NORTHWESTERN ENERGY

ENHANCED WILDFIRE MITIGATION PLAN

NorthWestern® Energy

Delivering a Bright Future

Contents

NorthWestern Energy Enhanced Wildfire Mitigation Plan

Message from Brian Bird, President & Chief Operating Officer

With the increasing risk of wildfires in the Western states, enhanced fire mitigation is a critical component to ensuring safe and reliable energy service. Drought, pine beetle infestation, extreme weather events and a growing population living in wildfire-prone areas – are outside NorthWestern Energy's control. The goal of NorthWestern Energy's Enhanced Wildfire Mitigation Plan is to focus on what we can directly control or influence and to take action in those areas.

Our Enhanced Wildfire Mitigation Plan represents our commitment to protecting our customers and communities from this growing threat. We have worked with numerous community stakeholders, first responders and peer energy companies in the development of this Plan, while also leveraging the expertise of our internal teams who have an in-depth understanding of our electrical grid.

We expect wildfire risk to continue to grow in the coming years and decades, but our commitment to safe and reliable energy for our Montana customers remains the same. At NorthWestern Energy, our mission is to provide safe, reliable energy to our customers. Our Enhanced Wildfire Mitigation Plan is key to achieving that mission. There are inherent risks with operating an electrical grid in wildfire-prone areas. Our goal with this plan is to identify those risks and outline measurable and attainable ways to reduce the probability of fire ignitions and mitigate the intensity and severity of fire spread.

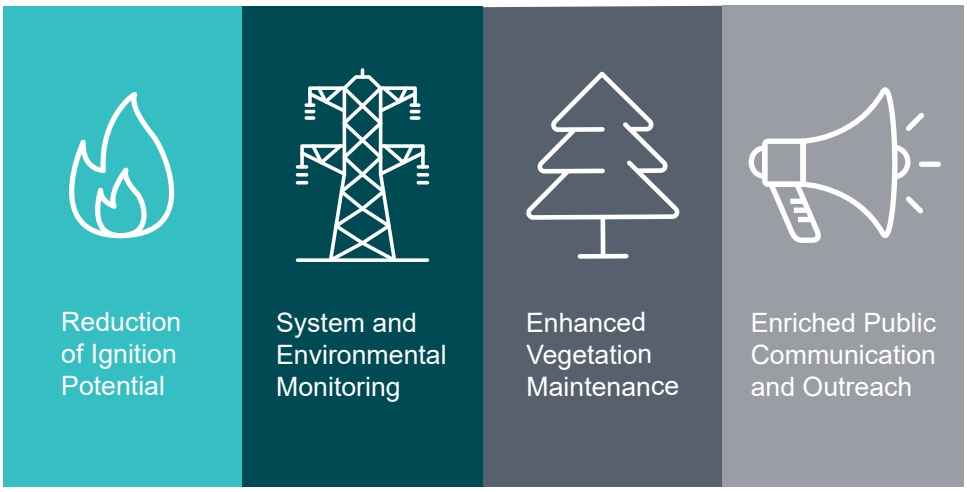
1. Introduction and Approach to the Enhanced Wildfire Mitigation Plan's Development

NorthWestern Energy (NorthWestern) is committed to providing safe and reliable service to our customers. With the increasing risk of fires in the West, NorthWestern expanded its prior fire mitigation plan, a fundamental component to ensuring safe and reliable service. NorthWestern presents this Enhanced Wildfire Mitigation Plan ("Plan") with a focus on managing the inherent risks associated with owning and operating an electric grid in wildfire prone areas.

In this Plan, risk is defined as the product of the probability of energy company facilities igniting a fire, with the potential consequence to the environment should the ignition occur. Risks are materially increasing due to warmer weather, drought, beetle and other insect infestations and other forest health cycle factors, as well as human migration into the Wildland Urban Interface (WUI), which NorthWestern Energy cannot directly control. The objective is to focus on activities that NorthWestern can conduct that mitigate risk. The NorthWestern Enhanced Wildfire Mitigation Plan focuses on activities that are measurable, attainable and provide a positive impact on reducing the probability and consequence of fire ignitions.

To that end, NorthWestern designed its Enhanced Wildfire Mitigation Plan to meet four principal objectives:

1. Reduction of Ignition Potential
2. System and Environmental Monitoring
3. Enhanced Vegetation Maintenance
4. Enriched Public Communication and Outreach

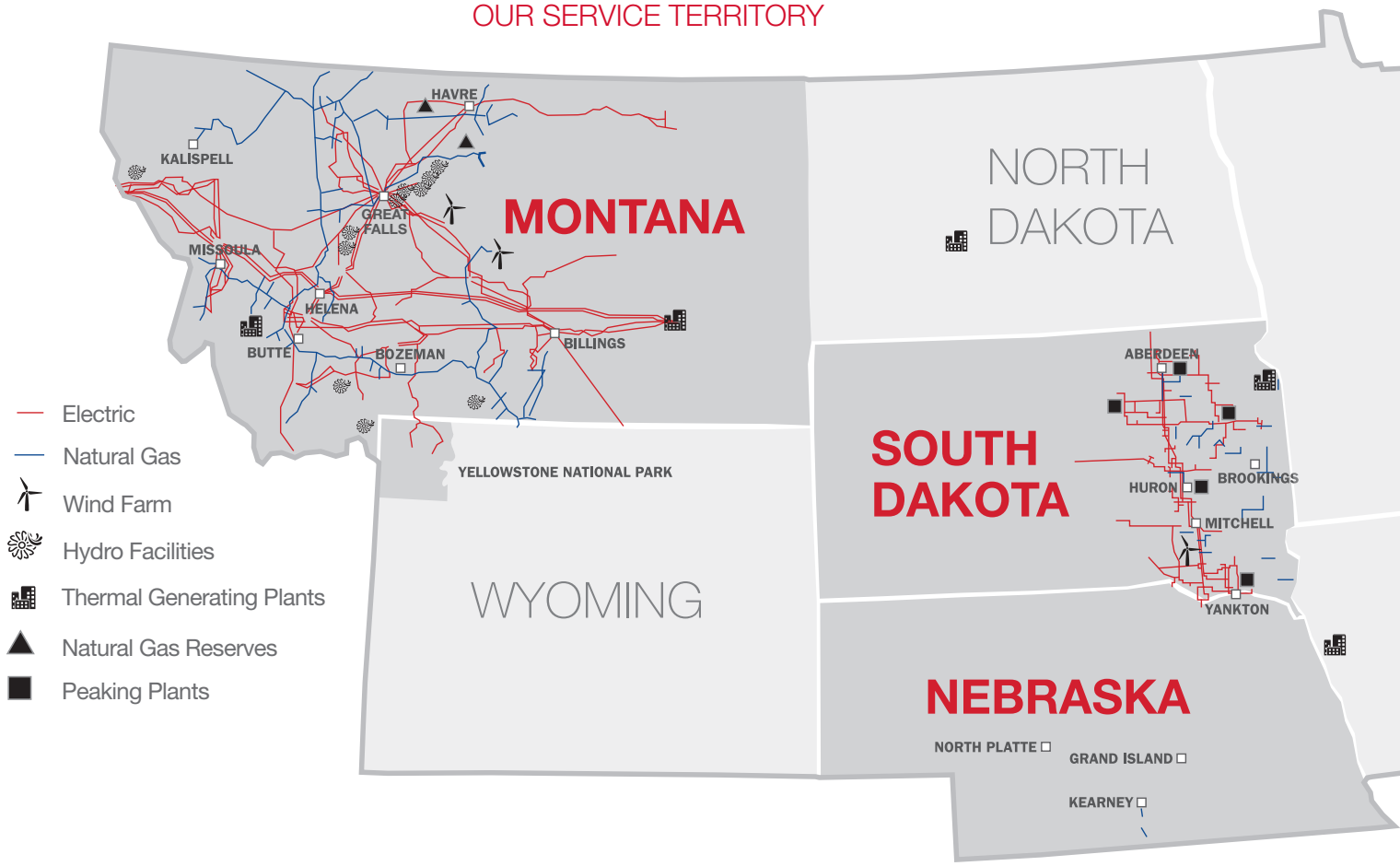


1.1. NorthWestern Energy

NorthWestern is a regional provider of electricity, natural gas and related services to approximately 743,000 customers in Montana, South Dakota and Nebraska. Our electric system has more than 28,499 miles of transmission and distribution lines and associated facilities serving 318 communities and surrounding rural areas in Montana and eastern South Dakota. Our natural gas system includes approximately 9,581 miles of transmission and distribution pipelines and storage facilities serving 168 communities and surrounding rural areas in Montana, South Dakota, and central Nebraska. NorthWestern has approximately 1,530 full-time employees.

The Montana operations, provide regulated electric and natural gas transmission and distribution services to approximately 384,700 electric customers,203,700 natural gas and 600 propane customers in two-thirds of Montana and Yellowstone National Park in Wyoming. Since most of the wildfire risk we have as a company is in our Montana service territory due to its heavily forested areas and extensive rural grasslands that have been subjected to drought and pine beetle and other insect infestations, the efforts laid out in this Enhanced Wildfire Mitigation Plan are primarily focused in Montana.

OUR SERVICE TERRITORY



1.2. NorthWestern's Wildfire Efforts to Date

NorthWestern has demonstrated a long history of commitment to safe and reliable service to our customers. While not focused specifically on wildfire mitigation, these efforts, such as NorthWestern's Distribution System Infrastructure Project ("DSIP"), have provided a foundational core to reduce wildfire risk.

DSIP was a program spanning from 2011 through 2017. The vision was for a distribution system that is: reliable; able to grow; optimized; responsive to all customers; energy efficient; cost effective; and state of the art. The objectives identified to achieve this vision were to: arrest or reverse the trend in aging infrastructure; restore margin capacity back into the system; maintain reliability over time; and increase reliability for our customers; and position NorthWestern to adopt new technologies. This program's goals were broader than reducing wildfire risk. However, because the DSIP program significantly increased the distribution system's reliability, it provided a foundational core to reduce wildfire risk. Details on this program can be found in Appendix A as well as more details regarding NorthWestern's historic reliability performance.

In addition, NorthWestern instituted two programs targeted at impacting the risks concerning wildfire. These programs are the Transmission and Distribution Forest Management Program ("Forest Management Program") and the Hazard Tree Program.

