or contained yards with non-burnable surface material adjacent to the batteries, limiting the potential for self-propagating fire should failure occur. Additionally, the locations shown above are all located within favorable response and detection areas, further limiting fire growth potential.

4 New or Discontinued Initiatives

New initiatives that were not included in the 2024 WMP are listed below by initiative tracking ID and initiative name. PGE has not identified any 2024 initiatives to discontinue in 2025, nor does it forecast discontinuing initiatives in 2025.

4.1 Grid Design and System Hardening

4.1.1 GDSH-09: Generation Resilience

The Generation Resilience initiative GDSH-09 was initiated in 2024 to reduce wildfire and PSPS consequence related to PGE's generation facilities.

4.1.1.1 **Justification**

PGE is installing emergency generators at selected dams and control houses to help keep those spillways operating during PSPS events per FERC and Oregon Department of Fish and Wildlife requirements. The emergency generators are not intended to preserve generation capacity at the dams, but to support spillway functionality at appropriate discharge levels to maintain fish flows and other environmental regulatory obligations. Although these emergency generators are a temporary solution, they are an important interim measure to support compliance with FERC and ODFW requirements during PSPS events.

4.1.1.2 Target

The first project under this initiative is occurring at West Side Hydro, a series of PGE-owned hydroelectric generating facilities on the Clackamas River, located within HFRZ 4. During 2024 wildfire season planning, PGE determined that West Side Hydro could be at risk for a PSPS in 2024 due to the severity of historic fire weather patterns and impacts from the 2020 Labor Day Wildfires.

4.1.1.3 Objective

The West Side Hydro Generation Resilience project is forecast to be complete as of May 31, 2025. The first EG (Harriet Lake) will be completed by March 1, 2025; the second EG (Oak Grove) will be completed by May 31, 2025.

4.1.1.4 Expenditures

This project was identified in PGE's Wildfire Mitigation Retrospective Report for First Half of 2024 compliance filing in docket UE 412 on October 1, 2024. The forecast cost of this project remains $1.466M, with approximately $200k of that spend occurring in 2025.

4.1.2 GDSH-10: Protection and Automation

The Protection and Automation initiative GDSH-10 was initiated in 2024 to increase operational capabilities and reduce PSPS exposure.

4.1.2.1 Justification

Upgrading control and protection equipment with SCADA-enabled devices allows more targeted execution of wildfire mitigations such as PSPS and Enhanced Powerline Safety Settings (EPSS). With the ability to implement EPSS during fire season and periods of enhanced fire risk, PGE may avoid preemptive de-energization through a PSPS event. Additionally, time-synchronized equipment improves PGE's situational awareness and ignition investigation capabilities.

4.1.2.2 Target

The first project in this initiative was completed at Pelton Round Butte (PRB) near Madras, OR. This project introduced operator capabilities to disable feeder reclosing out of Pelton and Round Butte substations during high fire risk conditions, reducing the likelihood of PSPS impacts. The distribution circuit in question provides the station service for Pelton dams where all of Pelton Round Butte generation and station service lines exist in areas of increased fire risk east of the Cascade crest.

PGE has not identified subsequent GDSH-10 projects for implementation in 2025, additional projects will be identified in the 2026-2028 Multi-year WMP.

4.1.2.3 Objective

The PRB protection & automation project was completed and operational as of June 11, 2024. There are no additional objectives identified for 2025.

4.1.2.4 Expenditures

2024 expenditures for this initiative were $54k. PGE is not currently forecasting 2025 expenses for this initiative.

4.2 Public Safety Power Shutoff

4.2.1 PSPS-03: Well Water Research

The Well Water Research initiative PSPS-03 was initiated in 2024 to inform mitigation strategies and reduce PSPS consequence.

4.2.1.1 Justification

PGE conducted customer survey research in early 2024 to quantify and identify the highest priority resilience needs of customers in high wildfire risk zones. A total of 1,466 customers completed the survey, with 62 percent of HRFZ customers reporting that they receive domestic water from a well. Among the customers who use a well, over half report that it is not easy to access water during a power outage, and when asked open ended what they need support with during a PSPS outage, well water was among the top responses.

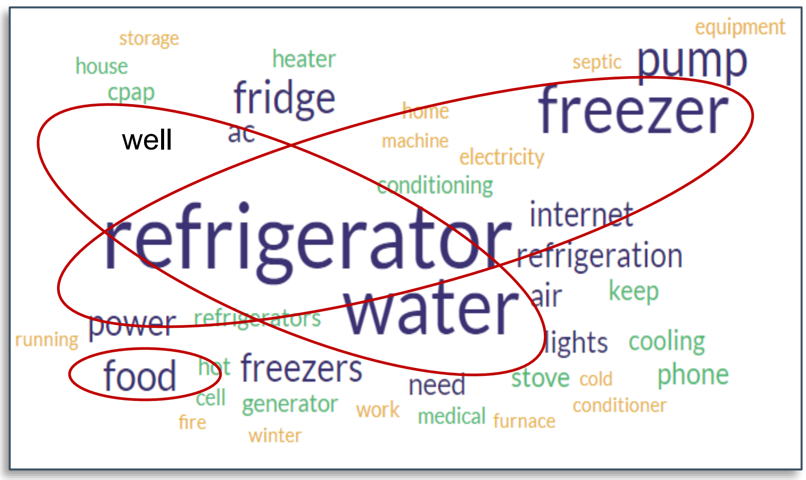


Figure 66: Customer Responses to PSPS-Related Customer Support Needs Survey

Based on this survey research, as well as numerous interactions with customers during community outreach opportunities, PGE sought to research options for how customers on wells can continue to have access to potable water during power outages.

While city water continues to work during a power outage, wells use pumps that require electricity to draw the water up from potentially very deep sources at a pressure sufficient to serve the household. These well pumps are hardwired into the home panel and powered via a 240-volt circuit.

When first turned on the starting current requirement of the pump can be six times the ongoing running current. These combined factors make well pumps a very challenging use case for back-up power sources during an outage. While 68 percent of HFRZ customers report having a back-up generator, a transfer switch is required to use a generator or battery due to the pump being hard-wired into the panel. Further, the generator or battery must be sized large enough to support the start-up power draw or have a variable frequency drive installed, all of which increase project cost and complexity.

4.2.1.2 Target

After secondary research, interviews conducted with PGE engineers, and engagement with industry experts, PGE identified multiple options for customers to access water during a power outage:

1. Traditional portable or whole-home generator (this is the baseline, what a customer is most likely to do today)
2. Portable battery
3. Whole-home battery
4. Temporary water supply

Because option one is the customer baseline and in common use today, PGE did not demonstrate this technology, but rather chose to focus on less-common solutions 2, 3 and 4.

PGE evaluated the various solutions available to customers and has decided to pursue additional work on the temporary water solution option. This decision is primarily based on the up-front customer investment required of all the options, as well as their technical complexity. For some customers, installing a transfer switch and purchasing a battery or generator is the most economical choice, even with whole-home battery back-up. The detailed findings from this study are documented in Section 8.8, Well Water Research Findings.

Temporary water delivery for power outages is not currently widely available in the open market, so PGE can make an impact at relatively low cost by supporting the development of this offering. It also has the potential to be the lowest barrier to entry, making temporary water delivery the option with the highest potential customer benefit. PGE is currently doing outreach to well installers and service providers to gauge the interest in making this type of offering available to customers across the PSPS geographic areas. PGE will then evaluate how best to make this temporary solution available to customers during PSPS events.

4.2.1.3 Objective

PGE completed the well water research in 2024 and will look to make additional information and potentially a customer offering available to customers in 2025. We will continue to review customer resilience needs as they evolve and expect to study how to make available products and solutions for food preservation and safe food preparation next year.

4.2.1.4 Expenditures

2024 expenditures for well water research totaled $12k. The 2025 forecast for the implementation and continued study of customer resilience needs is not to exceed $200k.

4.3 Risk Methodology and Assessment

4.3.1 RMA-03: Thread Imagery Platform

In 2024, PGE designed and executed a proof of concept of the Thread Imagery Platform initiative RMA-03 as a pilot project to enhance data management, reporting, and visualization to inform mitigation planning. This initiative will enable evaluation of innovative inspection techniques and improving efficiencies through data automation.

The pilot was performed on approximately 500 structures in one HFRZ with the goal of exploring three use cases:

1. Ability to use imagery to validate or improve PGE's asset data records.
2. Evaluation of a single platform to organize, store, and reference imagery of PGE assets captured via mobile devices, drone cameras, digital cameras, etc.
3. Ability to perform drone-based inspections inclusive of annotated imagery.

PGE is currently evaluating the proof-of-concept data, with the goal of producing lessons learned and identifying next steps in Q1 2025.

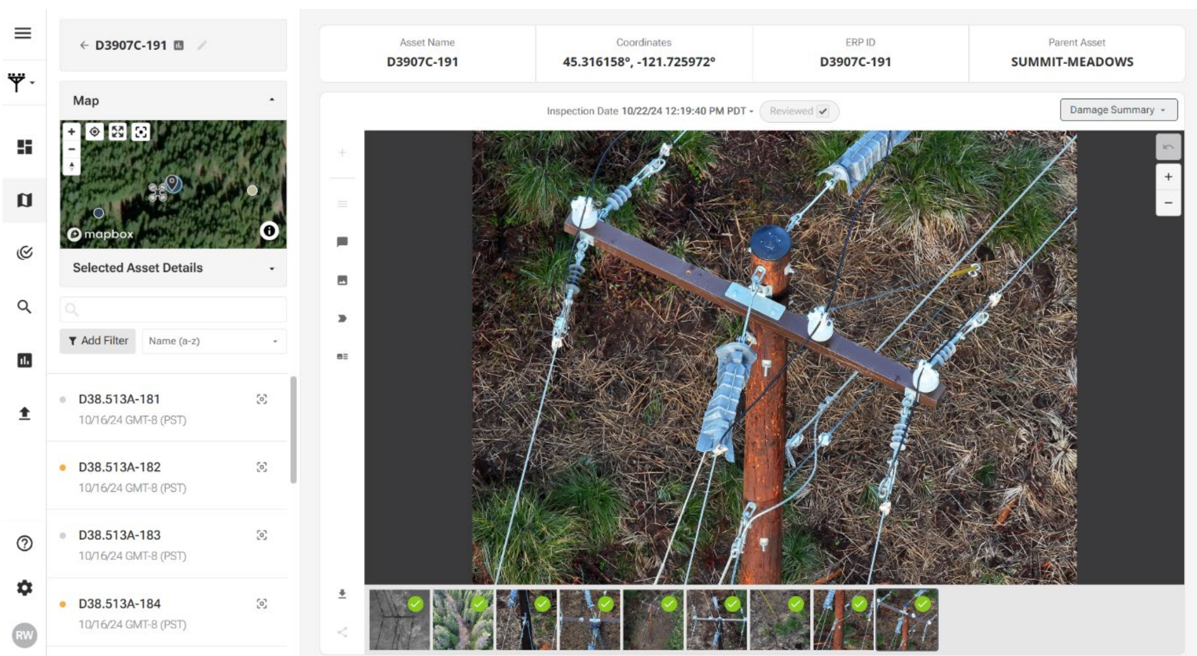


Figure 67: Thread Imagery Platform Asset Information View

4.3.1.1 Justification

The purpose of the initiative is to evaluate:

- Software solution to improve asset management data and associated reliability, ignition risk, cost management, and emergency preparedness analysis.
- A software solution that enhances imagery management, labeling, sharing, and documentation, with an emphasis on demonstrating compliance and prudent practices.
- Ability of the data imagery platform to incorporate data from ground and drone-based inspections, imagery-based asset health analysis, and software/process integration.

This pilot project aligns with multiple UM 2208 Order 24-232 recommendations, including:

- 24-232_1 Discuss timing of inspection and correction frequency inside and outside high fire risk areas.
- 24-232_17 & 22 Demonstration of risk driver analysis
- 24-232_21 Continue to engage in industry learning, identify lessons shared, and the role of industry collaboration in advancing technology.
- 24-232_23 Evaluate and provide evidence regarding effectiveness of inspection program

The purpose of this pilot project is to allow PGE to:

- Evaluate a solution to improve documentation, confidence, and quality of asset management registry and asset health data – a key area of focus with the OPUC and critical component for analysis.
- Evaluate a single-source imagery platform that provides data management, automation, reporting, collaborative tools, and integration with other systems and technologies.
- Explore modern techniques and inspection methods that may enhance data quality, findings, and/or cost effectiveness and align with OPUC expectations on optimizing inspections.
- Identify potential ignition sources through detection of improperly installed equipment and/or assets in poor health.

4.3.1.2 Target

The scope of PGE's 2024 Thread Imagery Platform proof of concept pilot was limited to one HFRZ and approximately 500 poles. Deliverables included drone flights for asset data collection and inspection, data processing and workflow creation, and access to a platform with asset imagery and associated health and inspection findings that would allow PGE to run reports and queries.

4.3.1.3 Objective

PGE tested the platform during Q4 2024 and will develop lessons learned and next steps in Q1 2025.

4.3.1.4 Expenditures

Total cost of the pilot was $50k, with all spend occurring in 2024.

4.3.2 RMA-04: Remote Sensing

In 2025, PGE is initiating Remote Sensing initiative RMA-04 to refresh Light Detection and Ranging (LiDAR) data capture within its HFRZs to inform risk modeling and mitigation planning.

4.3.2.1 Justification

PGE's most recent LiDAR data capture was in 2019. With updated data, PGE expects to provide customer value by delivering hard money savings on capital and O&M to reduce project costs and truck rolls, respectively. The value from this project includes:

- Updated data to improve reliability, ignition risk, cost management, and emergency preparedness.
- Updated data for risk and vegetation management modeling, analysis, and program optimization.
- Updated imaging data to provide evidence demonstrating compliance and prudency in support of cost recovery efforts.
- The potential usefulness of this large geospatial dataset to other use-cases (e.g., dynamic line ratings) and advanced analytics capabilities.

This project supports PGE's actions to implement multiple UM 2208 Order 24-232 recommendations, including:

- 24-232_5: Refresh RSE for vegetation management
- 24-232_18 & 19: Document and demonstrate the effectiveness of vegetation management activities.
- 24-232_17 & 22 Demonstrate risk driver analysis24-232_E, F & G Standardize reporting templates, including detailed inspection and vegetation management results.

4.3.2.2 Target

The project's 2025 scope includes the capture of up-to-date remote sensing data for 100 percent of PGE's HFRZs, as well as support for PGE's ongoing RSE work, including PGE's innovative vegetation management methodology.

4.3.2.3 Objective

The project will be completed in Q2 and Q3 of 2025, and the resulting data will inform development of PGE's 2026-2028 Multi-year WMP.

4.3.2.4 Expenditures

The remote sensing project will be executed at a forecast cost of $2M.

4.3.3 RMA-05: ICE CALCULATOR 2.0

PGE has established a strategic partnership with Lawerence Berkley National Laboratory (LBNL) to participate in the National Power Interruption Cost Survey to improve risk model accuracy by updating Value of Service (VOS) for customer consequence. The goal of this project is to update LBNL's ICE Calculator with new information collected from representative statistical samples of U.S. electricity customers on the economic costs they experience when electric service is interrupted.

This project is being conducted through a series of contracts with individual U.S. electric utilities, and PGE is one of the only Pacific Northwest utilities participating in the study.

4.3.3.1 Justification

The ICE Calculator 2.0 project will allow PGE to refine the VOS values used in customer outage impact modeling, improving the accuracy of calculated project benefits related to reducing PSPS exposure. The values identified from PGE's survey will also be used to update and improve the accuracy of LBNL's ICE 2.0 calculator, delivering broad value across the industry.

4.3.3.2 Target

Establish updated VOS values for PGE's residential, commercial, and industrial customers.

4.3.3.3 Objective

The initiative results will inform PGE's 2026 annual risk modeling and reflected in the 2027 WMP Update.

4.3.3.4 Expenditures

This cost of this initiative is $300k in 2025.

4.4 Wildfire Mitigation Strategy Development

4.4.1 WMSD-02: WMP Data Template Workbook

In response to new requirements adopted by the OPUC in 2340 Order 24-326, PGE has developed this new initiative to track the 2024 costs of developing the required OPUC Data Template Workbook. These outlays include the incremental cost of a contingent contract manager to manage data template workbook completion, as well as costs associated with the numerous subject matter experts contributing to workbook development in addition to, and in parallel with, PGE's 2025 WMP Update development.

4.4.1.1 Justification

Phase 1 of the multi-phase OPUC-led process to develop WMP Guidelines included the creation of the WMP Data Template Workbook to provide guidance regarding the appropriate information and level of granularity for WMP data submissions. The purpose of this initiative is to capture PGE's costs associated with template development and submittal beginning in 2024. PGE does not expect to incur significant incremental costs to upgrade systems or add personnel in support of this effort.

4.4.1.2 Target

The target for this new initiative is to file the WMP Data Template Workbook twice annually, per the schedule defined in the objective.

4.4.1.3 Objective

The WMP Data Template Workbook has two annual deliverables with required filing dates per OPUC Order 24-326, summarized in Table 28:

Table 28: 2025 Data Template Workbook Deliverables

Submission Element	Description	Deadline
WMP Data Template Workbook Initial Filing	Including data through Q3, of the current year	December 31
WMP Data Template Workbook Final Filing	Updating data through Q3 and appending Q4, of the prior year	March 31

4.4.1.4 Expenditures

PGE expenditures to compile and submit the 2024 Data Template Workbook Initial Filing are forecast to be approximately $150k in 2024. PGE estimates that an additional $250k will be required in 2025 to compile and submit the 2024 Data Template Workbook Final Filing and 2025 Data Template Workbook Initial Filing.

Additional 2024 work includes developing incremental cost estimates associated with a more comprehensive development cost data tracking initiative beginning with the 2026-2028 Multi-year WMP. These incremental costs may include new systems, system upgrades, and new data integrations. In 2025 and future years, PGE will leverage the results of this initiative to capture effort and costs associated with the twice-annual WMP Data Template Workbook filing schedule.

5 Existing Initiative Updates

The Initiative Update section provides a summary of PGE's wildfire mitigation initiatives targets, objectives, and expenditures for 2025.This section compares each initiative addressed in PGE's 2024 WMP to PGE's 2025 WMP Update.

PGE evaluated the initiative targets, objectives, and expenditures based upon the Initiative Update Thresholds provided in UM 2340 Order 24-326 and restated in the table below to determine whether an update is required.

Table 29: Initiative Update Thresholds

Category	Threshold
Target	For large volume work (equal to or greater than 100 units), changes of 10 percent or greater to a WMP Update reporting period target from the most recently approved Multi-year WMP constitute a significant change and must be reported. For small volume work (less than 100 units), changes of 20 percent or greater to a WMP Update reporting period target from the approved Multi-year WMP constitute a significant change and must be reported.
Objective	Any changes to forecasted initiative objective which shifts the completion dates in its most recently approved Multi-year WMP into the next calendar year constitute a significant change and must be reported. For example, if undergrounding of lines was forecasted to be completed by September 2027, in the most recently approved Multi-year WMP and is now forecasted completion date is changed to March 2028, then the change must be included in the WMP Update.
Expenditures[30]	Significant changes to expenditures include any change to project expenditures in the most recently approved multi-year plan which constitute a change of at least 20 percent in an initiative's planned total expenditure during the reporting period.

PGE has included all existing initiatives in this section, even where initiatives do not require an update based on the threshold criteria, to help bridge the multiple differences expected between the 2024 WMP and 2025 WMP Update formats.

In cases where explicit targets or expenditures were not provided in the 2024 WMP for 2025 work, PGE has provided references to specific data request responses to OPUC Safety Staff or included other detailed explanations.

[30] All expenditures and costs are in $, thousands including direct loadings.

5.1 Community Outreach and Public Awareness

The Community Outreach and Public Awareness initiative category is addressed in Section 7 of PGE's 2024 WMP, Wildfire Safety, Prevention, Communication and Engagement Strategies.

5.1.1 COPA-01: Wildfire Outreach and Public Awareness

This is an ongoing initiative aimed at increasing public awareness to reduce wildfire and PSPS consequence.

5.1.1.1 Objective

There are no changes to the objectives for initiative COPA-01: Community Outreach and Public Awareness.

5.1.1.2 Target and Expenditure Comparison

A summary of the forecast targets and expenditures for 2025 is provided in Table 30, below. The number of meetings target captures one of many customer-focused actions, while the expenditure forecast captures PGE's comprehensive spend for the entire initiative category.

Table 30: COPA-01 Target and Expenditure Comparison

2025 Forecast Source	Target (# of meetings)	Expenditure ($, thousands)
2024 WMP	6	$837
2025 WMP Update	6	$1,050
% Change	0%	25%
Update Required	No	Yes

5.1.1.3 Expenditure Update

The 25 percent increase from PGE's 2024 WMP to the 2025 WMP Update is driven by the need to contract for an additional outside service that will help provide customers and stakeholders with a clearer understanding of PGE's wildfire mitigation activities and how they are interrelated. The increase between PGE's 2024 WMP and 2025 WMP Update is driven by needing to contract for an additional outside service that will help provide customers and stakeholders with a clearer understanding of PGE's wildfire mitigation activities and how they are interrelated. PGE developed this approach in response to customer concerns expressed in other parts of the state, to better support customer actions that improve resilience. PGE 2024 WMP Recommendations 24-232_1, 10, and 13 identify the importance of storytelling to stakeholders and customers, the need for customers to obtain information about the WMP more easily, and the need to simplify how information is shared in real-time.

Additionally, this resource will support Joint IOU Recommendation 24-234_O to collaborate to develop consistent content and language to inform customers, communities, and public safety partners. The 2025 cost of this limited-duration outside services resource is forecast at $200k. PGE will use this resource to incorporate improvements into 2025 wildfire mitigation activities and PGE's 2026-2028 Multi-year WMP.

5.2 Grid Design and System Hardening

The Grid Design and System Hardening initiative category is addressed in Section 10 of PGE's 2024 WMP, System Hardening.

The baseline targets and expenditures for GDSH-02 through GDSH-08, listed in row 2024 WMP of each initiative 2025 Forecast Source, were provided to OPUC Safety Staff through data request response UM 2208_OPUC DR 156_Revised_Attach_A.

5.2.1 GDSH-01: Grid Planning and Design Standards

The purpose of this initiative is to consolidate the work required to support Grid Design and System Hardening investment planning and Fire-Safe Construction Standards. This initiative includes incorporating risk model updates as well as lessons learned from PGE's Ignition Management program. This ongoing initiative to plan projects and develop standards to reduce ignition likelihood and wildfire consequence.

5.2.1.1 Objective

In 2025, GDSH-01: Grid Planning and Design Standards will include updating standards to require underground service in HFRZs and other designated wildfire risk areas. This Fire-Safe Construction Standard will be facilitated by updates to PGE's Tariff Line Extension Rule I to be detailed in advice filings planned for early 2025. Additional information on this initiative is detailed in Program Sharing Section 8.7, Grid Planning and Design Standards.

5.2.1.2 Target and Expenditure Comparison

Due to the nature of this initiative, there is no quantitative target identified for 2025.

Table 31: GDSH-01 Target and Expenditure Comparison

2025 Forecast Source	Target (N/A)	Expenditure ($, thousands)
2024 WMP	-	-
2025 WMP Update	-	$200
% Change	-	-
Update Required	No	Yes

5.2.1.3 Expenditure Update

In 2024, PGE did not have an O&M Cost Area that mapped directly to Grid Planning and Design Standards. The work that supported Grid Hardening and Situational Awareness project evaluation was spread across multiple O&M and capital programs. The purpose of this initiative is to consolidate the O&M work required to support grid design and system hardening investments, outside of a planned capital project, or for any wildfire standards updates that could result from multiple sources including PGE's Ignition Management Program learnings.

5.2.2 GDSH-02: UNDERGROUND

PGE converts overhead distribution infrastructure to underground as a mitigation measure to reduce ignition likelihood and consequence and operational expenses.

5.2.2.1 Objective

The GDSH-02: Underground initiative notes two objective changes associated with PGE's Scoggins-Cherry Grove undergrounding project. The initial project, resulting in 10.79 underground line-miles, was completed ahead of schedule with construction beginning at the end of Q2 2024 and finishing in Q4 2024. Original estimates forecast construction and in-service date to occur in Q2 2025. HFRZ boundary changes in 2024 added an additional two miles to the Scoggins-Cherry Grove circuit (for additional information, refer to the Target and Expenditure Comparison section, below).

For 2025, the line miles in-service estimate shows a reduction in line miles to be completed due to the early completion of the initial phase of the Scoggins-Cherry Grove project in 2024.

As discussed in Section 3.12, Resulting Changes to Mitigation Initiatives, GDSH-02 also includes detailed planning and design for the Estacada – North Fork project in Zone 4, which will include both underground conversion and covered conductor mitigation.

Projects included in GDSH-02: Underground in 2025 are shown in Table 32.

Table 32: GDSH-02 2025 Project List

Project	HFRZ	Terrain	Plan(# of linear miles)	Forecast($, thousands)	In-service Year
WF–UG Scoggins Cherry Grove (Ph 2)	9	Flat terrain, heavily forested	2	$1,627	2025
WF–UG Grand Ronde - Agency (Grand Ronde Project)	10	Forested and agricultural land use, flat terrain	10	$6,420	2025
WF–UG Willamina – Buell	10	Forested and agricultural land use, flat terrain	11	$25,128	2027
WF–UG Orient-Oxbow	2	Heavily forested or agricultural. Borders Mt. Hood Forest and Bull Run watershed	3.2	$3,795	2027
WF–UG Summit 13	1	Rock and boulders in sand, heavily forested (Mt. Hood National Forest), snow Nov. - May	0	$272	2027
WF–UG Summit-Meadows	1	Rock and boulders in sand, heavily forested (Mt. Hood National Forest), snow Nov. - June	0	$51	TBD
WF–Estacada – North Fork	4	Agricultural and some forest cover. Clackamas River canyon bisects zone, flat save for river canyon.	0	$397	2029
Total			**26.2**	**$37,690**	

5.2.2.2 Target and Expenditure Comparison

A summary of the forecast targets and expenditures for 2025 is shown in Table 33.

Table 33: GDSH-02 Target and Expenditure Comparison

2025 Forecast Source	Target (# of linear miles)	Expenditure ($, thousands)
2024 WMP	31	$55,800
2025 WMP Update	26.2	$37,690
% Change	(15%)	(32%)
Update Required	No	Yes

5.2.2.3 Target Update

An additional two-mile section of Scoggins-Cherry Grove will be constructed in 2025 to address an additional portion of the circuit identified in HFRZ modeling in the 2024 update.

5.2.2.4 Expenditure Update

The original Scoggins-Cherry Grove scope was completed ahead of schedule in Q4 2024. No additional expenditures related to the original 10.79 mile overhead-to-underground conversion project are anticipated in 2025, but two additional line miles will be converted in 2025.

The $25.128M cost shown in Table 14 for Willamina-Buell includes civil construction costs for all sections of the project. However, only 11 miles are expected to be fully completed in 2025. The $25.128M cost shown in Table 32 for Willamina-Buell includes civil construction costs for all sections of the project, although only 11 miles are expected to be fully completed in 2025. The remaining civil and electrical work for sections 1 and 2 of the project will complete in 2026.

5.2.3 GDSH-03: Reconductor

PGE reconductors overhead infrastructure as a mitigation initiative to reduce ignition likelihood.

5.2.3.1 Objective

A change to the objective for the North Plains – Mason Hill reconductor project, included in initiative GDSH-03: Reconductor, was to defer the planned 2024 work to 2025 and defer the full project in-service year to 2026.

Projects included in GDSH-03 Reconductor in 2025 are shown in the table below.

Table 34: GDSH-03 2025 Project List

Project	Target (# of linear miles)	Forecast ($, thousands)	In-Service Year
WF–RC North Plains–Mason Hill	12	$5,562	2026
Total	**12**	**$5,562**	

5.2.3.2 Target and Expenditure Comparison

A summary of the forecast targets and expenditures for 2025 is provided in the table below.

Table 35: GDSH-03 Target and Expenditure Comparison

2025 Forecast Source	Target (# of linear miles)	Expenditure ($, thousands)
2024 WMP	0	$0
2025 WMP Update	12	$5,562
% Change	-	-
Update Required	Yes	Yes

5.2.3.3 Target Update

The North Plains - Mason Hill design, construction and in-service date originally scheduled for 2024 were delayed due to staffing constraints. As a result, project will largely be completed in 2025, with some construction continuing into 2026.

5.2.3.4 Expenditure Update

Due to project delays, the forecasted $5.562M spending for this project will occur largely in 2025 rather than 2024 as planned.

5.2.4 GDSH-04: Covered Conductor

PGE implements covered conductor as a mitigation to reduce ignition likelihood. To mitigate risks of high impedance faults associated with covered conductor, these projects typically require the installation of Early Fault Detection sensors.

5.2.4.1 Objective

In 2024, PGE evaluated a section of Sandy-Wildcat 13kV feeder within HFRZ 1 that was not protected by a SCADA-enabled device for mitigation options. Rather than relocating the protective device, PGE chose to bring this section up to compliance with the current Fire-Safe Construction Standards, similar to other overhead reconductor projects within PGE's portfolio. The project scope includes 10 spans, approximately 0.3 miles of three-phase mainline feeder that was replaced with covered conductor and ductile iron poles. This project was identified in PGE's Wildfire Mitigation Retrospective Report for First Half of 2024 compliance filing in docket UE 412 on October 1, 2024. The financial forecast for 2024 remains $375k.

The 45-mile Leland-Carus Project, PGE's other covered conductor project, is expected to execute Phase 2 (14.5 miles) in 2025. Phase 1 was completed ahead of schedule and put in-service in November 2024.

Table 36: GDSH-04 2025 Project List

Project	Planned In-Service (# of linear miles)	Forecast ($, thousands)	In-service Year
WF–RC Leland–Carus	15	$11,158	2026
WF-RC Estacada-North Fork	0	$923	2029
Total	**15**	**$12,081**	

5.2.4.2 Target and Expenditure Comparison

A summary of the forecast difference in target and expenditure for 2025 is summarized in Table 37.

Table 37: GDSH-04 Target and Expenditure Comparison

2025 Forecast Source	Target (# of linear miles)	Expenditure ($, thousands)
2024 WMP	15	$6,000
2025 WMP Update	15	$12,081
% Change	0%	101%
Update Required	No	Yes

5.2.4.3 Expenditure Update

PGE previously estimated overhead reconductor costs utilizing a unit cost of $400k per line-mile for all projects. 2025 expenditures are estimated utilizing the following per unit costs tied specifically to project scope:

- $1.1M per line-mile at the top value for three-phase ductile iron pole with covered wire replacements
- $580k per line-mile for single-phase wood or ductile iron pole replacements

The execution expenditures for Leland-Carus Phase 2 total $8.168M, which equates to approximately $545k per mile. Additionally, the forecast includes planning dollars for Phase 3 of $2.99M.

Additional costs of $923k are forecasted due to planning and design for the new Estacada-North Fork project, which includes both underground conversion and covered conductor mitigation.

5.2.5 GDSH-05: Distribution Pole Replacement

PGE implements distribution pole replacements as a mitigation to reduce ignition likelihood.

5.2.5.1 Objective

There are no changes to the objectives for the annual GDSH-05: Distribution Pole Replacement program.

5.2.5.2 Target and Expenditure Comparison

The forecast difference in target and expenditure for 2025 is summarized in Table 38.

Table 38: GDSH-05 Target and Expenditure Comparison

2025 Forecast Source	Target (# of structures)	Expenditure ($, thousands)
2024 WMP	95	$2,790
2025 WMP Update	100	$3,241
% Change	5%	16%
Update Required	No	No

5.2.6 GDSH-06: Transmission Structure Replacement

PGE implements transmission structure replacements as a mitigation to reduce ignition likelihood and wildfire consequence.

5.2.6.1 Objective

There are no changes to the objectives for the annual GDSH-06: Transmission Structure Replacement program.

5.2.6.2 Target and Expenditure Comparison

The forecast difference in target and expenditure for 2025 is summarized in Table 39.

Table 39: GDSH-06 Target and Expenditure Comparison

2025 Forecast Source	Target (# of structures)	Expenditure ($, thousands)
2024 WMP	30	$1,000
2025 WMP Update	15	$576
% Change	(50%)	(42%)
Update Required	Yes	Yes

5.2.6.3 Target Update

The transmission structure replacement program forecast remains a function of emergent work discovered during annual ignition prevention inspections. PGE forecasts annual expenditures based on previous annual finding counts.

5.2.6.4 Expenditure Update

As noted above, PGE anticipates that transmission asset inspections will begin to yield fewer transmission structure replacement work orders, as many inspection findings from prior inspections have been addressed since February 2022 during the annual HFRZ inspections. The 2025 reduction in forecast expenditure is in alignment with the 50 percent reduction in the transmission structure replacement target.

5.2.7 GDSH-07: Points of Isolation

The purpose of this initiative is to increase operational capabilities and minimize PSPS exposure for customers by deploying assets that give PGE the capability to de-energize specific feeder segments impacted by wildfire risk.

5.2.7.1 Objective

The objective for this annual program beginning in 2025 is to complete the points of isolation jobs by June 30th.

5.2.7.2 Target and Expenditure Comparison

A summary of the forecast difference in target and expenditure for 2025 is provided in the table below.

Table 40: GDSH-07 Target and Expenditure Comparison

2025 Forecast Source	Target (# of assets)	Expenditure ($, thousands)
2024 WMP	15	$1,370
2025 WMP Update	25	$2,413
% Change	67%	76%
Update Required	Yes	Yes

5.2.7.3 Target Update

The original 15 VIPER reclosers scoped for 2025 deployment were allocated to replace hydraulic reclosers (non-SCADA enabled) within the PGE HFRZs. The last three hydraulic reclosers within HFRZs are scheduled for replacement in 2026.

Of the eight additional reclosers scheduled for 2025 installation, six are required to reduce the PSPS exposure potential of customers near the new Chehalem Mountains HFRZ 12. The remaining two additional reclosers will be installed just outside HFRZ 11, decreasing the PSPS exposure of customers in that area.

VIPER recloser Standards were updated in 2024 to include single and two-phase VIPERs, providing greater flexibility in their deployment and replacement of non-SCADA-enabled reclosing devices.

5.2.7.4 Expenditure Update

The increased expenditure is primarily due to the increased quantity of reclosers planned for replacement in 2025 coupled with an approximately 7 percent increase in the unit price.

5.2.8 GDSH-08: Fire Safe Fuses

PGE implements fire safe fuse replacements as a mitigation technique to reduce ignition likelihood.

5.2.8.1 Objective

The objective beginning in 2025 for this annual program is to complete the fire safe fuse replacements by July 31. Two feeders have been selected for fire safe fuse replacement in 2025: Molalla-Marquam 13kV and Redland-Redland 13kV.

5.2.8.2 Target and Expenditure Comparison

A summary of the forecast difference in target and expenditure for 2025 is summarized in the table below.

Table 41: GDSH-08 Target and Expenditure Comparison

2025 Forecast Source	Target (# of feeders)	Expenditure ($,thousands)
2024 WMP	2	$2,880
2025 WMP Update	2	$2,099
% Change	0%	(27%)
Update Required	No	Yes

5.2.8.3 Expenditure Update

The number of feeders planned has not changed in 2025, however, the current expenditure forecast is 27 percent less than the 2024 WMP budget forecast. PGE has updated estimates for 2025 based on 2024 actuals, decreasing expected expenditure.

5.3 Grid Operations and Protocols

The Grid Operations and Protocols initiative category is addressed in Section 5 of PGE's 2024 WMP, Operating Protocols. Grid Operations and Protocols is now broken into two initiatives:

- GOP-01: Fire Season Readiness
- GOP-02: Enhanced Powerline Safety Settings

These two initiatives have not been tracked separately in previous WMPs. To develop a forecast for each initiative in 2025, PGE has split the expenditure forecast evenly between the two Grid Operations and Protocol initiatives and will report on its findings in PGE's 2026-2028 WMP.

5.3.1 GOP-01: Fire Season Readiness

This is an ongoing initiative aimed at providing tools, procedures, and training to personnel to reduce ignition likelihood and consequence.

5.3.1.1 Objective

There are no changes to the objectives for the annual GOP-01: Fire Season Readiness program.

5.3.1.2 Target and Expenditure Comparison

A summary of the forecast difference in target and expenditure for 2025 is summarized in Table 42.

Table 42: GOP-01 Target and Expenditure Comparison

2025 Forecast Source	Target (# of employees)	Expenditure ($, thousands)
2024 WMP	1,500	$350
2025 WMP Update	1,500	$410
% Change	0%	17%
Update Required	No	No

5.3.2 GOP-02: Enhanced Powerline Safety Settings (EPSS)

Enhanced Powerline Safety Settings refers to PGE's overall system operations strategy to reduce ignition likelihood, as described in Section 5.1 of PGE's 2024 WMP.

5.3.2.1 Objective

In 2024, PGE identified the need to implement EPSS device settings during periods of Enhanced Fire Risk (EFR) conditions even when an official Red Flag Warning (RFW) had not been issued by the NWS. References to Red Flag Warning (RFW), as shown in PGE's 2024 WMP Tables 10 and 11, have been replaced with Enhanced Fire Risk (EFR) as shown in Table 43.

Table 43: Enhanced Powerline Safety Setting Modes

Mode	Description
Normal	Definite time fast trip
	2-3 shot reclosing
Fire Season	Definite time fast trip
	1 shot reclosing
Enhance Fire Risk (EFR)	Definite time fast trip
	No reclosing

There are no other changes to the objectives for the annual GOP-02: Enhanced Powerline Safety Settings program.

5.3.2.2 Target and Expenditure Comparison

There is no quantitative target associated with the expenditure forecast for 2025, as shown in Table 44.

Table 44: GOP-02 Target and Expenditure Comparison

2025 Forecast Source	Target (N/A)	Expenditure ($, thousands)
2024 WMP	-	$350
2025 WMP Update	-	$410
% Change	-	17%
Update Required	No	No

5.4 Industry Engagement

The Industry Engagement initiative category is addressed in Section 12 of PGE's 2024 WMP, Participation in Regional, National, and International Forums.

5.4.1 IE-01: Industry Engagement

This is an ongoing initiative to drive continuous improvement and shared learnings.

5.4.1.1 Objective

There are no changes to the objectives for the annual IE-01: Industry Engagement program.

5.4.1.2 Target and Expenditure Comparison

A summary of the forecast target and expenditure for 2025 is provided in Table 45.

Table 45: IE-01 Target and Expenditure Comparison

2025 Forecast Source	Target (# of leadership positions held)	Expenditure ($, thousands)
2024 WMP	2	-
2025 WMP Update	2	$100
% Change	0%	-
Update Required	No	Yes

5.4.1.3 Expenditure Update

The overall budget for this initiative category was accounted for in the 2024 WMP Cost Area Wildfire Mitigation Program & Compliance and was estimated based on 2023 and 2024 costs. PGE will report out on its forecast expenditure findings in the 2026-2028 Multi-year WMP.

5.5 Inspect/Correct

The Inspect/Correct initiative category is addressed in Section 8, Ignition Prevention Inspections, and specific elements in Section 10, System Hardening, of PGE's 2024 WMP. Inspect/Correct is now broken into five initiatives:

- IC-01: Inspection and Correction Program
- IC-02: Ignition Prevention Inspections
- IC-03: Asset Corrections
- IC-04: Ignition Risk Corrections
- IC-05: Tree Attachments

5.5.1 IC-01: Inspection and Correction Program

The purpose of this initiative is to consolidate the O&M work required for program administration and planning for the Inspect/Correct program, as described in Section 8.3 of PGE's 2024 WMP, which reduces ignition likelihood.

5.5.1.1 Objective

There are no changes to the objectives for the annual IC-01: Inspection and Correction Program administration.

5.5.1.2 Target and Expenditure Comparison

Due to the nature of this initiative, no quantitative target was associated with the expenditure forecast for 2025 shown in the Table 46.

Table 46: IC-01 Target and Expenditure Comparison

2025 Forecast Source	Target (N/A)	Expenditure ($, thousands)
2024 WMP	-	-
2025 WMP Update	-	$495
% Change	-	-
Update Required	No	Yes

5.5.1.3 Expenditure Update

PGE did not explicitly budget for this initiative in PGE's 2024 WMP or associated data requests. The expenditure estimate is based on isolation of the administrative and planning costs associated with the Inspect/Correct initiative category, including $220k in IT capital to improve processes, standards, and technology enablement.

5.5.2 IC-02: Ignition Prevention Inspections

The purpose of this initiative is to capture the work associated with the Ignition Prevention Inspection methodology, as described in Section 8.1 of PGE's 2024 WMP, which reduces ignition likelihood. This initiative also includes correction completed concurrently by 2-person crews upon identification during inspection.

5.5.2.1 Objective

The objective beginning in 2025 for this annual program is to substantially complete PGE's Ignition Prevention Inspections by June 30 compared to July 31 in 2024. This update reflects findings associated with PGE's Ignition Management program.

5.5.2.2 Target and Expenditure Comparison

A summary of the IC-02 forecast target and expenditure for 2025 is provided in the Table 47.

Table 47: IC-02 Target and Expenditure Comparison

2025 Forecast Source	Target (# of structures)	Expenditure ($, thousands)
2024 WMP	27,215	-
2025 WMP Update	28,738	$3,650
% Change	6%	-
Update Required	No	Yes

5.5.2.3 Expenditure Update

PGE did not explicitly budget for this initiative in PGE's 2024 WMP or associated data requests. The expenditure estimate is based on isolation of the ignition prevention inspection and correction costs associated with the Inspect/Correct initiative category. PGE's 2025 WMP Update splits the Asset Management & Inspections Cost Area from PGE's 2024 WMP into initiatives IC-01 and IC-02. The total O&M expenditure difference for IC-01 and IC-02 when comparing the PGE's 2024 WMP and PGE's 2025 WMP Update is $225k, or 6 percent.

5.5.3 IC-03: Asset Corrections

The purpose of this initiative is to capture Operations & Maintenance (O&M) work associated with the correction of issues identified during Ignition Prevention Inspections, reducing ignition likelihood. This initiative includes asset corrections completed following the inspections, and excludes corrections identified and completed in initiative IC-02 Ignition Prevention Inspections.

5.5.3.1 Objective

There are no changes to the objectives for the annual IC-03: Asset Corrections program.

5.5.3.2 Target and Expenditure Comparison

A summary of the forecast target and expenditures for 2025 is provided in the Table 48.

Table 48: IC-03 Target and Expenditure Comparison

2025 Forecast Source	Target (# of landscape pole clearing jobs closed/completed)	Expenditure ($, thousands)
2024 WMP	-	-
2025 WMP Update	75	$200
% Change	-	-
Update Required	Yes	Yes

5.5.3.3 Target Update

The target set for this initiative is for the most common correction which results in vegetation work orders requiring correction.

5.5.3.4 Expenditure Update

This work is typically executed by PGE Line Crews or Landscape Services, and the expenditure amount was not budgeted for explicitly in the 2024 WMP or associated data requests. The 2025 forecast is based upon analysis of 2023 and 2024 costs.

5.5.4 IC-04: Ignition Risk Corrections

The ignition risk correction initiative is focused on Capital investments to reduce ignition likelihood and wildfire consequence.

5.5.4.1 Objective

In 2024, PGE created and operated a new Ignition Prevention Blanket intended to address immediate or recently discovered ignition risks on PGE's system. Smaller projects under the program may be identified through ignition reporting results, non-standard or outdated standards, construction methods shown to result in failure that may cause ignition, or recently discovered issues derived from Root Cause Analysis.

PGE's ignition task force, as described in the 2024 WMP Section 8.9.2, reviews ignitions and determines the appropriate level of corrective action. Corrective action can range from additional analysis, training, or new standards to singular or programmatic asset replacement requirements. Examples of 2024 ignition investigation processes that resulted in corrective actions is provided in confidential Appendix D: Ignition Management Learnings.

