CENTRAL LINCOLN PEOPLE'S UTILITY DISTRICT

2022

WILDFIRE

MITIGATION PLAN

CENTRAL LINCOLN
A COMMUNITY-OWNED ELECTRIC UTILITY

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Transmission line serving the northern portion of Central Lincoln's service area

1. INTRODUCTION

In recent years, the west has experienced exceptional wildfire seasons in terms of both destruction and duration. According to wildfire historians, the 2018 Camp Fire in Northern California was the deadliest wildfire in the United States in over a century and the most destructive in California history. The cause of the Camp Fire was determined to be Pacific Gas & Electric power lines – capturing the attention of utilities, policymakers and stakeholders alike.

In Oregon, not only has the wildfire season increased from five months to seven months in the last two decades, but wildfires are becoming more frequent and severe. In 2020, fueled by a combination of drought, high temperatures, low humidity, and easterly winds, Oregon experienced catastrophic and deadly wildfires throughout the state, including in coastal areas.

In this new era of wildfire risk, Oregon utilities are keenly aware that they must document their assessment, mitigation and response strategies for potential fire risk, as well as, adopt new approaches and tools to address this growing concern. This Wildfire Mitigation Plan (WMP) attempts to document those efforts for the Central Lincoln People's Utility District (Central Lincoln).

1.1 Policy Statement

Central Lincoln's overall goal is to provide safe, reliable and affordable electric service to its communities. To that end, Central Lincoln strives to design, construct, operate and maintain its electrical lines and equipment in a manner that minimizes the risk of wildfire ignition.

1.2 Purpose

The Wildfire Mitigation Plan describes the wildfire risk assessment process, mitigation strategies, and response protocols used to minimize the probablility of wildfire ignition from Central Lincoln's power lines and/or electrical equipment.

1.3 Objectives

The primary objectives of this Wildfire Mitigation Plan are to:

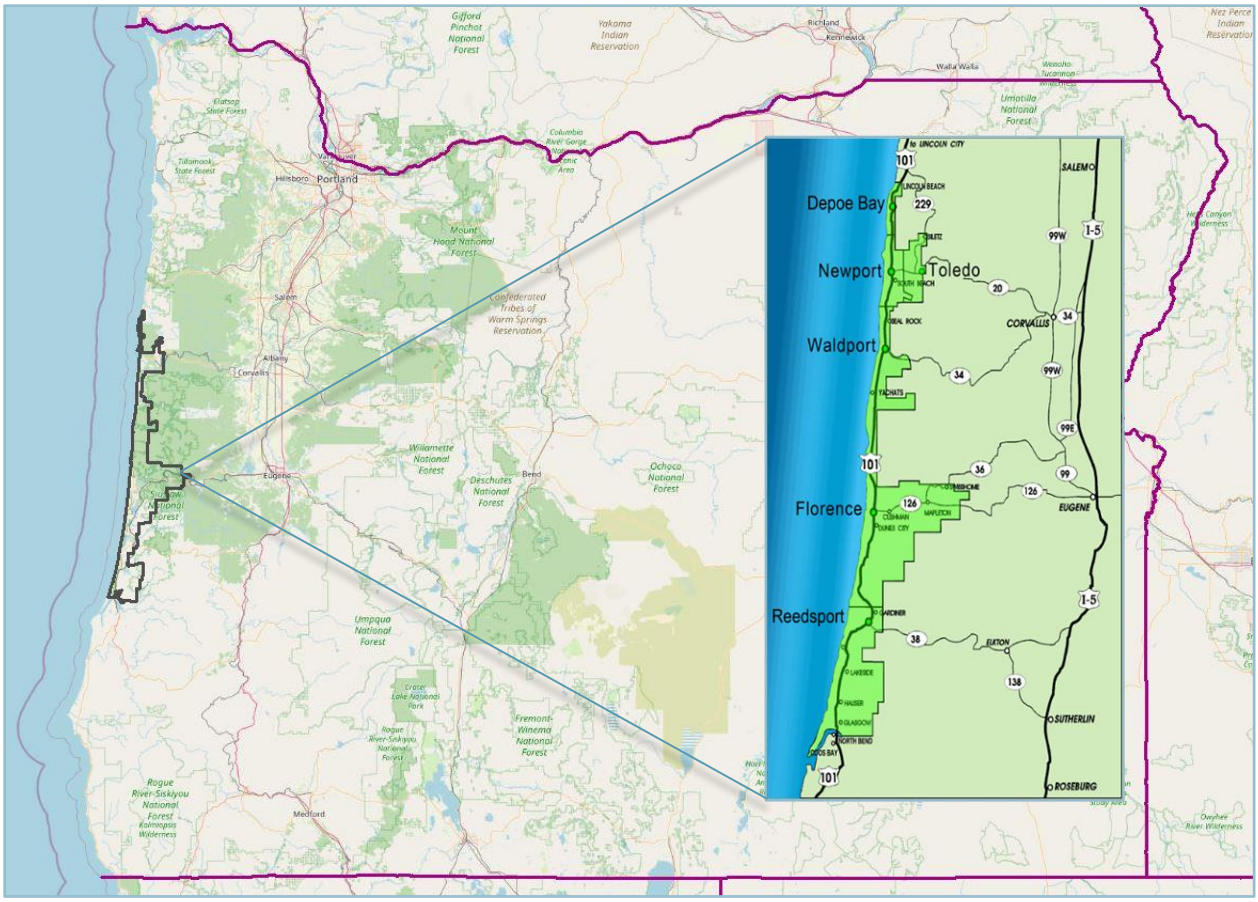
- Ensure public safety through ongoing assessment of potential wildfire risk from utility systems and implemention of strategies to mitigate those identified risks.
- Minimize fire ignitions from fault events by designing, constructing, operating and maintaining hardened and resilient electric systems.
- Minimize the impacts of a wildfire to the utility and communities served through enhanced situational awareness, operational readiness, and effective response strategies.

Sweet Creek Fire, east of Florence, August 2020

2. UTILITY PROFILE

Central Lincoln People's Utility District (Central Lincoln) is a consumer-owned utility serving portions of Lincoln, Lane, Douglas and Coos counties through more than 40,000 service points. Central Lincoln is a Special District of the State of Oregon and governed by an elected five-member board.

Figure 1 – Central Lincoln's service area covers one-third of the Oregon coastline



2.1 Service Area

The service area is approximately 700 square miles and encompasses a 120-mile stretch of the central Oregon coast varying in width from one to 25 miles. The service territory is comprised of extreme variations in terrain elevation, dense vegetation, corrosive salt air, and frequent winter occurrences of high winds and heavy rain.

To ensure system reliability, the coastal environment requires that Central Lincoln build structures to withstand 100+ mph winds; utilize galvanized steel, stainless or marine grade aluminum on all external metals; and use weather tight control cabinets with heaters, thermostats and vents to prevent condensation and marine air contamination. Coastal conditions have also compelled the utility to deploy its own robust fiber network in order to have reliable two-way communication with devices from the substation to the customer meter. Two-way communication allows operators to monitor and control field devices for reliability and safety.

2.2 Electric System

Central Lincoln is a BPA load-following utility that takes delivery of energy at two primary points. The single delivery point in the northern half of the district is the BPA Toledo substation. Through this delivery point, BPA supplies electricity to more than half of all Central Lincoln's customers as well as one large industrial customer that accounts for approximately 40% of the utility's overall load.

In the southern half of the district, BPA's Wendson and Fairview substations are the primary delivery points and feed eight secondary metering points at Florence, Mapleton, Berrydale, Gardiner, Reedsport, Lakeside, Hauser and Glasgow.

BPA supplies the utility's northern division at 69kV and the eight southern division substations at 115kV. Central Lincoln is a winter peaking utility at approximately 250-270 megawatts.

2.3 Asset Overview

Figure 2 – Central Lincoln's infrastructure includes transmission, distribution and fiber

Asset	Quantity
Substations – includes power transformers, disconnect switches, circuit breakers, capacitors, voltage regulators, protective devices, relays, communication equipment and a control building	31
Transmission and Distribution Pole Structures – includes cross arms, braces, insulators, distribution transformers, voltage regulators, switches, line protective devices, capacitors, trip savers, communication equipment and lighting	21,892
Surface Structures – includes pad mount transformers, switch stands, junction boxes and underground distribution vaults	15,952

Asset	OH circuit miles	UG circuit miles
Total Transmission Lines	336	3
69kV Transmission	259	3
115kV Transmission	77	0
Total Distribution Lines	2335	1499
Primary Distribution	2019	1185
Secondary/Service Wire	316	314
Total Fiber Optic Cable	99	195

