2024 WILDFIRE MITIGATION PLAN

DATE: October, 2024

PROJECT: SKPUD23-001

REVISION: V2

BKI
BROWN & KYSAR, INC.

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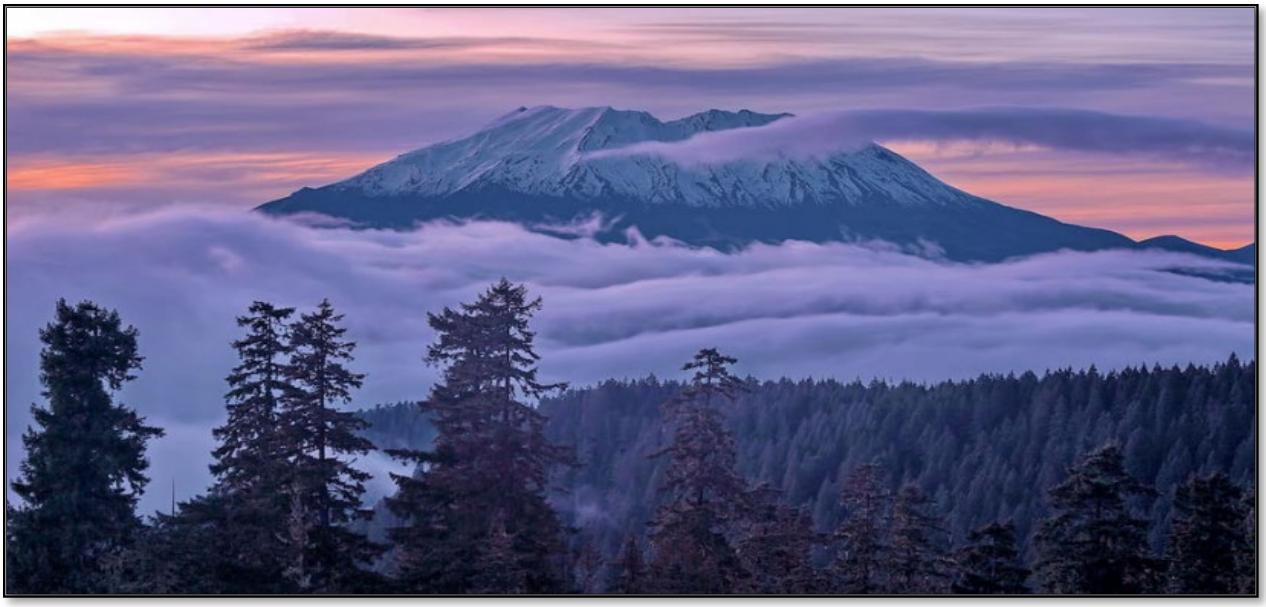

1 Executive Summary

Unusually large wildfires are on the rise in the Pacific Northwest, with an increase in fires in west-side conifer forests. The annual probability of very large fires is projected to increase by a factor of 4 in 2041-2070 compared to 1971-2000[1]. When the Washington Legislature passed House Bill 1032 in July 2023 it stated that, it is in the best interest of the state, our citizens, and our natural resources to identify the sources of wildland fires; identify and implement best practices to reduce the prevalence and intensity of those wildland fires; put those practices in place; and by putting those practices in place, reduce the risk of wildland fires and damage and losses resulting from those fires.

The Legislature directed the Department of Natural Resources (DNR), in consultation with the Energy Resilience and Emergency Management Office of the Department of Commerce, to contract with an independent consultant with experience in developing electric utility wildfire mitigation plans to develop an electric utility wildfire mitigation plan format and a list of elements to be included in electric utility wildfire mitigation plans. The Wildfire Mitigation Plan (WMP) format below achieves the direction of the Legislature.

By October 31, 2024, and every three years thereafter, each consumer-owned utility and investor-owned utility must review, if appropriate revise, and adopt its wildfire mitigation plan. When reviewing or revising a wildfire mitigation plan, utilities must use the recommended format and elements contained in the WMP format developed by DNR. The plan must be submitted to the utility wildland fire prevention advisory committee created in RCW 76.04.780 to be posted on their website.

[1] Northwest Climate Adaptation Science Center

Skamania County Public Utility District #1 (Skamania PUD) believes the development of a thorough WMP is a prudent and responsible effort to prepare for increased wildfire occurrence in Skamania County. For Skamania PUD, which aims to protect public safety and preserve the reliable delivery of electricity, wildfire mitigation is a top priority. While an electric utility can never fully eliminate the risk of fire, Skamania PUD is committed to taking practical actions to reduce the devastation that a wildfire could bring to the people and communities we serve. This Wildfire Mitigation Plan lays out the steps we are taking to do so.

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Plan Review and Revision Record

Date	Version	Author	Revision Description
06/2023	V1	BKI	Original document adopted in 2023.
10/2024	V2	BKI	Report and maps updated in 2024. Format modified to new DNR template.

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2 Wildfire Mitigation Plan Overview

2.1 Purpose of the Wildfire Mitigation Plan

Reducing the risk of utility-caused wildfire plays an essential role in Skamania PUD's operational practices. Its existing policies, programs, and procedures, as well as the incorporation of emerging technologies, are intended to directly or indirectly manage or reduce the risk of its utility infrastructure becoming the origin or contributing factor for wildfire.

Skamania PUD believes the strategies and activities described in this WMP, with associated goals and metrics, are a practical approach to reducing fire-related risk for the PUD's customers in the near term and will allow for refinement and improvement over time. As the PUD gains experience implementing the WMP's mitigation programs and new information emerges, the PUD will assess, evaluate, enhance, and refine its practices.

The WMP describes vegetation management, asset inspection and maintenance, recloser setting protocols, restoration of service processes, and community outreach efforts. Additionally, it spells out plan ownership, performance metrics, deficiency identification, and the plan's audit and approval process. It also addresses the unique features of Skamania PUD's service area, such as topography, weather, infrastructure, grid configuration, and potential wildfire risks. While Skamania PUD's Board of Commissioners provides supervision over the plan, its implementation primarily resides with Project Manager (PM) and Line Superintendent (LS), but it is the General Manager (GM) who is ultimately responsible.

2.2 Description of Where the WMP Can Be Found Online

The WMP can be found on the Skamania PUD website at www.skamaniapud.com/electric/WMP/.

2.3 Best Practices Cross-Reference

Table 1. Best Practices Cross-Reference Table

Standard or Best Practice Name and Description	Document, page number, or citation
HB 1032 – By October 31, 2024, and every three years thereafter, each Investor-owner and Consumer-owned Utility must review, if appropriate revise, and adopt its wildfire mitigation plan	N/A

3 Utility Overview

Table 2. Utility Context Setting Information

Utility Name	Skamania County PUD #1
Service Territory Size (sq miles)	155
Service Territory Make-up [ ]% Urban [ ]% Agriculture [ ]% Barren/Other [ ]% Conifer Forest [ ]% Conifer Woodland [ ]% Desert [ ]% Hardwood Forest [ ]% Hardwood Woodland	[ ]% Herbaceous [ ]% Shrub [ ]% Water [X] NA / Not tracked (Describe below) The service territory is largely composed of conifer forest and shrub with smaller amounts of urban, agriculture, water and hardwood forest.
Service Territory Wildland Urban Interface	3.6% Wildland Urban Interface 26.1% Wildland Urban Intermix 46.8% Uninhabited 23.5% Very Low Density Vegetated
Consumers Served	6,500
Account Demographic	89% Residential 0% Agricultural 11% Commercial/Industrial
Utility Equipment Make-up (circuit miles) *Calculated using GIS data*	Overhead Distribution: 234 mi Overhead Transmission: 0 mi Underground Distribution: 325 mi Underground Transmission: 0 mi Substations: 5
Has developed protocols to pre-emptively shut off electricity in response to elevated wildfire risk[2]?	Yes: [ ] No: [X]
Has previously shut off electricity in response to elevated wildfire risk?	Yes: [ ] No: [X]

[2] For many utilities this will be a reference to a Public Safety Power Shutoff (PSPS) event. These events, whether through a formally defined PSPS program or not, are recognized as a safety measure of last resort initiated by utilities to pre-emptively de-energize specific powerlines during critical fire weather to reduce the risk of the electric system being involved in an ignition. The decision to either have or not have this type of practice is at the operational discretion of the individual utility.

3.1 Utility Description and Context Setting

Skamania PUD was founded as a municipal corporation by the vote of the people in November of 1938. With just 400 utility customers upon opening for business in 1940, Skamania PUD has grown to serve over 6,500 customers in southern Skamania County. The PUD also provides water service to approximately 1,500 customers in the Carson and Underwood areas.

The PUD is governed by a three-member popularly elected Board of Commissioners that determines policy and appoints the GM who is responsible for Skamania PUD's overall management and operations. Skamania PUD owns and operates its electrical distribution systems, which are critical to maintaining electric service to its customers.

Skamania PUD is rooted in services that go beyond providing safe, reliable power at some of the most affordable rates in the nation. These principal focuses are further enhanced with innovative energy solutions and a deep-rooted involvement in the communities it serves. Skamania PUD's mission is to provide the best possible utility service at the lowest cost consistent with sound business principles.

3.2 The Service Area

Operating out of offices located in the town of Carson, Washington, Skamania PUD serves the cities of North Bonneville, and Stevenson, as well as several unincorporated communities including Skamania, Prindle, Washougal, Home Valley, Mill A, Underwood, Carson, and Stabler. The District provides electric services to approximately 6,600 meters in southern Skamania County and water services to approximately 1,500 meters in the unincorporated communities of Carson and Underwood.

The approximately 35-mile long, 155-square mile service area is positioned between Clark and Klickitat Counties in the heart of the Columbia River Gorge in Southwest Washington (figure 1). Hood River and Multnomah Counties are directly south across the Columbia River, with the Cowlitz, Lewis, and Yakima counties bordering to the north. Skamania County straddles the Cascade Range where it's divided between Oregon and Washington by the Columbia River. Distribution system elevation ranges from ~60 feet above mean sea level (AMSL) at the Columbia River to ~3,300 feet AMSL at the microwave radio sites above Woodard Creek.