This initiative also includes the following ignition risk correction activities:

- Crossarm replacements
- Distribution transformer replacements
- Pole Wraps
- Removal of abandoned assets

5.5.4.2 Target and Expenditure Comparison

A summary of the forecast target and expenditure for 2025 is provided in the table below. For the purposes of the WMP Update, the target for this initiative is planned pole wraps. Other metrics, such as cross-arms and distribution transformers replace, will be reported through the WMP Data Template Workbook.

Table 49: IC-04 Target and Expenditure Comparison

2025 Forecast Source	Target (# of pole wraps)	Expenditure ($, thousands)
2024 WMP	1,200	$796
2025 WMP Update	964	$1,602
% Change	(20%)	101%
Update Required	Yes	Yes

5.5.4.3 Target Update

Portland General Electric reduced the forecasted pole wrap candidates from approximately 1,200 poles to 964 poles for 2025. A transmission circuit originally scoped for inclusion for 2025 was found previously wrapped in 2021. Pole wrap candidate poles will be in HFRZ 3 and HFRZ 11 for 2025.

5.5.4.4 Expenditure Update

The difference in expenditure between the 2024 WMP and 2025 WMP Update is driven by the inclusion of the Wildfire Ignition Prevention Blanket into the Ignition Risk Corrections initiative. The Ignition Prevention Program was identified in PGE's Wildfire Mitigation Retrospective Report for First Half of 2024 compliance filing in docket UE 412 on October 1, 2024. The forecast for the project was $1.5M in 2024 and is forecast at $1M in 2025. The existing workstream in this initiative, PGE's Wildfire FITNES capital work, is forecast for a 10 percent decrease from 2024 due to repeated annual inspections.

5.5.5 IC-05: Tree Attachments

The purpose of this initiative is to reduce ignition likelihood by removing all secondary conductor tree attachments by December 31, 2027, as required by OAR 860-024-0018.

5.5.5.1 Objective

There are no changes to the objective for the annual IC-05: Tree Attachment program.

5.5.5.2 Target and Expenditure Comparison

In 2024, PGE rectified 318 inspection findings, setting 265 poles. A variety of solutions are required to rectify tree-attached secondaries and services, including setting a new pole, removing the attachment while maintaining NESC requirements, or changing the alignment from the existing secondary path.

A summary of the forecast target and expenditures for 2025 is shown in the Table 50.

Table 50: IC-05 Target and Expenditure Comparison

2025 Forecast Source	Target (# of corrections)	Expenditure ($, thousands)
2024 WMP	250	$3,000
2025 WMP Update	300	$2,170
% Change	20%	(28%)
Update Required	Yes	Yes

5.5.5.3 Target Update

PGE's tree attachment program gained efficiency in 2024 through active project management, effective design and customer outreach, coordination with the US Forest Service, and expedited construction methods, including pre-digging the pole holes ahead of line crew work, and separating specialties for efficiency. These efficiencies in design, coordination and construction are expected to further reduce costs and increase work order completion velocity in 2025.

5.5.5.4 Expenditure Update

Design, construction and management efficiencies are expected to reduce overall program costs in 2025.

5.6 Overview of the Service Territory

There are no PGE initiatives identified under the Overview of the Service Territory initiative category in 2025. Additionally, there is no change in the expected overall spend in Overview of the Service Territory when comparing PGE's 2024 WMP and 2025 WMP Update.

5.7 PSPS/Emergency Preparedness

5.7.1 PSPS-01: PSPS Readiness

The purpose of this initiative is to prepare PGE and partners for effective execution of a PSPS to mitigate ignition risk under extreme fire weather conditions and reduce PSPS consequence. The PSPS-01: PSPS Readiness initiative category maps to Section 5.3, Event Response Management, and Section 6, Operations During PSPS Event, of PGE's 2024 WMP.

5.7.1.1 Objective

There are no changes to the objectives for the annual PSPS-01: PSPS Readiness initiative. PGE remains focused on continuous improvement of PSPS procedures, communications, and decision making to improve the effectiveness and reduce customer impacts of a potential PSPS.

5.7.1.2 Target and Expenditure Comparison

A summary of the forecast target and expenditures for 2025 is shown in the Table 51.

Table 51: PSPS-01 Target and Expenditure Comparison

2025 Forecast Source	Target (# of exercises)	Expenditure ($, thousands)
2024 WMP	2	$920
2025 WMP Update	2	$1,560
% Change	0%	70%
Update Required	No	Yes

5.7.1.3 Expenditure Update

The primary difference in expenditure is driven by Incident Command System (ICS) training development and IT enablement associated with PSPS.

ICS training is being developed by an outside vendor to provide sustainable, role-specific training for Incident Command and General Staff and mature integration of key PGE personnel into ICS activations implemented by other entities or agencies. The amount budgeted to PSPS-01 in 2025 is $130k, which is approximately 45 percent of the total cost to implement the full training which includes a train-the-trainer element enabling PGE to deliver this training content in the future. This training is also in support of PGE Recommendation 24-232_9.

IT support for PSPS-01 in 2025 will include scoping the system changes and upgrades needed to incorporate WRF data into PSPS planning and real-time decision making. The forecast cost for this effort is $460k in 2025.

5.7.2 PSPS-02: MEDICAL BATTERY SUPPORT

This initiative reduces PSPS consequence by providing a portable battery to eligible customers as addressed in Section 13.5, Customer Medical Battery Support, of PGE's 2024 WMP.

Objective

PGE supports the most vulnerable customers impacted by Public Safety Power Shutoffs by providing portable batteries at no cost to select eligible customers. Eligibility criteria is to reside within a high wildfire risk zone, be enrolled in PGE's Medical Certificate program, and enrolled in the Income Qualified Bill Discount program.

PGE monitors for newly eligible customers on a monthly basis, and proactively contacts customers with the offering via email, postal mail, or phone calls. Customers are asked to complete an enrollment form and return back to PGE, upon which time arrangements will be made to deliver the battery. Currently PGE will either mail the battery to the customer or have it delivered by a representative from Meals on Wheels if the customer indicates that additional support is desired.

To conduct the Medical Battery Offer pilot PGE purchased 82 batteries from Goal Zero via a bulk purchase with competitive pricing. The battery provided to customers is the Yeti 1500X Portable Power Station, with a capacity of 1,500 watt hours.

PGE provided the first portable battery to eligible customers in August of 2023, reaching out to all customers who met the eligibility criteria. The initial data pull identified 42 customers eligible to receive a battery; PGE ultimately provided batteries to 33.

PGE then extended the offering to all customers, making numerous attempts via email, postal mail, and phone calls to ensure that customers were aware of the offer. Following initial outreach, PGE re-pulled the list of eligible customers each month, again providing aggressive outreach to every qualified customer to ensure that they were aware of the battery offer. As of November 2024, PGE had provided 75 batteries to the 126 eligible customers. PGE will continue to distribute the remaining batteries from the initial bulk purchase of 82 batteries until they are fully distributed.

In 2025 PGE will continue to make this offer available to eligible customers with enhancements for customer ease of participation and operational efficiencies. This includes an integration with PGE's marketplace website for a more scalable order and delivery process and a second bulk purchase agreement with a manufacturer to keep costs as low as possible.

5.7.2.1 Target and Expenditure Comparison

A summary of the forecast target and expenditures for 2025 is shown in the Table 52.

Table 52: PSPS-02 Medical Battery Support Target and Expenditure Comparison

2025 Forecast Source	Target (# of batteries)	Expenditure ($, thousands)
2024 WMP	36	$17[31]
2025 WMP Update	73	$120
% Difference	103%	606%
Update Required	Yes	Yes

5.7.2.2 Target Update

Because the Medical Battery Support offering received positive customer feedback and has been approved as an ongoing program, PGE is increasing efforts to raise program awareness. PGE's 2025 target is to increase enrollment from 58 percent of eligible customers to 75 percent. The 2025 forecast of 73 batteries to be delivered assumes increased enrollment as well as a 20 percent increase in program eligibility.

5.7.2.3 Expenditure Update

PGE is planning significant improvements to its Medical Battery Support offering[32] in 2025, including the implementation of automated processes to improve program efficiency. This budgeted expenditure will increase ease of program management in future years.

[31] 2024 costs for Medical Battery only reflect the cost for outreach, shipping of devices, the Meals on Wheels partnership, and customer support staffing. All devices were purchased in 2023.

[32] PGE Filing RE 46 PGE 2023 Notice of Promotional Concession; Resilience for Electricity Dependent Individuals (REDI), May 19, 2023

5.8 Risk Methodology and Assessment

The Risk Methodology and Assessment initiative category is addressed in Section 3, Wildfire Risk Mitigation Program Overview, and Section 4, High Fire Risk Zones in PGE's 2024 WMP. Additional details related to 2025 risk modeling can be found in Section 3, Significant Risk Model Updates above. Risk Methodology and Assessment is now broken into two initiatives:

- RMA-01: Wildfire Risk Modeling and Planning
- RMA-02: Ignition Management

5.8.1 RMA-01: Wildfire Risk Modeling and Planning

The purpose of this initiative is to consolidate work to support risk modeling program and mitigation planning that serves as the foundation of PGE's risk mitigation work.

5.8.1.1 Objective

There are no changes to the objective for the annual RMA-01: Wildfire Risk Modeling and Planning efforts.

5.8.1.2 Target and Expenditure Comparison

A summary of the forecast target and expenditures for 2025 is provided in Table 53.

Table 53: RMA-01 Target and Expenditure Comparison

2025 Forecast Source	Target (Annual Wildfire Risk Analysis)	Expenditure ($, thousands)
2024 WMP	1	$794
2025 WMP Update	1	$3,818
% Change	0%	381%
Update Required	No	Yes

5.8.1.3 Expenditure Update

The additional forecast expenditures for 2025 included in this initiative include:

- Information technology support
  - O&M - $830k
  - Capital - $1.05M
- Matrixed wildfire mitigation support across the business including geospatial operations, asset management planning, and enterprise data strategy - $662k.
- Advancing risk modelling and real-time tools for region (not just PGE), including co-op and municipal utilities, and for creating a tool to demonstrate individual consequence weightings per OPUC request – $305k.
- Third party risk model review – $150k.

5.8.2 RMA-02: Ignition Management

The purpose of this initiative is to investigate and analyze ignitions to inform risk modeling and mitigations as described in PGE's 2024 WMP Section 8.9, Ignition Management and Root Cause Analysis.

5.8.2.1 Objective

There are no changes to the objectives for the annual RMA-02: Ignition Management program.

5.8.2.2 Target and Expenditure Comparison

Due to the nature of this initiative, there is no quantitative target identified with the expenditure forecast for 2025, as shown in Table 54.

Table 54: RMA-02 Target and Expenditure Comparison

2025 Forecast Source	Target (N/A)	Expenditure ($, thousands)
2024 WMP	-	-
2025 WMP Update	-	$422
% Change	-	-
Update Required	-	Yes

5.8.2.3 Expenditure Update

The expenditure amount was not budgeted for explicitly in the 2024 WMP or associated data requests. The 2025 forecast is based upon analysis of 2024 costs.

5.9 Situational Awareness and Forecasting

The Situational Awareness and Forecasting initiative category is addressed in Section 5.3, Event Response Management, and Section 6, Operations During PSPS Event, of PGE's 2024 WMP.

5.9.1 SAF-01: Situational Awareness and Forecasting

The purpose of this initiative is to consolidate the work required to support weather forecasting and the situational awareness program that enables identification of wildfire hazards.

5.9.1.1 Objective

There are no changes to the objectives for the annual SAF-01: Situational Awareness and Forecasting program administration.

5.9.1.2 Target and Expenditure Comparison

Due to the nature of this initiative, there is no quantitative target associated with the expenditure forecast for 2025, as shown in Table 55.

Table 55: SAF-01 Target and Expenditure Comparison

2025 Forecast Source	Target (N/A)	Expenditure ($, thousands)
2024 WMP	-	$794
2025 WMP Update	-	$2,393
% Change	-	201%
Update Required	No	Yes

5.9.1.3 Expenditure Update

The purpose of this initiative is to create new or bolster existing situational awareness capabilities. These expenditures include additional labor support for the meteorology team, a high-resolution numerical weather prediction model (i.e. Weather Research and Forecasting model), weather station data hosting paired with a real-time weather data alerting capability, and wildfire spread and behavior modeling.

Table 56: Additional Forecast Expenditures for 2025

Information Technology Support	Meteorology and Situational Awareness	Weather Research and Forecasting (WRF) Model	Wildfire Simulation Capability (Ororatech)	Weather Station Data Hosting
O&M: $430,000 Capital: $690,000	$168,000	$125,000	$100,000	$72,000

5.9.2 SAF-02: AI CAMERAS

This initiative enables detection of wildfire hazards using High-Definition AI-enabled cameras as described in Section 4.2, Enhanced Monitoring and Technology in HFRZ, and Section 10, System Hardening of PGE's 2024 WMP. Early ignition detection enables swift response, limiting fire growth potential.

5.9.2.1 Objective

PGE's 2024 scope included two cameras located outside of PGE's service territory. Latgawa Mountain and Sycan Capacitor Station were chosen as the preferred locations, as these cameras cover one of the most important transmission corridors and assets in Oregon, the California-Oregon Intertie (COI). PGE owns one 500kV transmission circuit between Madras, OR and the California border as well as the in-line Sycan capacitor bank, both operated by BPA as part of the COI.

The Latgawa Mountain camera came online in September 2024; Sycan Capacitor Station camera will be installed end of Q1, 2025 as permitting and winter weather have delayed deployment. The locations of these cameras and their viewsheds are shown in the figure below. PGE added three additional AI cameras to the scope of this initiative in 2024, see Target Updates below for details.

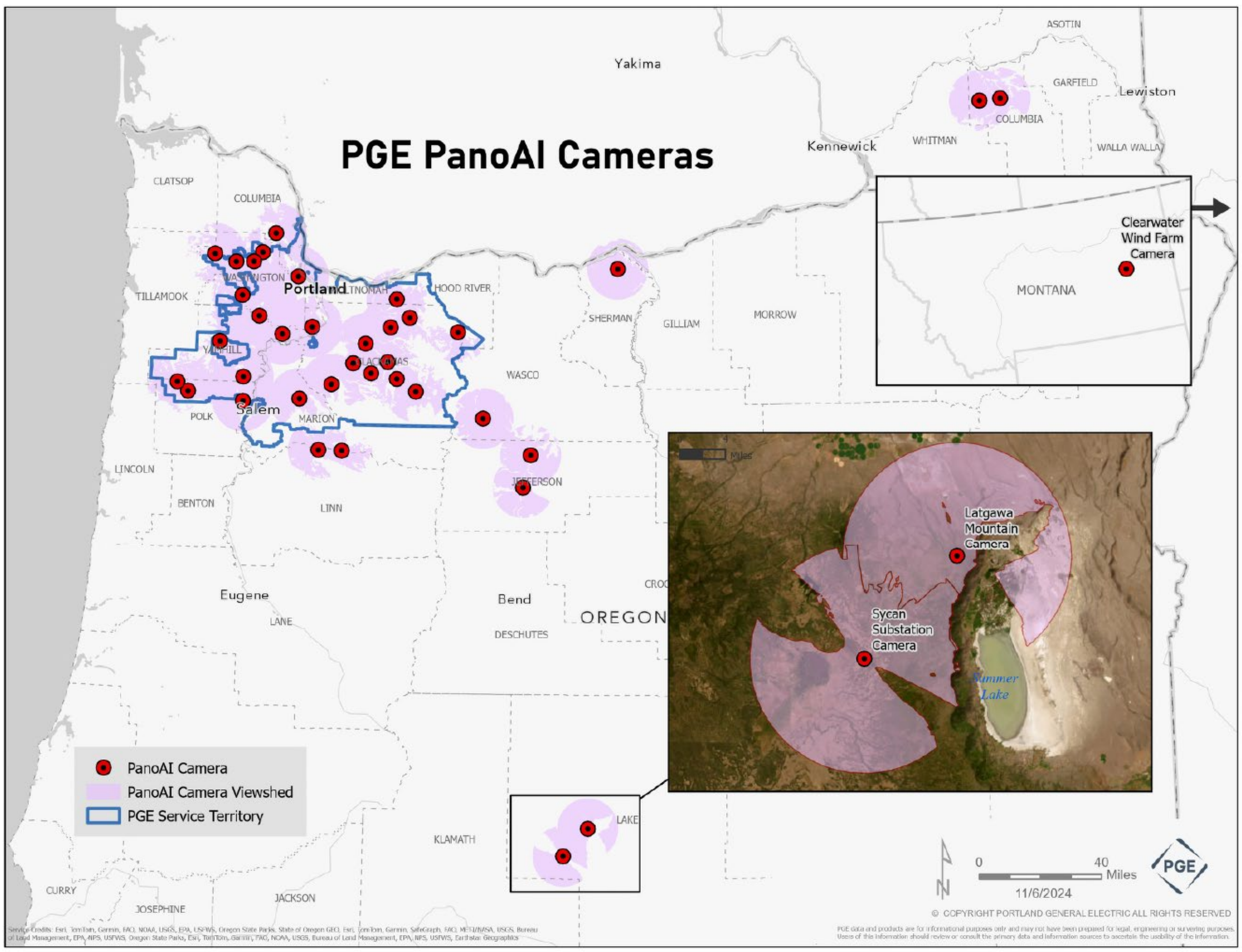


Figure 68: PGE AI Cameras – Current deployment with Viewsheds

5.9.2.2 Target and Expenditure Comparison

A summary of the forecast target and expenditures for 2025 is provided in the table below.

Table 57: SAF-02 Target and Expenditure Comparison

2025 Forecast Source	Target (# of cameras AI Detection)	Expenditure ($, thousands)
2024 WMP	0	$326
2025 WMP Update	0	$355
% Change	-	9%
Update Required	No	No

5.9.2.3 Target Update

PGE's 2025 WMP Update includes three additional cameras: two cameras sited in the Willamette Valley to cover the new Chehalem Mountains HFRZ 12 and a third camera at the new Clearwater Wind generation facility in Montana. PGE was able to proactively install the additional three cameras in 2024.

5.9.2.4 Expenditure Update

Operations and maintenance costs total $9.6k per year for each camera; three additional cameras represent an O&M increase of approximately $28.8k annually.

5.9.3 SAF-03: Weather Stations

The Weather Stations initiative enables detection of wildfire hazards and deployment is addressed in Section 10, System Hardening, of PGE's 2024 WMP.

5.9.3.1 Objective Update

The objective beginning in 2025 for this annual program is to complete all weather station additions by June 30th.

5.9.3.2 Target and Expenditure Comparison

A summary of the forecast difference in target and expenditures for 2025 is provided in Table 58.

Table 58: SAF-03 Target and Expenditure Comparison

2025 Forecast Source	Target (# weather stations)	Expenditure ($, thousands)
2024 WMP	5	$432
2025 WMP Update	8	$600
% Change	60%	39%
Update Required	Yes	Yes

5.9.3.3 Target Update

PGE added three additional weather stations to the 2025 scope to provide meteorological data within the newly designated Chehalem Mountains HFRZ 12. HFRZ 12 did not exist when PGE's 2024 WMP was filed; therefore this additional scope was not included in the original scope of five weather stations for deployment within existing HFRZs.

5.9.3.4 Expenditure Update

The cost to deploy each weather station is approximately $50k, including design, materials, permitting and contract labor. The increase in expenditure covers the increased weather station deployment cost, while the ongoing O&M expense is forecast to be unchanged from 2024 to 2025.

5.9.4 SAF-04: Early Fault Detection

The Early Fault Detection (EFD) initiative is addressed in Section 13.1, Early Fault Detection Pilot Program, of PGE's 2024 WMP. This initiative reduces ignition likelihood and reliability risk by alerting personnel of pending equipment failures.

5.9.4.1 Objective Update

In 2025, PGE will transition this pilot to an ongoing annual program with the objective to complete the EFD sensor installations by May 31st. In 2024, EFD sensors will be deployed on the Molalla – Marquam (Zone 5) and Redland–13 distribution circuits (Zone 3) based upon the criteria outlined in Section 3.12, Resulting Changes to Mitigation Initiatives.

5.9.4.2 Target and Expenditure Comparison

A summary of the forecast target and expenditure for 2025 is summarized in Table 59.

Table 59: SAF-04 Target and Expenditure Comparison

2025 Forecast Source	Target (# of feeders)	Expenditure ($, thousands)
2024 WMP	3	$1,530
2025 WMP Update	2	$2,198
% Change	(50%)	44%
Update Required	Yes	Yes

5.9.4.3 Target Update

PGE added circuits to the EFD plan to address Root Cause Assessment findings related to system response to high impedance faults. See Confidential Appendix D, Ignition Management Learnings, for additional details.

PGE measures EFD deployment in circuits deployed rather than number of units or circuit mileage covered. EFD placement is a function of available poles, distance between sensors, communications carrier signal strength and circuit geometry complexity. Circuits in 2025 are larger in length and more complex topography changes than previous 2024 circuits, requiring additional sensors than previously forecasted.

PGE added seven additional circuits to its total 2024 circuit deployment, bringing the total circuits on which EFD is deployed to nine. The table below shows the 2024 results of the EFD initiative. PGE identified in 2024 the need to upgrade the Generation 3 EFD sensors to Generation 4. This upgrade allows for higher precision of pre-fault detection, detection of high impedance faults, and expanded visibility across the circuit.

Table 60: Early Fault Detection Units Deployed in 2024

Circuit or Feeder	Distribution Count	Transmission Count	Total
Brightwood-North Bank*	10		10
Brightwood-Rhododendron		5	5
Brightwood-Brightwood 13*	12		12
Scotts Mills-Scotts Mills 13	44		44
Summit-Government Camp*	4		4
Summit-Meadows*	4		4
Summit-Summit 13*	4		4
Welches-Welches 13*	5		5
Welches-Zig Zag*	15		15
Grand Total	**99**	**5**	**103**

* Indicates 2024 Scope absorption of additional circuits

5.9.4.4 Expenditure Update

Expenditure differs by circuit due to utilization of contract labor, varying design complexity, potential access limitations, and required asset replacements. The Early Fault Detection program continues to baseline costs and improve unit cost estimates as the program accumulates more data. 2024 program costs amount to approximately $1.92M, or $18.86k per unit installed compared to an initial estimate of $23k per unit. The increase in forecasted expenditure for 2025 circuit deployment is a result of longer line mileage and more complex circuit geometry than previously forecasted.

5.10 Vegetation Management

Vegetation Management initiative category is addressed in Section 9, Vegetation Management, of PGE's 2024 WMP. Additional details on the criticality of PGE's AWRR Vegetation Management program can be found in the Vegetation Management Risk Update section. Additional program information and definitions can be found in Program Sharing Section 8, Vegetation Management.

This initiative category is now broken into five initiatives:

- VM-01: AWRR Program
- VM-02: AWRR Active Growth Period Patrol
- VM-03: AWRR Active Growth Period Mitigation
- VM-04: AWRR Hazard Patrol
- VM-05: AWRR Hazard Mitigation

5.10.1 Overall AWRR Program Updates

For 2025, PGE will continue to improve the AWRR program design, operations, and alignment with current climate conditions while focusing on Oregon Public Utility Commission (OPUC) requirements and recommendations. OAR 860-024-0016 provides the regulatory framework for PGE's vegetation management activities, influencing the company's AWRR-related practices, which often occur outside designated PGE right-of-way, utility easements, and annual maintenance schedules.

Nearly two full years of AWRR program activities, including bi-annual patrols, mitigation activities, and thorough analysis of each zone and its condition, have led PGE to identify the following program improvements for implementation in 2025:

- Introduction of an **Active Growth Period (AGP)** to manage clearances and mitigate imminent hazards prior to fire season, reducing the likelihood of outages and ignitions.
- Addition of a new **High Growth Potential (HGP) Condition 3 (C3)** designation, enabling identification and mitigation of fast-growing vegetation, resulting in reduced likelihood of outages and ignitions.
- **Optimized scheduling** of Full Scope Patrol & Mitigation (FSPM) and Inter-cycle Patrol & Mitigation (ICPM) for each zone, increasing program efficiency and limiting cost.
- **Underground Conversion** of 20.65 line-miles of overhead conductor to underground lines, reducing the need for vegetation management and lowering overall program cost.

Despite increasing labor costs and tree mortality rates, the 2025 WMP Update AWRR forecast has decreased by $2.2M (6 percent) compared to the 2025 forecast shared in PGE's 2024 WMP. The following table shows the program scope changes by HFRZ, reflecting the new HFRZ 12, System Hardening benefits delivered in 2024, and in-flight construction projects forecast to complete in 2025.

Table 61: AWRR Program Scope Changes by HFRZ

HFRZ	Line Miles			Approximate Tree Count			Change Reason
	2024	2025	Change	2024	2025	Change	
Zone 1	289.81	289.81	0%	188,991	188,991	0%	
Zone 2	24.59	24.59	0%	45,871	45,871	0%	
Zone 3	51.15	51.15	0%	18,594	18,594	0%	
Zone 4	161.23	161.23	0%	63,984	63,984	0%	
Zone 5	150.28	150.28	0%	72,137	72,137	0%	
Zone 6	16	16	0%	21,354	21,354	0%	
Zone 7	92.82	92.82	0%	51,247	51,247	0%	
Zone 8	43.07	43.07	0%	27,830	27,830	0%	
Zone 9	85.11	74.47	-13%	21,587	15,915	-26%	Scoggins-Cherry Grove UG
Zone 10	133.31	123.27	-8%	58,801	53,904	-8%	Grand Ronde-Agency UG
Zone 11	17.95	17.95	0%	8,205	8,205	0%	
Zone 12	0	36.33	+new	0	9,156	+new	New Zone
Total	**1065.32**	**1080.97**	**1.47%**	**578,601**	**577,823**	**-0.13%**	

5.10.2 VM-01: Advanced Wildfire Risk Reduction Program

The purpose of this initiative is to capture the cost to plan and administer the AWRR program which reduces ignition likelihood due to vegetation contact.

5.10.2.1 Objective

There are no changes to the objectives for the annual VM-01: AWRR program administration.

5.10.2.2 Target and Expenditure Comparison

Due to the nature of this initiative, there is no quantitative target identified with the expenditure forecast for 2025, as shown in Table 62.

Table 62: VM-01–Target and Expenditure Comparison

2025 Forecast Source	Target (N/A)	Expenditure ($, thousands)
2024 WMP	-	-
2025 WMP Update	-	$941
% Change	-	-
Update Required	No	Yes

5.10.2.3 Expenditure Update

This initiative was not disaggregated from the comprehensive AWRR expenditure in 2024. PGE has been able to leverage learnings from 2024 to reduce overall AWRR program costs.

5.10.3 VM-02: AWRR Active Growth Period Patrol

The purpose of this initiative is to reduce ignition likelihood from vegetation contact through annual patrol and subsequent mitigation of all HFRZ line miles.

5.10.3.1 Objective

In 2025, the AWRR Patrol and Mitigation 1 (PM1) discussed in PGE's 2024 WMP will be modified to emphasize inspections during the active growth period (AGP), March through May. This effort identifies C1 and High Growth Rate (C3) vegetation near high-voltage conductors. This program modification allows for timely identification of vegetation hazards prior to the annual fire season declaration, enhancing safety and compliance with OAR Division 24 standards.

5.10.3.2 Target and Expenditure Comparison

Table 63 summarizes the forecast target and expenditures for 2025.

Table 63: VM-02 Target and Expenditure Comparison

2025 Forecast Source	Target (# of linear miles)	Expenditure ($, thousands)
2024 WMP	1,065	-
2025 WMP Update	1,081	$110
% Change	2%	-
Update Required	No	Yes

5.10.3.3 Expenditure Update

This initiative was not disaggregated from the comprehensive AWRR expenditure in 2024. Using the program efficiencies identified above, PGE expects the unit cost for this initiative to be approximately $102 per line-mile in 2025.

5.10.4 VM-03: AWRR Active Growth Period Mitigation

The purpose of this initiative is to reduce ignition likelihood from vegetation contact through annual mitigation of identified hazards.

5.10.4.1 Objective

In 2025, the AWRR Patrol and Mitigation 1 (PM1) discussed in PGE's 2024 WMP will be modified to emphasize inspections during the active growth period (AGP), March through May. This effort mitigates C1 and High Growth Rate (C3) vegetation near high-voltage conductors. This program modification allows for timely mitigation of vegetation hazards prior to the annual fire season declaration, enhancing safety and compliance with OAR Division 24 standards.

5.10.4.2 Target and Expenditure Comparison

A summary of the forecast target and expenditure for 2025 is summarized in Table 64.

Table 64: VM-03 Target and Expenditure Comparison

2025 Forecast Source	Target (# of linear miles)	Expenditure ($, thousands)
2024 WMP	1,065	-
2025 WMP Update	1,081	$334
% Change	2%	-
Update Required	No	Yes

5.10.4.3 Expenditure Update

This initiative was not disaggregated from the comprehensive AWRR expenditure in 2024. Using the program efficiencies identified above, PGE expects the unit cost for this initiative to be approximately $312 per line-mile in 2025.

5.10.5 VM-04: AWRR Hazard Patrol

The purpose of this initiative is to reduce ignition likelihood from vegetation contact through full-scope and inter-cycle patrol of all HFRZ line miles.

5.10.5.1 Objective

Full scope and inter-cycle inspections identify Imminent Hazards (C1), Probable Hazards (C2), and potential clearance violations.

Full scope patrols also focus on areas requiring intensified clearance, including side-clearance, overhang removal, selective tree part removal, Right-of-Way (ROW) expansion, mowing, and whole tree removal. Starting in 2025, full-scope and inter-cycle patrols will also include the identification of High Growth Potential (C3) vegetation to prevent encroachments and proactively address emerging hazards.

5.10.5.2 Target and Expenditure Comparison

Table 65 summarizes PGE's forecast target and expenditures for 2025.

Table 65: VM-04 Target and Expenditure Comparison

2025 Forecast Source	Target (# of linear miles)	Expenditure ($, thousands)
2024 WMP	1,065	-
2025 WMP Update	1,081	$945
% Change	2%	-
Update Required	No	Yes

5.10.5.3 **Expenditure Update**

This initiative was not disaggregated from the comprehensive AWRR expenditure in 2024.

5.10.6 VM-05: AWRR Hazard Mitigation

The purpose of this initiative is to reduce ignition likelihood from vegetation contact through full-scope and inter-cycle mitigation of identified hazards.

5.10.6.1 Objective

PGE contract tree crews mitigate Imminent Hazards (C1), Probable Hazards (C2), and clearance violations as directed by AWRR inspectors. During full scope mitigation, crews also focus on areas needing intensive clearance work, including increased side-clearance, overhang removal, selective tree part removal, ROW expansion, mowing, and whole tree removal. Starting in 2025, full-scope and inter-cycle mitigation will also address High Growth Potential (C3) vegetation to prevent encroachments and proactively address emerging hazards.

5.10.6.2 Target and Expenditure Comparison

Table 66 summarizes PGE's forecast target and expenditure for 2025.

Table 66: VM-05 Target and Expenditure Comparison

2025 Forecast Source	Target (# of trees)	Expenditure ($, thousands)
2024 WMP	15,900	$37,609
2025 WMP Update	15,337	$34,671
% Change	(4%)	(8%)
Update Required	No	No

5.11 Wildfire Mitigation Strategy Development

Wildfire Mitigation Strategy Development initiative category maps to the Wildfire Mitigation Program and Compliance activity shown on Section 11.1, Table 24, 2024 WMP Activity and Description of PGE's 2024 WMP.

5.11.1 WMSD-01: WMP STRATEGY AND PROGRAM DELIVERY

The purpose of this initiative is to capture enterprise costs associated with the planning, compliance, and administration of PGE's WMP initiatives.

5.11.1.1 Objective

There are no changes to the objectives for WMSD-01: WMP Strategy and Program Delivery.

5.11.1.2 Target and Expenditure Comparison

Table 67 summarizes PGE's the forecast target and expenditure for 2025.

Table 67: WMSD-01 Target and Expenditure Comparison

2025 Forecast Source	Target (Approval of WMP)	Expenditure ($, millions)
2024 WMP	1	$2,611
2025 WMP Update	1	$2,335
% Change	0%	(11%)
Update Required	No	No

6 Areas for Additional Improvement

6.1 PGE Recommendations

PGE Recommendation 24-232_1

Requirement: Explain how PGE incorporated the effects of mitigation deployment, climate change and other temporal aspects into its baseline risk modeling.

Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE has shared additional information in Section 8, Program Sharing, to supplement Section 3, Wildfire Risk Mitigation Program Overview, of PGE's 2024 WMP.

- Section 8.1, Asset Reliability and Wildfire Risk Methodology
- Section 8.3, Fire Behavior Modeling Methodology

PGE has provided detailed information regarding 2025 updates to its baseline risk modeling in Section 3, Significant Risk Model Updates, specifically:

- Section 3.2, PGE Asset Review Input Updates, reflects the effects of mitigation deployment on the risk modeling inputs.
- Section 3.5, Climate Change Impacts, details the effects of climate change on risk modeling.
- Section 3.10, High Fire Risk Zone Updates, includes specific HFRZ boundary changes associated with mitigation deployment.

PGE Recommendation 24-232_2

Requirement: Explicitly detail changes to the risk model resulting from input of subject matter experts.

Timeframe: 2025 WMP Update

PGE Response:

PGE has provided detailed information regarding updates to its baseline risk modeling in Section 3, Significant Risk Model Updates, and Section 8, Program Sharing. Most notably, subject matter expertise input is detailed in the following sections:

- Section 3.2, Asset Review Input Update (Cost)
- Section 3.3, Asset Review Methodology Update (Geo-Probability Model)
- Section 3.5, Climate Change Impacts
- Section 3.6, Fire Behavior Model Updates
- Section 3.9, Fire Agency Reviews
- Section 3.11, Third-Party Validation
- Section 3.13, Vegetation Management Risk Updates
- Section 8.1, Asset Reliability and Wildfire Risk Methodology
- Section 8.3, Fire Behavior Modeling Methodology

Additionally, the following details ongoing risk model improvements; information on the current methodology can be found in Program Sharing Section 8.1, Asset Reliability and Wildfire Risk Methodology.

Asset Failure Probability

In 2025, PGE will refine the failure curve parameters it uses to determine the annual likelihood of a pole failure. The current algorithm utilizes a shape and scale that is annually refreshed based on the most recent failure counts from PGE's OH Facility Inspections and Treatment to National Electrical Safety Code Standards (FITNES) program and annual average counts of poles causing outages.

While this approach works at a system level, PGE sees an opportunity to improve its existing probability curve by incorporating additional data inputs and advanced analytical approaches to develop a unique failure probability for each pole. The goal of this update is a more sophisticated failure curve layering together characteristic data, five years of historical failure data, pole condition data, data concerning the benefit of inspection/treatment, and potential external factors that may influence the annual probability of failure of a pole. PGE believes that the ability to calculate a unique estimated failure probability for each pole will provide valuable insights for risk-informed decision-making and support targeted wildfire mitigation efforts.

Ignition Probability

PGE is exploring ways to use location-specific historical ignition data to improve its ignition likelihood calculations. The current modeling approach uses historical data to determine the annual number of expected asset- or vegetation-caused ignitions across the system without consideration of historical location-specific ignition data and trends. PGE is exploring whether it can improve the accuracy of its ignition likelihood calculations by reviewing predicted ignitions v. actual ignitions for specific assets and protected sections against location-specific data.

PGE Recommendation 24-232_3

Requirement: Explicitly identify how PGE has incorporated climate change into its current fire risk modeling.

Timeframe: 2025 WMP Update

PGE Response:

PGE incorporated a new climate modifier and vegetation management ecology mortality projections into its risk model in 2024. For details, please refer to Sections 3.5, Climate Change Impacts, and 3.13, Vegetation Management Risk Updates.

PGE Recommendation 24-232_4

Requirement: Provide a risk ranking by circuit, zone of protection, circuit segment or asset, and explain its use in advancing risk mitigations.

Timeframe: 2026-2028 Multi-year WMP

PGE Response:

The following sections provide information about PGE's risk ranking and use in advancing risk mitigations:

- Section 3.1.1, Risk Model Annual Update Process
- Section 3.8, Risk Register Update
- Section 3.12.1, Wildfire Mitigation Strategy Overview

The detailed risk register is provided with Confidential Appendix E, Sensitive Data

PGE Recommendation 24-232_5

Requirement: Provide details for selected mitigation measures, including capital and operational expenses and program level spending, with estimated costs, units, and risk reduction by year.

Timeframe: 2025 WMP Update

PGE Response:

Risk Spend Efficiency values and avoided ignitions are provided in Section 3.12, Resulting Changes to Mitigation Initiatives. Mitigation initiative objectives, targets, and expenditures are provided in Sections 4 and 5.

PGE's detailed response to Area of Additional Improvement 24-326_5 is included in 2025 WMP Update Data Template Workbook, Tab 2 and Tab 13. Risk reduction work is part of the OPUC UM 2340 Phase 2 work, scheduled for 2025. Findings/outcomes will be summarized in PGE's 2026-2028 WMP.

PGE Recommendation 24-232_6

Requirement: Provide spending plans including programs, costs, units, and risk reduction by year for each mitigation tactic.

Timeframe: 2025 WMP Update

PGE Response:

Risk Spend Efficiency values and avoided ignitions are provided in Section 3.12. Mitigation initiative objectives, targets, and expenditures are provided in Sections 4 and 5.

PGE's detailed response to Area of Additional Improvement 24-326_6 is included in 2025 WMP Update Data Template Workbook, Tab 2 and Tab 13. Risk reduction work is part of the OPUC UM 2340 Phase 2 work, scheduled for 2025. Findings/outcomes will be summarized in PGE's 2026-2028 WMP.

PGE Recommendation 24-232_7

Requirement: Provide further information regarding the feedback being received in either public safety partner engagement or community outreach.

Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE hosted two fire agency partner meetings in October and November to discuss observations from the wildfire season, present wildfire risk methodologies for assessment and feedback, and to identify potential coordination opportunities. Details on the meeting topics, outcomes, and attendees are presented in Section 3.9, Fire Agency Reviews.

In 2024, PGE hosted six community engagement events where customers learned about PGE's WMP and associated programs and had the opportunity to provide feedback, including four in-person events and two virtual events between May 29 and June 12. Public Safety Partners, municipalities, and CBOs were invited to participate and share preparedness information.

In 2024, PGE recorded a 19 percent increase in the number of customers who attended and a 25 percent increase in the number of partner agencies that participated in these events, which included American Sign Language and Spanish interpreters at each event. Post-event survey results revealed that customers enjoyed the opportunity to learn more about wildfire preparedness, and that, following the event, 88 percent of residential customers who attended felt more confident in PGE's preparedness for wildfires.

A summary of each event, including methodology, participants, and feedback, is presented in Appendix B. In addition, PGE participated in wildfire preparedness events hosted by community-based organizations and Public Safety Partners listed in Appendix A, Outreach and Engagement. PGE will continue to implement methods of tracking and responding to community and customer feedback in 2025.

PGE Recommendation 24-232_8

Requirement: Identify general frequency and types of interactions with public safety partners.

Timeframe: 2025 WMP Update

PGE Response:

PGE meets before fire season with Public Safety Partners to discuss communications, terminology, and community resource centers (CRCs) locations, among other topics. PGE hosts a service area-wide public safety partner PSPS exercise each June. During the exercise, PGE provides a scenario for the PSPS event and scope for public safety partners to discuss communication strategies, health and human service needs, as well as other PSPS-related topics.

PGE hosts a post-fire season after-action reviews with Public Safety Partners whenever a PSPS event occurs to capture lessons learned and areas for continuous improvement. PGE Emergency Management also attends public safety partners wildfire, PSPS, and storm meetings when invited.

PGE Recommendation 24-232_9

Requirement: Provide further details regarding local, regional, and state interactions with Public Safety Partners when the incident command system is activated.

Timeframe: 2025 WMP Update

PGE Response:

PGE's Business Continuity and Emergency Management (BCEM) organization notifies public safety partners and the OPUC when PGE's Incident Management Team is activated for any event. The OPUC receives these notifications through its ESF-12 function via both phone and email:

- Activation type
- Expected event duration
- Reason for IMT activation

Public Safety Partners receive similar information via email notification, as well as point of contact information for each shift and situation status (SitStat) meeting cadence. These communications continue until the Incident Management Team is deactivated. The Incident Management Team activation notifications were done in 2024 for the January Winter Storm, Summer High Heat Event in July, and Troutdale Airplane Crash in September.

PGE Recommendation 24-232_10

Requirement: Leverage and simplify methods for customers to obtain preparedness and real time information regarding Public Safety Power Shutoffs, including increasing languages in which Public Safety Power Shutoffs information is available, simplifying web-site navigation, and utilizing Community Based Organizations and public safety partner channels where available. Describe steps taken to implement these changes.

Timeframe: 2025 WMP Update

PGE Response:

PGE developed and implemented its 2024 annual wildfire awareness, education, and outreach campaign that supported communications for employees, stakeholders, partners, and customers. The campaign promoted wildfire safety and highlighted steps PGE takes to mitigate wildfire risk, including PSPS events.

The tactical communications mix made PSPS information accessible in a simplified and streamlined manner. Also included in the campaign was outreach and engagement with Community-Based Organizations (CBOs), Public Safety Partners, state and federal agencies, and business customers.

Similar to previous years, PGE conducted awareness and education activities before, during, and after fire season to reach customers, critical facility operators, elected officials, agencies, Public Safety Partners and federal, state, Tribal, and local governments. PGE carried out communication activities during fire season via media outreach, website information, social media, paid advertising, and strategic direct customer outreach.

One element of media outreach included PGE collaborating with PacifiCorp, Idaho Power, and the OPUC to issue a joint press release in support of National Wildfire Awareness Month in May. The OPUC issued the release, which underscored a unified wildfire safety message and promoted the need to be prepared, and that wildfire is not just a utility issue, but it is a societal problem and something we must collectively address.

PSPS map updates were made in 2024 to provide further clarity for customers who may be referencing it on PGE's website leading into and during an event. On the map, customers can see the HFRZ areas and which ones are actively involved in a PSPS. PGE added the ability to highlight areas that are in a pending status or will be impacted by a PSPS event in the next 24-to-48 hours. In the event that there is a PSPS event, the map will also show any active Community Resource Center locations.

Based on learnings from 2022, 2023, and 2024, direct customer communications and paid advertising began in late June / early July when the information is most relevant to customers, with the cadence and medium tailored to specific target audiences, including residential and business customers, and customers inside and outside of HFRZs.

PGE ran ads on social media, Google, Connected TV, and YouTube from mid-June through the end of September, collectively generating almost 40M total impressions and driving 136,000+ clicks to the Wildfire Safety and Prevention webpage.

- Facebook: This was the highest-performing platform in the campaign, driving 55 percent of total clicks. We reached our goals about halfway through the campaign, showing that our audiences were resonating with content and messages throughout the campaign.
    - Clicks to PGE Wildfire webpage: 36,936 (Goal: 13k)
    - Average Cost Per Click: $1.90 (Goal <$2)
    - Impressions: 4.1M (Goal: 2.3M)
- Google Display: With this campaign, we targeted five languages – English, Spanish, Vietnamese, Russian, and Chinese – and tripled our impression goal with 22.4M impressions.
- YouTube Ads: Ads targeting both English and Spanish speakers exceeded 5.3M impressions, with high view rates of 20.29 percent, far above the industry average of 10 to 15 percent.
- Connected TV (CTV): Ads ran on streaming platforms, including Olympics coverage, and generated almost 1.7M impressions, over-delivering by 50 percent. Spanish CTV ads achieved better click-through rates than English ads.
- Terrestrial Radio: Targeted the Portland designated market area (DMA) (ages 25-64), achieving 3.84M impressions.
- Print Ads: Appeared in The Chinese Times and The Asian Reporter, reaching non-English-speaking audiences.

Metrics Overview

- All platforms exceeded their impression goals, particularly Facebook, Google Display, and YouTube.
- Spanish-language ads, especially on YouTube and CTV, saw strong Click-Through Rates, while platforms like X had lower conversion rates despite high visibility.
- Cost per Clicks and Cost per Mille[33] remained cost-effective across most platforms, with Facebook and Google Display exceed industry averages.
- Spanish-language ads performed better than English on YouTube and CTV, with higher click-through rates and lower Costs per Click.
- Ads on YouTube and CTV platforms both exceeded view rate and frequency benchmarks, driving significant visibility and engagement.