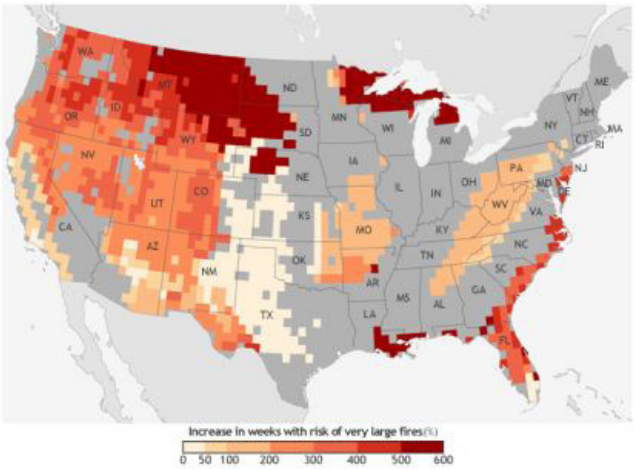
NorthWestern designed the Forest Management Program to reduce risk exposure in forested areas throughout the system by prioritizing mitigation strategies for each identified line segment using a comprehensive risk methodology. The risk model evaluates a combination of environmental and system performance risk to calculate an overall risk exposure by segment. NorthWestern is in the process of completing a detailed engineering assessment to address the risk starting with the highest scored line segments in forested areas. Further details on this program can be found below in the 'Current State' description of the System Preparedness portion of this Plan.

The Mountain Pine Beetle (MPB) infestation resulted in increased tree mortality across all of NorthWestern's Montana operating areas. This increased tree mortality subsequently increased the probability associated with vegetation fall-ins (dead or diseased trees falling into power lines), a known risk condition. The design of the Hazard Tree Program was to mitigate risk and enhance safety by addressing hazard trees inside of and outside of right-of-ways ("ROW"). The Montana Public Service Commission approved NorthWestern's Hazard Tree Program in NorthWestern's 2018 Electric Rate Case. Further details on this program can be found below in the 'Current State' description of the Vegetation Management portion of this Plan.

1.3. Understanding Changing Environmental Risk

Increased fire activity throughout the West and notably in California have highlighted the risks energy companies face with owning and operating assets in areas prone to wildfire. The threat of wildfires continues to increase in conjunction with modeled increases in the length of fire seasons. In an article published by NOAA, the National Oceanic and Atmospheric Agency, called Risk of Very Large Fires Could Increase Six fold by Mid-Century in the US, the author included the attached map and stated that "This map shows the projected increase in the number of 'very large fire weeks' –weeks in which conditions are favorable to the occurrences of very large fire –by mid-century (2041-2070) compared with the recent past (1971-2000)."[1] The map depicts a potential for a 600% increase in fire season length throughout much of NorthWestern's service territory.

FIGURE 1: GROWTH IN FIRE WEEKS



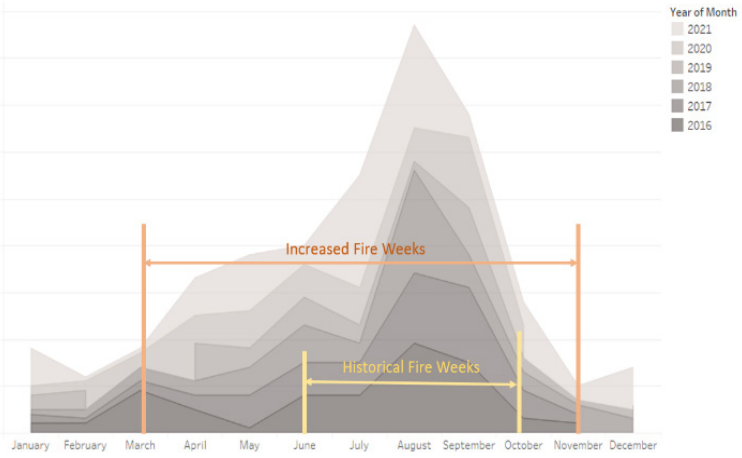
NorthWestern's own data supports this article's conclusion regarding the length of the fire season. The Figure 2 below shows outages indicating fire activity on NorthWestern's distribution system spanning 2016-2021. The graph shows an aggregate view of outages where fire was directly or indirectly involved with NorthWestern's facilities. The graph shows an increase in fire weeks over the past six years compared with historical data and demonstrates the increase in fires outside of historical fire season months.

1 Caitlyn Kennedy, "Risk of Very Large Fires Could Increase Six fold by Mid-Century in the US," NOAA, Climate.gov, August 26, 2015, https://www.climate.gov/news-features/featured-images/risk-very-large-fires-could-increase-sixfold-mid-century-us

As people continue to move into the Wildland-Urban Interface (WUI), with increasing threats of longer fire seasons, it all adds to the complexity of modeling the growing risk in relation to consequence. A team of scientists studied areas in the western United States to map out areas where the vegetation is creating the highest potential for fire. This data was compared to data reflecting the locations of where people have been moving into the WUI areas. This graph shows the population growth in the WUI is also in the same areas where the threat is the greatest. The highest hazard areas have seen growth as high as 160%. "As more people move into these areas, the opportunity for fires to ignite rises, as does the number of people at risk."[2]

1.4. Understanding How to Assess the Risk

FIGURE 2: NORTHWESTERN DISTRIBUTION ELECTRIC FACILITIES INVOLVED IN FIRE



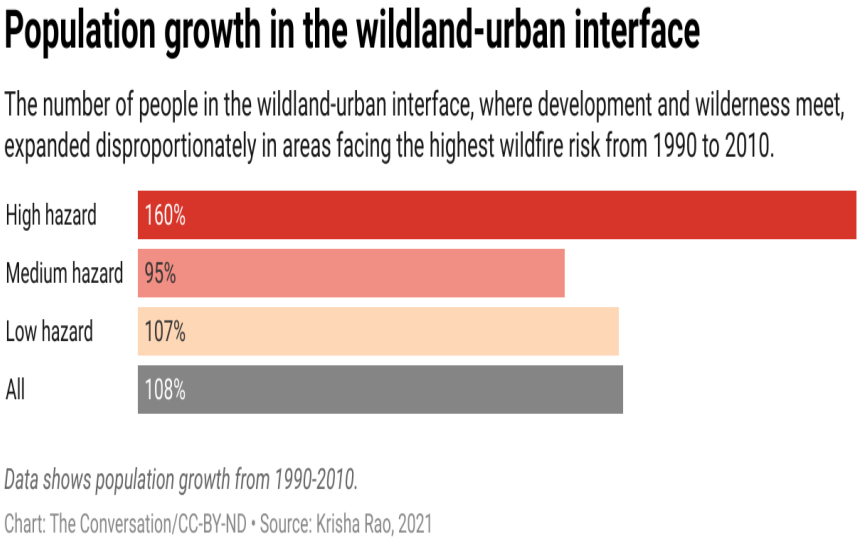
Due to constantly evolving changes in the environment, both climate change and human population migration, it is unrealistic to specifically quantify the impact of every potential future wildfire cost. Therefore, in order to arrest or reduce the growing risk from these two factors, the NorthWestern Enhanced Wildfire Mitigation Plan must focus on items that are measurable, attainable, and provide positive impact on reducing the probability and consequence of fire ignitions.

Fire ignitions are generally created by the same events that create outages. Even momentary contacts with live electrical equipment, while not evolving into an outage, could create an ignition event. Actively managing the reduction of electrical contacts while exercising situational awareness during the contact reduces the probability as well as potentially the consequence of an ignition.

Preventative maintenance programs developed at NorthWestern are traditionally based on reliability or asset life drivers. Today, the probability of igniting a fire due to owning and operating an electric grid in wildfire prone areas drives the need to change the scope and frequency on some initiatives. The scoring described in Appendix B demonstrates how NorthWestern determined the Plan Improvement Score and assists in obtaining an understanding of how the different line items identified within the Plan can effectively mitigate those risks as well as identify a way to prioritize implementation.

Details of how NorthWestern calculated the risk impact scoring can be found in Appendix B.

FIGURE 3: GROWTH IN WUI



2 Krishna Rao, Alexandra Konings, Marta Yebra, Noah Diffenbaugh and Park Williams February 9th, 2022 "The Fastest Population Growth in the West's Wildland-Urban Interface is in Areas Most Vulnerable to Wildfires" The Conversation | The West is Growing Rapidly in Fire Areas - Bay Nature

1.5. NorthWestern's Plan Development

Given the increase in fire threat in recent years in the West, NorthWestern recognizes the need to develop an Enhanced Wildfire Mitigation Plan. NorthWestern conducted a gap analysis based on reviewing plans developed by neighboring energy companies to gain an understanding of improvements to current practices needed for a more enhanced fire mitigation plan.

NorthWestern joined in discussions with the Pacific Northwest Utility Wildfire Working Group (PNUWWG), to gain an understanding on what neighboring energy companies were doing and technologies they were deploying to assist with managing assets in wildfire prone areas. The categories identified grouped vulnerability to actively burning fires, prevention of igniting a fire as well as public communication to impacted customers. The energy companies making up the PNUWWG include: Avista, Idaho Power, Chelan County PUD, Rocky Mountain Power, Portland General Electric, Pacific Power, and Puget Sound Energy. A gap analysis identified how NorthWestern compared to the other energy companies as well as the California Investor-Owned Utilities that have established or were developing wildfire mitigation plans. The gap analysis scored NorthWestern's transmission and distribution programs in the following areas, against the peers mentioned above:

- Situational Awareness
- Operational Practices
- System Assessment/Repair Programs
- System Hardening
- Public Safety Power Shutoff Programs

NorthWestern's largest gap in both transmission and distribution was in the Situational Awareness category. The next largest gap was in the Public Safety Power Shutoff Programs (PSPS). NorthWestern currently does not have an active PSPS program, nor does it believe that the development of the associated initiatives required for the successful implementation of a PSPS for our Montana customers is appropriate at this time. This is discussed further below. Operational practices, assessment, and repair as well as wildfire hardening scored very close to the neighboring energy companies" assessments.

To bridge the gaps identified in the analysis, NorthWestern's Enhanced Wildfire Mitigation Plan used the same category structure from the standards development, and consists of the following five main components:

- Situational Awareness: Ability to understand changes to the environment or system allowing for faster changes to operational practices.
- Operational Practices: Defining how NorthWestern will operate and maintain its system to lower the probability of an ignition.
- System Preparedness: This describes the Forest Management Program that focuses on fire mitigation as well as the reliability-focused programs that mitigate fire risk.
- Vegetation Management: Similar to system preparedness, this describes the expanded Hazard Tree Program that focuses on mitigating vegetation-related fire risk as well as the reliability-focused programs that mitigate fire risk.
- Public Communication and Outreach: Opportunities to advance our training in communicating to our customers as well as the beginning steps to set up resiliency zones for customers with services impacted by wildfire.