Much of the distribution system lies within US Forest Service lands[3] and Columbia River National Scenic Areas. The majority of the service area is heavily vegetated with over 85% of the County's total acreage covered by public forest lands. The major ecoregions are Western Cascades Lowlands and Valleys in the central region, oak conifer foothills to the east, and Valley foothills to the west[4]. Topography is primarily mountainous uplands with moderate

[3] Gifford Pinchot National Forest
[4] https://www.plantmaps.com/interactive-washington-ecoregions-l4-map.php

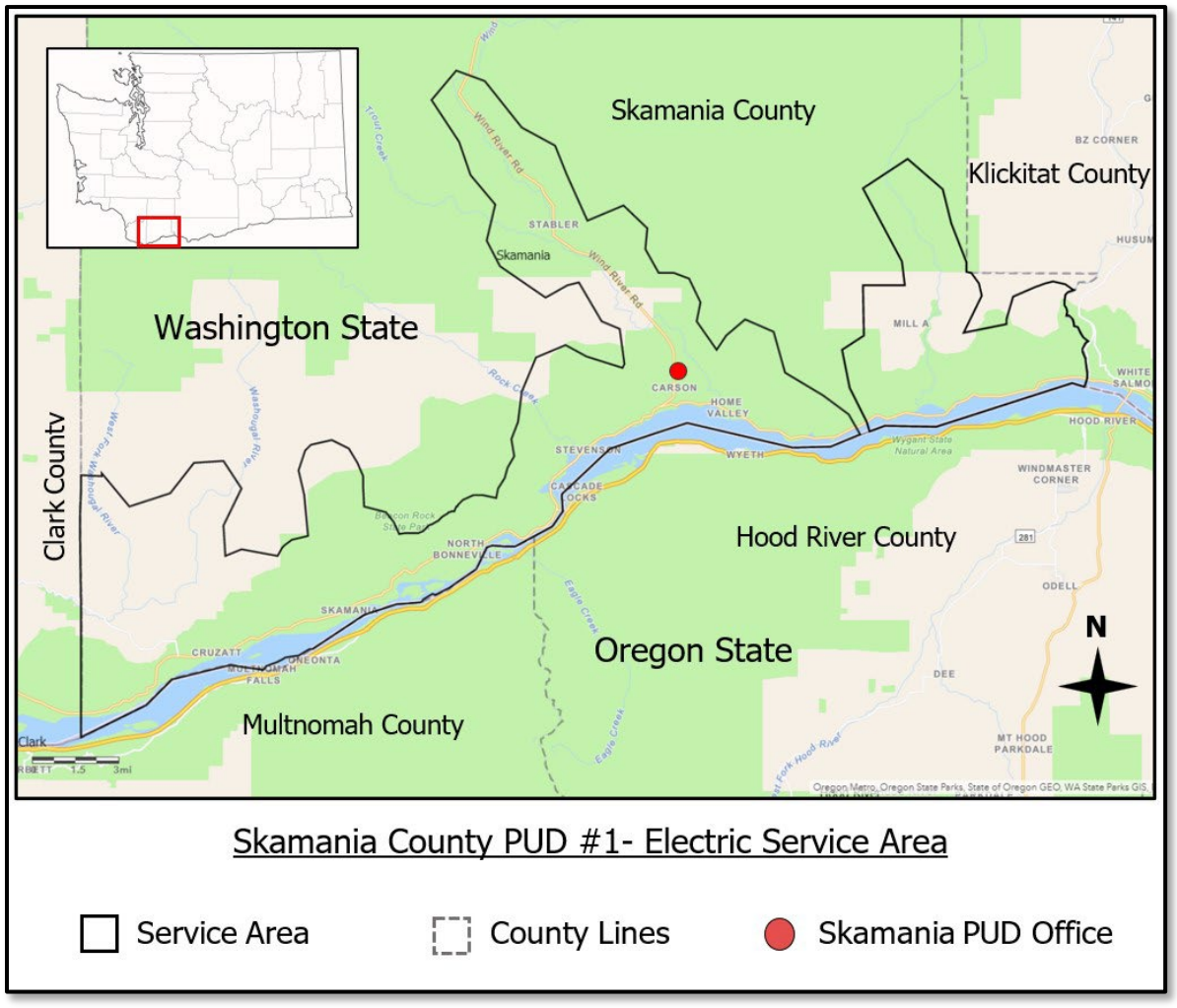
slopes, broad valleys, medium to high gradient streams and rivers, and steep cliffs along the Columbia River Gorge.

The Skamania County area has a warm-summer Mediterranean climate[5] and receives an average of 64 inches of precipitation per year. However precipitation within the district varies significantly, ranging from 99 inches per year on the west end to just 20 inches per year on the east end. The summer fire season generally runs from June to mid-September with average daily high temperatures above 75°F. The hottest and driest month of the year is August, with an average high of 80°F[6].

The average hourly wind speed in Skamania County experiences mild seasonal variation over the course of the year. Wind speeds, location, and direction will vary depending on the season; In the summer months the west wind conditions are higher (up to ~32 mph) on the east end of the county. During the winter season, east winds tend to be highest (up to ~33.mph) on the west end.[7] The windiest areas are generally along the Gorge.

[5] Köppen climate classification
[6] https://weatherspark.com/y/1222/Average-Weather-in-Carson-Washington-United-States-Year-Round
[7] http://www.usa.com/skamania-county-wa-weather.htm

Figure 1. Skamania PUD Service Territory



3.3 The Electric System

Skamania PUD is a full preference customer of the Bonneville Power Administration (BPA) meaning the District, by contract, purchases all of its electrical energy from BPA. Approximately 83% of the power for the electrical grid comes from large hydroelectric generation facilities along the Columbia and Snake Rivers and wheeled primarily over BPA transmission lines. The remaining comes from nuclear and non-federal market purchases.

As a federal agency, BPA sells power to its customers at the cost of generation and transmission. In turn, Skamania PUD provides electricity to our customers at the cost of purchase and delivery. Skamania PUD owns and operates an electric system that includes distribution facilities serving approximately 6,500 meters. See Table 2 below for an overview of Skamania PUD's assets

The local power network is a part of a larger electrical grid serving the greater Pacific Northwest region. Cowlitz PUD owns and maintains generation and distribution facilities in North Skamania County at Swift Reservoir and also serve the Johnston Ridge Observatory on Mt St. Helens. Major BPA transmission corridors with 115kV, 230kV, 345kV, and 500kV lines carry power into and through the service area.

4 Objectives of the Wildfire Mitigation Plan

The WMP's main objective is to implement an actionable plan to:

- Create increased reliability and safety;
- Prevent, mitigate, respond/assist, and recover from wildfires;
- Comply with the National Electric Safety Code (NESC) regulations and guidelines;
- Comply with the requirements of HB1032 for customer owned electric utilities (COU) to prepare a wildfire mitigation plan by October 31, 2024, and every three years thereafter;
- Reduce liability, and;
- Continually improve the plan

4.1 Minimizing Sources of Ignition

The proposed wildfire prevention strategies can be categorized into five main mechanisms that align with Skamania PUD's best practices. Together, the five components create a comprehensive wildfire preparedness and response plan with a principal focus on stringent construction standards, fire prevention through system design, proactive operations and maintenance programs, and specialized operating procedures and staff training.

- **Design & Construction:** Skamania PUD's design and construction consist of system, equipment, infrastructure design and technical upgrades. These practices aim to improve system hardening to prevent contact between infrastructure and fuel sources to minimize the risk of Skamania PUD's systems becoming a source of ignition.
- **Inspection & Maintenance:** Skamania PUD's inspection and maintenance strategies consist of diagnostic activities as well as various methods of maintaining and ensuring all equipment and infrastructure is in proper working condition.
- **Operational Practices:** Comprised of proactive day-to-day actions taken to mitigate wildfire risks and to ensure preparedness in high-risk situations, such as dry and windy climatological conditions.
- **Situational & Conditional Awareness:** This component consists of methods to improve system visualization and awareness of environmental conditions. The practices in this category aim to provide tools to improve the other components of the plan.
- **Response & Recovery:** This strategy consists of Skamania PUD's procedures in response to wildfire, de-energization, and other emergency events. This component aims to formalize protocols for these situations for thorough and efficient communications, emergency response and recovery.

4.2 Preventative Strategies and Programs

This WMP integrates and interfaces with Skamania PUD's existing operations plans, asset management, and engineering principles, which are themselves subject to change. Future iterations of the WMP will reflect any changes to these strategies and will incorporate new best management practices as they are developed and adopted.

Table 3 summarizes Skamania PUD's five mitigation components with associated programs and activities that support Skamania PUD's ongoing commitment to wildfire prevention and mitigation.

Table 3. Mitigation Programs and Activities

DESIGN AND CONSTRUCTION
Strategic undergrounding of distribution lines
Substation perimeter fencing for security and protection
Polymer crossarms
Animal guards on transformers
Avian protection construction standards in select areas
INSPECTION AND MAINTENANCE
Infrared inspections of substation and field equipment
Substation inspections
Distribution system right-of-way (ROW) maintenance
Distribution system line patrols
GIS assisted maintenance and VM tracking
Vegetation management program
Mid-cycle vegetation trimming and enhanced VM work in high risk areas
Wood pole intrusive inspection and testing
OPERATIONAL PRACTICES
Community outreach/wildfire safety awareness
Enhanced hazard trees removal
Fire suppression equipment on service vehicles
Increased Right of Way
SITUATIONAL AWARENESS
Tracking of Industrial Fire Precaution Levels (IFPL)
Weather Monitoring (USFS-WFAS, NWS)

RESPONSE AND RECOVERY
Outage response communications
Coordination with local first responders
Line patrols prior to re-energization
Regular communication with Washington Dept. of Natural Resources & USFS

4.3 Resiliency of the Electric Grid

Considering that approximately 42% of the utility's assets are overhead, wood pole construction located across a heavily forested and rugged landscape, Skamania PUD's distribution grid is very susceptible to wildfire.

The electric grid is relatively small, with no vast distances for utility crews to travel. Restoration and recovery time is highly dependent on wildfire response agency's ability to contain and extinguish any fires. The forested areas, without active forest management, tend to grow thick with heavy underbrush making navigation difficult.

The local grid is a radial, rather than looped system with no micro-grids, therefore segments at that experience wildfire-related outages at circuit extremities would remain de-energized until the feeders can be repaired.

5 Roles and Responsibilities

5.1 Utility Roles and Responsibilities

The Board of Commissioners make policy decisions for Skamania PUD and will be responsible for approving the Wildfire Mitigation Plan. Staff responsibility for plan implementation and general communications is described below.

- The General Manager (GM) is responsible for the implementation of the WMP in general. Staff will be directed as to their roles and responsibilities.
- The GM directs management staff responsible for operations, engineering, and information technology.
- The Project Manager (PM) and Line Superintendent (LS) are responsible for monitoring and auditing the metrics specified in the WMP to confirm that the objectives of the WMP are met.
- All communications are reviewed by the GM before distribution, and by any other staff members contributing information to the communication.
- The LS or Customer Service Representative (CSR) communicates with key accounts.
- The GM determines when and how to notify outside agencies in cases of wildfire emergency events.
- The GM responds to the news media and the general public.

- The LS communicates with first responders, health agencies, and communication providers.
- The LS and Tree Foreman (TF) are responsible for oversight of the in-house and contracted VM operations and inspections.
- The LS is responsible for oversight of the electric system's design.

5.2 Coordination with Local Utility and Infrastructure Providers

Depending on the severity of emergency, coordination with other local utility and infrastructure providers will generally be coordinated through Skamania Department of Emergency Management (DEM). In minor cases, communication can be done by Skamania PUD customer service representatives directly contacting the affected utility or provider.