2.4 Fire Protection Zones

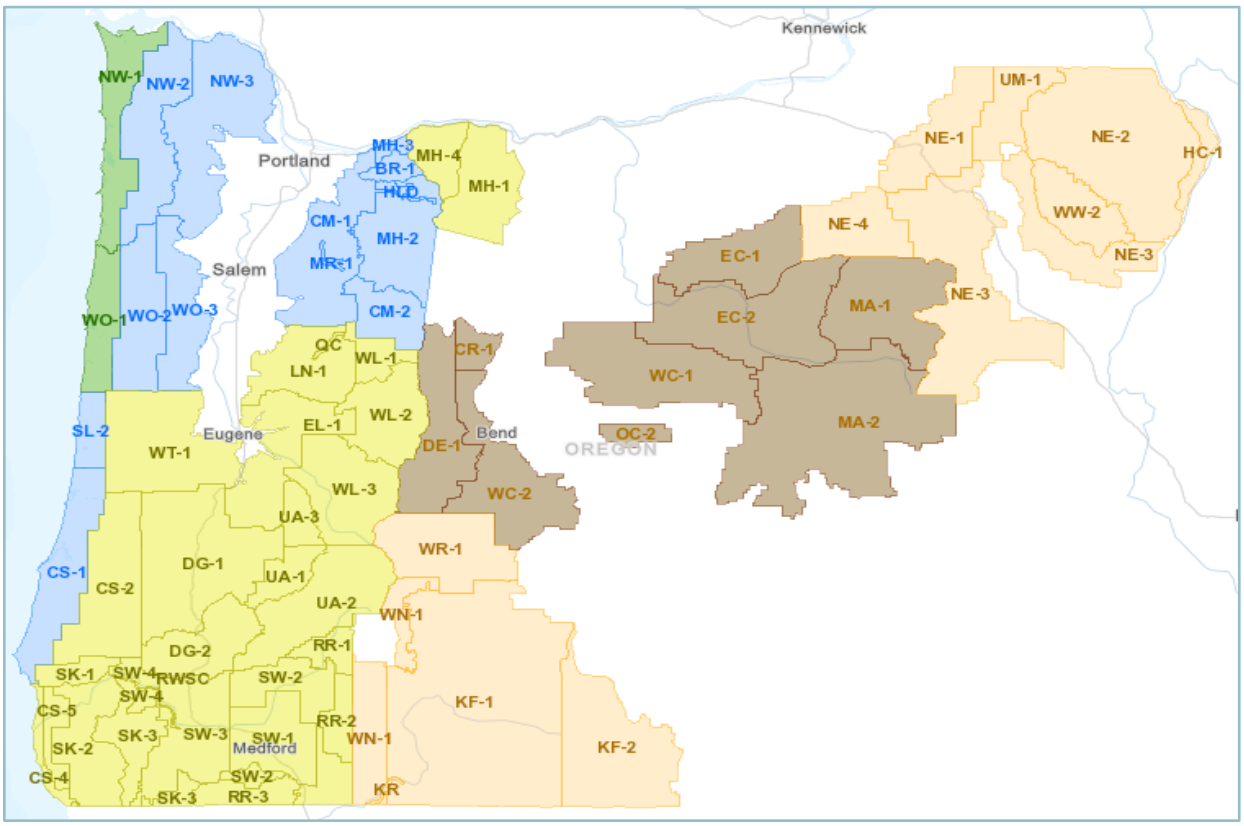
Central Lincoln's service area is situated within four Industrial Fire Precaution Level (IFPL) zones including WO-1, SL-2, WT-1 and CS-1. The Oregon Department of Forestry (ODF) establishes industrial use restrictions for zones WO-1, SL-2, and WT-1; while the Coos Forest Protective Association (CFPA) sets the restrictions for zone CS-1.

IFPL restrictions are primarily based on climatic conditions (temperature, wind speed, relative humidity and likelihood of lightning) as well as local topography, fuel (vegetation) and wildfire resource availability. Each precaution level specifies those activities that are permitted as well as prohibited, and are labeled as:

- IFPL 1 – Fire Season
- IFPL 2 – Limited Shutdown
- IFPL 3 – Restricted Shutdown
- IFPL 4 – Complete Shutdown

During wildfire season, the IFPL restrictions may change daily. Central Lincoln's operations supervisors, field personnel and contractors must be aware of the changing restrictions in each zone and shift work protocols as required by each zone authority. For situational awareness, operations supervisors must communicate and coordinate with three wildfire management offices: ODF-Toledo for zones WO-1 and SL-2; ODF-Veneta for WT-1; and, CFPA-Coos Bay for CS-1.

Figure 3 - Oregon Industrial Fire Precaution Level (IFPL) Zones



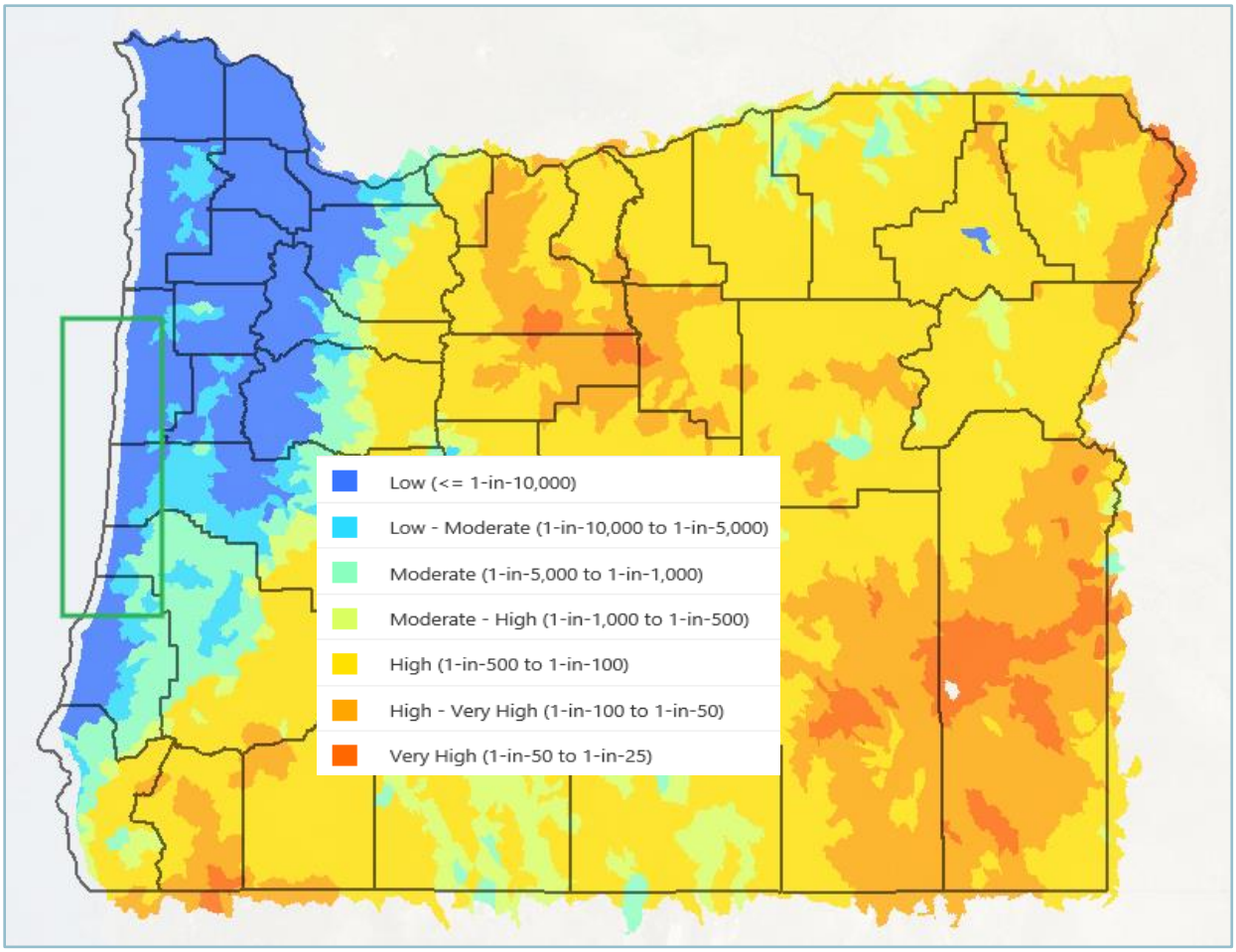
3. RISK PROFILE

> **"Nearly all areas in Oregon experience some level of wildfire risk.** Conditions vary widely with local topography, fuels, and local weather, especially local winds. In all areas, under warm, dry, windy, and drought conditions, expect higher likelihood of fire starts, higher fire intensities, more ember activity, a wildfire more difficult to control, and more severe impacts. "
>
> *Oregon Wildfire Risk Explorer*

3.1 Burn Probability

Burn probability shows the annual likelihood of a wildfire greater than 250 acres occurring. The analysis takes into consideration weather, topography, fire history, fuel (vegetation), and disturbed fuels from large wildfires dating back to 2013. Based on historical data, areas within Central Lincoln's service territory have a burn probability that varies from Low to Moderate.