PGE plans to maintain this cadence of communication as we have seen positive results with our advertising and outreach efforts.

Increase Languages and Reach Non-English Speaking Communities

This year, PGE used its digital ad campaign to understand how best to reach customers whose first language is not English. As part of this focused campaign, PGE ran digital ads in English, Spanish, Vietnamese, Russian and Chinese. Excluding English and Spanish, these ads received more than 850k impressions with Vietnamese-, Russian- and Chinese-speaking audiences. Between the digital ads, connected TV ads, and YouTube ads, PGE generated more than 7.2M impressions with Spanish-speaking audiences.

[33] An advertising metric commonly used with social media and digital advertising that tracks how much it costs for an ad to generate 1,000 views or impressions.

PGE chose to use the aforementioned languages for our advertising because according to PGE customer analytics, these are the top five languages spoken by residential customers within the PGE service area. This data also reflects information provided by the Oregon Secretary of State that shows that, aside from English, Spanish, Vietnamese, Chinese and Russian are the most common languages used by Oregonians.

PSPS preparedness information provided on the PGE website is available in 15 languages. In addition, throughout fire season, PGE references the Language Line on its website and customer communications. When activated during a PSPS, PGE Customer Resource Centers will distribute fliers in multiple languages with the following message: "We speak your language. Our customer service advisors can assist you in 200+ languages. Call us at 503-228-6322."

Simplify Website Navigation

Prior to the 2024 fire season, PGE had a consolidated wildfire webpage as a single source of information. PGE created two webpages on portlandgeneral.com where customers can learn about ways PGE is reducing wildfire risks, tips to prepare for a PSPS event, and general information on wildfire safety. The purpose of this effort is to improve the customer experience and make website navigation simpler so customers can more easily access the seasonal or event information they need.

- Wildfire Safety & Prevention: Educate audiences about wildfire threat, what PGE is doing to keep the system safe, actions they can take to prepare, link to PGE's Wildfire Mitigation Plan (WMP), frequently asked questions (FAQs) and a new video that explains how a PSPS works.
- Public Safety Power Shutoff (PSPS): Focused on PSPS-specific information, including an interactive map, how a PSPS works, what to expect, and why PGE would need to declare a PSPS. This webpage is also the dedicated information resource should the company need to initiate a PSPS.

These pages also provide year-round resources to help customers learn how to be prepared:

- Be Prepared landing page: A landing page for residential or business customers, with links to preparedness pages and helpful outage information.
- Prepare your home: Designed to educate residential customers about what they need to do to prepare for summer outages.
- Prepare your business: Designed to educate general business and key customers about what they need to do to prepare for summer outages.

Utilize Community-Based Organizations and Public Safety Partner Channels

PGE produced a Wildfire Communications Toolkit, which included prepared wildfire safety messaging and links to collateral. This was shared with more than 65 CBOs and 90 regional public information officers (PIOs) and emergency management personnel to help them easily share wildfire safety and preparedness messaging, including PSPS.

Throughout the year, PGE worked closely with local, state, and federal land and emergency management agencies, the U.S. Forest Service, Bureaus of Indian Affairs and Land Management, Oregon Department of Forestry, local tribes, fire districts, and emergency responders. This close collaboration included joint planning, presentation delivery and real-time information sharing to promote smooth communication and rapid engagement in the event of an emergency.

PGE also shared information from outside organizations relevant to safety and preparedness:

- Oregon's Department of Emergency Management has resources for businesses, including a checklist to help think through preparedness steps, what to do during and immediately after a disruptive emergency event and ways to recover.
- FEMA provides a planning guide for businesses that includes a range of tools, including power outage toolkits and a guide specifically designed for healthcare facilities.
- The Regional Disaster Preparedness Organization via PublicAlerts manages the Critical Safety Messages page, which provides over 260 messages covering 16 topics in 28 languages.

PGE Recommendation 24-232_11

Requirement: Identify Community-Based Organizations participating in Public Safety Power Shutoffs supportive community outreach and detail what specific actions the organizations are taking.

Timeframe: 2025 WMP Update

PGE Response:

PGE prepared communities for fire season by providing information about specific preparedness actions they can take, as well as steps PGE may take, including PSPS events. To reach customers and communities throughout the PGE service area, PGE used multiple partners, stakeholders, and channels.

CBOs have diverse and trusted communication channels within their communities and are essential partners in our integrated approach to PGE's outreach and engagement strategy. PGE's Wildfire Communications Toolkit includes collateral that CBOs can share through their outreach such as a wildfire brochure, social media copy, and newsletter copy.

PGE also participated in community preparedness events hosted by CBOs to share preparedness messaging and engage directly with customers. While PGE partners with CBOs on PSPS outreach, PGE does not require CBOs to report on any actions taken as we do not currently provide funding to support organizational capacity for such tracking.

Examples of how community partners have led outreach include Tualatin Soil and Water Conservation District including PGE's wildfire brochure in their workshop participant packets and Mt. Hood Corridor Wildfire Partnership inviting PGE to lead a workshop for homeowners on PSPS communications. In 2024, PGE sent the toolkit to over 65 CBOs and participated in 42 community events (a 90 percent increase from 2023) listed in Appendix A, Outreach and Engagement.

PGE will continue to engage CBOs to better understand unique community needs and opportunities to share preparedness messaging for PSPS.

PGE Recommendation 24-232_12

Requirement: Identify how customers are able to use battery rebate or other programs, if available, to improve resilience to events such as Public Safety Power Shutoffs.

Timeframe: 2025 WMP Update

PGE Response:

PGE supports the most vulnerable customers impacted by PSPS events by providing portable batteries at no cost to select eligible customers. Eligibility criteria includes residents within a high wildfire risk zone, enrollment in PGE's Medical Certificate program, and enrollment in the Income Qualified Bill Discount program.

PGE monitors for newly-eligible customers on a monthly basis, and proactively contacts customers with the offering via email, postal mail, or phone calls. Customers are asked to complete and return an enrollment form to PGE, after which PGE arranges for battery delivery. Currently PGE will either mail the battery to the customer or have it delivered by a representative from Meals on Wheels if the customer indicates a need for additional support.

To conduct the Medical Battery Offer pilot PGE purchased 82 batteries from Goal Zero via a bulk purchase with competitive pricing. The battery provided to customers is the Yeti 1500X Portable Power Station, with a capacity of 1,500 watt-hours. The figure below shows example runtimes for devices that a 1,500 watt-hour battery can power:

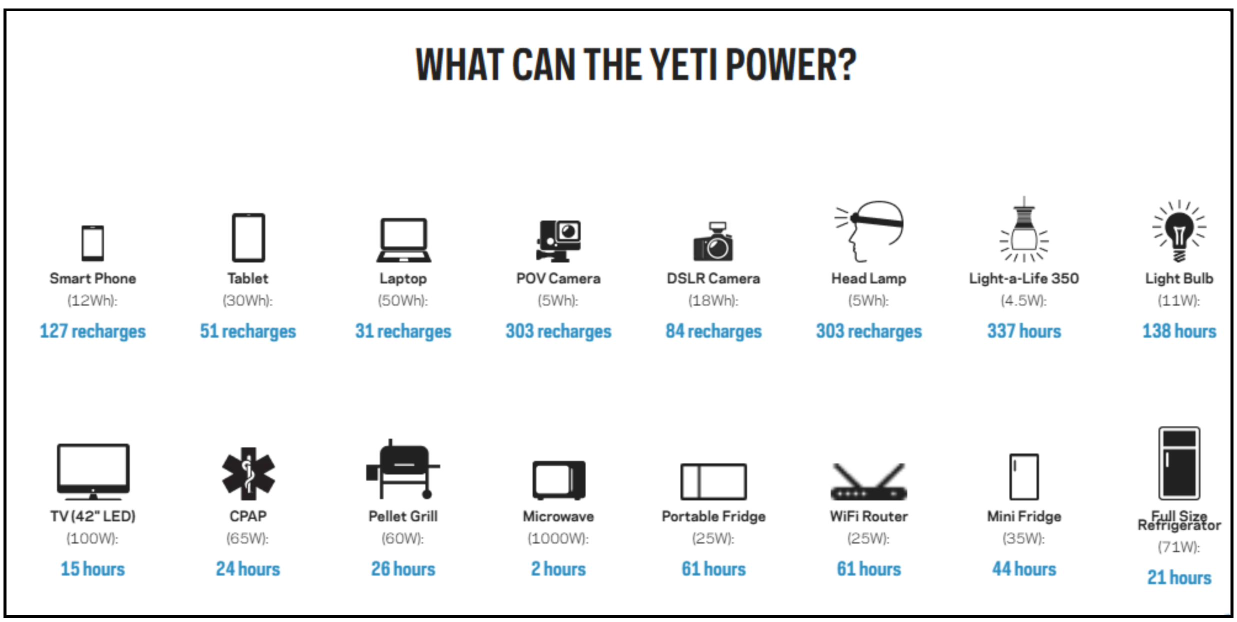


Figure 69: Example Recharge and Runtime Data for Portable Battery Unit

PGE provided its first portable batteries to eligible customers in August 2023, reaching out to all customers who met the eligibility criteria. The initial data pull found 42 customers eligible to receive a battery, of whom 33 received batteries. The offering was then extended to all PGE customers, with numerous attempts via email, postal mail, and phone calls to raise customer awareness of the offering. PGE continues to re-pull the list of eligible customers monthly. As of October 2024, PGE had provided 74 batteries, distributed among 126 eligible customers.

PGE will continue to distribute the remaining batteries from the initial bulk purchase of 82 batteries until all have been distributed. To prepare for the next iteration of the offering, PGE is seeking proposals from manufacturers for bulk pricing and willingness to integrate with the marketplace website for a more scalable order and delivery process.

PGE Recommendation 24-232_13

Requirement: Discuss evolution of customer outreach metrics and the role they have taken in evolving the Company's safety awareness program. Additionally, identify methods determined to ensure these messages are reaching non-English speaking communities.

Timeframe: 2025 WMP Update

PGE Response:

To date, PGE has completed three customer awareness surveys in support of wildfire outreach efforts. In fall 2023, PGE launched its first post-season survey; in 2024 it executed both pre-and post-season surveys, designed to capture the knowledge level of customers regarding PGE communications related to severe weather and wildfires.

Generally speaking, awareness of PSPS was significantly higher among customers located within PGE's HFRZs, but awareness levels for both groups have been consistent since the 2023 post-season survey. As shown in Figure 70, below, the 2024 post-season survey demonstrated awareness and familiarity with PSPS fell in line with the 2023 post-season survey after slight declines in the 2024 pre-season survey.

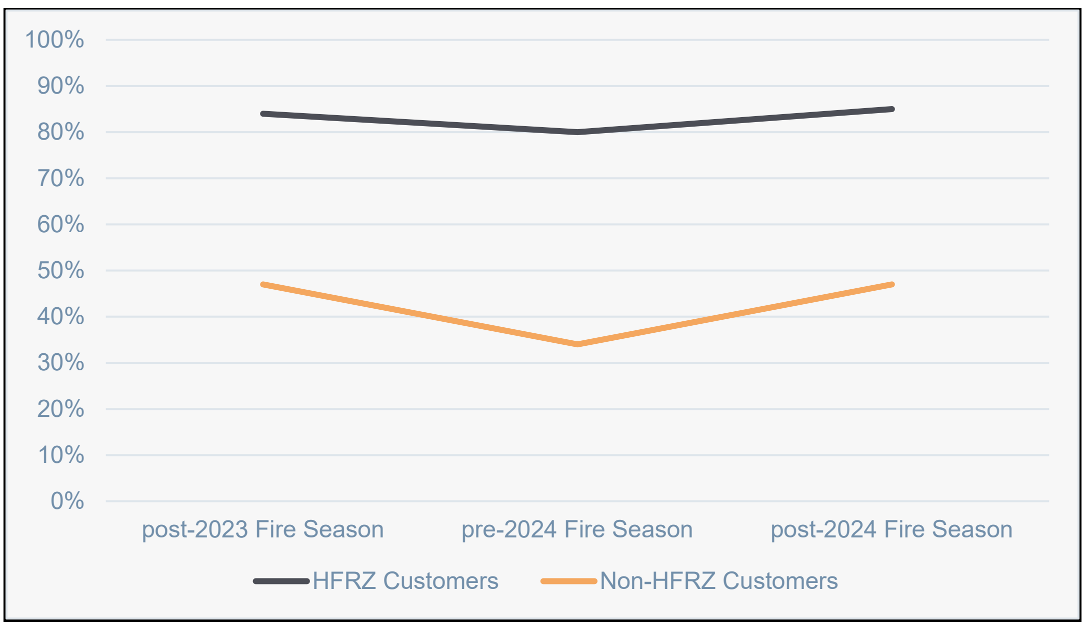


Figure 70 PSPS Customer Awareness Survey Results

Through the customer feedback from both 2024 surveys, three key learnings emerged that will help PGE refine its customer awareness and education efforts:

- **Communication Preference:** PGE emails are the primary source of PSPS information among customers and the most-requested form of communication by customers from PGE.
- **Education and Confidence:** There is a positive correlation between increased awareness of PGE wildfire mitigation actions and customers' confidence in PGE's ability to reduce wildfire impacts. HFRZ customers aware of PGE actions reported significantly higher confidence than

those unaware of PGE’s actions. Non-HFRZ customers showed a similar directional impact resulting from an awareness of PGE actions.

- **Customer Expectations:** Customers expect heavy PGE involvement in mitigating wildfire including preventative efforts and collaboration with local authorities, and frequent communication with and support for customers. Customers surveyed want:
    - PGE to take preventive actions like tree trimming and maintaining powerlines to protect public safety in wildfire season.
    - To be kept in the loop when shutoffs occur, and to be updated frequently.
    - Material support from PGE during long events, such as access to ice, water, and cooling stations.
    - Assurances that PGE is monitoring conditions and working with local authorities to manage risks to customers.

PGE Recommendation 24-232_14

Requirement: Disaggregate survey results based on inclusion or non-inclusion in HFRZ zones and by Public Safety Power Shutoffs potential areas.

Timeframe: 2025 WMP Update

PGE Response: All three surveys – post-season 2023 and pre- and post-season 2024 – have survey results that are disaggregated by HFRZ and non-HFRZ customers.

PGE Recommendation 24-232_15

Requirement: Provide an update regarding the completion of the ignition prevention inspection by July 31, 2024, including outlining how many conditions were found during these inspections.

Recommended Timeframe: 2025 WMP Update

PGE Response: Consistent with Section 8.4 of PGE's 2024 WMP, PGE's goal was to begin its annual Ignition Prevention Inspections as early as possible during the first quarter of each year and to complete the inspections no later than July 31, with most inspections completed before PGE declares the start of fire season. In connection with the 2024 Ignition Prevention Inspections, all inspections were completed by July 31, 2024. PGE's Ignition Prevention Inspections identified 3,430 conditions in 2024.

PGE Recommendation 24-232_16

Requirement: Discuss timing of inspection and correction frequency inside and outside high fire risk areas.

Recommended Timeframe: 2025 WMP Update

PGE Response:

Refer to Program Sharing Section 8.6, Ignition Prevention Inspections, for details about PGE's inspection and correction programs.

PGE Recommendation 24-232_17

Requirement: Discuss and demonstrate the use of ignition risk driver analysis and ignition historic analysis to determine optimal timing and completion of inspection and correction activities.

Recommended Timeframe: 2025 WMP Update

PGE Response:

This recommendation is addressed in the following sections:

- Section 3.14, Ignition Prevention Inspection Risk Update, provides details about PGE's risk-based prioritization of inspections and corrections. This includes a comparison of inspection criteria to PGE ignition data and non-PGE fires.
- Section 5.5.2, IC-02: Ignition Prevention Inspections, describes an initiative objective update resulting from ignition records analysis.
- Section 5.5.4, IC-04: Ignition Risk Corrections, describes an initiative expansion to ensure timely correction of emerging ignition risks.
- Confidential Appendix D: Ignition Management Learnings, details 2024 learnings associated with the program described in Section 8.9, Ignition Management and Root Cause Analysis, of PGE's 2024 WMP.

PGE Recommendation 24-232_18

Requirement: Discuss evolution of vegetation management program risk buy-down with demonstrable data for various patrol classifications, program actions, and their subsequent effectiveness.

Recommended Timeframe: 2025 WMP Update

PGE Response:

The evolution of the utility vegetation management program highlights a progressive approach to mitigating wildfire risks through PGE's AWRR program, showing measurable risk buy-down by year, driven by strategic patrols, classifications, and escalating programmatic actions. The following sections, derived from data across the years 2019-2024, reveal how various program actions and technologies demonstrate effectiveness. This program evolution is summarized in Table 68.

Table 68: AWRR Program Evolution Summary 2019-2025

Measure	2019	2020	2021	2022	2023	2024	2025
# of Zones	1	3	5	10	10	11	12
Budget	$2.39M	$2M	$4.83M	$5.08M	$16.2M	$36.2M	$37M
Improvement Focus	Cycle-busters + technology		Expansion	Pre-fire season patrol	CBTA	FSPM + ICPM	AGP + HGP
Imminent Hazard	Patrol 1 (P1)				Condition 1 (C1)		
Probable Hazard	Patrol 2 (P2)				Condition 2 (C2)		
Clearance Issues	Cycle-busters				Vegetation w/in 5 ft (V5)		Condition 3 (C3)
Mitigation Rate	0.82%	1.58%	1.7%	0.6%	0.1%	5% FSPM + 0.5% ICPM	5% FSPM + 0.5% ICPM
GDSH Benefit*						$49.5k	$795k
Reliability Impact			83% reduction in Zone 1 outages during fire season			To be determined	To be determined
RSE						10.89	14.25

*AWRR scope reduction due to benefits of underground conversion system hardening investments

Program Growth and Investments

2019-2020 Initiation Phase: The program launched in high-risk areas (Mt. Hood corridor) with a targeted approach on cycle-busting, essential clearance maintenance, and pilot technology (ArcGIS) for tracking and planning. Spending in 2019 reached $2.39, with a low initial mitigation rate of 0.82 percent, rising to 1.58 percent in 2020 as work cycles improved, clearances expanded, and targeted tree removal took hold.

2021-2022 Expansion Phase: As the AWRR program expanded into additional HFRZs 4 and 5 in 2021 and extended to all 10 HFRZ in 2022, its budget increased to $4.83M in 2021 and $5.08M in

2022. This expansion allowed for a broader focus on Imminent Hazard trees and cycle-busters, with detailed overhead line inspections scheduled before fire season. Collaborations with partners such as the USFS, along with system hardening efforts, supported consistent improvements in reducing fire risks. By 2022, AWRR had established coverage across all 10 HFRZs, enabling comprehensive pre-season mitigation. Focused patrols completed before July 1 targeted cycle-busters and Imminent Hazard trees likely to fail and make contact with conductors, substantially reducing vegetation-related hazards ahead of fire season.

2023-2024 Optimization and Expansion: With the AWRR Program Management Guidelines developed and implemented for foresters and vegetation crews, field guides for operational clarity and effectiveness, and optimized digital tools like Field Maps, 2023-2024 saw significant operational scale-up. Spending increased to $16.2M in 2023, then to $36.2M in 2024 as PGE extended patrols to all 11 HFRZs. This scale increased the projected C2 mitigation rate to 5 percent in Zones 1, 7, and 10 and 0.5 percent in all other zones. PGE achieved an average mitigation rate of 2.675 percent in 2024, with a robust 52-crew operation. Additionally, the program has been effective in addressing Probable Hazard trees, especially in reducing fire-season vegetation risks.

Risk Reduction and Outage Improvements

AWRR has delivered demonstrable benefits in Zone 1 which has the largest historical dataset. Comparing averages between 2018-2020 and 2021-2023:

- PGE achieved an 83 percent reduction in outages during major event days (MED) during fire season.
- Non-MED outages decreased by 50 percent, demonstrating risk reduction even outside extreme conditions during fire season.

Patrol and Condition Classifications with Targeted Program Actions

- Each phase of the AWRR program demonstrates a refinement in patrol classifications, evolving from initial cycle-busting to targeted patrols. PGE's program evolved to include refined and specific definitions to more effectively target, track, and communicate the conditional differences between various types of vegetation priority with mitigation efforts timed to pre-fire season needs.
- In 2024, PGE applied a comprehensive full-scope approach to HFRZs 1, 7, and 10, achieving a 5 percent mitigation rate. This approach included patrols with enhanced assessment protocols and an expanded range of advanced vegetation mitigation techniques. To optimize resources, PGE used a reduced-scope inter-cycle approach in HFRZs 2, 3, 4, 5, 6, 8, 9, 10, and the newly added HFRZ 11, applying a 0.5 percent mitigation rate. The pre-season mitigation efforts in HFRZ 11 demonstrated the program's adaptability and responsiveness to newly identified HFRZ areas.
- PGE's adoption of a Condition-Based Tree Assessment (CBTA) Field Guide in 2023 enhanced the precision of tree-risk categorization, facilitating targeted mitigation and allowing the program to manage over 16,350 C2 vegetation points in 2024.

Long-Term Projections and Cost Stabilization

- The program's budget requirements will reflect long-term efficiencies from system hardening and strategic resource scaling. Although rising labor costs and an expanding number of HFRZs may initially increase program expenses, benefits from program stabilization are expected to offset the increase.
- By 2028, budget projections suggest stabilization, with cost factors managed through AWRR refinements and the return on system hardening investments.

PGE Recommendation 24-232_19

Requirement: Provide supporting evidence regarding vegetation management measures effectiveness versus other long-term comparative hardening measure for various circuit segments based upon their circuit risk scores.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE has provided details on the various effectiveness and risk reduction aspects of PGE's vegetation management program in Section 3.13, Vegetation Management Risk Updates, including circuit prioritization and Risk Spend Efficiency.

PGE Recommendation 24-232_20

Requirement: Report on results of maturity model pilot work and continue advancing wildfire maturity rubric in alignment with internation wildfire risk mitigation consortium (IWRMC).

Recommended Timeframe: 2025 WMP Update

PGE Response:

In 2023 PGE, Idaho Power Company, and PacificCorp, in consultation with IWRMC leadership, adopted the IWRMC Wildfire Risk Mitigation Maturity Model as the basis of an Oregon IOU rubric to develop a sustainable and structured maturity model program. PGE and the joint IOUs developed the Oregon Maturity Model Pilot Program Timeline, broken into four elements to help produce the tools, process, and procedures needed to implement the IWRMC Maturity Model.

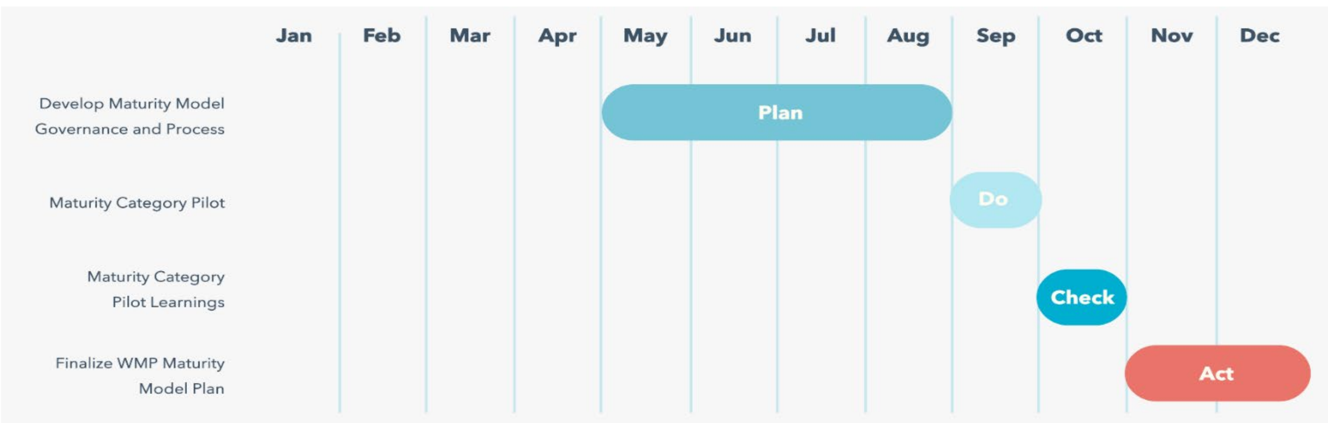


Figure 71: Oregon Maturity Model Timeline

The 2024 Pilot Program focused on IWRMC Maturity Category F (Grid Operations and Protocols) with a focus on PGE's risk maturity during the 2022 PSPS event. The pilot program tested one out of the 10 Maturity Categories, as well as six of the 50 key capabilities, to help PGE and its partners clearly define objectives, develop a project plan, identify required stakeholder support, develop collaboration, and gather data and feedback. This information will empower a full-scale Maturity Model Program in 2025 that will cover all 10 maturity categories and 50 key capabilities, as shown in the figure below:

Overview of Key Capabilities

Maturity Category	Key Capabilities					
A. Risk assessment and mapping	1. Estimation of ignition probability	2. Estimation of wildfire consequences	3. Estimation of wildfire and pre-emptive power shutoff risk-reduction impact	4. Climate/Weather scenario modeling and sensitivities	5. Risk maps and simulation algorithms	
B. Situational awareness and forecasting	6. Weather variables utilized	7. Weather data resolution	8. Weather forecasting	9. Weather vulnerability and damage prediction	10. Wildfire detection	
C. Grid design and system hardening	11. Prioritization and justification of wildfire risk mitigation grid design/ system hardening initiatives	12. Grid design for minimizing ignition risk	13. Grid design for resiliency and minimizing pre-emptive power shutoffs (if applicable)	14. Risk-based grid hardening and cost efficiency	15. Evaluation and Deployment of Technology & Innovations	
D. Asset management and inspections	16. Asset inventory and condition assessments	17. Asset inspection cycle	18. Asset inspections & diagnostic effectiveness	19. Asset maintenance and repair efficiency, effectiveness, and compliance	20. QA / QC for asset management	
E. Vegetation management and inspections	21. Vegetation inventory and condition assessment data	22. Vegetation analytics & diagnostic effectiveness	23. Vegetation grow-in inspection and trimming / treatment process & cycle times	24. Vegetation fall-in / hazard inspection and mitigation process & cycle times	25. Fuel Load Management	26. QA / QC for vegetation management
F. Grid operations and protocols	27. Protective equipment and device settings	28. Incorporating ignition risk factors in grid control	29. Pre-emptive power shutoff operating model and consequence mitigation (if applicable)	30. Pre-emptive power shutoff initiation protocols (if applicable)	31. Pre-emptive power shutoff re-energization protocols (if applicable)	32. Ignition prevention and suppression
G. Data governance	33. Data quality and comprehensiveness	34. Data management	35. Data democratization & literacy	36. Data & cyber security	37. Analytic solutions	
H. Resource allocation methodology	38. Benefit-cost assessment and scenario analysis	39. Portfolio-wide initiative allocation methodology	40. Portfolio-wide innovation in new wildfire initiatives	41. Wildfire Organization design, resourcing, and skills		
I. Emergency planning and preparedness	42. Wildfire plan consistency with overall disaster / emergency plan	43. Plan to restore service after wildfire related outage	44. Emergency community engagement during and after wildfire	45. Protocols in place to learn from wildfire events	46. Processes for continuous improvement after wildfire and pre-emptive power shutoffs (if applicable)	
J. Stakeholder cooperation and community engagement	47. Data and practices sharing, and cooperation with external stakeholders	48. Engagement with communities and stakeholders on wildfire mitigation planning and mitigation initiatives	49. Engagement and communication with disadvantaged populations	50. Collaboration with emergency response agencies		

Figure 72: IWRMC Maturity Model

PGE initiated the 2024 IWRMC Maturity Model Pilot Program by identifying the appropriate contributors and business units tasked with answering maturity questions associated with Category F of the Self-Assessment Questionnaire – version 1.4 (last revised 11/2023). Once all contributors were identified, PGE developed an internal questionnaire that followed the same multiple-choice format as the IWRMC Self-Assessment Questionnaire. Once all questions were answered, the process owner tabulated the answers within the IWRMC Maturity Model Questionnaire and identified a category score.

PGE's 2024 Pilot Program was designed to help assess and improve best management practices regarding the development and implementation of the IWRMC Wildfire Risk Mitigation Maturity Model into a comprehensive and sustainable format beginning in 2025. The benefits gained from the Pilot program included increased efficiency and effectiveness of the process and workflow, improved risk management over time, and the promotion of continuous improvement through comparison of PGE's performance against industry standards and best management practices.

The results of the 2024 IWRMC Maturity Model Pilot Program provide insights into the strengths, weaknesses, and gaps in PGE's wildfire risk mitigation practices. The 2024 Pilot Program focused on Grid Operations and Protocols that included six different maturity categories with a total of 24 indicators:

1. Protective Equipment and Device Settings
2. Incorporating Ignition Risk Factors in Grid Control
3. Pre-emptive Power Shutoff Operating Model and Consequence Mitigation
4. Pre-emptive Power Shutoff Initiation Protocols
5. Pre-emptive Power Shutoff Re-Energization Protocols
6. Ignition Prevention and Suppression.

PGE scored the individual categories from Low capability to High Capability. Table 69 identifies PGE's maturity throughout the six maturity categories:

Table 69: Maturity Categories and Associated PGE Capability Score

Maturity Category	Low	Moderate	High
Protective Equipment and Device Settings			X
Incorporating Ignition Risk Factors in Grid Control			X
Pre-emptive Power Shutoff Operating Model and Consequence Mitigation			X
Pre-emptive Power Shutoff Initiation Protocols		X	
Pre-emptive Power Shutoff Re-Energization Protocols		X	
Ignition Prevention and Suppression			X

Results from the Grid Operations and Protocol Pilot Program indicated that PGE ranks moderate to high in the six risk maturity categories and 24 maturity strategies, although there is room for improvement within all six categories. Key areas of improvement include:

1. PGE's procedures for adjusting the sensitivity of grid elements that can reduce wildfire risk. This includes limiting or disabling reclosures within HFRZs. Higher scores are awarded for automating this process.
2. PGE's approach to mitigating outage impacts to customers during a PSPS event. Higher scores are awarded to utilities that have undergrounded overhead lines within their HFRZs to minimize the customer impacts of PSPS events.
3. PGE's approach to inspecting circuits after they have been de-energized and prior re-energization. Higher scores are awarded to utilities that have a faster inspection process, for example, through the use of technology such as drones, LiDAR, and/or sensors to help automate the process.

The IWRMC Wildfire Risk Maturity Model continues to be an integral part of PGE's continuous improvement process. PGE will initiate the entire model in 2025 and will reassess progress every three years thereafter to assess how these capabilities are maturing, and work to ensure that new opportunities are being addressed.

PGE Recommendation 24-232_21

Requirement: Continue to engage in industry learning, identify lessons shared, and the role of industry collaboration in advancing technology. Include a description of individual pilots considered and their potential benefits for reducing wildfire risk in future WMPs. Provide data, metrics or other criteria that led to dismissal or implementation of a new pilot technology, including any effectiveness assumptions and costs.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

As part of the Phase 2 work described in Order 24-232, PGE is collaborating with Pacific Power and Idaho Power on a standard template for reporting pilot technologies on Joint IOU Recommendation 24-232_I.

Both the PGE Recommendation 24-232_21 and Joint IOU Recommendation 24-232_I have required implementation within the 2026-2028 WMP due to be filed on December 31, 2025.

PGE Recommendation 24-232_22

Requirement: Provide tabular data regarding outages (or ignition risk drivers) and their root causes, as well as ignition risk analysis findings

Recommended Timeframe: 2025 WMP Update

PGE Response:

This recommendation is addressed in the following sections:

- Section 3.14.2, Inspection Risk Spend Efficiency, includes a tabular comparison of ignition root causes and inspection criteria.
- Confidential Appendix D: Ignition Management Learnings, details 2024 learnings associated with the program described in Section 8.9, Ignition Management and Root Cause Analysis, of PGE's 2024 WMP.
- WMP Data Template Workbook tables 7, 8, and 9 provide additional tabular data about risk performance, including outages, risk events, and ignition events.

PGE Recommendation 24-232_23

Requirement: Evaluate and provide evidence regarding effectiveness of inspection program, particularly focusing on ignition prevention inspections, including costs per inspection, conditions discovered, timeframe for corrections, and adherence to internal or regulatory deadlines.

Recommended Timeframe: 2025 WMP Update

PGE Response:

This recommendation is addressed in the following sections:

- Section 3.14, Ignition Prevention Inspection Risk Update, includes details about inspection findings, effectiveness, and Risk Spend Efficiency.
- Section 8.6, Ignition Prevention Inspections, includes details about correction timeframes and 2024 timeframe adherence.
- Confidential Appendix E: Sensitive Data, details commercially sensitive inspection unit cost data.

PGE Recommendation 24-232_24

Requirement: PGE continue to align its ignition inspection and root cause analysis processes with IOUs as well as other peers.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE began this effort by utilizing non-PGE ignition records and fire investigation findings in the assessment of inspection criteria. Refer to Section 3.14.2, Ignition Prevention Inspection Risk Update, for details. This analysis will allow PGE to align the inspection process to the observed empirical data in partnership with peer utilities.

6.2 Joint Utility Recommendations

Joint Recommendation 24-232_A

Requirement: All utilities should provide Plans that allow a determination on compliance within the body of its Wildfire Mitigation Plan.

Recommended Timeframe: 2025 WMP Update

PGE Response:

Per OPUC UM 2340 Order 24-326 approved at the September 19, 2024, Public Meeting the Update will have a "WMP Regulatory Compliance Index, which is a table identifying where the most current information is located for each WMP requirement articulated in the administrative rules." Refer to Section 2, Wildfire Mitigation Plan Compliance Index, for additional details.

Joint Recommendation 24-232_B

Requirement: All utilities should provide multi-year Plans which are updated on an annual basis.

Recommended Timeframe: 2025 WMP Update

PGE Response:

PGE is filing this 2025 WMP Update to the 2024 WMP to meet the requirements of Order 24-326 approved the September 19, 2024, Public Meeting. PGE will file a multi-year plan beginning with the 2026 WMP.

Joint Recommendation 24-232_C

Requirement: All utilities should participate in a joint utility effort to move towards use of shared terminology throughout the WMPs. The utilities must agree upon and use a standard WMP glossary which articulates shared terminology, and any differences in use of terminology between the utilities in the 2026 Plans.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

As part of the Phase 2 Guidelines work described in Order 24-232, PGE is collaborating with Pacific Power and Idaho Power on a glossary of shared terminology that will be included in the 2026 WMP filing.

Joint Recommendation 24-232_D

Requirement: All utilities should provide WMPs in a standard format which adopts uniform chapter and section headings, as well as other agreed upon organizational features.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

As part of the Phase 2 Guidelines work described in Order 24-232, PGE is collaborating with Pacific Power and Idaho Power on a standard WMP format with uniform chapter and section headings and other agreed upon organizational features.

Joint Recommendation 24-232_E

Requirement: All utilities should provide the program level details though standard reporting templates.

Recommended Timeframe: 2025 WMP Update

PGE Response:

Standard reporting templates were approved with Order 24-326 at the September 19, 2024, Public Meeting. The data tables for reporting the first through third quarters of 2024 are included with this filing and full year 2024 data will be filed by March 31, 2025. Refer to Section 7.1, WMP Data Template Workbook, for additional information.

Joint Recommendation 24-232_F

Requirement: All utilities should provide inspection and correction data through a standard reporting template which facilitates comparisons of inspection functions, costs (at unit level), and amount of work across the IOUs (and potentially bench markable across a broader region).

Recommended Timeframe: 2025 WMP Update

PGE Response:

Standard reporting inspection and correction reporting templates were approved in Order 24-326 at the September 19, 2024, Public Meeting. Data Tables 3-T&D Inspection and 4-T&D Correction with reporting for the first through third quarters of 2024 are included with this filing and PGE will file full-year 2024 data by March 31, 2025.

Joint Recommendation 24-232_G

Requirement: All utilities should provide vegetation management data through a standard reporting template which facilitates comparison of inspection functions, costs, and amount of work across the IOUs. Given the large costs expended or forecasted to achieve "optimal" clearance, a standard data template should include information about vegetation management program administration, work scopes, and costs by clearance objectives. Again, this information should be comparable across the IOUs in Oregon (a broader regional perspective may be useful in this area).

Recommended Timeframe: 2025 WMP Update

PGE Response:

Standard reporting inspection and correction reporting templates were approved in Order 24-326 at the September 19, 2024, Public Meeting. Data Table 5-Vegetation Management with reporting for the first through third quarters of 2024 is included with this filing. PGE will file full-year 2024 data by March 31, 2025.

Joint Recommendation 24-232_H

Requirement: All utilities should provide industry engagement information though a standard reporting template which outlines participation in industry forums and expected information to be shared in such forums, including results from pilots prior to widescale adoption, and pilot valuation methods.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

As part of the Phase 2 work described in Order 24-232, PGE is collaborating with Pacific Power and Idaho Power on a standard template for reporting participation in industry forums as part of the standard WMP template described in Recommendation 24-232_D.

Joint Recommendation 24-232_I

Requirement: All utilities should provide pilot technology information though a standard reporting template which includes details of pilot projects, goals for the pilot, status of the pilot (planning, development, implementation), the current penetration and saturation across the system, envisioned application, milestones for determining usefulness of pilot, expected capital costs, expected O&M costs, expected timeframe for pilot implementation and lifespan. At minimum this level of detail is needed for the following pilot technologies:

- Communicating Fault Circuit Indicators (CFCI).
- Fuel load reduction projects.
- Wildfire detection cameras.
- Early fault detection.
- Drone inspection pilot.
- Distribution fault anticipation
- Covered conductor or spacer cable
- Infrared patrols.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

As part of the Phase 2 Guidelines work described in Order 24-232, PGE is collaborating with Pacific Power and Idaho Power on a standard template for reporting pilot technologies.

Joint Recommendation 24-232_J

Requirement: All utility risk maps should originate from a foundational utility risk map which considers the logical set of variables. Short range outlooks, as well as mid-range outlooks may inform the foundational map. After developing the foundational map, a utility risk map can consider and overlay a variety of conditions, such as response times and locale as well as locations where mitigations have taken place or recent fuel has been removed. Any adjustments made to the foundational risk maps or the outlooks, should be explicitly identified and recorded as to what variable caused the change and what new information supported this change.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE's foundational Fire Behavior Model methodology is described in Section 8.3, Fire Behavior Modeling Methodology, including the selection of the 75th percentile Wildfire Thread Index (WTI). PGE's foundation risk map is provided in Confidential Appendix E: Sensitive Data. PGE's risk model update process and baseline risk maps are shown in Section 3.1, High Fire Risk Zone Annual Update Overview. Sections 3.2 through 3.6 detail model input and methodology updates that resulted in a risk shift from 2024 to 2025. PGE provided risk maps for each step of the process to illustrate the resulting risk shift.

Joint Recommendation 24-232_K

Requirement: All utilities should collaborate to calibrate their risk modeling methods and identify the underlying assumptions in determining line segment risk. Some of the assumptions might include fire spread modeling periods, probability being considered, fire weather history, and inclusion of response likelihood. This work approach would result in fundamental agreement on a specific modeling method for which each utility would produce its current asset register, as well as GIS and tabular data identifying the risk scoring for each asset.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE will participate in the OPUC Staff-led Phase 2 Guideline working group described in Order 24-232 to discuss risk modeling methods and underlying assumptions in determining estimated line segment risk.

Joint Recommendation 24-232_L

Requirement: The WMP working group should adopt Risk Mitigation and Cost Valuation (RSE) as part of its area of focus. This Staff led working group should propose risk quantification guidelines to the Commission for implementation in the 2026 WMPs. RSE should reflect granular data for electric assets which quantify risk that is derivative of operational data (include outage and device state information), observational data (inspections), temporal data (snapshots in time related to peripheral systems). RSE should also reflect data that fully comprises all the facilities that are part of the utility's HFRZ. Consistency of terminology, data sources and their confidence, and expected calculation processes should be prepared by the utilities with consistent guidance by the PUC. In addition, RSE needs to recognize the way "risk" is quantified by the utility, result in an agreed-upon method for the quantification and the manner that reduced risk will be measured.

Recommended Timeframe: 2026-2028 Multi-year WMP

PGE Response:

PGE will participate in the OPUC Staff-led Phase 2 working group described in Order 24-232 regarding risk quantification guidelines.

Joint Recommendation 24-232_M

Requirement: All utilities should regularly participate in a cross-utility effort, via working group or other format, to share experience, learnings, and industry best practices, surrounding system reliability. At minimum, this effort should include discussion of sophisticated protection control equipment and its application to sensitive settings, consideration of impact to reliability, in particular the response during elevated risk season with repeated outages to customers when "self-healing" is not in place (resulting in them experiencing nuisance trips). This group should not only consider impacts to system level reliability but consider impacts of momentary interruptions and longer sustained outages to remote customers, particularly those which may be less able to sustain during poorer reliability periods.

Recommended Timeframe: Ongoing

PGE Response:

PGE currently participates in the following industry working groups to share best practices regarding system risk and reliability: IWRMC, EPRI, WEI Wildfire Planning & Mitigation, PNW Wildfire Group, and Oregon Joint IOU discussions.

PGE will continue to learn and mature this process at the Commission’s discretion as described in Order 24-232.

Joint Recommendation 24-232_N

Requirement: All utilities should regularly participate in a cross-utility effort, via working group or other format, to share experience, learnings, and industry best practices, for identifying and coordinating with Public Safety Partners, building on the ground relationships and communication, developing livestream/recorded multi-language community meetings, and coordinate with local communities to participate in safety fairs.

Recommended Timeframe: Ongoing

PGE Response:

PGE currently participates in the following industry working groups to share best practices regarding coordinating with Public Safety Partners: IWRMC, EPRI and PNW Wildfire Group. PGE is in leadership positions across all of these forums.

PGE will continue to learn and mature this process at the Commission's discretion as described in Order 24-232.

Joint Recommendation 24-232_O

Requirement: All utilities should collaborate to develop consistent content (and should conform to generally consistent language) to inform customers, communities and public safety partners about operational protocols which can impact their power reliability and power system operations. As a complement to these approaches, utilities should perform analysis regarding the location-specific impacts to reliability, including the increase in customer complaints internally as well as those recorded by the OPUC consumer services division, and develop methods to quickly react to heightened operations impacting customers' reliability. Customers and communities may benefit from awareness of other outage causes (beyond weather), which impact reliability and during "sensitive settings" or "fire season" period or which could result in unusual reliability.

Recommended Timeframe: Ongoing

PGE Response:

Pacific Power hosted a one-day workshop on November 19, 2024, in Portland, Oregon to meet with communications teams from western utilities to discuss wildfire communications. Events included discussions on internal communications, digital media, paid media, media relations, community engagement, lessons learned from the 2024 wildfire season with a look ahead to 2025 challenges. Communications teams were invited from AltaLink, ATCO, Avista, Fortis Alberta, Fortis BC, Idaho Power, NV Energy, Pacific Gas and Electric, Pacific Power, PGE, Puget Sound Energy, Rocky Mountain Power, San Diego Gas and Electric, and Xcel. Two additional workshops are planned for March and November 2025.

PGE is reporting customer reliability complaints, inquiries, and OPUC recorded reliability complaints in Table 7-Risk Performance of the data templates submitted as part of this filing.

PGE will continue to learn and mature this process at the Commission’s discretion as described in Order 24-232.

Joint Recommendation 24-232_P

Requirement: All utilities should collaborate to develop a "template" for reporting PSPS details during the execution of a PSPS.

Recommended Timeframe: Ongoing

PGE Response:

As described in Order 24-232, PGE will collaborate with Pacific Power and Idaho Power to develop a template for reporting the details of a PSPS as part of the ongoing maturation working group after the 2026 WMP.