1.6. The Plan Methodology

PLAN CATEGORIES	OBJECTIVES			
	1) Ignition Potential Reduction	2) System & Environmental Monitoring	3) Enhanced Vegetation Maintenance	4) Public Communication
Situational Awareness	✔	✔		
Operational Practices	✔			✔
System Preparedness	✔		✔	
Vegetation Management	✔		✔	✔
Communication and Outreach				✔

NorthWestern's Enhanced Wildfire Mitigation Plan addresses the four objectives identified to help reduce risks and applies those to the existing categories.

- Ignition Potential Reduction
- System & Environmental Monitoring
- Enhanced Vegetation Maintenance
- Public Communication

The analysis conducted by NorthWestern in the development of the Enhanced Wildfire Mitigation Plan identified: (1) existing programs that needed to be maintained at current levels, accelerated, or expanded, and (2) new programs that needed to be developed and implemented. The exercise also identified programs new to NorthWestern's operation and maintenance philosophies.

NorthWestern then evaluated each of these programs. A brief description of current state, proposed state, and benefit and costs for each program is presented below in the overall Plan cost summary. Programs were scored to understand the percent improvement for each change to or new addition as it relates to impacting wildfire mitigation. The scoring description can be found in the plan description under the heading 'How to impact the risks', with additional details in Appendix B. NorthWestern cataloged all of the current work activities, activities identified to accelerate, and new activities to implement.

The gap analysis described above allowed NorthWestern to understand what it was doing and how it compared to other energy companies from a broad category standpoint. A second gap analysis provides insight to understand how the planned items within each category compared to today. This second gap analysis scored each item, indicating the level of development along with NorthWestern's ability to fund/implement the program or procedure. A criticality factor multiplies the summation of these two scores. The Criticality Factor indicates this specific line item's ability to impact the overall effectiveness of the wildfire plan. This second gap analysis is used to calculate the Percent Plan Improvement Score for each category as an indication of the level of impact each line item will have once developed and executed.

Plan Categories	% Plan Improvement
Situational Awareness	97%
Operational Practices	53%
System Preparedness	44%
Vegetation Management	65%
Communication and Outreach	100%

The Percent Plan Improvement Scores (noted to the right) are indicative of the work NorthWestern has been doing in our wildland areas, while also highlighting areas to improve upon. A lower score indicates that the current programs and strategies are already achieving many aspects of the Plan itself and therefore do not lend themselves for a lot of room to improve. The higher scores point to areas where there is opportunity for improvement. Fine tuning the programs NorthWestern currently implements in conjunction with initiating new programs with room for growth, provides substantial enhancement to the existing Plan.

Increasing risks due to climate change and human population migrations are driving NorthWestern to a more risk-based approach to mitigating wildfire as opposed to historical reliability-based drivers. Changes to the frequency and scope of many projects as well as incorporating new technologies and resource additions will aid in reducing wildfire risk. After identifying key objectives for building a forward-looking plan, NorthWestern identified existing programs to either keep at current scope and schedule, accelerate, or enhance. Through working with peer energy companies and continuing Subject Matter Expert (SME) education, new maintenance programs and tools are being added. NorthWestern scored all items to understand their individual increase from the current to proposed state. Five years is the timeline for completion of the majority of the Plan, although many items in the Plan will vary from that timeline, including on-going costs into perpetuity. As the Plan is implemented each year, NorthWestern will continually re-evaluate and revise programs and activities to understand their impact and efficiencies, and how to best reduce fire risk.

The Plan currently consists of a total estimated cost of approximately $288 million over the next five years. Current estimates of the total five-year costs for each of five categories are summarized in the table below.

Category	Capital	Expense	Total
Situational Awareness	*$-*	*$8.8M*	$8.8M
Operational Practice	*$-*	*$1.9M*	$1.9M
System Preparedness	*$191.5M*	*$36.1M*	$227.6M
Vegetation Management	*$-*	*$47.7M*	$47.7M
Public Communication	*$1.8M*	*$0.3M*	$2.1M
Total	**$193.3M**	**$94.8**	**$288.0M**

2. NorthWestern's Enhanced Wildfire Mitigation Plan Summary

NorthWestern's Enhanced Wildfire Mitigation Plan represents our proposal to mitigate the growing risk of owning and operating an electric grid in wildfire prone areas. This Plan builds from our over 100 years of operating a reliable utility grid, which consists of our distribution (D), sub-transmission (ST) and transmission (T) assets. The plan includes our recommendations to accelerate or enhance existing programs, as well as the establishment of new programs, all of which address the growing risk of wildfire experienced in the western United States.

NorthWestern's Enhanced Wildfire Mitigation Plan addresses the five categories identified through our gap analysis. Using the four objectives described above as guiding principles, NorthWestern developed and assigned programs and resources to the categories we represented.

In the following sections, NorthWestern provides a description of what that category aims to address with individual components required. Each component has an estimated cost, current and proposed state as well as benefits of the component within that category. NorthWestern also includes the estimated cost and risk impact table for the category. Although the costs are expressed as a single amount it should be noted that the costs could be a one-time investment or a total cost accumulated annually for the five-year period. Details on costs can be found in Appendix C.

The following summarizes the programs within the five categories of NorthWestern's Enhanced Wildfire Mitigation Plan with further details discussed in Section 3.

Situational Awareness – Estimated Budget $8.8M

The Enhanced Wildfire Mitigation Plan addresses the risks associated with both climatic and demographic changes. Climatic changes includes both real time changes in the weather and temperature as well as changes in the landscape Demographic changes focus on the increase or decrease in human occupancy of areas where there is a potential for fire. Situational Awareness is critical to understanding how those factors and changes in those factors can affect the likelihood and consequence of a fire ignition.

Key activities include:

- Establish a dedicated Fire Mitigation Team
- Establish a data platform and dashboard to allow for real-time monitoring of environmental and system conditions
- Implementation of predictive wildfire modeling
- Deploy Weather Stations as needed

These items will provide the situational awareness necessary for consistent changes to Operational Practices and System Practices.

Situational Awareness				
Item	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Benefit**
Wildfire Team	$3.1M (Expense)	No dedicated team	Add dedicated team of technology, engineering, and management resources.	Full time monitoring of changing environmental conditions and providing necessary information for operational decision making to reduce risk.
Internal Server/ Dashboard	$700k (Expense)	No real time dashboard for operational monitoring	Develop internal platform with environmental and system data	Enhanced data management platform to assist Wildfire Team.
Wildfire Modeling	$2.5M (Expense)	No predictive modeling in place	Implement a wildfire predictive modeling and mapping dataset.	Predictive wildfire modeling overlaid onto GIS data to understand environmental consequences.
Weather Stations	$2.5M (Expense)	No internal weather monitoring.	Deploy weather stations.	Real time weather monitoring to understand changing environmental conditions.

Operational Practices – Estimated Budget $1.9M

Operational Practices establishes the distribution and transmission operational practices and procedures NorthWestern will adopt during elevated environmental changes affecting wildfire potential. It will cover both preemptive actions as well as actions taken during an active fire threatening or already damaging NorthWestern's facilities.

Key Activities include:

- Establish a dedicated Reliability Engineer
- Establish Line Operations Follow-Up

Operational Practices				
Item	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Benefit**
Reliability Operations Engineer	$625k (Expense)	No dedicated resource	Full time, dedicated engineer	Dedicated resource monitoring system operations and directing field resources to follow up.
Line Operations Follow-up	$1.3M (Expense)	No official program	Fund repairs proactively	Maintenance funding to proactively correct/ repair issues from line operations.

System Preparedness – Assessment, Repair, and Protection Programs – Estimated Budget $227.6M

This category of the Enhanced Wildfire Mitigation Plan demonstrates the activities, initiatives, and engineered solutions NorthWestern employs to mitigate wildfire risk. It identifies the programs targeting NorthWestern's facilities in wildfire prone areas throughout the Montana service territory. The proposed state reflects NorthWestern's vision of an increased scope and schedule of select current activities as well as adoption of new initiatives aimed at reducing the probability and consequence of igniting a fire.

Key Items include:

- Assessment and Repair
  - ↳ Aerial Assessment
  - ↳ Ground Assessment
  - ↳ Assessment Repairs
  - ↳ Repairs- Backlog
  - ↳ Repairs- Rejected Components
  - ↳ Inventory
  - ↳ Lidar
- Construction
  - ↳ Substation
  - ↳ Section Refurbishment
  - ↳ Section Reliability
  - ↳ Repeater Resiliency Zones
- Resource
  - ↳ Project Management Team
  - ↳ Plan Development and Maintenance
  - ↳ Construction and Operations Engineer

System Preparedness – Assessment and Repair				
Item	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Benefit**
Aerial Assessment	$4.9M (Expense)	100% of T/ST Annually, no D	No change to T/ST, add 20% D Annually via Drone Technology	Enhanced aerial assessment for proactive Maintenance investigation.
Ground Assessment	$3.5M (Expense)	50% D Annually, no T/ST	100% D, 100% ST, 20% T Annually	Enhanced ground assessment for proactive Maintenance investigation.
Assessment Repairs	$6.4M (Expense)	High priority repairs from assessments	Complete all repairs annually based on increased assessments	Maintenance funding to fix exceptions found during assessments, including proactively repairing lower priority historical exceptions where found.
Repairs-Rejected Components	$10.5M (Expense)	T/ST Components rated during pole inspection	Replace rejected components within a year	Proactively replace rejected T/ST components found during annual inspections, including proactively repairing historical components yet to be addressed.
Inventory	$1.5M (Expense)	No specified program	Inventory to identify concerning components	Inventory of concerning components to be addressed in System Refurbishment task.
Lidar	$3.7M (Expense)	Existing T/ST program	Accelerate to complete remaining 40% of system	Accelerated Lidar collection to model T/ST for System Reliability task.

System Preparedness - Construction				
Item	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Benefit**
Substation	$70.0M (Capital) $1.0M (Expense)	Programs exist to update substation communication and technology	Accelerate and target continued upgrades. Introduce advanced relaying technology.	Improved substation automation through advanced relay technology and electronic breakers. Expanded communication abilities for better situational awareness.
Section Refurbishment	$15.0M (Capital)	No official program dedicated to refurbishment	Based on inventory, systematically refurbish areas of concern	Replacement of concerning components and/or design practices found through inventory to reduce fire ignition sources.
Section Reliability	$72.7M (Capital)	Targeted reliability strategy for D, no official program for T/ST	Add T/ST into the program based on Lidar results	Expand current distribution reliability strategy targeting outage reduction to T/ST to reduce ignition sources.
Repeater Resiliency Zones	$8.8M (Capital)	None	Create resiliency zones for communication sites	Strengthen reliability to critical communication infrastructure to continued operation through weather events.