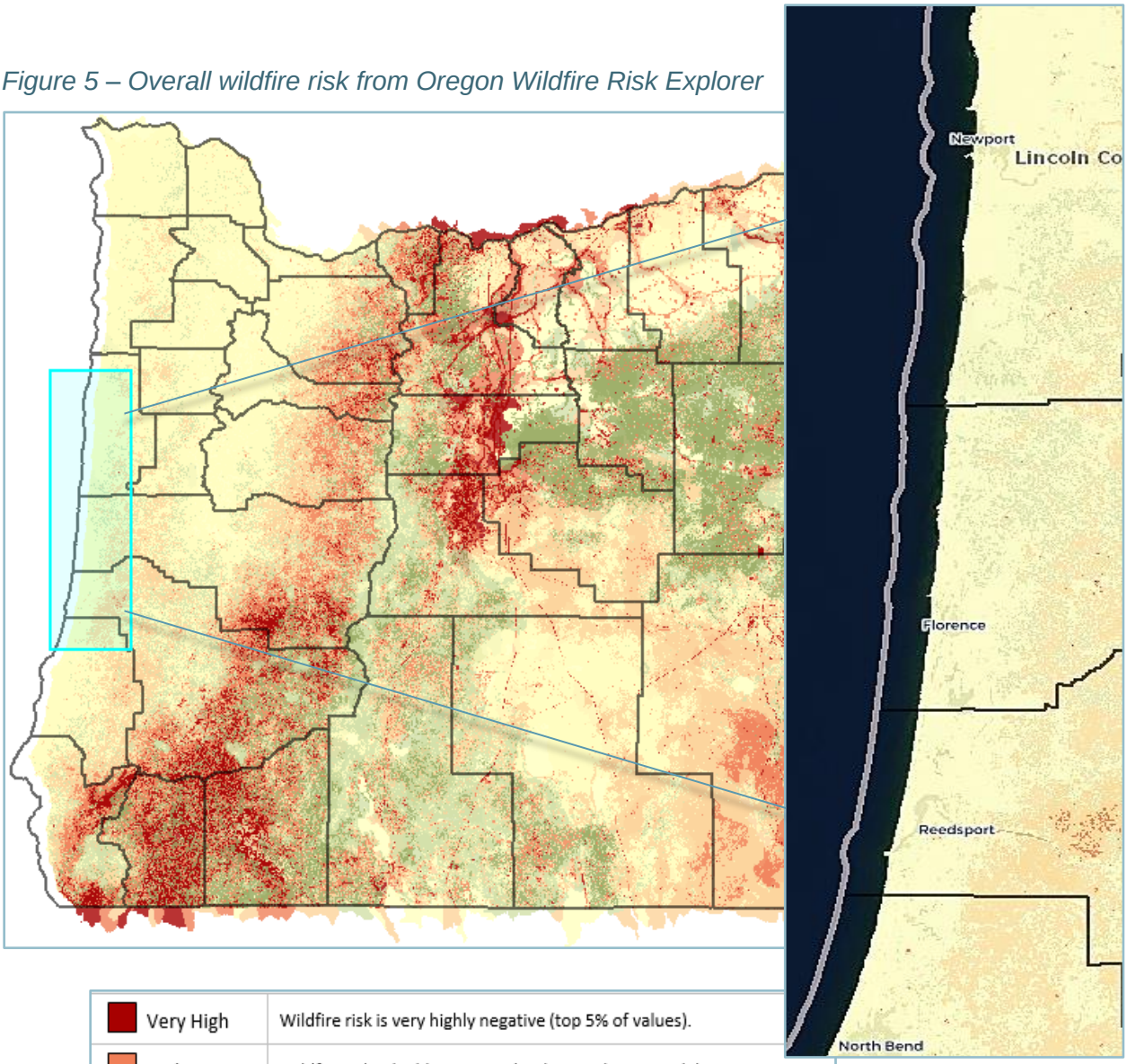
Figure 4 - Burn probablility from Oregon Wildfire Risk Explorer



3.2 Overall Wildfire Risk

Overall Wildfire Risk is the product of the **likelihood** and **consequence** of wildfire on all mapped highly valued resources and assets combined: critical infrastructure, recreation, housing, orchards, sawmills, historic structures, timber, municipal watersheds, vegetation, and wildlife habitat.

Figure 5 – Overall wildfire risk from Oregon Wildfire Risk Explorer



Very High	Wildfire risk is very highly negative (top 5% of values).
High	Wildfire risk is highly negative (80th to 95th percentile).
Moderate	Wildfire risk is moderately negative (50th to 80th percentile).
Low	Wildfire risk is slightly negative (29th to 50th percentile).
Low Benefit	Wildfire is slightly beneficial (14.5 to 29th percentile).
Benefit	Wildfire is beneficial overall (0-14.5th percentile).
Non-burnable	There are no highly valued resources or assets mapped in the area, or it is considered non-burnable (urban, agriculture, etc.).

3.3 Identified Risks

Central Lincoln categorizes the potential causes for electric system sparks and ignitions from its overhead system into four general areas:

- Contact from Objects (including vegetation)
- Equipment Failure
- Wire to Wire Contact
- Other

3.3.1 Contact from Objects

As with most electric utilities, Central Lincoln's overhead power lines are installed as bare wire on top of insulated poles and structures. Depending upon the voltage level and applicable design criteria, the lines are kept a specified distance from the ground and from adjacent objects to prevent contact and faults. However, with approximately 2,700 circuit miles of overhead lines traversing Central Lincoln's service area, contact from objects are anticipated and can occur throughout the year.

Vegetation: The central Oregon coast receives approximately 75 inches of annual rainfall; as a result, much of Central Lincoln's service territory is densely forested. Vegetation contacts, as a result of tree failure, tree growth, and wind-blown branches, make up roughly 50% of all Central Lincoln's outages. Trees from inside and outside of the right of way come in contact with power lines and can potentially cause sparks or arcs. In most cases, wet conditions prevent fire ignition. However, there are instances where the contact is large enough to cause a conductor or pole to fail, leading to wires falling to the ground and creating a potential for fire ignition. In other instances, a tree or branch may lean or grow into the power line resulting in a continual burn at the point of contact.

Vehicles: Vehicular contact with poles or supporting guy wires can damage or break the pole. The heavy, broken pole in turn can put stress on the conductor or cross arms and cause wires to break and fall to the ground, potentially causing sparks and arcs.

Wildlife, Kites and Balloons: Birds and animals, as well as highly conductive kites and mylar balloons, are all objects that can make contact with the power lines and cause sparks and arcs. While protection equipment such as circuit breakers, reclosers and fuses are installed to isolate the faults, there are time delays (fraction of a second) from when the equipment senses the fault and isolates the faulted section. In that time delay, sparks may be emitted or burnt objects dropped to the ground causing fire ignition near the pole or under the power line.

3.3.2 Equipment Failure

Central Lincoln employs a robust maintenance program for system and field equipment to ensure reliability at all times. However, the inherent aging of equipment, as well as environmental conditions, wear on the utility's equipment and can eventually cause it to fail. The salt air at the

coast is particularly corrosive to equipment. Salt can accumulate on equipment such as insulators, creating an unintended path for electricity to flow, burning the insulator, and causing a fault.

Failed equipment components such as connectors and insulators can result in wire failure, causing the energized conductor to fall to the ground, and potentially emit sparks prior to the breaker or fuse tripping. Other equipment such as transformers can have internal shorts, causing the fuse to open which can produce sparks and could ignite a fire under the right conditions.

3.3.3 Wire-to-Wire Contact

Overhead transmission and distribution lines are generally constructed using up to four conductor wires. When two or more energized conductors make wire-to-wire contact, sparks can occur prior to the breaker or fuse tripping, creating the potential for fire ignition.

Wire-to-wire contact caused by trees falling into a conductor can cause two lines to touch resulting in sparks and arcs. A vehicle hitting a pole can also put two conductors in contact and create the potential for fire ignition. Central Lincoln's service area frequently experiences high winds. The utility's overhead lines are designed to meet these windy conditions; though rare, it is still possible to have wire-to-wire contact due to high winds.

3.3.4 Other

Fire ignitions involving Central Lincoln's power lines can be caused by contacts from property owner equipment or contractors. Even though property owners and contractors take precautions, their equipment can come into contact with power lines and cause sparking. The unintentional contact may cause damage to power lines, poles and supporting equipment, which may in turn cause sparks and fire ignition.

Central Lincoln vehicles and tools can be a source of sparks or fire ignition. Crews working in remote areas and driving vehicles over dry grass or brush can cause the vegetation to ignite. Crews using gas powered tools and light powered equipment can also cause sparks if dry conditions exist.

Central Lincoln's equipment and power lines can also be vandalized and damaged. Depending on the extent of the damage, the damaged equipment can cause sparks, arcs or fire ignition.

4. RISK ASSESSMENT

In recent years, electric utilities in the west have experienced the impacts of increasingly variable and extreme weather events – most notably wildfire. These experiences highlight the need for utilities to fully explore the wildfire risks surrounding its distribution and transmission systems. Further, the need to mitigate for those risks is underscored by the public expectation that "lights will remain on" during extreme events and fire starts will not emanate from utility facilities.

Like other small rural utilities, Central Lincoln is aware of the need to act on wildfire risk management planning despite the lack of an industry framework and operational specifics. Before incorporating wildfire risk strategies into utility system planning, an assessment of the distribution and transmission systems was necessary. Central Lincoln opted to use in-house experienced personnel to complete its initial distribution and transmission wildfire risk assessments.

4.1 Distribution

Central Lincoln's service territory is densely forested with the exception of those areas nearest the beach. As a result, more than half of all the utility's outages are related to vegetation coming into contact with conductor lines - either due to plant growth or windblown trees and limbs. Generally, high winds experienced during the winter months coincide with heavy rain, minimizing the risk of fire ignition from vegetation contact. However, summer months can be dry and windy in the inland portion of the service area creating a potential for fire starts.

Central Lincoln recognizes the impact wildfires can have on communities and the local economy and has sought to identify those areas with the highest risk of wildfire from vegetation contacts using a systematic and cost-effective approach. Staff developed a risk assessment process that gives consideration to the unique characteristics of the service territory including dense vegetation, challenging terrain, high winds and multiple rural residential areas. The assessment process engaged experienced Central Lincoln personnel to quantitatively evaluate the potential wildfire risk for each overhead distribution feeder within the service area.

4.1.1 Distribution Feeder Risk Analysis

Subject matter experts (SME) within the utility completed a risk analysis *(figure 5)* using system and publicly available data, as well as, personal field experience. Each feeder was scored based on an evaluation of six conditions within the feeder area – from substation to service drop. Criteria for low, moderate and high risk levels were provided as a general guide for scoring (*figure 6)*. Additionally, the lead SME worked with the evaluators to ensure scores were applied consistently across the district. The risk analysis overall scores were subject to two rounds of peer review.

