



20-YEAR FOREST HEALTH STRATEGIC PLAN

EASTERN WASHINGTON



WASHINGTON STATE DEPT OF
**NATURAL
RESOURCES**

HILARY S. FRANZ
COMMISSIONER OF PUBLIC LANDS

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CONTRIBUTING ORGANIZATIONS

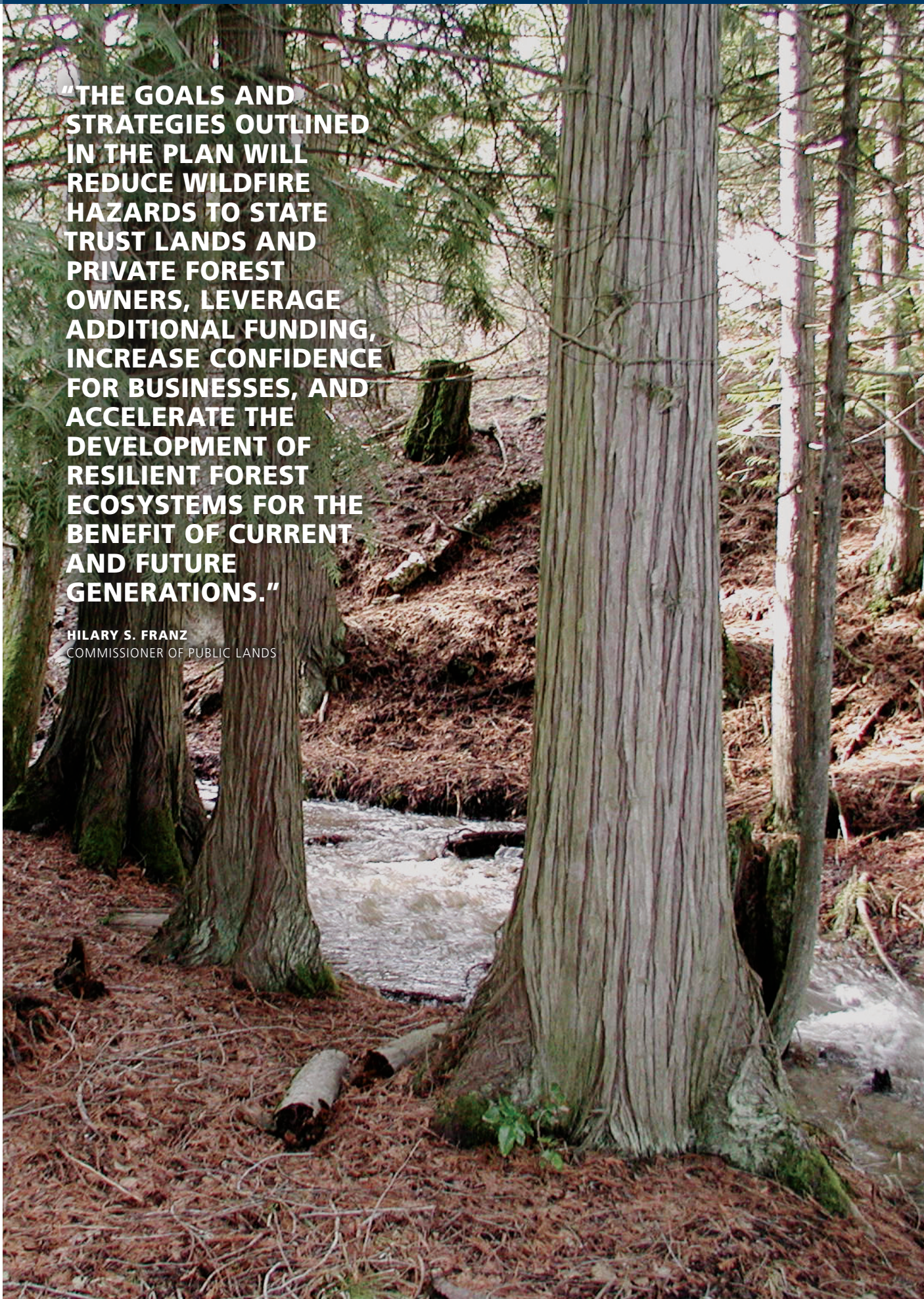
The following organizations contributed to the development of Washington's 20-Year Forest Health Strategic Plan Eastern Washington:

American Forest Resource Council
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Washington Association of Land Trusts
Washington Department of Commerce
Washington Department of Fish and Wildlife
Washington Environmental Council
Washington Farm Forestry Association
Washington Fire Adapted Communities
Washington Forest Protection Association
Washington Prescribed Fire Council
Washington Resource Conservation & Development Council
Washington State University
Yakama Nation



“THE GOALS AND STRATEGIES OUTLINED IN THE PLAN WILL REDUCE WILDFIRE HAZARDS TO STATE TRUST LANDS AND PRIVATE FOREST OWNERS, LEVERAGE ADDITIONAL FUNDING, INCREASE CONFIDENCE FOR BUSINESSES, AND ACCELERATE THE DEVELOPMENT OF RESILIENT FOREST ECOSYSTEMS FOR THE BENEFIT OF CURRENT AND FUTURE GENERATIONS.”

HILARY S. FRANZ
COMMISSIONER OF PUBLIC LANDS



A LETTER FROM THE COMMISSIONER OF PUBLIC LANDS



Hilary S. Franz, a statewide elected official, is Washington's fourteenth Commissioner of Public Lands since statehood in 1889.

I am pleased to present Washington's 20-Year Forest Health Strategic Plan, Eastern Washington. Forest health, wildfire risk, and rural economic development are inextricably linked in eastern Washington. Our rural communities and all people in Washington State benefit from well-managed, resilient forest ecosystems that provide timber products, natural resource and recreation jobs, wildlife habitat, clean water and many other important ecosystem services and social values.

This phase of the strategic plan sets a course for coordinated, focused actions and investments that will be critical to addressing the forest health crisis in eastern Washington. Our state can simply not afford to continue to lose homes, lives, and ecosystem values to large, uncharacteristic wildfires. Climate change will only exacerbate the forest health and wildfire risks facing our forests and communities. This plan prepares the state to undertake strategic actions to address these risks over the next two decades.

Through innovative partnerships with other agencies and landowners and the implementation of a Good Neighbor Authority agreement with the USDA Forest Service, the state will increase its capacity for landscape-scale planning and coordinate implementation across land ownership boundaries. The goals and strategies outlined in the plan will reduce wildfire hazards to state trust lands and private forest owners, leverage additional funding, increase confidence for businesses, and accelerate the development of resilient forest ecosystems for the benefit of current and future generations.

The process to develop this plan was data-driven, transparent, and collaborative. This same approach will be essential to the plan's successful implementation. The plan's development was intentionally designed to engage a diverse range of partners that are committed to continuing to work together to implement cross-boundary solutions.

Importantly, this plan must be an evolving guide. Although it is a strategic roadmap for our actions and investments over the next two decades, we also need it to be dynamic. As science continues to advance our understanding of forest restoration and management, it is paramount that we integrate the best available data into our planning and be responsive in our actions.

My sincere thank you for the contributions of Department of Natural Resources staff, partner agencies, universities, tribes, businesses, organizations, and the numerous community stakeholders dedicated to working together to restore resiliency to our forests. There has never been more urgency to address forest health and wildfire risks in eastern Washington. It is time to take critical, coordinated actions and move forward with this unprecedented opportunity to achieve our shared vision for eastern Washington's forests and communities.

A handwritten signature in blue ink that reads "Hilary Franz". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

HILARY S. FRANZ
COMMISSIONER OF PUBLIC LANDS



**NEARLY 2.7 MILLION
ACRES OF EASTERN
WASHINGTON FORESTLAND
NEED TREATMENT TO BE
MORE RESILIENT AGAINST
INSECTS, DISEASES AND
WILDFIRES.**

HAUGO ET AL. 2015

**TAPASH SUSTAINABLE FOREST
COLLABORATIVE'S MANASTASH-
TANEUM CROSS BOUNDARY PROJECT**

This forest health thinning project is the combined effort of DNR, WDFW, Yakama Nation, USFS, and TNC to have a larger impact on the health of two watersheds near Cle Elum. By working together, the collaborative restores forests to a more healthy condition.

Introduction

The Scale of the Forest Health Problem

Throughout the western United States, including Washington State, forest health has been in decline for several decades. At a broad scale, the decline can be attributed to past management practices, including past fire management practices, that have resulted in uncharacteristically overstocked forests; and episodic droughts that have increased the competition among trees for available moisture, resulting in increased stress and loss of vigor.

These densely packed and moisture-stressed forests have become less resistant to wildfires and insects and disease outbreaks. Combined with record-setting summer droughts, forest fires often burn with uncharacteristic severity and duration, in part because of dense and continuous fuel accumulations. Tree mortality rates associated with bark beetles and other insects and diseases have also increased substantially over large areas.

Much of the 10 million acres of forestland in eastern Washington faces serious threats to forest health. Decades of fire suppression and past management practices have put these forests at higher risk of damage by disease, insects and wildfire and reduced ecosystem resilience in the face of climate change. An analysis by The Nature Conservancy and the U.S. Forest Service identified nearly 2.7 million acres of eastern Washington forestland requiring some sort of active management or disturbance to create forest structures more resilient against insects, diseases and wildfires (Haugo et al. 2015).

The acres of trees that have been killed or damaged in the first decade of the 2000s was 150 percent greater than the 1990s and 200 percent greater than in the 1980s. The National Insect and Disease Risk Map (NIDRM) projects continued elevated levels of damage will occur from insects and diseases (Krist et al. 2014). NIDRM estimates that 2.7 million acres of Washington state forestland are at risk to suffer severe damage from insects and diseases from 2013-2027.

Increasingly large and expensive wildfires have led other states to identify pathways to accelerate the pace and scale of forest health management and restoration and take actions to reduce wildfire risk in communities. In 2015, more than 1,500 wildfires burned over one million acres and 230 homes across Washington State. Wildfires cost state taxpayers \$89 million that year, which is almost three times the 10-year annual average of \$34 million. In 2015, wildfires represented the second largest single carbon emitter in the state – second only to the transportation sector. In total, agencies and landowners

JOHN MCCOIGAN / BLM



▲ Forest stands of contiguous, closely spaced trees with multiple canopy layers have become more common in eastern Washington. These overstocked forests are more likely to experience stand replacing wildfire and elevated levels of mortality due to competition, insect damage, and disease. Dense stands (bottom photo) can sustain multi-year outbreaks of mountain pine beetle over thousands of acres, resulting in newly killed lodgepole pine (red) and ponderosa pine (orange) with older mortality appearing grey.

collectively spent more than \$319 million on fire suppression activities that year in Washington. While the 2015 wildfire season broke many records, predictions indicate that the Pacific Northwest may experience four times more acres burned annually in the 2080s compared to the median annual area burned from 1916 to 2006 (Littell et al. 2010).

Without active restoration and management, including changes in the approach and methods for treating broad forest landscapes, forest health will continue to decline and the occurrence of uncharacteristic wildfires will continue to increase.

Forest Health Policy in Washington

Forest health is defined in state statute as “the condition of a forest being sound in ecological function, sustainable, resilient, and resistant to insects, diseases, fire and other disturbance, and having the capacity to meet landowner objectives” (RCW 76.06).

In 2004, the Commissioner of Public Lands was designated as the state’s lead to improve forest health (RCW 76.06). Concurrently with this designation, the state legislature emphasized the need for coordination across land ownerships—federal, state, private, and tribal—in recognition that forest conditions on one property can pose risks to adjacent properties. Wildfire, insects, disease, and invasive species often spread indiscriminately across land ownership boundaries.

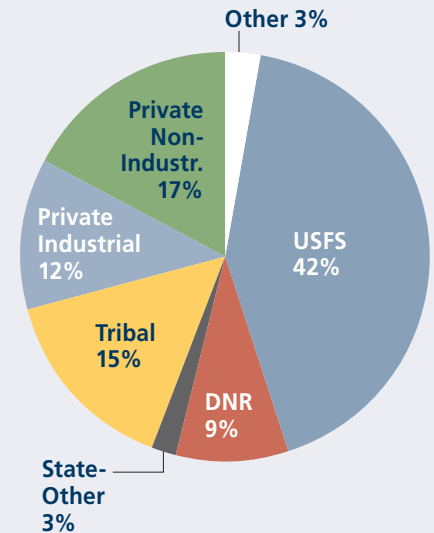
In 2012, the DNR designated the first Forest Health Hazard Warning Areas under RCW 76.06, which was the first statewide effort to prioritize forest health investments. In 2017, the DNR further increased its internal prioritization process and external coordination efforts with partners through its emphasis on targeted priorities areas in its capital budget request. Four main priority areas were selected to direct treatment implementation across eastern Washington to increase the effectiveness of DNR’s forest health efforts.

Forest health continues to be a critical issue, so the Washington State Legislature in 2016 passed a provision in ESHB 2376 Sec. 308, that provided funding and direction to the Department of Natural Resources (DNR) to develop a 20-Year Forest Health Strategic Plan to “treat areas of state forestland that have been identified by the department as being in poor health.”

In 2017, the Washington State Legislature unanimously passed additional legislation that provided additional direction to the DNR related to restoring forest health in the state. SB 5546 directed the DNR to develop an assessment and treatment framework designed to proactively and systematically address the forest health issues facing the state. Specifically, the framework must endeavor to achieve an initial goal of assessing and treating one million acres of land by 2033. The framework must be utilized to assess and treat acreage in an incremental fashion each biennium and consists of three elements: assessment; treatment; and progress review and reporting. The Legislature also directed the DNR to utilize and build on the forest health strategic planning initiated

EASTERN WASHINGTON ACTIVE RESTORATION NEED BY OWNERSHIP

HAUGO ET AL. 2015



ESHB 2376, SEC. 308

Develop a 20-Year Forest Health Strategic Plan to “treat areas of state forest land that have been identified by the department as being in poor health.”

SB 5546

Build on the 20-Year Forest Health Strategic Plan to develop an assessment and treatment framework to proactively and systematically address the forest health issues, and assess and treat one million acres of land by 2033.

HB 1711

Develop and implement a policy for prioritizing forest health treatment investments on state lands to reduce wildfire hazards and losses; reduce disease and insect infestation; and achieve forest health and resilience at a landscape-scale.

under ESHB 2376 Sec. 308 to the maximum extent practicable, to promote the efficient use of resources.

Finally, HB 1711 directed the DNR to develop and implement a policy for prioritizing investments in forest health treatments to protect state lands and state forest lands to reduce wildfire hazards and losses from wildfire; reduce insect infestation and disease; and achieve forest health and resilience at a landscape-scale.

This plan focuses on eastern Washington's fire-prone forests in response to a current and pressing need. Wildfires in eastern Washington have grown larger in recent decades and are increasingly expensive and difficult to fight. The DNR is committed to exploring the need to evaluate forest health conditions in western Washington and engaging with partners in creating pathways to address any identified forest health conditions.

Environmental, Social and Economic Links

Assessments of forest health in eastern Washington provide evidence of what many have suspected—that current treatment levels and approaches are inadequate to significantly modify the risks to communities and forest ecosystems from poor forest health conditions. Accelerating the planning and implementation of treatments across eastern Washington and doing so at the landscape-scale, is critically important to reduce the risk of uncharacteristic wildfire and improve forest health conditions. The 20-Year Forest Health Strategic Plan provides a framework that can result in accelerated planning and implementation of forest health treatments to improve the ecological functions of forest ecosystems and the economic climate for rural communities and the people of Washington State.