7 Additional Requirements

7.1 WMP Data Template Workbook

7.1.1 Requirement

In alignment with OPUC UM 2340 Order 24-326, PGE submits its first RA3 Data Workbook, reflecting data from Quarters 1-3 of 2024. This workbook represents PGE's best effort to meet the newly established WMP Data Guidelines. This submittal reflects PGE's commitment to transparency, data-driven risk assessment, and continual improvement in wildfire mitigation strategies.

This submittal includes:

- Comprehensive tables summarizing PGE's wildfire mitigation initiatives, reliability metrics, risk reduction efforts, and system-wide initiatives consistent with the new data templates.
- Explanatory narratives addressing the scope, methodology, and context of each data table, promoting clarity and alignment with PGE's interpretation of the reporting expectations.

PGE recognizes the importance of this data in supporting the OPUC's efforts to standardize and mature wildfire risk mitigation practices, and is committed to providing robust, accurate, and actionable information.

7.1.2 Process

PGE is providing available data and accompanying comments in the Excel template provided by the OPUC. At the time of this filing, PGE does not have a centralized, consolidated library that contains all of the data necessary to complete the submittal. The breadth of the submittal's requirements extends beyond the information historically collected during PGE's wildfire mitigation planning.

Fulfilling this data request required PGE to query 15 distinct internal systems of record. These systems span various operational domains and are not exclusively related to wildfire activities. Once obtained from subject matter experts, the data was processed using PGE's geospatial tools to document the required geospatial and temporal features.

This submittal is the culmination of extensive internal collaboration within a condensed time period. Where challenges in data availability or system constraints exist, PGE is actively determining the level of business process improvements and technological investment needed to efficiently produce complete, accurate data template submittals.

7.1.3 Definitions

7.1.3.1 Geographic Designations

High Fire Risk Zones (HFRZ): All references to HFRZs in this RA3 Data Workbook reflect PGE's 2024 HFRZ designations as documented in the 2024 Wildfire Mitigation Plan (WMP).
Area of Interest: PGE does not use the Area of Interest designation in any of its systems of record. For the purposes of its 2024 filing, PGE designated a portion of the new 2025 Chehalem Mountains HFRZ 12 as an Area of Interest. During the 2024 fire season, PGE implemented EPSS on several

circuits within the new HFRZ 12 due to Elevated Fire Risk (EFR). The area in which EPSS was implemented is the designated Area of Interest for the purposes of this filing.

Wildland-Urban Interface (WUI): For metrics referencing the WUI, PGE used the shapefile provided by OPUC Safety Staff. WUI layer as provided by Staff does not reflect the map shown online[34] and includes additional geometries, resulting in duplicative data. PGE sought to remove these duplicates where possible to improve accuracy.

Urban-Suburban-Rural: PGE followed the definitions from IEEE Standard 1782, as directed in UM 2340, which is based upon customer meter density per circuit mile. This definition applies specifically to distribution lines that serve customers and is not applicable to transmission lines and substations. PGE reported all transmission and substation metrics under the "Urban" designation and recommends that an updated definition be provided for future filings.

Fire Weather Zones: PGE used the authoritative geometries from the NWS. However, the NWS revised these boundaries in March 2024, and PGE was unable to use or reconcile the polygons from before the change. This limitation has been noted in the comments on the applicable tables.

7.1.3.2 Transmission Classification

PGE operates certain transmission circuits at 57kV, which is below the threshold for transmission voltage defined by Staff in UM 2340. PGE has included its 57kV circuits in responses pertaining to transmission in the data tables. Many PGE poles serve as support structures for both transmission-level lines and distribution-level underbuilds. In such cases, PGE's asset management system classifies these poles as transmission assets.

Additionally, certain vegetation management and equipment inspection processes for transmission assets differ based on the line rating, with distinctions between 57kV, 115kV, 230kV, and 500kV. PGE has made a concerted effort to consolidate these figures in responses pertaining to transmission assets to ensure clarity and alignment with the requirements.

7.1.4 DATA TABLE CLARIFICATIONS

PGE has provided Wildfire Mitigation Data Tables 1-13 in accordance with the requirements detailed in UM 2340 with the following clarifications:

- The information provided as directed by UM 2340 associated with ignition events and wildfire risk metrics should not be construed as an admission of any liability or wrongdoing by PGE. Many wildfire-related incidents are influenced by factors outside of PGE's control, including third-party actions, weather conditions, and the presence of external ignition sources.
- Future projections in these tables, specifically in Table 11 Asset Index Changes, represent the intentions of PGE at of the time of this filing and are subject to change.
- PGE remains committed to transparency and continuous improvement in wildfire mitigation planning. In this submission, data for all Wildfire Mitigation Data Tables is included to the

[34] Oregon Statewide Wildfire Hazard Map as published on the Oregon Wildfire Risk Explorer, a collaboration of OSU Libraries & Press and Institute for Natural Resources.

best of PGE's current capabilities, along with additional notes and comments in each table, as directed by Staff, to clarify methodology, assumptions, and potential data gaps.

7.1.4.1 Table 1: System Overview

- Data provided reflects system records as of the end of Q3 2024 and may not be reflective of all corrections or construction performed in Q3.
- "Secondary Distribution Lines" reflects only overhead.
- "Support Structure/pole" includes both transmission & distribution, combined.
- "Total Acres" for non-HFRZ reflects distribution service territory, not generation areas or transmission corridors outside of service territory.
- "CFCI (sensory)" reflects smart Faulted Circuit Indicator (FCI) devices that were installed as part of PGE's Grid Advisor II project.
- "Connected Device (controllable device)" reflects SCADA-enabled devices.
- "Lightning Arrester" is left blank as this asset type is not currently mapped in the PGE GIS.
- "Customer/Meters" reflects all customer types.
- "Planned Outages" and "Unplanned Outages" reflect distribution only.

7.1.4.2 Table 2: Initiatives

- Initiatives were developed to categorize all wildfire mitigation program costs.
- "Start date" is left blank for programs that started prior to 2024.
- "End date" is left blank for activities that are classified as programs
- "2024 Actual Units" and "2024 Actual $" reflect completions and spend, respectively.
- PGE made best efforts to align costs tracked using 2024 WMP Cost Areas to the 2025 WMP Update Initiatives. PGE has updated processes and systems to track expenses in alignment with the 2025 WMP Update going forward.

7.1.4.3 Table 3: T&D Inspection

- All rows referring to "Priority C" are intentionally left blank.
- All rows referring to "Non-HFRZ" include results for "Area of Interest"
- All ground inspection data is reflected as "Other" inspection method; PGE recommends adding rows for reporting ground inspections separately from other less traditional methods like Infrared (IR).
- Inspections done on a pilot basis (such as drone inspections for 2024) are excluded so that the tables reflect programmatic, on-going initiatives.
- To avoid duplications and data omissions, PGE recommends updating the Metric Names for rows 438-441 and rows 450-453:
  - Rows 438-441 reflect "Priority A findings" resulting from "Other Inspection".
  - Rows 450-453 reflect "Priority B findings" resulting from "Ignition Prevention Inspection".
- The Inspection Types described in Section 8.6.1 are reflected in the data tables as follows:
  - "Patrol Inspection" reflects Safety Patrols
  - "Detailed Inspection" reflects FITNES inspections as well as transmission IR inspections. PGE may opt to reclassify IR inspections in future filings.
  - "Ignition Prevention Inspection" reflects Ignition Prevention Inspections

    - "Other Inspection" reflects Post Storm Patrols as well as unplanned inspections.
- Tree attachment findings reported as Transmission reflect attachments identified during a Transmission inspection.

7.1.4.4 **Table 4: T&D Correction**

- See Table 3 clarifications above for references to Inspection Type.
- All rows referring to "Non-HFRZ" include results for "Area of Interest."
- PGE reported all corrections under the "Other" Inspection Method and recommends decoupling correction metrics from inspection method.
- Tree attachment corrections from 2023 Inspection Findings reflect correction of all attachments identified prior to 2024.

7.1.4.5 **Table 5: Vegetation Management**

- PGE does not conduct vegetation management patrols on a per-tree basis, so line-miles are offered as a proxy metric for "Number of trees inspected".
- "Number of completed tree removals" for "Routine non-wildfire" reflect partial year results. PGE started recording individual tree removals under non-wildfire Routine Vegetation Management (RVM) mid-2024.
- "Number of completed tree removals" for "Routine wildfire" reflect both tree removal and non-tree removal mitigation of Probable Hazards (C2) under initiative VM-05, AWRR Hazard Mitigation.
- PGE reported all tree removals and hazard mitigations under the "Ground" Inspection Method and recommends decoupling mitigation metrics from inspection method.
- Satellite inspection was performed only as part of HFRZ routine inspections in 2024. Satellite inspections do not produce a unique count of trees and do not definitively indicate a need for trimming and/or removal.
- LiDAR inspections were not performed in 2024.
- Routine wildfire inspections were not performed outside of HFRZ.
- Metrics associated with "Non-Routine" vegetation management work cannot be accurately reported at this time.
- Metrics for distribution also include data pertaining to vegetation along OH transmission lines with voltages not exceeding 115kV.
- All rows referring to "Non-HFRZ" include results for "Area of Interest."

7.1.4.6 **Table 6: Other Metrics**

- PGE evaluated California IOU Wildfire Mitigation Data Tables Template Table 3 to identify potential metrics. Predominantly, the metrics California utilities listed in Table 3 had a high correlation with the metrics built into the Oregon data tables.
- PGE added two additional metrics to address:
    - Effectiveness measure for COPA-01: Wildfire Outreach and Public Awareness.
    - Secondary target for IC-03: Asset Corrections.
- Execution of initiatives with multiple targets.

- Table 6 in the workbook provided to PGE was unable to be edited. Please see the supplemental worksheet "6-Performance Metrics(editable) in the submitted workbook.

7.1.4.7 **Table 7: Risk Performance**

- Counts of events include distribution and transmission unless otherwise noted.
- Events that could not be mapped were excluded from the table.
- A small number of duplicates exist due to data integrity issues with the fire weather zones and public weather zones (overlapping boundaries) provided by the NWS.
- All cells pertaining to ignition events that are not reportable under OAR 860-024-0050 on FM221[1] are marked Confidential.
- PGE currently tracks protective device settings and tagging procedures separate from outage records unless a protection misoperation or tagging error is identified. Rows referring to specific "settings" or "non-reclosing" at the time of the event have been left blank.
- Select rows beginning in the General Reliability Metrics section were unable to be edited within the workbook provided to PGE. Please see the supplemental worksheet "7- Reliability (Editable) in the submitted workbook.
- Due to the subjective and manual nature of classifying customer complaints not escalated to the OPUC, the metric for "Reliability Complaints" has been left blank. PGE has provided data as available for customer inquiries pertaining to reliability that were escalated within Customer Service, as well as all complaints pertaining to reliability that were reported to the OPUC.

7.1.4.8 **Table 8: Risk Events**

- PGE completed a comprehensive mapping exercise to align the provided Risk Event Types and Risk Event Drivers to PGE's recorded cause codes. Risk Event Types and Drivers that could not be aligned to PGE's system of record are left blank and identified in the Comments cell of each row.
- "Within Clearance Zone" and "Outside Clearance Zone" are reflected as a function of secondary cause codes from PGE's records, aligned with methodology previously used in general reliability reporting.
- All risk events attributed to weather are listed in the "Other: Utility Error/Other" rows, since no weather-related risk drivers are available in the document as provided.
- "Electric Contact" reflects risk events attributed to human contact from machinery.
- PGE does not distinguish between direct vs indirect strike for events attributed to lightning; all lighting events are listed as "indirect."
- PGE tracks secondary cause codes for outages attributed to equipment at the granularity of type of equipment, not the failure mode. Equipment risk drivers are mapped to the closest values in PGE data, and all other outages attributed to equipment that do not fit into that mapping are classified as "Equipment: Other-Other."
- SAIDI/SAIFI/CAIDI calculations are reflected at the protected section level and may differ from what is shown in the annual reliability report which uses the feeder level with a static customer count for the full year.
- A small number of duplicates exist due to the fire weather zones and public weather zones having overlapping boundaries, provided by the NWS.

- Events that could not be mapped were excluded from the table.

7.1.4.9 Table 9: Ignition Events

- PGE completed a comprehensive mapping exercise to align the provided Ignition Event Type and Ignition Event Driver to PGE's recorded cause codes. Event Types and Drivers that could not be aligned to PGE's system of record are left blank and identified in the Comments cell of each row.
- "Within Clearance Zone" and "Outside Clearance Zone" are reflected as a function of secondary cause codes from internal systems of record, aligned with methodology previously used in general reliability reporting.
- All risk events attributed to weather are listed in the "Other: Utility Error/Other" rows, since no weather-related ignition event drivers are available in the document as provided.
- "Electric Contact" reflects risk events attributed to human contact from machinery.
- PGE does not distinguish between direct vs indirect strike for events attributed to lightning; all lighting events are listed as "indirect."
- PGE tracks secondary cause codes for outages attributed to equipment at the granularity of type of equipment, not the failure mode. Equipment risk drivers are mapped to the closest values in PGE data, and all other outages attributed to equipment that do not fit into that mapping are classified as "Equipment: Other-Other."
- Events that could not be mapped were excluded from the table.

7.1.4.10 Table 10: Asset Index

- "Overhead circuit miles: Distribution" and "Underground circuit miles: Distribution" reflect only Primary.

7.1.4.11 Table 11: Asset Index Changes

- Asset replacements are reflected by numbers in "Additions" and "Removals" that total to zero.
- "Upgrades" reflect investments that increase capacity, resilience, situational awareness, or other functionality.
- Planned projects outside the scope of this WMP may reflect early-stage designs with estimated asset characteristics and locations.
- PGE planned projects are not tracked geospatially; the systems and processes are not in place to share future work delineated by "Area Type" and "WUI Status". PGE reported all data under the "Urban" and "WUI" classification combination.
- PGE does not currently have a planning system of record to summarize "Additions", "Removals", and "Upgrades"; these details are stored in engineering and design documentation.
    - PGE's best efforts were made to manually gather data for "Overhead circuit miles" and "Underground circuit miles". Providing the data as requested in the Table 11 with a high confidence in data accuracy will require investment in tools and process changes.

- Projects designed to address emergent needs, including customer and municipality driven work, are not reflected in the line-miles reported.

7.1.4.12 **Table 12: De-energization & PSPS Metrics**

- Rows referring to "fire encroachment events" are intentionally left blank.
- Rows referring to "pre-emptive fire encroachment events" and "fire encroachment events" reflect instances where PGE initiated de-energization.
- "FS requested de-energization events" reflect instances where a fire suppression agency issues a request for de-energization.
- All rows referring to "encroachment" reflect numbers for fire encroachment only, not other encroachment types.
- "Sensitive settings" reflects all EPSS measures, including Fire Season mode and EFR mode.
- Rows referring to Warning Status "HWW & RFW" reflect metrics in which a High Wind Warning and a Red Flag Warning were simultaneously in effect for the public weather zone and fire weather zone that corresponds to the event location.

7.1.4.13 **Table 13: Mitigation Initiative Targets**

- This table reflects incremental, program-specific activities supporting the Wildfire Mitigation Plan and best estimates of allocated costs.
  - Estimates for 2026-2027 capital costs reflect projects still in development and may not be indicative of PGE's multi-year plan to be filed at the end of 2025. Further analysis of project scopes, schedule, risk reduction, and cost is required.
  - Projected units and associated O&M costs are based upon the assumption that there no net changes to PGE HFRZs between 2025 – 2027.
- Organizing the table by "WMP Initiative Activity" combines multiple initiatives on the same row, resulting in units and costs for multiple initiatives being combined.
- PGE made best efforts to align costs that were tracked using prior-year Cost Areas to the 2025 WMP Update Initiatives. PGE has updated processes and systems to align with the 2025 WMP Update for 2025 tracking.
- PGE aggregated cost and quantity tracking for 2023 at the most appropriate initiative level.
- PGE assigned cost and quantity tracking for 2024 to "Initiative Categories" consistent with Table 2. PGE expects to encounter similar challenges in the Q3 2024 submittal and full year 2024 submittal shared previously in the Table 2 narrative.

7.1.5 TECHNOLOGY AND PROCESS IMPROVEMENTS

PGE has identified the following opportunities to improve data systems and processes to support filing efficiency and accuracy. Estimates represent a rough order of magnitude (ROM); PGE will continue to refine estimates and evaluate benefits of improved data systems. To inform investment decisions, PGE is working to identify the most critical data for wildfire risk modeling, evaluation of mitigation effectiveness, and non-wildfire grid investment decisions. PGE is also tracking costs associated with this effort under new initiative WMSD-02, WMP Data Template Workbook.

This evaluation process is currently underway and will continue into Q1 2025, simultaneous with the preparation of the March filing. Additionally, PGE is reviewing active and upcoming technology upgrade projects to identify areas of intersection with the RA3 data tables effort. This approach seeks to integrate improvements into already-funded initiatives, minimizing re-work and delivering faster impact than a standalone effort.

PGE assesses potential improvement efforts based on their complexity, anticipated cost, potential co-benefits for other PGE initiatives (e.g., advanced risk modeling), time to implement, and alignment with other projects and items on the technology roadmap. The evaluation encompasses the following categories, with examples of the types of work that would go on as part of that category:

7.1.5.1 Business Process Improvements

- Standardizing text elements within records
- Establishing formal workflows between departments
- Maturing data governance efforts for naming conventions and data labels
- **Tables 2-6, 13:** Process improvements are in flight related to inspect/correct data, RVM mitigation tracking, and wildfire initiative tracking.

7.1.5.2 Technology Updates

- Adding fields to existing applications to capture data points from field crews.
- Creating validation rules to improve data quality.
- Creating new reports within current platforms.
- **Tables 3-5, 9, 12:** PGE will update system requirements for planned technology projects associated with vegetation management, inspection/correction, wildfire decision support, and ignition management.
- **Tables 6-8, 11:** PGE is exploring opportunities inform system requirements for planned IT projects associated with outage management and project management.

7.1.5.3 Automation

- Developing Python scripts or robotic process automation tools to reduce repetitive steps and transform data into the correct format.
- Automating data quality checks to flag missing or inconsistent values.
- **Tables 1, 3-5, 7-10, 12 ROM Estimate:** $150-350k one-time project + $60-135k ongoing maintenance

7.1.5.4 Data Integration

- Establishing Application Programming Interface (API) and ETL (Extract, Transform, Load) pipelines to consolidate data from various systems into a staging area.
- Building metadata layers to standardize input formats.
- **Tables 2, 6, 13 ROM Estimate:** $200k-500k one-time project + $35k-90k ongoing maintenance

7.1.5.5 New Systems of Record

- Implementing new tools to solve for gaps in existing data repositories, particularly for elements currently tracked on paper records or in spreadsheets.
- **Table 11 ROM Estimate:** $ 200k-450k one-time project + $60k-135k ongoing maintenance

8 Program Sharing

8.1 Asset Reliability and Wildfire Risk Methodology

The following information is provided to supplement Section 3.4, Risk Assessment Methodologies, in PGE's 2024 WMP. The following figure illustrates the fundamental risk calculation used to estimate risk associated with PGE assets. Because wildfire risk and reliability risk are coupled together, as failures on the grid may result in customer outages as well as ignitions, PGE quantifies both wildfire and reliability risk for each asset. To make economically prudent customer-focused investment decisions, PGE analyzes opportunities to mitigate both risk streams.

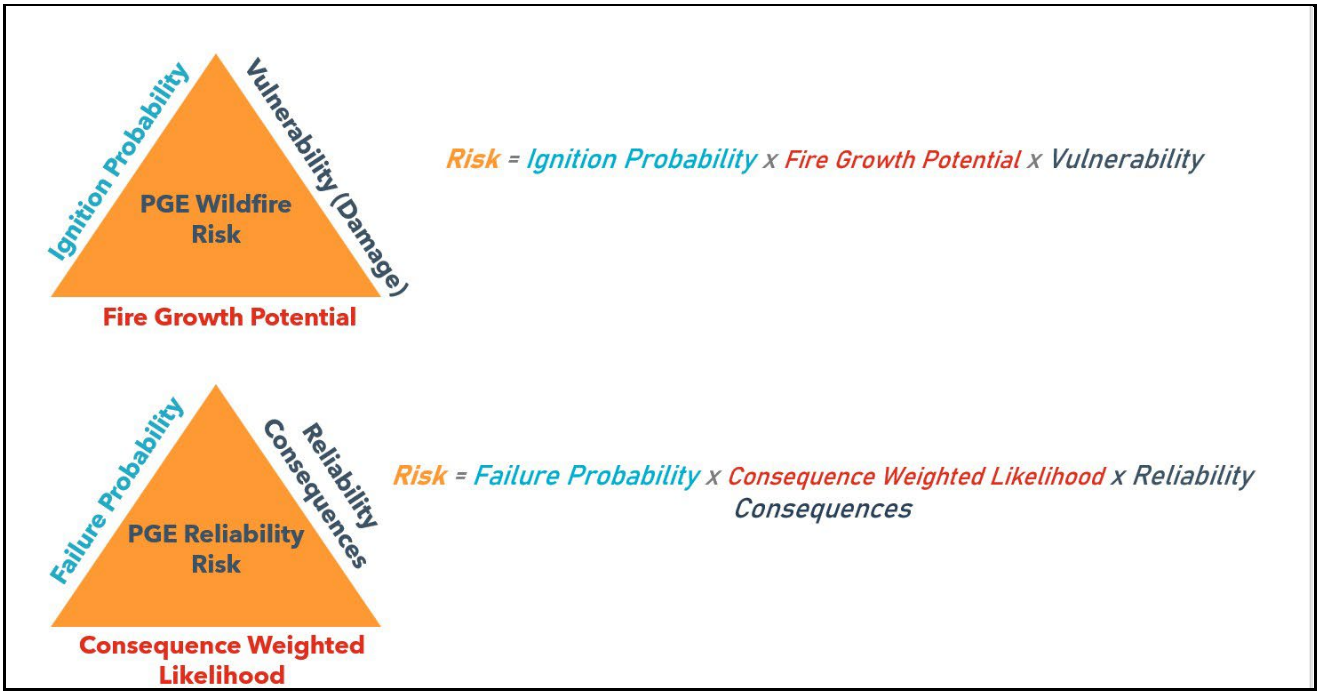


Figure 73: Wildfire and Reliability Risk Fundamentals

PGE's approach to Asset Management is to maximize customer value by cost-effectively mitigating risk. Its Asset Management program includes risk-based economic lifecycle models to prioritize long-term capital investments and optimize maintenance strategies. These models assess both system reliability and wildfire risks, factoring in asset-specific conditions as well as geographic influences like vegetation and weather. By aggregating annual risk projections with maintenance expenses and levelized capital costs, PGE calculates the cost of ownership for each asset on the grid in terms of Net Present Value (NPV).

The lowest cost of ownership determines the optimal timing for proactively replacing an asset or intervening to mitigate risks in another manner. This value strikes a balance between maintenance costs, operational risks, and intervention expenditures. These outputs inform project development designed to reduce system failure risks, enhance reliability, and improve the overall customer experience. The key input for calculating risk-spend efficiency is the reduction in cost of ownership, which incorporates decreased expected reliability risk, wildfire risk, and maintenance costs across the asset's economic lifecycle, as well as those of future lifecycles.

The following sections describes PGE's approach to calculating failure probability, ignition probability and reliability consequences.

8.1.1 Asset Failure & Ignition Probability

PGE's algorithm assigns each asset a relative ignition contribution. These relative contributions are based on feedback obtained from recent workshops with subject matter experts and will be refreshed in the next iteration of the model. For each asset, the contribution factors yielded a relative ignition probability as a function of age, type, and condition for all system components. Ignition likelihood varies by the probability of an asset being in violation condition.

Asset characteristic data, a key input to PGE's asset failure and ignition probability calculations, is foundational to both reliability risk and wildfire risk calculations. Figure 74 illustrates how PGE uses characteristic data (age, material, inspection year) to calculate asset failure probability of a pole before and after inspection. The year of inspection is an input into the probability that an asset will be found in violation condition when inspected.

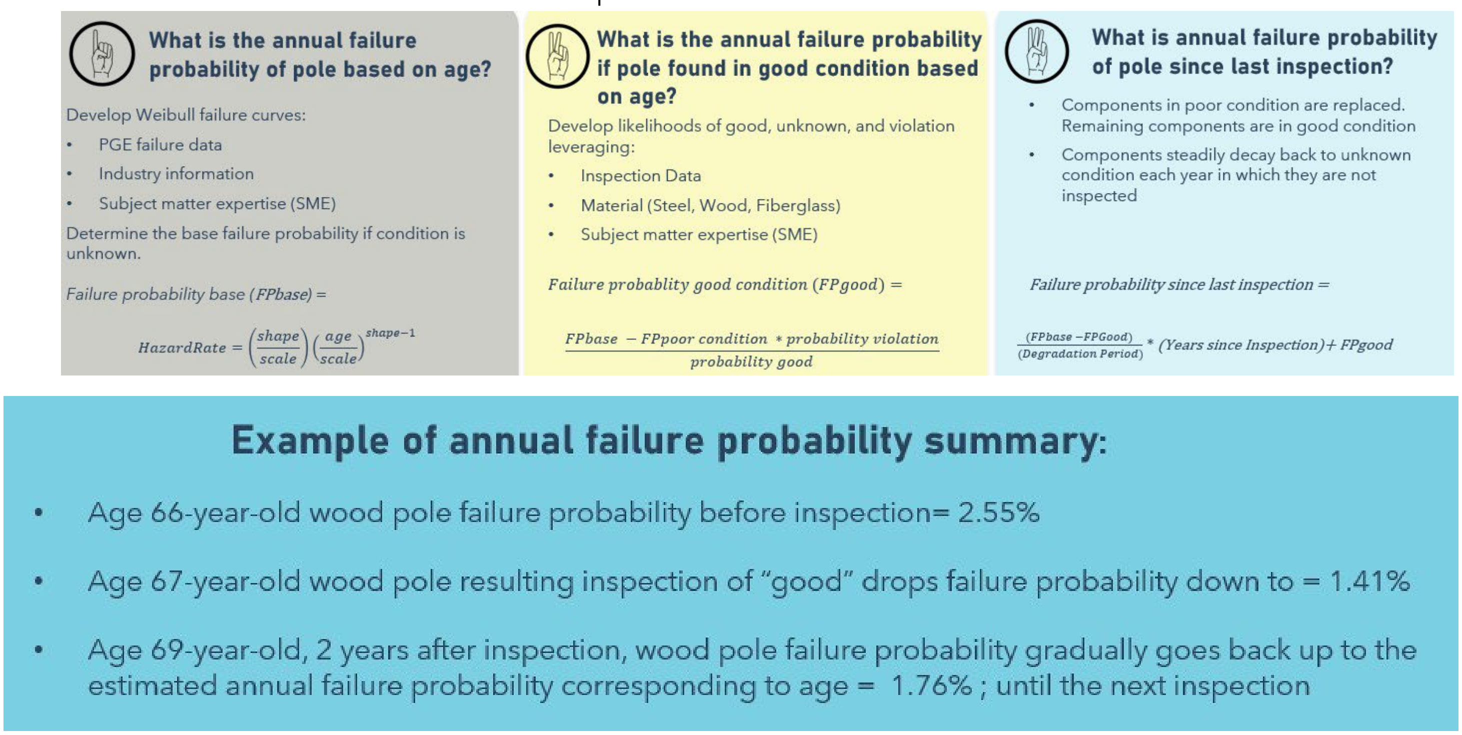


Figure 74: Calculated Asset Failure Probability

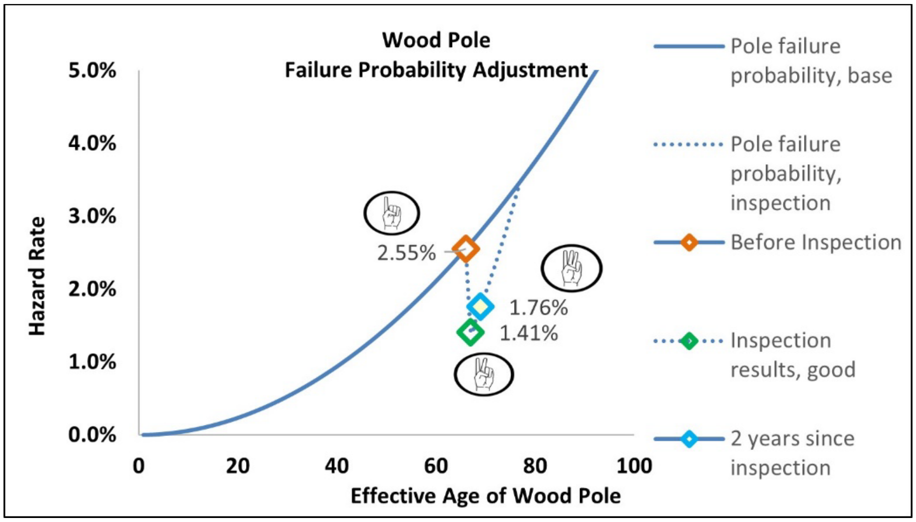


Figure 75: Pole Asset Failure Probability Before and After Inspection

Asset ignition probability is the annual probability that a given piece of equipment will ignite a fire. To calculate ignition probability, PGE draws information from the following sources:

- **Likelihood of Violation**: The probability that an asset will be found in "violation" condition when inspected. PGE assumes that the probability of being in violation condition varies with age and since last inspection.
- **Ignition Constants**: These relative contributions for each asset are based on feedback obtained from recent workshops with subject matter experts and will be refreshed in the next iteration of the model. For each asset, the contribution factors yielded a relative ignition probability as a function of age, type, and condition for all system components.
- **Ignition Calibration Factors**: Estimate of the total number of ignitions caused by PGE's system in a year.
- **Ignition Potential Index**: Location-specific estimates of average relative ignition probability

Asset Ignition probability varies by the likelihood of an asset being in violation condition:

$$Asset\ Ignition\ Probability = Burnability\ Factor\ x \\ [(Likelihood\ of\ Violation\ x\ Violation\ Ignition\ Constant) \\ +\ (Likelihood\ good\ Condition\ x\ Good\ Ignition\ Constanty)]$$

Where:

$$Burnability\ Factor = Ignition\ Probability\ Index\ x\ Ignition\ Calibration\ Factor$$

The following diagram illustrates the four steps PGE uses to calculate asset ignition probability before and after inspection for a wildfire violation for a specific structure:

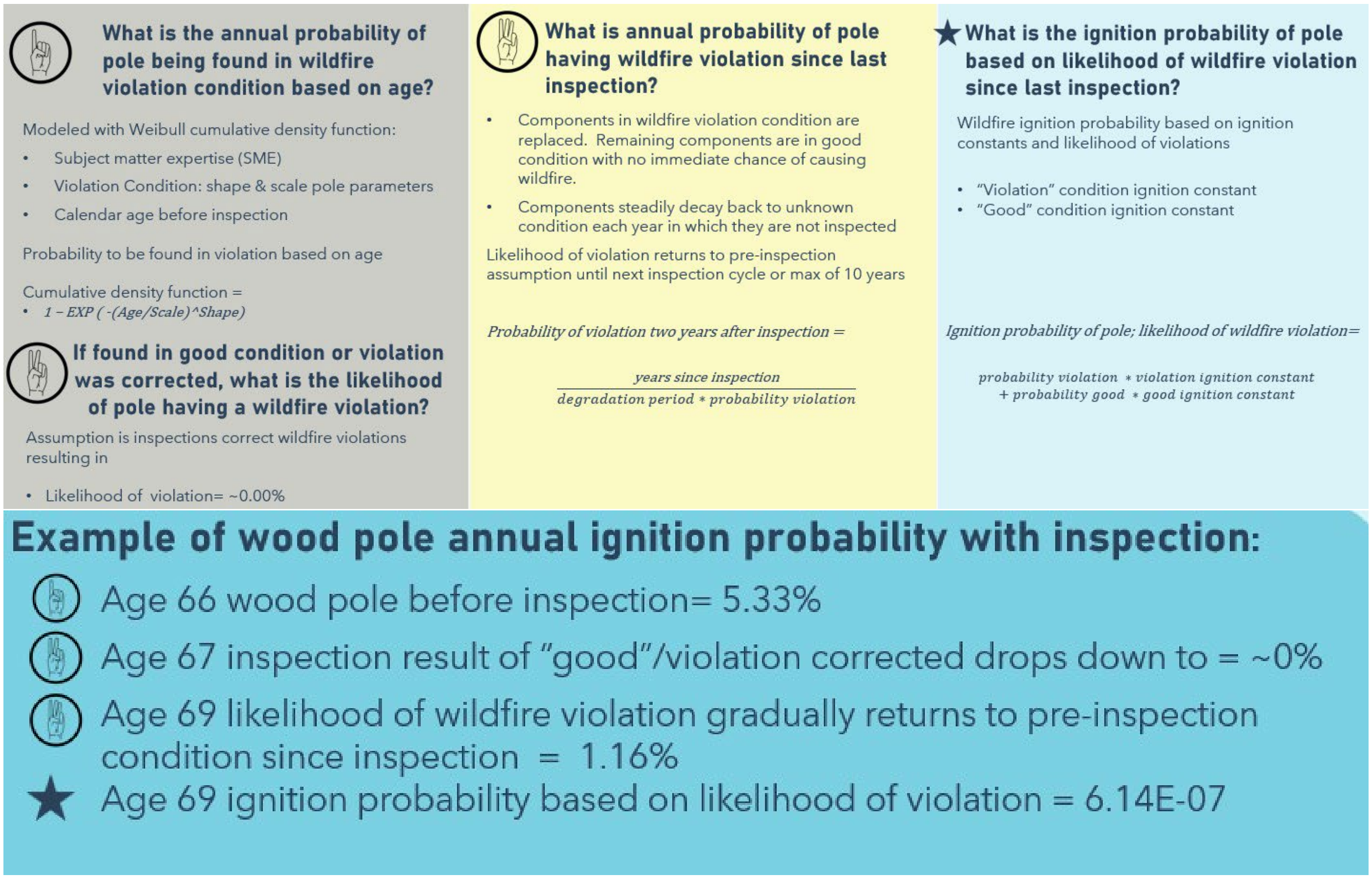


Figure 76: Steps to Calculate Asset Ignition Probability

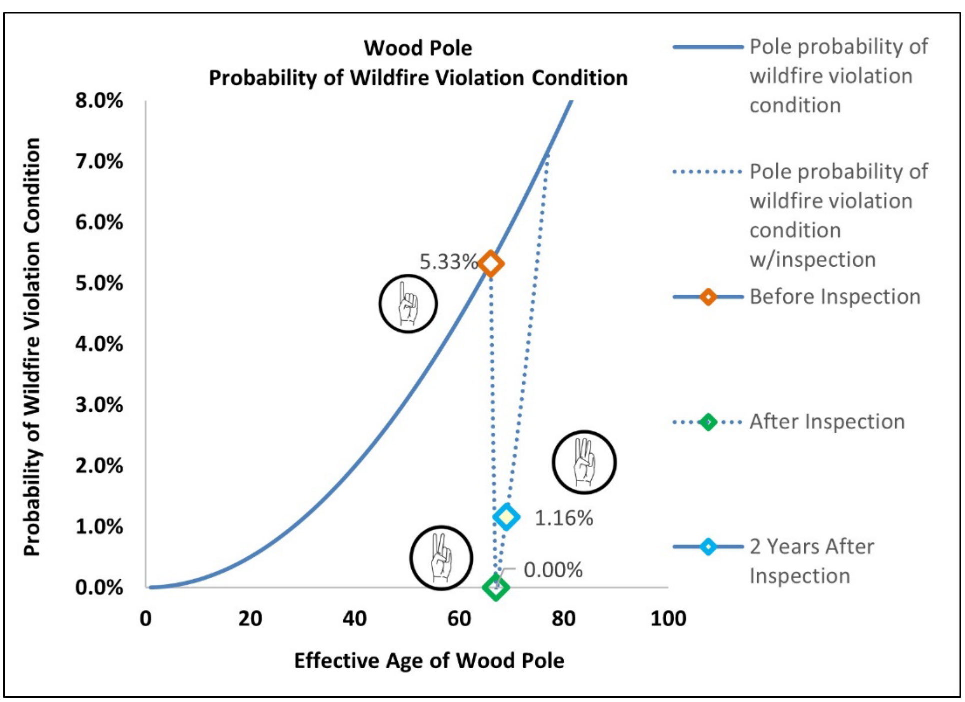


Figure 77: Wood Pole Probability of Wildfire Violation Condition Before and After Inspection

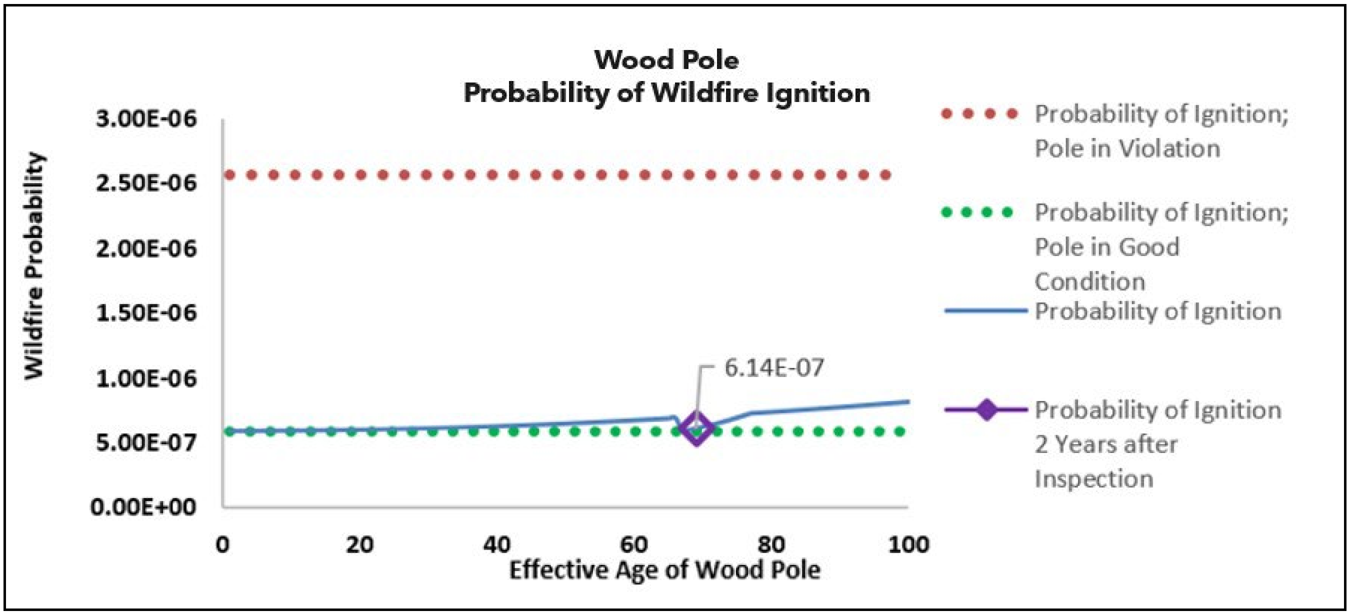


Figure 78: Pole Asset Wildfire Ignition Probability After Inspection

8.1.2 GEOGRAPHIC FAILURE PROBABILITY

The section below describes the general data inputs PGE uses to model geographic failure probability.

PGE incorporates vegetation data from LiDAR, orthoimagery, hyper-spectrometry acquisitions, and vegetation- and weather-related outage data from PGE's Outage Management System (OMS) to inform its statistical geo-probability models. These models are designed to predict vegetation- and weather-related outages relative to PGE's entire system based on several inputs.

PGE's model captures vegetation data at the individual tree level. To understand the relationship between vegetation and outage data, PGE determines which trees can cause an outage at each protective device and associated protected section. This enables PGE to understand the relative likelihood of vegetation- and weather-related outages across its entire electrical system.

PGE developed a process to assign LiDAR-derived individual tree vegetation data to a span of circuit and the related segment in its connectivity model, and then to aggregate the vegetation data to the protected device/protected section, as shown in the following figure:

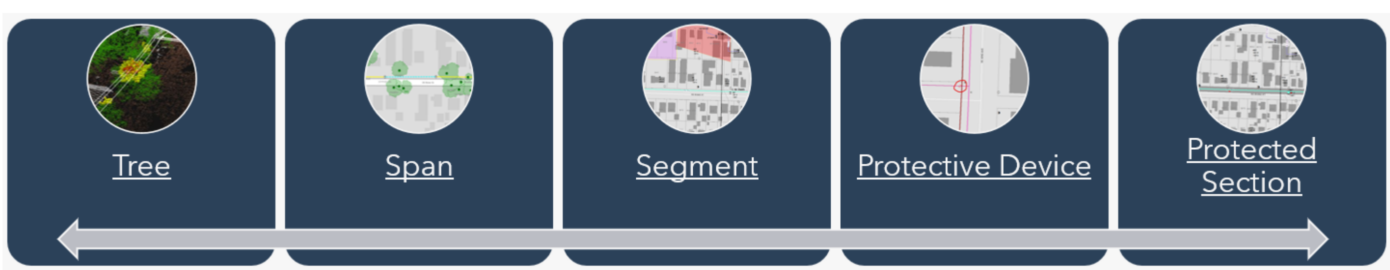


Figure 79: Vegetation Data to Protected Section Process

Vegetation inputs in the predictive models include the aggregate number of trees in proximity to each protected section with fall-in, grow-in, and overhang encroachment threat. The threat for each encroachment category is broken into three zones, as illustrated in the following diagram:

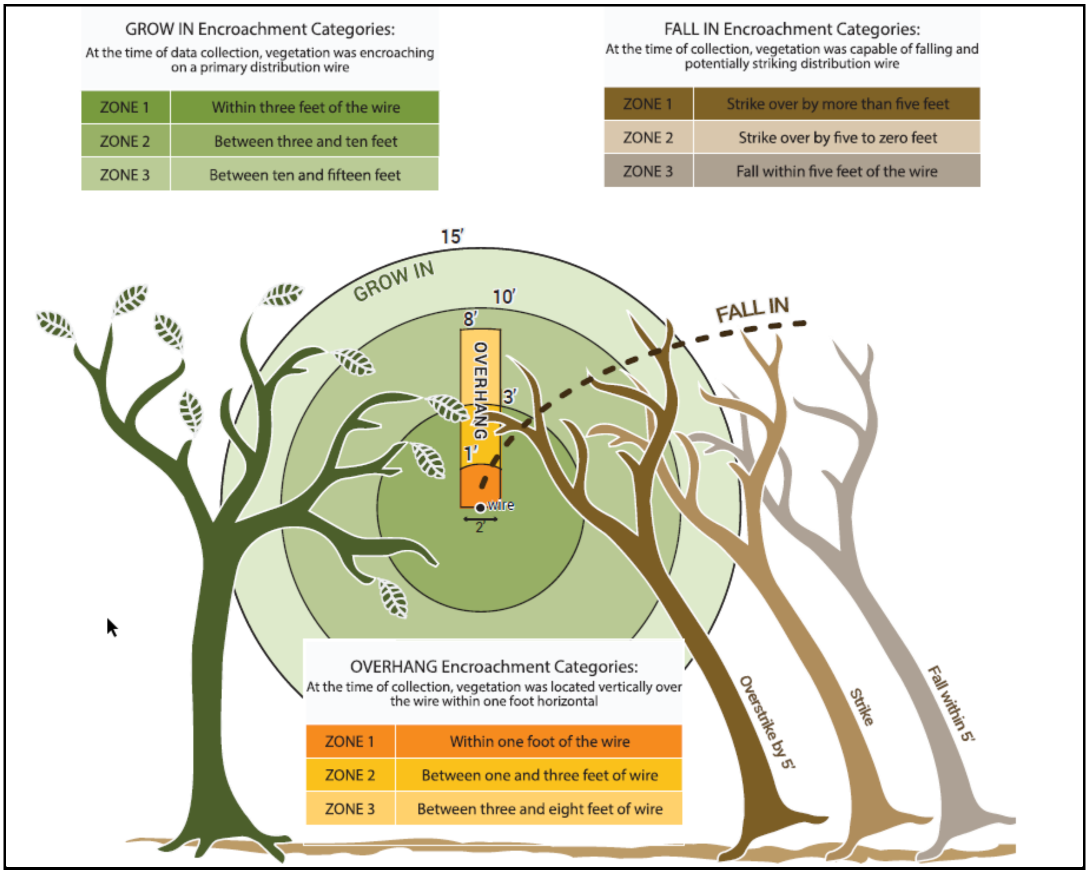
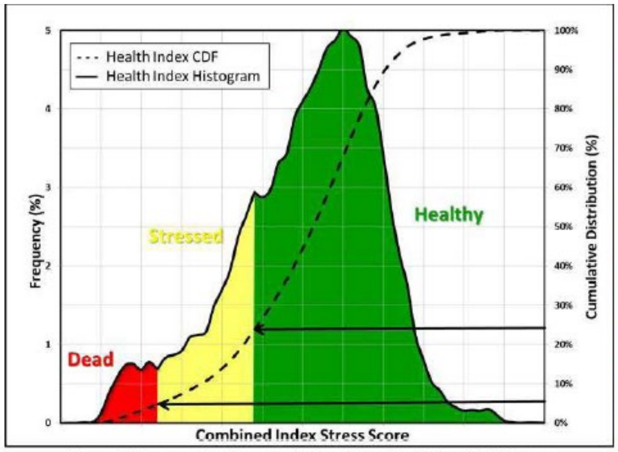


Figure 80: Vegetation Encroachment Categories or Threat Zones

Additionally, PGE aggregates the total number of stressed or very stressed (unhealthy) trees per protected section and uses this information as a modeling input, as shown in the figure below.