Upon completion of the risk analysis, feeders with the highest overall scores were prioritized for mitigation, either for additional vegetation maintenance or for inclusion in the utility's multi-year undergrounding plan. Additional vegetation management resources, in the form of contract crews, were allocated to increase the frequency of cycle trimming in the feeder right-of-ways beginning in FY22.

Figure 5 – Sample score sheet used to complete the risk analysis

1-Low 2-Moderate 3-High		Substation 777			Substation 888			Substation 999		
CONDITIONS AT FEEDER	**SOURCE**	**777** F11	**777** F12	**777** F13	**888** F11	**888** F12	**888** F13	**999** F11	**999** F12	**999** F13
Vegetation (species, growth rate, density)	patrol	1	1	1	1	1	2	3	3	3
Accessibility (terrain, ingress)	patrol, maps	1	1	1	1	1	1	2	2	3
Outages (attributed to vegetation)	OMS	1	1	1	1	1	3	2	3	2
Fire season weather (dryer/warmer, fuel moisture)	NWS data	1	1	2	1	1	2	3	3	3
Distance (to firefighting resources)	maps	1	1	1	1	1	2	2	2	3
Impact of wildfire (residential and/or critical infrastructure)	CIS	1	2	3	3	2	2	3	2	2
Overall Score		6	7	9	8	7	12	15	15	16
Reference Data										
Outages (2019-21 # of incidents due to vegetation)	OMS	4	15	5	1	8	40	30	48	6
Meters (total number)	CIS	134	349	786	465	132	22	967	388	210

Figure 6 - Criteria used to evaluate current conditions at each overhead distribution feeder

CONDITIONS AT FEEDER	Scoring Criteria – may not meet all measures listed		
	1- Low Risk	2 – Moderate Risk	3 – High Risk
Vegetation (species, growth rate, density)	• slow growing • not in lines	• moderate growing • some areas in lines • needs spot trimming	• fast growing • multiple areas in lines
Accessibility (terrain, ingress)	• relatively flat • paved roads	• some hills/ravines • some parking • moderate access	• steep or ravine • areas unpaved • minimal parking
Outages (due to windblown or growing vegetation)	• 0-29 outages	• 30-55 outages	• 56-131 outages
Fire Season (weather dryer/warmer, fuel moisture)	• mostly IFPL-1 days (fire season) • some IFPL-2 days (limited shutdown)	• multiple IFPL-2 days (limited shutdown) • few IFPL-3 days (restricted shutdown)	• multiple IFPL-3 days (restricted shutdown) • some IFPL-4 days (complete shutdown)
Distance (to firefighting resources)	• 0-5 miles • feeder primarily in town	• 5-10 miles • parts of feeder in rural area	• more than 10 miles • most of feeder in rural area • parts of feeder in inaccessible area
Impact of wildfire (residential and/or critical infrastructure)	• few residents • no critical infrastructure (utility or community)	• multiple residents • some critical infrastructure (utility or community)	• heavily populated • critical infrastructure (utility or community)

4.1.2 Next Steps - Distribution

A risk assessment of the district's overhead feeders was an important first step toward a more strategic approach to vegetation management as well as forwarding wildfire mitigation efforts. The risk assessment process - more specifically, the risk analysis, provided valuable information to assist in identifying and prioritizing areas of potential fire risk for near and longer term planning. Going forward, the Central Lincoln's efforts include:

Near term:

- Feeders with the highest risk scores will be prioritized for trimming and clearing in the next three fiscal years.
- Feeders with high risk scores, that also experience other issues, will be evaluated to determine if it is more cost-effective to underground or relocate sections of the line.
- Tree trimming resources will be increased in the next fiscal year to help reset and increase the frequency of the district's trim cycle.

Distribution lines in Central Lincoln service area

Longer term:

- Wildfire risk will be added to the utility's systemwide vulnerability risk assessment which currently considers earthquake and flooding risks for its transmission, distribution and communication systems.
- Staff will explore adopting a comprehensive vegetation management assessment program that leverages LiDAR imagery, drone photography and/or GIS layers to assist in inspections as well as documents vegetation clearance year over year.
- Staff will explore ways to enhance vegetation crew efficiency in the field through access to data on mobile devices. Data may include job site location, GIS maps, detailed work plans, maintenance and inspection history, and relevant customer or landowner information. Time-on-task data and photos of completed work could be captured by crews and used to assist in planning future work and as a resource for FEMA reporting, should it be needed.

4.2 Transmission

Central Lincoln inspects its transmission lines using a combination of aerial (helicopter) and ground patrols. Aerial transmission line inspections occur annually and are supplemented by ground patrols in areas where they are deemed more effective. The aerial and ground inspections provide information on the conditions within a transmission right-of-way and inform where vegetation clearing is needed as well as infrastructure maintenance.

To date, routine vegetation clearing in the transmission right-of-ways has been determined by the utility's ten-year pole test and treat cycle. A transmission right-of-way is cleared every ten years in order to provide access for the pole inspections. Off-cycle vegetation clearing of the right-of-ways and access roads is performed when access is required for maintenance work or pole replacements.

4.2.1 High Level Transmission Risk Assessment

Over time, the ten-year trim cycle, coupled with a need-based approach to vegetation clearing, has caused some transmission right-of-ways and access roads within the service area to become overgrown. After the 2020 fire season, staff sought to determine whether the utility's current maintenance approach for transmission right-of-ways met the desired level of access and line clearance to mitigate for wildfire.

Central Lincoln SMEs performed a high-level qualitative review of each transmission line section using personal experience and information from aerial and ground patrols *(figure 7).* The review considered:

- The condition of the access road to the transmission structures as well as the accessibility and terrain in the wire zone (between structures);
- The vegetation growth under the line, on the sides, and at the base of structures; and,
- The ability to serve customers through an alternate line in the event of a wildfire.

Figure 7 – Sample assessment used to capture risk level for each transmission line section

Transmission Line	Access		Vegetation		Wildfire Impact	
	Road	Wire Zone	Side Growth	Under Growth	Radial	Dbl. Circuit Loop Feed
L1 101-102						
L1 102-106						
L1 106-108						
L3 107-137						
L3 131-137						
K8 241-BPA						
K9 224-228						
K9 steel						

Minimal or Isolated Risk | Moderate or Amplified Risk | Major or High Impact Risk

4.2.2 Next steps - Transmission

After review of the transmission system, Central Lincoln determined that it was necessary to increase the frequency of vegetation clearing for the transmission right-of-ways and access roads. In order to reset the cycle, additional resources are required during the initial "catch-up" years as the utility continues need-based maintenance and corrective work while increasing its cycle trimming efforts.

- The utility has committed resources, in the form of additional contract crews, to transition from its 10-year cycle to a 4-year trim/mow cycle, beginning in FY21.
- The Pole Test and Treat schedule will be changed from a 10-year cycle to an 8-year cycle in order to coordinate with the new 4-year trim/mow schedule, ensuring easy access to structures when needed.

Aerial trimming of Central Lincoln's transmission right-of-way

Transmission and Distribution – Incremental Approach

Central Lincoln manages vegetation clearing for its transmission and distribution systems separately. Adding resources to enhance vegetation clearing for both sectors will be done incrementally to balance the need to act on wildfire mitigation with the need to deliver affordable electricity to customers.

5. MITIGATION STRATEGIES

Central Lincoln uses a variety of proactive measures to mitigate for fire ignitions on its transmission and distribution systems. The mitigation strategies for wildfire prevention intersect with the utility's engineering principles and operating policies for overall system resiliency.

5.1 System Hardening

Central Lincoln systems are designed and constructed for coastal conditions including high winds, heavy rain and corrosive salt air. The utility's robust construction standards not only address extreme weather conditions, they also mitigate for potential fire ignitions from wire-to-wire contact due to high winds, failed equipment due to corrosion, and arcing due to salt contamination. The utility's system hardening strategies are summarized below:

5.1.1 Transmission

- Pole structures are designed to exceed wind loading standards.
- Hot dipped galvanized steel poles are used to address corrosion issues.
- Heavier than required cross arms are used to address wind load.
- Heavier than required all-aluminum alloy conductor wire is used to address wind loading as well as corrosion.
- Overhead wire spacing is increased to reduce wire to wire contact in high winds.
- Corrosion resistant materials are used on all structure attachments and components.
- Circuits are over insulated to reduce tracking and potential fire ignition due to salt contamination.
- 75% of transmission lines are looped and have an alternate route for overall resilliency.

5.1.2 Distribution

- Larger class poles and shortened span lengths are used to address high winds.
- 600 amp conductor is used for enhanced capacity and minimal line loss.
- Conductors are installed with extra ground and tree clearance for wind and loading.
- Circuits are over insulated to reduce tracking and potential fire ignition due to salt contamination.
- Stainless steel is used for overhead transformers, pad-mount transformers and cutout brackets to address corrosion.
- Pressed or compressed connections are used to mitigate for corrosion.

- Covered (insulated) service wire is used throughout the district. The covered wire is designed to withstand inadvertent contact with vegetation or other objects without fire ignition.
- Overhead lines are undergrounded in areas prone to repeated outages due to high winds and tree exposure.