5.3 Public Agency and Customer Communications for Outages

Skamania PUD has plans for communicating with its customers before planned outages and during un-planned outages. For scheduled maintenance outages, Skamania PUD provides as much notice as possible, typically at least 24-hour advanced notice. In the event Skamania PUD needs to schedule an outage for maintenance or repair, phone calls will be made to the affected customers as far in advance as possible. When a system-wide emergency or storm outage occurs, website and social media announcements and updates will be made as frequently as possible. Updates are posted during business hours as there is not an automated outage management system in place.

Key stakeholders and key accounts affected by a de-energization of the power lines are notified in all cases. Skamania PUD calls the local communications companies (phone and internet providers), county government officials and Spokane County Department of Emergency Management (SCDEM) prior to large, planned outages. Businesses receive automated calls if current contact information has been provided.

During outages, information and geographical location are posted on the Skamania PUD web-based outage map. Here you can see outages currently reported and view details such as the number of customers affected and percentage out. Additional information, such as phone numbers for reporting downed lines and outages, safety information, and a frequently asked questions (FAQ) page are also provided on the PUD website.

5.4 Coordination with Local Tribal Entities

Skamania PUD may coordinate with the affected Tribes Public Safety Department in the event of a PUD-related wildfire impacting the reservation or adjacent lands.

5.5 Emergency Management/ Incident Response Organization

The Skamania Department of Emergency Management (DEM) prepares for, coordinates response, logistical support, mitigation and recovery for all natural and man-made

emergencies and disasters. During wildfire events, Skamania PUD Emergency Response staff contact the local DEM and establish themselves as the duty officer for coordination.

Skamania PUD coordinates and collaborates with its local emergency response agencies as well as other relevant local and relevant state agencies as a peer partner. Skamania PUD's primary coordination point is Skamania DEM in Stevenson, WA. During emergency events, Skamania PUD collaborates with the local Departments of Emergency Management (DEM) and provides an agency representative to the county and/or city Emergency Operations Centers (EOC) to ensure effective communication and coordination.

6 Wildfire Risks

6.1 Risk Drivers Associated with Topographic and Climatological Factors

Skamania PUD staff evaluated its own, as well as other utilities' fire causes in the region and applied its own field experience to determine the key potential risk drivers.

Five categories were identified as contributors for heightened wildfire risk and listed by priority of concern and impact:

- Vegetation Type/Fuels
- Fire Weather/Drought
- Tree Failure/Tree Mortality
- Limited Accessibility
- High Winds

In Skamania County, the risk factor computation incorporated a multifaceted analysis. The proximity to recent wildfires (Figure 2) is significantly high due to the area's location within a prevalent fire zone, marked by recent incidents that demonstrate an increasing trend in wildfire activity. Historically, this region has a notable record of frequent and intense wildfires, attributed to a combination of climatic conditions, particularly prolonged dry spells, and human interactions with the environment. Vegetation in this region is predominantly Douglas fir and Grand fir types, followed by western hemlock and white oak. The dense and dry nature of this vegetation, along with topographical features that facilitate rapid fire spread, contributes to a heightened risk.

6.1.1 Vegetation Type/Fuels

The predominant forest type in the service area is Douglas fir and Grand fir types, followed by western hemlock and white oak. The forested areas, without active forest management, tend to grow thick with heavy underbrush making navigation difficult and available fuel for fire abundant.

6.1.2 Fire Weather/Drought

The service area can experience very hot and dry weather during late summer and early fall with drought conditions developing quickly. These conditions are more prevalent east of Carson. During this time, strong, dry winds, which sometimes last for days, in combination with dry vegetation, can produce extreme fire conditions. This is exacerbated during years with an unusually wet spring, as this encourages a large bloom of underbrush that then dies off in the beginning of the dry season. This abundant ground cover becomes ample kindling for wildfire in the late summer and fall and is an abundant fuel source.

6.1.3 Limited Accessibility

The service area is crisscrossed by steep rolling hills, sharp cliffs, rivers, and river breaks making it difficult to reach equipment in some remote locations, due to the indirect routes and natural barriers. Portions of the service area have steep and rugged terrain comprised of river valleys and eroded hillsides and many circuits are routed cross-country over difficult terrain with limited vehicle access. These factors can negatively impact outage response and restoral times for Skamania PUD line crews.

6.1.4 Tree Failure/Tree Mortality

The majority of all line down events are attributed to trees or branches falling into power lines. Since many portions of Skamania PUD's distribution system are located in wooded or heavily treed areas, any tree, either live or dead, is considered a potential threat to the electric system if it is within striking distance of the power lines. Electric utilities that investigate the actual causes of outages often find that the failure of hazardous branches and trees is a significant component of the tree-related outage category[8].

6.1.5 High Winds

High wind events, from both the east and west, are common occurrences in the region. Areas in proximity to the Columbia River are most prone to high winds, which can cause conductors to sway, and if extreme, phase-to-phase contact or cross-phasing can occur which may result in sparks, and momentary or sustained outages.

High winds can cause trees to fall from outside the ROW into the power lines. This can bring the lines into contact with fuel sources or down the conductor, which allows it to contact dry ground covering. Ignition events are particularly dangerous on high wind days, as it can be difficult to suppress and contain the fire.

6.2 Enterprise-wide Safety Risks

The Enterprise Risk Management process is not a periodic "Risk Assessment" but an ongoing and forward-looking management discipline enabling Skamania PUD to analyze risks continually and adapt to changing conditions. The key or critical risks affect the entire

[8] NRECA Vegetation Management Manual

community and are interrelated; therefore, they are managed holistically with a structured approach.

The Risk Assessment process began with the General Manager, and key staff, working together to collect information on all potential and perceived risks. Relevant local plans were reviewed for additional data. Also analyzed were the key impacts, mitigations, controls, and Skamania PUD policies and procedures.

6.2.1 Foreign Contact

Approximately 42% of Skamania PUD's distribution system is made up of overhead bare-wire conductor installed on insulated structures. The benefits of this type of conductor is that it is much lighter and easier to work with, troubleshoot following an outage event, and quickly restore to service. It is also a much more cost-effective method of delivering energy compared to insulated/covered wire or underground construction. The downside to bare wire is its susceptibility to contact from foreign objects such as wildlife, vegetation, and third-party equipment. Protection equipment is utilized to isolate faults, but there are time delays associated with circuit breakers, reclosers and fuses. These time delays are not fast enough, in many cases, to prevent all sparks prior to interruption.

6.3 Key Risk Consequences

The aforementioned risks drivers have many possible consequences should any become a contributing factor for an ignition. The list below outlines some of the worst-case outcome scenarios, the prevention of which is the impetus for the development of this WMP:

- Personal injuries or fatalities to the public, employees, and contractors
- Damage to public and/or private property
- Damage and loss of Skamania PUD-owned infrastructures and assets
- Impacts to reliability and operations
- Damage claims and litigation costs, as well as fines from governing bodies
- Damage to Skamania PUD's reputation and loss of public confidence
- Negative public opinion of the power industry in general

6.4 Wildfire History and Outlook

Most wildfires are human caused (89% of the average number of wildfires from 2018 to 2022). Wildfires caused by lightning tend to be slightly larger and to burn more acreage (53% of the average acreage burned from 2018 to 2022) than human-caused fires[9]. While most large Washington wildfires occur on the drier east side of the Cascade Range, some of the largest fires have been on the wetter west side. The Yacolt Burn of 1902 and the Dole Valley fire of 1929, both of which burned portions of Skamania County, remained two of the largest fires in the state until the 2014 Carlton Complex fire in Okanogan County. Fast-moving large-scale grassland fires are more common to the east, but the west side is less adapted to wildfire, resulting in more

[9] Congressional Research Service, March 2023

severe fires due to the accumulation of fuels. As illustrated in Figure 2, recent large-scale wildfires have occurred in Skamania and adjacent counties.

The Skamania County Wildfire Hazard Potential (WHP) risk score of 40.28% is moderate. The distribution of WHP for the County is 6% very high, 11% high, 22% moderate, 46% low, and 15% very low[10]. It should be noted that this scoring does not consider the structures or other high value assets in the assessment. Since a significant percentage of the service area is made up of Wildland Urban Interface (WUI) communities, the Washington Department of Natural Resources (DNR) has ranked Skamania County's Hazard Profile as "High" in its 2013 Washington State Hazard Mitigation Plan[11].

Generally, fire season in Washington lasts from April through the end of October, but wildland fires have occurred in every month of the year. Fire seasons from 2003 through 2012 averaged more than 84 days longer than in 1973 to 1982[12]. The largest fire years coincide with warm spring and summer temperatures, and early spring snowmelt. Annual large wildfire frequency in US Forest Service (USFS), National Park Service and Bureau of Indian Affairs (BIA) forests is significantly correlated with spring and summer temperature. Figure 2 illustrates the regional wildfire perimeters from 2000 through 20231 and Figures 3 shows Red Flag Warning data from 20015 through 2024.

[10] https://www.firelab.org/project/wildfire-hazard-potential
[11] NFPA 299 Standard for Protection of Life and Property from Wildfire
[12] Westerling, A.L. 2016 Increasing Western US Forest Wildfire Activity; https://royalsocietypublishing.org/doi/10.1098/rstb.2015.0178