Above: Histogram showing calculation of Tree Health for all PSPS zones

Tree Health		
Attribute	**Criteria**	**Legend**
Not Analyzed	Not within range for health analysis	
Healthy	Less than 10% stressed pixels within polygon	
Stressed	10 to 30% stressed pixels within polygon	
Very Stressed	Greater than 30% stressed pixels within polygon	

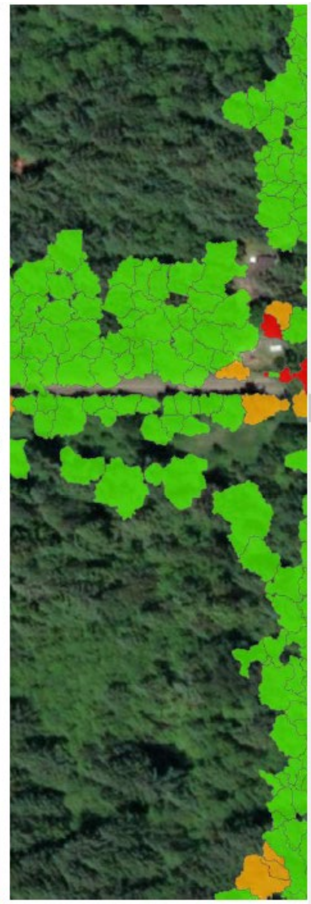


Figure 81: Tree Health Classifications

The figure below illustrates how vegetation threat data is factored into each protected section:

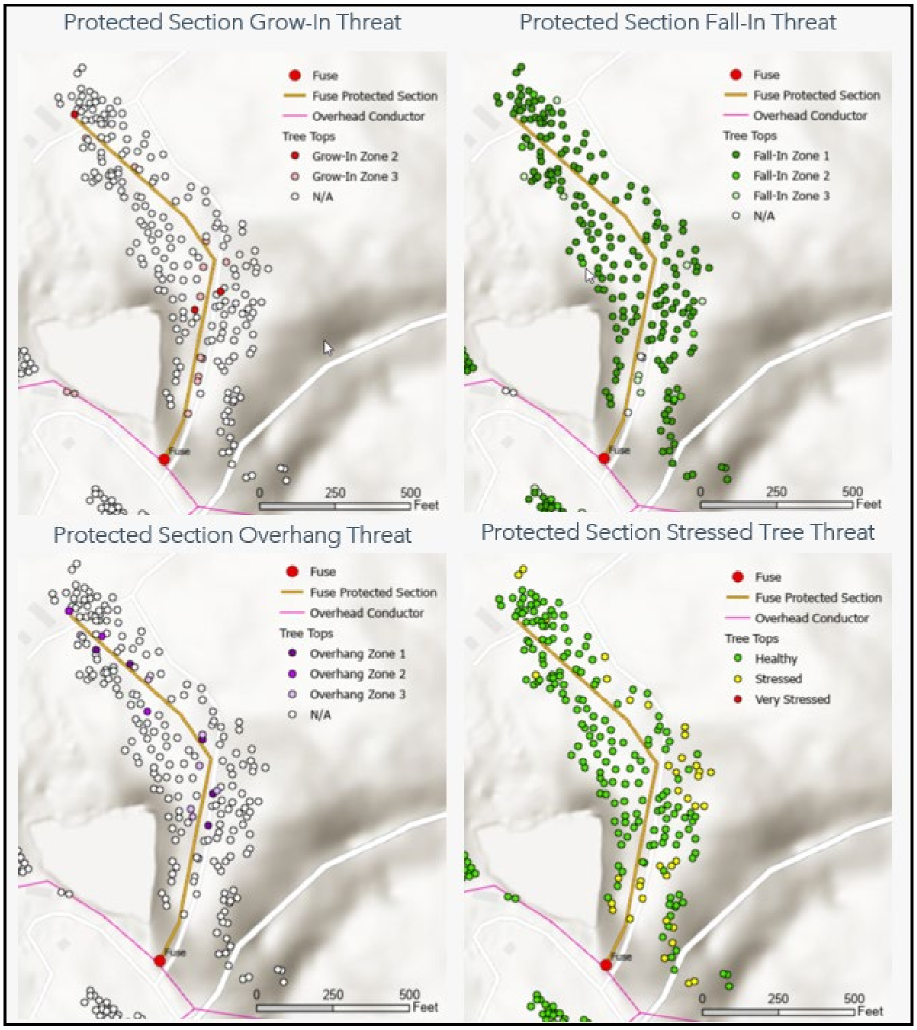


Figure 82: Protection Device and Protected Section with Associated Vegetation Threat

PGE tracks outages in its OMS by interrupt location (the protective device upstream from a failure or fault that breaks the circuit). Each protective device outage represents an outage for the associated protected section. PGE used outage data from the previous six years to calculate the historical outage count per protected section, filtering the data by protective device, major cause, and sub-cause to select the outages included in the study. PGE determined that the outages most likely to cause an ignition are those that occur within a protected section protected by a breaker, recloser, or fuse, and are caused by vegetation or weather.

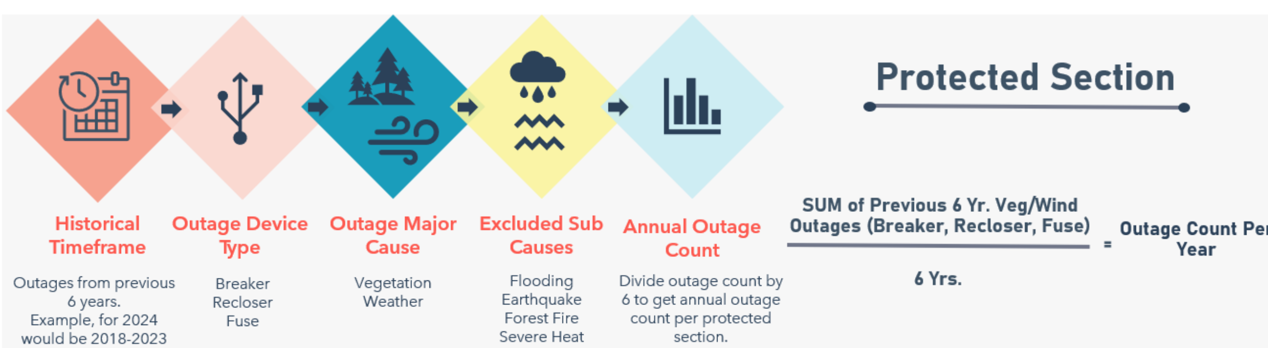


Figure 83: Outage Data Criteria Aggregated by Protected Section

In addition to vegetation and outage data, PGE used characteristics of each protected section as a key input to its statistical modeling. These characteristics include the total circuit segment length of the protected section, the line category (i.e., mainline or tapline), and the protective device type (whether the section is protected by a recloser or breaker). PGE selected model inputs that are likely to be true over longer periods of time (e.g., number of trees rather than volumetric threat and species exclusion) to increase the useful lifespan of its model.

Refer to Section 3.3 for the details on calculating geographic reliability failure probability at the protected section level by leveraging the inputs detailed above.

PGE's Neural Network Learning model, described in Section 3.3, was designed to achieve high accuracy and efficiency while minimizing overfitting. Models that overfit learn the training data too well, adjusting too readily to noise and outliers, which can negatively affect its performance when incorporating new, previously unseen data. Individual structure geo-probability is derived from its associated protected section divided by the structures on the protected section, yielding results down to the individual asset level.

Figure 84 illustrates the three steps PGE uses to calculate the annual probability of a vegetation outage before and after inspection for a specific structure, which includes an assessment of vegetation condition:

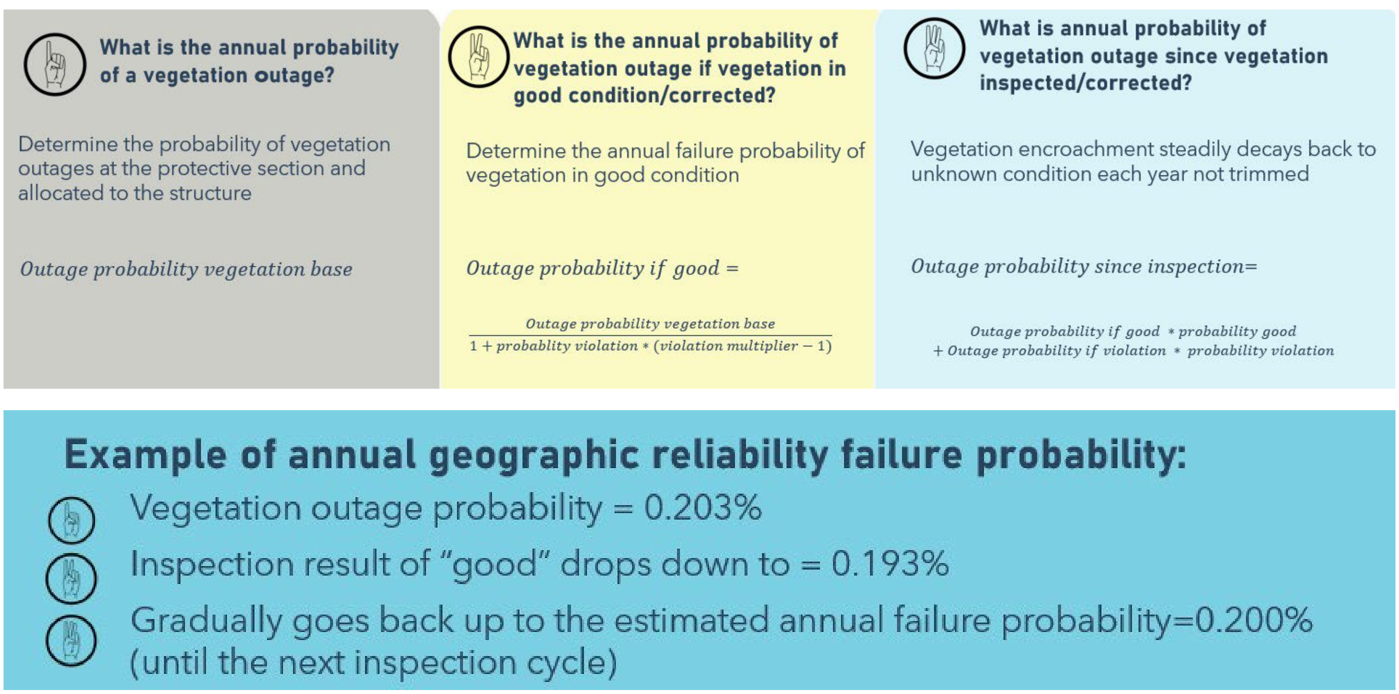


Figure 84: Steps Used to Calculate Geographic Reliability Failure Probability

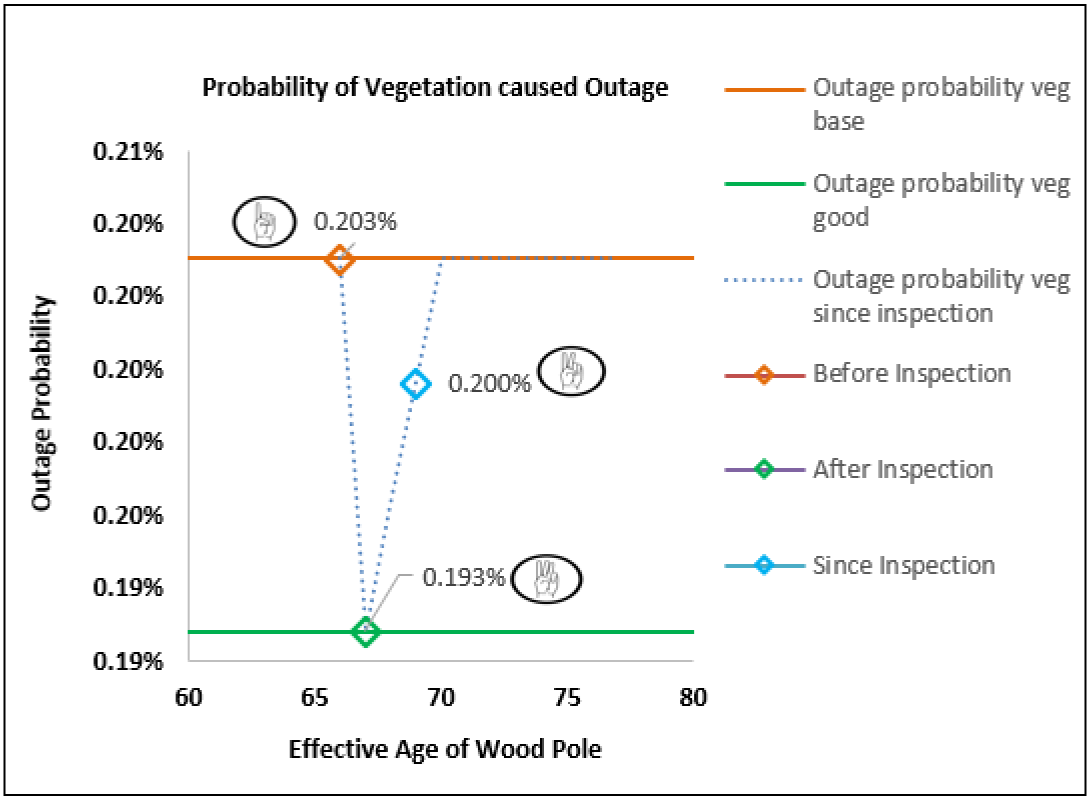


Figure 85: PGE Geographic Reliability Failure Probability Before and After Inspection

8.1.3 GEOGRAPHIC IGNITION PROBABILITY

Figure 86 illustrates PGE's approach to calculating geographic ignition probability at the individual asset level by scaling outages to the number of ignitions:

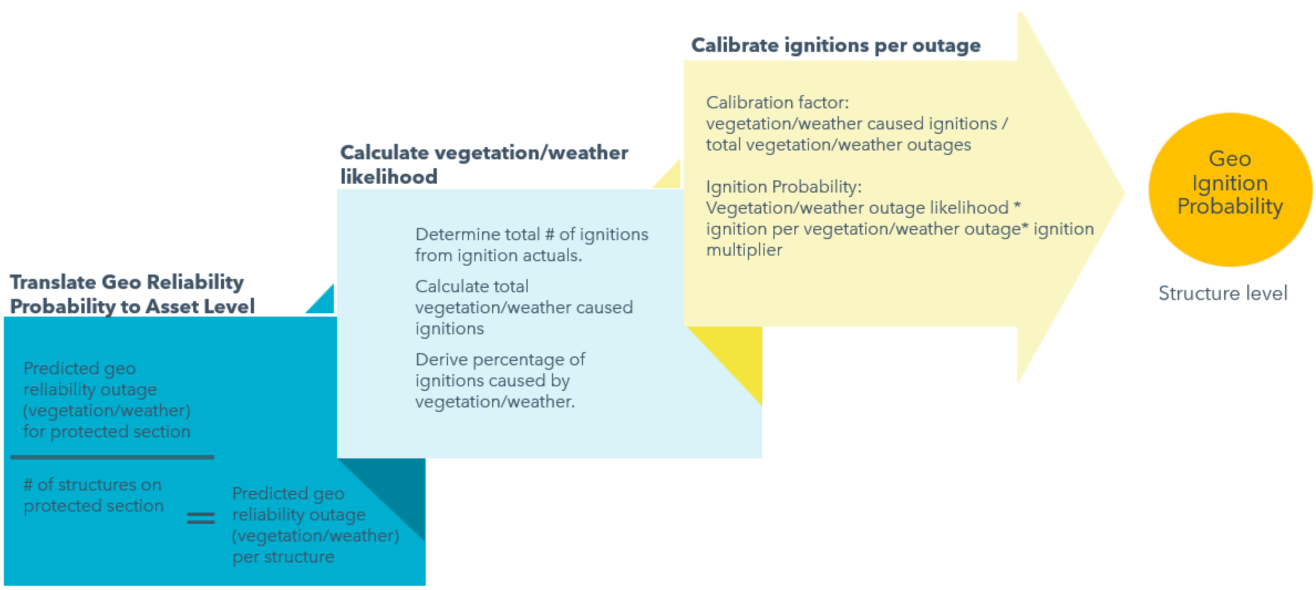


Figure 86: Methodology to Calculate Geographic Ignition Probability

The figure below illustrates the three steps PGE uses to calculate the annual probability of a vegetation ignition before and after inspection for a specific structure, which includes an assessment of vegetation condition:

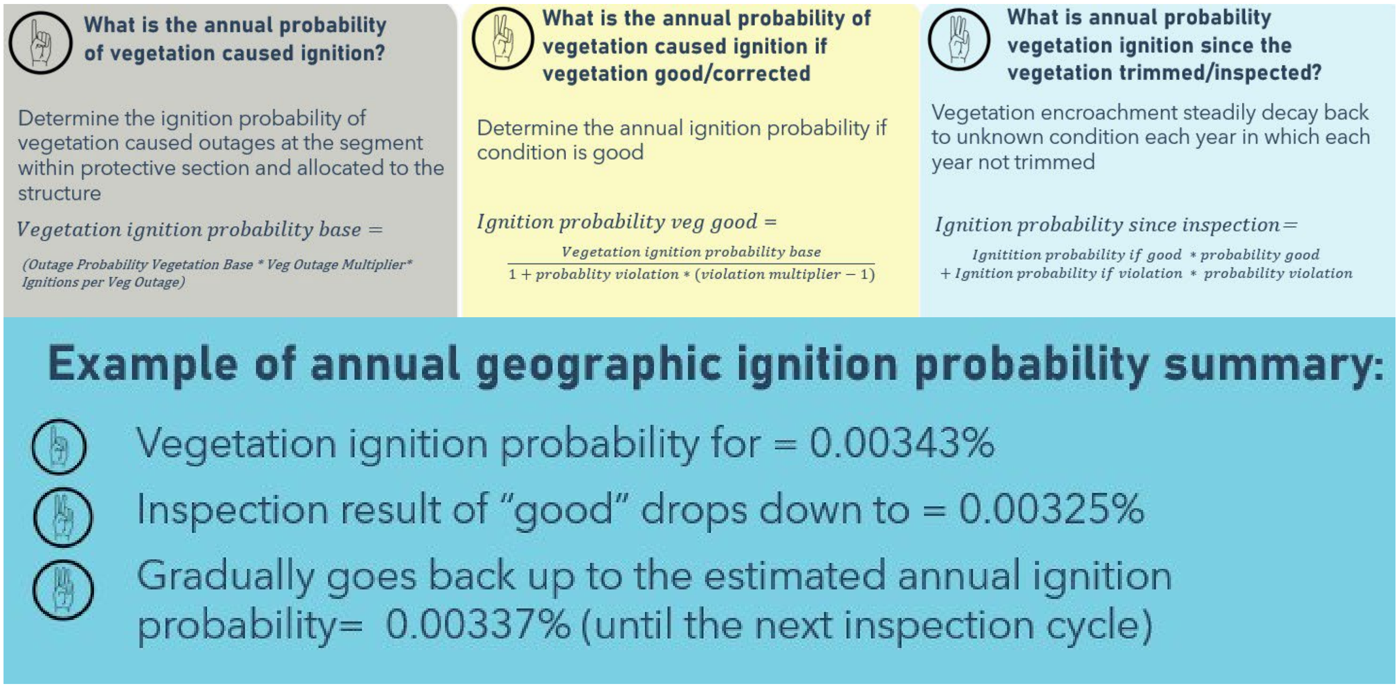


Figure 87: Steps Used to Calculate Geographic Ignition Probability After Inspection

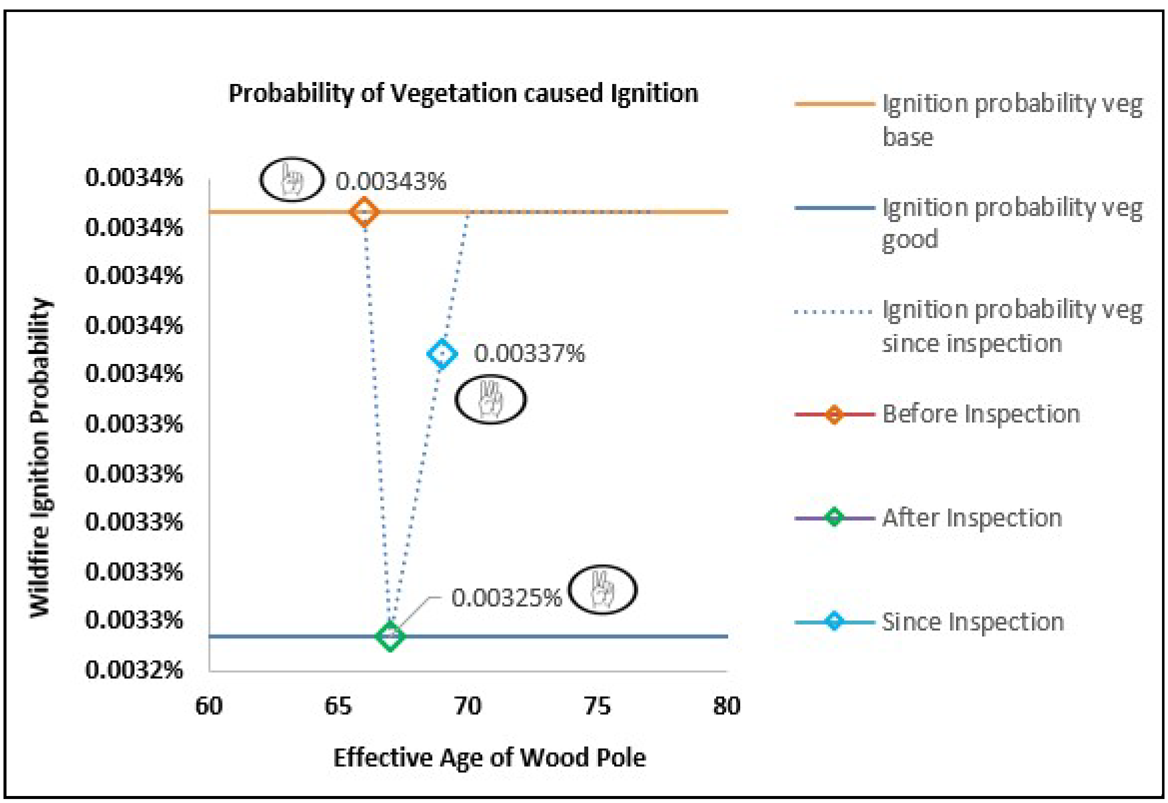


Figure 88: PGE Geographic Ignition Probability Before and After Inspection

8.1.4 RELIABILITY CONSEQUENCES

PGE uses a weighted average approach to quantify the impact of asset failure, leveraging subject matter expertise and failure data to build out failure scenarios from minor to catastrophic. Each scenario is assigned its own relative likelihood and corresponding cost of failure.

$$y = (RL * S_1) + (RL * S_2) + (RL * S_3) + (RL * S_4)$$

Where:

y = Weighted Average Consequence Cost

RL = Relative Likelihood

$S_1 - S_4$: Consequence Cost of Failure Scenarios (Minor-Catastrophic)

The example below shows how this algorithm is applied to a specific wood pole within PGE's service territory.

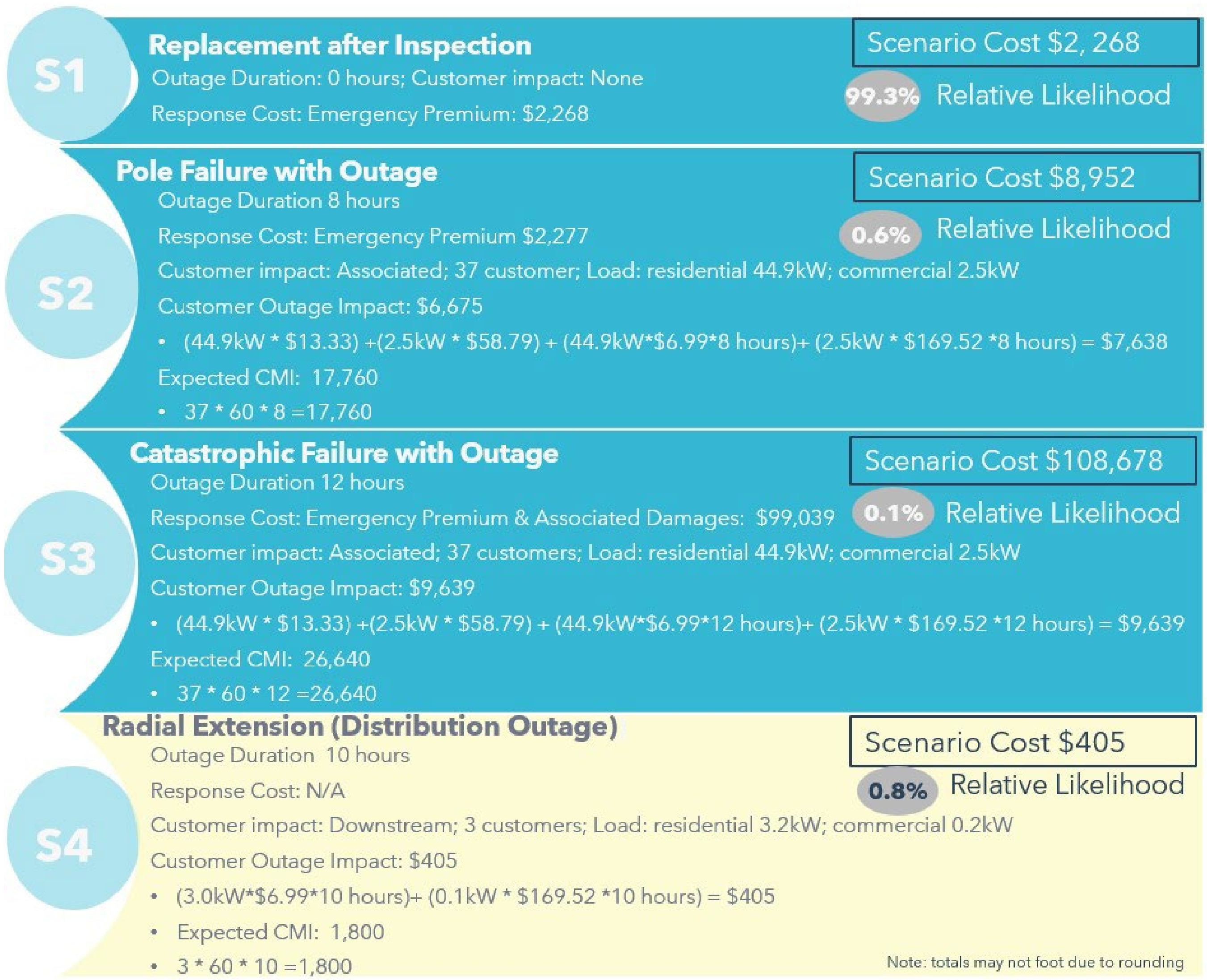


Figure 89: Pole Reliability Failure Cost Under S1-S4 Scenarios

8.1.4.1 **Relative Likelihoods**

To calculate the appropriate relative likelihood of each failure scenario, PGE reviews existing asset class failure data to identify the frequency and severity of the failure impact to customers and PGE. This ranges from "Inspection finds failure with no outage impact" to "Catastrophic failure with long-duration outage." PGE reviews the respective annual failure curves annually, including the relative likelihood assigned to each consequence scenario, to ensure consistency in the definition and probability of failure.

As illustrated below, reliability consequence cost of failure calculation includes both customer outage impacts and PGE response costs.

8.1.4.2 **Customer Outage Impact**

With each asset failure scenario, PGE quantifies the load impacted differentiated by customer class, feeder configuration, and feeder class (urban, rural, or remote).

- Feeder class impacts the customer outage duration assumptions in the consequence scenarios.
- Feeder configuration identifies whether an asset serving distribution customers is radial or looped and the duration associated with the outage. Customers in a looped configuration may be restored more quickly through switching, while radial customers will be without power until repairs are made, resulting in a longer average outage duration for downstream customers.

The customer outage impact assigns a value of service (VOS) on a per-kilowatt and kilowatt-per-hour basis, differentiated by customer class, to derive respective reliability impact for each asset failure scenario.

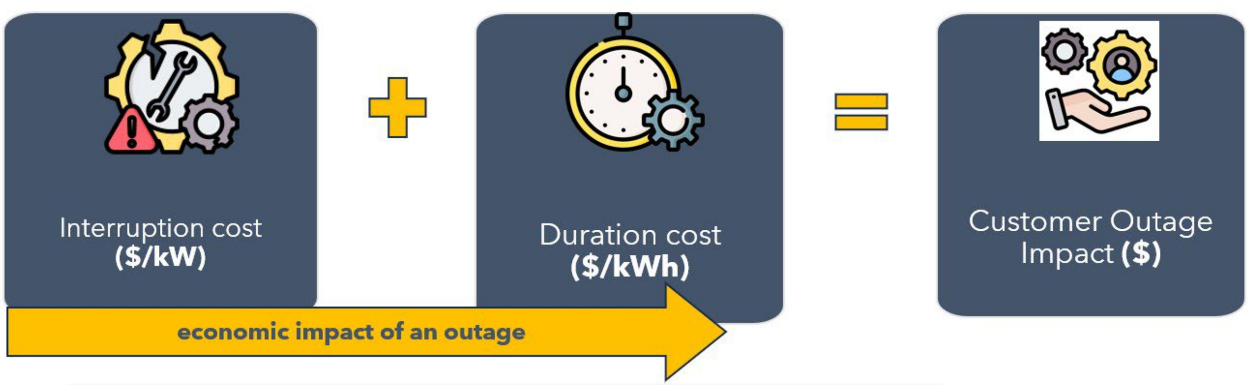


Figure 90: PGE Customer Outage Impact Methodology

VOS is an industry-standard metric leveraged by tools such as the Interruption Cost Estimate (ICE) Calculator, used by utilities, regulators, and other stakeholders to estimate interruption costs and the benefits attributable to reliability improvements. These VOS values are primary drivers to quantifying customer outage impact cost, a key input in reliability risk modeling. Additionally, PGE uses VOS to quantify the benefits of avoided PSPS events in evaluating proposed projects:

PGE's current VOS values are derived from Pacific Gas & Electric's 2012 VOS study (updated to reflect 2024 dollars), approved by the California Public Utility Commission. PGE leveraged PG&E's VOS study because the publicly available ICE calculator did not exist at the time.

PGE continues to use PG&E's study because PGE believes it more accurately reflects the economic impact of outages for its customers.

- The ICE calculator used publicly available interruption cost estimates from across the country, some dating back to the 1980s. PGE's models are structured using different customer classes than those found in the ICE calculator.
- The VOS values attributed to the residential customer class in the ICE calculator were unrealistically low compared to PGE's VOS values.

PGE is participating in the ICE calculator 2.0 project, see Section 4.3.3 for details on this new initiative.

8.1.4.3 **PGE's Response Cost**

PGE response cost calculation is an incremental cost adder on top of the cost to repair or replace the asset, intended to capture additional costs associated with reactive, unplanned failure (compared to the cost of programmatic or proactive asset replacement). These values were obtained from subject matter experts during modeling assumptions development and review sessions, and typically reflect a 25 percent cost adder. The 25 percent adder was a high-level cost applied across all substation, transmission, and distribution models when PGE reviewed the reactive v. proactive cost differentials. PGE did not refresh its response cost values for this 2025 update.

8.2 Neural Network Learning Model

8.2.1 Architecture

The architecture shown in the figure below includes multiple layers, including five hidden layers that each incorporate advanced techniques such as batch normalization and dropout.

Input Layer

The model uses nine input features for each protective section, derived using PCA. The activation function used is Rectified Linear Unit (ReLU),[35] which helps in learning complex patterns by allowing non-linearity.

Hidden Layers

There are five hidden layers in the network, with varying numbers of units:

- The first hidden layer consists of 128 units with ReLU activation.
- Subsequent layers have 64 units, again with ReLU activation. The ReLU function allows the model to capture intricate relationships by introducing non-linearity at each layer.
- The final hidden layer has 32 units with ReLU activation.

Batch normalization is applied at certain points, helping the model maintain stable activations and ensuring faster convergence during training.

Dropout layers are included with a rate of 0.5 to prevent overfitting. By randomly dropping units during training, the model is encouraged to learn more robust patterns that generalize well to new data.

Output Layer

The output layer contains a single unit with a linear activation function, suitable for regression tasks where continuous values are predicted (in this case, for predicting outcomes related to tree-fall outages).

The combination of these five hidden layers, along with batch normalization and dropout, allows the neural network to effectively learn from complex, high-dimensional data while avoiding overfitting, making it a highly effective predictive tool for outage forecasting.

[35] Rectified linear unit (ReLU) is a commonly used activation function in neural networks, which essentially outputs the input value if positive, and outputs zero if negative. ReLU, mathematically represented as $f(x) = \max(0, x)$, allows the model to learn non-linear relationships in data while being computationally efficient due to its simple structure.

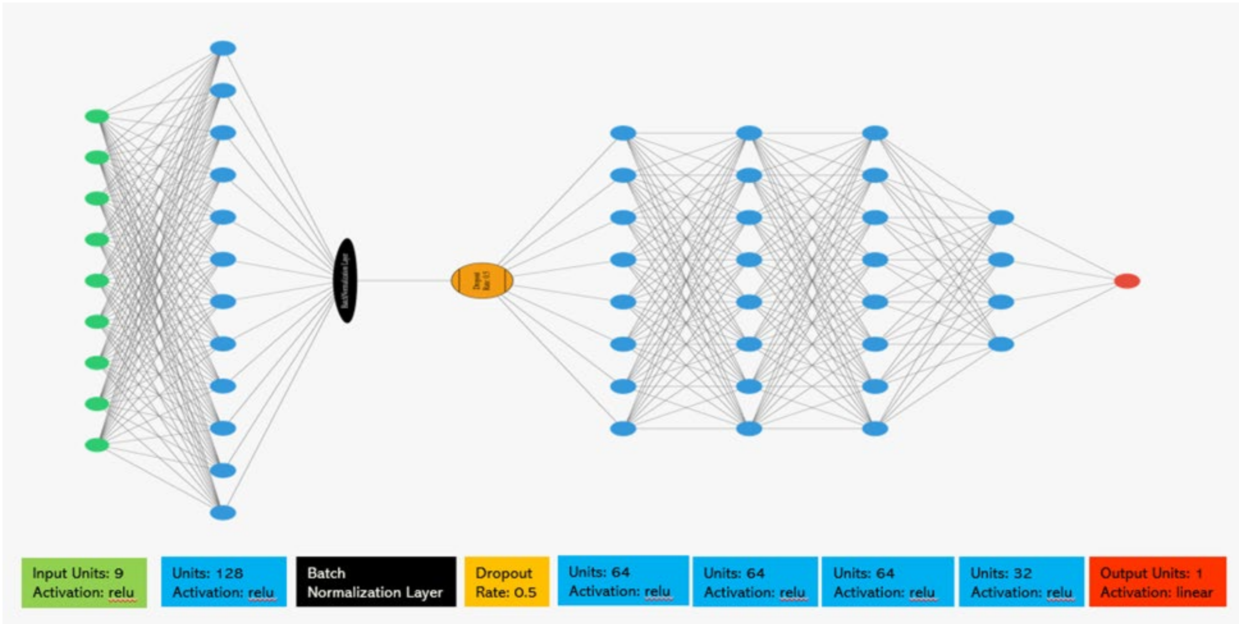


Figure 91: Architecture of Neural Network Model 2 (NN2)

8.2.2 MODELING TARGET FUNCTIONS

The figures below illustrate how a neural network model can be used to fit a target function, represented by the red curve, which can be interpreted as the outage counts across all protected sections.

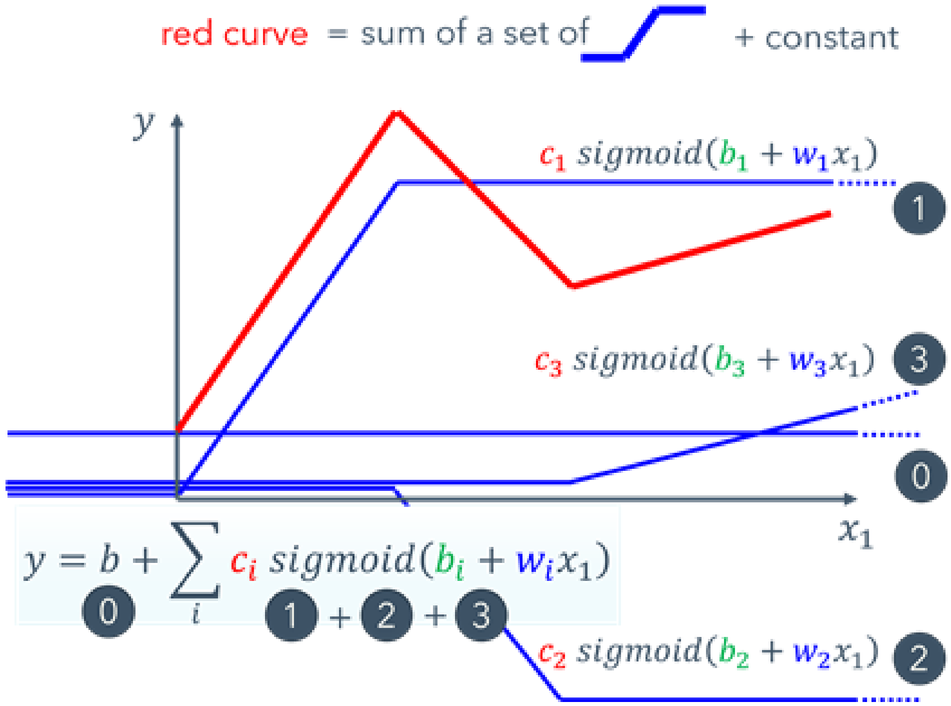


Figure 92: Sigmoid Function Outputs and Linear Combination[36]

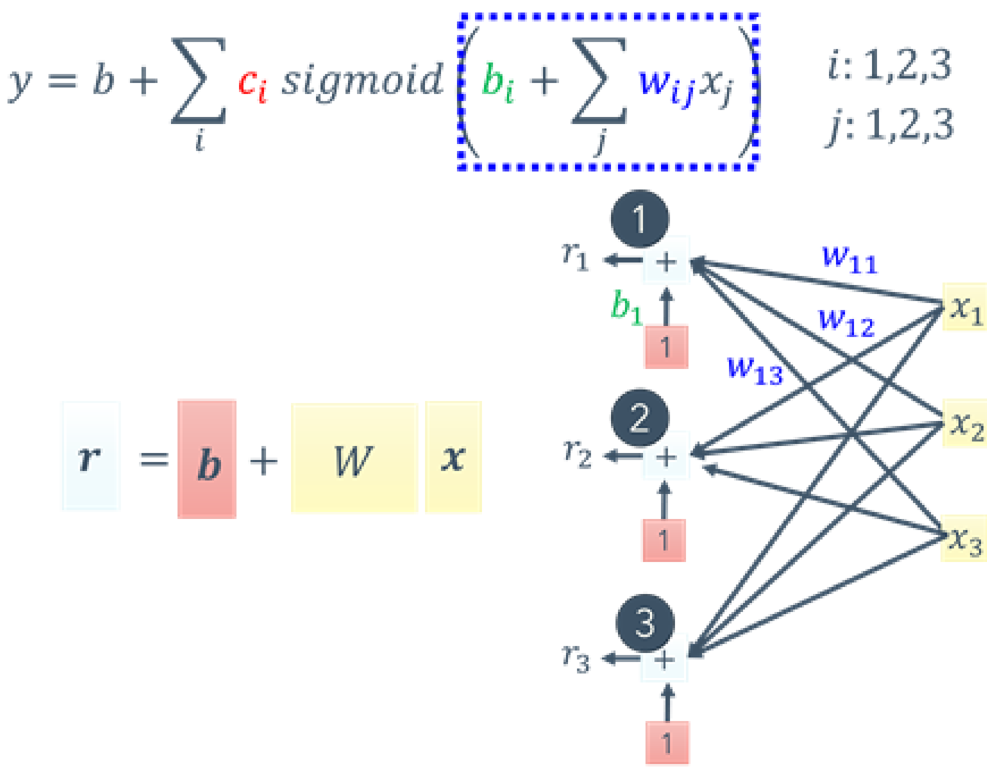


Figure 93: Neural Network Structure with Sigmoid Activation[37]

[36] Ref: Hung-Yi Lee, Machine Learning (Lecture Notes), National Taiwan University, 2023)
[37] ibid.

Figure 91 shows a model based on a single input variable to fit the output target. Figure 92 illustrates how a neural network can integrate multiple input variables, adjust their influence through weights and biases, and apply non-linear transformations (note that the outage prediction model used the ReLU activation function instead of the sigmoid) to generate a final output that captures complex data relationships. This multi-variable approach, employed in the protected sections of the outage prediction model (NN2), enables the network to learn from diverse inputs and achieve high predictive accuracy, resulting in the best-performing model.

The following section explains how the model approximates this curve:

- **Sigmoid Activation and Linear Combination:** The diagram shows the use of multiple sigmoid functions represented by the blue lines, each transformed by unique weights and biases (w_i and b_i). Each sigmoid function provides a smooth, non-linear transformation that allows the model to approximate complex shapes. By adjusting the weights and biases, the network can position and scale each sigmoid function to match different segments of the target curve.
- **Weighted Sum of Sigmoid Functions:** The red line (target curve) is approximated by summing scaled versions of individual sigmoid functions (blue lines). This is represented by the formula:

$$y = b + \sum c_i \cdot sigmoid(b_i + w_i x)$$

Each sigmoid curve contributes a portion to the final approximation, with coefficients (c_i) controlling the influence of each sigmoid function. By combining these weighted sigmoid functions, the model creates a composite output that closely follows the shape of the red curve.

- **Adjustment and Flexibility:** The network can adjust the parameters of each sigmoid function (through training) to capture different features of the red line, such as sharp changes or smooth regions. Each sigmoid function in this model plays a specific role in approximating segments of the curve, allowing the network to produce a fitted curve that closely matches the target line.
- **Final Prediction:** The output of this network is the sum of the transformed sigmoid functions, which collectively form a curve that approximates the red line. As the network trains, it adjusts weights and biases to minimize the difference between the red target curve and the network's output, achieving a close fit.

This approach illustrates the capabilities of neural networks to approximate complex functions by combining simple non-linear transformations (like sigmoid) to capture the overall trend and variations of the data, particularly in regression tasks.