Forest health, wildfire risk, and rural economic development are inextricably linked in eastern Washington. Our rural communities and all people in Washington State benefit from well-managed, resilient forest ecosystems that provide timber products, natural resource and recreation jobs, wildlife habitat, clean water and many other important ecosystem services and social values.

Washington State has abundant and diverse natural resources. These natural resources bring a tremendous management and stewardship responsibility. This

plan aims to outline a comprehensive path to steward and restore the resiliency of eastern Washington forests for the benefit of Washington's people, wildlife, and communities. Moving forward in the face of climate change, it will be vital to protect aquatic resources including drinking water, 80 percent of which flows from forests in the state as well as protecting forest ecosystems against the affects drought and increasing their stress tolerance.

The plan relies on a commitment from all interested parties – state and federal agencies, conservation groups, timber industry, private landowners, tribes, and other stakeholders—to take an approach that emphasizes strategically focused forest health treatments in priority landscapes to achieve the mission, goals and overarching strategy of the plan. It will also require working at large scales across land ownership boundaries, with unprecedented degrees of collaboration among landowners with diverse management objectives.

Importantly, the DNR also understands that the success of treatments often requires work to go beyond trust land borders. Using tools like the Good Neighbor Authority, the DNR now has the ability to look beyond its own ownership boundaries and effectively work with the USDA Forest Service to address forest health needs at a landscape-scale.

20-Year Forest Health Strategic Plan Stakeholder Engagement Process

The Department of Natural Resources determined that in order to meet the intent of the Legislature, and to address the forest health issue in a meaningful way, it was necessary to take a broad view of “treat areas of state forest lands that have been identified by the department as being in poor health.” The Department of Natural Resources adopted a guiding philosophy of “all lands, all hands” to ensure that multi-ownership landscapes were evaluated for risks and that forest health treatments would be advanced in a more coordinated, strategic fashion.

The Department of Natural Resources invited a broad, diverse range of stakeholders to participate on a 20-Year Forest Health Strategic Plan steering committee. Steering committee members provided input, conducted analyses and evaluated data, drafted elements of the plan, and submitted recommendations on the final content of the plan to the Department of Natural Resources' staff. The development of this plan relied on the work of a

broad, diverse group of stakeholders who participated on a steering committee that guided the development of the plan. The steering committee comprised people from more than 30 unique organizations, representing a diverse range of perspectives and expertise including state and federal land management agencies, county government, timber industry, environmental groups, and forest collaboratives (see page 5).

Steering committee members met regularly over several months throughout the planning effort. In addition to serving on the steering committee, some members participated on one of three subgroups to lead key elements of the plan. In total more than 20 stakeholder meetings were convened in Chelan, Colville, Ellensburg, Olympia, and Stevenson to develop the plan.

There was consensus among committee participants to advance a landscape-scale, cross-boundary strategy to achieve forest health and coordinate project planning and implementation across landownership boundaries in Washington.

During the 20-Year Forest Health Strategic Plan development, steering committee members studied the potential effectiveness of three possible forest health treatment scenarios over the next 50 years in eastern Washington: a baseline scenario modeling current forest treatment rates and two scenarios modeling increased rates of forest treatments (Hemstrom and Henderson 2017). Through the analysis of the Institute for Natural Resources at Oregon State University, members drew the following conclusions:

- **Forest health can be put on a positive trend** toward resilient conditions in those portions of the landscape that are available for active treatment, especially in dry forests. However, it will take several decades or more of dedicated, repeated treatments for the forests to fully approach a resilient condition. It takes time for trees to grow to a larger size from the currently dominant smaller-sized classes.
- **Wildfire will continue to be a major disturbance of eastern Washington forests**, and relatively high levels of stand-replacement fire appear likely to continue. However, strategically focused treatments that restore structural conditions and spatial patterns will increase stand and landscape-level resilience to fire and reduce the amount of uncharacteristic high severity fire.
- **Insect-related mortality appears likely to decrease with increased forest health treatments, especially in areas of dry forest available for forest health treatments.**
- **Timber volume produced might increase substantially from dry forests** with increased restoration treatments. But that volume would largely come from partial harvests and may be mostly in smaller-diameter material.
- **Wildlife habitat could increase for some species and decrease for others** under different management approaches. Increased

NANCY CHARBONNEAU / DNR



Good Neighbor Authority

Good Neighbor Authority (GNA) is a tool that allows the USDA Forest Service and Bureau of Land Management to pass-through federal dollars to state agencies to plan and implement forest health treatments on federal lands and facilitate cross-boundary large landscape projects. GNA projects may be funded with appropriated dollars, stewardship receipts, or program income generated from timber sales.

Washington State signed a master agreement (photo above) with the USDA Forest Service in 2017. Supplemental project agreements (SPA) outline specific work and associated budgets required to meet forest health objectives. Implementation of GNA in western states has focused on improving forest health, reducing fuels and threats to communities from uncharacteristic wildfire, and creating natural resource employment opportunities in rural communities.

restoration treatments generate more potential habitat for species related to open, late-seral forest conditions and decreased habitat for species associated with closed forests.

- **Forest restoration and local economic benefits can be substantial over 20+ years in local areas where resources can be strategically focused through collaborative actions.**

Support for Treatments at a Landscape-Scale

According to a report by the Institute for Natural Resources at Oregon State University, active restoration and management approaches could treat over one million acres of forestland in eastern Washington in the next twenty years using a combination of mechanical treatments and prescribed fire (Hemstrom and Henderson 2017). The report findings conclude that achieving forest health objectives in eastern Washington will likely require a focused landscape-scale, cross-boundary approach. If treatments are implemented successfully, they will likely reduce insect and disease-related mortality and high severity fire over time, especially in dry, fire-prone forests.

Land management agencies are actively working to accelerate the planning and implementation of forest health treatments in eastern Washington. However, recent estimates suggest that at current treatment rates it would likely take 53 years to address the restoration need on federal lands alone (DNR Eastern Washington Forest Health Report 2014). In order to meaningfully reduce wildfire and forest health risks in a watershed, land management agencies and private landowners will need to increase the pace, scale, and effectiveness of treatments, and prioritize landscapes and watersheds to coordinate activities and focus investments (Finney et al. 2008; Stine et al. 2014).

Monitoring

Monitoring of forest health conditions and tracking progress toward achieving the goals established in this plan is critical to ensuring the success of the plan and determining continued investments in forest health treatments. Potential metrics to assess progress toward the strategic goals based on similar work in other nearby states include: forest-related employment; forest ecosystem services produced; improvements in the composition, diversity, and structure of forests towards



a desired future condition; the levels of dead and dying trees; the spread of invasive species; the rates of effective forest fuel treatments; and the rates of carbon sequestration in forests. Monitoring and progress reporting will require collaboration and continued support of existing partnerships between the Department of Natural Resources, Department of Fish and Wildlife, USDA Forest Service, Bureau of Land Management, Natural Resource Conservation Service, tribes, and private landowners.

The first report on the status of the 20-Year Forest Health Strategic Plan will be presented to the State Legislature on December 1, 2018 and each subsequent even-numbered year on the same date. The report will include: 1) request for appropriations designed to implement the plan including assessment work and implementing treatments; 2) prioritized list and brief summary of planned treatments with the appropriations request; 3) list and brief summary of treatments completed, total funding available, cost for completed treatments, and outcomes; and 4) summary of trends in forest health conditions.

FOREST HEALTH TREATMENT TYPES

There are two broad categories of active management strategies described in this report: 1) mechanical treatments, or the physical removal of biomass and 2) prescribed fire, also known as controlled burning, to reduce fuel loads. Passive management, in other words, allowing the forest time to grow is also an important strategy in eastern Washington, where it takes multiple decades for trees to mature.

1 Mechanical Treatments

A legacy of fire suppression has resulted in a preponderance of small, densely packed trees in eastern Washington forests. Improving forest structure, species composition, reducing surface-to-tree-crown fuel continuity and selecting for fire tolerant species increases the resiliency of stands to future wildfires and insect and disease outbreaks. Reducing tree density and selecting for fire tolerant species is often achieved through mechanical treatments. Common mechanical treatments used to achieve forest health objectives include commercial and noncommercial treatments. Depending on forest stand conditions, appropriate site-specific forest health treatments can range greatly in intensity from light thinnings to even-aged regeneration harvests.

MECHANICAL TREATMENT

2 Prescribed Fire

Fire is a natural part of the dry forest ecosystems in eastern Washington and the use of controlled fire promotes forest health. Prescribed fire, or controlled burning, is “the planned, professional application of fire in the right place, at the right time” with the right intensity to meet a forest health improvement prescription or meet the landowner’s objectives (Washington Prescribed Fire Council). Burning helps to reduce fuel loads and increase effectiveness of mechanical treatments to withstand and constrain future wildfires. Prescribed fire also improves forest aesthetics and viewsheds, removes slash that cannot be utilized, improves forage conditions for big game and livestock, and reduces risk of insect and disease spread.

PRESCRIBED FIRE TREATMENT



Land management agencies are actively working to accelerate the planning and implementation of forest health treatments in eastern Washington. However, recent estimates suggest that at current treatment rates it would likely take 53 years to address the restoration need on federal lands alone (Eastern Washington Forest Health Report 2014). In order to address the forest health issue, land management agencies and private landowners will need to increase the pace, scale, and effectiveness of treatments, and prioritize landscapes and watersheds to coordinate activities and focus investments.

Vision, Mission and Overarching Strategy

The vision, mission, goals and strategies of this plan were developed collaboratively by a steering committee comprised of individuals representing more than 30 organizations. The statements reflect the diversity of values and interests in forest management, and provide a shared set of objectives that will guide stakeholders' continued work together to address forest health and resilience

VISION

Washington's forested landscapes are in an ecologically functioning and resilient condition and meet the economic and social needs of present and future generations.

MISSION

Restore and manage forested landscapes at a pace and scale that reduces the risk of uncharacteristic wildfires and increases the health and resilience of forest and aquatic ecosystems in a changing climate for rural communities and the people of Washington State.

OVERARCHING STRATEGY

Maximize effectiveness of forest health treatments by coordinating and prioritizing forest management activities across large landscapes.

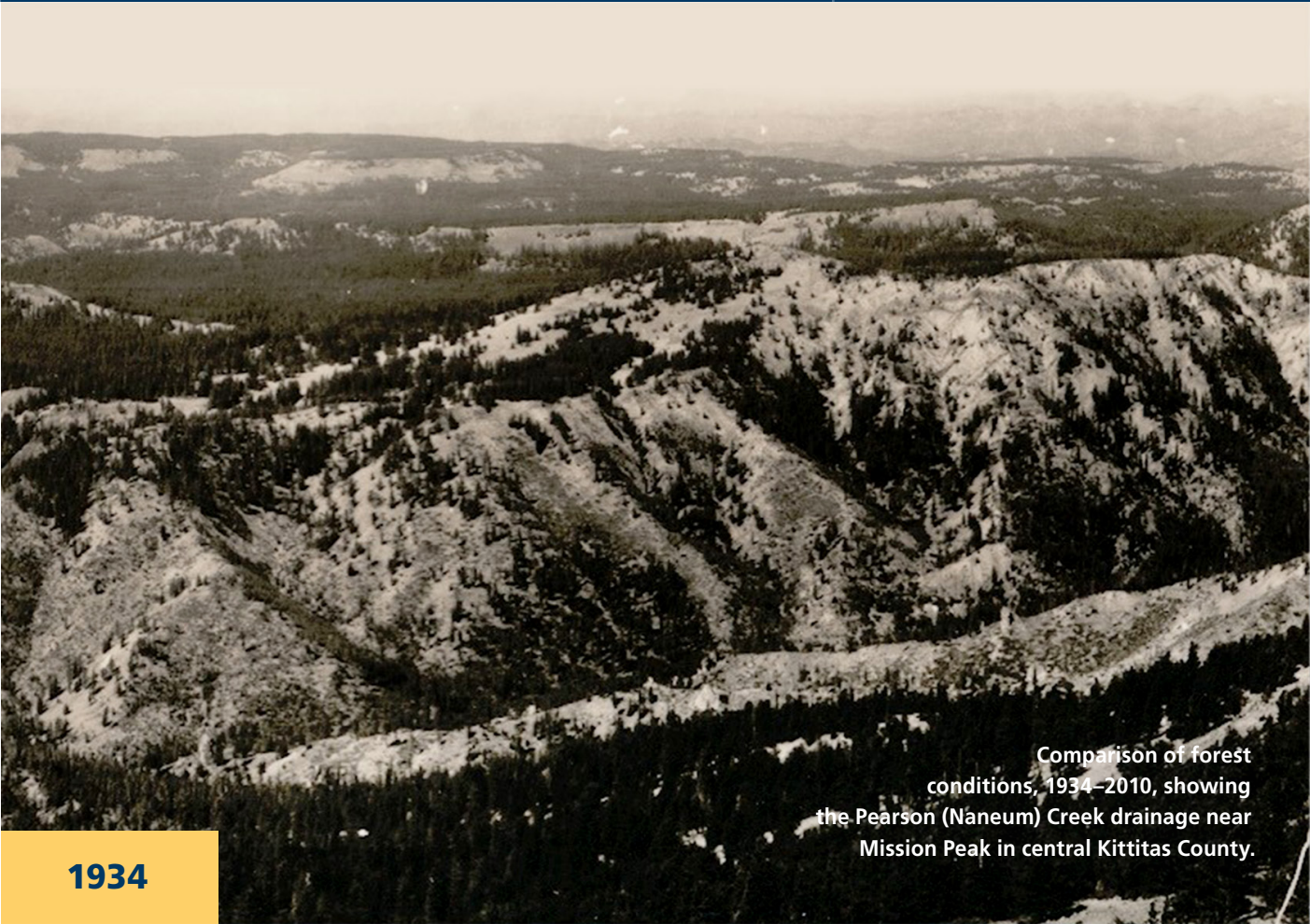
DEREK CHURCHILL



The five goals of the plan are intended to meet five key objectives that will be necessary to achieving forest health in eastern Washington:

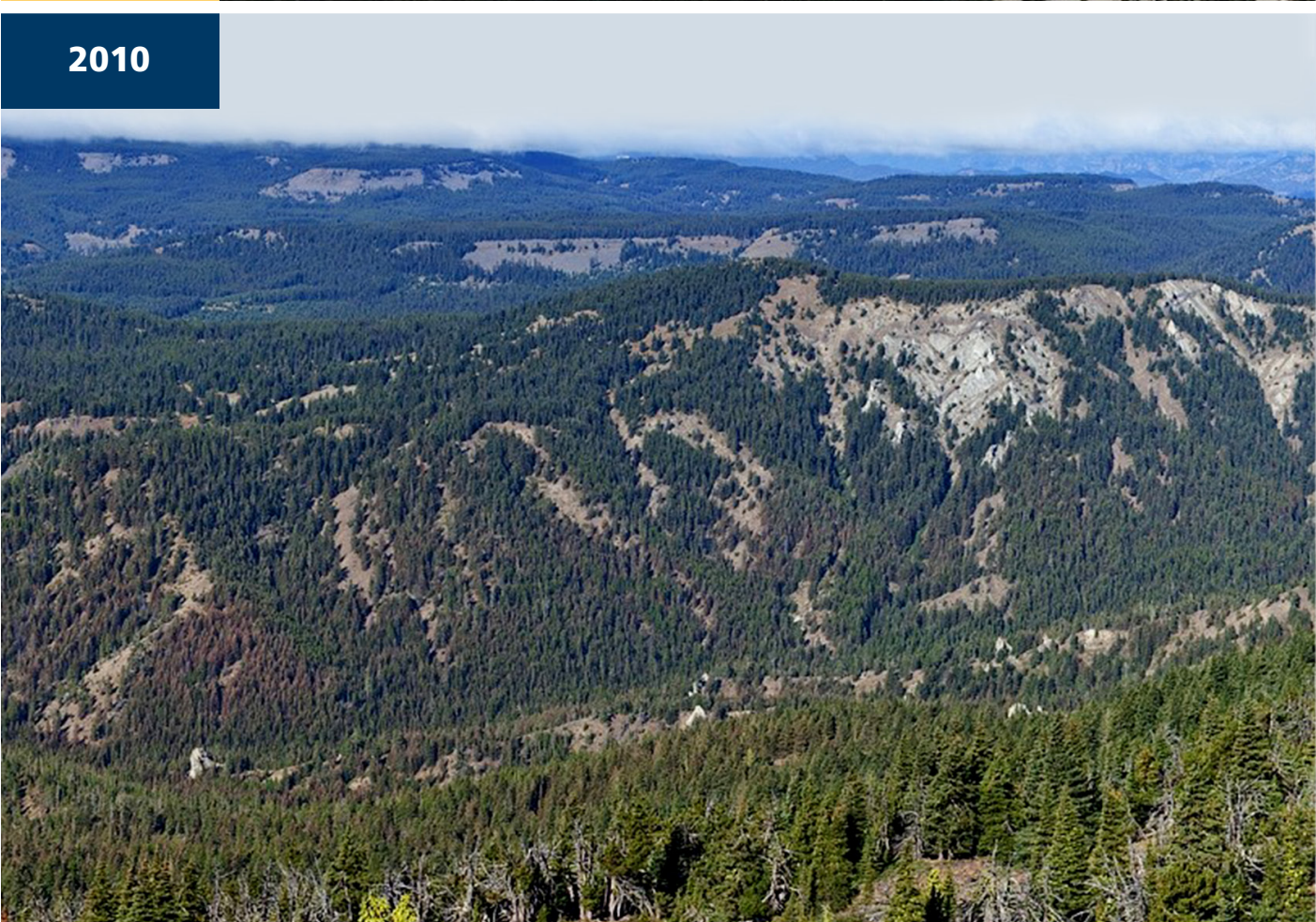
- 1 Accelerate the pace and scale of treatments,
- 2 Strategically focus work to protect communities and values at risk,
- 3 Promote rural economic development and use of restoration by-products,
- 4 Respect and integrate diverse landowner objectives, and
- 5 Monitor progress and adapt strategies over time to ensure treatment effectiveness.

UPPER PHOTO BY REINO R. SARLIN, USDA FOREST SERVICE, 08/19/1934, RECORDS GROUP 95, NATIONAL ARCHIVES AND RECORDS ADMIN. SEATTLE. LOWER PHOTO BY JOHN F. MARSHALL 09/10/2010, FOR THE USDA FOREST SERVICE, PNW RESEARCH STATION, WENATCHEE, AND OKANOGAN-WENATCHEE NF.



1934

Comparison of forest conditions, 1934–2010, showing the Pearson (Naneum) Creek drainage near Mission Peak in central Kittitas County.



2010

GOAL 1

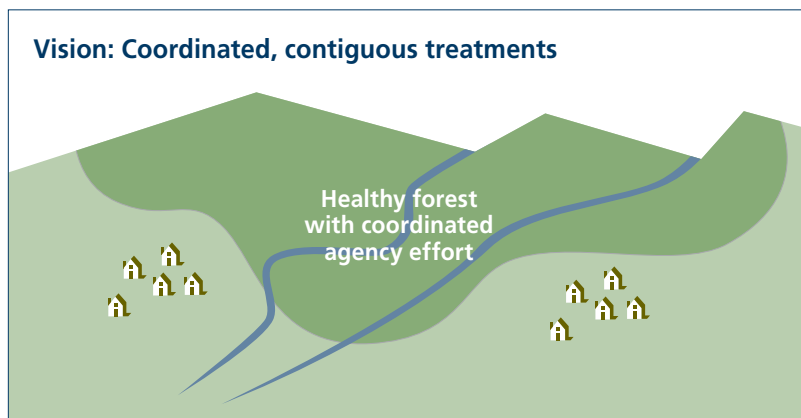
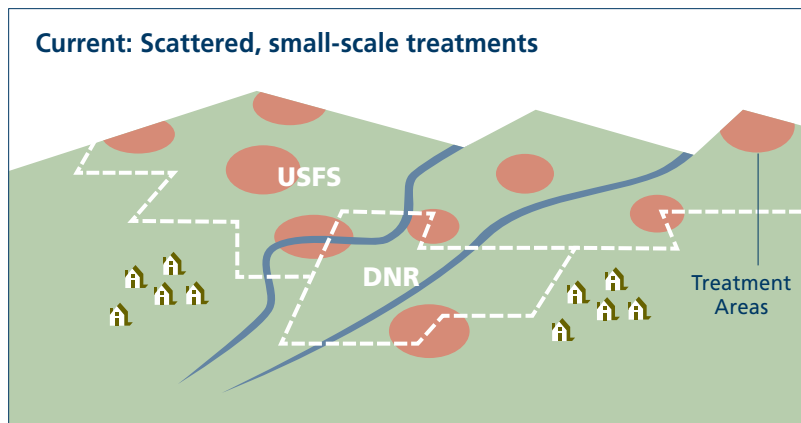
Conduct 1.25 million acres of scientifically-sound, landscape-scale, cross-boundary management and restoration treatments in priority watersheds to increase forest and watershed resilience by 2037.

OVERVIEW

Given the scale of forest health problems in eastern Washington, the DNR, federal agencies and other partners agree that in order to meaningfully reduce wildfire and forest health risks, it will take coordinated actions across land ownership boundaries at a watershed scale. To effectively reduce wildfire and forest health risks, landowners will need to be more deliberate in coordinating forest health treatments across ownerships and work at a large enough scale to change the risk profile. Planning and implementing treatments at larger-scales will require coordination and leverage of resources amongst landowners. Identifying shared objectives and supporting stronger inter-agency partnerships and collaboration will be critical in increasing the effectiveness of landscape-scale, cross-boundary projects in priority watersheds.



▲ Diverse landowners and agencies act as stewards to one of Washington’s most important forest resources—water. Eighty percent of Washington drinking water flows from forestlands.



COORDINATED, LANDSCAPE-SCALE FOREST HEALTH TREATMENTS ARE NEEDED TO MEANINGFULLY REDUCE WILDFIRE AND FOREST HEALTH RISKS IN A WATERSHED.

The current level of forest health treatments in eastern Washington are not adequate to reduce wildfire and forest health risks. This Plan highlights the need to implement forest health treatments on a larger scale (landscape or watershed scale) and coordinate forest health activities among landowners in a watershed to maximize treatment effectiveness.

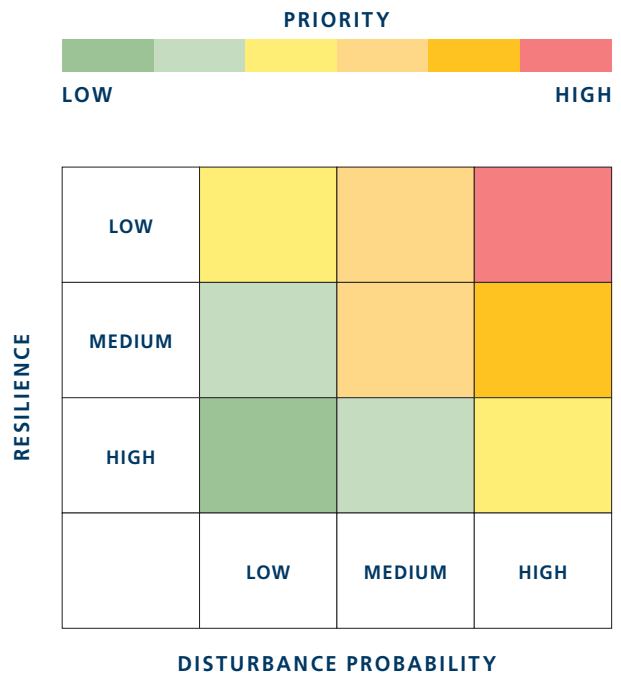
Priority Forest Health Watersheds

There are not enough resources to address the widespread forest health and wildfire risks present in eastern Washington all at once. Thus, a prioritization process is essential to help focus resources in high priority watersheds and to successfully implement the framework. Prioritizing landscapes for treatments also improves the efficiency and effectiveness of investments by increasing the number of acres treated within a priority watershed and leveraging resources to accelerate planning processes and implementation of forest health treatments.

As part of the 20-Year Forest Health Strategic Plan, a prioritization process was developed at the HUC 5* watershed level (an average HUC 5 watershed is approximately 150,000 acres) using a variety of available data sets to help describe forest health/wildfire risk and the values at risk.

This new forest health watershed prioritization builds on the Department of Natural Resources Forest Health Hazard Warning Areas issued in 2012 under RCW 76.06, which was the first statewide effort to prioritize forest health investments. This prioritization process includes two of the same datasets and approaches used in the Forest Health Hazard Warning process. It also includes many different datasets such as fire risk, wildland urban interface (WUI), drinking water, aquatic resources, wildlife habitat, timber volume, and climate change, which reflects a broader focus on the risks facing our forests and the values they provide. For a complete description of the methodology used to identify forest health priority landscapes, please see Appendix 1.

The forest health landscape prioritization results, shown on the opposite page, make it clear that high priority treatment areas exist across all of eastern Washington, and that the process to strategically focus investments and treatments will be critical to address those areas with the highest level of relative risk. Areas with high community protection needs, such as Spokane and Klickitat County, and Department of Natural Resources Forest Health Hazard Warning Areas will continue to be priorities for state forest health investments.



▲ The prioritization process built upon previous criteria and included fire risk, wildland urban interface (WUI) areas, drinking water, aquatic resources, wildlife habitat, timber volumes and factors associated with climate change.

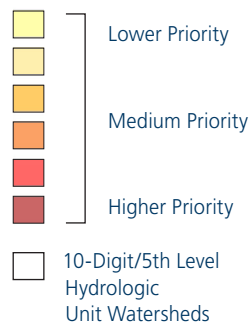
It is important to note that based on site-specific conditions and individual landowner objectives, valid and appropriate forest health treatments may often be implemented outside of formally prioritized watersheds and landscapes.

The forest health priority HUC 5 watershed process will serve as a first step in selecting smaller HUC 6 watersheds (a HUC 6 watershed averages 20,000 acres in size) to develop landscape evaluations and landscape treatment prescriptions to implement the forest health assessment and treatment framework required by SB 5546.

*HUC: Hydrologic unit code. The U.S. Geological Survey developed this classification system as a way to categorize watersheds. The smaller the number, the bigger the geography, (e.g. HUC 1, HUC 2, HUC 3, HUC 4, HUC 5, HUC 6) Average HUC 6 watershed is approximately 20,000 acres. Average HUC 5 watershed is approximately 150,000 acres.



**EASTERN WASHINGTON
FOREST HEALTH
PRIORITY HUC 5
WATERSHEDS**



HUC: Hydrologic unit code.

The U.S. Geological Survey developed this classification system as a way to categorize watersheds. The smaller the number, the bigger the geography, (e.g. HUC 1, HUC 2, HUC 3, HUC 4, HUC 5, HUC 6) Average HUC 6 watershed is approximately 20,000 acres. Average HUC 5 watershed is approximately 150,000 acres.

Goal 1	Strategies
1	Prioritize forest health treatments in landscapes with the highest need and relative risk.
2	Conduct landscape evaluations that utilize the best available science and analytical tools to produce landscape-level forest health data that stakeholders and agencies use to efficiently prioritize and design forest health treatments to improve forest conditions and enhance ecosystem values across landscapes.
3	Implement a wide range of treatment types, including mechanical treatments and prescribed fire, to increase tree vigor and reduce vulnerability to uncharacteristic levels of damage from forest insects (such as bark beetles), pathogens (for example, root disease or dwarf mistletoe), drought and wildfire.
4	Maximize the extent and effectiveness of treatments through consideration of the relative cost, efficacy, and effective duration of treatment methods.
5	In priority landscapes, work with landowners and agencies to coordinate activities across boundaries, and select the most effective treatment approaches relative to the unique needs of the prioritized landscapes and landowner objectives.
6	Work with forest collaboratives — existing partnerships that include land management agencies, conservation groups, timber industry, and local government—to build social license, address barriers, and leverage resources to develop landscape-scale restoration and management projects on national forests and other lands where appropriate.
7	Increase capacity to implement landscape-scale cross-boundary management approaches through existing authorities and programs such as Good Neighbor Agreements.
8	Regularly convene a group of stakeholders to review legal, regulatory, and policy obstacles to accelerating the planning and implementation of landscape-scale, cross-boundary forest health treatments.
9	Develop and support additional policy as needed to incentivize forest health treatments on non-federal lands and support sustainable forest management that addresses ecological, economic, and social aspects of forest health.

GLORIA FLORA / NE WASHINGTON FORESTRY COALITION



Forest Collaboratives

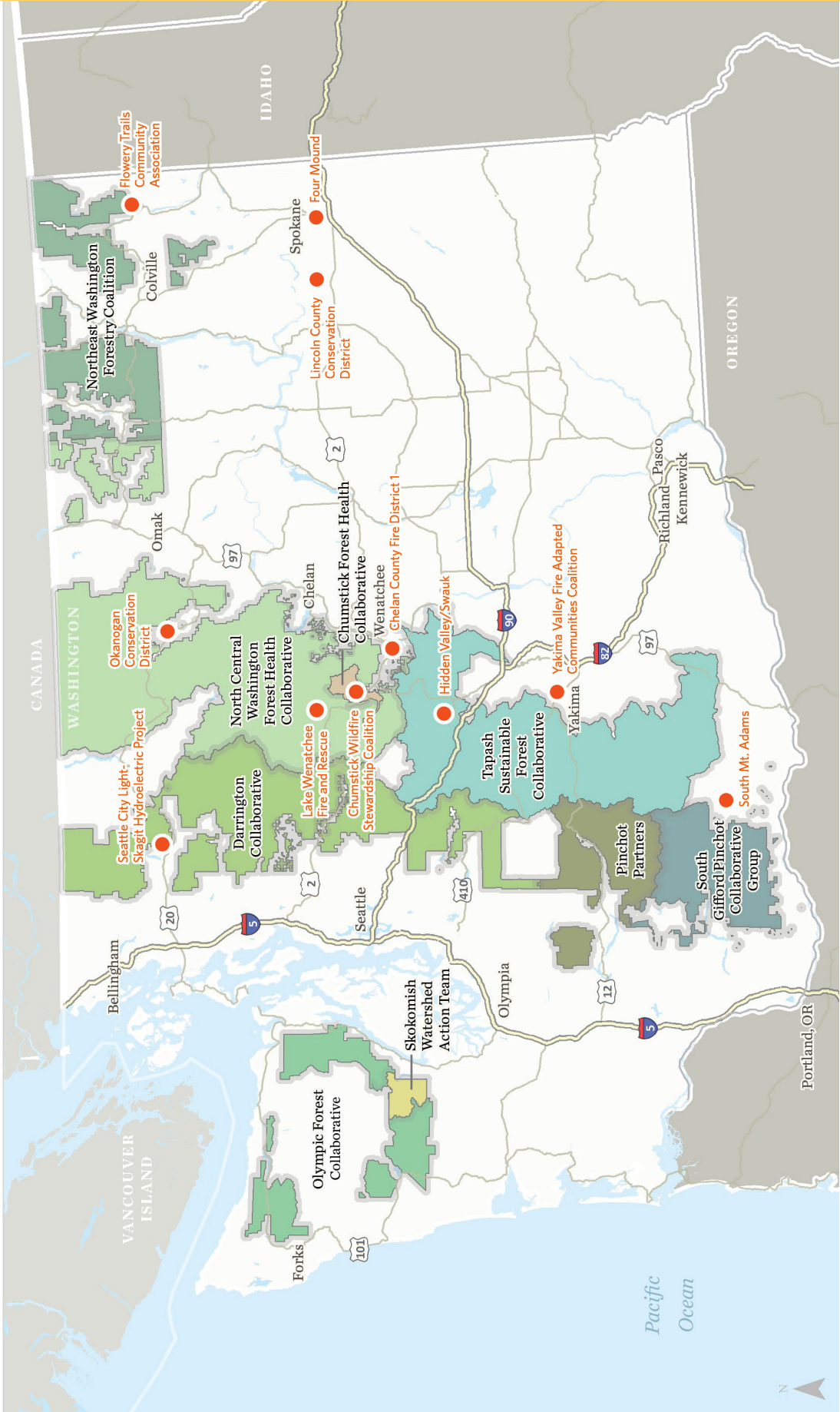
The State of Washington currently has eight forest collaboratives working to address forest health issues and support rural economic development. Forest collaboratives are diverse stakeholder groups, bringing together environmentalists, timber industry representatives, county government, and state and federal land management agencies to develop and implement forest restoration treatments.