Figure 2. Wildfire Perimeters 2000-2023

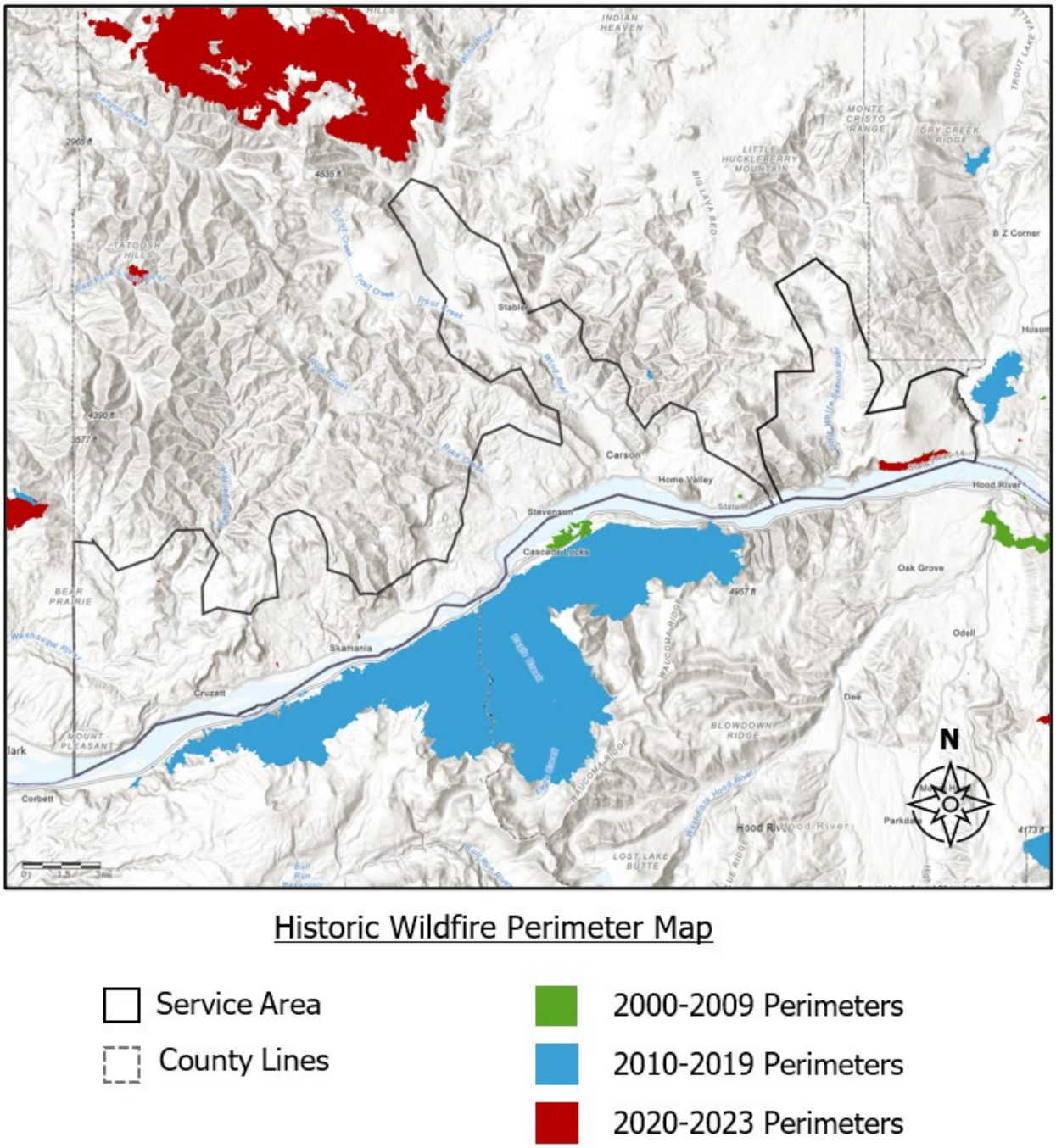
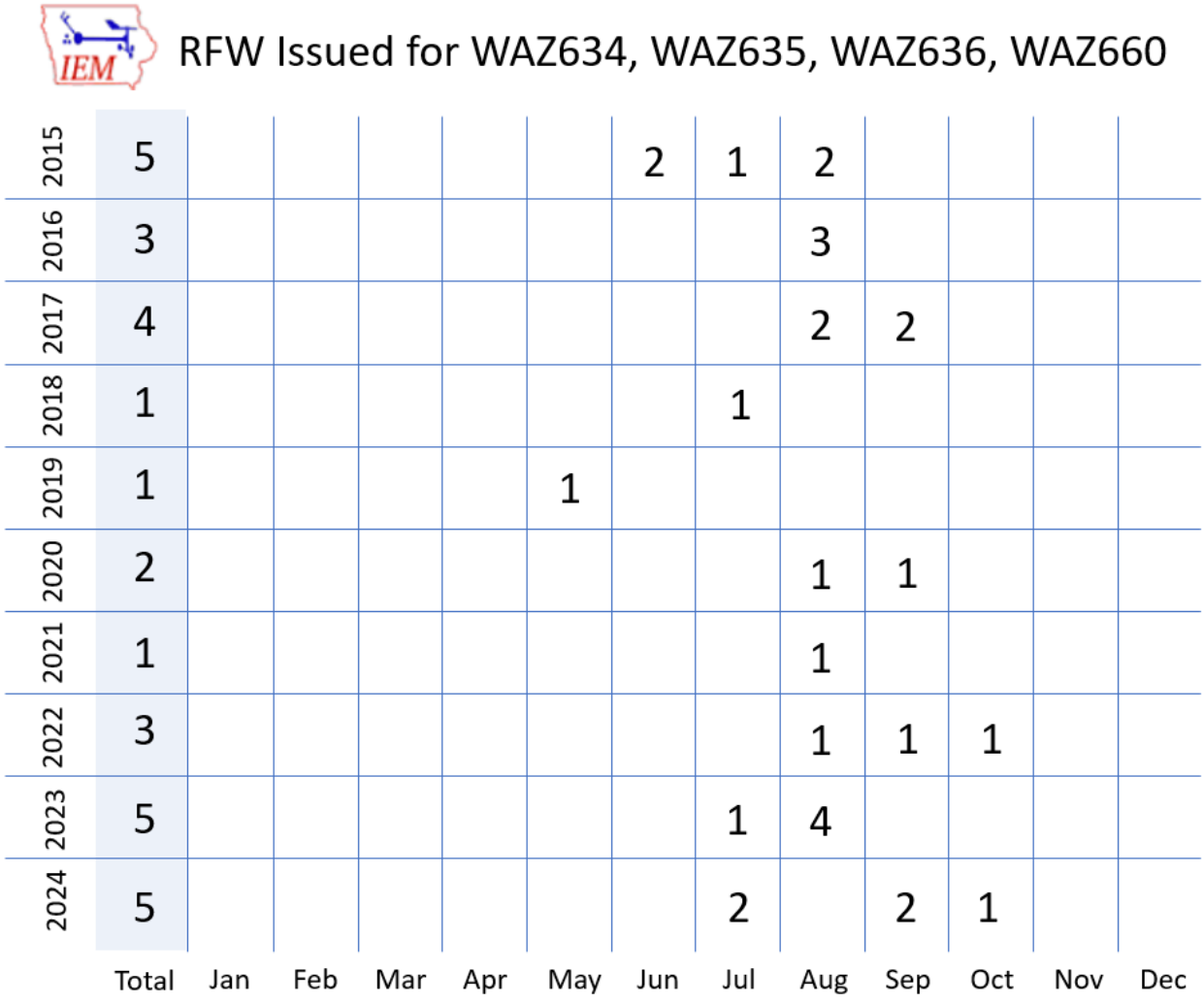


Figure 3. Red Flag Warning by Year & Month (2015-2024)



6.4.1 Wildfire Threat Assessment Mapping

The Wildfire Hazard Potential (WHP) map used in this plan is a raster geospatial dataset produced by the USDA Forest Service, Fire Modeling Institute (FMI). It is intended to inform evaluations of wildfire risk or prioritization of fuels management needs across large landscapes. The specific objective of the WHP map is to depict the relative potential for wildfire that would be difficult for suppression resources to contain.

The WHP-2020 dataset was built upon:

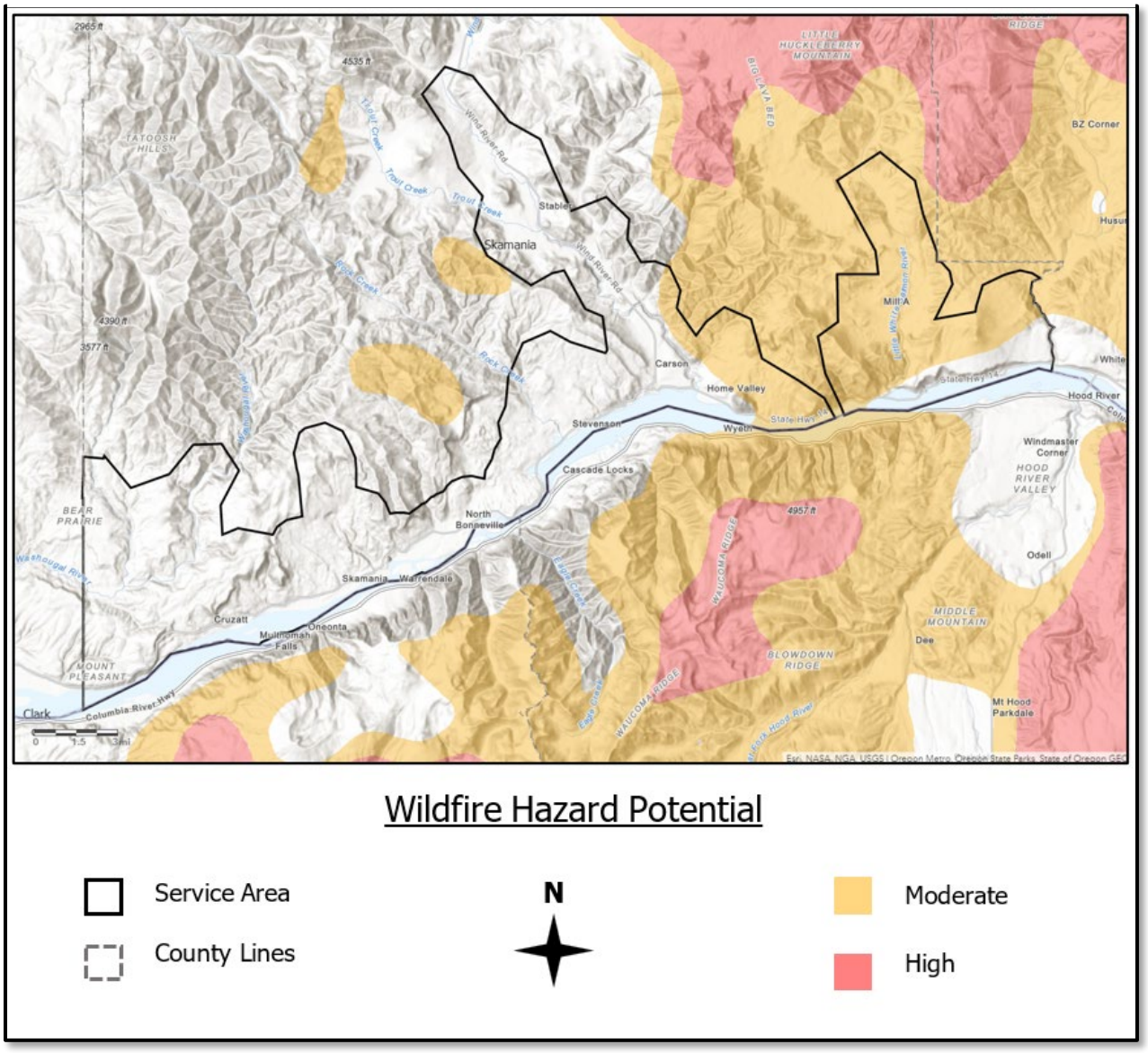
- Spatial vegetation and wildland fuels data from *LANDFIRE 2014* (version 1.4.0). The *LANDFIRE* Fire Behavior Fuel Models layer is a primary input to the FSim Burn Probability (BP) and Fire Intensity Level (FIL) datasets and forms the foundation for WHP. Historically, this model has been updated every 4-6 years, but developers are working to accelerate the process.
- Spatial datasets of wildfire likelihood and intensity were generated for the conterminous U.S. with the *Large Fire Simulator* (FSim). FSim simulates the growth and behavior of hundreds of thousands of fire events for risk analysis across large land areas using geospatial data on historical fire occurrence, weather, terrain, and fuel conditions. Effects of large-fire suppression on fire duration and size are also simulated. This research aims to develop a practical method of quantifying geospatial wildfire impacts, including annual probabilities of burning and fireline intensity distributions at any point on the landscape.
- Point locations of past fire occurrence from 1992 through 2015

Areas mapped with higher WHP values represent fuels with a higher probability of experiencing torching, crowning, and other extreme fire behavior under conducive weather conditions. An essential aspect of the WHP method is the use of "resistance to control weights" at the end of the mapping process. This serves to reduce the WHP index in areas with light fuels, such as grass and shrubs. This helps to inform where forest fuel reduction treatments might be most needed. It is anticipated that the WHP dataset will be updated approximately every two years.