System Preparedness - Resource				
Task	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Benefit**
Project Management Team	$1.5M (Capital) $375k (Expense)	None	3 full time employees	Project Management for successful execution of the Plan.
Plan Development and Maintenance	$2.5M (Capital) $625k (Expense)	None	5 full time employees	Dedicated engineers continually analyzing data to ensure Plan is successfully reducing risk.
Construction and Operations Engineer	$15.0M (Capital) $3.8M (Expense)	None	30 full time employees	Team dedicated to completing the engineering and construction oversight of Plan tasks.

Vegetation Management – Estimated Budget $47.7M

Managing the risks associated with vegetation is a key part of the overall Enhanced Wildfire Mitigation Plan. In particular, this Plan identifies eight key areas in which to institute new programs or accelerate/enhance existing programs to address the vegetation risk. Collectively, these programs will provide additional vegetation hardening and lower the company's overall risk level for potentially igniting a fire.

Key activities include:

- Aerial Assessment and Hotspot
- Ground Assessment and Hotspot
- Proactive Maintenance
- Remote Sensing and Analysis
- Right Tree, Right Place
- Risk Tree Program
- Fuel Reduction Partnerships
- ROW - Clear Fall Zone
- Vegetation Analyst/Scheduler
- Vegetation Coordinator

Vegetation Management				
Item	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Benefit**
Aerial Assessment and Hotspot	$800k (Expense)	Limited to Transmission System Only	Add Distribution System Assessments and repair	Increase Situational Awareness. Reduce exposure to non-conforming and at risk vegetation.
Ground Assessment and Hotspot	$4.8M (Expense)	Limited to Distribution System Only	Add Transmission System Assessments and Repair	Increase Situational Awareness. Reduce exposure to non-conforming and at risk vegetation.
Proactive Maintenance	$21.9M (Expense)	Combined performance and cycle-based program	Accelerated cycle and aggressive pruning	Proactively plan system maintenance to set schedule matching pruning to vegetation species to limit faults
Remote Sensing and Analysis	$7.4M (Expense)	No program	Remote data collection and analysis for increase situational awareness	Improve planning and implementation efficiency; Quality Assurance assessment on completed work
Right Tree, Right Place	$125k (Expense)	Coordinated with existing proactive maintenance program	Increase education and offerings to customers for removals and compatible trees	Reduce tree grow-in potential; removes cycle-buster maintenance items
Risk Tree Program	$16.3M (Expense, no funding changes from today)	Mitigation Mountain Pine Beetle infested vegetation	Expand focus to all at risk vegetation species; improve implementation with additional risk factors	Comprehensive program to address all at risk vegetation with increase priority towards WUI areas
Fuel Reduction Partnerships	$2.0M (Expense)	No program	Partner with local, state, federal agencies to reduce overall fuel loading	Reduces fire severity near critical assets; strengthens relationship with fire agencies
ROW - Clear Fall Zone	$9.4M (Expense)	No program	Establish vegetation fall zones in high consequence areas	Mitigate or eliminate fault potential in areas sensitive to fire activity
Vegetation Analyst/ Scheduler	$625k (Expense)	No program	Dedicated resource focused on vegetation analytics and scheduling	Data analytics, improved implementation efficiency, and quality assurance.
Vegetation Coordinator	$625k (Expense)	Staffed at current work volume	Match workforce to proposed state requirements	Certified arborist performing vegetation assessments and work planning

Public Communication and Outreach – Estimated Budget $2.1M

Work by NorthWestern on its systems cannot guarantee complete reduction of fire activity. Customers rely on NorthWestern to notify them if a disruption in service is expected, as well as provide them with estimated return to service timelines. Currently, NorthWestern uses automated dialing programs for notifying customers of outages with pre-recorded messages in an attempt to communicate pertinent information with our customers.

Key activities include:

- Enhance Internal Fire Safety Training
- Mobile Units

Public Communication and Outreach				
Item	**Estimated Five Year Cost**	**Current State**	**Proposed State**	**Item**
Enhance Internal Fire Safety Training	$250k (Expense)	Annual fire safety training	Enhanced program	Enhanced education for internal staff on response during wildfire events.
Mobile Units	$1.8M (Capital)	None	Nine mobile emergency units	Mobile generation and communication resource for public assistance during emergency events.

3. NorthWestern's Enhanced Wildfire Mitigation Plan Details

The following discusses the details of NorthWestern's Enhanced Wildfire Mitigation Plan.

3.1. Situational Awareness

The environment discussed in this Plan relates to both climatic as well as demographic changes. Climatic changes include both real time changes in the atmosphere as well as natural changes to fuel loading levels. Demographic changes relates to the increase or decrease in human occupancy of areas where there is a potential for wildfire. Situational Awareness gives NorthWestern an opportunity to understand how those changes in the environment can affect the consequence of an ignition. These items will provide the situational awareness necessary for consistent changes to Operational Practices and System Practices.

3.1.1. Wildfire Team:

Current State:

NorthWestern's wildfire team typically consists of the Fire Command/Fire Notification group working with individual operations for the purpose of maintaining situational awareness during an active fire season or event. Today, that team is not a dedicated fire team and consists of departmental resources assigned a particular task pertaining to wildfire as needed. These structures expand and contract through our current Incident Command ("IC") processes as the situation dictates a need for such movement. A Fire Notification email list is created to share pertinent weather or other impactful information throughout the organization.

Proposed State:

Full Time Wildfire Resiliency Team: *New Initiative*

The Enhanced Plan identifies a need to fund and staff a department of five full time employees, consisting of a Manager, an Engineer, a Climate Scientist GIS/Data Technician, and a Business Technology resource. This team will be responsible on a full time basis to monitor changes in environmental conditions and communicate needed changes to operating practices. This team will be responsible for the continued advancement of the overall Plan as well as reporting on the adherence to and integration of NorthWestern's wildfire strategies.

Costs and Risk Impact Tables:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Wildfire Team	$3.1M	100%	Dedicated resource to monitor changing environment conditions and driving operational decision making to reduce risk

3.1.2. Data Dashboard:

The climate changes to the environment are requiring NorthWestern to look at fire seasons differently. Seasonal approaches to driving operational behavior are becoming less and less reliable. NorthWestern participates in active weather monitoring, fire monitoring, and limited fire risk prioritization. Advances in technology provide energy companies the ability to make real time or near real time decisions to change operational behavior with a high degree of accuracy.

Current State:

The situational awareness part of current activities details specific items NorthWestern is currently conducting concerning weather monitoring, fire monitoring and detection, and prioritizing fire threat potential. Currently, NorthWestern does not have an environmental dashboard to inform changes in operational behavior, nor does NorthWestern work with Fire Science/Modeling contractors.

Proposed State:

Environmental Dashboard: *New Initiative*

Combine the weather monitoring and fire monitoring portions of current activities, and develop an Environmental Dashboard to be utilized by the Wildfire Team. The dashboard will utilize data from internal and external sources combining climatic and other environmental factors for consistent guidance on how the system will be operated.

Wildfire Modeling: *Enhance Existing*

Fire modeling is a science that energy companies use to understand the impacts of fire ignitions in different locations along our system. Not all fire ignitions are created equally. Knowing and prioritizing the area's most vulnerable to the consequence of a fire ignition through fire modeling provides critical situational awareness on where to focus preventative measures. This Plan identifies an opportunity to work with third party contractors to develop a wildfire predictive modeling and mapping dataset. This dataset will allow for a more strategic and logical prioritization to preventative maintenance and work practices.

Weather Stations: *New Initiative*

Invest in and deploy weather stations. Collaborate with third party contractors who specialize in weather forecasting and data to assist NorthWestern in understanding changing weather patterns.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Environmental Dashboard	$700k	90.9%	Enhanced data management platform to assist Wildfire Team.
Wildfire Modeling	$2.5M	95.5%	Predictive wildfire modeling overlaid onto GIS data to understand environmental consequences.
Weather Stations	$2.5M	100%	Real-time weather monitoring to understand changing environmental conditions.

3.2. Operational Practices

This category is to establish the distribution and transmission operational practices and procedures NorthWestern will adopt during elevated environmental changes affecting wildfire potential. It will cover both preemptive actions as well as actions taken during an active fire threatening or already damaging NorthWestern's facilities.

Current State:

Operational Practices are designed to provide consistent direction to NorthWestern employees on our accepted practices before, during, and after an active fire impacting our facilities. Operational Practices guides employees through steps to take in establishing contact and working with local authorities including Fire IC Structures. The document also describes changes NorthWestern will make to the operations of its system and necessary changes to work procedures and work plans due to changes in situational awareness pertaining to fire.

Public Safety Power Shutoffs (PSPS) is a program or approach to mitigating ignition risks, by understanding a set of metrics to help an energy company make a determination on de-energizing a line, affecting customer service, in order to prevent an ignition by a company-owned electrical line. Currently, NorthWestern has not utilized a PSPS in this manner. NorthWestern evaluates taking lines out of service, which does not disrupt customers, on a case-by-case basis.

Proposed State:

The enhancements to Operational Practices in the Plan take a more formal approach to understanding how the system is being operated. The Plan identifies a full-time position to improve existing processes for analyzing the momentary automatic protective system operations recorded on the system. As indicated in the Plan Impact Improvement, NorthWestern has processes for addressing issues found on our system. The opportunity lies in dedicating a resource to formalize a consistent approach, to analyzing the momentary events. Traditionally Operational Practices were developed from a reliability standpoint, and momentary events do not always develop into reliability concerns. The change is developing processes to address risk to wildfire ignition. This process will identify the nature and cause of these operations created by momentary events, as well as identify corrective actions as needed. Operational Practices will continue to evolve as new advancements in Situational Awareness tools become available.

3.2.1. Line Operations Engineer and Maintenance Follow-up

Line Operations Maintenance: *New Initiative*

The Plan includes funding and staffing for one full time employee to investigate momentary operations. Unknown operations will be assessed and any exceptions found will be repaired.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Reliability Operations Engineer	$625k	95.7%	Dedicated resource monitoring system operations and directing field resources to follow up.
Line Operations Follow-up	$1.3M	11.1%	Maintenance funding to proactively correct/ repair issues from line operations.

3.3. System Preparedness – Assessment, Repair, and Protection Programs

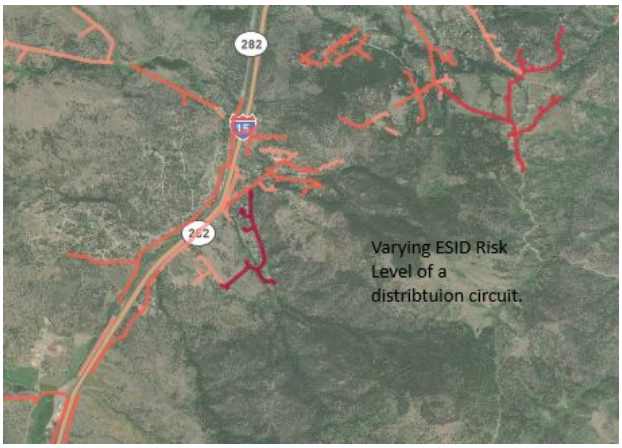
This component within the Plan is intended to establish the activities, initiatives, and engineered solutions NorthWestern employees perform to mitigate wildfire risk. It will identify the programs targeting NorthWestern's facilities in wildfire prone areas throughout the service territory.