8.3 Fire Behavior Modeling Methodology

The following information is provided to supplement Appendix 5, Wildfire Risk Assessment Overview and Process, in PGE's 2024 WMP. PGE's fire behavior modeling reflects a Wildfire Threat Index (WTI) planning scenario, observed weather analysis, topographic considerations, and fuels analysis.

8.3.1 Wildfire Threat Index (WTI)

Wildfire season within PGE's service territory typically occurs from June through October. The historical pattern begins with warming and seasonal drying in spring and summer and ends with the arrival of cooler, wetter conditions in the fall. To assess wildfire potential, electrical utilities have historically developed Fire Potential Indices (FPI) that combine weather, vegetation, and topographical data to yield an estimate of fire danger within their service territories. These indices are then correlated with historical wildfire data to inform short-term decision-making for mitigation actions.

Figure 94: Risk Associated with Ignition Location

Drawing on an understanding of wildfire drivers and risk assessment and leveraging subject matter expertise, PGE developed a risk driven FPI called the Wildfire Threat Index (WTI). WTI is based on the California Public Utilities Commission's Ignition Index and Utility Threat Index and is modeled after industry best practices for FPIs used by electrical utilities in California. The WTI uses a Risk Associated with an Ignition Location (RAIL) framework shown in the figure above to assess ignition likelihood, fire growth potential, and high-value resource vulnerability correlated to potential ignition location. RAIL serves as a mechanism to spatially join the utility assets with simulated ignition points.

Figure 95: Wildfire Threat Index Components

WTI comprises two quantitative indices based on the RAIL model: Ignition Potential Index (IPI) and Conditional Impact (CI). The IPI uses weather and fuels data to predict the potential for utility-associated consequential wildfires while CI uses fire growth modeling and High-Valued Resource and Asset (HVRA) data to assess potential impacts and quantify associated losses. The indices rely on weather and fuels data, classified into 216 weather types that factor in nine wind speed groupings, eight wind directions, and three fuels scenarios.

PGE's WTI approach enhances the traditional FPI by incorporating advanced risk assessment methodologies, allowing PGE to quantify wildfire risk across its service territory with greater than industry-standard precision. The WTI supports both short-term wildfire potential assessment and long-term mitigation strategy development.

PGE's foundation risk planning scenario represents the 75th percentile, utilizing the following theoretical weather scenarios:

- Wind: 30 mph sustained at 20 feet (low end of observed ranges)
- Wind direction: 180 degrees
- Fuel moisture: 5 percent (dead fuel)
- Resolution: 120 meters

8.3.2 IGNITION POTENTIAL INDEX (IPI)

IPI is a relative measure of the propensity for weather and fuel characteristics at a given location to result in a consequential utility-related wildfire.

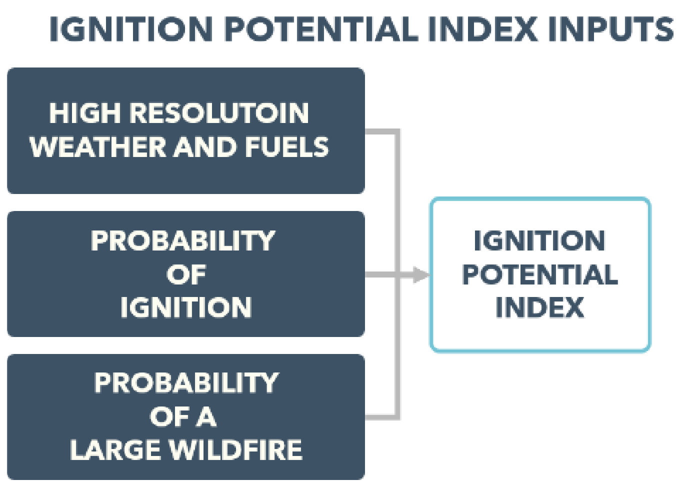


Figure 96: Ignition Potential Index Inputs

IPI is designed to assess weather and fuels conditions that historically have resulted in large wildfires. The formulation includes drivers of large wildfires (e.g. wind and fuels conditions), the probability that an ignition could occur, and the probability that an ignition could become a large wildfire based on a historical analysis of wildfires, and environmental fuel heat content. The result of the analysis is a location-specific database of IPI values that depend on specific weather and fuels scenarios.

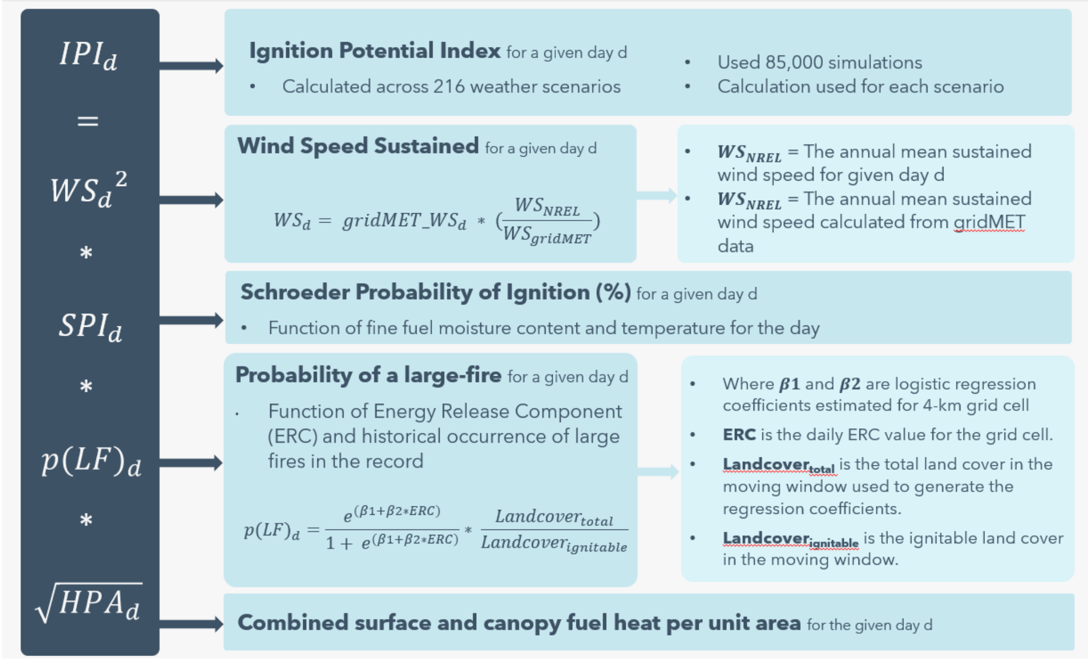


Figure 97: PGE IPI Calculation Methodology

8.3.2.1 Weather and Fuels Adjustments

The weather and fuels inputs to IPI use historical observations obtained from the Gridded Surface Meteorological (gridMET) dataset, which includes historical weather and fuels data from 1979 onward. PGE used weather and fuels data from the 2005-2020 period to develop the IPI used to inform its WTI.

The gridMET dataset provides weather and fuel observations on a four-kilometer grid. These wind speed observations contain an annual bias. To achieve improved IPI performance, PGE corrected annual wind data bias using the National Renewable Energy Laboratory (NREL) annual mean wind speed dataset (Draxl et al. 2015) from 2007 to 2013. A bias correction factor was derived by dividing the mean annual NREL wind speed by the average yearly gridMET wind speed during overlapping periods.

$$Bias\ Correction\ Factor = \frac{Mean\ annual\ NREL\ wind\ speed}{Mean\ annual\ gridMET\ wind\ speed}$$

This approach allows PGE's model to maintain the daily coordination of wind speed and dryness observed in gridMET while matching the precision of the NREL dataset.

PGE's IPI model also factors in surface and canopy fuels conditions across its service territory. Fuels were characterized using heat per unit area (HPA), which measures fuels heat content (kJ/m2). HPA varies with wind speed and fuels dryness and is a function of the fire behavior fuel model (e.g. fuel loading by fuel size class and component, heat content, etc.). PGE aggregates daily HPA values into 27 weather types (nine wind speed groups, each with three fuel dryness scenarios).

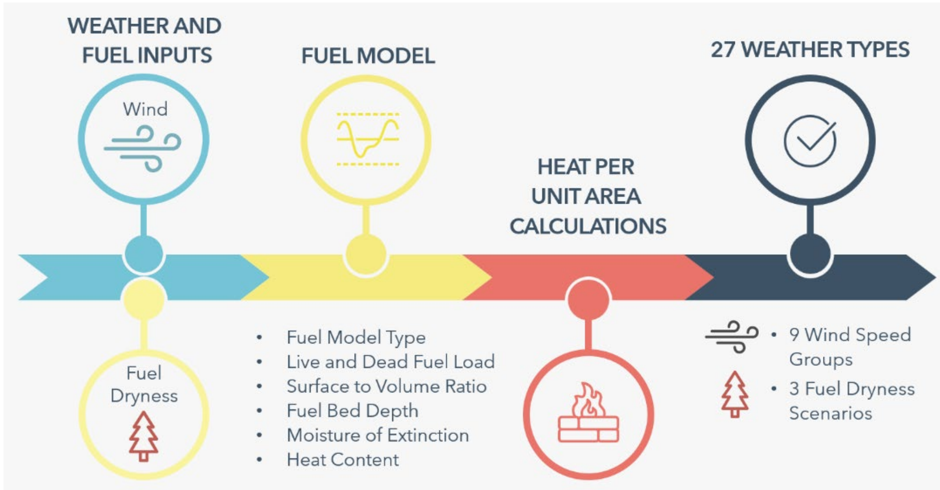


Figure 98: PGE IPI Model Design

The fuel data necessary for HPA calculations are available at a 30-meter resolution. To align weather and fuel data resolutions, PGE used a bilinear interpolation technique to resample and smooth the 30-meter HPA data to 120-meter and 4-kilometer resolution (depending on the data set).

HPA values have a direct influence on IPI calculations, because higher HPA values correlate to larger and more aggressive wildfires and higher IPI values. PGE used a modified version of HPA that is analogous to flame length to assess wildfire behavior under the selected fuels conditions.

Using the high-resolution weather and fuels dataset, PGE aggregated wind and fuels data into 216 weather types. The weather types consist of nine 20-foot wind speed groups using five mile-per-hour increments, eight wind directions, and three fuel moisture scenarios.

8.3.2.2 Topographic Considerations

PGE does not limit fire behavior modeling to its asset base or service territory. PGE studies wildfires that have similar topography, fuel, fire regime, or wind patterns. The figure below illustrates similarities between the topographical features that influenced the 2018 Carr Fire in California and PGE's service territory.

California's Redding area and Oregon's Willamette Valley share similar topographical impacts on weather due to a coastal mountain range that separates the cool, moist marine air from the hot, dry continental air. During the day, heating of the inland valleys can draw the marine layer through gaps in the mountain range, creating airflow spin (shear) resulting from terrain friction.

The 2018 Carr Fire involved a pyrogenetic tornado that initially formed within a pre-existing zone of cyclonic wind shear that "likely contributed to the vortex generation."[38] Similar terrain-airflow interaction has been observed in Oregon, with flow of the marine airmass into the western edges of PGE's service territory, specifically the Highway 18 corridor through the Coast Range.

[38] Lareau N. P., Nauslar N. J., & Abatzoglou J. T., *The Carr Fire Vortex: A Case of Pyrotornadogenesis*, (Geophysical Research Letters *2018), pg 13109*

This topographical impact could potentially amplify fire behavior on an existing fire in the Willamette Valley. PGE reviewed these findings with the incident meteorologist on the Carr fire to understand the learnings. This evaluation resulted in no changes to PGE's risk modelling along with confirmation of the need to understand the fuel and wind dynamics in high resolution across these locations in which the fire potential had similar characteristics to Carr Fire.

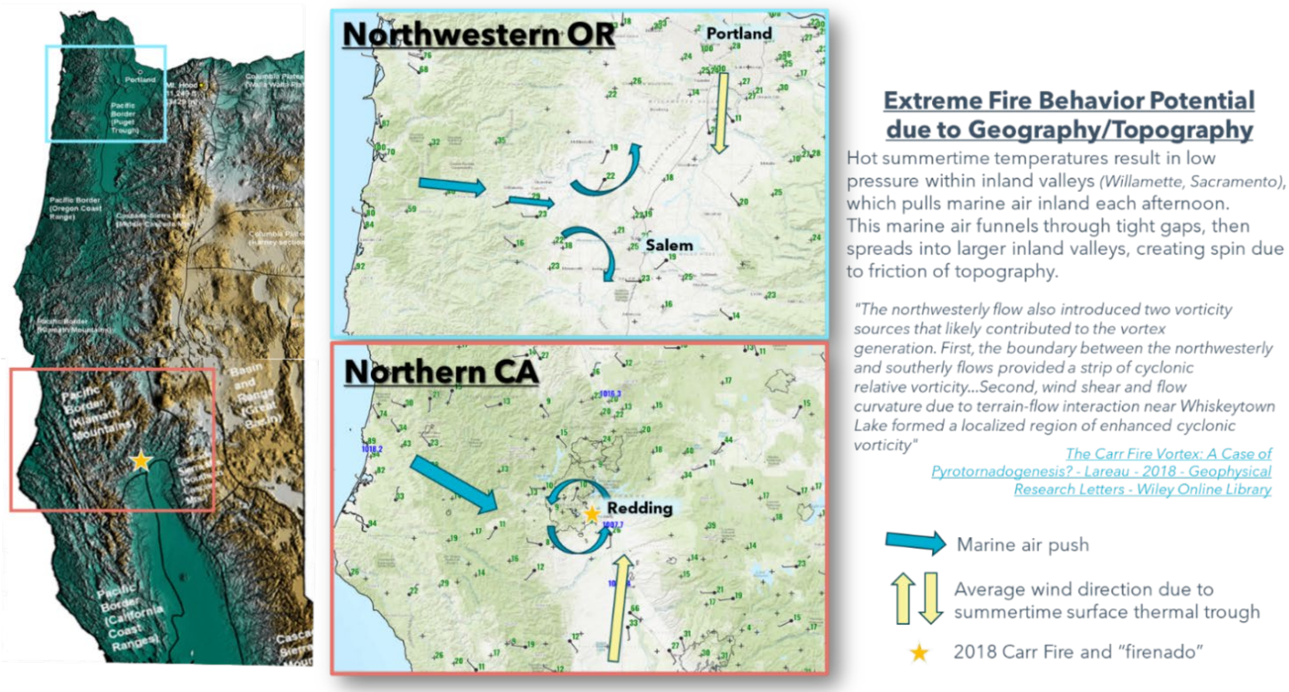


Figure 99: Observed Fire Behavior with Similar Topography

8.3.2.3 High-Resolution Wind Simulations

The highly variable terrain within PGE's service territory has a significant impact on local wind patterns and wildfire behavior. To assess terrain-scale winds and their influence on wildfire risk, PGE conducted advanced wind modeling using the high-resolution WindNinja model.

PGE applied smoothing and downscaling techniques to compile a high-resolution 120-meter gridded temperature, relative humidity, and wind speed dataset using the 4-km gridMET data. PGE then downscaled the GridMET wind data from 4-km to 120-meter resolution using a bilinear interpolation smoothing technique. PGE further downscaled the GridMET temperature and relative humidity data from 4-km to 120-meter resolution using bilinear interpolation with adiabatic adjustments to account for elevation. The resultant 120-meter temperature, relative humidity, and wind speed gridded dataset feeds PGE's fine-scale WindNinja modeling.

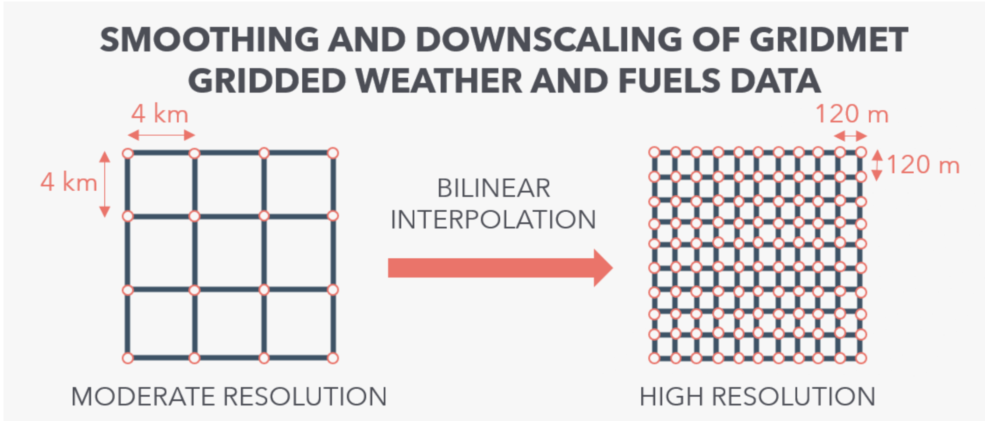


Figure 100: Wind Simulation Smoothing and Downscaling

8.3.2.4 Ignition and Large Fire Probabilities

Large wildfires occur in environments where fuels are receptive to ignition sources. To identify environmental conditions where large wildfires are possible, PGE calculates the probability of ignition and the probability of a large wildfire using historical fuels and wildfire data.

Ignitions are only possible when a heat source or spark occurs in a location with receptive fine fuels. To calculate the probability of an ignition, PGE uses the Schroeder Probability of Ignition (SPI) (Schroeder 1969), an industry-standard measure of the likelihood that a competent ignition source will result in a fire start. PGE's probability of ignition calculations also factor in temperature and relative humidity data from the gridMET dataset.

Fuels environments within the PGE service territory are complex and include a wide range of fuel types. The probability for a large wildfire increases as fuels become drier. A common metric used to assess vegetation dryness is Energy Release Component (ERC). To understand the impacts of the fuels environment on the large wildfire probability, PGE analyzes ERC values during historical wildfires using the U.S. Forest Service's Fire Program Analysis Fire-Occurrence Database. This analysis yielded probability of large wildfires as a function of ERC.

8.3.2.5 Ignition Potential Index

Equipped with high-resolution weather and fuels data, ignition potential, and large fire probability modeling results, PGE calculates daily and conditional IPI values. Daily IPI values were calculated using the high-resolution weather and fuels observations from the gridMET dataset. Conditional IPI values are calculated for likely weather and fuels scenarios not represented in the historical record. The conditional IPI values support analysis of future weather observations.

Using the observed weather and fuels data, each daily calculated IPI value for each 4-km grid point is classified into one of 216 weather types. A weather type probability was calculated by comparing the sum of daily IPI values for each weather type to the total IPI for each grid point. The weather type probability serves as a weighting factor. A weather type with a higher IPI value generates a higher weighting factor than a weather scenario with a lower IPI value. Weather types that occur more frequently in the historical record have a higher weighting factor than similar weather types that occur less frequently.

8.3.2.6 IPI Scenario Selection

PGE uses the 75th percentile IPI scenario (shown in Figure 101) for planning purposes.

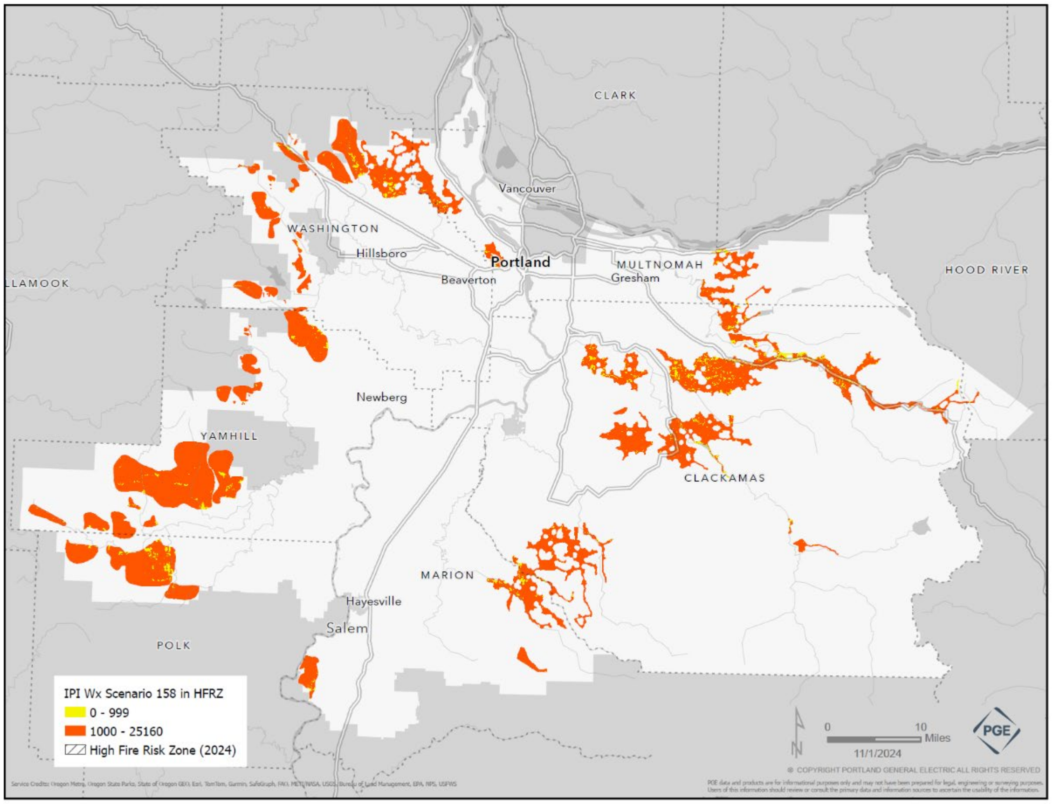


Figure 101: IPI – 75th Percentile

This scenario reflects a 30 mph sustained wind at 180 degrees (south cardinal direction) at a 5 percent moisture class. This is not the worst-case or an average, but it was chosen based upon the historical meteorological record within PGE's service territory. The weather assumptions fall into the three major categories as shown in the figure below:

Classification of Windstorms that affect PGE Service Territory

Following research done by Wolf Read, titled "The Strongest Windstorms in the Western Pacific Northwest 1950-2004", statistical wind data provided by the National Weather Service Portland Weather Forecast Office, and analysis data provided by the NWS Weather Prediction Center, three (3) specific weather patterns have been found and classified as potential infrastructure damaging wind producers.

Classification	Description	Wind Direction	Max Wind Speeds	Pressure Gradient**
LL	**Landfalling Low** (minimum pressure of 950-990) landfalling between Salem and British Columbia	S-SW	Sustained 25-40 mph Gusts of 45-75mph	OLM-EUG: >= -10 mb
BC	**Bomb Cyclone**: rapidly intensifying offshore low moving north inside of 130°W	S-SW	Sustained 30-60mph Gusts of 60-90mph	OLM-EUG: >= -10mb
EW	**East Winds**: Strong East-to-West pressure gradient under stable conditions	E	Sustained 30-40mph Gusts of 40-80mph	AST-DLS: -9 to -24mb

** reflects ongoing meteorological study

Figure 102: Potential Infrastructure-Damaging Weather Pattern Classifications

As documented in the historical record, the predominate storm sustained wind speeds average in the low 30 mph range, with pressure gradient dominance from the south. This is not a worst-case scenario, such as a sustained east offshore wind at 40 mph.

8.3.3 Conditional Impact (CI)

Conditional Impact (CI) measures the relative impact of a wildfire (i.e., loss). CI is a function of fire growth potential and the vulnerability of assets and resources that exist within the perimeter of the simulated wildfire. Fire growth potential is a function of fuel, weather, and topography. Vulnerability is a function of the exposure and susceptibility of homes, resources, and assets across the landscape where the fire occurred. PGE generalized wildfire simulation results to produce a CI data layer at 120-meter resolution to represent the tendency for fires originating in that area to impact resources and assets.

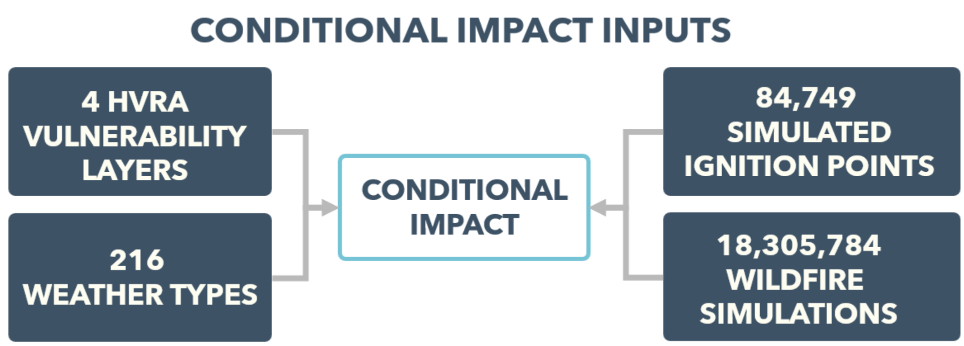


Figure 103: Conditional Impact Inputs Wildfire Simulation Modeling

To generate CI data, PGE leveraged the RAIL framework to conduct wildfire simulation modeling that associates HVRA data within the final simulated wildfire perimeters back to the ignition location. The wildfire modeling uses a Minimum Travel Time algorithm called Randig to simulate short-duration wildfires under constant weather conditions with no modeled fire suppression. These assumptions are appropriate for wildfire events that overwhelm fire suppression efforts due to aggressive wildfire behavior, which often lead to consequential wildfires.

PGE performed these wildfire simulations iteratively using the 216 weather types and high-resolution 120-meter gridMET weather observations, augmented with terrain-enhanced wind fields. For each grid cell, PGE modeled fuels using 10 moisture adjustments based on canopy cover and the slope and aspect of the terrain. After generating the final fire-perimeter event set, PGE overlayed each simulated wildfire with HVRA spatial data to represent the impacts of wildfire and its associated conditional losses.

The study area for PGE's wildfire simulations included a 270-meter lattice grid of ignition points, filtered using a one-kilometer buffer around PGE assets. Additional ignition locations were filtered out based on inherent burnability characteristics such as water or ice land cover areas.

PGE used the resulting 84,749 ignition points to simulate wildfires using the 216 weather types, yielding 18,305,784 wildfire simulations. In Figure 103, Panel A (left) depicts the overall study area of the wildfire simulation ignition points, while panel B (right) provides a detailed view of the ignition lattice near Sandy, Oregon.

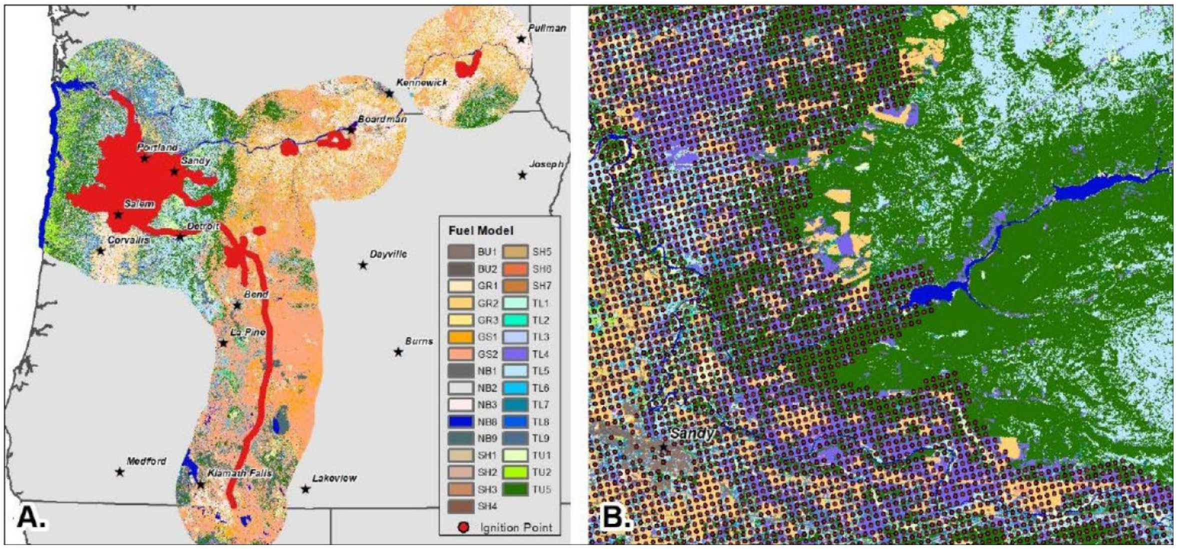


Figure 104: Wildfire Simulation Ignition Point Locations

8.3.4 URBAN CONFLAGRATION MODELING

Several significant utility-sourced wildfires in the past two decades featured urban conflagrations (such as the 2020 Almeda Fire in Ashland) that caused widespread devastation. To understand the potential for an urban conflagration in the PGE service territory, wildfire modeling included burnable urban fuel models within the appropriate weather types.

To account for the potential for wildfire spread into urban areas (mapped by LANDFIRE[39] as non-burnable), PGE used an iterative smoothing process to spread distributions of flame-length probabilities into non-burnable land cover (other than open water or ice) within 1.5 km of contiguous, burnable land cover at least 500 ha in size. PGE applied a fractional exposure value based on the distance from the burnable fuel (the source of exposure) to account for the decreased exposure of housing units within the 1.5 km distance from burnable fuel. PGE adjusted housing-unit density exposure by multiplying the housing unit density by an exposure mask value for each location. The final People and Property HVRA included housing units directly exposed to wildfire (located in burnable land cover areas) and those indirectly exposed to wildfire (within a 1.5 km distance of burnable fuel).

8.3.4.1 **Impact Data**

To assess wildfire risk across its service territory, PGE quantified impacts observed in wildfire modeling. In a prior Pacific Northwest Quantitative Wildfire Risk Assessment (PNRA), Conditional Net Value Change (CNVC) was calculated to represent wildfire impacts. CNVC analysis was applied to the following HVRA datasets: people and property, wildlife, infrastructure, and surface drinking water. For its current impacts analysis, PGE adjusted the response functions in the PNRA analysis to

[39] LANDFIRE (Landscape Fire and Resource Management Planning Tools), is a shared, government-developed program used by the wildland fire management programs of the U.S. Forest Service and U.S. Department of the Interior. It uses landscape-scale geospatial products to support cross-boundary planning, management, and operations.

remove beneficial effects of the wildfires: positive values were replaced with a zero value.[40] PGE applied these modified response functions to all HVRA CNVC layers.

To quantify impacts, PGE ran an overlay script to sum the total CNVC within each simulated wildfire perimeter. Utilizing the RAIL framework approach, the total CNVC reported within each wildfire perimeter (including spot fires) is attributed back to the original ignition location. This allowed PGE to apply CNVC values, representing the estimated HVRA impacts for each of the 216 modeled weather conditions, to each of the original 84,749 simulated ignition points.

8.4 Seasonal Risk Assessment

The following information is provided to supplement Section 3.3.2, Seasonal Wildfire Risk, of PGE's 2024 WMP. In addition to the baseline risk assessment resulting in the identification of HFRZs, PGE conducts seasonal risk assessments. Wildfire risk associated with weather and fuels can change rapidly throughout the season; PGE leverages the baseline Fire Behavior Modeling, meteorologists, wildland fire experts, and weather sensor networks to inform seasonal wildfire risk assessments. This assessment considers annual and seasonal variations to inform the following decisions:

- Fire Season declaration
- Implementation of Enhanced Powerline Safety Settings (EPSS)
- Implementation of Public Safety Power Shutoff (PSPS)

PGE has modeled fuel and weather scenarios ranging across 216 different levels of wind speed, fuel moisture, temperature, and humidity to quantify WTI and wildfire risk. By performing the calculations across the boundary conditions from low to high fire weather combinations during the baseline risk modeling process, PGE can leverage the high-resolution forecast, real-time weather, and drought data during fire season to determine the WTI in real-time throughout the season.

Table 70 details the various weather conditions and fire risk indices evaluated against defined thresholds to inform operational decisions. Additionally, PGE considers fire activity, resource availability, detection capability, and seasonal fire behavior in the area to inform operational decisions.

[40] Wildfire risk modelling best practices recognizes that fire across the landscape can be not only beneficial but essential for forest and ecology health. These positive benefits occur however are not included in the CNVC layer as a reduction in consequence or risk.

Table 70: Seasonal Risk Assessment Metrics and Indices

Metric	Unit	Source(s)
Wind Gust	mph	PGE installed weather stations, ASOS,[41] RAWS[42]
Wind Sustained	mph	
Relative Humidity (RH)	%	
Hot-Dry-Windy Index (HDWI)	percentile	US Department of Agriculture
Evaporative Drought Demand Index (EDDI)	percentile	NOAA Physical Sciences Laboratory
US Drought Monitor (USDM)	D0-D4	US Drought Monitor[43]
Energy Release Component (ERC)	percentile	Northwest Interagency Coordinating Center (NWCC)
Burning Index (BI)	percentile	
Severe Fire Danger Index (SFDI)	Index	WFAS and NDFD[44]
Wildfire Threat Index (WTI)	percentile	PGE Fire Behavior Model
Preparedness Level (Region 6)	1-5	Columba Cascade Interagency Communication Center (CCICC)
Staffing Level (WACCC)	1-5	
Aviation Resources	qualitative	
PGE Operational Capacity	qualitative	PGE assessment

8.5 Vegetation Management

The following information is provided to supplement Section 9, Vegetation Management, in PGE's 2024 WMP. PGE's multifaceted vegetation management strategy focuses on Routine Vegetation Management (RVM) for areas outside of PGE's HFRZs and applies AWRR techniques within PGE's HFRZs. PGE is responsible for monitoring, inspecting, and mitigating approximately 2.2 million trees across 12,000 miles of overhead conductor within its service territory, and takes a systematic approach that includes regular inspections and maintenance of its entire distribution and transmission system.

PGE performs cyclic patrols and prunes vegetation to comply with Oregon and federal vegetation clearance standards. PGE also patrols for and mitigates readily climbable vegetation during routine maintenance inspections per state requirements.[45] The table below summarizes the list of vegetation programs PGE administers in accordance with Chapter 860, Division 024 Oregon Administrative Rules, and NERC Operations & Planning standards.

[41] Automated Surface Observing Systems operated by NWS, Federal Aviation Administration (FAA), and the Department of Defense

[42] Remote Automatic Weather Stations operated by National Interagency Fire Center (NIFC)

[43] Western Regional Climate Center, NOAA, and National Centers for Environmental Information (NCEI)

[44] Wildland Fire Assessment System operated by NIFC and the National Digital Forecast Database operated by NWS

[45] See OAR 860-024-0016(1)(b) for definition of "Readily climbable."

Table 71: Vegetation Management Programs Overview

Program	Rule	Scope	Frequency	Focus
Routine Vegetation Management (RVM)	OAR 860-024-0016	Outside HFRZs	3 years + mid-cycle	Clearances, hazards
Advanced Wildfire Risk Reduction	OAR 860-024-0016 OAR 860-024-0018(4)	Inside HFRZs	Annual + 2 years + inter-cycle	Ignition risks, clearances, hazards, off-right-of-way, access, new growth
Bulk Electric System (BES)	NERC FAC-003-4	230kV and above + select BES lines	Annual	Ignition risks, clearances, hazards, right-of-way encroachments

8.5.1 Routine Vegetation Management (RVM) Program

PGE's RVM program follows a structured three-year maintenance schedule, ensuring that vegetation surrounding a minimum of one-third of its overhead distribution assets is inspected and mitigated annually in alignment with state requirements and industry best practices. RVM activities are conducted year-round across PGE's overhead system, but timing of these activities may vary as PGE evaluates and optimizes the effectiveness and efficiency of its vegetation management cycles. PGE inspectors assess all vegetation adjacent to PGE facilities, including PGE-owned communications facilities, for factors such as proximity, species, growth habits, strength, and overall vegetation health. During these assessments, inspectors consider the following in developing their vegetation management prescriptions:

- Clearance requirements to avoid off-cycle pruning
- Line configuration
- Line voltage
- Location
- Potential sag under various environmental conditions

PGE foresters create project-specific work layouts for vegetation contractors to complete while moving through the system and performing RVM activities. Line clearance pruning specifications are designed to maintain vegetation clearances during routine wind and adverse weather conditions. At a minimum, PGE adheres to the voltage-based clearance requirements specified in OAR 860-024-0016. During the three-year standardized maintenance cycle, PGE vegetation contractors prune identified vegetation to PGE specifications to comply with OAR Division 24 Safety Standard, American National Standards Institute A300, and OSHA Z133 guidelines.

Additionally, RVM work is field validated by PGE forestry personnel who work closely with crews to ensure thorough and accurate completion. PGE conducts detailed audits of its vegetation management activities to verify that tasks have been completed to specification. To enhance the effectiveness of the RVM program, PGE coordinates closely with external stakeholders, including the USFS, ODF, Oregon Department of Transportation (ODOT), municipalities, and private landowners.

8.5.2 ADVANCED WILDFIRE RISK REDUCTION PROGRAM

PGE takes a proactive approach to reducing the threat posed by hazardous vegetation to its utility assets, especially within the HFRZs. In 2019, PGE expanded its vegetation management program in the Mt. Hood corridor to increase efforts to identify and mitigate vegetation with growth habits or defects that present an increased risk to overhead power lines. This focus on vegetation conditions both on and off the right-of-way proactively addresses vegetation that poses an escalated ignition-risk potential to utility assets by implementing a shorter patrol schedule, conducting more thorough vegetation evaluations, and allocating additional resources.

These efforts led PGE to develop its AWRR program, which aims to assess and reduce the risk of utility-caused, vegetation-induced, potentially catastrophic wildfires within PGE's service territory through implementation of a dedicated vegetation management strategy within the HFRZs.

The overall goal of the AWRR program is to decrease the likelihood of ignitions and mitigate the potential for catastrophic fire spread. Objectives include making distribution and transmission lines easier to inspect, improving system resilience, and reducing the number of vegetation-powerline conflicts. Meeting these objectives will increase both reliability and safety while decreasing wildfire risk.

PGE's annual AWRR activities are focused within the boundaries of PGE's HFRZs established through PGE's WRMA process with a more compressed cycle, more stringent inspection criteria, and more active mitigation in comparison to RVM. These efforts are supported by remote sensing data as discussed in Section 3.13, Vegetation Management Risk Updates. Additionally, annual vegetation survey findings contribute to the strategic planning of AWRR activities.

Under the AWRR program, PGE performs annual vegetation inspections on all overhead distribution circuits, 57kV lines, and 115kV lines within its HFRZs and mitigates vegetation according to PGE specifications.

Patrols involve three levels of assessment as defined by the International Society of Arboriculture (ISA):

- **Level 1:** Limited Visual Assessment
- **Level 2:** Basic Assessment
- **Level 3:** Advanced Assessment

Assessments identify the following conditions, discussed in more detail below.

- **Condition 1 (C1)** vegetation is an imminent hazard to PGE facilities
- **Condition 2 (C2)** vegetation is a probable hazard to PGE facilities
- **Condition 3 (C3)** vegetation has high-growth potential and is likely to be a "Cycle Buster"[46]

PGE foresters create project-specific work layouts for vegetation contractors to complete, performing AWRR mitigations in alignment with the prioritization discussed in Section 3.13, Vegetation Management Risk Updates. PGE also conducts QA/QC of vegetation management work

[46] See OAR 860-024-0016(1)(a) for definition of "Cycle Buster"

completed by crews, documents these activities, and coordinates with county, municipal, and other external agencies, including ODOT, ODF, and USFS.

The vegetation management work within PGE's HFRZ aims to control vegetation adjacent to power lines, improve ingress and egress, provide better lines of sight for power line inspection, clear ROW of vegetative debris, remove small combustible vegetation and shrubs, decrease fuel loading and ladder fuels, expand ROW widths, eliminate hazard vegetation throughout PGE's system, and prune vegetation overhanging powerlines, as shown in the figure below:

Figure 105: Hazardous Vegetation Mitigation

Figure 106: Hazardous Overhang Mitigation Pre- and Post-Mitigation

8.5.3 AWRR Operational Periods

As shown in the figure below, PGE's 2025 AWRR patrol and mitigation activities are divided into three operational scopes:

- Active Growth Period Targeted Patrol + Mitigation (AGP)
- Inter-cycle Patrol + Mitigation (ICPM)
- Full Scope Patrol + Mitigation (FSPM)

All HFRZs will receive AGP annually. Over a two-year schedule between 2024 and 2025, each HFRZ will receive ICPM and FSPM in alternating years. AWRR inspectors design work for vegetation management contract crews that adheres to the distinct specifications of each mode, distinguished mainly by Condition 2 (C2) mitigation rates and the application of enhanced vegetation management (EVM) techniques. These specifications are detailed in the figure and narrative below.

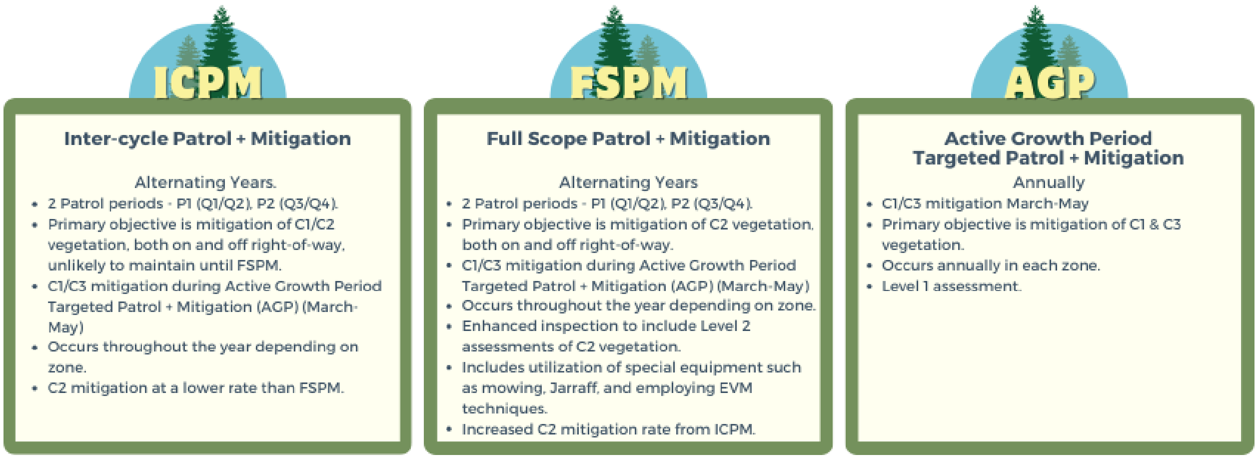


Figure 107: AWRR Operational Scopes

8.5.4 ACTIVE GROWTH PERIOD (AGP) TARGETED PATROL + MITIGATION

During the peak growing season for PGE's service territory (March-May), each HFRZ designated for AGP scope undergoes patrols specifically targeting C1 and C3 vegetation. PGE then assigns crews to address any patrol-identified issues. After completing the mitigation work, crews resume FSPM or ICPM activities within their designated HFRZ(s).

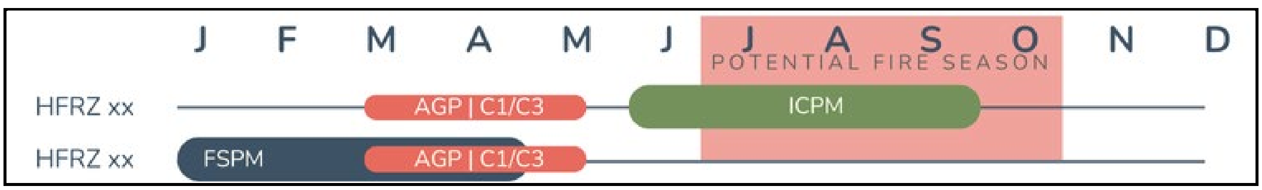


Figure 108: Active Growth Period Schedule

The AGP targeted patrol + mitigation period offers significant benefits by continuing to prioritize Condition 1 (C1) and Condition 3 (C3) vegetation management before fire season begins. From March 1 to May 30, PGE assigns crews to address specific concerns, ensuring that inspections and pruning align with current growth rates and adhere to ICPM and FSPM schedules.