On its own, WHP is not an explicit map of wildfire threat or risk, but when paired with spatial data depicting highly valued resources and assets such as communities, structures, or powerlines, it can approximate relative wildfire risk to those resources and assets. WHP is not a forecast or wildfire outlook for any particular season as it does not include any information on current or forecasted weather or fuel moisture conditions.

The WHP map (Figure 4) is used to prioritize vegetation management activities, inspections, field work scheduling, and future sectionalizing studies and associated remedial actions.

Figure 4. Wildfire Hazard Potential



6.4.2 Assets Within Wildfire Threat Index Tiers

Table3 provides a high-level overview of Skamania PUD's various distribution assets relative to the Wildfire Hazard Potential tiers shown in Figure 4 above.

Table 4. Overview of Distribution Assets within WHP Tiers

Assets	Total	Low		Moderate		High	
	Line-miles	Line-miles	%	Line-miles	%	Line-miles	%
Primary OH Distribution	194.7	157	81%	38	19%	0	0%
Secondary OH Distribution	39.4	36	92%	3	8%	0	0%
Primary UG Distribution	233.1	216	93%	17	7%	0	0%
Secondary UG Distribution	91.9	87	94%	5	6%	0	0%
Totals							
Total OH Distribution	234.1	193	82%	41	18%	0	0%
Total UG Distribution	325	303	93%	22	7%	0	0%
All Distribution	559.1	496	89%	63	11%	0	0%
Substations	5	5	100%	0	0%	0	0%

7 Wildfire Preventative Strategies

7.1 Weather Monitoring

7.1.1 Current Strategy Overview

Situational assessment is the process by which current operating conditions are determined. Situational Awareness (SA) is the understanding of the working environment, which creates a foundation for successful decision making and the ability to predict how it might change due to various factors.

Skamania PUD uses all situational awareness resources at its disposal to monitor evolving fire weather, fuel, and other climatological conditions that may lead to fire events. It evaluates information such as real-time field observations, GIS data, asset maintenance reports, ongoing wildfire reporting and other resources. Based on available information, Skamania PUD appropriately schedules work crews as needed.

Skamania PUD's System Operators use various resources to monitor evolving fire weather and climatological conditions that may lead to fire events using one or more of the following online resources.

- **USFS-Wildland Fire Assessment System (WFAS):** Mapping tools from the USFS-WFAS help determine daily and short-term forecasted risk, with daily or weekly fire weather status maps produced as needed to assess PNW wildfire conditions. (https://www.wfas.net/)
- **The National Weather Service (NWS):** The NWS provides on-line predictive fire weather forecasting tools in the form of a current fire-weather outlook, 2-day, and a 3-8 day outlook. (https://www.spc.noaa.gov/products/fire_wx/)
- **NOAA Weather and Hazards Data Viewer:** This on-line map provides historic or real-time surface observations including wind speed and direction, wind gust, dew point, relative humidity, and sea level pressure collected from remote automated weather stations (RAWS). Extreme-weather alerts such as fire weather watch, high wind watch, and red flag warning are provided from this resource. (https://www.wrh.noaa.gov/map/?wfo=psr)
- **Industrial Fire Level Precaution Levels (IFPL):** Fire season requirements become effective when fire season is declared in each DNR Protection District. (https://www.dnr.wa.gov/ifpl)

7.1.2 Planned Updates

Skamania PUD will continue to research weather monitoring technologies and services in an effort to stay informed on

7.2 Design and Construction Standards

7.2.1 Avian Protection Construction Standards

Skamania PUD has employed design and construction standards with the protection of raptor and migratory birds in mind where a risk to protected avian species has been identified. The primary species of concern is the Osprey. Standards being used include the use of conductor shields, covered jumpers, perch discouragers, and transformer bushing covers. Going forward, single, polymer crossarms will be used in place of double wood crossarms as a nesting deterrent strategy.

These measures have substantially reduced the electrocution and collision risk to avian wildlife and the number of birds injured. Consequently, these measures have also reduced the potential for fire ignition. New construction projects are evaluated to determine the need for avian protection hardware or avian construction specifications. Wildlife protective devices are also installed on most substation equipment. An example of a perching deterent installed on the crossarms of a power pole is shown below.

7.2.2 Underground Conductor

Skamania PUD has approximately 325 miles of 7.2kV UG distribution line on its network. Many of these facilities are direct-buried conductors. Due to reliability issues relating to this type of construction, in 1995 the District began replacing the aging direct-buried underground distribution line with a vault and duct system. The new EPR cabling provides increased reliability and should have a lifespan of 75 to 100 years.

While there are many benefits to underground distribution lines, these facilities are more costly, and take longer to construct and repair. Because much of the service area is located on public lands or on private land within the Columbia Gorge National Scenic Area, permitting UG projects can be a lengthy process.

The undergrounding of overhead distribution lines eliminates the impacts of ice loading, improves reliability during high wind events and functions as an effective mitigation of wildlife related outages and greatly reduces wildfire risk. The key indicators when considering which lines to convert is the exposure to vegetation, extreme weather, the condition of the existing wood poles, access, and traffic.

7.2.3 Circuit Recloser Upgrade

A recloser is an automatic, high-voltage electric overcurrent protective device. Like a circuit breaker in a household electric panel, these devices shut off electric power when trouble occurs, such as a short circuit. Reclosers will close back multiple times to detect if the problem still exists. If the problem was temporary, the recloser automatically resets and restores power[13]. Electronic Vacuum reclosers provide fast, low energy interruption with long

[13] https://www.eaton.com/content/dam/eaton/products/medium-voltage-power-distribution-control-systems/reclosers/recloser-definition-information-td280027en.pdf

contact life, are oftentimes programable, and do not require the high maintenance demands associated with traditional recloser devices which contain oil and utilize electromechanical mechanisms.

It is Skamania PUD's long range goal to progressively replace oil-filled hydraulic reclosers with modern electronic units that provide better line protection that minimize fault energy, reducing the ignition potential to start a wildfire.

7.2.4 Planned Updates

Skamania PUD will continue to implement fire safety into their design and construction practices by furthering the practices noted above.

7.3 Fuel and Vegetation Management

7.3.1 Current Strategy Overview

Skamania PUD maintains over 234 miles of OH ROW to minimize interruptions of services to our customers. This includes not only the maintenance of the hardware, conductors, and poles, but also trees and other vegetation that threaten to fall or grow into the power lines. Trees that grow within or adjacent to power line ROWs are a common cause of outages and damage to facilities, as well as a potential cause for wildfire.

While Skamania PUD is responsible for maintaining the ROW above and below our power lines, we strive to balance maintaining our natural surroundings with ensuring a reliable power supply by keeping the lines clear of vegetation. While we recognize and appreciate the beauty of trees, the three main benefits to tree trimming in ROW areas are; Safety, Reliability, and Affordability. To this end, Skamania PUD has recently developed a comprehensive VM program intended to maintain safe and reliable electric facilities, provide safety for the public and for utility workers, and fire mitigation throughout the service area.

When work is well planned and completed, the overall impact on the desirable vegetation on the ROW is reduced, and the neighboring landowners, the motoring public, and the wildlife that uses the ROW for nesting and foraging will benefit. With a prescriptive and balanced approach to VM, Skamania PUD can focus more of its energy and resources on preparing for future weather events, improving the reliability of the grid, and controlling maintenance costs.

7.3.2 Trimming Standards

Tree clearance is determined by the growth rate of the species. Correct tree trimming should promote tree growth away from electrical conductors, provide longer periods of clearance, and reduce future work. Correct tree trimming techniques include, but are not limited to, collar cuts, directional pruning, and drop-crotch trimming.

State and Federal Agencies require maintenance of the ROW under or around the PUD's power lines. Skamania PUD is authorized by RCW 64.12.035 to trim or remove any tree or vegetation that poses an imminent hazard to the general public or is a potential threat that could damage

electric facilities. Trees are trimmed or removed for safety, reliability, board policies, and compliance with the National Electric Safety Code (NESC) and RCW requirements. If a tree's proximity to power lines is a threat to our electric system, our tree crew will trim the growth away from our equipment.

Skamania PUD's tree trimming crews and contractors are governed by principles of modern arboriculture using the following standards:

- American National Standards Institute (ANSI) A300 Part 1 concepts and utility directional pruning, which supports proper pruning/tree health while achieving and maximizing the pruning cycle
- Standard for Arboricultural Operations – Safety Requirements (ANSI Z133-2017)
- OSHA 29 CFR Parts 1910-1926
- WDOT Manual on Uniform Traffic Control Devices

7.3.3 Vegetation Management Trimming Schedule

The PUD has evaluated the vegetation characteristics and growth rates of the predominant species along the OH lines to determine the years of growth until they contact the conductor. Skamania PUD and contracted VM crews are responsible for trimming trees and vegetation around the energized power lines, utility poles and pad-mount transformers to obtain the minimum required clearance with due regard to current and future tree health and symmetry. Areas identified on the USDA/USFS Wildfire Hazard Potential map as elevated risk receive focused vegetation management efforts.

Cycle trimming is the cornerstone of the vegetation management program. Under this concept all system electrical distribution lines are assigned a schedule for tree trimming and/or removal. Currently, the full tree trimming cycle is 7-10 years, which means every feeder line in the service territory receives attention within that time frame.

Table 5. Vegetation Management Schedule

Asset Classification	Operation Type	Frequency
Overhead Distribution	Trimming	Every 7-10 years
High Growth Rate Areas	Mid-cycle Trimming	As needed

7.3.4 Trimming Specifications

Skamania PUD has an operational and management responsibility and is required by State and Federal Agencies to maintain the right of way, under or around its power lines. Skamania PUD will meet the minimum standards for conductor clearances from vegetation to provide safety for the public and utility workers, reasonable service continuity and fire prevention. A typical ROW clearance area is 30 feet in total width with the conductor in the center. Trees are trimmed to a minimum clearance of 10 feet at time of trim. Limbs may be cut farther from the conductors to comply with later trim methods. In all cases, tree removal is preferred over tree trimming.