5.1.3 Substations

- Perimeter fencing is installed at all sites for substation security and public safety.
- Defensible space is maintained around substation perimeter fencing for fire mitigation.
- On-site cameras are used to monitor substation property for security and hazards.
- Fire suppression systems are currently being installed in substation control houses located in higher fire-risk areas.
- Main and auxiliary bus configurations are used for all-hazard resiliency.
- A line differential protection scheme is used at the breakers to monitor and protect the line, locate faults remotely, and perform circuit isolation without customers experiencing an outage.
- Relays are standardized for ease of operation, maintenance and integration with other devices.
- A fiber optic network connects all utility operations, substations and communication tower sites, ensuring SCADA-enabled control and high-speed communication between devices. The utility's fiber network has physical redundancy ensuring reliability during critical events.

Central Lincoln crews construct and maintain the utility's substations

5.2 System Protection

5.2.1 Non-reclose Settings

Under normal operating conditions, the utility's reclosures are set to open and close three times for incidental faults (such as an object blowing into the line) before opening for a more significant fault. During high fire-risk days, SCADA can be used to remotely set the relays to a type of non-reclose which the utility calls its "wildfire setting." The wildfire setting disables the reclosing function so contacts with the conductor result in de-energization. While disabling the reclose function does not fully eliminate ignition events from contacts with the line, it does reduce the number of potential ignitions (sparks).

The wildfire setting retains the function to coordinate in-series devices for the purpose of opening the device closest to a fault. Opening the device closest to a fault confines the outage to a small section of the line rather than de-energizing the entire line. This functionality allows operators to continue to monitor and control the portion of the line that remains energized. The de-energized portion of the line must be inspected by ground patrols for vegetation contacts or equipment failure before it is re-energized. The wildfire setting minimizes the amount of crew time required to fully inspect the de-energized section and minimizes the number of customers who experience an outage.

The wildfire setting is in contrast to the utility's "one-shot" (non-reclose) setting which disables reclosing and removes the functionality to coordinate in-series devices. The one-shot setting is used for worker safety when crews are working near or on the line. With one-shot, the entire line is de-energized and must be inspected before it is re-energized. Ground level inspection of a de-energized line may take hours to days to complete depending on the length of the line and location. In a wind event, if there are multiple circuits de-energized, restoration efforts could take days to weeks.

Currently, the one-shot non-reclose setting for all transmission reclosures is available through SCADA. The wildfire setting for distribution reclosures is also integrated into SCADA for all substations with the exception of one undergoing equipment updates.

5.2.2 Non-expulsion Devices

Fuses protect the distribution system from faults and damaged lines and equipment. Conventional fuses, when operated, expel hot particles and gases, which can ignite fires. Central Lincoln primarily uses conventional expulsion fuses to protect its overhead circuits. However, system engineers are assessing current-limiting fuses and cut-out mounted reclosers that could be used to replace some expulsion fuses on overhead feeders in high fire-risk areas to mitigate for fire ignitions.

5.3 Operational Tools and Practices

- AMI (advanced metering infrastructure) meters are used to view meter status, monitor voltage at the meter level, measure usage, detect tampering, identify and isolate outages, perform remote connect/disconnects, and provide on-demand reads. The AMI system provides overall situational awareness in real time and allows for a proactive approach to potential fire-ignition issues.
- OMS (outage management system) is used for tracking and responding to outages and system hazards. The OMS captures outage information in near real time from all AMI meters, consolidates field events, and alerts operators to potential issues impacting the system. OMS includes outage location, cause, duration and number of customers impacted. The information is used to plan work and prioritize system upgrades including vegetation maintenance.
- SCADA (supervisory control and data acquisition) is used to monitor, operate and remotely control field devices including substation reclosures to isolate a line or line section.
- Mobile radio repeaters are available for use in the event radio communciation systems fail or in remote areas where radio reception is sporadic. All employees are trained to deploy and use the mobile units that are staged throughout the district.

Employees assemble emergency radio repeaters

- Operations supervisors monitor weather using a variety of sources including NOAA, National Weather Service, weather apps and various websites.
- During fire season, work procedures are adjusted based on the Industrial Fire Precaution Levels (IFPL). Crews carry fire suppression equipment (firefighting tools, water, fire extinquishers) and follow a fire-watch protocol after work is completed. The agency responsible for a given IFPL area inspects utility trucks for fire season tools and equipment.

5.4 Infrastructure Inspection and Maintenance

5.4.1 Transmission

- Aerial inspections of transmission lines are performed annually using helicopters. Inspectors look for safety hazards as well as issues related to pole structures, attachments, insulators and conductor.
- Ground-based inspections of the transmission lines occur every other year. A driving or walking visual inspection is performed using binoculars to detect any damage to the overhead line, structures or attachments. Inspectors are also looking for conductor clearances and hazard trees. A drone assisted inspection may be performed to further investigate an identified issue.
- Combined, aerial and ground-based inspections achieve effective and economical results. The inspections provide information on facility conditions for planning and prioritization of future maintenance work necessary to maintain system reliability as well as mitigate for fire ignition.
- Intrusive inspections (pole test and treat) on the utility's wood transmission poles will be performed on an eight-year cycle, up from the previous 10-year cycle. In the past,10% of all transmission wood poles were tested annually, 12.5% will now be tested. The shorter cycle coincides with the 4-year transmission mowing cycle for right-of-ways and increases the opportunity for proactive maintenance to mitigate for infrastructure failure.
- Steel poles are inspected every ten years for corrosion on the pole and for cracks on the caisson.

Central Lincoln transmission line

5.4.2 Distribution

- Distribution pole and line inspections are performed by contract and in-house crews on a 10-year cycle. Inspectors perform a detailed visual inspection of poles, cross arms, attachments, conductor, service wire, ground rods and any other components associated with the pole as well as communication line and vegetation clearances. The inspectors look for signs of defects, structural damages, broken or loose hardware, sagging lines, condition of conductor, service and ground wires, condition of guy wires and anchors, condition of insulators, fuse holders, disconnects, risers, transformers, reclosers and other equipment as well as any clearance violations. Inspectors use a combination of walking and driving to complete the inspection. The report informs future distribution maintenance work and the capital plan.
- Operations and engineering personnel perform periodic drive by assessments of overhead distribution facilities and equipment and provide information to inform system maintenance.
- During a conductor rebuild, all poles and attachments are replaced at the same time and the inspection cycle is reset for that particular line. In high fire-risk areas, a steel or alternate material pole may replace a wood pole and non-expulsion devices may replace conventional equipment.

5.4.3 Substations

- Equipment cabinets are inspected monthly for water intrusion, corrosion and pest infestation.
- Security perimeter fencing, grounds inside and outside the fence line, control building, signage, fire suppression system and battery banks are inspected quarterly.
- Switches, breakers, insulators, bus, structures and other hardware, as well as lines exiting the substation, are inspected three times a year to ensure all components are in good condition and functioning as intended.
- Transformers that are de-energized undergo a complete inspection of all electrical, relay and bushing components to ensure proper functionality and reliability.
- A 20-foot defensible space beyond the perimeter fence line is maintained with vegetation trimming and clearing. A spray treatment is used to maintain a vegetation-free zone inside the fence line.

5.5 Vegetation Management

5.5.1 Transmission

- Aerial inspections of access roads and transmission line right-of-ways are performed annually using helicopters. Utility personnel look for the condition of access roads, right-of-way encroachments and hazard or danger trees.
- Periodic ground-based inspections of access roads and transmission right-of-ways are performed by utility personnel who are planning for work on the line or structures. Vegetation management work that is required prior to the construction or maintenance project is reported and a service order is generated.
- Information from the aerial and ground-based inspections of transmission line access roads and right-of-ways are combined to determine and prioritize immediate and future vegetation work.
- The utility seeks a clearance of 50 feet on either side of the transmission line with no vegetation overhang. However, 50 feet is not always possible due to the terrain or easement agreements. In those cases, a minimum clearance of 15 feet in all directions is sought with an effort made to remove all overhang.
- Vegetation growth and encroachment for transmission right-of-ways are primarily addressed by the utility's established mow and trim cycle. The mow and trim cycle was recently reset from a 10-year to a 4-year cycle. The more frequent mowing and trimming minimizes the potential for fire-ignitions from vegetation contacts. Central Lincoln uses contracted tree crews to complete the annual mowing and trimming work.
- Helicopter trimming is periodically used to maintain transmission right-of-ways in select areas that are difficult to access and relatively unpopulated.
- Off-cycle trimming is performed prior to construction or maintenance of a transmission line or pole structure replacement, and also after a weather event that resulted in vegetation issues on the access road or in the right-of-way. Off-cycle trimming is performed by in-house tree crews.

5.5.2 Distribution

- Off-cycle inspections of distribution lines occur through notifications from a variety of sources including tree crews doing driveby visual inspections, engineers planning for conductor or pole replacement work, adjacent land owners, first responders, customers, and operations personnel responding to vegetation-related outages or easement issues.
- Off-cycle inspections, in addition to follow-up inspections performed by the right-of-way supervisor, provide the information to determine and prioritize the off-cycle vegetation management work.
- The utility is in the process of establishing a distribution trim cycle; resources are currently available for a 9-year trim cycle. High-fire risk locations will require more frequent trimming or warrant a cost-analysis of alternatives to a particular overhead line.

- Central Lincoln seeks a minimimum clearance of 6-feet or more on either side of the conductor and 20-feet above the line at time of trim. Secondary or service conductors should have a minimum clearance of 2-feet all around. Before trimming, tree crews consider location, line voltage, importance of line, height of structures, growth habit of tree species, movement of trees and conductor in adverse weather, as well as, sag of conductor at elevated temperatures or under high load demand. Clearing for pole climbing space is determined by location of pole and growth habit of vegetation near the structure.
- The Customer Information System records customer calls regarding potential tree hazards in proximity to electric lines. Service orders are created for tree crews to respond to and record completed work. The information is used to track the number of customer calls regarding hazard trees, and the number of occurrences by location.
- During fire season, tree crews carry firefighting equipment, water, chain saws equipped with spark arrester, and handheld weather monitoring stations. Tree crews adjust their work to comply with the Industrial Fire Protection Level waiver.
- Tree removal is encouraged if the trees are a fast growing species, leaning heavily toward the line, are dead or dying, heavily topped with no chance of reasonable development, or are easily climbable trees that are near the lines. A herbicide is applied to cut stumps of fast growing trees.