PGE's new Condition 3 (C3) designation highlights vegetation that grows faster than the maintenance cycle ("Cycle Buster"). [47] Factors such as species, proximity to assets, and inspector assessments will determine whether vegetation qualifies as C3, which must be mitigated before the start of PGE-declared fire season each year. The C3 designation has been integrated into PGE's AWRR work management software, enhancing operational efficiency with three advantages:

- Inspectors can quickly identify and document vegetation at risk of violating clearance distances to optimize crew deployment.
- Crews can focus on C3 points, streamlining operations and ensuring more effective mitigation.
    - Foresters can track C3 trends to inform future risk modeling, resource allocation, and program improvements.

[47] See OAR 860-024-0016(1)(a) for definition of Cycle Buster

Leveraging satellite data, growth rates, and species information, this method combines remote sensing with on-the-ground patrols to yield more focused and strategic vegetation management outcomes. It also enables PGE to optimize program components like shop locations, fueling stations, and chip dump sites to enhance operational logistics and efficiency.

8.5.5 INTER-CYCLE PATROL + MITIGATION (ICPM)

8.5.5.1 Purpose and Definition

The purpose of ICPM is to mitigate the vegetation at risk of breaking the scheduled mitigation cycle and to mitigate any imminent vegetation-related failures. This targeted approach allows PGE to minimize the risk of vegetation-related utility ignitions, increase reliability, and maintain compliance with safety standards. ICPM targets Condition 1 (C1) vegetation, Condition 2 (C2) vegetation, and Condition 3 (C3) vegetation, as well as readily climbable vegetation.

PGE implements the ICPM approach within designated HFRZs during alternating years, bridging the interval between the biennial FSPM cycles. Under this methodology, AWRR inspectors conduct semiannual inspections along overhead conductors within specified HFRZs, identifying and prioritizing mitigation measures to be conducted by PGE's vegetation management contractors.

8.5.5.2 ICPM Assessment Process

Each HFRZ designated for ICPM receives a patrol during AGP and a second patrol during work layout. Following either patrol, PGE tasks vegetation crews to mitigate identified issues. The majority of ICPM inspections begin with a Level 1 visual assessment, progressing to a Level 2 basic assessment if necessary.

During ICPM work layout patrol, PGE AWRR inspectors conduct patrols along all overhead primary conductors and assets within the designated HFRZ. They identify C1 and C3 vegetation, as well as C2 vegetation probable to fail within 12 months.

Figure 109: Vegetation Mitigation Pre- and Post-Mitigation

8.5.6 FULL SCOPE PATROL + MITIGATION (FSPM)

8.5.6.1 Purpose and Definition

FSPM provides a more comprehensive approach in comparison to ICPM by implementing a higher mitigation rate for C2 hazards and right-of-way management while continuing to target C1 and C3 vegetation. By alternating FSPM with ICPM from year to year, PGE is able to balance resources while addressing reliability and ignition risks.

Mitigation efforts under FSPM include increasing side clearance, removing dead or diseased limbs, widening right-of-way (ROW) corridors, conducting ROW mowing, and performing whole tree removals as needed. Through this approach, illustrated in the figures below, PGE ensures that its vegetation management practices align with both safety regulations and ignition prevention goals.

Figure 110: C2 Pruning in Mt. Hood National Forest Pre and Post-Mitigation

8.5.6.2 FSPM Assessment Process

Prior to fire season, each HFRZ designated for FSPM undergoes patrol and mitigation activities during the AGP to identify and mitigate C1 and C3 vegetation, as described above. The goal of these activities is to identify and address any C1 vegetation, as well as any C3 re-growth that may jeopardize compliance with clearance specifications.

FSPM inspections extend beyond the ROW, surpassing the scope of inter-cycle inspections, and play a crucial role in identifying and mitigating *potential* vegetation-conductor contact to reduce long-term risk. Inspections conducted both on and off the ROW include comprehensive visual assessments.

Typically, FSPM inspections begin with a Level 1 visual assessment and progress to a Level 2 basic evaluation. Off-ROW inspections necessitate a Level 2 assessment to accurately assess the likelihood of tree and vegetation contact with assets. PGE crews also assess the suitability of these sites for alternative mitigation solutions such as mowing, herbicide application, tree replacement, and interventions requiring specialized equipment.

The inspection and mitigation cadences for the various AWRR operational periods are outlined in the table below.

Table 72: AWRR Inspection and Mitigation Cadence by Operational Period

AWRR Operational Period	Inspection or Mitigation	Cadence	Description
Inter-cycle Patrol	Inspection	Semi-annual	PGE AWRR inspectors identify C1, C2, & C3 vegetation inside HFRZs that is currently or will be outside of PGE specifications as defined in PGE's Vegetation Clearance Policy & Specifications as well as newly established vegetation that is not suitable for a given location. Inspectors verify compliance with vegetation clearance specifications and identify vegetation that has encroached on PGE assets since the previous inspection.
Inter-cycle Mitigation	Mitigation	2-year Cycle	Contract vegetation crews mitigate vegetation identified by AWRR inspectors by pruning vegetation and brush to PGE specifications and OAR Division 24 safety standards. Vegetation crews prioritize mitigation of C1 vegetation immediately, typically within 24 hours of identification. C2 vegetation is targeted for mitigation within one year of identification.
Full-scope Patrol	Inspection	Semi-annual	AWRR inspectors perform a comprehensive inspection within designated HFRZs to identify C1, C2, and C3 vegetation. Inspectors target specific sections of line identified through PGE's remote sensing that require more intensive clearance work, including increased side-clearance, overhang removal, selective removal of vegetation parts, expansion of ROW widths, ROW mowing, and whole vegetation removal.
Full-scope Mitigation	Mitigation	2-year Cycle	Under the direction of PGE AWRR inspectors, contract vegetation crews mitigate any C1, C2, and C3 vegetation. Crews also address areas identified by inspectors that may require more intensive clearance work, including increased side-clearance, overhang removal, selective removal of vegetation parts, expansion of ROW widths, ROW mowing, and whole vegetation removal. Due to the scale and logistics of C2 mitigation, some projects planned for a given year may carry over for completion in the subsequent year.
Active Growth Period Targeted Patrol + Mitigation (AGP)	Inspection + Mitigation	Annual	PGE inspectors patrol for vegetation that has grown to within six inches of the conductor or that may contact the conductor prior to the next mitigation cycle, targeting trees with annual growth increment demonstrating a fast growth rate due to environmental conditions or species characteristics. AGP crews target mitigation of C3 vegetation for completion before the beginning of PGE-declared fire season or within 48 hours of detection.

8.5.7 PATROL AND ASSESSMENT

8.5.7.1 Patrol Schedule

AWRR vegetation management patrols and mitigation activities are guided by regulatory requirements and the ISA Utility Tree Risk Assessment (UTRA) best management practices when assessing the potential risk of vegetation within a given HFRZ.[48]

In 2025, PGE inspectors will perform AGP patrols to identify and mitigate C1 and C3 vegetation. Additional patrols include C1, C2 and C3 vegetation within designated HFRZs. Refer to the table above for details regarding patrol and mitigation activities during AWRR's various operational periods.

8.5.7.2 Levels of Assessment

AWRR assessment levels are aligned with ISA standards for vegetation risk assessment. All assessments follow Level 1 and Level 2 procedures; a Level 3 assessment is only required if specifically requested by the forestry manager.

- **Level 1:** Limited Visual Assessment involves a quick, high-level inspection of trees from a specified vantage point, such as on foot, in a vehicle, or by aerial patrol. It aims to identify trees that pose high or extreme risk by focusing on large areas with minimal details recorded for each tree. Level 1 assessments can also help identify trees or areas that may require a more detailed Level 2 assessment.
- **Level 2:** Basic Assessment is a more thorough visual inspection of a tree and its surrounding environment. This involves walking around the tree to examine the site, above-ground roots, trunk, and branches, and may include the use of simple tools such as a mallet for sounding.
- **Level 3:** Advanced Assessment goes beyond the routine objectives of the AWRR program and is conducted only on an as-needed basis with input from subject matter experts. This level involves more intrusive methods, such as sonography and extraction of core samples. Level 3 assessments are typically performed when removal activities require a higher level of proof, such as for sensitive customers.

During patrols, PGE inspectors use the Level 1 process to assess each span, identifying vegetation that is at immediate risk of failure and contact with PGE assets, as well as conditions indicating decline or damage. Inspectors also look for vegetation that may encroach upon energized conductors before the next inspection or mitigation period.

When they detect concerning conditions such as decay, fungal fruiting bodies, or structural damage such as cracks or dead limbs, the inspector performs a more detailed Level 2 assessment and assigns the appropriate condition status. This process also incorporates site condition assessments, microclimatic factors, historical failure data, and remote sensing analysis. Level 2 assessments also look for trees that may be growing to encroach within the minimum clearance requirements or that

[48] Goodfellow, JW, *Best Management Practices: Utility Tree Risk Assessment* (ISA, 2020)

may otherwise pose a threat to overhead conductor due to trunk or branch failure within three years of inspection.

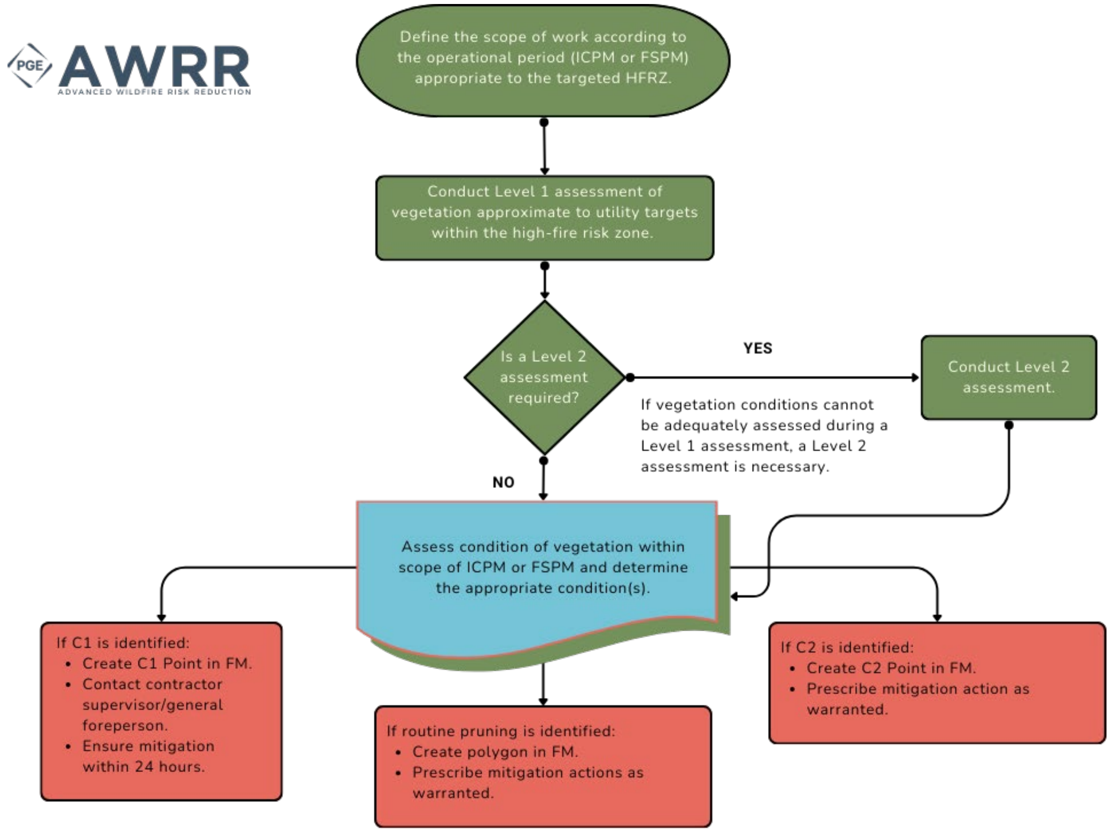


Figure 111: AWRR Work Layout Process for FSPM and ICPM

8.5.7.3 Forestry Risk Assessment

PGE's risk-based vegetation management strategy impacts how PGE inspects vegetation, assesses the likelihood of failure, and assigns corrective measures to prevent failure. The following section describes how PGE applies risk-informed decision-making in its day-to-day vegetation management program using ISA's risk assessment model and PGE's Condition-Based Tree Assessment (CBTA) described in Section 8.5.8.

Forestry Likelihood of Failure:

- **Improbable:** Very unlikely to fail within the next 12 months
- **Possible:** Could fail under specific conditions (e.g., severe storm)
- **Probable:** Likely to fail within the next 12 months
- **Imminent:** High risk of imminent failure

Forestry Consequence of Failure:

- **Low:** Minimal impact (e.g., no structures or people nearby)
- **Moderate:** Some impact (e.g., minor property damage)
- **High:** Significant impact (e.g., injury, major property damage)

Forestry Risk Rating:

- **Low risk:** Improbable/Possible + Low/Moderate consequence

- **Moderate risk:** Possible + Moderate consequence
- **High risk:** Probable/Imminent + High consequence

PGE combines the likelihood of tree failure with the likelihood that the failing tree will contact PGE infrastructure to predict the likelihood of tree failure to impact the target PGE asset, as shown in the table below. This information guides the forester in assessing likelihood of failure and consequence of failure to develop an overall risk rating, as shown in Tables 73 and 74, adapted from the ISA UTRA.[49]

Table 73: Forestry Likelihood of Failure Matrix

Likelihood of Failure	Likelihood of Impacting the Target			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Table 74: Forestry Risk Rating Matrix

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

8.5.8 VEGETATION CONDITIONS

To assist in the management of vegetation that may impact PGE's utility assets within a given HFRZ, PGE developed a Condition-Based Tree Assessment (CBTA) to categorize potential risks to people, property and/or utility assets.

This CBTA applies to vegetation observed in the normal course of field activities and should be used when crews note vegetation conditions that require mitigation. The approach used to address these conditions may vary based on the specific condition of the tree(s), proximity to the utility asset, and site location properties. Regardless of vegetation condition, mitigation practices associated with AWRR apply to any vegetation within striking distance of PGE electrical infrastructure.

[49] Goodfellow JW, *Best Management Practices: Utility Tree Risk Assessment* (ISA, 2020)

8.5.8.1 Imminent Hazard Condition 1 Vegetation (C1)

Imminent Hazard vegetation is located within an AWRR-delineated zone that poses an immediate public safety risk and exhibits a high likelihood of failure in the near future. C1 trees typically exhibit multiple defects, including some or all of the following characteristics:

- Presents an imminent likelihood of failure and a high likelihood of impacting PGE assets
- At risk of contact with utility assets within 24 hours due to severe weather conditions or other identified conditions such as:
  - Severe lean
  - Heaving and/or disturbed root area
  - Loss of structural integrity (e.g., fractures, cracks)

8.5.8.2 Probable Hazard Condition 2 Vegetation (C2)

Probable Hazard vegetation is any vegetation located within an AWRR-delineated zone that poses an increased failure potential but is not an immediate public safety concern. C2 vegetation exhibits the following characteristics:

- Hanging over utility assets or growing in such close proximity to utility assets that it creates an electrical hazard or poses a danger to a person working on or near the assets
- Diseased, dead, or dying
- Size, condition, and proximity to utility assets that it is expected to cause damage in the future

C2 vegetation may show signs of:

- Mortality (Dead/Dying)
- Structural Damage (e.g., fractures, cracks)
- Construction Damage (e.g., soil grade change, mechanical wounding)
- Abiotic Problems (e.g., pollution, herbicidal damage)
- Biotic Problems (e.g., insect damage, common fungal pathogens)

Structural defects and conditions that may lead to failure in C2 vegetation include, but are not limited to:

- Dead or dying parts
- Broken or hanging branches
- Longitudinal or transverse cracks
- Weak attachments or co-dominant stems (including bark, adventitious branches, multiple branching at one point, history of failure)
- Missing or decaying wood
- Sapwood decay or damage (including certain types of cankers, mechanical injury, animal feeding, and sapwood decay)

- Tree architecture issues (e.g., leans, bows, one-sided or unbalanced crown, live crown ratio, taper, overextended branches)
- Root problems

Soil and site conditions surrounding the tree can frequently offer insights into changes that may have damaged the root system or compromised soil strength as shown in the figure below.

Visual indicators of root/soil defects that may indicate reduced stability		
• Dead or missing roots	• Wounded roots	• Restricted root space
• Fungal fruiting structures	• Root cuts	• Soil erosion
• Lack of root flare	• Soil mounding or cracking	• Excessive soil moisture
• Stem-girdling roots	• Crown dieback or decline	• Adventitious roots
• Dead or loose bark		• Termite nests/mounds at tree base
Visual indicators of compensation that may increase stability		
• Wide root flare	• Fused root buttress	

Figure 112: Indicators of Root/Soil Defects[50]

8.5.8.3 **High Growth Rate Condition 3 Vegetation (C3)**

High Growth Rate vegetation exhibits the following characteristics:

- Not expected to sustain the required minimum clearance from the conductor during the pruning cycle due to fair or adverse weather conditions.
- Expected to grow within six inches of the conductor before the next inspection cycle [51]

C3 vegetation shows signs of high growth, including:

- Contacting the conductor
- High annual growth increment
- Environmental or site conditions that encourage vegetation to exceed normal growing increments (e.g., fertilizer application, irrigation, ideal site conditions, etc.).

8.5.9 MITIGATION TIMEFRAMES

PGE's AWRR program includes mitigation of identified vegetation conditions as shown in Table 75. Imminent hazards are addressed as quickly as possible pending safety considerations, including but not limited to extreme weather, access requirements, and the availability of specialized equipment.

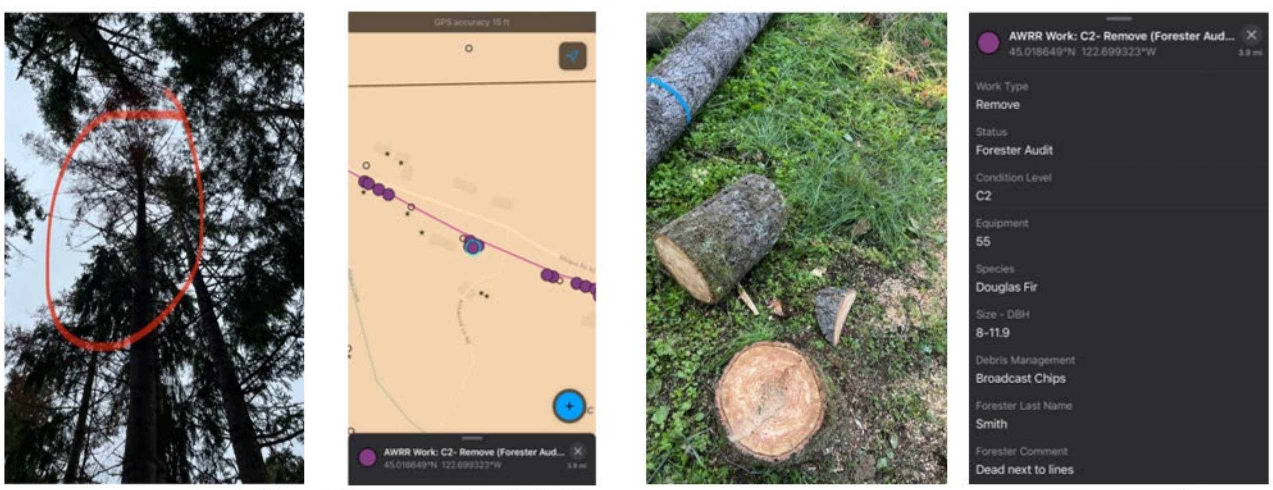
[50] Goodfellow JW, *Best Management Practices: Utility Tree Risk Assessment* (ISA, 2020)
[51] See OAR 860-024-0016(4)(c)(B) for additional information about intrusion of limited small branches and new tree growth.

Table 75 Vegetation Conditions and Correction Timeframes

Condition	AWRR Correction Timeframe	OAR Correction Timeframe	OAR
Imminent (C1)	Immediately (pending safety & equipment)	Immediately	860-024-0018(5)(a)
High Growth Potential (C3)	≤ 72 hours (before fire season)	≤ 180 days	860-024-0018(5)(b)
Probable (C2)	≤ 12 months	≤ 2 years	860-024-0018(5)(c)

8.5.10 AWRR Work Management

All vegetation work identified and prescribed for crews in the field is documented using AWRR's work management platform. This platform is used by PGE AWRR foresters, inspectors, vegetation contract managers, and crews to record information such as vegetation location, species, physical characteristics, condition, and the prescribed work, along with photos and any relevant customer or site details for the crew. Work identified by an AWRR inspector is assigned to a vegetation crew, reviewed by the vegetation supervisor, and audited by the AWRR forester to verify that it meets specifications (see figures below for details).



C2 Vegetation Identified
Dead fir is identified during patrol and a prescription for a C2 removal mitigation is documented in Field Maps.

Documented in Field Maps
A picture is uploaded and the location of the C2, work prescription, equipment needs, species information, and more are documented.

Crew Mitigates C2
Tree crew follows mitigation prescription and removes dead fir, documenting completion with a picture.

Forester Audit
Forester returns post-mitigation to audit the work and ensure compliance with program guidelines and completion of C2.

Figure 113: AWRR Work Management Example

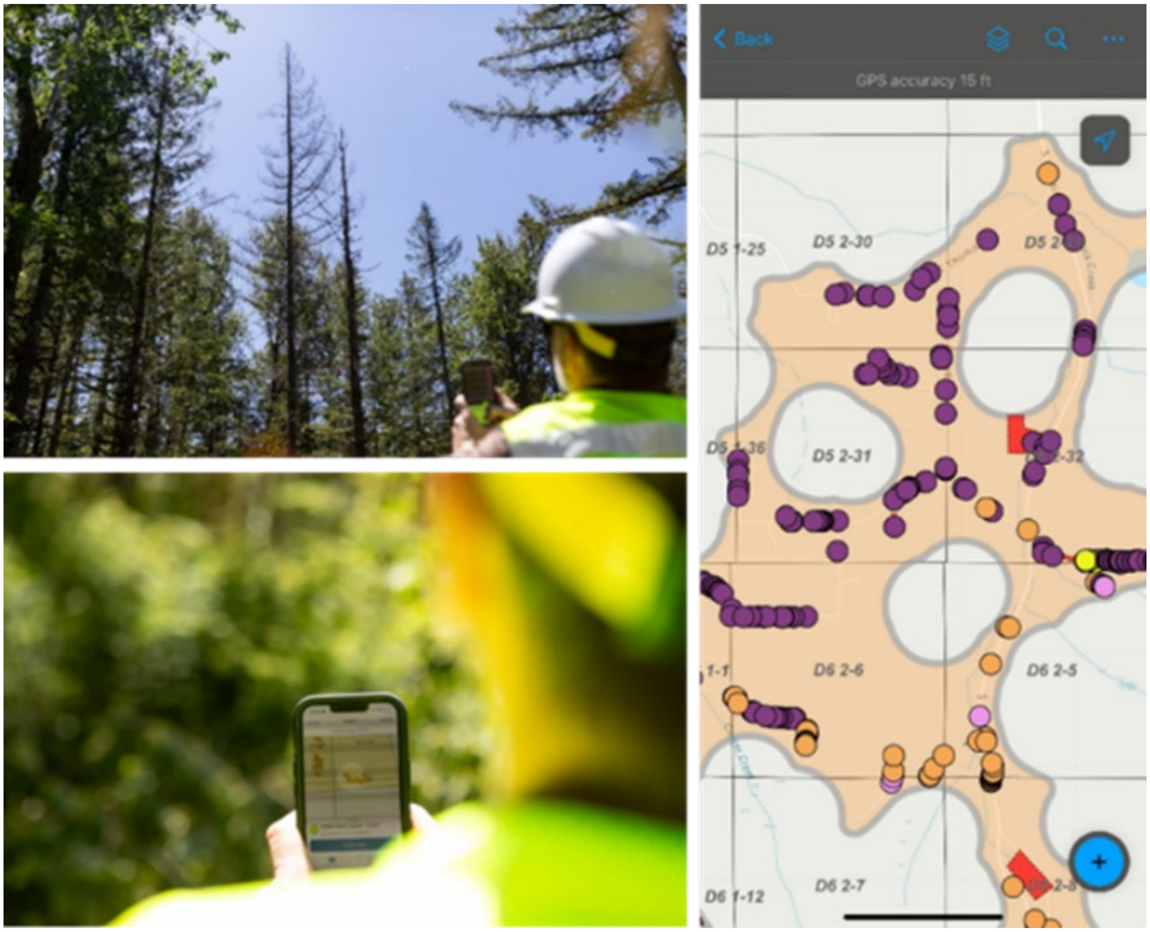


Figure 114: AWRR Work Management Mobile Platform Example

8.5.11 Tree Mitigation Prescriptions

8.5.11.1 Pruning

Vegetation clearances at the time of C2 pruning adhere to PGE specifications and OAR Division 24 safety standards, establishing a minimum distance of vegetation from energized assets to maximize public safety, prevent asset damage, and mitigate vegetation-caused ignition risks. However, pruning decisions are not constrained by specific measurements and are made based on the affected tree part(s), assessed risk level, and the prognosis of a long-term mitigation result.

Pruning procedures are prescriptive and consider the species of vegetation as well as regional and location-specific factors related to both tree and asset protection. Pruning procedures also reflect prevailing wind patterns, weather conditions, abiotic and biotic stressors, and proximity to people and property. C2 pruning extends the vegetation assessment beyond PGE's ROW and OAR Division 24 Standards, including the following advanced procedures as prescribed by foresters.

- **Reduction** involves manipulating the canopy height and/or length of tree parts such as competing leaders and branches. Pruning for reduction mitigates fall-in potential impact to assets.

- **Crown Reduction:** Remove structurally compromised leader(s)[52] and branches of the crown resulting in reduced tree height.
- **Branch Reduction:** Shorten laterally over-extended branches to limit oscillation, lever movement, and reduce branch weight.

▪ **Raise** involves the removal of branches and stems that are positioned in the lower canopy of a tree. Pruning to raise provides increased clearance from assets. The lower "shelf," or scaffold branches, of trees that are growing underneath the assets.

▪ **Cleaning** involves removing dead, hanging, or damaged branches from the canopy that have the potential to detach and/or fall from the tree and impact a utility asset.

Figure 115: Vegetation Structural Defect Mitigation (White Oak) Pre and Post-Mitigation

[52] Dominant vertical stem of a tree of decurrent growth habit, single stem of excurrent growth habit.

8.5.11.2 Removal

Trees that are dead, suppressed, in decline, and/or low vigor are assessed and, if necessary, removed to prevent tree failure impacts to assets. Trees that exhibit the following observed characteristics are considered more likely candidates for removal, depending on the circumstances:

- **Crown Ratio:** Live crown ratios of less than 33 percent may indicate a higher likelihood of tree/tree part failure.
- **Sweep or Bow Lead:** Bows with longitudinal cracks and/or limited corrective growth in response to bowing.
- **Lean:** Depending upon growth characteristics and species, Lean can indicate partial failure of the anchoring roots. Leans of greater than 25 percent are evaluated for removal.
- **Cracking:** Shear, torsional, and horizontal cracking in the major support stems and/or branches.
- **Decay:** Visible wounding and cavities that exceed approximately 50 percent stem circumference.
- **Pathogen:** Visible signs and symptoms of known pathogens and insects causing health decline and/or mortality.

Trees and vegetation identified for removal on private property will be scheduled following landowner discussion and/or presentation of formal notification documentation.

8.5.12 ALTERNATIVE MITIGATIONS

8.5.12.1 Mowing

Where feasible, PGE uses mowing to remove trees and vegetation greater than 8-inch diameter that are beneath assets and within the ROW. Vegetation less than 8-inch diameter is also removed and considered infill to reduce conductor contact and limit the accumulation of ground fuels. On private lands, this is accomplished where viable only after discussion with the landowner.

Figure 116: Mowing Mitigation (Heavily Vegetated Powerline Corridor), Pre and Post-Mitigation

8.5.12.2 Herbicide Treatment

Herbicide application within the HFRZ is conducted by an Oregon Department of Agriculture (ODA) licensed applicator. All applicable areas are treated, targeting fast-growing brush under 8 inches in height, unless restricted by property owner preferences or herbicide label guidelines.

8.6 Ignition Prevention Inspections

The following information is provided to supplement Section 8, Ignition Prevention Inspections, in PGE's 2024 WMP. PGE conducts annual Ignition Prevention Inspections within its HFRZs and in areas subject to heightened wildfire risk within PGE's ROW for generation and transmission assets located outside of PGE's service area in accordance with OAR 860-024-0018(3)(4). PGE inspects each supporting structure (pole or tower) within each HFRZ or area subject to heightened risk.

8.6.1 Inspection Types

The table below summarizes the list of inspection and correction programs PGE administers in accordance with Chapter 860, Division 024 Oregon Administrative Rules.

Table 76 : Inspect/Correct Programs Overview

Inspection Type	Data Table Inspection Type	OAR	Frequency and Scope	Objective
FITNES Overhead Inspection	Detailed Inspection	860-024-0011(1)(b)	Annual Inspection: 10-percent of overhead facilities per year	Identify violations of Commission Safety Rules + Pole Test and Treat

Inspection Type	Data Table Inspection Type	OAR	Frequency and Scope	Objective
Ignition Prevention Inspection	Ignition Prevention Inspection	860-024-0018(3) 860-024-0018(4)	Annual Inspection: HFRZs and PGE Generation and Transmission Outside the Service Territory	Identify potential sources of electrical ignition
Safety Patrol	Patrol Inspection	860-024-0011(2)(c)	Annual Inspection: 50-percent of overhead facilities per year	Identify hazards
Post Storm Patrol and Repair	Other Inspection	860-024-0010	As Needed: follows significant storm events	Identify hazards, material inventory, and material/debris removal

To avoid multiple inspections and lower costs, PGE includes inspection criteria from multiple requirements in a since inspection as shown in the figure below. If detailed 10-year FITNES inspections are conducted in an HFRZ, the schedule for both inspection and correction activities is accelerated to align with the Ignition Prevention Inspection timetables.

	Inspection Criteria				Resources
Inspection Type	FITNES Overhead Inspection (includes Pole Test & Treat)	Ignition Prevention Inspection	Safety Patrol	Post Storm Patrol and Repair	
FITNES Overhead Inspection	✓	✓	✓	✓	2-person crew to enable safe use of tools (including chemicals) and data collection*
Ignition Prevention Inspection		✓	✓	✓	2-person crew to enable safe use of tools, data collection, and 2-person corrections
Safety Patrol			✓	✓	Driver + Inspector
Post Storm Patrol and Repair				✓	Driver + Inspector

*Industry standard is to use 2-person crews for Pole Test & Treat. Inspection of lattice transmission towers are performed by PGE Patrolmen to satisfy the requirements of OAR 860-024-0011(1)(b).

Figure 117: Inspection Type vs. Inspection Criteria

8.6.2 INSPECTION FINDINGS & CORRECTION TIMEFRAMES

Inspections in HFRZs could result in findings associated with Ignition Prevention Inspection, FITNES Detailed Inspection, Safety Patrol, or Post-Storm Patrol conditions.

- Ignition Prevention Inspection findings in HFRZs are addressed as set forth in OAR 860-024-0018(5).
- Conditions outside an HFRZ as well as non-Ignition Prevention Inspection findings (e.g. FITNES or Post Storm) within an HFRZ are addressed as set forth by OAR 860-024-0012.

- Tree attachments located in HFRZs are governed by OAR 860-024-0018(2), which provides for a correction timeframe of no later than December 31, 2027.

Table 77: Inspection Findings and Correction Timeframes

Finding	Correction Timeframe	Data Table Metric Name	OAR	HFRZ OAR
Imminent	Immediately	Priority A findings	860-024-0012(1)	860-024-0018(5)(a)
Heightened	≤ 180 days	Ignition prevention findings	N/A	860-024-0018(5)(b)
Other	≤ 2 years	Priority B findings	860-024-0012(2)	860-024-0018(5)(c)
Tree Attachments	by 12/31/2027	Tree Attachments	N/A	860-024-0018(2)

8.6.3 Correction Adherence

Table 78 summarizes the 2024 Ignition Prevention conditions identified and corrected in HFRZs by classification through Q3. Full year data will be provided with the WMP Data Template Workbook submittal in March 2025. Heightened severity conditions and Tree Attachments in an HFRZ may have been identified through Ignition Prevention Inspection or detailed FITNES inspection. PGE has not exceeded any correction timeframes associated with conditions identified by the 2024 Ignition Prevention Inspections.

Table 78: 2024 Ignition Prevention Findings and Corrections

Severity	Correction Timeframe	PGE Conditions Identified	PGE Corrections	Outstanding PGE Corrections	Timeframe Adherence
Imminent	Immediately	23	23	0	100%
Heightened	≤ 180 days	4	3	1	100%
Other	≤ 2 years	3384	2874	510	100%
Tree Attachments	by 12/31/2027	19	5	14	N/A

8.7 Grid Planning and Design Standards

The following information is provided to supplement Section 10, System Hardening, in PGE's 2024 WMP. PGE continues to refine its construction documentation, standards, and associated requirements since the inception of Fire-Safe construction requirements in 2020. These updates include:

- Updated distribution framing and documentation
- Underground fuse cabinets
- Transformer cooling material updates
- Secondary Breakaway Services
- Early Fault Detection construction

The most recent updates build on a foundation of significant changes in PGE's construction standards in recent years. Initial changes in 2020 and 2021 included the addition of ductile iron pole replacement requirements within HFRZs. Fire-safe fuses (non-expulsion) have been required in PGE HFRZs since 2021, replacing both overhead tap cutouts and fuses and transformer cutouts and fuses. These replacements are required in all new and existing construction within PGE's HFRZs and are the foundation of PGE's fuse replacement program.

Distribution framing updates included validation of insulator strengths. Pin and post insulators required for tree wire (dielectric compatibility) were tested and validated at an EPRI research facility in Western Massachusetts, verifying some assumptions made by PGE engineers during overhead reconductor projects. Framing spacing requirements have also been updated, lowering the crossarm slightly and raising the center-phase bracket (sky pin), intending to shed small fronds and limbs more effectively over historic, flatter construction. The ability to shed limbs more effectively remains an assumption and has not been validated.

Underground construction of long, radial, terminal end circuits within PGE's HFRZs has also resulted in updates for both protection (fuse positions) and pad-mount transformer materials investigations. PGE continues to assess available construction materials with the goal of reducing risk within PGE's HFRZs while delivering safe, reliable electricity to customers.

The importance of highlighting this information is to convey that PGE continues to evolve in its Fire-Safe construction standards, adding, including, and adapting to new information available in the market. Ignition information, civil and electrical engineering technology changes, directed by data or root-cause analysis investigations drive this work as PGE continues to evolve proactively to meet safety and reliability requirements.

8.8 Well Water Research Findings

The following information is provided to detail the findings of PGE's new Well Water Research initiative PSPS-03 described in Section 4.

8.8.1 Portable Battery Back-Up

There are two primary obstacles to the use of portable batteries as a backup power supply for well pumps. First, most well pumps are hard-wired into the electrical panel, which means that the pump cannot simply be plugged into a portable power source. As a result, most homeowners must hire an electrician to install a transfer switch. The second issue is the size and voltage requirements necessary to operate the pump. PGE was able to identify the EcoFlow Delta Pro 3[53] as a portable battery system capable of powering a typical well pump and purchased a unit for testing purposes. This battery was selected because it is capable of operating at both 120 and 240 volts and has a capacity of 4,000 watts. The cost of the device to PGE was $3,199.

PGE, seeking to understand the full experience, including related expenses and other barriers, for customers interested in acquiring a backup power source for their wells, issued an internal request

[53] https://us.ecoflow.com/products/delta-pro-3-portable-power-station

for employees or customers willing to participate in a test of the portable battery system technology. The request sought to identify a customer or employee with a well who did not already have a transfer switch or existing back-up power source installed. A single employee agreed to volunteer, but changed their mind when the electrician told them that their electrical panel would have to be completely upgraded (estimated cost: $8k+) before the transfer switch could be installed (estimated cost: $2k).

PGE determined that the panel upgrade was out of scope for the demonstration, and was subsequently able to identify another employee who had a transfer switch already installed who was willing to test the battery system. The employee plugged the battery into the well pump and found that it ran the pump for its full cycle, resulting in an energy capacity reduction of 3 percent. After observing and developing estimates for surge power and constant power, PGE engineers estimated that the battery would be able to perform 20 pump cycles before it was depleted to a point where voltage drop could potentially damage the pump.

8.8.2 WHOLE-HOME BATTERY

The second option for backing up well pumps with a non-emitting battery is to install whole-home battery back-up. PGE identified an existing customer who was using a permanent battery back-up to support his well, and conducted an interview and site visit to gain a detailed understanding of the customer's experience.

Prior to installing the whole-home battery system, the customer reported experiencing a power outage during a family event, and the difficulty of not being able to flush toilets or access drinking water with dozens of guests present. The customer already had solar panels installed and was encouraged by his installer to invest in whole-home battery back-up that would serve the well pump as well as the rest of the home, rather than a portable generator, due to noise and environmental concerns.

To accommodate the surge power draw of a well pump, two 5 kW batteries were installed in the customer's garage. PGE estimates the cost for the two installed batteries at $25,000-$30,000. The customer has not reported having any extended power outages since installing the batteries, but with careful energy usage and the large solar array able to recharge the battery, PGE believes that the customer will be well-protected in the event of a PSPS or other power outage.

Figure 118: Battery Energy Storage and Solar for Well Water Backup

8.8.3 TEMPORARY WATER SOLUTIONS

PGE also conducted interviews with well pump installers and repair providers, to develop and demonstrate a temporary customer water supply solution capable of maintaining the customer's water supply during a power outage without the heavy expense associated with portable or whole-home battery backup solutions. Portable water pumps are commonly used during maintenance and repair event for customers with wells, but these temporary pumps, used to move water at pressure from a storage tank into the home, must be plugged into a home outlet. During an outage event, a small battery and solar panel could supply the power required to enable this solution.

PGE commissioned a service provider to create a prototype low-cost temporary water solution. Components included a 500 gallon opaque water tank, a pump and expansion tank, portable battery, and portable solar panel. The scenario envisioned by PGE was that, prior to a PSPS event, customers would call the service provider, would connect the temporary water solution to the customer's home. The customer would fill the 500 gallon tank with their own water prior to the PSPS start.

Once the outage begins, the customer would open the connection valve, allowing the water to flow into their home with the help of the pressure pump switch and portable battery. With water conservation, this solution would provide a multi-day customer water supply, enough potentially to last through a multi-day PSPS event (though a water truck could refill the holding tank as well).

Following a successful test of the prototype (shown in the figure below), the well service provider installed the solution at their own home and conducted a real-world test with their own family. The service provider reported that the temporary solution worked "better than expected" during the simulated outage – they were able to shower, flush toilets, and utilize domestic water as they normally would, with no significant impacts to water quality or pressure. The only problem reported was a pressure reduction when the system was stress-tested by multiple faucets running at the same time.

The service provider reported that his family of four used 340 gallons of water over a weekend, using no conservation measures, even running washing machines. The real-world test demonstrated that, for customers practicing conservation measures, this solution could maintain an adequate water supply through a multi-day PSPS, without the need for tank refill by truck.

Figure 119: Temporary Water Solution Prototype

Appendix A: Outreach and Engagement Events Attended by PGE Staff

Date	Event Name	Location
March 13, 2024	Mount Hood Corridor Wildfire Partnership (MHCWP) Monthly Meeting	Welches, OR
April 10, 2024	MHCWP Monthly Meeting	Welches, OR
April 11, 2024	Multnomah County Community Wildfire Protection Plan Meeting	Portland, OR
April 17, 2024	Bull Run Pre-Season Meeting	Sandy, OR
April 27-28, 2024	Wildfire Preparedness Weekend	Portland, OR
May 1, 2024	City of Sheridan Wildfire Meeting	Sheridan, OR
May 11, 2024	Government Camp CPO Meeting	Government Camp, OR
May 8, 2024	MHCWP Monthly Meeting	Welches, OR
May 19, 2024	Wildfire Ready Mt Hood Homeowners Workshop	Welches, OR
May 29, 2024	PGE Wildfire Ready	Oregon City, OR
May 31, 2024	Forest Heights Spring Safety Festival	Portland, OR
June 4, 2024	Marion County Commission Meeting	Salem, OR
June 4, 2024	PGE Wildfire Ready	Virtual
June 5, 2024	PGE Wildfire Ready	Banks, OR
June 6, 2024	Wildfire Preparedness Partner Coordination	Oregon City, OR
June 8, 2024	PGE Wildfire Ready	Salem, OR
June 11, 2024	PGE Wildfire Ready	Corbett, OR
June 12, 2024	PGE Wildfire Ready	Virtual
June 22, 2024	Tualatin Soil and Water Conservation District's Wildfire Ready	Gaston, OR
June 27, 2024	Mt Hood National Forest Partnership on Every Forest	Virtual
July 10, 2024	MHCWP Monthly Meeting	Welches, OR
July 13, 2024	Silverton Emergency Preparedness Fair	Silverton, OR
August 1, 2024	Hoodland CPO	Welches, OR
August 7, 2024	Harborton Reliability Project Community Meeting	Portland, OR
August 14, 2024	Mount Hood Corridor Wildfire Partnership (MHCWP) Monthly Meeting	Welches, OR
September 5, 2024	Lake Oswego Emergency Preparedness Fair	Lake Oswego, OR
September 7, 2024	Wilsonville Safety Fair	Wilsonville, OR
September 11, 2024	MHCWP Monthly Meeting	Welches, OR
September 11-12, 2024	Washington County and Clean Water Services Employee Safety Fair	Hillsboro, OR
September 14, 2024	Clackamas Fire District Hilltop Health & Safety Fair	Oregon City, OR

Date	Event Name	Location
September 20, 2024	PGE Workshop with Grand Ronde	Grand Ronde, OR
September 23, 2024	Emergency Response Training	Gresham, OR
September 24, 2024	Harborton Reliability Project Community Meeting	Portland, OR

Appendix B: 2024 PGE Wildfire Ready Event Summary

Overview and Introduction

Between May 29th and June 12th, PGE hosted six Wildfire Ready public events, two online and four in-person, to present aspects of PGE's 2024 Wildfire Mitigation Plan to residential customers and the public throughout four service areas in Oregon: Oregon City, Banks, South Salem and Corbett. Community members could have one-on-one conversations with PGE wildfire subject matter experts, staff and local community partners in hopes of better preparedness in case of a wildfire or public safety power shut-off.

A total of 83 people participated in person and 65 in online meetings, totaling 148 attendees.

Meeting Goals

- Throughout this public outreach, PGE was committed to sharing information and gathering input on future wildfire mitigation planning considerations. Goals for the public events included:
- Share how PGE wildfire mitigation strategies can help reduce the devastation caused by wildfires.
- Build a broader understanding of the methodologies for wildfire prevention.
- Provide resources for individuals, families and the community to learn about wildfire prevention and ways to be prepared.

Methodology

PGE hosted four in-person open house events in the following service areas:

1. Oregon City on May 29, 2024, at Oregon City Public Library (28 attended)
2. Banks on June 5, 2024, at Banks Public Library (19 attended)
3. South Salem on June 8, 2024, at Leslie Middle School (3 attended)
4. Corbett on June 11, 2024, at Corbett High School (33 attended)

The in-person open houses were drop-in events that presented aspects of the Wildfire Mitigation Plan and other related topics on display boards and at tables. An overview video of the plan was presented on a large monitor. PGE partners were invited to share information about their fire prevention programs and ways community members can be proactive.

After speaking with PGE experts at display tables and PGE partner booths, attendees were encouraged to complete a feedback survey (provided with a physical copy or through the online link).

In addition, PGE hosted two online meetings on Zoom on the following dates:

- June 4th from 11:00 am – 12:00 pm (33 attended)
- June 12th from 5:00 pm – 6:00 pm (32 attended)

The online meetings began with a high-level overview of PGE's Wildfire Mitigation Plan, presented by PGE Wildfire Mitigation team members. Following the overview presentation, participants were encouraged to join break-out rooms to ask questions directed at PGE's subject matter experts. All meetings provided Spanish and ASL interpretation.