In eastern Washington, there are five collaboratives: **South Gifford Pinchot Collaborative, Tapash Sustainable Forest Collaborative, Chumstick Wildfire Stewardship Coalition, North Central Washington Forest Health Collaborative, and Northeast Washington Forestry Coalition.**

The longest-standing collaborative in eastern Washington is the Northeast Washington Forestry Coalition. Formed in 2002, the Northeast Washington Forestry Coalition focused on accelerating the pace and scale of forest restoration on the Colville National Forest. Between 2002 and 2017, the coalition collaborated on 34 projects covering 417,561 acres of forestland. More than 369.9 million board feet of timber was produced as a result of the restoration activities.

FOREST COLLABORATIVES WORKING FOR FOREST AND COMMUNITY RESILIENCY IN WASHINGTON STATE

MAP COURTESY OF THE NATURE CONSERVANCY / WASHINGTON



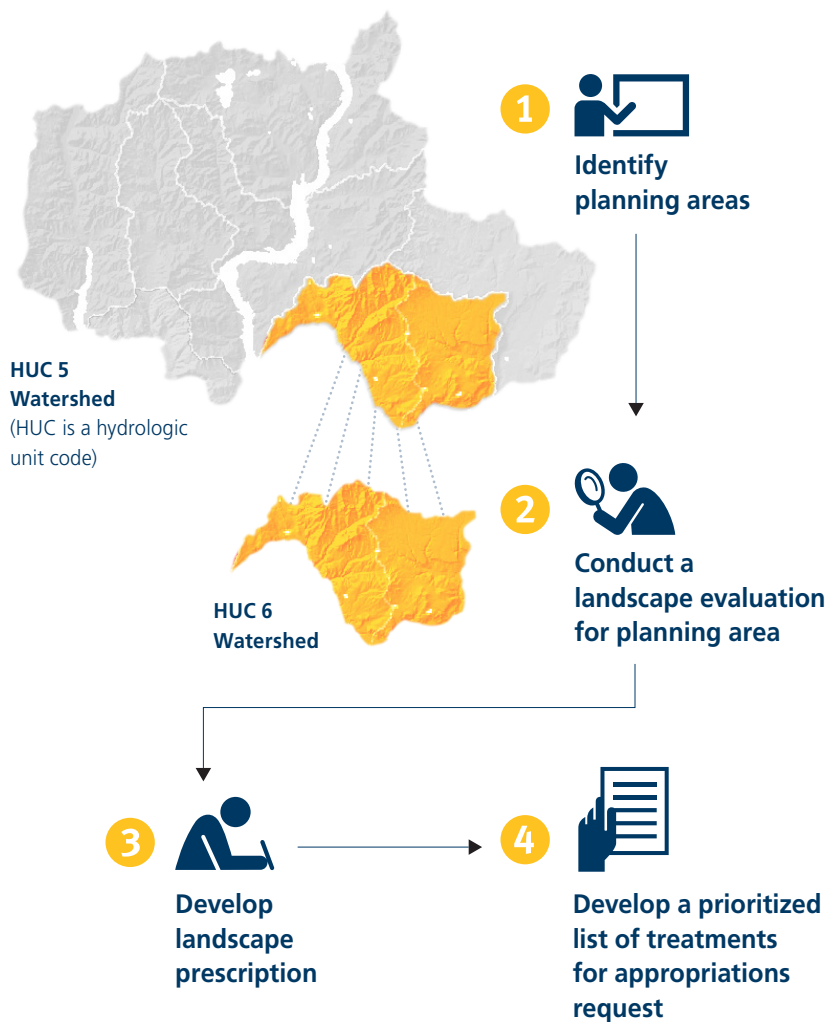
- LEGEND**
- Fire Adapted Learning Network Community
 - Olympic Forest Collaborative
 - Skokomish Watershed Action Team
 - Darrington Collaborative
 - Pinchot Partners
 - South Gifford Pinchot Collaborative Group
 - North Central Washington Forest Health Collaborative
 - Chumstick Forest Health Collaborative
 - Tapash Sustainable Forest Collaborative
 - Northeast Washington Forestry Coalition

NEAR-TERM ACTIONS

Making Landscape-Scale Restoration and Management a Reality



The scientific basis, social consensus, and implementation tools for landscape-scale restoration have been developing over the last several decades and are now ready for large scale application. DNR is committed to providing leadership to make the vision and goals contained within this plan a reality. The authority and direction contained in SB 5546, forest health assessment and treatment framework, will direct DNR's efforts to restore and manage large landscapes. The process to assess and identify forest health treatment needs in a landscape will follow these general steps:



Forest Health Advisory Committee

Under SB 5546, the Commissioner will appoint a Forest Health Advisory Committee to assist in developing and implementing the forest health assessment and treatment framework. The committee will include representation from a broad scope of forest health stakeholders in Washington including: large and small forest landowners, wildland fire response organizations, milling and log transportation industries, forest collaboratives that may exist in the affected areas, highly affected communities and community preparedness organizations, conservation groups, and other interested parties deemed appropriate by the commissioner. The committee may also consult with relevant local, state, and federal agencies, and tribes.

The Forest Health Advisory Committee will be involved in all the major steps of the process used to assess and identify forest health treatment needs in a watershed.

NEAR-TERM ACTIONS

1 Identify Planning Areas

The forest health priority HUC 5 watershed process will serve as a first step in selecting planning areas. Within the HUC 5 watersheds that have been selected, smaller HUC 6 watersheds will be assessed and scored based on fire risk, restoration need, aquatic function, economic potential, and other resources and values. DNR will then present this information to local forest collaboratives and work with them to identify which HUC 6 watersheds are the best candidates to select for planning areas based on local knowledge and priorities. The local consultation will then be melded with the HUC 6 assessment process to develop a list of candidate planning areas for review by the Forest Health Advisory Committee. Based on input from the local consultation, Forest Health Advisory Committee recommendations and DNR staff recommendations, the Commissioner of Public Lands will make the final selection of planning areas.

2 Conduct Landscape Evaluations

The DNR, in coordination with other private and public landowners, will conduct landscape evaluations on the HUC 6 watersheds selected as planning areas by the Commissioner of Public Lands. A landscape evaluation is a data driven approach to understanding the current condition of a landscape and its level of resilience to future disturbances and climatic change (Hessburg et al. 2015). The landscape evaluation provides the data necessary to make determinations on which treatments at a watershed scale will be effective in increasing overall forest health condition and resilience to major disturbances and drought events. Economic needs and social values are incorporated in the evaluation.

3 Develop Landscape Prescriptions

The information and data from the landscape evaluation will be synthesized into a landscape prescription that summarizes current forest conditions and risks; lays out management direction for vegetation structure, composition, and pattern; and includes treatment targets with associated acreage, cost/revenue and volume estimates. Maps that show priority areas for different kinds of forest treatments will be included. Guidelines, targets, and spatial locations for treatments will likely be more specific for public lands and more general for private lands. Both the landscape evaluation and landscape prescriptions will be developed in consultation with the local forest collaboratives and major landowners.

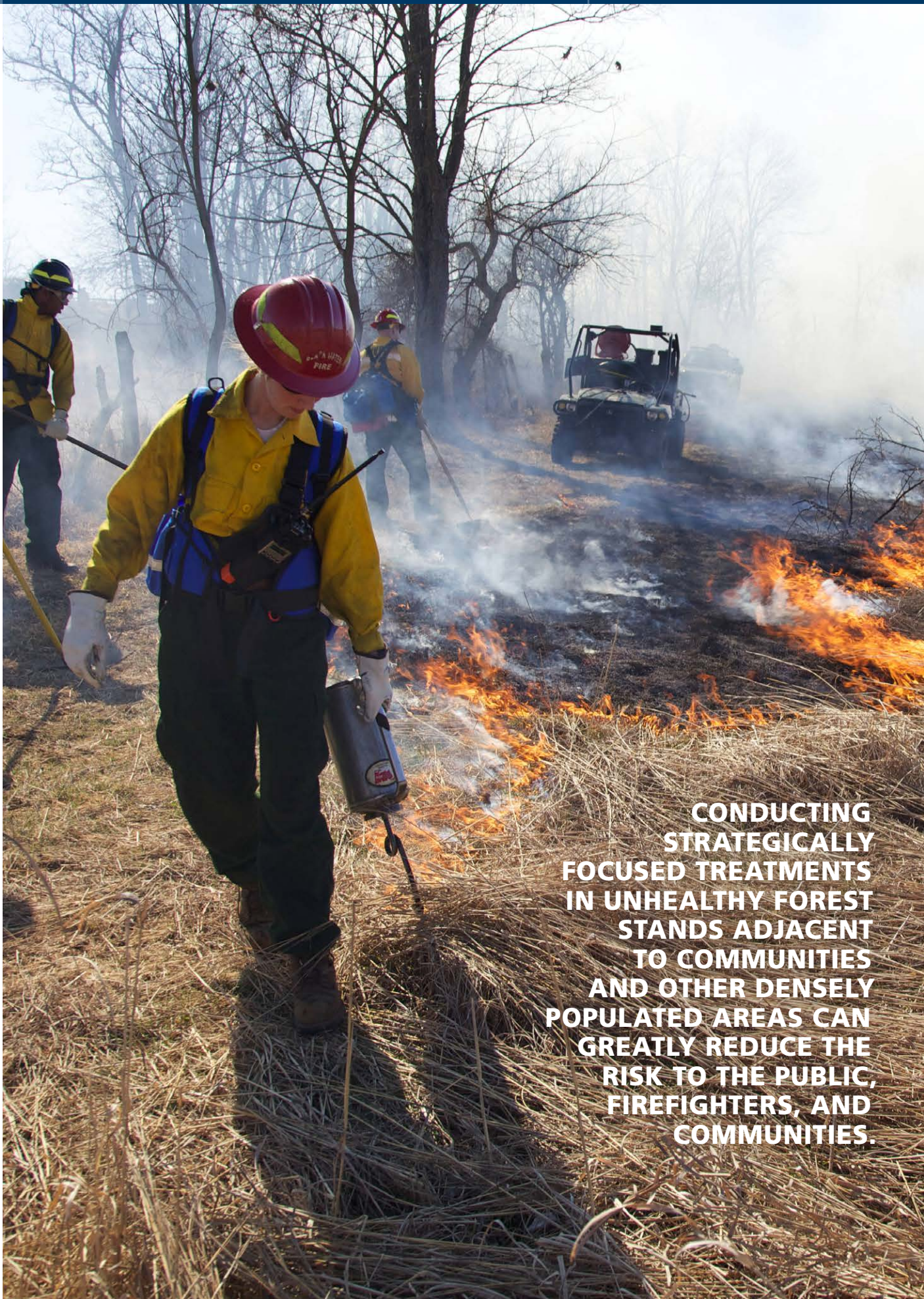
4 Develop a Prioritized List of Treatments for Appropriations Request

The final step in the process will be distilling recommended treatments contained in the landscape prescription into a prioritized list of treatments that will be included in DNR's biennial report to the legislature and budget appropriations request.

LANDSCAPE EVALUATION AND PRESCRIPTIONS WILL BE DEVELOPED IN CONSULTATION WITH THE LOCAL FOREST COLLABORATIVES AND MAJOR LANDOWNERS.

Evaluation components include:

- Identify landowner objectives and general management zones
- Departure assessment
- Fire modeling and risk assessment
- Climatic drought stress and biophysical alignment analysis
- Aquatic evaluation
- Identify additional resource focus areas for protection and restoration (e.g. habitat, cultural resources, recreation, etc).
- Economic and operational analysis



CONDUCTING STRATEGICALLY FOCUSED TREATMENTS IN UNHEALTHY FOREST STANDS ADJACENT TO COMMUNITIES AND OTHER DENSELY POPULATED AREAS CAN GREATLY REDUCE THE RISK TO THE PUBLIC, FIREFIGHTERS, AND COMMUNITIES.

GOAL 2

Reduce risk of uncharacteristic wildfire and other disturbances to help protect lives, communities, property, ecosystems, assets, and working forests.

OVERVIEW

Predictions indicate that the Pacific Northwest may experience four times more acres burned annually in the 2080s compared to the median annual area burned from 1916 to 2006. (Littell et al. 2010). Wildfire will continue to be a major disturbance catalyst in eastern Washington forests, and relatively high levels of stand-replacement fire appear likely to continue. However, strategically focused forest health treatments that restore structural conditions and spatial patterns will increase forest stand and forest landscape-level resilience and reduce the amount of uncharacteristic high severity wildfires.

Conducting these strategically focused treatments in unhealthy forest stands adjacent to communities and other densely populated areas known as the wildland urban interface (WUI), can greatly reduce the risk to the public, firefighters, and communities. Dense stands of trees and accumulations of forest fuels in the WUI often produce intense, fast moving wildfires that immediately pose a risk to people, homes, and buildings. Critical suppression resources are often diverted to protect lives and structures reducing the overall effectiveness of suppression efforts and increasing costs. In heavily populated areas, these multiple "missions" can increase the complexity to the point it can overwhelm firefighters. Reducing the risk of wildfire in the WUI is critical to achieving the objectives of the plan.

Wildfires are increasingly expensive to fight because of fragmentation of forests due to increasing population and development. The loss of working forestland in Washington and an ever-expanding WUI will continue to increase fire suppression costs and put property, homes, and lives at risk. By maintaining healthy working forestland, including establishing and maintaining community forests, the risk to the public and firefighters can be reduced, suppression costs associated with fires in the WUI can be reduced, and stable sources of forest products can be produced.