During tree work, trimmers aim to achieve the clearance specifications described below.

- **OH Distribution:** Minimum of 10 feet from the outside conductor.
- **Trees Under Conductors:** All trees directly below conductors are removed.
- **Overhanging Branches:** Removed to a height of 15 feet above all distribution conductors. All weak, diseased and dead limbs above the conductors shall be removed.
- **Secondary/Service Wire:** Branches that deflect or weigh heavily upon service or other secondary wires beyond the last Skamania PUD pole are removed, but not pruned in their entirety without specific direction by Skamania PUD operations
- **Pole Clearing:** Vines growing on poles and wires shall be cut at ground level to a 10-foot circumference.
- **Pole Guy Wire:** Shrubs and ground cover shall be trimmed to a 4-foot circumference around all guy wires
- **Brush removal:** Removed on all ROW when possible; they must not exceed 1 foot in height.
- **ROW:** Cleared to minimum of 15 feet on either side of the center line (where possible).

7.3.5 Vegetation Control Options

Methods for controlling vegetation along the ROW include chemical, manual, or mechanical techniques. The choice of control option(s) is based on effectiveness, environmental impact, site characteristics, worker and public health and safety concerns. All ground cut vegetation shall be sprayed with an approved herbicide if weather conditions permit. Tree growth regulators are applied in areas where pruning may not provide the necessary line clearance. Low growing shrubs will be removed on all ROWs when possible.

7.3.6 Hazard Tree Removal

A subset of Danger Trees[14], a Hazard Tree is defined as any tree or portion of a dead, dying, rotten, or decayed tree that may fall into or onto the overhead lines, or trees leaning toward distribution facilities. Skamania PUD makes it a priority to remove hazard trees as soon as they are identified.

[14] As defined by ANSI 300 Part 7 standards

Hazard tree removals are assessed and completed as part of the normal cycle trim. These trees are generally outside the right-of-way and are deemed by a Journeyman Tree Trimmer to pose a potential threat to the lines. Leaning trees beyond the ROW which would strike the power line in falling, and which would require topping if not removed, shall either be removed or topped.

The tree removal selection criteria includes the overall condition of the tree, the stability of the ground around the tree, the tree species, and any defects that would cause tree to be unstable and more likely to fall into the lines. If a tree is healthy and stable, it is usually not designated for removal. Trees outside the ROW require landowner permission prior to cutting unless emergency conditions exist.

Additional candidates for tree removal include;

- Trees that are located at homes, parks, or other areas which a person may climb easily and contact the conductors;
- Volunteer trees which will eventually interfere with PUD lines;
- Immature trees that are not presently interfering with the lines but could do so at their mature height, and;
- Trees that require extensive drop-crotch trimming.

7.3.7 Herbicide Treatment

Herbicide use is an integral part of a utility vegetation management program for control of brush and resprouting tree species. Selective herbicide use controls target tree species that will grow into the conductors, while avoiding damage to desirable trees, shrubs, and ground cover.

As the density of undesirable trees decrease, the environmental impacts of our vegetation management activity will decrease, with a corresponding decrease in maintenance costs. The utility, its customers and the environment all benefit from this integrated approach to vegetation management.

Skamania PUD uses select herbicide products that will control deciduous tree species with minimal damage to desirable surrounding plants due to the selective activity of the herbicide on broadleaf plants, and lack of activity on grasses. When applied as labeled, little to no off-target damage should occur.

7.3.8 Service Orders/Hot Spots

This program involves the fast response to emergency situations. An example of this would be reports of arcing and sparking where trees are contacting the high voltage lines. Once reported, a service order would be generated and a tree trimming crew would be assigned to address the issue.

7.3.9 Brush Mowing Plan

The brush mowing process is used to remove under-growth within the Skamania PUD ROWs. Brush and small trees are removed with a large tractor mounted shredder that cuts and

mulches the undergrowth into small pieces and spreads them across the ROW. The result is a ROW that is resistant to fire and easy to navigate by repair crews. This work is prioritized in areas identified as having high fire risk where access to lines may be difficult.

7.3.10 Site preservation

Care shall be taken to preserve the natural ground covers where possible. Rivers, lakes, streams, natural draining areas, ponds, etc. shall not be disturbed. All local, state, and federal laws and regulations will be followed when performing work around fish spawning streams.

7.3.11 Tree trimming requests

Skamania PUD receives a large number of requests for tree trimming each year. Some of these requests must be rejected because they do not meet District guidelines.

Skamania PUD will trim or remove customer owned trees if they are:

- Within the 30-foot ROW
- Will negatively impact the power lines

Skamania PUD will not trim or remove trees if they are:

- Not affecting the power lines
- Leaning away from the power lines
- Over structures including homes, garages, outbuildings, campers, etc.
- Not accessible by Skamania PUD equipment

7.4 Asset Inspections and Responses

7.4.1 Current Strategy Overview

Recognizing the hazards of equipment that operate high voltage lines, Skamania PUD maintains formal time-based inspection and maintenance programs for distribution and substation equipment, which plays an essential role in wildfire mitigation, reliability, and safety. Skamania PUD currently patrols its system regularly and is starting to increase the frequency of inspections in higher risk areas. The following sections outline policies for inspections of Skamania PUD assets. Table 5 outlines the inspection schedule for all assets.

Table 6. Inspection Program Summary

Asset Classification	Inspection Type	Frequency
Overhead Distribution	Safety Patrol Inspection	Annually in Moderate to High WHP zones before fire season
	Detailed Inspection	Every 8-10 years
	Wood Pole Testing	Every 8-10 years
Substation	Routine Inspection	Quarterly
	Detailed Inspection	Annual
	Testing and diagnosis	5 years

7.4.2 Definition of Inspection Levels

1. **Routine Patrol Inspection:** A simple visual inspection of applicable utility equipment and structures designed to identify obvious structural problems and vegetation hazards. Patrol inspections may occur in the course of other company business.
2. **Detailed Inspection:** Individual pieces of equipment and structures receive a careful visual examination using routine diagnostic testing as appropriate.
3. **Intrusive Pole Inspection:** This involves the boring holes in the wood pole and checking for decay.

7.4.3 Instruction to Inspectors

The preventative maintenance plan is based on sound industry principles and practices and is designed to provide safe, reliable service. Skamania PUD shall prioritize maintenance work considering the most urgent need due to compromised safety and reliability.

The inspector will document the condition of the overhead and underground systems, recording defects, deterioration, violations, safety concerns or any other conditions that require attention. The focus of the inspection shall be on any hazards that could affect the integrity of the system or the safety of line workers and the general public.

Inspection tags (overhead & underground) will be prioritized and issued as follows:

- **Priority # 1** – Immediate hazard:

Conditions that may affect the integrity of the system or present a hazard to workers or the general public. Priority #1 tags will be responded to **immediately** and appropriate action taken until the hazardous condition is remedied.

- **Priority # 2** – Non-emergency repair condition:

Conditions requiring maintenance that can be scheduled to maintain the integrity of the system. Priority #2 tags will be prioritized by urgency and will be scheduled to have appropriate repairs made to correct the condition within two years where practicable. If the Priority Level 2 issue is located in a Moderate or High Risk zone and poses a potential fire risk, correction of the deficiency will occur within 2 months when permitting requirements allow.

- **Priority # 3** – Non-emergency repair condition:

Conditions that do not present a situation that could jeopardize the safety of the system, line workers and the general public. Priority #3 tags will be submitted by the inspector with the time interval recommended. In the judgment of the Operations Department, work will be scheduled to be completed within five years.

7.4.4 Distribution Line Routine Inspections

Line inspections consist of vehicle patrols, foot patrols, and all-terrain vehicle patrols to examine Skamania PUD assets including poles, crossarms, conductors, and related equipment. The distribution asset inspections also provide a ground-level evaluation of ROWs, access roads, and vegetation-to-conductor clearances. The inspections focus on any hazards that could affect the system's integrity or the safety of line workers and the public.

Visual aids assist with evaluating and detecting potential damage to above-ground components. Inspectors look for visible signs of defects, structural damage, broken hardware, abnormally sagging lines, and wildlife contacts. Any anomalies found are addressed based on the severity of the defect.

The inspectors will document the overhead systems' condition, recording safety concerns, or any other factors requiring attention on the inspection records. The information accumulated informs planning and scheduling of future maintenance to avoid major faults and reduce ignition potential. Skamania PUD considers and schedules maintenance work by prioritizing the most urgent needs. Beginning in 2024, Skamania PUD will inspect distribution lines located in the Moderate Wildfire Hazard Potential zones annually prior to the Fire Precautionary Period[15]. Areas outside these zones, generally west of Carson, are given a safety patrol inspection on a 5-year cycle.

7.4.5 Detailed Inspection for Distribution Assets

Detailed Inspections of distribution lines are performed in conjunction with the wood pole inspection program. Wood poles are inspected by outside contractors on an 8-10 year cycle.

[15] Fire Precautionary Period is June 1st to October 25th

The pole inspection procedure includes a visual inspection of the entire pole and associated hardware and equipment with photographs and documentation of noted deficiencies. Repairs are prioritized based on the severity of the deficiency.

7.4.6 Pole Management Program

To maintain the PUD's 6,500+ utility poles, a Pole Management Program was initiated in 2019 with the goal of inspecting approximately 10% of the poles per year. Contracted pole testers perform the pole inspections on a planned basis to determine whether they have degraded below National Electric Safety Code (NESC) design strength requirements with safety factors.

This program facilitates a one-stop assessment of a pole's condition, both above and below ground, on an 8-10 year cycle. Wood poles 10 years old or less receive a visual and sound inspection. Older poles receive a visual, sound & intrusive bore inspection utilizing resistograph technology.

Additionally, the poles are visually evaluated to assess the condition of cross arms, hardware, and related equipment and the condition and clearances of the wire spans. This process is a comprehensive and systematic inspection of Skamania PUD's distribution assets. Although not every component in need of repair may be identified, this process has proven valuable in identifying and proactively repairing system components.

Poles that fail inspection are prioritized based on the level of the structural defect and scheduled for replacement or corrective repair accordingly. Wood poles that pass the intrusive inspections are re-tested with a target interval of 10 years. Groups of 6 or more poles that exhibit signs of excessive degradation are considered for overhead-to-underground conversion where feasible.

7.4.7 Substation Inspections

The maintenance plan provides for regular inspections of substations. Qualified personnel will use prudent care while performing inspections. Inspectors follow all required safety rules to protect themselves, other workers, the general public and the reliability of the system.