Presentation Materials and Event Stations

PGE provided several opportunities at each meeting for the public to learn about the Wildfire Mitigation Plan, Community Resource Centers and public safety power shutoffs, including considerations, trends, and communications.

At the in-person events, display board stations presented information on the following topics:

- Display #1: Advanced Wildfire Risk Reduction
- Display #2: Public Safety Power Shutoff (PSPS)1
- Display #3: Community Resource Centers (CRC)
- Display #4: Situational Awareness
- Display #5: 5 Steps of a PSPS event
- Display #6: Battery Backup (full size poster and half sized)
- Display #7: Potential PSPS Area Map
- Display #8: PGE AI Camera Map Displays
- Display #9: Wildfire Mitigation Plan Projects

A video was developed to provide an overview at the in-person open houses, including highlights of the PGE Wildfire Mitigation plan. The footage shared information on steps PGE takes to reduce wildfire risks, including system hardening investments, expanded tree and brush clearing, operational changes, situational awareness, Public Safety Power Shutoff (PSPS) and what residents can do today to prepare for wildfires.

Watch the overview video here.

All events included Spanish-language and ASL interpretation.

All events included pizza from locally owned restaurants.

Promotion

PGE's communication team advertised the six Wildfire Ready public meetings to residential customers and community members in service areas through:

- An insert in the PGE Bill
- Community partner who participated in the event
- PGE Customer Newsletter
- PGE email
- PGE Social Media and Webpage

Many survey respondents mentioned hearing about these events from an insert in the PGE bill, PGE emails, social media, and community partners who participated in the event. Other ways mentioned included the Banks Post newspaper and the local library's social media.

Overall Feedback Themes

- Attendees expressed interest in learning more about the displays, such as the PSPS alerts and notifications.
- Several attendees expressed interest in generators and portable batteries. Specifically, their use, pricing and ways to make them more affordable.
- Rural community members were worried about how they'd function in the case of a PSPS event.

- Several people expressed concerns that a PSPS event can impact their business or animals that rely on water.
- There were many questions about yard maintenance and ways to reduce fire risk on private properties.
- Several attendees said they liked the event food selection from local businesses.

The most-attended events were online and in-person meetings in Oregon City and Corbett.

- Attendees liked the events and appreciated PGE's hard work putting them together. They enjoyed learning more about wildfire preparedness, connecting with PGE staff, and walked away feeling more confident in PGE.
- Attendees appreciated all the helpful tips and were grateful the staff at the event were kind and knowledgeable.
- Community partners were grateful for the opportunity to connect with one another and with PGE. However, there was some disappointment around the turnout. Many partners suggested that PGE could partner with existing events that are popular in the community already.

Online Meeting #1 Highlights

The first online meeting was on June 4th, 2024, from 11:00 a.m. to 12:00 p.m. The Zoom webinar was held in the afternoon for PGE customers who could attend during midday or lunch breaks. 33 people attended, participated in the break-out conversations and engaged in the chat. This webinar was staffed by 12 PGE wildfire subject matter experts, one Spanish-language interpreter, one ASL interpreter, and three staff members from JLA who assisted with meeting facilitation and logistics.

Questions and Feedback:

- Attendees asked PGE staff what the upcoming wildfire season might look like and how it might compare to last year's wildfire season.
- Attendees asked for resources regarding brush, tree, and vegetation management in threatened areas.
- One attendee asked for a recording of the webinar because they joined late.
- A PGE staff reported technical issues with entering and leaving the breakout rooms.

Online Meeting #2 Highlights

The second online meeting was on June 12th, 2024, from 5:00 pm – 6:00 pm. The Zoom webinar was held in the evening for PGE customers that work a more traditional work schedule. 32 people attended, participated in the break-out conversations, and engaged in the chat. This webinar was staffed by eight PGE wildfire subject matter experts, one Spanish-language interpreter, one ASL interpreter and three staff members from JLA who assisted with meeting facilitation and logistics.

Questions and Feedback eOne attendee asked about tree and vegetation management (pine trees) and potential subsidies available because cost is the main prohibitive to remove them.

- JLA and PGE staff experienced some Zoom limitations.
- Attendees were most interested in the infrastructure breakout room.
- Near the end of both online meetings, all attendees were provided with an a PGE email (wildfire@portlandgeneral.com) to send any additional questions, a survey link, PGE's wildfire webpage, information to sign up for emergency alerts on their county through Public Alerts and

additional resources including National Fire Protection Association, the American Red Cross, Oregon Wildfire Response, Ready.gov and 211info.

- The recorded Zoom webinars and closed captions are available to attendees upon request.
- See recorded Zoom meetings here:
- June 4: PGE Online Wildfire Ready Event – June 4, 2024 on Vimeo
- June 12: PGE Online Wildfire Ready Event - June 12, 2024 on Vimeo

Oregon City Meeting Summary

The first in-person open house meeting was held on May 29, 2024, at Oregon City Public Library's Community Room from 4:00 to 6:00 p.m. The open house was held in the evening for PGE customers and community members in wildfire-threatened areas closest to Oregon City. Approximately 28 people attended. This event was staffed by 14 PGE wildfire subject matter experts, one Spanish-language interpreter, one ASL interpreter, and four staff members from JLA who assisted with event logistics.

The following PGE local partners shared information about the wildfire mitigation programs:

- Clackamas County Disaster Management
- Clackamas Fire Department
- Clackamas River Basin Council
- ODHS Office of Resilience and Emergency Management (OREM)
- Oregon Department of Forestry
- Oregon State Fire Marshal
- US Forest Service

Feedback

Five completed surveys were submitted to PGE at this event. Responses highlighted from these surveys include:

- Request for an Oregon Humane Society representative at future events to address questions about pets and farm animals in the case of wildfire excavation.
- Attendees reported feeling "peace of mind" learning about the situational awareness projects in place to detect wildfires near them.
- Learning something new to prepare for wildfire season, such as screening house vents.

Banks Meeting Summary

Figure 120: Image From Banks Open House

The second in-person open house meeting was held on June 5, 2024, at Banks Public Library's Jane Moore Community Room from 5 – 7 pm. The open house was held in the evening for PGE customers and community members in the Banks community and nearby wildfire-threatened areas. Approximately 19 people attended. This event was staffed by nine PGE wildfire subject matter experts, one Spanish-language interpreter, one ASL interpreter and three staff members from JLA who assisted with event logistics.

The following PGE local partners shared information about the wildfire mitigation programs:

- American Red Cross
- Banks Fire Department
- ODHS Office of Resilience and Emergency Management (OREM)
- Oregon State Fire Marshal
- Washington County

Feedback

A total of 7 surveys were submitted to PGE at this event. Responses from these surveys include:

- Several individuals rated themselves as "high" in feeling more confident after attending the Wildfire Ready event and learning about how PGE is developing new initiatives.
- A community member shared that their residential home is 8 miles west of Banks, but, unfortunately, their power source is 26 miles away in Vernonia (under West Oregon Electric). They are not confident in WOE and wish for better infrastructure and more reliable power throughout the year, including during wildfire season.
- Many found the event to be "very informational," "friendly," and "knowledgeable." They wanted to learn more about the detection cameras and other wildfire alert technologies being developed at PGE.

South Salem Meeting Summary

Figure 121: Image from Salem Open House

The third in-person open house meeting was held on June 8, 2024, at South Salem's Leslie Middle School Gym from 11 a.m. to 1 p.m. It was intended for PGE customers and community members living in Salem and service areas closest to Salem. A total of 3 people attended. This event was staffed by eight PGE wildfire subject matter experts, one Spanish-language interpreter, one ASL interpreter, and three staff members from JLA who assisted with event logistics.

The following PGE local partners shared information about the wildfire mitigation programs:

- American Red Cross
- ODHS Office of Resilience and Emergency Management (OREM)
- Oregon State Fire Marshal
- Salem Fire Department

Feedback

A total of 3 surveys were submitted to PGE at this event. All three attendees provided responses that included:

- Customers shared they "acquired good information," "folks were helpful, knowledgeable, and easy to talk to!"
- Rated high in feeling more confident after attending the Wildfire Ready event and request PGE continue to put on these events.
- Shared that they learned something new about preparing for wildfire season, such as making e-kits and checking emergency supplies.
- Not related to wildfire but attendees shared they'd like PGE to share more on ice storm resources as well.

Corbett Meeting Summary

Figure 122: Images from Corbett Open House

The fourth in-person open house meeting was held on June 11, 2024, at Corbett High School's Gym from 5 to 7 p.m. The open house was held in the evening for PGE customers and community members in the Corbett community and nearby wildfire-threatened areas. Approximately 33 people attended. This event was staffed by 10 PGE wildfire subject matter experts, one Spanish-language interpreter, one ASL interpreter and three staff members from JLA who assisted with event logistics.

The following PGE local partners shared information about the wildfire mitigation programs: Mt Hood Corridor Wildfire Partnership

- Corbett Fire Department
- Corbett Firewise
- ODHS Office of Resilience and Emergency Management
- US Forest Service
- Multnomah County Emergency Management
- American Red Cross
- ODF

Feedback

A total of six surveys were submitted to PGE at this event. They included the following feedback themes:

- A residential customer expressed concern regarding the conversation surrounding buried, and several other customers showed support for burying powerlines in the Corbett area to limit lengthy power outages.
- Several participants rated themselves high in feeling more confident about being prepared for a wildfire after attending the Wildfire Ready event and having a plan, such as a backup power supply (generator).
- PGE to provide more wildfire communication through app push notifications or text. Attendees would like PGE to provide plans on how PGE will avoid or prevent more power outages in the community and service area.

Appendix C: Significant Risk Model Updates 10% Change Maps

The following maps highlight, for each step in the WRMA process, protected sections with a 10% or greater change in risk. Changes shown represent a combination of reductions and increases in risk. Impacts to PGE's 2025 WMP Update are discussed in Section 3, Significant Risk Model Updates.

Step 1: Asset Review Input Updates

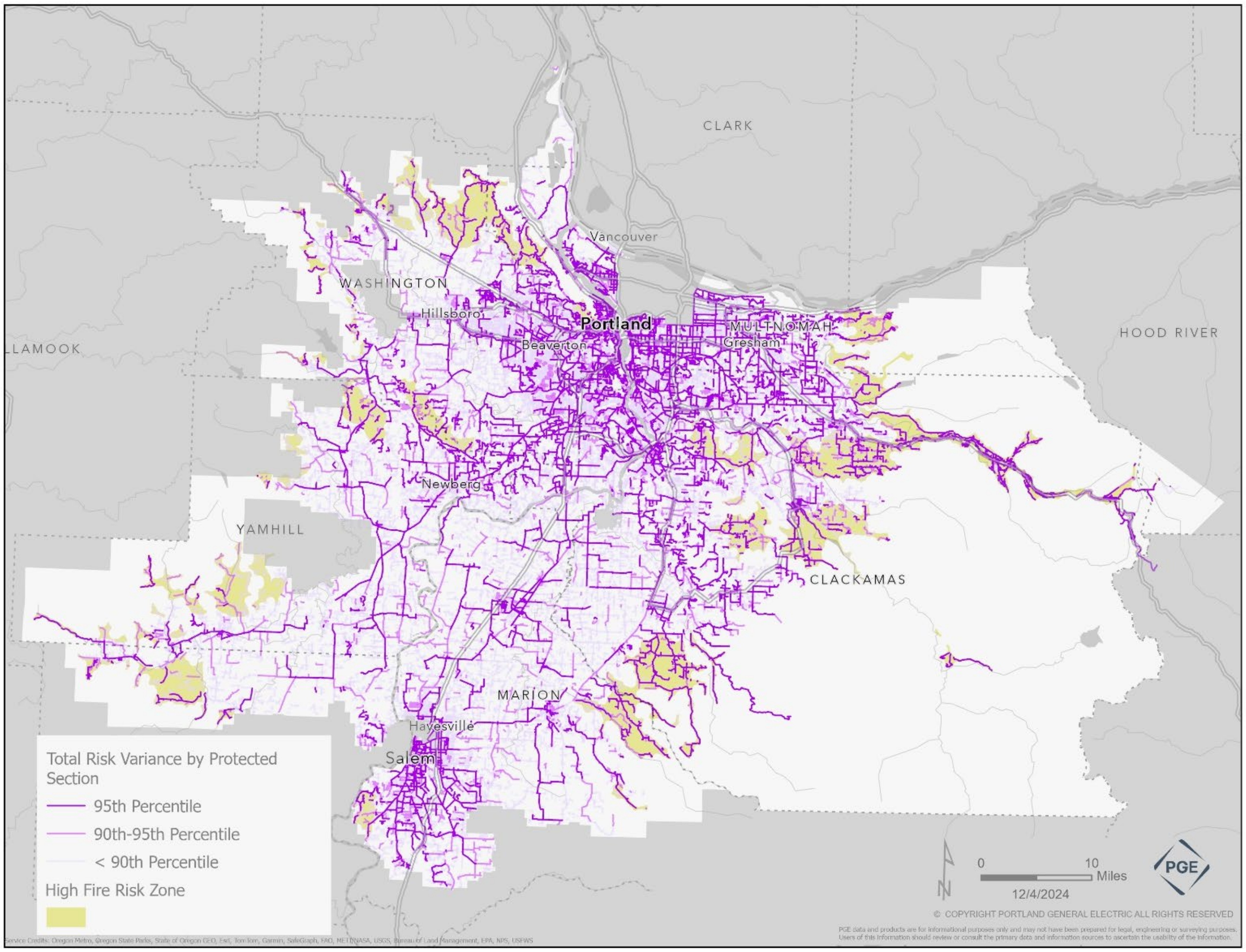


Figure 123: Risk Protected Sections Change >= 10% 2024 to 2025

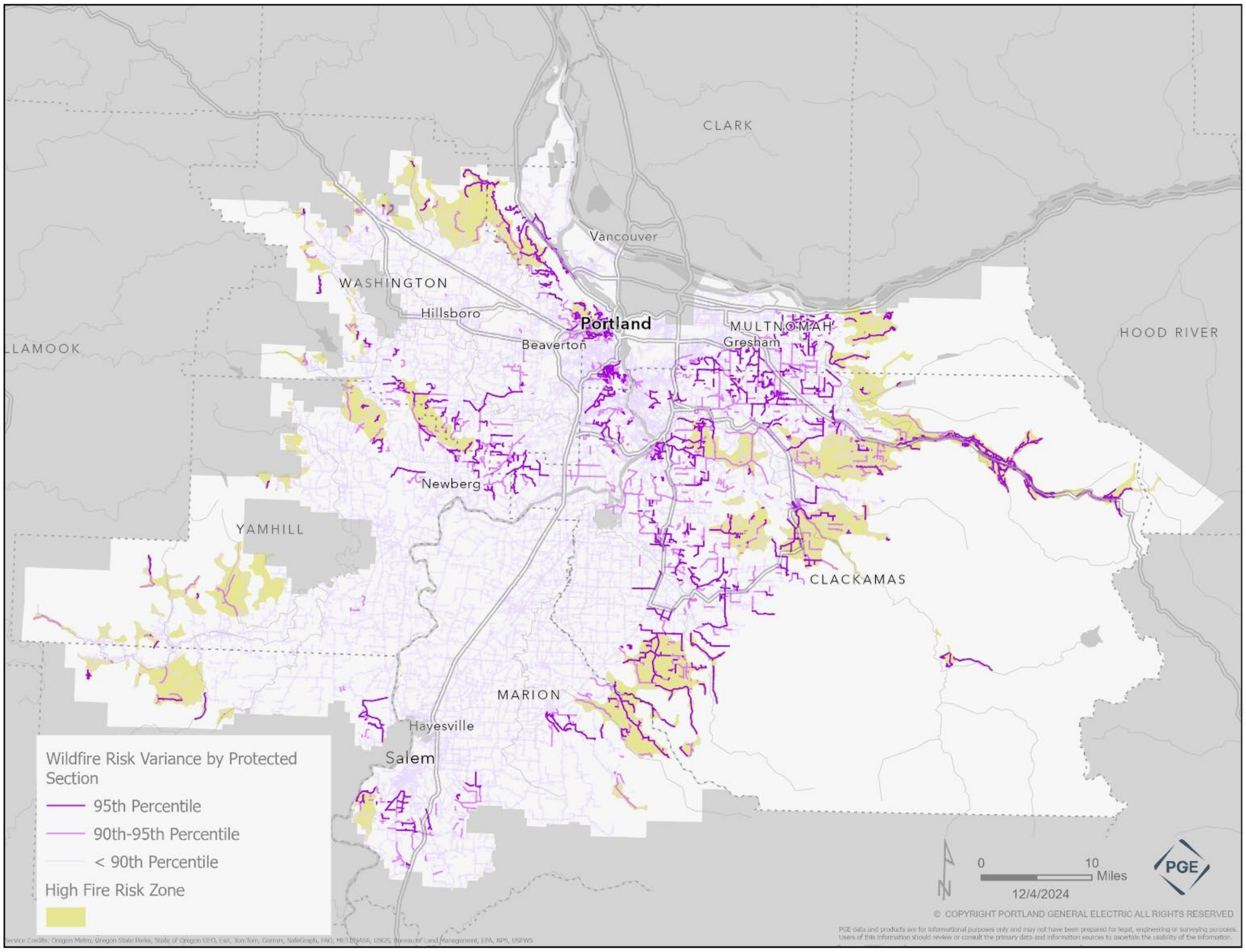


Figure 124: Wildfire Risk Protected Sections with Change >= 10% 2024 to 2025

Step 1: Asset Review Methodology Update

See Section 3.3.4

Step 2: Climate Change Impacts

See Section 3.5.3

Step 3: Fire Behavior Model Updates

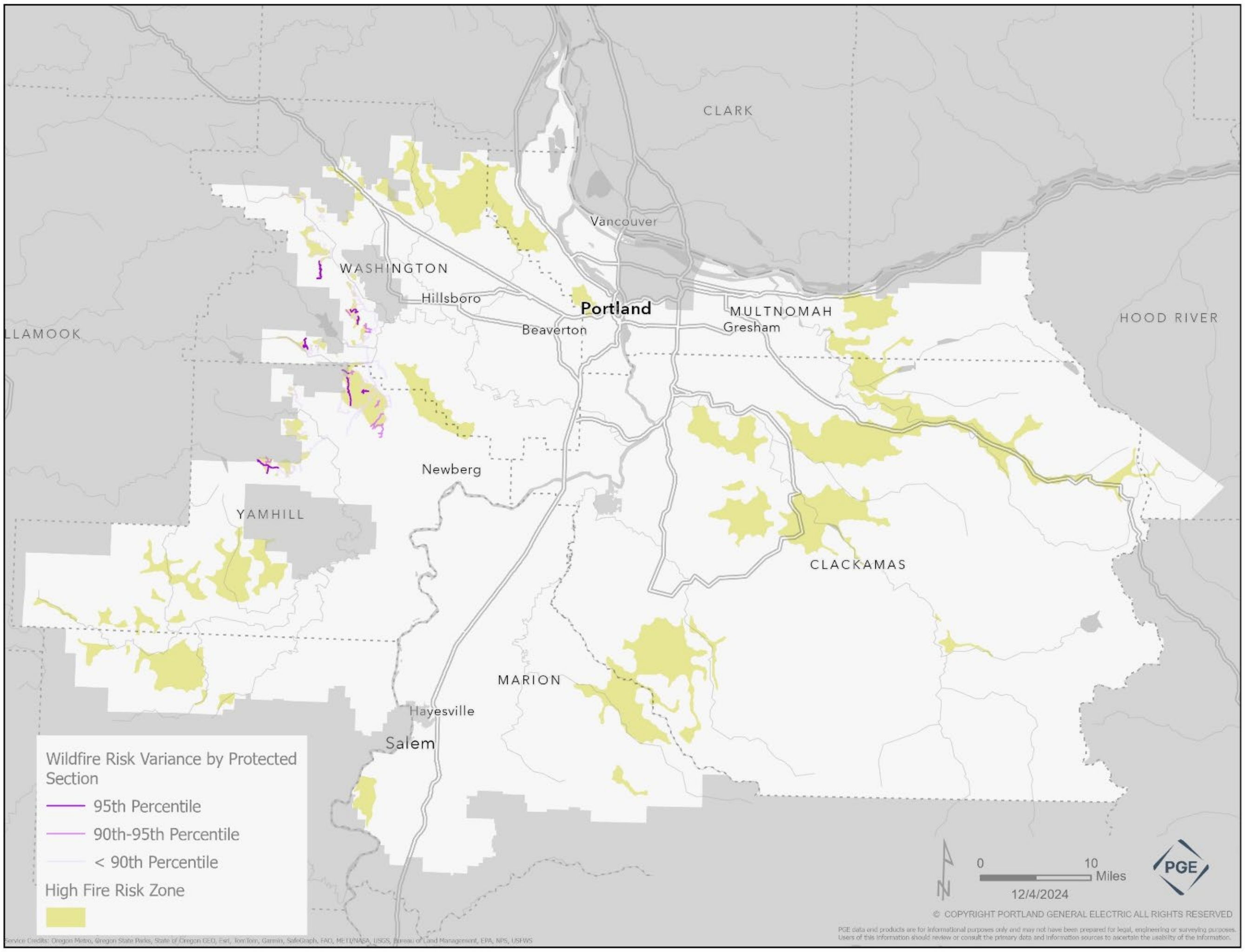


Figure 125: Wildfire Risk Protected Sections with Change >= 10% Zone Multiplier Applied

Step 4: Consequences Adjustments

There were no consequence adjustments impacting protected section risk by 10 percent or more.

Step 5: Baseline Risk

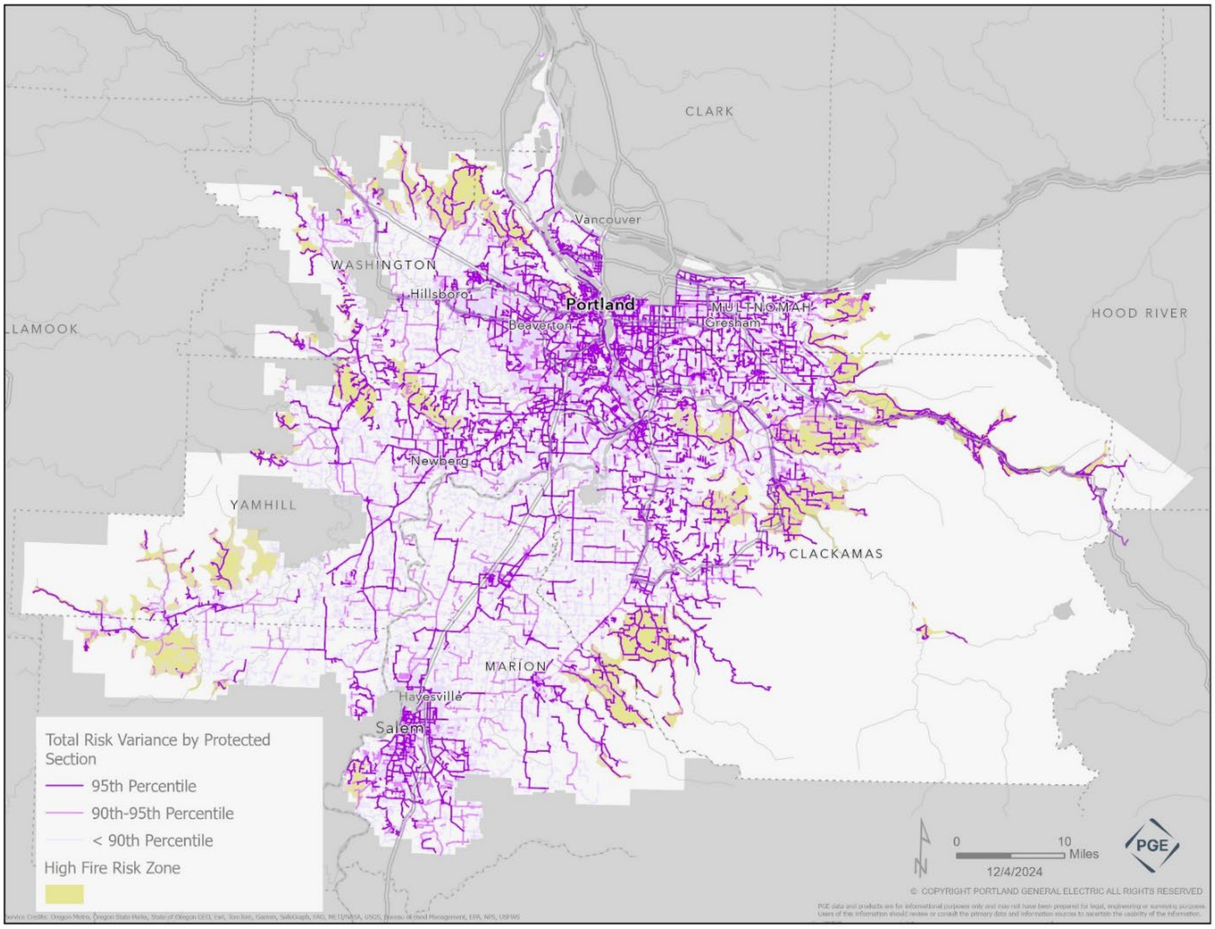


Figure 126: Total Risk Protected Sections with Change >= 10% 2024 to 2025

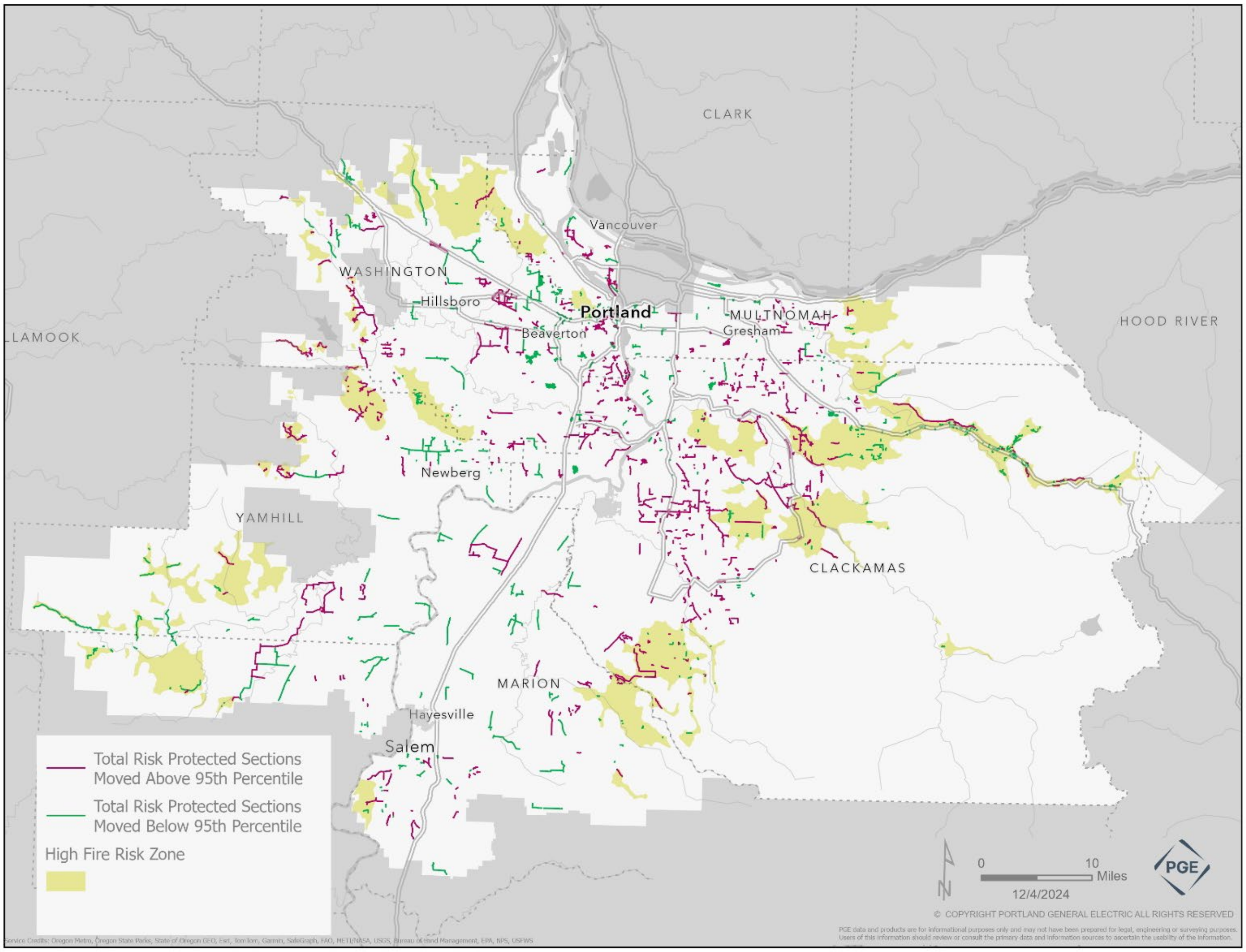


Figure 127: Total Risk 95th Percentile Protected Section Movement 2024 to 2025

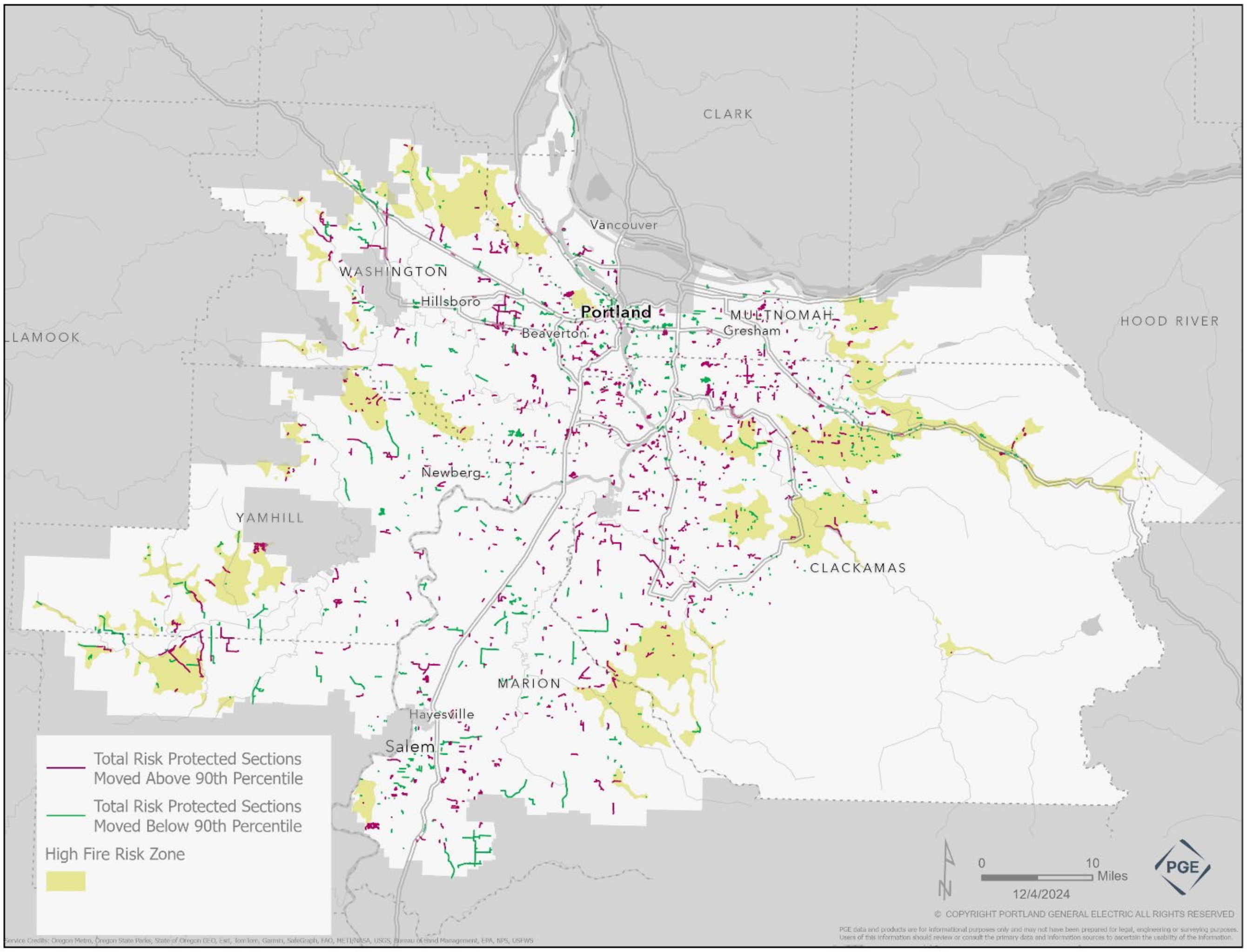


Figure 128: Total Risk 90th Percentile Protected Section Movement 2024 to 2025

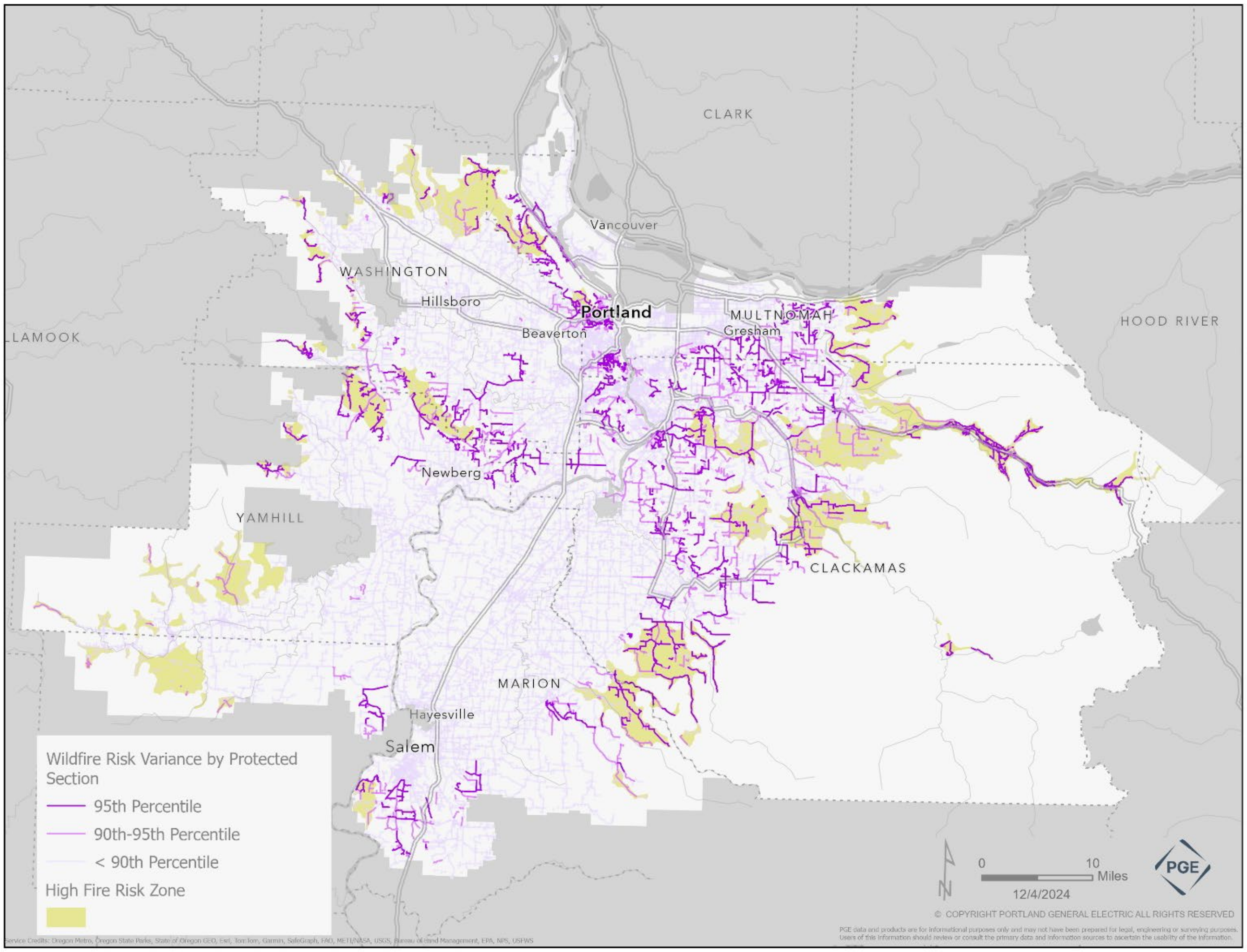


Figure 129: Wildfire Risk Protected Sections with Change >= 10% 2024 to 2025

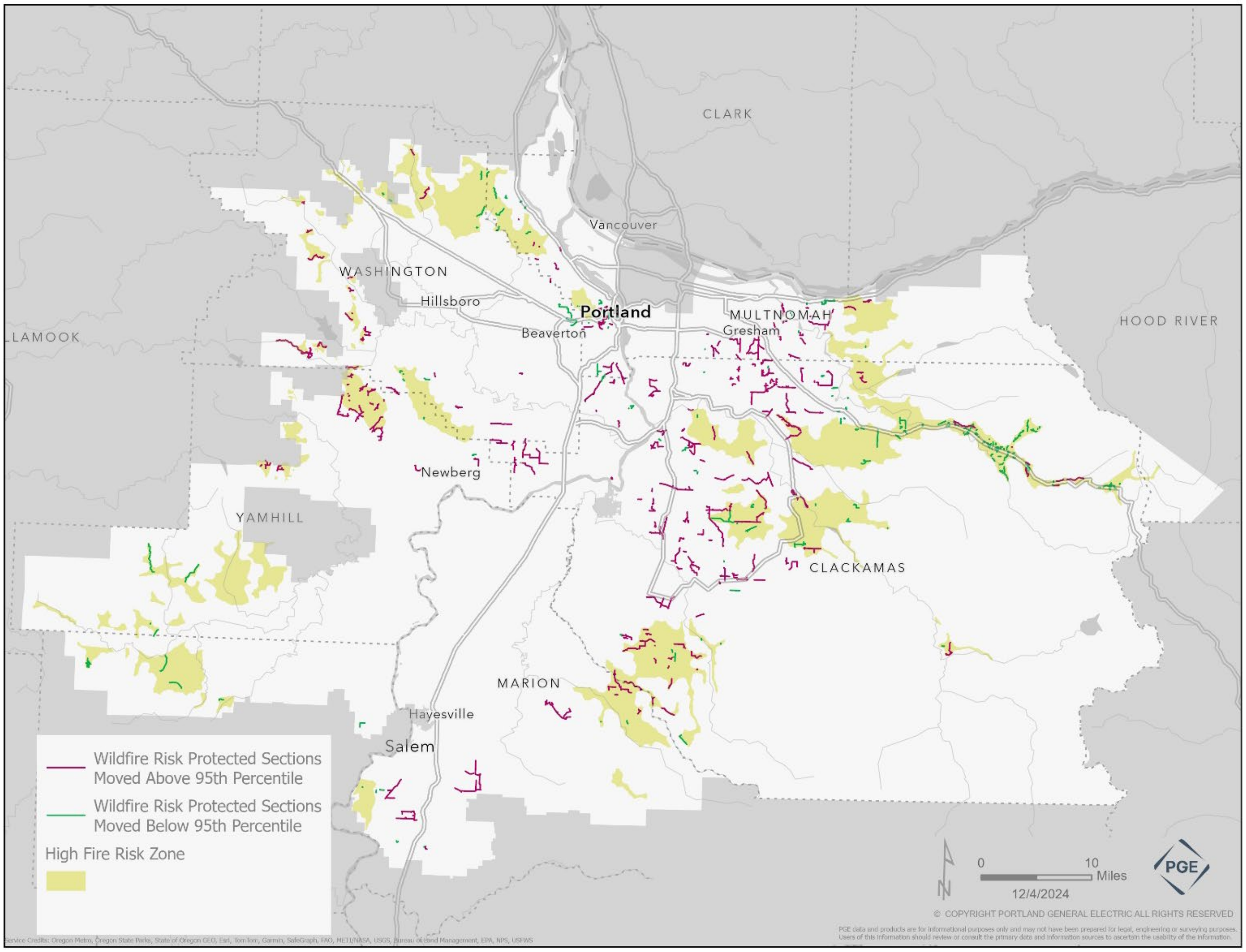


Figure 130: Wildfire Risk 95th Percentile Protected Section Movement 2024 to 2025

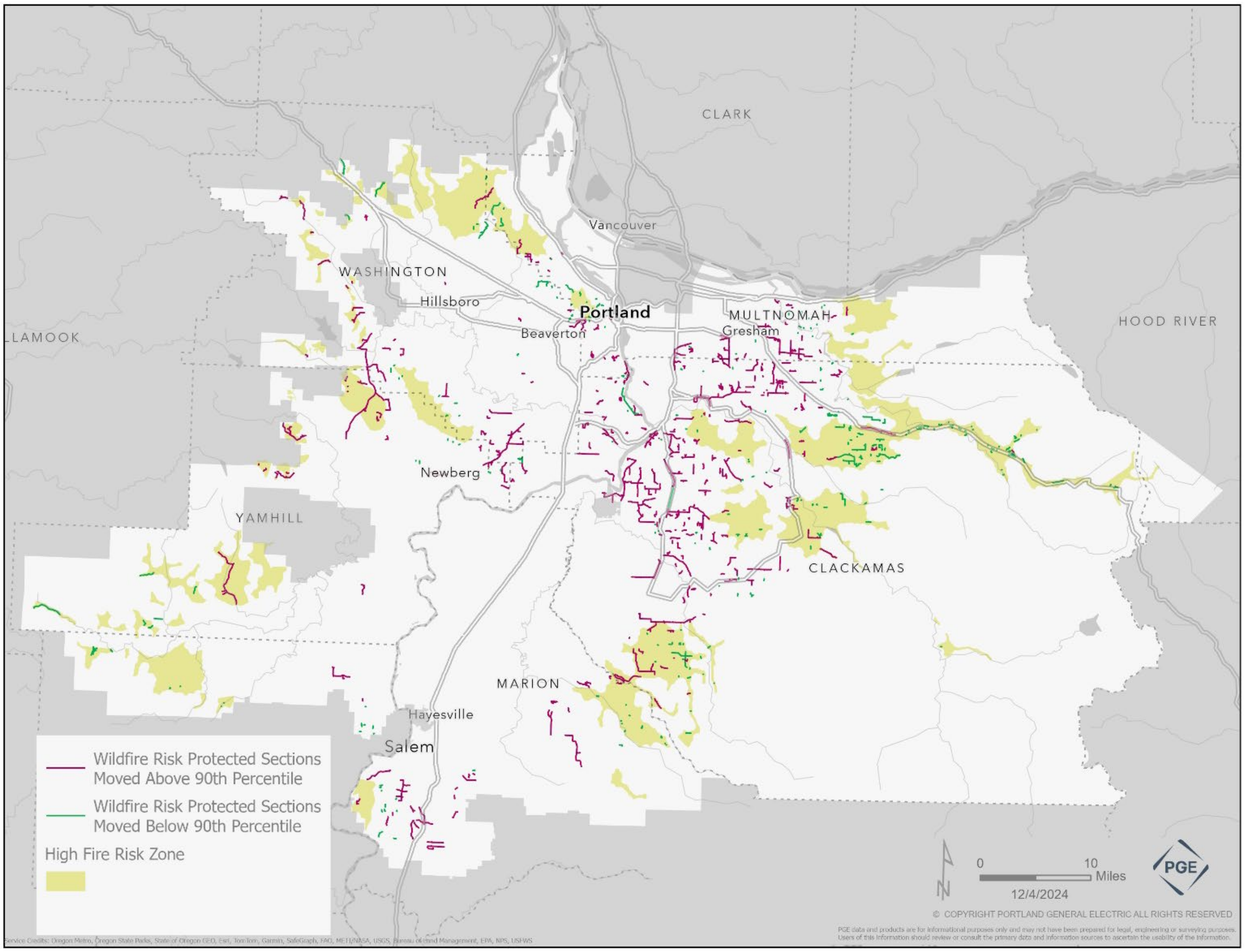


Figure 131: Wildfire Risk 90th Percentile Protected Section Movement 2024 to 2025

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