Central Lincoln tree crews

5.6 Interagency Collaboration

- Central Lincoln collaborates with local fire departments, county emergency management services, county fire councils, Oregon Department of Forestry, Bonneville Power Administration, and neighboring utilities through meetings, forums and exercises throughout the year to prepare for high fire-risk and wildfire events.
- Central Lincoln coordinates with local emergency responders, county and state road departments, and communication providers on smaller incidents throughout the year. Operation supervisors are familiar with the local agency representatives and benefit from the established relationships during a larger event with enhanced situational awareness and established communication paths.
- Prior to the pandemic, Central Lincoln was in the design phase with the University of Oregon to install AlertWildfire cameras on two of its communication towers. The communication towers at Otter Crest and Table Mountain have been identified as viable locations for the pan-tilt-zoom, night vision cameras to detect and locate fire ignitions for early intervention.
- Central Lincoln has mutual assistance agreements with Lane County utilities, American Public Power Association, Western Region Mutual Assistance Group and the Bonneville Power Administration. Central Lincoln has provided mutual assistance to neighboring utilities on multiple occasions in the last three years and benefits from shared demonstrated technology, professional networking and industry coordination.

5.7 Next Steps – Mitigation

- Expand the number of relays on the distribution system that are pre-programmed for the non-reclose setting in order to retain the functionality to coordinate with fuses, relays and circuit breakers during a critical event.
- Expand on the deployment of non-expulsion devices in identified high fire-risk areas. Installation work could be coordinated with other line work in the area for increased efficiency.
- Explore the use of fiberglass crossarms as a means to mitigate for fire ignition in select areas.
- Explore the use of thermal imagery to discover abnormal conditions (hot spots) on substation and transmission facilities related to loose connections, splicing, arrestors or other hardware.
- Adopt digital technologies to identify encroaching trees and vegetation growth around power lines and document completed vegetation trimming and clearing work as a GIS layer in the utility's data base. Year-over-year data showing tree trimming progress and current encroachments would benefit vegetation management planning and budgeting.

6. RESPONSE STRATEGIES

6.1 Situational Awareness

Central Lincoln operations supervisors regularly monitor incoming weather using NOAA's National Weather Service data, weather apps and various websites. Currently, the district does not have fixed weather monitoring stations that provide localized weather information at the substation or feeder level. During fire season, handheld weather stations are used by tree trimming crews and operations supervisors to monitor weather conditions and fire risk in the field.

During fire season, operations supervisors communicate with local wildfire management offices regarding IFPL restrictions and share relevant operational information. Operations supervisors notify field personnel and contractors of the changing restrictions in each zone and shift work protocols to meet each precaution level.

Red Flag Warnings and wildfire threat notifications are received by management as well as operations supervisors. Additional resources may be deployed to an area to further assess and monitor conditions at the local level. If an unusual weather event is expected, the emergency manager, safety coordinator, as well as engineering and operations supervisors, attend weather briefings hosted by county emergency management or joint fire command.

Smoke and wind event in Central Lincoln's service area, mid-September 2020

6.2 Employee Readiness

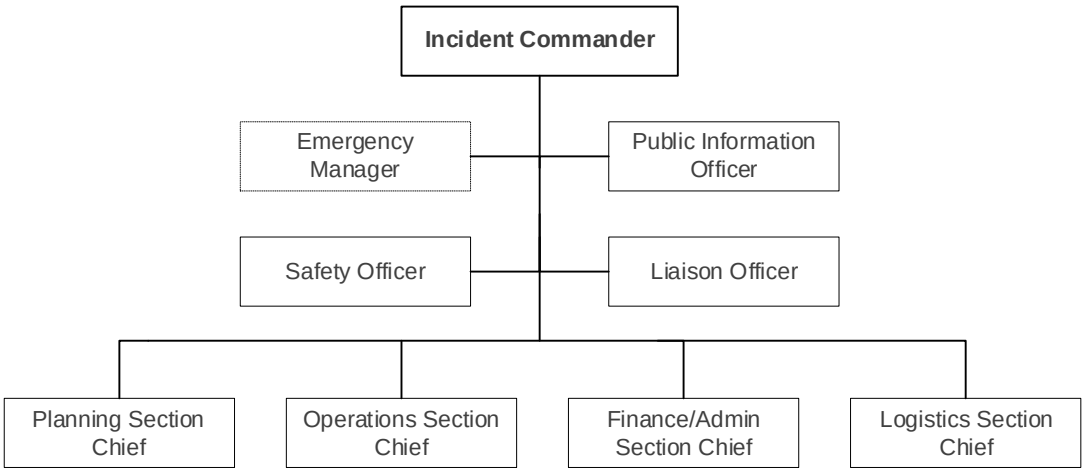
6.2.1 Incident Command System

Central Lincoln's emergency response protocols reflect the national Incident Command System (ICS) framework. Emergency events impacting the utility are managed using ICS; therefore, all employees are required to complete the ICS 100 course within the first six months of employment. In addition, supervisors and managers are expected to complete ICS 200, 700, 800 and 300 as well as any other role specific courses needed for their pre-assigned ICS position.

The utility's overarching Emergency Response Plan specifies the roles and responsibilities for each ICS position and is tailored to Central Lincoln's organizational structure and operations. The Emergency Response Plan identifies operational status levels including an Alert status. During Red Flag Warning Days, the utility moves to Alert status and employees are notified. As the situation escalates, employees follow the readiness protocols described in the Emergency Response Plan for their assigned ICS position.

When the potential for fire ignition is high, the Incident Command Team considers likely scenarios based on environmental, locational and weather conditions and develops an overall strategy. The overall strategy is carried out by the Command Staff and Sections Chiefs and additional ICS positions are added as the situation develops. The Operations and Planning Sections work together to protect utility infrastructure while continuing to deliver power to customers in a safe manner.

Figure 8 – Central Lincoln's Incident Command Team



6.2.2 Stakeholder Communication

During an emergency event, ICS ensures clear lines of authority as well as the centralized dissemination of information. The Public Information Officer is responsible for preparing the communication plan based on information from the Incident Command Team. Consistent internal and external messaging is prioritized as well as timely updates to stakeholders. Communication may be done through the utility website, via social media, by push notifications to SmartHub users, press releases, liaison to local agencies, and personal contact with key account representatives.

6.3 Operational Response

Central Lincoln understands that the availability of electricity during an emergency event is critical. First responders' communication systems, emergency medical services and community water all require electricity to operate. For those times when a potential for wildfire exists, the utility has a variety of measures and tools it can implement to deliver power safely.

6.3.1 Field Work

During high fire-risk days, work procedures are adjusted to mitigate for potential fire ignitions. Crews carry firefighting tools and extra water as well as refrain from using equipment that may spark. Tree crew foreman use hand held weather stations at the work site to monitor relative humidity and wind conditions, adjusting their work accordingly. Upon completion of vegetation work, crews remain in the area for a prescribed amount of time to ensure there are no ignitions as a result of their work.

6.3.2 System Monitoring

During normal operations, Central Lincoln has an overnight/weekend dispatcher that receives SCADA alarms and other alerts for both the transmission and distribution systems. When there is a high risk of fire ignition from utility infrastructure due to low relative humidity, dry vegetation and high winds, the utility has an operations supervisor scheduled for 24-hour system monitoring through SCADA.

6.3.3 Adjusting Reclosers

For high fire-risk days, operators are able to adjust recloser settings from normal to a wildfire (non-reclose) setting. The wildfire setting preserves the ability for devices (fuse, recloser, circuit breaker) to coordinate and permits the device closest to a fault to open, de-energizing that section of line. Once a line is de-energized, ground patrols, looking for vegetation in the line or damaged equipment, must inspect the line before re-energizing. The wildfire setting allows crews to confine the ground patrol to the section of line closest to where the device opened - eliminating the need to patrol the entire line and a prolonged outage for customers.

6.3.4 De-energizing Lines

Under normal operating conditions, operations supervisors have the authority to proactively de-energize sections of transmission and distribution lines to make safe for employee/contractor work as well as during isolated emergency events when requested by local law enforcement or fire officials to ensure public safety. In most cases, the transmission and distribution line sections can be isolated and de-energized remotely through SCADA. In the event of a wildfire, operations supervisors are authorized to de-energize at the request of the jurisdiction's unified Incident Command.

6.4 Public Safety Power Shut Off (PSPS)

The potential for proactive de-energization of power to Central Lincoln customers in order to mitigate for fire ignition is extremely remote. However, in the unlikely event that the utility is compelled - due to extraordinary conditions - to proactively shut power off to specific sections of the service territory, Central Lincoln's goal is to provide as much advance notice as possible.

6.4.1 Customer Awareness

In advance of peak fire season, Central Lincoln will communicate with customers regarding the possibility of proactive de-energization. The advance messaging to customers and talking points for customer service include the conditions which may trigger de-energizing a line, the means by which the customer will be notified and the expected duration of an event.

6.4.2 PSPS Protocol

Trigger: Weather conditions are forecasted to exceed utility established thresholds for humidity, wind and temperature.