The routine inspections occur quarterly to ensure safety and reliability. Additionally, each substation receives an annual detailed inspection, which involves a thorough look at the system to confirm that there are no structural or mechanical deficiencies, hazards, or tree trimming requirements. These inspections also include transformer oil testing, thermal infrared photography, yard cleaning, DC system load testing and maintenance planning. In addition to in-house inspections, the District has contracted with a third party to perform comprehensive preventative inspection, testing, and maintenance of its substation equipment on a 5-year cycle.

7.4.8 Infrared Thermography

Hundreds of different pieces of equipment may be found in an electrical distribution system. They start with electricity production, high voltage distribution, switchyards and substations, and end with service transformers, switchgear, breakers, meters, local distribution. Abnormal heating associated with high resistance or excessive current flow is the main cause of many problems in these electrical systems.

Using FLIR cameras, also referred to as IR thermography, Skamania PUD inspects all of its 3-phase and high load circuits during peak winter load to find and measure hidden electrical and mechanical issues before they become a reliability issue. FLIRs create images from heat, rather than visible light. But thermal imagers don't just make pictures from heat; they make pictures from the minute differences in heat between objects. Because excess heat is a sign of increased resistance, FLIR technology is well suited to locating defects in connections and components. Thermal imagers enable inspectors to see the heat signatures associated with high electrical resistance long before the circuit becomes hot enough to cause an outage or damage providing information critical to avoid system failures and fires.

7.4.9 Geographic Information Systems (GIS) Mapping

Each component of the distribution system, as well as each meter, has a physical location and associated data. To plan, construct, maintain, operate, and manage the network, it is beneficial to create and manage this geospatial data.

Skamania PUD geolocates and manages its assets utilizing GIS mapping technology which has been integrated into its asset inspection and maintenance programs. This provides the ability to record and map this work to ensure assets are maintained on a prescribed schedule.

To streamline the inspection and maintenance process, including VM work, Skamania PUD has integrated handheld computer tablets with GIS mapping applications into its daily operations. The tablet interface allows field workers to capture and return field data that integrates into GIS mapping software. Inspectors, linemen, and VM crews can easily document equipment condition or vegetation clearance issues using the handheld mobile devices.

7.5 Workforce Training

7.5.1 Current Strategy Overview

Skamania PUD has developed rules and complementary training programs for its workforce to reduce the likelihood of an ignition. All field staff are:

- Trained on the content of the WMP
- Trained in proper use and storage of fire extinguishers
- Required, during pre-job briefings, to discuss the potential(s) for ignition, environmental conditions (current and forecasted weather that coincides with the duration of work for the day)
- Required to identify the closest fire extinguisher and other fire abatement tools

- Required to report all ignition events to management for follow-up
- Encouraged to identify deficiencies in the WMP and bring such information to management

7.6 Relay and Recloser Policy

7.6.1 Current Strategy Overview

Although it is Skamania PUD's long range goal to progressively replace oil-filled hydraulic reclosers with modern electronic units that provide better line protection that minimize fault energy, it is not current Skamania PUD policy to alter recloser settings in response to daily weather conditions. The utility does not have the ability to make equipment setting adjustments via SCADA.

7.6.2 Planned Updates

As it becomes feasible with the addition of SCADA connection to its reclosers, Skamania would consider alternate settings for reclosers during RFWs.

7.7 De-energization / Public Safety Power Shutoff

7.7.1 Current Strategy Overview

Skamania PUD has considered the extremely complex external risks, and potential consequences of de-energization while striving to meet its main priority of protecting the communities and customers we serve. They include:

- Potential loss of water supply to fight wildfires due to loss of production wells and pumping facilities.
- Negative impacts to emergency response and public safety due to disruptions to the internet and mobile phone service during periods of extended power outages.
- Loss of key community infrastructure and operational efficiency that occurs during power outages.
- Medical emergencies for members of the community requiring powered medical equipment or refrigerated medication. Additionally, the lack of air conditioning can negatively impact medically vulnerable populations.
- Negative impacts on medical facilities, fire, police, and schools.
- Traffic congestion resulting from the public evacuation in de-energized areas can lengthen response times for emergency responders.
- Negative economic impacts from local businesses forced to close during an outage.
- The inability to open garage doors or motorized gates during a wildfire event.
- Loss of power for fuel station pumping

Based on the above considerations, Skamania PUD reserves the option of implementing a PSPS when conditions dictate but does not currently plan to proactively de-energize its system.

However, on a case-by-case basis, the PUD will consider de-energizing a portion of its system in response to a known public safety issue or response to a request from an emergency

management agency. Any de-energizing of the lines is performed in coordination with key local partner agencies, but the final determination is made by Skamania PUD.

8 Community Outreach and Public Awareness

8.1 Current Community Outreach and Public Awareness Program

Defensible Space is often defined as an area around a home or outbuilding, where the flammable vegetation is modified and maintained to slow the rate and intensity of an advancing wildfire. In practice, this is an area with a minimum of 30 to 100 feet around a structure that is cleared of flammable brush or vegetation. This area would also provide room for firefighters to work to protect a structure from advancing wildfire as well as protect the forest from a structure fire.

Skamania PUD encourages its customers to take proactive measures to safeguard their homes from wildfire danger and to prepare for emergency events. To help create an awareness of fire danger in the service area, and what homeowners can do to minimize it, Skamania PUD provides information on prevention and mitigation on its website.

Customers will also find links to the following information on the Skamania PUD website:

- Home Electrical Safety
- Utility Notification Center-Call Before You Dig
- Safety during a power outage
- Downed power line safety
- Portable generator safety
- Home Ignition Zone-Defensible Space
- Underwood Conservation District Firewise and Mobile Chipping Programs

9 Restoration of Service

Skamania PUD work crews will take the following steps before restoring electrical service after a de-energization event. These measures are intended to protect the worker, the general public, and the system's reliability.

- **Patrol:** De-energized lines are patrolled to ensure no hazards have affected the system during the outage. If an outage is due to a wildfire or other natural disaster, as soon as it is deemed safe by emergency response officials, lines and equipment are inspected for damage or foreign objects contacting the lines, and to assess the need for equipment repairs and reconstruction. Lines located in remote and rugged terrain with limited access may require additional time for inspection. VM crews are called on to assist in clearing downed trees and limbs as needed.

- **Isolate:** Isolate the outage and restore power to areas not affected.

- **Repair:** After the initial assessment, Skamania PUD supervisors, managers, and engineers meet to plan the needed work. Re-building will commence as soon as affected areas become safe. Repair plans prioritize substations, then distribution circuits that serve the most critical infrastructure needs. While the goal is to reenergize all areas as soon as possible, emergency services, medical facilities, and utilities are given first consideration when resources are limited. Additional crews and equipment will be dispatched as necessary.

- **Test:** After repairs are completed and the equipment is safe to operate, line segments are energized and tested.

- **Restore:** After successful line testing, power is restored to homes and businesses as quickly as possible. Customers are then notified of the restoration of electric service. After initial power restoration, further demolition and rebuilding may be necessary.

10 Evaluating the Plan

In addition to a robust mitigation strategy, Skamania PUD has developed performance metrics to monitor its efforts over time. The goal of these metrics is to provide a data-driven evaluation of plan performance to help determine the effectiveness of various programs and to identify areas for improvement.

This chapter also identifies Skamania PUD's management responsibilities for overseeing this WMP, the methods for identifying plan deficiencies, and the inspection and VM program monitoring processes.

10.1 Metrics and Assumptions for Measuring Plan Performance

Skamania PUD has developed performance metrics intended to gauge the effectiveness of Skamania PUD's various programs and strategies for mitigating wildfire ignitions. The annual tracking of these metrics (table 7) will help identify circuits most susceptible to unexpected outages, time-of-year risks, and the adequacy of the VM and asset inspection schedules.

Table 7. Performance Metrics

Metric	Rational	Indicator	Measure Of Effectiveness
Red Flag Warning (RFW) days in service area	Used to adjust annual variation in criteria	Number of RFWs during analysis cycle	N/A
Vegetation caused ignition	Assess VM program work schedules/QC process	Count of events	Reduction or no material increase
Vegetation related outage during fire season	Assess VM program work schedules/QC process	Count of events	Reduction or no material increase
Utility equipment caused ignitions	Assess system hardening efforts in critical areas	Count of events	Reduction in the general trend of events
Utility equipment-related line down event during fire season	Assess system hardening efforts in critical areas	Count of events	Reduction in the general trend of events

10.2 Identifying and Addressing Areas of Continued Improvement

Because this plan is in the initial stage of implementation, relatively limited data is on hand. However, as results of the mitigation programs become evident and additional data is collected, Skamania PUD will identify areas of its operations that will require a different approach, as well as develop additional methods to achieve the goal of eliminating Skamania PUD asset sourced ignitions.

As the metrics are analyzed in the following years, refinements will be made. The selected metrics, as with other aspects of the plan, will likely evolve in future iterations. As results of the programs become evident and additional data is collected, Skamania PUD will identify areas of its operations that will require a different approach, as well as methods that are working towards the goal of eliminating Skamania PUD asset related ignitions.

The GM is responsible for ensuring the WMP meets all Washington State guidelines to mitigate the risk of its assets becoming the source or contributing factor of a wildfire. Staff responsible for assigned mitigation areas must vet current procedures and recommend changes or enhancements to build upon the Plan's strategies. Due to unforeseen circumstances, regulatory changes, emerging technologies, environmental changes, or other rationales, deficiencies within the WMP are reported to the GM and LS.

The GM or their designee are responsible for spearheading discussions on addressing deficiencies and collaborating on solutions when updating the WMP. When deficiencies are identified, the GM and designated staff evaluate each reported deficiency to determine their validity. The GM and LS record the agreed upon corrective actions and plan steps for implementation and inclusion in future iterations of the WMP.

10.3 Reviewing, Updating, and Approving the Plan

Skamania PUD monitors the WMP and reports on its effectiveness to the Board of Commissioners on an annual basis or after major events. Reports of the Plan's progress and risk reduction impacts are developed annually and circulated to appropriate utility staff to generate collaborative discussions. The GM monitors the WMP's implementation and audits the specified objectives. The GM, or their designee, updates leadership with recommendations or proposed actions to enhance the Plan's objectives and strategies over time.

The WMP annual review aligns with Skamania PUD's existing business planning process which includes budgeting and strategic planning for a 3-5 year planning horizon.

The GM is responsible for establishing and implementing the plans, procedures, and controls to effectively manage hazards and risks faced by the PUD. Effective risk management will enable the Skamania PUD to provide high quality services to its members, respond quickly and effectively to natural and man-made emergencies and disasters, better manage costs, maintain high employee productivity, and better fulfill its purpose and objective. The Board of Commissioners will provide any necessary feedback and approve the 2024 plan.

10.4 Monitoring the Performance of Inspections

The Line Superintendent manages the distribution line and substation assets and develops comprehensive inspection and maintenance programs. These programs ensure the safe operation of Skamania PUD line and substation facilities.