▲ **The Firewise USA program** encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. In 2016, more Firewise USA communities were added in Washington than any other state.

\$89 MILLION

in wildfire costs paid by taxpayers in 2015. Over one million acres and 230 homes were burned that year across Washington State.

Goal 2	Strategies
1	Support Fire-Adapted Communities and landowner assistance programs that provide resources to coordinate risk reduction activities including defensible space near homes and structures.
2	Support the development and integration of Community Wildfire Protection Plans (CWPP) with state and federal resources and priorities.
3	Conduct mechanical treatments and controlled burns in the wildland-urban interface (WUI) to increase firefighter safety and reduce risks to communities.
4	Reduce risk of conversion of forestland to non-forest uses.
5	Communicate relevant and timely information about wildfire risk to landowners, policy makers, and the public. Assist communities in planning for future wildfire events.

COMMUNITIES IN WILDFIRE PRONE AREAS NEED TO UNDERSTAND THE RISK AND WORK TOGETHER TO BE PREPARED FOR WILDFIRE.

A “Fire Adapted Community” incorporates people, buildings, businesses, infrastructure, cultural resources and natural areas. During a wildland fire, Fire Adapted Communities reduce firefighting costs, minimize damage to homes and infrastructure, and lessen the potential for injury or loss of human life.

BEFORE

AFTER

Left: Aerial view of before and after a fuel-reduction thinning in Riverside State Park, Spokane, WA. This is an example of strategic investments to lower wildfire risk in the wildland-urban interface.

Conducting treatments in unhealthy forest stands adjacent to communities and other densely populated areas known as the wildland urban interface (WUI) can greatly reduce the risk to the public, firefighters, and communities.

REDUCING WILDFIRE RISK

Dense forest with ladder fuels and a structure without defensible space.



SCENARIO 1

Wildfire in dense, over-stocked forests with multiple canopy layers has a higher likelihood of becoming a sustained crown fire. Closely spaced small trees and branches in the understory act as ladder fuels that allow fire to spread more easily into the upper canopy, even with shorter flame lengths. The resulting crown fire behavior can become extreme in certain weather conditions and is more likely to kill trees. Structures adjacent to these types of stands are at much higher risk of igniting.

Widely-spaced forest with minimal ladder fuels and a structure with defensible space



SCENARIO 2

Wildfire in forests composed of widely spaced, mature trees with minimal ladder fuels in the understory is more likely to remain on the ground. Large diameter, thick-barked trees with few lower branches are more likely to survive this type of fire. A low-intensity ground fire has less risk of igniting structures, especially those with defensible space. This fire-adapted stand structure is maintained naturally through frequent fire return intervals or through management activities such as thinning, pruning, and/or prescribed burning.



**INCREASED
HARVEST OF
UNHEALTHY
TIMBER FROM
OVERSTOCKED
FORESTS, SMALL-
DIAMETER WOOD
BYPRODUCT
INNOVATIONS,
AND LOCAL
WOOD PUBLIC
PREFERENCES CAN
CONTRIBUTE TO
RURAL AND STATE
ECONOMIES.**

GOAL 3

Enhance economic development through implementation of forest restoration and management strategies that maintain and attract private sector investments and employment in rural communities.

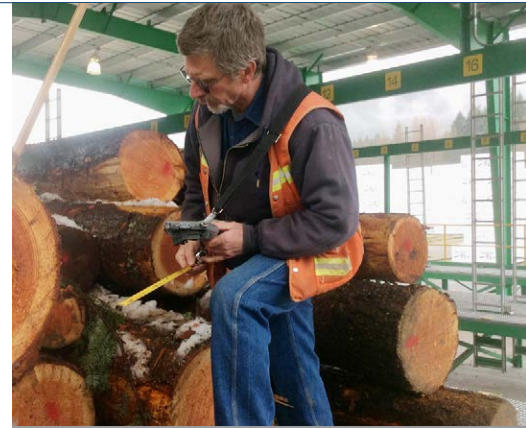
OVERVIEW

Forest health, wildfire risk, and rural economic development are inextricably linked in eastern Washington. Rural communities and all people of the state benefit from well-managed, resilient forest ecosystems that provide timber products, natural resource and recreation jobs, wildlife habitat, clean water and many other important ecosystem services and social values.

Forest health can be put on a positive trend in those portions of the landscape that are available for active treatment, especially in dry forests. However, it will take several decades or more of dedicated, repeated treatment for the forests to fully approach a desired, resilient condition. In some cases, self-sustaining programs and economically “break-even” projects are possible; but merchantable timber alone will not fund all of the forest health treatments required to meet the objectives outlined in this plan. Meeting forest health goals will require finding ways to add value to forest restoration byproducts and increased financial resources from state and federal agencies, tribes, and private landowners over the next twenty years.

To effectively implement landscape-scale forest health treatments in eastern Washington, there will be a need for adequate milling infrastructure and logging contractors. In certain areas, there has been a decline in both due to a decrease in wood supply from public lands and the uncertainty of future supply. Ensuring a reliable and consistent supply of forest products is critical in attracting private investment and supporting rural economic development. Emerging opportunities, such as the use of cross-laminated timber (CLT) sourced from small diameter trees, could support buildings designed and built in our cities with products responsibly sourced and milled in our forest communities.

In advancing landscape priorities it is important to evaluate the economic and noneconomic values of forest health treatments. This includes timber removed during mechanical treatment; wildlife habitat created through forest health treatments and reintroduction of fire; loss from wildfire of homes, structures, timber and agricultural products, and public infrastructure; impacts to recreation and tourism; and ecosystem services such as water, air, and carbon sequestration. Research suggests that investments in forest health treatments produce multiple public benefits. The State of Oregon conducted a cost benefit analysis and found that for every \$1 million spent on forest restoration there is \$5.7 million generated in economic returns, and that for every \$1 invested in restoration the state saves \$1.45 in suppression (Rasmussen et al. 2012).



▲ The loss of milling infrastructure has made it more difficult to treat forestlands—a reliable and consistent supply of forest products is critical in attracting private investment and supporting rural economic development.

Goal 3 Strategies

- 1 Increase timber supply and produce a consistent and reliable supply of timber volume to maintain and increase forest products industry infrastructure to levels required to meet forest health objectives.
- 2 Support continued innovation and investment in the forest products sector to utilize and add value to restoration by-products and small-diameter wood, including cross-laminated timber (CLT), mass timber, biochar, and biofuels and associated co-products.
- 3 Assess forest management contracting capacity and infrastructure required to meet forest health objectives. Support investments in worker training for forest health treatment and prescribed fire crews.
- 4 Implement a local wood marketing campaign to connect urban and rural communities to address forest health issues.
- 5 Support the development of wood energy systems at meaningful and appropriate scales. Expand Washington Department of Ecology Wood Stove Change-Out Program to support the installation of clean-burning wood and pellet stoves to improve air quality, provide a market for forest restoration by-products, and stimulate local economic development.

JEANHUP



Clean-Burning Pellet Stoves Improve Air Quality

A pellet stove is a stove that burns compressed wood or biomass pellets to create a source of heat for residential and sometimes industrial spaces. By steadily feeding fuel from a storage container (hopper) into a burn pot area, it produces a constant flame that requires little to no physical adjustments. Today's central heating systems operated with wood pellets as a renewable energy source can reach an efficiency factor of more than 90 percent.



**AN AVERAGE OF
18 JOBS, \$528,000
IN WAGES, AND
\$3.2 MILLION IN SALES
ARE GENERATED PER
MILLION BOARD FEET OF
TIMBER HARVESTED
WITHIN THE PACIFIC
NORTHWEST.**

COOK ET AL. 2015

EMERGING OPPORTUNITIES

Classroom Construction with Cross-Laminated Timber (CLT)

A Washington State Department of Enterprise Services pilot project built 20 grade school classrooms using cross-laminated timber (CLT) in 2016 and 2017. CLT is a prefabricated, solid engineered wood panel. CLT can use trees that in the past have not been economical to harvest, including small Douglas fir, Western hemlock and other trees that have diameters as small as 4 inches—including some dead or diseased trees.

One of four cross-laminated timber classrooms built at Adams Elementary in the Wapato School District.



Cross laminated timber project building at Greywolf Elementary in the Sequim School District.





**WORKING AT THE
LANDSCAPE-SCALE WILL
REQUIRE UNPRECEDENTED
LEVELS OF COLLABORATION BY
DIVERSE LANDOWNERS,
AGENCIES AND STAKE-
HOLDERS ALL WITH UNIQUE
MANAGEMENT PHILOSOPHIES,
ORGANIZATIONAL CULTURES,
POLICIES, AND
PRACTICES.**

GOAL 4

Plan and implement coordinated landscape-scale forest restoration and management treatments in a manner that integrates landowner objectives and responsibilities.

OVERVIEW

Working at the landscape-scale will require unprecedented levels of collaboration by diverse landowners, agencies and stakeholders all with unique management philosophies, organizational cultures, policies, and practices. Working in more integrated, collaborative relationships will require unique competencies, skills, attitudes, and behaviors. Because the field of natural resources landscape-scale collaboration is still emerging, each will need to pay special attention to addressing organizational, operational, and human resource challenges to ensure they can work effectively across landownership boundaries.

Given the scale of the forest health problem and the need for active forest management to address it, the long-term success of this plan will largely depend on the extent to which many forest landowners can meet their financial objectives while conducting forest health treatments. The DNR, private timber companies, and some tribes have a responsibility to generate revenue in their forest management activities. Therefore, commercial timber harvesting will be an essential component of restoration efforts. In some cases, this may mean prioritizing treatments on higher quality sites, conducting more intensive even-aged harvests, and re-planting harvested areas with desirable tree species that are adapted to withstand disturbance agents. For some landowners it may also mean de-emphasizing treatments in remote areas with lower productivity, where resource investments are limited by the rate of return from the forest.

Since watershed and landscape-level restoration will seek to create a diversity of age classes, seral stages, and forest conditions, having a mix of ownerships within these planning areas can contribute to this diversity. While most DNR trust lands will likely provide early to mid-seral stage forests where revenue production is a primary objective, other lands have habitat conservation commitments requiring late seral forest stands to provide old growth dependent wildlife species with habitat. Privately owned forests may also contribute to the early to mid-seral stage forests. Additionally, it is in all landowners' interest to have their lands in watersheds that are "restored" to decrease the threat from insects, disease, and wildfire to their commercial timber crop. By pooling resources in an "all lands, all hands" approach to restoring watersheds, we are able to have a greater impact as multiple landowners work toward a larger, overarching goal.



Forest Practices Act

The Forest Practices Act, Chapter 76.09 RCW, directs the Forest Practices Board to adopt rules governing timber harvesting and road building on private and state forestlands. The comprehensive statewide forest practices rules protect water quality, aquatic resources, and public safety through application of forest practices regulating timber harvesting and riparian buffers along streams. In addition, the state entered into a federally approved programmatic habitat conservation plan providing long-term conservation of designated aquatic species covering landowner activities under the forest practices rules. The application of the forest practices rules protects public resources and ensures working forests, clean water, and unique species habitat will continue to thrive for future generations to enjoy.

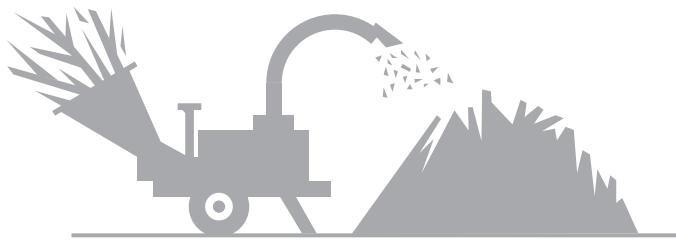
Goal 4	Strategies
1	Assess landowner objectives and build the capacity to plan and implement accelerated, cross-boundary management and restoration treatments.
2	Respect the management responsibilities and trust mandates on federal and state lands. Support sustainable forestry and use of prescribed fire as appropriate on industrial and private forestland.
3	Develop a strategy to manage wildfire in wilderness areas, reserves, and roadless areas on national forest system lands and national parks.
4	Support the development and scaling of emerging funding mechanisms to accelerate forest and aquatic lands management treatments to reduce risk and support sustained provision of ecosystem services from forestlands.
5	Provide technical assistance, financial resources, and education and outreach in priority landscapes to encourage the adoption of voluntary forest health treatments with willing private landowners.
6	Collaborate with local governments and other partners in priority landscapes to provide incentives to discourage conversion of existing forest to non-forest uses.



DNR Small Forest Landowner Assistance

Chapter 76.13 RCW, authorizes the Washington State Department of Natural Resources to provide financial resources and stewardship services for non-industrial private forest landowners. The Forest Stewardship Program, established in Chapter 76.13 RCW, assists non-industrial forest landowners in achieving their stewardship objectives.

Technical Assistance Foresters provide professional on-site technical consultation for small forest landowners to remain current with the Forest Practices Rules, use low impact harvest techniques, and implement best practices in road construction. These technical services foster a strong incentive for landowners to actively manage their forests to address forest health conditions, protect aquatic resources, and to keep millions of acres across Washington as forested lands.



▲ Thinning and pruning improves forest health by reducing insects, diseases and wildfires.