Current State:

NorthWestern currently has programs designed to directly reduce wildfire risk under "System Preparedness – Assessment, Repair, and Protection Programs. They are: (1) Transmission and Distribution Forest Management and (2) Hazard Tree. The Hazard Tree program has been in place for years and is detailed in the Vegetation Management portion of this Enhanced Wildfire Mitigation Plan. Hazard trees have been a significant risk for NorthWestern, a risk we have been well aware of and have been actively addressing since 2018.

The Transmission and Distribution Forest Management Program is designed to reduce risk exposure in forested areas throughout the system. This program was initiated in 2019 and continues to develop as new technology and tools can be applied. The program is intended to identify and prioritize the segments of our electric system at greatest risk. The strategy uses a comprehensive methodology to identify overall segment risk. The overall segment risk is the summation of environmental risk (consequence) and system performance risk (probability) and is used to prioritize targeted areas for engineering investigation on appropriate mitigation efforts to reduce wildfire risk.

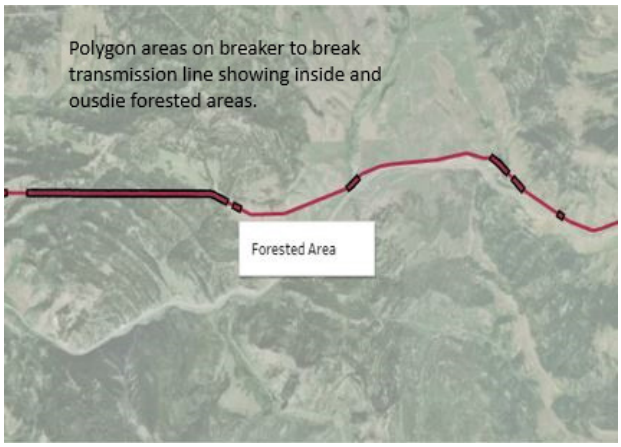
FIGURE 4 – DISTRIBUTION ESID



Targeted Approach:

Breaking the grid into smaller sections provides an opportunity to take a targeted approach to mitigate higher perceived segment risk. The alternative is a rebuild of the entire circuit or breaker-to-breaker line segment which is cost prohibitive. Under this approach, we have split distribution circuits into sections delineated by protective devices along the circuit. Transmission circuits were split up into polygons based on a specified distance to a forested area(s) as shown in Figure 5.

FIGURE 5 – TRANSMISSION POLYGON



Each smaller identified segment is ranked by the combination of the probability (measured by system performance) and consequence (environment and NorthWestern's customer density) scoring metrics. These sections are prioritized for the engineering group to model and analyze for the best possible solution to mitigate fire risk.

Engineered Solution:

Because of their varying size and complexity, we have taken different approaches to evaluate distribution segments versus transmission segments. Distribution segments (referred to as ESIDs) are assessed in the field by the engineer where data is gathered using a Trimble Total Station. The data is then modeled in Distribution Design Software (DDS) to evaluate a number of exceptions that could cause a fault, including galloping and blowout. Transmission line data is gathered with LIDAR technology that is incorporated into PLS Cadd design software looking for the same anomalies. An engineered solution is then developed to mitigate those exceptions, reducing risk. It is important to note that not all ESIDs or transmission segments will have exceptions. Solutions will range from a complete rebuild or burial of a distribution ESID, or a rebuild of transmission structures. Engineering analysis has found that some line segments are in no need for any corrective action. The vegetation management department is consulted and work coordinated for solutions requiring pruning or removal of vegetation. Included with the engineered solution are studies on relaying and fuse coordination strategies to understand if opportunities to reduce arc flash potential in the event of a fault are possible.

FIGURE 6 - PLS CADD (SHOWING GALLOPING)

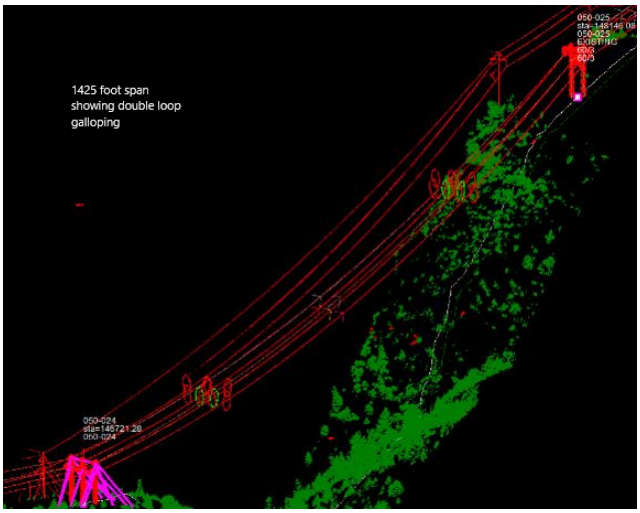
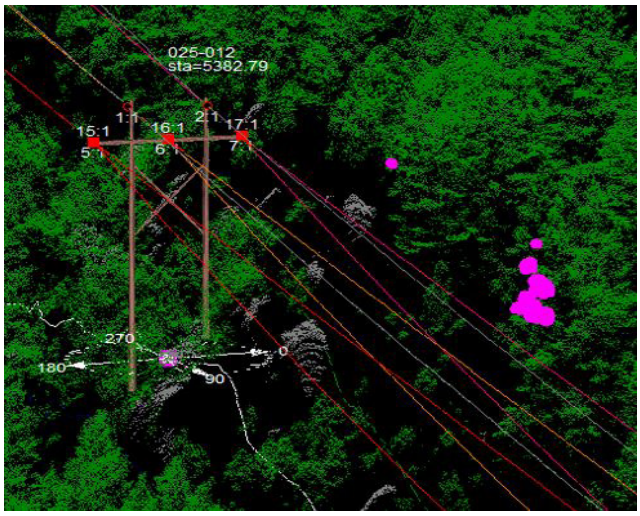


FIGURE 7 - PLS CADD (SHOWING VEGETATION BLOWOUT)



Proposed State:

The system preparedness portion of the Enhanced Wildfire Mitigation Plan is the largest component in terms of work and resources required as well as dollars estimated for work completion. The majority of this section details the opportunities for reducing the number of unintended faults, which could trigger an ignition event. The proposed state can be broken down into three main subjects, Assessment and Repair, Construction, and Resource. The resources identified in the proposed state of this section is for the successful implementation within the identified five-year cycle. Each item is described in more detail below on what is being required to implement the Plan.

3.3.1. Assessment and Repair

Assessments: *Enhance Existing Initiative*

- Aerial Assessments: Continue 100% of the aerial assessments on the transmission and sub-transmission facilities. Incorporate an aerial (drone) assessment of 100% of the distribution system identified in the Forest Management Program.
- Ground Assessments: Accelerate distribution ground assessment to cover 100% of the distribution system every year for five continuous years. Begin 100% ground assessment of the sub-transmission system every year for five continuous years. Begin 20% ground assessment of transmission system every year for five continuous years with a 100% cycle completion within five years.

Both Aerial and Ground assessment initiatives will be re-evaluated upon full implementation of the Plan. Determination will then be made on the future scope and schedule of these activities.

Assessment Exception Repairs: *Enhance Existing Initiative*

During the implementation of the assessment plan, the prioritization methodology of P1, P2 and P3 will be suspended. The original prioritization system of P1, P2 and P3 were reliability focused and incorporated an estimate on when an issue would potentially evolve into an outage interrupting service. The priority would drive corrective action schedules for completion of exceptions found. All exceptions recorded will be treated as a P1 and repaired within the same calendar year in which they are found. In addition, complete historical lower priority repairs where found.

Repairs – Rejected Components: *New Initiative*

For transmission only, as rejected components are found, these are to be corrected within the same year. This includes addressing components previously identified that have not been addressed.

Inventory: *New Initiative*

This initiative is an inventory of specified items to be recorded during the enhanced assessments. The items to be cataloged in NorthWestern's GIS system include but are not limited to:

- Porcelain Cut-Out
- Solid #6 and #8 Copper Wire
- Vertical to Horizontal Construction Transitions
- Splices
- Slack Spans
- Other items that may be deemed necessary

Lidar: *Enhance Existing Initiative*

This initiative is to accelerate the completion of Lidar for the remaining transmission and sub-transmission system within three years from the adoption of the Plan.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Aerial Assessment	$4.9M	55.6%	Enhanced aerial assessment for proactive Maintenance investigation.
Ground Assessment	$3.5M	71.9%	Enhanced ground assessment for proactive Maintenance investigation.
Assessment Repairs	$6.4M	23.8%	Maintenance funding to fix exceptions found during assessments.
Repairs- Rejected Components	$10.5M	80.0%	Proactively replace rejected T/ST components found during annual inspections.
Inventory	$1.5M	35.6%	Inventory of concerning components to be addressed in System Refurbishment task.
Lidar	$3.7M	13%	Accelerated Lidar collection to model T/ST for System Reliability task.

3.3.2. Construction

Substation: *Accelerated Initiative*

Accelerate existing plan of installing electronic (transmission, sub-transmission and distribution) breakers in all substations to be completed within five years from the adoption of the Plan. Identify strategic locations and deploy downstream electronic breakers/re-closers on the D system. Accelerate communications program for remote control of the electronic breakers where feasible. Identify strategic locations for the investment in and deployment of Advanced Relay Technology.

Section Refurbishment: *New Initiative*

Based on findings from the Inventory initiative, develop engineered solutions as necessary for the refurbishment or complete rebuild of a distribution electric section ID (ESID) or specified sections on both T and ST systems.

Section Reliability (T/ST – Only): *New Initiative*

Based on findings from LIDAR, develop engineered solutions as necessary for the refurbishment or complete rebuild of specified sections on the T and ST systems. This program will use Lidar technology to support a Section Reliability initiative modeled closely after the D – Section Reliability initiative that is currently in progress.