1. The General Manager will activate ICS and schedule regular briefings for the Incident Command Team. The utility will move to Alert status for internal readiness.
2. The Incident Command Team will develop a proactive plan which contains timing details, area or circuits impacted and anticipated duration of event, if known.
3. The Incident Command Team will authorize a notification plan, prioritizing local emergency services, local law enforcement, fire departments and key accounts for early notice.
4. As conditions become more certain, the decision to proactively de-energize a line will be based on feedback from local emergency services, operational personnel and weather forecasts.
5. If a decision is made to proactively de-energize, the Incident Command Team will execute the plan including:
    a. Notification to local emergency services, law enforcement, fire departments and other public partners as well as key accounts representatives. Customers will be notified using reverse calling, email, social media, utility website and local media outlets.
    b. Pre-positioning of crews in preparation to patrol lines before re-engergizing when conditions warrant. Crews will patrol the entire line to look for vegetation in the line and obvious damage that may prevent safe re-energization. Depending on the length of lines, number of circuits impacted and repairs required, the patrols may take hours to weeks to complete.
6. If conditions abate, the proactive de-energization event will be canceled and local emergency services, law enforcement, fire departments, other public partners, key accounts and customers will be notified.

Figure 9 – Summary of Central Lincoln's communication protocol for PSPS

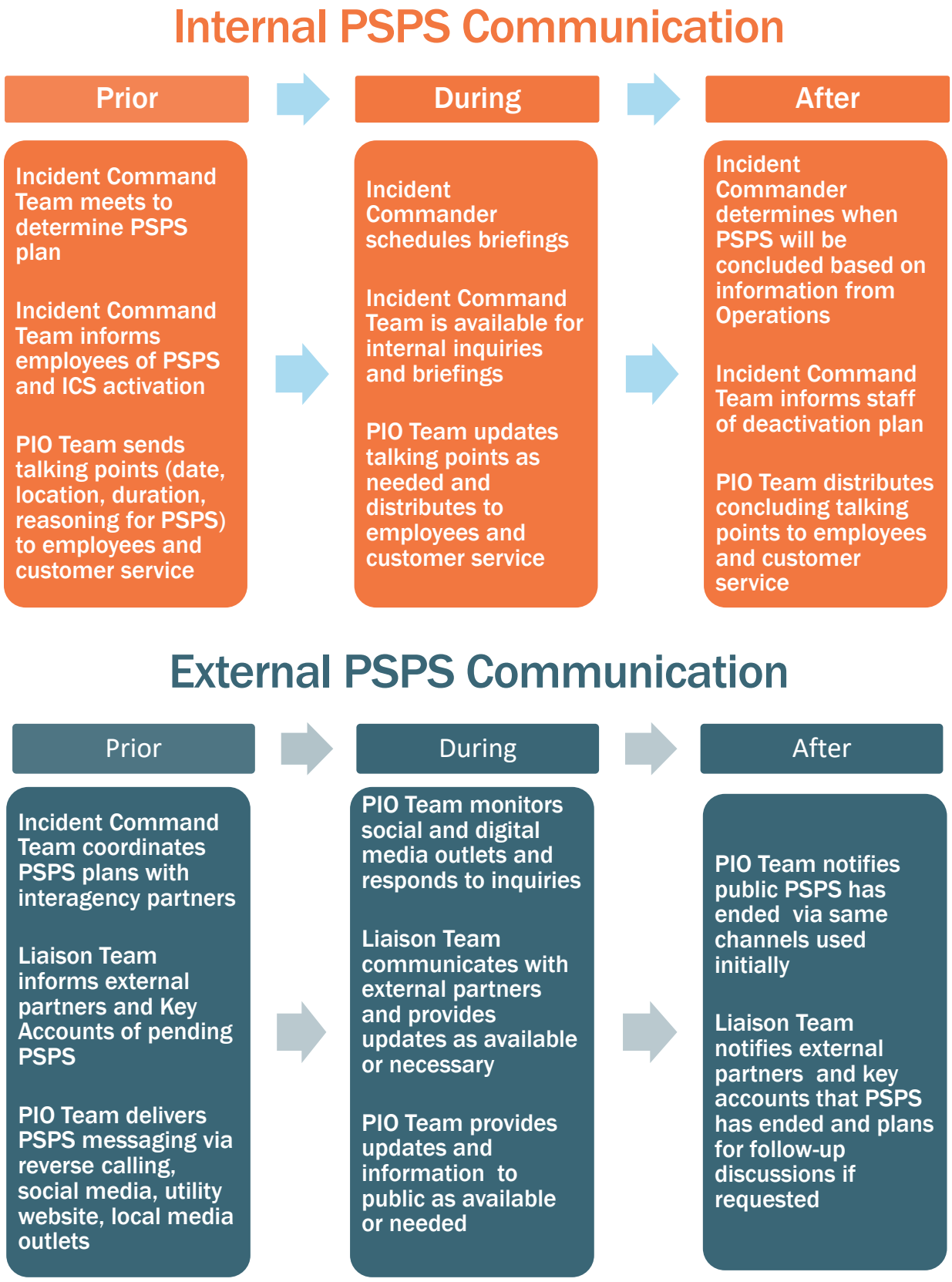
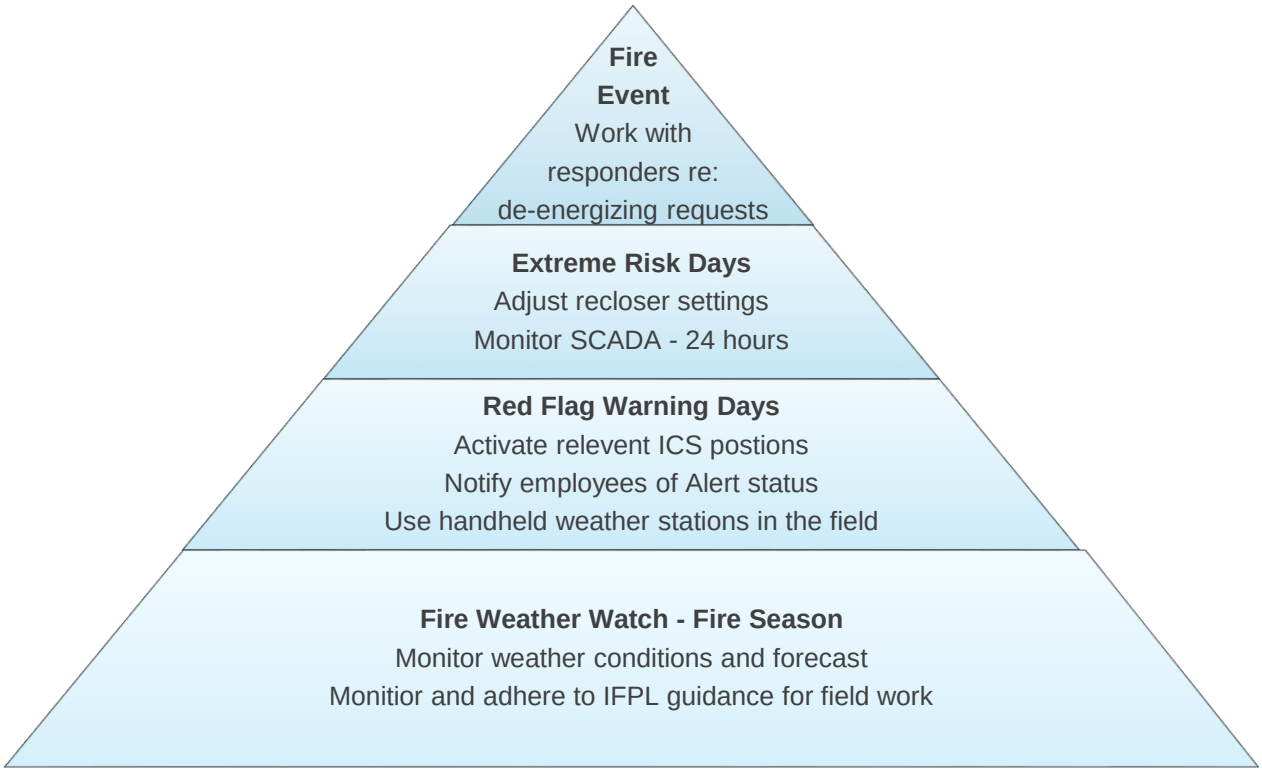


Figure 10 – Summary of Central Lincoln's key response activities as situation escalates



6.5 Interagency Coordination

During a wildfire event, Central Lincoln leverages the connections formed throughout the year with emergency management personnel, first responders, fire chiefs and forestry staff. The right-of-way supervisor is in contact with the local Oregon Department of Forestry managers, the emergency manager is in contact with the county emergency managers, and operations supervisors are often contacted by local first responders. Central Lincoln may also send a liaison to represent the utility at another entity's Emergency Operations Center. The utility's use of the Incident Command System to interface with first responders, agencies and local governments is key to two-way communication, effective coordination and a successful overall response.

6.6 Industry Collaboration

During fire season, if Central Lincoln de-energizes lines proactively, or as a result of a wildfire, crews will patrol each line section prior to re-energizing. If there are more lines to patrol than the utility has resources to complete the inspections in a timely manner, Central Lincoln may call for mutual assistance from other utilities. Requests for assistance will go to neighboring utilities first and Central Lincoln will lean into its established mutual assistance agreements with Lane County, APPA/NRECA and WRMAAG. Central Lincoln requests and manages mutual assistance crews using the ICS based protocols outlined in the enterprise Emergency Response Plan.