FORESTLAND OWNERSHIP IN EASTERN WASHINGTON

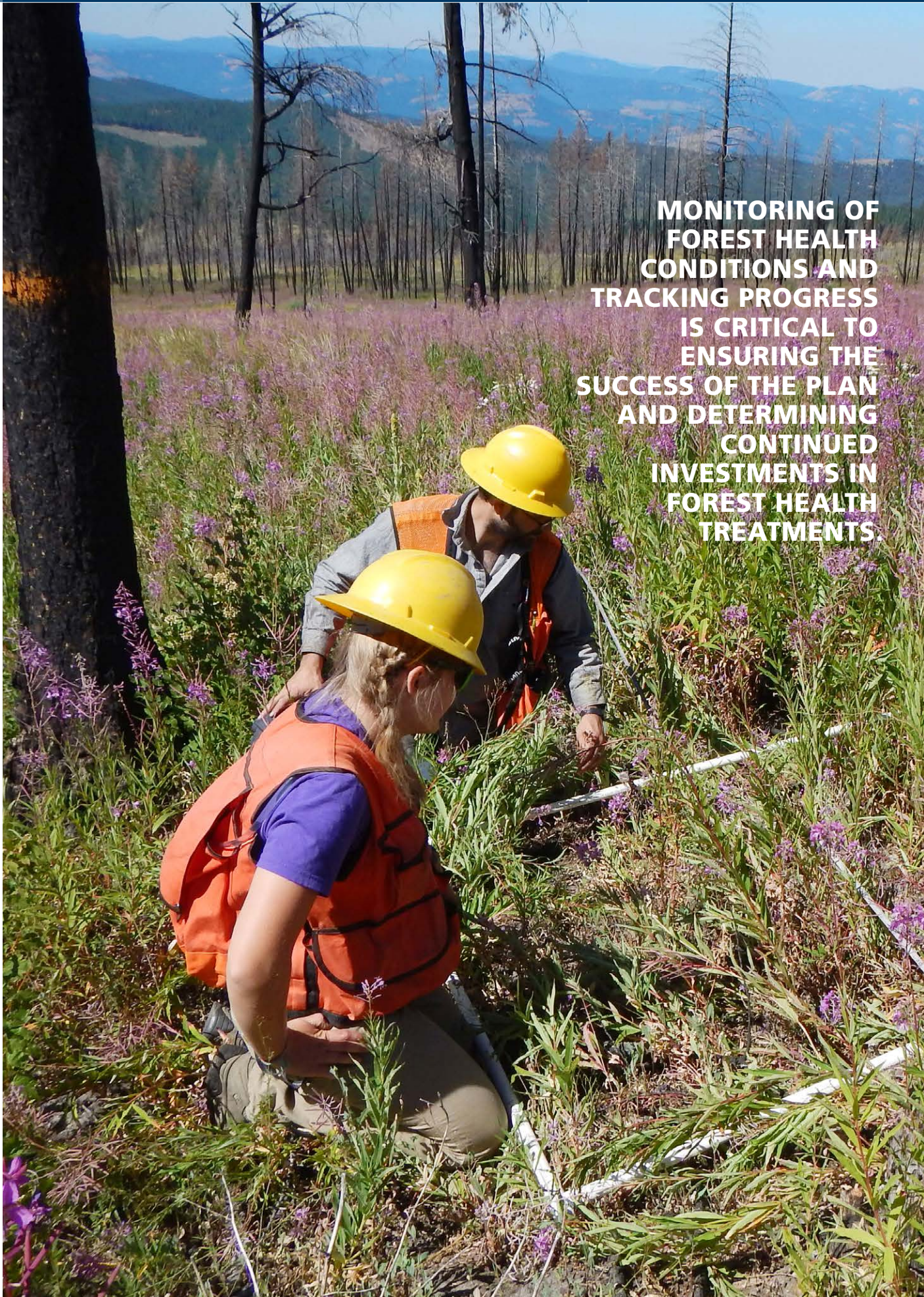
- | | | |
|--|--|--|
|  National Park |  WA State Park |  Private Industrial Timberlands |
|  National Wilderness |  WA Dept. of Fish & Wildlife |  Small Private Forested Landowner |
|  National Forest |  WA Dept. of Natural Resources |  Other Public Lands |
|  National Wildlife Refuge |  WA Dept. of Natural Resources NAP & NRCA |  Other Private Lands |
|  Tribal Lands |  The Nature Conservancy | |

MAP BY THE NATURE CONSERVANCY. DATA SOURCES: PUBLIC LANDS: THE NATURE CONSERVANCY; PRIVATE LANDS: ATTERBURY & ASSOCIATES; FOREST BOUNDARY: ILAP





**MONITORING OF
FOREST HEALTH
CONDITIONS AND
TRACKING PROGRESS
IS CRITICAL TO
ENSURING THE
SUCCESS OF THE PLAN
AND DETERMINING
CONTINUED
INVESTMENTS IN
FOREST HEALTH
TREATMENTS.**



GOAL 5

Develop and implement a forest health resilience monitoring program that establishes criteria, tools, and processes to monitor forest and watershed conditions, assess progress, and reassess strategies over time.

OVERVIEW

Adaptive management—the process of planning, implementing, monitoring, and integrating new information into land management practices over time—is important in ensuring accountability, building shared understanding and trust across land ownerships, and increasing the effectiveness of forest health treatments and investments.

Monitoring of forest health conditions and tracking progress toward achieving the goals established in this plan is critical to ensuring the success of the plan and determining continued investments in forest health treatments. Monitoring and progress reporting will require collaboration and continued support of existing partnerships between the Department of Natural Resources, Department of Fish and Wildlife, USDA Forest Service, Bureau of Land Management, Natural Resource Conservation Service, tribes, and private landowners.

The first report on the status of the 20-Year Forest Health Strategic Plan will be presented to the State Legislature on December 1, 2018 and each subsequent even-numbered year on the same date.

The report will:

1. Request for appropriations to implement the plan including assessment work and treatments;
2. Include a prioritized list and brief summary of planned treatments;
3. List and briefly summarize treatments completed, total funding available, cost for completed treatments, and outcomes; and
4. Share a summary of forest health trends.



▲ Forest health treatment progress reports will share results with the legislature, partner agencies, county governments, communities, conservation groups, timber industry, and tribes.

A KEY MONITORING STRATEGY IS TO COMPLETE COMPREHENSIVE MAPPING OF CURRENT FOREST STRUCTURE, WILDLIFE HABITAT, AND FUEL CONDITIONS ACROSS EASTERN WASHINGTON BY 2020.

Goal 5 Strategies

- 1 Collect, map, analyze, and report on forest health conditions, forest restoration and management activities, and trends in forest health and wildfire risk over time across all land ownerships.
- 2 Identify metrics to measure progress against specific management goals and objectives.
- 3 Create a forest health tracking system that includes spatial and tabular data describing forest health treatments conducted by federal agencies, state agencies, tribes, and other willing landowners.
- 4 Support effective fire management actions and integrate Qualitative Risk Assessment (QRA) and treatment data into the Wildland Fire Decision Support System (WFDSS).
- 5 Provide regular forest health treatment progress reports to the legislature and communicate results to partner agencies, county governments, communities, conservation groups, timber industry, tribes, and other stakeholders.
- 6 Complete comprehensive mapping of current forest structure, wildlife habitat, and fuel conditions across eastern Washington by 2020. Update forest inventory data on a regular basis to reflect changes in forest conditions from wildfires, insects, disease, and management.
- 7 Develop standardized, science-based mapping of wildland urban interface (WUI) zones in Washington State, including better characterization of current land use within WUI zones.



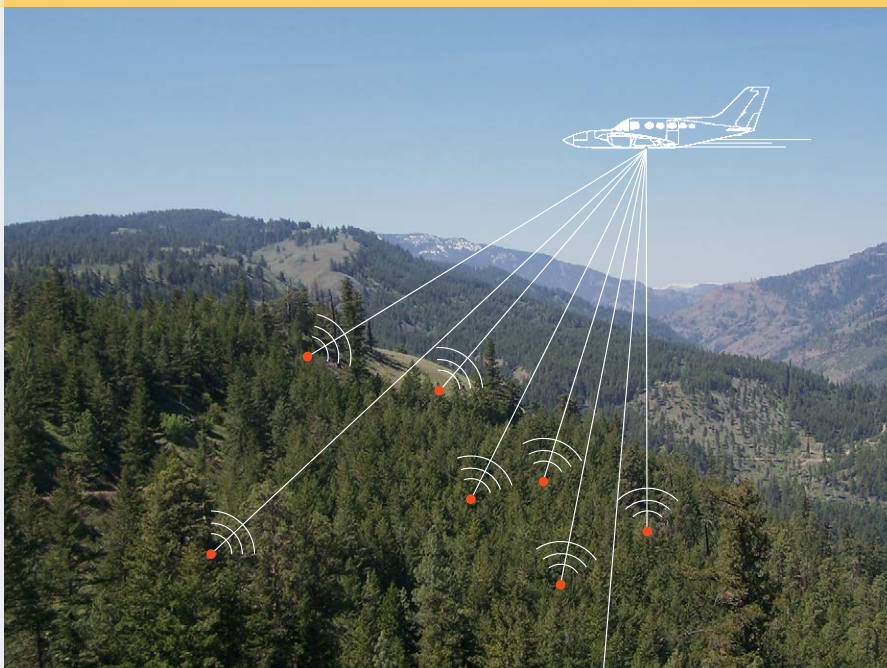
Events like storms and fires kill or injure trees. These events can lead to large outbreaks of bark beetles and other pests and pathogens. The western pine beetle (inset) and Douglas fir beetle (photo) can infest tree species in Washington state.

HANNAH LETINICH / THE NATURE CONSERVANCY



▲ Monitoring and progress reporting will require collaboration and continued support of existing partnerships between the Department of Natural Resources, Department of Fish and Wildlife, USDA Forest Service, Bureau of Land Management, Natural Resource Conservation Service, tribes, and private landowners.

MONITORING TECHNOLOGY



▲ Eastern Washington forested lands, as defined by the Department of Natural Resources, covers 15,350 square miles. Of that area, 6,260 square miles have been covered by previous lidar coverage or will have coverage in the near future and 9,090 square miles do not have LiDAR coverage as shown on the map above.

LiDAR Imaging

LiDAR stands for light detection and ranging and describes the method of using a laser to measure the distance of an object from the light's point of origin. By using a lidar sensor mounted to the underside of an airplane, it can efficiently measure the height of the earth's surface—buildings, trees, the ground surface, and even cars and culverts. The method is highly accurate, with vertical accuracies 20 cm or less, and measures multiple elevation values per square meter.

An inherent feature of LiDAR data that gives it an advantage over other elevation sources, and even imagery, is that a single pulse from the laser can be reflected off multiple objects and the sensor can record each reflection returned. This means that one laser pulse may yield information about the top of a tree, a building, a low shrub, and the ground surface. By tagging each return, this information can be used

later in the resulting point cloud to gain information for a variety of applications. The applications and benefits of LiDAR data are numerous, with those listed here being just a few examples:

- Forest growth and canopy height modeling
- Wildfire management for identification of fuel area and volume, as well as ingress and egress for wildfire teams
- River and stream management including stream morphology and channel depth
- Geologic resource assessment and hazard mitigation
- Feature detection and extraction of roads, building footprints, culverts, etc.

An additional benefit of lidar data is that a high-quality collection can serve all of the applications and be compared to past lidar collections to track change in the environment over time.

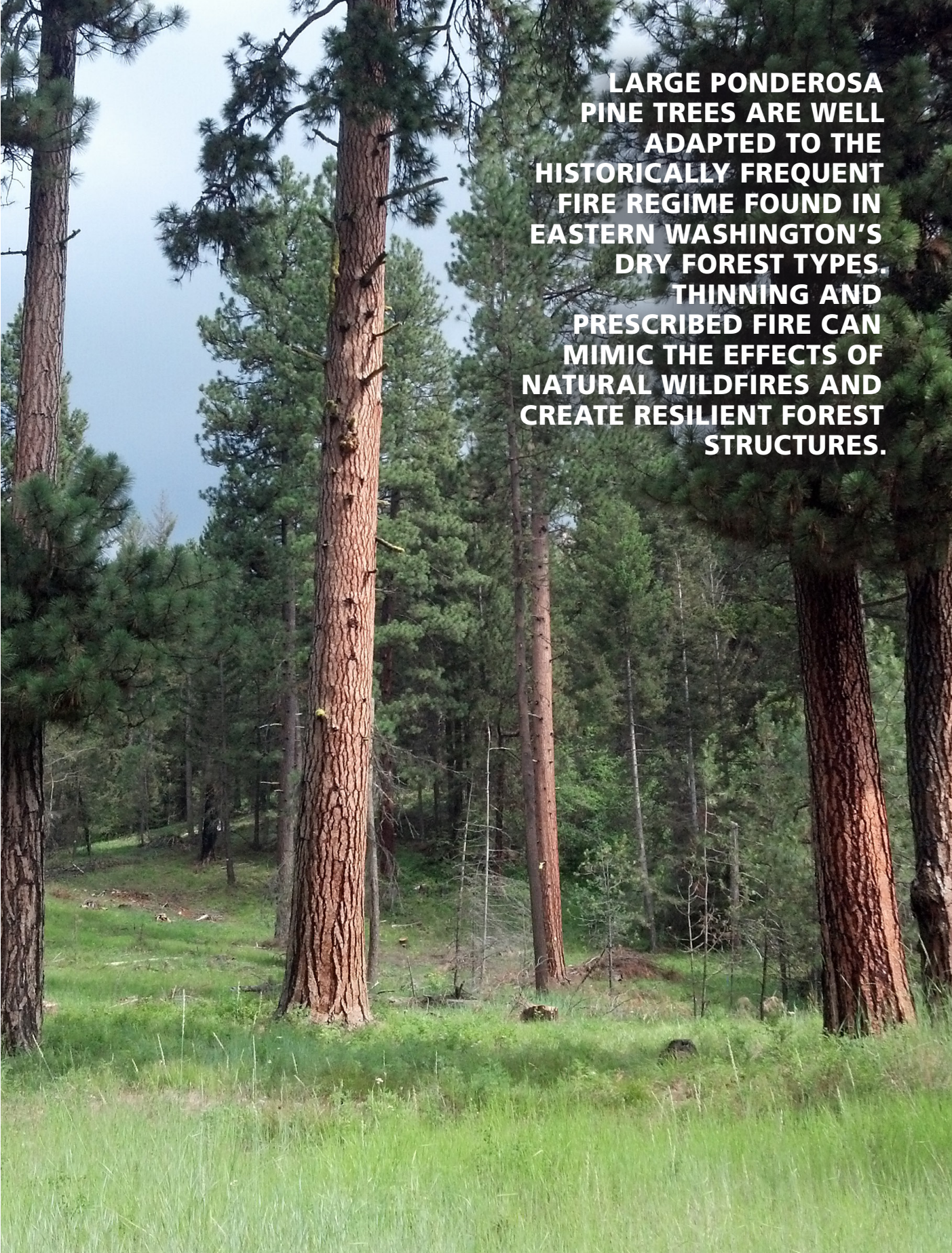
Before Treatment

After Treatment



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- Washington State Forest Action Plan. http://file.dnr.wa.gov/publications/em_wa_statewide_a_strategy_final_part3.pdf**



**LARGE PONDEROSA
PINE TREES ARE WELL
ADAPTED TO THE
HISTORICALLY FREQUENT
FIRE REGIME FOUND IN
EASTERN WASHINGTON'S
DRY FOREST TYPES.
THINNING AND
PRESCRIBED FIRE CAN
MIMIC THE EFFECTS OF
NATURAL WILDFIRES AND
CREATE RESILIENT FOREST
STRUCTURES.**

Appendix 1

Landscape Prioritization, Assessment, and Treatment Design Process

Past assessments of forest health in Eastern Washington indicate that current treatment levels and approaches are inadequate to meet forest health goals. Accelerating the planning and implementation of treatments across Eastern Washington—and doing so at the landscape-scale—is important to reduce the risk of uncharacteristic wildfire and restore forest health.

APPENDIX 1

I. Prioritizing Landscapes in Eastern Washington

A. OVERVIEW

Given the scale of forest health problems across Eastern Washington, DNR, federal agencies, and other partners agree that in order to make a meaningful change in reducing wildfire and forest health risks, it will take coordinated actions across land ownership boundaries at a watershed scale. There are not enough resources to address the widespread forest health and wildfire risks present in Eastern Washington all at once. A prioritization process is essential to help us focus resources in high priority watersheds to implement landscape-scale, cross-boundary management.

As part of the development of the 20-Year Forest Health Strategic Plan, we developed a prioritization process at the HUC 5* watershed level (average HUC 5 watershed is approximately 150,000 acres) utilizing a variety of available data sets to help describe forest health wildfire risk and the values at risk. The HUC 5 level offers an appropriate scale for prioritization as HUC 5s are small enough to contain broadly similar ecological conditions, but large enough to identify large project areas, analyze large scale disturbances, wildlife habitat needs, and watershed processes, and utilize datasets that are only accurate at a coarse scale. This prioritization work was led by Department of Natural Resources staff and Dr. Derek Churchill of Stewardship Forestry & Science and the School of Environmental and Forest Sciences at the University of Washington.

This forest health watershed prioritization builds on the Department of Natural Resources Forest Health Hazard Warning Areas issued in 2012 under RCW 76.06, which was the first statewide effort to prioritize forest health investments. This prioritization process includes two of the same datasets and approaches used in the Forest Health Hazard Warning process, but also includes new and updated information covering fire risk, wildland urban

interface (WUI), drinking water, aquatic resources, wildlife habitat, timber volume, and climate change. These additional datasets reflect a broader focus on the risks facing our forests and the values they provide.