Repeater Resiliency Zone: *New Initiative*

Create resiliency zones by installing small micro grid applications and/or burying electric facilities to ensure communication sites have no interruptions of service through weather events.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Substation – Electronic Breakers and Advanced Relay Technology	$71.0M	57.5%	Improved substation automation through advanced relay technology and electronic breakers. Expanded communication abilities for better situational awareness.
Section Refurbishment	$15.0M	100%	Replacement of concerning components and/or design practices found through inventory to reduce fire ignition sources.
Section Reliability	$72.7M	48.5%	Expand current distribution reliability strategy targeting outage reduction to ST/T based on Lidar results.
Repeater Resiliency Zones	$8.8M	100%	Strengthen reliability to critical communication infrastructure

3.3.3. Resource:

Project Management Team: *New Initiative*

The Project Management team will consist of three full time employees to ensure successful completion of the Wildfire Plan construction activities by monitoring scope, schedule, and budget.

Plan Development and Maintenance: *New Initiative*

This will be a dedicated team within Asset Management to continue to develop and update Wildfire Plan strategies through data analytics, targeting the highest risk components while working closely with the Construction and Wildfire Teams to ensure strategy objectives are met.

Construction and Operations Engineer: *New Initiative*

Based on previous experience executing large initiatives, 30 full time employees are required to complete the detailed engineering, planning, and construction coordination of the Wildfire Plan. This team will consist of both engineering and supervision for construction and maintenance activities.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Project Management Team	$1.9M	100%	Project Management for successful execution of the Plan.
Plan Development and Maintenance	$3.1M	42.9%	Dedicated engineers continually analyzing data to ensure Plan is successfully reducing risk.
Construction and Operations Engineer	$15.0.M	100%	Team dedicated to completing the engineering and construction oversight of Plan tasks.

3.4. Vegetation Management

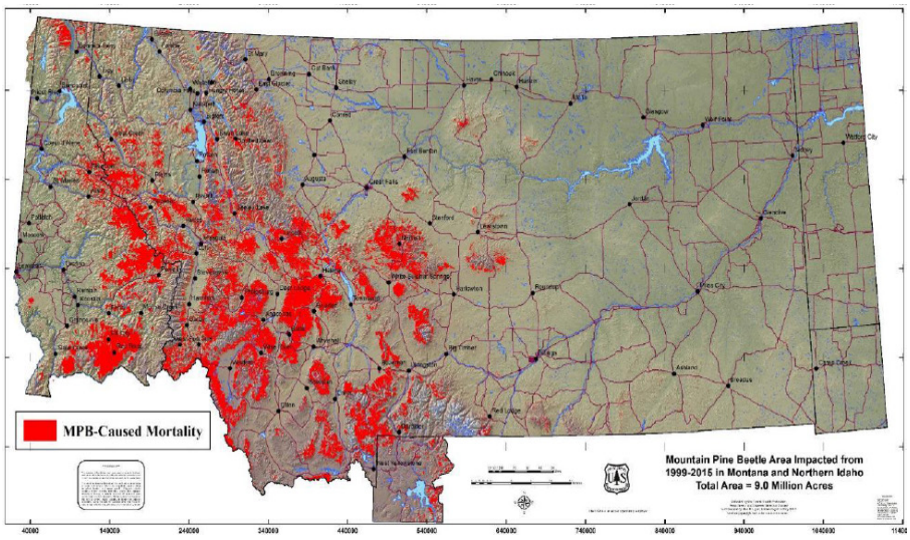
Trees are an important part of any landscape and are common within nearly all power-line corridors. However, coexisting in the same general space leads trees to be one of the leading causes of service interruptions. The original best practices related to energy company vegetation management put emphasis on three main components: public safety (climbable trees), compliance (transmission), and service reliability. This strategy has served NorthWestern well for years. However, our operating environment is now much different from prior years, both from where our communities are being built (including in the WUI), to the health of both urban and rural forests. These components are adding to the complexity of an already difficult task surrounding the management of a living organism. Due to this changing operating landscape, the vegetation management scope within the Wildfire Plan strengthens the existing program while increasing the situational awareness and focus of risk mitigation for vegetation-related faults.

Current State:

NorthWestern's Hazard Tree Program is well established and is designed to reduce the probability of beetle-killed trees contacting or falling into our electric facilities.

Established in 2018, the Hazard Tree Program's goal was to mitigate risk and enhance safety by trimming or removing trees outside of our right of ways (ROW) that could fall into our lines. This program became an absolute priority due to the Mountain Pine Beetle (MPB) infestation, as illustrated in Figure 5, which resulted in additional tree mortality across all of NorthWestern's Montana operating areas. This additional tree mortality increases the probability of trees falling into electric power lines.

FIGURE 8 - MOUNTAIN PINE BEETLE IMPACT AREAS



The foundation of the Hazard Tree Program used internal data (customer counts, outage reliability data) combined with external data (MPB infestations, Wildfire Hazard Potential) to define the required mitigation and prioritize the implementation. Since 2018, this program cleared more than 1,200 miles of impacted forests and reduced the risk specific to the MPB infestation. As discussed further in the Proposed State section, this program is being enhanced because of additional insect infestations and risks observed since the program's initiation.

There are additional vegetation management programs that have a primary purpose related to reliability and compliance, but also include ancillary benefits of wildfire mitigation. Each of these existing programs are included in the "proposed state" section below as they are being enhanced to provide more direct benefit in regards to wildfire prevention and protection.

Proposed State

NorthWestern utilizes a number of different methods to manage the vegetation across the thousands of T&D miles it actively maintains. These maintenance practice methods align with historic practices used throughout the energy industry. However, integrated vegetation management ("IVM") is becoming the preferred best practice for the long-term maintenance of ROWs. An IVM program combines the traditional removal methods (cycle pruning, machine mowing, ground-sterilant, etc.) with a purposeful detailed plan for both mitigating non-compatible vegetation while promoting compatible vegetation. The process includes a science-based understanding of vegetation and ecosystem dynamics, establishment of vegetation management objectives, selection of treatments to achieve objective, and monitoring treatments for effectiveness. An IVM program moves the company forward from the rigid prescriptions based on a set period use of a less refined, unselective processes. However, it is a long-term pledge and acknowledgment that getting to a mature maintenance state requires commitment, time, and resources.

Implementing the following eight vegetation management programs using the IVM methodology has the high probability to reduce NorthWestern's exposure to wildfire-based risk while actively controlling the long-term maintenance. Each aspect of the vegetation management plan includes identification if the program is a new

initiative or an enhancement to an existing program. It is also important to note there are additional vegetation management programs (customer call hotspot, ground sterilant, etc.) that remain in their current state moving forward.

3.4.1. Assessment and Repair

Aerial Assessment and Hotspot - *Enhance Current Program*

NorthWestern currently completes an aerial assessment of its owned transmission facilities on an annual basis. This assessment is coordinated with various NorthWestern Departments to concurrently evaluate the system for maintenance and vegetation-based exceptions. The process includes corrective action for found exceptions. The Wildfire Plan enhances the existing aerial assessment and repair program to include the distribution system. This added aerial assessment may be either a manned or an unmanned flight depending on operational efficiencies and again be coordinated with other internal maintenance stakeholders. The added situational awareness from this assessment will allow the company to hotspot identified exceptions and harden the system against vegetation contacts.

Ground Assessment and Hotspot– *Enhance Current Program*

Similar to the Aerial Assessment and Hotspot program, NorthWestern currently completes a ground assessment of its distribution system according to our operations and maintenance guidelines. Much like the aerial program, resources are coordinated during the assessment process for efficiency. The Plan adds a vegetation-specific ground assessment on NorthWestern's transmission system completed by a utility arborist on a 4-year cycle. Adding the ground assessment to the transmission ROW provides a ground level, detailed view of the vegetation condition not available during the aerial assessment. This method will greatly reduce the opportunity for at-risk vegetation to turn into a hazardous condition before performing proactive maintenance.

Proactive Maintenance – *Enhance Current Program*

NorthWestern has a long established maintenance program to address tree encroachments allowing for reliable, safe energy delivery to our customers. The foundation of the proactive maintenance program assumes a healthy forest and matches performance and time-based cycles to balance the needs of the system, the public, and the vegetation itself. This approach has allowed NorthWestern to maximize the time between maintenance cycles while still providing industry acceptable reliability. This historic maintenance approach put a premium on safety and service reliability and has served the company well for decades. However, as discussed in the opening statements of this Plan, the environment in which our system operates has changed with specific impacts to vegetation maintenance based on the following: extreme localized weather conditions, ecosystems in drought, and population increases within the wildland-urban-interface areas. The impacts of operating the system in these changing conditions requires a change in our maintenance philosophy. NorthWestern is enhancing the cycle approach to harden the system against vegetation encroachments while also aggressively increasing our pruning practices in areas of high consequence.

Remote Sensing and Analysis – *New Initiative*

Technological advancements continue to push into nearly every sector of utility operations and utility vegetation management is no exception. There are now several proven remote technologies (satellite imagery analytics, PhoDAR, Lidar, etc.) with specific advancements in the vegetation space providing expanded situational awareness. This remote method of data collection and associated analytics is able to provide both an aggregate view of NorthWestern's system over time as well as very specific, detailed vegetation conflicts. This awareness provides our vegetation management team an additional non-biased resource to enhance the implementation of our proactive maintenance program.

Right Tree, Right Place – *Enhance Current Program*

Trees provide a bountiful list of positive impacts to any community – from wildlife habitat, erosion control from storm water runoff, through a shady location to rest on a summer day, and on and on – their value cannot be overstated. Given all the positive impacts, one critical item often overlooked is the space trees require to grow to full maturity. Full tree mature height is rarely considered when trees are planted near existing power lines, eventually requiring ongoing maintenance for adequate clearance distance. This program reviews vegetation within the ROW corridors and works with property owners to promote the "right tree" in the "right place" to reduce power outages and wildfire potential for all.

Risk Tree – *Enhance Current Program, no proposed funding changes only scope*

NorthWestern started a formal program in 2018 to address the dramatic increase in the MPB infected dead and dying vegetation found across its Montana operating territory. This program, known as the Hazard Tree Program and described above in the Current State section, is evolving due to equal parts lessons learned during the implementation of the Hazard Tree Program as well as the continued changes in vegetation across the state. As such, the Hazard Tree Program is maturing to a more comprehensive and all-encompassing program by implementing a larger set of model components to address the gaps learned throughout the last 4 years. The enhanced "Risk Tree" program primary differentiates itself by increasing the scope to consider all bug infestations versus the narrow focus specific to the MPB. It also includes a broader data model considering additional risk factors such as terrain, accessibility, vegetation density, wildfire history, prevailing wind direction and places greater importance on operations within the WUI.