Nearby fires impact Central Lincoln service area, Labor Day 2020

7. PLAN EVALUATION

Central Lincoln will track three metrics to measure the performance of this WMP:

- Number of vegetation related outages using existing definitions and parameters, including location by feeder.
- Number of wire down events and causes (vegetation, equipment failure, car hit pole, etc.)
- Number of known fire ignitions associated with the utility's electric infrastructure and which traveled more than 3 meters. A qualitative description of any unusual events related to a fire ignition will supplement this metric.

Central Lincoln acknowledges that it may be difficult in the initial years to draw meaningful conclusions regarding the effectiveness of this WMP based on the limited data gathered. However, as the data collection becomes more robust, the utility will be able to identify areas of its operations that require evaluation for potential improvement. Additionally, staff will evaluate modifying the metrics or adding new metrics in future years as more data becomes available and situational awareness continues to improve.

8. PLAN MANAGEMENT

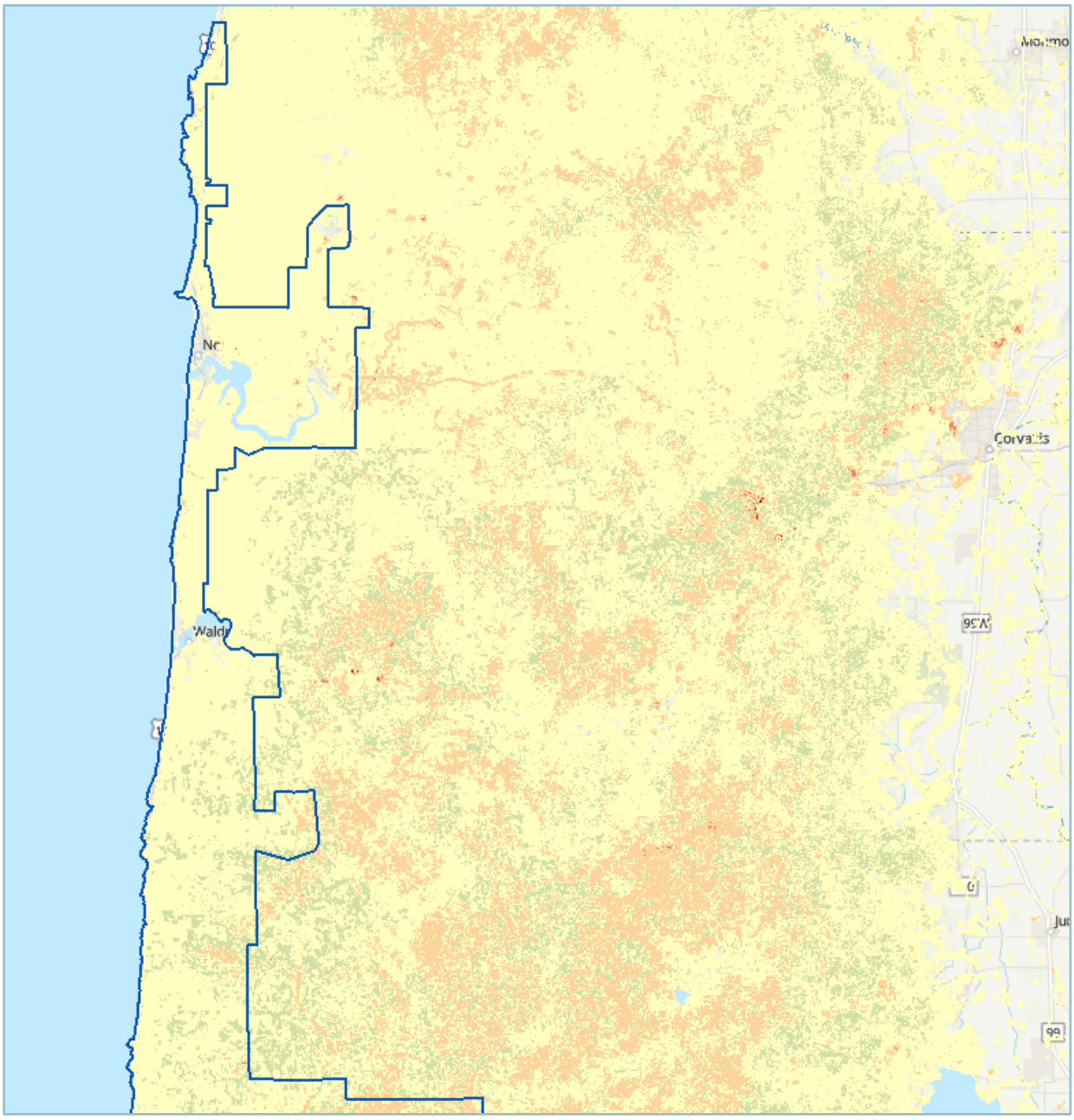
This Wildfire Mitigation Plan is subject to review by the Central Lincoln Board of Directors. Mitigating for wildfire risk is the primary objective of this document. Staff have the role of vetting current procedures and recommending changes or enhancements to build on strategies to meet the objective. Deficiencies due to industry developments, technology adoption, modified operational practices, or unforeseen circumstances, will be addressed in the form of an updated WMP and presented to the Board on an annual basis.

APPENDIX

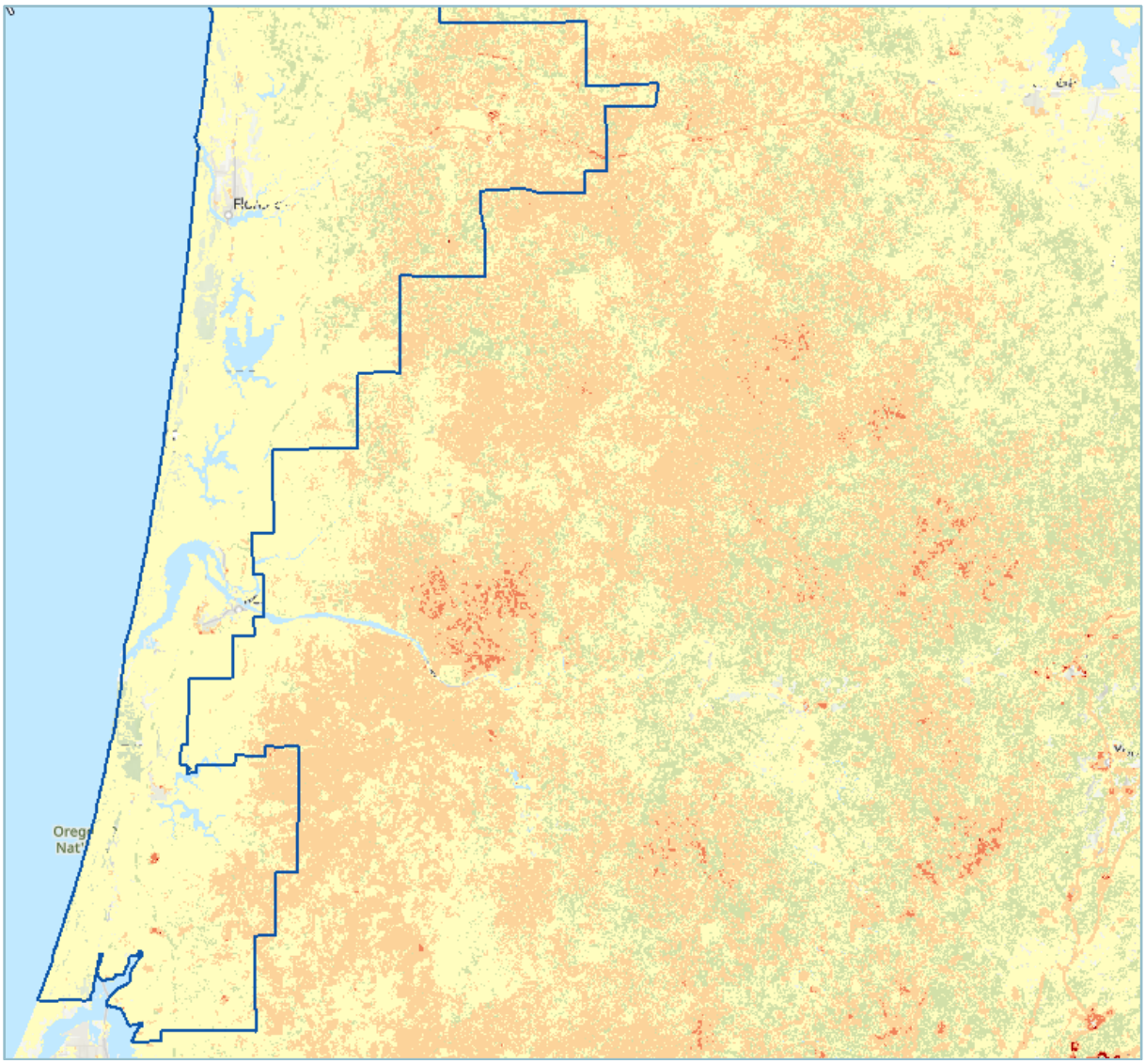
CLPUD Wildfire Risk Areas

The following map, created using the Oregon Wildfire Risk Explorer tool, shows the areas of wildfire risk within Central Lincoln's service area. The tool is based on data from the 2018 Quantitative Wildfire Risk Assessment and is scheduled to be updated on June 30, 2022.

Wildfire risk combines the likelihood of a fire occurring with the exposure and susceptibility of valued resources and assets on the landscape.



Northern half of service area



Southern half of service area (above); Mapleton area (below)