The prioritization process identifies high priority HUC 5 watersheds to help focus the state's forest health investments and also align forest health activities and investment by willing landowners and partners where appropriate. A further process, described in section II: Selection of Planning Areas and Treatment Locations, will be used to select planning areas. Planning areas will generally be at the scale of HUC 6 watersheds (average HUC 6 watershed is approximately 20,000 acres) where conducting landscape evaluations and creating treatment prescriptions to implement SB 5546 is most efficient. In some cases, multiple HUC 6 or sections of HUC 6s may be combined into a planning area.

The high priority HUC 5 watersheds identified in this plan will serve as one filter for determining the selection of HUC 6 watershed planning areas for further evaluation. Certainly there are high priority HUC 6 watersheds in HUC 5 watersheds identified as low or medium priority; just as the inverse is also true, there are low priority HUC 6 watersheds in HUC 5 watersheds identified as high priority. Areas with high community protection needs such as Spokane and Klickitat County and Department of Natural Resources Forest Health Hazard Warning Areas will continue to be priorities for planning areas and state forest health investments.

***HUC: Hydrologic unit code.** The U.S. Geological Survey developed this classification system as a way to categorize watersheds. The smaller the number, the bigger the geography, (e.g. HUC 1, HUC 2, HUC 3, HUC 4, HUC 5, HUC 6) Average HUC 6 watershed is approximately 20,000 acres. Average HUC 5 watershed is approximately 150,000 acres.

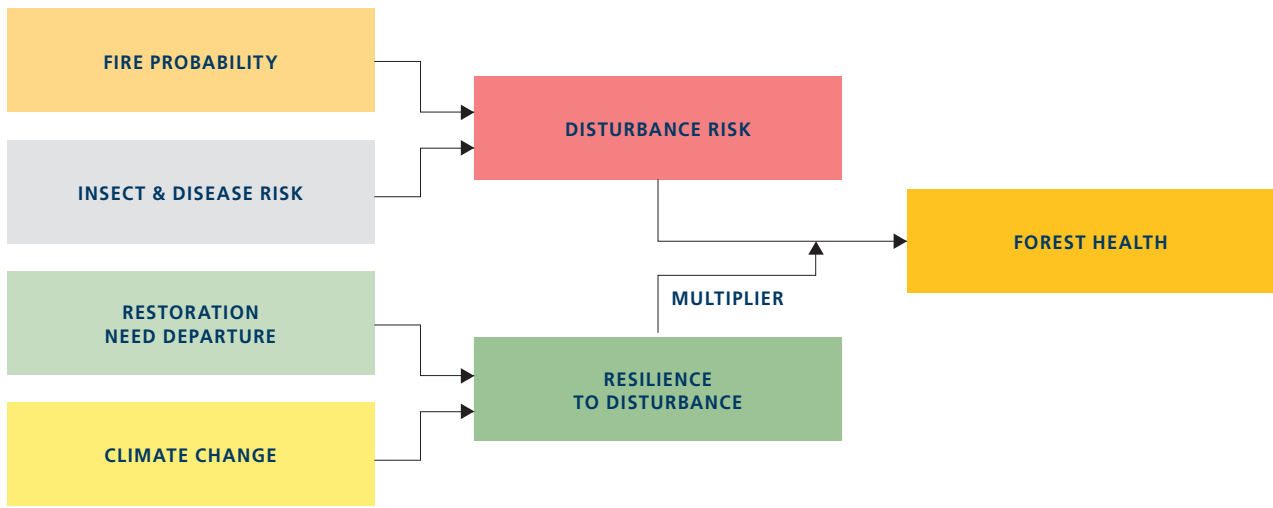
B. DATA SOURCES & METHODOLOGY FOR PRIORITIZING HUC 5 WATERSHEDS

The process to prioritize HUC 5 watersheds used two groups of metrics or Tiers. Tier 1 includes metrics that represent forest health conditions and probability of major fire or insect and disease disturbances that could affect forest health. Tier 2 metrics represent natural and human values at risk from major, uncharacteristic disturbances or declines in forest health. The two tiers were used to allow for separate evaluations of each tier and to ensure equal weighting between the two sets of metrics. Scores for each metric were derived from one or more datasets that represent the best available science that was publicly available during this planning process. The Landscape Prioritization Subgroup identified and approved the datasets. All metrics were summarized at the HUC 5 level in order to combine them into Tier 1 and Tier 2 scores. Below we describe each of the metrics, their respective datasets and sources, and how they were analyzed and combined into composite Tier 1 and Tier 2 scores.

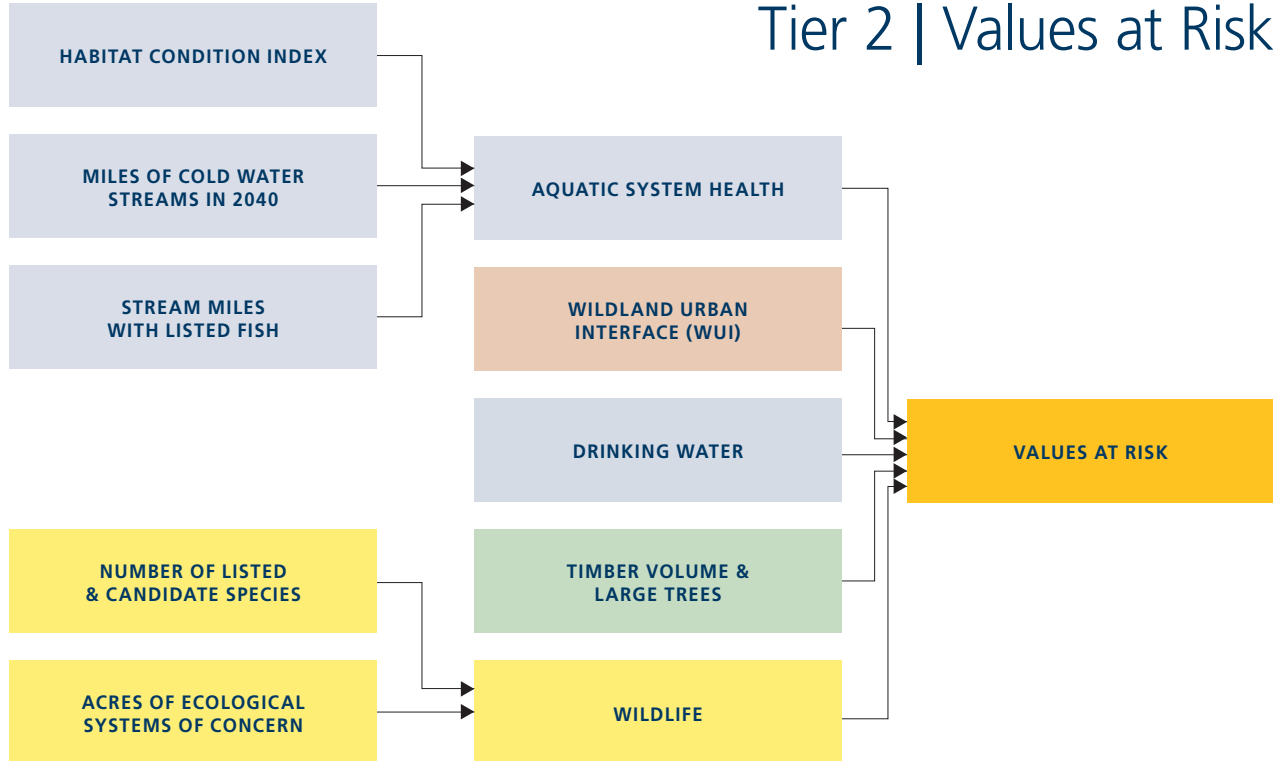
THE PRIORITIZATION PROCESS BUILT UPON PREVIOUS CRITERIA AND INCLUDED FIRE RISK, WILDLAND URBAN INTERFACE (WUI) AREAS, DRINKING WATER, AQUATIC RESOURCES, WILDLIFE HABITAT, TIMBER VOLUMES AND FACTORS ASSOCIATED WITH CLIMATE CHANGE.



Tier 1 | Forest Health



Tier 2 | Values at Risk



Tier 1 **Forest Health**

1 Fire Probability

This metric combines three recent in depth wildfire probability datasets. The three datasets use different methodologies and thus provide a more robust assessment of fire probability when used together. The first dataset is the Fire Threat Index from the Westwide Fire Risk Assessment that was conducted in 2012 (Wolf et al. 2013). This index models the likelihood of 30m pixels burning based on current fuel conditions, fire spread, topography, past fire locations, climate, and fire suppression effectiveness. It does not model fire severity and is based on fuel conditions and fire history from 2012. The second dataset predicts large fire probability for 140 acre pixels based on a statistical model (MaxEnt model) developed from past fire events (up to the year 2015), fuel conditions, climate, and topography for current and future time periods using downscaled climate projections (Davis et al. 2017). We used the average probability from 3 time periods to create a single dataset: 1981–2010, 2011–2040, and 2041–2070. The third dataset is a quantitative wildfire risk assessment recently produced for Oregon and Washington by Rick Stratton of the USFS (Stratton In Prep) using the FSim fire modeling system (Finney et al. 2011). This dataset contains both burn probability and probability of flame lengths greater than 8 feet for 120m pixels. The final step was to create a single fire probability score for each HUC 5. To do this, the mean value for each of the three fire probability datasets was calculated for each HUC 5. These three scores were then averaged to create a single fire probability score.

2 Insect and Disease Risk

The National Insect and Disease Risk Map was used (Krist et al. 2014). This dataset quantifies the hazard or probability of tree mortality from different insects and diseases based on current forest conditions, climate, proximity to known insect and disease disturbances, soils, topography, and other factors. The combined risk of all insect and disease agents was used. Risk values are based on vegetation conditions in 2012. A threshold mortality risk of 25% or greater was used based on recommendations from the creators of the model. To calculate a risk value for each HUC 5, the percentage of 30m pixels with 25% or greater risk of mortality in the watershed was derived.

3 Restoration Need

This dataset is based on an assessment of departure from historical conditions conducted by Haugo et al. (2015). Current vegetation condition data is from the 2014 GNN dataset (Ohmann et al. 2011). It compares estimated historical ranges of five structure classes with current conditions to quantify how departed or “out of whack” a watershed is. Based on these departures, the percent of acres in a HUC 5 that need mechanical and/or prescribed fire treatments to align the watershed with historical conditions was derived.

Tier 1 Forest Health

4 Climate Change

The projected increase in water balance deficit was included to capture the projected changes in climate that will exacerbate forest health issues. Water balance deficit, or deficit, is a measure of moisture stress that plants face and thus constraints were different plant species can grow (Stephenson 1998). Increases in deficit elevate fire behavior and make forests more susceptible to insect and disease outbreaks (Littell et al. 2010). Downscaled climate projections from the AdaptWest Project (AdaptWest 2015) were used, which is based on climate data from Climate North America (Wang et al. 2016). Future projections are based on an Ensemble of 15 Global Circulation Models under the R8.5 emissions scenario. The difference between the 1981–2010 and 2041–2070 time periods was calculated for 1km pixels and then averaged across each watershed to get a single score for each HUC 5. Absolute change in deficit was used instead of proportional change. The Hargreave’s method of calculating water balance deficit was used as it is readily available on the AdaptWest site.

Tier 2 Values at Risk

1 Wildland Urban Interface

This dataset was created by DNR staff by buffering all values of the Where People Live dataset used in the West Wide Wildfire Risk Assessment by 0.5 miles and then intersecting the buffered Where People Live dataset with forestland (Oregon Dept. of Forestry 2013). This dataset is a good approximation of where there are forests and structures to represent the forested WUI. The Where People Live dataset estimates the number of housing units per acre and was developed using advanced modeling techniques based on the LandScan population count data available from the Department of Homeland Security, HSIP Freedom Dataset.

2 Wildlife

Two datasets were averaged together to identify overall wildlife habitat importance for each HUC 5. The first was the number of listed and candidate wildlife species. The second was the number of acres in “ecological systems of concern”, which are habitats that are at risk and support a high number of species. Scores were obtained at the HUC 6 level from WDFW and aggregated to generate a HUC 5 score. No attempt was made to distinguish between species that require dense, closed canopy forest vs. more open forest. This will be done within HUC 5s during project planning, where a finer scale approach can be used to identify portions of watersheds best suited to sustain dense forest vs. areas where treatments should be located to restore open forest and reduce overall risk of uncharacteristic, large fires.

Tier 2**Values at Risk****3 Aquatic System Health**

Three different datasets were used to rate both riparian conditions and fish habitat. HUC 5s with higher scores have higher functioning aquatic systems that could be degraded by uncharacteristic high severity fires, thus potentially warranting forest restoration treatments in portions of the watershed. Within a HUC 5, areas more suitable for no-management, treatment as well as aquatic related restoration activities will be identified during actual project planning. The first dataset is the number of stream miles in each HUC 6 with listed fish species and was provided by WDFW. The second dataset is the Habitat Condition Index (HCI) from the National Fish Habitat Assessment which quantifies the overall level of human disturbance (e.g. road density, stream crossings, percent in agriculture, percent in developed areas, etc) by catchment (smaller than HUC 6) (Esselman et al. 2010). The third dataset is projected stream temperature in 2040 from the NorWest Stream Temperature Modeling project to capture future cold water fish habitat (Isaak et al. 2016). The total miles of stream with projected maximum temperatures less than 16 C was used as the metric for each HUC 5. Scores from the three datasets were averaged together to create a single rating for each HUC 5.

4 Drinking Water

The Forest to Faucets dataset was used to identify forest areas most important to surface drinking water (Weidner and Todd 2011). Scores are based on the number of people that derive water from a watershed and the amount of water supply. High scores mean that more people rely on the watershed for drinking water and the overall amount of water supplied is higher. Scores were obtained at the HUC 6 level and averaged to generate a HUC 5 score.

5 Timber Volume and Large Trees

Timber volume and thus potential economic value was quantified using the regional GNN forest inventory dataset from LEMMA (Ohmann and Gregory 2002, Ohmann et al. 2011). This dataset also captures to some degree the extent of large tree structure that exists in a watershed. Large trees are the backbone of resilient forests and thus a major focus of restoration treatments. Tree volume of 30m pixels was averaged across each HUC 5.

C. CREATING COMPOSITE PRIORITY SCORES

In order to rank and prioritize HUC 5 watersheds for treatment need, the datasets making up Tier 1 and Tier 2 were combined together using the process described below. Note that all scores are relative. A low score does not mean that a watershed has no forest health issues or need for treatment. Instead, it means that metrics and overall needs are lower relative to other watersheds. In combining metrics into composite scores, we used the simplest, most transparent approaches possible unless a clear need and advantage for a more complicated approach existed. This avoided the need to determine and apply weightings that would have elevated some metrics over others.

1 Derive HUC 5 Scores

For each dataset, the value of pixels or HUC 6s across each HUC 5 was aggregated to derive a single score for each HUC 5. This was done in three different ways for different datasets. For the majority of the datasets, the values of pixels or HUC 6 values were averaged across the HUC 5. A non-forest mask was applied to remove all pixels that are non-forested. For two datasets, values were summed (miles of streams with listed fish and miles of stream with projected maximum temperatures <16C). For the remaining four datasets, the percent of acres relative to total HUC 5 acres was used (restoration need acres, acres with >25% probability of insect and disease mortality, WUI acres, and acres in ecological systems of concern).