Key imperatives are to:

- Reduce the risk of power-related wildfire;
- Meet federal and state regulatory requirements, and;
- Achieve reliability performance within mandated limits and to optimize capital and O&M investments.

Designated managers regularly monitor inspection and corrective maintenance records and diagnostic test results to adjust maintenance plans and develop new programs. Skamania PUD make all efforts to follow best industry practices in developing its maintenance programs.

Skamania PUD's Operations Department is responsible for performing the inspections and corrective maintenance. The priority for corrective maintenance is to remove safety hazards immediately and repair deficiencies according to the type of defect and severity of the risk

level associated with the asset location. Work orders are monitored throughout the year to ensure timely completion via regular internal reports.

10.5 Vegetation Management Quality Control Process

Approximately 75% of all ROW tree work is performed by Skamania PUD staff. The remainder of the work is contracted to certified tree trimming specialists as needed. The LS oversees the VM program and manages all tree-related issues. To ensure all components of the program are being satisfactorily completed, the LS performs periodic site inspections throughout the system. This strong quality control practice enables us to verify system condition when all work is completed. The LS audits 100% of the contracted tree work, and 50% of the tree work performed by Skamania PUD crews. Work areas are mapped after the QC work has been completed.

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Appendix A: Definitions

Bonneville Power Administration: The Bonneville Power Administration (BPA) is an American federal agency based in the Pacific Northwest created in 1937 to market electric power from the Bonneville Dam and to construct transmission facilities. BPA is the marketing agent for power from all 31 of the federally owned hydroelectric projects in the Pacific Northwest. The BPA is one of four regional Federal power marketing agencies within the U.S. Department of Energy (DOE).

Circuit Breaker: An electrical switch designed to protect an electrical circuit from damage caused by overcurrent/overload or short circuit. The basic function is to interrupt current flow after protective relays detect a fault.

Commission: Publicly elected three-member board of commissioners.

Danger Tree: A danger tree is any tree, on or off the right of way, that can contact electric power lines. A danger tree may be completely healthy and intact, or it may be sick or dead. Even a healthy tree could sustain damage in a severe storm and impact nearby power lines, thus the potential for "danger."

Distribution System: The final stage in the delivery of electric power carrying electricity from the transmission system to individual consumers. The Skamania PUD distribution system includes 7.2Kv lines not tied to generation facilities.

Defensible Space: An area around a structure, either natural or manmade, where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildfire and the structure. In practice, it is defined as an area a minimum of 30 to 100 feet around a structure that is cleared of flammable brush or vegetation.

Drop Crotch Tree Trimming: A form of thinning used to reduce the size of large trees, involves the removal of a main branch (or leader) by cutting it back to a large, lateral branch.

Electric Utilities Wildland Fire Prevention Task Force: The tasks assigned to the Task Force by the legislature are to advise the department on the following issues:

a) Developing, for consideration by the department and individual electric utilities, a model agreement for managing danger trees and other vegetation that pose a risk of wildland fire and associated utility liability due to the proximity to electrical transmission wires and other utility equipment;

b) Assist the department with the distribution of the model danger tree management agreement developed in (a) to utilities for their consideration for execution with the department;

c) Developing communication protocols and educational exchanges between the department and electric utilities for identifying and addressing issues relating to utility infrastructure to reduce the risks of wildland fires;

d) Developing protocols, including thresholds, for implementing the relevant provisions of RCW 76.04.015 when the department's investigation involves electric utility infrastructure or potential electric utility liability;

e) Creating rosters of certified wildland fire investigation firms or persons and third-party qualified utility operations personnel who may be called upon by the parties as appropriate; and

f) Other issues brought forward by Task Force members.

Fire Hazard: "Hazard" is based on the physical conditions that give a likelihood that an area will burn over a 30 to 50-year period without considering modifications such as fuel reduction efforts.

Fire Risk: "Risk" is the potential damage a fire can do, to the area under existing conditions, including any modifications such as defensible space, irrigation and sprinklers and ignition resistant building construction which can reduce fire risk. Risk considers the susceptibility of what is being protected.

Fire Season: 1) Period(s) of the year during which wildfires are likely to occur, spread, and affect resource values sufficiently to warrant organized fire management activities. 2) A legally enacted time during which burning activities are regulated by state or local authority.

Fire Weather Watch: A term used by fire weather forecaster to notify using agencies, usually 24 to 72 hours ahead of the event, that current and developing meteorological conditions may evolve into dangerous fire weather.

Hardening: Modifications to electric infrastructure to reduce the likelihood of ignition and improve the survivability of electrical assets.

Hazard Tree: A specific type of danger tree that poses a greater likelihood of causing damage to electric power lines or equipment. In this case, the tree is structurally unsound and positioned in such a way that it could fall onto conductors.

Industrial Fire Precaution Level (***IFPL):*** Activated when needed during the summer fire season, IFPL are an activity closure system to reduce wildfire risk. By law (WAC 332-24-301), it applies to woods workers and other industrial forest users on 13 million acres of unimproved private, federal, and state forestlands protected by the WADNR, BLM or USFS. Levels range from Level-1 to Level-4.

Landscape: Refers generally to the area of interest in a project or study and could refer to modeled or on-the-ground conditions.

National Fire Danger Rating System (NFDRS): A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels. It combines the effects of existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's fire protection needs.

Raster: An array or regular grid of square cells used to store data. Raster data is made up as a matrix of pixels, also referred to as cells in much the same way as you might find when working within a spreadsheet. They are often square and regularly spaced on a field divided into a grid of squares with each square representing a value which can be discrete (e.g. soil type) or continuous (e.g. elevation).

Recloser: Recloser is a device that is used in over-head distribution systems to interrupt the circuit to clear faults. Automatic reclosers have electronic control senses and vacuum interrupters that automatically reclose to restore service if a fault is temporary. There are several attempts that may be made to clear and reenergize the circuit and if the fault still exists the recloser locks out. Reclosers are made in single-phase and three-phase versions and use oil or vacuum interrupters.

Red Flag Warning (RFW)[16]: A term used by fire- weather forecasters to call attention to limited weather conditions of importance that may result in extreme burning conditions. It is issued when it is an on-going event, or the fire weather forecaster has a high degree of confidence that Red Flag criteria will occur within 24 hours of issuance. Red Flag criteria occurs whenever a geographical area has been in a dry spell for a week or two, or for a shorter period, if before spring green-up or after fall color, and the National Fire Danger Rating System (NFDRS) is high to extreme and the following forecast weather parameters are forecasted to be met:

- A sustained wind average 15 mph or greater;
- Relative humidity less than or equal to 25%, and;
- A temperature of greater than 75 degrees Fahrenheit

In some states, dry lightning and unstable air are criteria. A Fire Weather Watch may be issued prior to the RFW.

Remote Automatic Weather Station (RAWS): an apparatus that automatically acquires, processes, and stores local weather data for later transmission to the GOES Satellite, from which that data is retransmitted to an earth-receiving station for use in the national Fire Danger Rating System.

Right-of-Way (ROW): The corridor of land under (and adjacent to) a transmission or distribution line.

16 Source: https://w1.weather.gov/glossary/index.php?word=Red%20Flag%20Warning

Risk: A measure of the probability and severity of adverse effects that result from exposure to a hazard.

Substation: Part of the electrical generation, transmission and distribution system, substations transform voltage from high to low, or the reverse, or perform any of several other important functions. Between the generating station and consumer, electric power may flow through several substations at different voltage levels. A substation may include transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two different transmission voltages.

Summer Fire Rules (DNR): Washington's "summer fire rules" are in effect April 15 through October 15. These rules apply to the 13 million acres of private and state forestlands protected from wildfire by the Washington Department of Natural Resources.

These regulations affect loggers, firewood cutters, land clearers, road builders, heavy equipment operators, off-road motorcyclists, and others. During fire season, people using motorized equipment in the woods must have approved spark arresters and follow fire safety precautions. In addition, those working in the woods must have fire prevention and extinguishing equipment in good working order at the job site and workers trained in proper use.

The rules are intended to prevent forest fires and to extinguish small fires before they spread to the forested lands. These rules restrict cigarette smoking in forested areas to roads, gravels pits, or other clearings and prohibit lighting fireworks on forestland.

Transmission System: The bulk delivery of electrical energy from a generating site to an electrical substation. While Skamania PUD does not currently own any transmission system assets, BPA does operate several transmission lines in the county.

UAV: An unmanned aerial vehicle is a powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely.

Vegetation: Trees, shrubs, and any other woody plants.

Vegetation Management: A broad term that includes tree pruning; brush removal through the use of power saws and mowers; the judicious use of herbicides and tree growth regulators; hazard tree identification and removal; the implementation of strategies to minimize the establishment of incompatible species under and near power lines; and the control of weeds.

Wildfire: Also called wildland fire, an unplanned, uncontrolled fire in a forest, grassland, brushland or land sown to crops.

Wildfire Mitigation Plan (WMP): A comprehensive plan to reduce the threat and severity of wildfire within an electric utility's service area. Plans include the preventive strategies and programs adopted by the utility to minimize the risk of its facilities causing wildfires along with its emergency response and recovery procedures.

Wildlands: Forests, shrub lands, grasslands, and other vegetation communities that have not been significantly modified by agriculture or human development*. A more specific meaning for fire managers, used by the National Wildfire Coordinating Group (which coordinates programs of participating wildfire management agencies nationwide), refers to an area in which development is essentially non-existent (except for roads, railroads, power lines, and similar transportation facilities); structures, if any, are widely scattered.

Wildland Urban Interface (WUI): Line, area, or zone where structures and other human development meet or intermingle with vegetative fuels in wildlands.

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Appendix B: Acronym Glossary

ANSI	American National Standards Institute
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
BPA	Bonneville Power Administration
CSR	Customer Service Representative
DEM	Department of Emergency Management
DNR	(Washington) Department of Natural Resources
EOC	Emergency Operation Center
GM	General Manager
HFTA	High Fire Threat Area
IFPL	Industrial Fire Protection Level
KV	Kilovolt
KWH	Kilowatt Hours
LDE	Line Down Event
LS	Line Superintendent
MW	Mega Watts
MVCD	Minimum Vegetation Clearance Distance
NESC	National Electric Safety Code
NFDRS	National Fire Danger Rating System
NF	National Forest
OH	Overhead
OEM	Office of Emergency Management
PUD	Skamania County Public Utility District #1
PSPS	Public Safety Power Shutoff
PM	Project Manager
QA	Quality Assurance
QC	Quality Control
RAWS	Remote Automated Weather Station
RFW	Red Flag Warning

ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
TF	Tree Foreman
UG	Underground
USDA	United States Department of Agriculture
USFS	United States Forest Service
VM	Vegetation Management
WA	Washington State
WDFW	Washington Department of Fish and Wildlife
WHP	Wildfire Hazard Potential
WMP	Wildfire Mitigation Plan
WUI	Wildland Urban Interface