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Aerial Assessment and Hotspot	$800k	33%	Increase Situational Awareness. Reduce exposure to non-conforming and at risk vegetation.
Ground Assessment and Hotspot	$4.8M	85%	
Proactive Maintenance	$21.9M	48%	Proactively plan system maintenance to set schedule matching pruning to vegetation species to limit faults
Remote Sensing and Analysis	$7.4M	100%	Improve planning and implementation efficiency; Quality Assurance assessment on completed work
Right Tree, Right Place	$125k	83%	Reduce tree grow-in potential; removes cycle-buster maintenance items
Risk Tree	$16.3M (same as existing funding level)	15%	Comprehensive program to address all at risk vegetation with increase priority towards WUI areas

3.4.2. Asset Protection

Fuel Reduction Partnerships – *New Initiative*

NorthWestern has a good history of working closely with local emergency responders and fire protection agencies. This relationship started with a safety focus to educate these agencies surrounding the hazards of our facilities during an emergency. However, it is now apparent this education and partnership can go further resulting in a proactive reduction in the collective wildfire exposure. Through collaboration with local, state, and federal agencies (or even private landowners), NorthWestern can continue pushing forward with these groups to reduce the impacts of wildfires. NorthWestern has worked on a limited basis historically in conjunction with the United States Forest Service related to slash pile cleanup. This initiative will establish equivalent win-win partnerships within our Montana operating area.

Clear Fall ROW Zone – *New Initiative*

NorthWestern's T&D system traverses pristine areas of not only Montana, but some of the best areas in all of the Western United States. Within that crisscrossed network of lines, the system operates between the extremes of highly inhabited, dense regions all the way through areas that are extremely remote. Regardless of where on this spectrum the electrical lines are located, there are zones in which fire start models indicate an increased risk towards life and property and, thus, requires a program to limit line fault opportunities. By working with local landowners, this program would establish a clear zone for falling vegetation to reduce or eliminate the probability for vegetation contact in these critical areas.

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Fuel Reduction Partnership	$2.0M	100%	Reduces fire severity near critical assets; strengthens relationship with fire agencies and stakeholders
ROW – Clear Fall Zones	$9.4M	100%	Mitigate or eliminate fault potential in areas sensitive to fire activity

3.4.3. Resource

Vegetation Analyst/Scheduler – *New Initiative*

Data driven programs rely on resources to gather and interpret data from multiple sources into meaningful information. Combining the expected increase in data management from the proposed new and enhanced vegetation wildfire programs with contracted and government data resources is a formidable task. Maintaining and updating all these data connections in coordination with field data execution is required on an ongoing basis. In addition, setting and maintaining control points allows for improved implementation efficiency as well as quality assurance. Adding scheduling functions to this role allows the field vegetation coordinators to focus on field related activities and establishes a delineation point between office and field activities.

Vegetation Coordinator – *New Initiative*

The new and enhanced vegetation components of the Plan increases the department workload significantly. Heavy dependence is placed on the existing vegetation coordinator to evaluate the risk associated with each piece of vegetation. The coordinator, a certified utility arborist, works out in front of field crews determining the proper mitigation methods, plans work scope, and works with impacted landowners for successful outcomes for all stakeholders. This position is critically important to meeting the implementation schedule and objectives associated with previously described integrated vegetation management philosophy.

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Vegetation Analyst/ Scheduler	$625k	100%	Data analytics, implementation efficiency, quality assurance.
Vegetation Coordinator	$625k	100%	Certified arborist performing vegetation assessments and work planning

3.5. Public Communication and Outreach

When a wildfire occurs within NorthWestern's Montana service territory, as occurs in service territories across the country, NorthWestern initiates its Incident Command System (ICS) process in coordination with its Public Safety Partners, including local Montana Disaster and Emergency Services Disaster and Emergency Services (DES) Coordinators, state and local government entities, DNRC, BLM, and USDA Forest Service, etc. The ICS process is a nationally established cross-organization process that enables private and public organizations to work in collaboration to respond to an emergency incident, including wildfires. This process includes setting up an IC center and the establishment of a Public Information Office (PIO) role across participating organizations that works with the media and that may utilize a NorthWestern resource, such as, a Community Relations Manager. There is also generally a PIO that is the governmental DES representative, and generally during a fire emergency, the DES representative, incident commander, or PIO handle the public communication and NorthWestern's role is to support these partners public outreach efforts. During a major incident, there are informal communication efforts that local NorthWestern Community Relations Managers implement, including reaching out to community stakeholders, including local governments, mayors, county commissioners, school officials, etc. to provide those entities with a local utility contact. NorthWestern's primary role within the ICS process is focused on continuing to maintain safe and reliable service to its customers and to emergency responders during such events and to continue to communicate to its customers regarding their energy service during such incidents.

All of the work being done by NorthWestern to its system for the safety of the public and its employees cannot guarantee complete reduction in fire activity. Customers rely on NorthWestern to notify them if a disruption in service is expected, as well as provide them with estimated return to service timelines. Currently, NorthWestern uses automated dialing programs for notifying customers of outages with pre-recorded messages in an attempt to communicate pertinent information with our customers.

Current State:

Currently, NorthWestern uses automated dialing programs for notifying customers of outages with pre-recorded messages in an attempt to communicate pertinent information with our customers and this can be used if we take circuits of power offline due to fires. Our Outage Management website is utilized to provide updates to customers on the location and status of outages.

NorthWestern's website, Wildfire Safety (northwesternenergy.com), provides general information for customers on emergency phone numbers, preparing for wildfire tips, our wildfire mitigation, hazardous tree removal and how customers can update their contact info for our system. Other NWE tools for public outreach include our social media postings, and information resources such as Energy Connections and Bright Magazine.

NorthWestern currently does not have and is not proposing to implement a Public Safety Power Shutoff Program. Alternatively, prior to fire season, NWE establishes a different operating protocol on our electric system. This includes identifying and monitoring protective devices on certain segments of the system and changing the settings on those devices so that they operate more quickly to shut off the power when a line fault occurs. During normal operations these devices would attempt two times within seconds to restore power automatically to clear a fault which increases reliability, but also increases the opportunity for a fault that does not clear to become an ignition source. During fire season, protocol requires any fault that trips one of the monitored devices is investigated by field operations before power is restored. It is recognized that under this mode of operations, reliability of the system is reduced. Nevertheless, it is an important step to reduce the overall fire risk. Also, prior to fire season, all of our field operating employees go through fire prevention training and all of their line vehicles are equipped with fire prevention equipment.

Proposed State:

At NorthWestern Energy, we focus on the safety of our customers and the reliability of our electric and natural gas systems. We understand the relationship between safe and reliable utility service and the economic vitality of the areas that we serve. We recognize the importance of clear and concise public communication, especially during times of possible service interruption and safety incidents such as wildfires, earthquakes, etc. Although we utilize a variety of tools to keep our customers informed of potential impacts to our systems, we work closely with our local, state and federal partners to ensure that consistent, clear messaging is provided.

NorthWestern's website, Wildfire Safety (northwesternenergy.com), provides general information for customers on emergency phone numbers, preparing for wildfire tips, our wildfire mitigation, hazardous tree removal and how customers can update their contact information for our system. Throughout the year, we provide a variety of informational pieces to assist customers with planning and preparing for events such as wildfires, earthquakes, floods, etc. This includes the use of billing inserts, brochures, social media posts, our You Tube channel and various other media forms. One tool that is especially valuable is our online outage map. This tool provides customers with a graphical view of system outages, customers impacted and expected restoration times. The Outage Map is dynamic in nature and is updated in real time.

In addition, we utilize two contact centers and numerous walk-in offices to serve as information sources for our customers. Another tool within our Contact Centers is a Voice Response Unit (VRU). Through the VRU, we are able to provide recorded messages that relate directly to the service area of the impacted customer.

When system outages are planned, we utilize numerous sources to inform our customers of the interruption. This includes public service announcements (radio and television), face-to-face notifications, and pre-recorded telephone messages. Once the interruption has been resolved, follow-up telephone notifications can be conducted to inform customers of their current service status.

In the case of unplanned outages, the primary communication methods are the online outage map, the voice response unit, and our contact centers and walk in offices. Additionally, depending on the magnitude of the outage, we may utilize social media, public service announcements and proactive telephone calls.

NorthWestern will continue and build on the current state strategies identified above. However, there are opportunities to advance our training and expansion of fire communication efforts internally to employees and externally to the public through community and stakeholder engagement efforts. These efforts should focus on system integrity and reliability; how NorthWestern is proactively and responsibly addressing wildfire risks (vegetative management); further collaboration with federal state and local government agencies (Public Safety Partners); keeping NorthWestern customers informed and informing employee and contractors.

NorthWestern will identify ways to enhance internal fire safety training and information for employees. This will include identifying information front line employees need and can share, to providing information on NorthWestern's internal website, called iConnect.

NorthWestern will evaluate expanding information on wildfire awareness, prevention and outage preparedness via various media channels including: fact sheets, media articles, community presentations, social media, and website for customers. During the fire season, NorthWestern will expand collaboration efforts with our Public Safety Partners to coordinate media outreach efforts and plans as requested by our partners.

Research will be conducted to identify other resources and emergency response plans that could be utilized to benchmark our communication efforts. For example, NorthWestern's Hydro department has an Emergency Activation Plan that should be reviewed to benchmark ideas that could be utilized in the Enhanced Fire Mitigation Plan. There are community sustainability/resiliency and wildfire protection plans that will be reviewed.

In Montana, once Advanced Metering Infrastructure (AMI) is fully implemented it will provide opportunities for additional information on our system and proactive outage management efforts to update customers on status of lines that maybe taken out of service due to fires.

Enhanced Internal Fire Safety Training

Enhanced Internal Fire Safety Training: *Enhanced Initiative*

Annual enhanced training for field personnel to educate on effectively responding and communicating with the public in wildfire situations.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Enhanced Internal Fire Safety Training	$250k	100%	Enhanced education for internal staff on response during wildfire events.

Mobile Units

Mobile Units: *New Initiative*

Design mobile generator units and invest in a quantity of nine units to be kept at strategic locations for deployment in an emergency. Develop training and a process for a NorthWestern employee to be staffed in an emergency during hours of operation with the unit for public information as it applies to NorthWestern and the emergency.

Costs and Risk Impact Table:

Task	Estimated Five Year Cost	% Plan Impact Improvement	Benefit
Mobile Units	$1.8M	100%	Mobile generation and communication resource for public assistance during emergency events.

Conclusion

NorthWestern is well aware of the risks associated with owning and operating an electric grid in wildfire prone areas. The changing environment with respect to the increasing length of fire seasons and growing WUI populations has a direct relationship to the exposure as well as risks faced by utilities. Recognizing these challenges, NorthWestern identified a set of objectives used as guiding principles in developing programs and identifying resource requirements to aid in the control of these growing risks. In order to arrest or reduce the growing risk due to increased length of fire seasons as well as increased population growth in the WUI, the NorthWestern Enhanced Wildfire Mitigation Plan must focus on items that are measurable, attainable, and provide positive impact on reducing the probability and consequence of fire ignitions. Items NorthWestern cannot directly control include the climate (extreme weather events), the population growth in the WUI, the nature of our dispersed rural assets and forest health cycles. Instead, the objective is to focus on activities where NorthWestern can have direct control or influence.

NorthWestern utilized peer relationships to gain an understanding in the gaps of what NorthWestern does today (pre-enhanced plan) and how that compares to our neighbors. From that gap analysis, NorthWestern then developed this Enhanced Wildfire Mitigation Plan that consists of five components: Situational Awareness, Operational Practices, System Preparedness, Vegetation Management and Public Communication and Outreach. This Enhanced Wildfire Mitigation Plan builds off of a strong foundation that consists of standards that have been established as a result of our demonstrated history of commitment to safe and reliable service to our customers.

The development of NorthWestern's Enhanced Wildfire Mitigation Plan began with establishment of Plan objectives as guiding principles and builds off of the strong foundation of existing standards to ensure safe and reliable service. NorthWestern then reviewed programs to determine the benefits and the costs of maintaining the current scope and schedule timelines, accelerating or enhancing the existing programs, and/or identifying and developing new programs or resources for the development of this Plan. Given the rapidly evolving nature of wildfire risk and available technology and resources, NorthWestern will continue to re-evaluate its Plan on an annual basis. This Plan represents a critical first step to address increasing wildfire risks and once this five year timeline is completed,

NorthWestern will conduct a further evaluation to determine on-going future needs.

Appendix A

NorthWestern's Montana electric distribution customers have seen consistent reliability in recent years. Annual benchmarking with IEEE (Institute of Electrical and Electronics Engineers) and EEI (Edison Electric Institute) ranks Northwestern steadily in the 1st-2nd Quartiles including Major Event Days and 2nd-3rd Quartiles excluding Major Event Days. These benchmarks include peer utilities nationwide. NorthWestern's Montana customers have seen large storms in recent years where the system experiences devastating stresses beyond those normally expected. These events are deemed as catastrophic. These events, which include the mid-January windstorm in central Montana in 2021 and the major snowstorm in the Hi-Line region in October of 2017, are reported and analyzed separately.

FIGURE 9: MONTANA SYSTEM INDICES WITH AND WITHOUT MAJOR EVENT DAYS (MEDS) AS DEFINED IN IEEE STANDARD 1366-2012.

Outages most often reported in summer afternoons range from tree limbs brushing into lines, equipment failures to animal contacts. Northwestern strives to provide reliable electric service and therefore one of the largest contributors to outages is due to scheduled maintenance and construction. These shorter planned outages help prevent longer reactive outages from occurring. Transmission and supply also cause a significant percentage of outages, from NorthWestern transmission lines to lines fed into the system from other utilities in the region. Areas with more customers and therefore more assets on the system, such as Billings, Bozeman, Missoula and Great Falls, tend to experience more outages. However, rural areas with many miles of line are also subject to longer outages due to the difficulty of access and remote locations. Montana is a large territory with varying geography, climate and rural-urban interfaces. It is impossible to prevent all outages from occurring, but with better data available and innovative new programs, NorthWestern has worked to reduce interruptions to customers. Additional information on Montana distribution reliability is in NorthWestern's annual reliability report filed with the Montana Public Service Commission.[3]

From a transmission perspective, the majority of system operations do not result in a distribution customer outage. Nearly one-third of outages experienced on the Northwestern Transmission system are momentary 'blinks.' These are often caused by weather or unknown sources. Of the remaining outages, three-quarters are due to maintenance. When maintenance takes a line out of service, customer service continues through other methods, whether it be a different transmission line or portable substations. Weather is the largest cause of unplanned outages on the transmission system followed by unknown causes and hardware. As with the distribution system, rural areas with many miles of line are often the locations of these unknown outages due to the difficulty of access and remote locations.

3 Reports (mt.gov)

Distribution System Infrastructure Program

One program that has been foundational to NorthWestern's reliability efforts is Distribution System Infrastructure Program (DSIP). DSIP was a program spanning from 2011 through 2017. The vision was for a distribution system that is: reliable, able to grow, optimized, responsive to all customers, energy efficient, cost effective and state of the art. The objectives identified to achieve this vision were: to arrest or reverse the trend in aging infrastructure, restore margin capacity back into the system, maintain reliability over time and increase it for our customers as well as position NorthWestern to adopt new technologies. While not all of this work was aimed at just the wildfire prone areas, there was a large number of poles replaced to current standards, rural reliability improvements completed, and over 12,000 circuit miles of vegetation trimmed or removed, affecting those areas. The automation platform started with this program puts the Distribution Operations Control Center (DOC) in a position for quicker reaction to needed changes in operational practices given changing environmental conditions.

FIGURE 10 - DSIP COSTS 2011 THRU 2017

	DSIP ($)	Base ($)	Project Units Complete
Expense Projects - $64.1M			
Tree Trimming	$ 21,256,400.00	$ 16,610,585.00	12,238 Circuit Miles
Pole Inspection	$ 9,161,793.00	$ 4,820,341.00	14,174 Circuit Miles
OH Electric Repairs (P2's)	$ 3,936,884.00	$ -	8553 Repairs
Rural Reliability Improvement	$ 5,324,441.00	$ -	14 Circuits
Substation Upgrades	$ 1,321,565.00	$ -	*111 Substations
Automation	$ 853,464.00	$ -	*76 Substations *35 Base Stations
Farm Taps	$ 62,423.00	$ -	*24 Farm Taps
Gas Repairs (G1's)	$ 756,204.00	$ -	7,254 Repairs
Capital Projects - $296.5M			
Pole Replacement	$ 84,305,064.00	$ 20,964,951.00	32,172 Poles
Underground Cable Replacement	$ 80,023,261.00	$ 13,921,908.00	1,802,557 Trench Feet
Substation Upgrades	$ 21,814,271.00	$ -	*111 Substations
Capacity Upgrades	$ 21,075,627.00	$ -	27 Projects
Gas One Plan (Includes Gas Historic Block Refurbishment)	$ 39,357,724.00	$ 5,238,424.00	276 Blocks
Rural Reliability Improvement			
Automation	$ 9,375,685.00	$ -	*76 Substations *35 Base Stations
Farm Taps	$ 442,441.00		*24 Farm Taps
***Combination of Capital and Expense**			

Appendix B

Understanding How to Assess the Risk

NorthWestern cataloged all of the current work activities, activities identified to accelerate and new activities to implement. A gap analysis, or maturity model, conducted provides insight to understand how the planned items compared to today. This second gap analysis scored each item indicating the level of development (System Score). This System Score was added to an organizational environment score, which indicates an organizations ability to fund/implement the program or procedure (Environment Score). A Criticality Factor multiplies the summation of these two scores. The Criticality Factor indicates this specific line items ability to influence the overall effectiveness of the Wildfire Plan itself. The Gap Analysis Score ($Score_{GA}$) gives an indication of the level of impact each line item will have once developed and executed.

An Outage Reduction Score ($Score_{OR}$) indicates an assumed reduction in contact events through the implementation, of each line item. A Situational Awareness Score ($Score_{SA}$) indicates an ability to affect the probability and potentially consequence from active management of the grid pre-ignition. The Situational Awareness Score also aims to understand the impact to consequence through active management of the grid post-ignition. These two scores indicate an ability to effectively influence the probability of an ignition and the consequence should a contact or an ignition occur.

A total overall score is calculated by the summation of the three scores ($Score_{GA}$ +$Score_{OR}$ +$Score_{SA}$). Each item was scored by today (if no plan was implemented) with scores for post-Fire Plan implementation. Using this methodology, a consistent approach can be applied to understand the benefits against the costs, as well as the level of how each item could impact NorthWestern's risk.

1. Define Plan Gap Analysis
    A. System – 0-4 score indicating the development of the program or process
        1. No Program
        2. Below Acceptable Level
        3. Acceptable
        4. Best Practice
        5. Above/Beyond Best Practice
    B. Environment – 0-4 score indicating organizations ability to implement program or process
        1. No Intention
        2. Limited Capability – Constraints based on but not limited to:
            a. Resource
            b. Material
            c. Funding
        3. Reactive Implementation – Run to failure model
        4. Proactive Implementation – actively managing according to plan
        5. Accelerated Implementation – Intention to execute beyond plan defined time and funding metrics
    C. Criticality Factor – 0-4 score indicating the programs impact to the overall effectiveness of the wildfire plan
        1. No Impact
        2. Marginal Impact
        3. Impact
        4. Large Impact
        5. Greatest Impact

    $Score_{GA} = (A+B)*C$

Define metrics to articulate reduction of a fire ignition

D. Assumptions/Clarifications
   1. Fire ignitions generally created due to outages, reduction in outages reduces probability of fire ignition
   2. Active management of situational awareness reduces both consequence and probability
   3. Outage Reduction is the count of outages both sustained and momentary

E. Plan Impact on reducing Unanticipated Outages (Score $_{OR}$) – 0-4 score indicating expected impact to ignition probability
   1. No Impact
   2. Marginal Impact
   3. Reduction less than 20%
   4. Reduction between 20%-40%
   5. Reduction Greater than 40%

F. Plan Impact on Situational Awareness (Score $_{SA}$) – 0-4 score indicating ability to impact probability from active management of system/environment pre-ignition as well as impacting consequence from active management of system/environment post-ignition
   1. No Impact
   2. Marginal Impact
   3. Reduction Less than 20%
   4. Reduction Between 20%-40%
   5. Reduction Greater than 40%

2. Total Risk Reduction Score
   $\text{Score}_{Total} = \text{Score}_{GA} + \text{Score}_{OR} + \text{Score}_{SA}$

3. Objective:
   A. Score programs/processes for Today
   B. Score programs/processes for Plan

Scoring Example:

Task	State	System	Environmental	Criticality	Outage Reduction	Situational Awareness	Plan Improvement Score
Reliability Engineer	Today	0	0	4	0	1	1
Reliability Engineer	Plan	2	3	4	1	2	23 (96% Improvement)

NorthWestern currently does not have a dedicated resource specifically monitoring and following up on multiple line operations, such as a transmission breaker open and re-closing multiple times due to a wind event. We do have some resources at NorthWestern that are reviewing operations as part of their duties, but not specific to this intent. Therefore, the total score today is one.

Based on the Fire Plan, a full time employee will be reviewing grid operations. The Plan allows for a funded position and program. This person will be affecting both outage reduction and situational awareness on the systems by following up on the operations and deploying a field resource to fix the issue that is creating multiple line operations.