2 Standardize Scores

A simple ranking approach was used to convert the HUC 5 scores derived for each dataset onto a standardized 0-1 scale. For each dataset, values for the HUC 5 watersheds were ranked and then divided by the total number of watersheds. The watershed with the highest value for a dataset was given a score of 1 and the lowest value a score of 0. This relative approach resulted in scores with the same distribution for each dataset, which made them each have the same contributions to composite scores. Standardizing the absolute HUC 5 values of the datasets was explored, but the datasets had many different types of distributions (normal, log, etc) that resulted in different relative contributions when combining into composite scores. Transforming the different distributions was attempted but still resulted in unbalanced contributions between the different metrics.

3 Create Single Fire, Wildlife, and Aquatic Scores

These 3 metrics had multiple datasets that were combined to create a single score for each HUC 5. To do this, the standardized scores from #2 were simply averaged.

4 Tier 1 & 2 Composite Scores

After exploring a number of different approaches to combining scores of the different metrics, a relatively simple, transparent approach was chosen to avoid the need to subjectively weight different metrics. Fire probability and insect and disease risk were added together to create a “disturbance probability” score. Restoration need and climate change were added together to create a “resilience to disturbance” score. High scores indicate low resilience (high departure and climate change). The resilience score was converted 1-2 scale in order to use it as a multiplier. This was done by standardizing the values to a 0-1 range (dividing all value by the maximum value) and then adding 1. The disturbance probability scores were then multiplied by the resilience score to derive the Tier 1 composite score. The maximum possible value was 4 and minimum was 0. This multiplication approach was used over a simpler addition approach to ensure that watersheds could not receive a high prioritization based on low resilience scores alone. This would have occurred if the metrics were simply added together. The prioritization sub-group determine that high overall priority areas for treatment should have at least a moderate disturbance probability. Composite scores were derived by simply adding scores for the five Tier 2 metrics together.

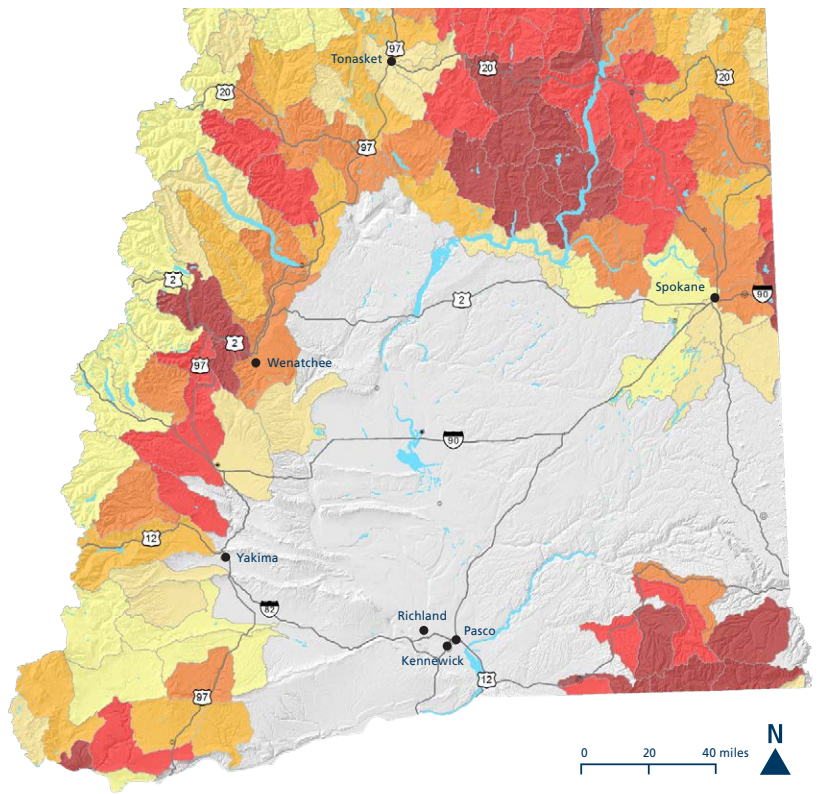
5 Combined Tier 1 & 2 Rankings

The last step in the process was to combine the two Tiers. This was done by first standardizing the Tier 1 and Tier 2 scores to a 0-1 range and then adding them together. This ensured equal weight for each tier in the final composite score. These final scores, as well as the tier 1 and tier 2 scores, were then placed into low, medium, and high categories based on percentiles. For example, watersheds with the top 33% scores were given a high priority rank. Each category was broken into 2 sub-categories on maps to allow for more in depth visualization of relative rankings. We explored more complex approaches to combining the two tiers, but determined that this simpler approach worked as well as any of the others. In particular, no watersheds with low Tier 1 score receiving a high priority ranking. All high priority watersheds had either a high Tier 1 and medium Tier 2, or a medium Tier 1 and high Tier 2.

The amount of potentially treatable acres in each HUC 5 was also calculated. First, all non-forested acres were removed. Then acres in Wilderness Areas and inventoried roadless areas were removed. Finally, acres that burned at high severity from 2012-2015 were removed. The total number of potentially treatable acres will be factored into the final selection of HUC 5 watersheds for treatment planning efforts. Watersheds with few acres may be combined with adjacent watersheds if significant restoration needs are present.

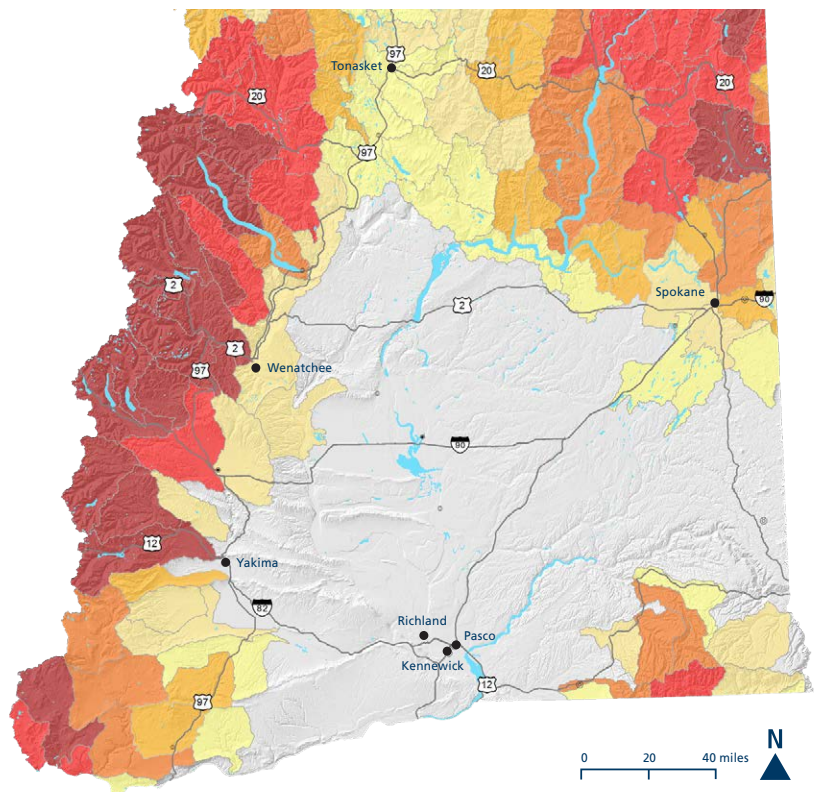
FOREST HEALTH / WILDFIRE RISKS TIER 1 EASTERN WASHINGTON HUC 5 WATERSHEDS

- Lower Priority
- Medium Priority
- Higher Priority
- 10-Digit/5th Level Hydrologic Unit Watersheds



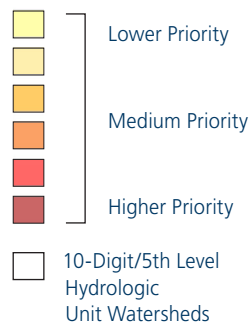
VALUES AT RISK TIER 2 EASTERN WASHINGTON HUC 5 WATERSHEDS

- Lower Priority
- Medium Priority
- Higher Priority
- 10-Digit/5th Level Hydrologic Unit Watersheds





**EASTERN WASHINGTON
FOREST HEALTH
PRIORITY HUC 5
WATERSHEDS**



HUC: Hydrologic unit code.

The U.S. Geological Survey developed this classification system as a way to categorize watersheds. The smaller the number, the bigger the geography, (e.g. HUC 1, HUC 2, HUC 3, HUC 4, HUC 5, HUC 6) Average HUC 6 watershed is approximately 20,000 acres. Average HUC 5 watershed is approximately 150,000 acres.

APPENDIX 1

II. Selected Planning Areas and Treatment Locations

This section describes a landscape evaluation process for determining project areas and potential treatment locations within prioritized HUC 5 watersheds. This process is based on a whole landscape approach that encourages public and private landowners within a watershed to work together across landownership boundaries to improve ecosystem resilience and reduce risks of uncharacteristic wildfires. The process combines the most recent scientific understanding of the factors that drive resilience in fire prone landscapes (Stine et al. 2014), quantitative risk assessment to (Miller and Ager 2013, Thompson et al. 2016), treatment prioritization (Vogler et al. 2015), and landscape restoration (Hessburg et al. 2015). It also incorporates social values, collaborative input, and professional judgment of land managers.

The objective of this process is to produce science-based and socially supported landscape level evaluations and treatment blueprints that can be used to coordinate, guide, and accelerate USDA Forest Service National Environmental Policy Act (NEPA) planning and Department of Natural Resources and Washington Department of Fish and Wildlife treatment priorities, as well as inform private and tribal land management. Treatments that require supplemental funding can then be packaged into funding requests and as part of cross-boundary competitive grant programs administered by federal and state agencies. The process is meant to guide and assist managers and stakeholders in meeting this objective rather than be a one-size-fits-all approach. We thus outline general principles and three key steps while providing flexibility for local land managers and stakeholders to develop and customize their own approaches to meet the desired outcomes. The detailed methodologies used in this process will evolve over time as different planning efforts undertake landscape evaluations.

Core Principles

- **A whole landscape approach should be used to focus on restoring resilient landscape conditions, reducing risk to communities, and producing economic benefits.** This means analyzing forest conditions, risks, and treatment options across all landownerships and coordinating management planning and treatments where practical.
- **Different objectives (ecological, economic, social) and treatment types (mechanical, prescribed fire) will be emphasized in different parts of the landscape and on different ownerships.** Given the mix of public and private ownership in most of the forested areas of Eastern Washington, we anticipate that there will be options in most watersheds to address tradeoffs among multiple objectives across different ownerships while achieving the overarching goals of increasing resilience and reducing risks from uncharacteristic wildfires.
- **Conduct science-based Landscape Evaluations that assess and integrate information from departure assessments, quantitative risk assessments, Community Wildfire Protection Plans, aquatic restoration needs, wildlife habitat conditions, stakeholder input, and economic and operational considerations.**
- **Develop projects that balance multiple goals such as reducing wildfire risk to communities, restoring the role of fire, building a backbone of large fire resistant trees, long-term wood production, and ensuring a net benefit to aquatic systems at the watershed level.**

Step 1: Identify Planning Areas within a HUC 5 Watershed

There will be a three part process to identify and select HUC 6 watersheds as planning areas each biennium for landscape evaluations and treatment prescriptions required under SB 5546. In some cases, multiple HUC 6 or sections of HUC 6s may be combined into a planning area. Priorities can and will change over the course of 20 years due to changing resource conditions, science, and socio-political values so the HUC 5 prioritization will need to be regularly updated to reflect those changes.

1 Local Consultation

Department of Natural Resources will work with local forest collaboratives, landowners, and other stakeholders to identify which HUC 6 watersheds are the best candidates to serve as planning areas under SB 5546. To guide selection of planning areas, datasets from the broad-scale prioritization process can be used to assess conditions across the HUC 5 and places HUC 6s into groups with similar conditions and forest health challenges. Planning areas can then be selected from these groups based on a simple data driven prioritization, local knowledge and priorities, stakeholder input, and existing agency planning efforts. Planning areas may consist of a single or multiple HUC6 watersheds.

2 Forest Health Advisory Committee Recommendations

The Forest Health Advisory Committee will review candidate planning areas identified through Department of Natural Resources' consultation with local stakeholders and make recommendations to the Commissioner of Public Lands as to which planning areas should be selected under SB 5546. The Forest Health Advisory Committee recommendations will favor planning areas that have the greatest alignment with the vision, mission and goals of the 20-Year Forest Health Strategic Plan.

3 Commissioner of Public Lands Selection

Based on input from the local consultation, Forest Health Advisory Committee Recommendations, and Department of Natural Resources' staff recommendations, the Commissioner of Public Lands will make the final selection of planning areas under SB 5546.

Step 2: Conduct a landscape evaluation for planning area

A landscape evaluation is a data driven approach to understanding the current condition of a landscape and its level of resilience to future disturbances and climatic change (Hessburg et al. 2015). It provides a common basis and language for stakeholders and land managers to assess and balance a range of resources, risks, and tradeoffs, and to design strategic and cost effective treatment plans. Conducting an evaluation does not mandate specific targets or goals for specific ownerships. Instead, it provides broad direction and benchmarks for the whole watershed in order to increase forest health and resilience to major disturbance and drought events. Evaluation components include:

1 Identify General Management Zones

Within the HUC 5 based on land ownership, primary management objective, and the types of treatments that will be most common. These zones will set the stage for the rest of the landscape evaluation. Typical zones and treatment types may include:

- **Long term wood production:** regeneration harvests and thinning on private and DNR
- **Active Restoration:** mechanical thinning and prescribed fire on Forest Service, WDFW, and DNR.
- **Wildfire protection:** fuel reduction treatments on private and public land in WUI
- **Managed wildfire in wilderness and roadless areas, plus other Forest Service land**

OUTPUT: Map of zones with description of primary objectives, constraints, and treatment options.

2 Departure Assessment

To inform how healthy, or “out of whack”, a landscape is by comparing current conditions to reference conditions that are thought to be resilient to disturbances and drought while sustaining biodiversity, aquatic functions, and human needs. Departures for both percent land (acres in different structure or habitat classes) and pattern (patch size, connectivity, etc) should be included. Ideally, reference information can be derived from both historical photographs and simulation models, as well as current and future climates.

OUTPUT:

- The number of acres of different structure classes and cover types that are too high or too low relative to reference conditions, as well as pattern departures (e.g. patch sizes).
- Targets for how many acres of different structure classes need to be treated, plus guidelines to restore resilient patterns.
- Percent land and pattern departure of wildlife habitat classes, as well as other metrics, may also be included.

Step 2: Conduct a landscape evaluation for planning area

3 Fire Modeling and Risk Assessment

To identify high risk areas where high intensity fire could threaten human communities, as well as susceptible natural resources (e.g. key northern spotted owl habitat). New or existing models of fire probability and intensity are combined with locations of WUI and other resources to identify strategic treatment locations to interrupt fires and reduce risk (Ager et al. 2010). Fire probability under future climates should be included as well. Community wildfire protection plans, as well as local knowledge of fire managers, should be integrated with models.

OUTPUT: Maps of burn probability, intensity, and fire flow for the planning area. Map of key treatment areas needed to reduce risk to socially acceptable levels for WUI areas and other identified resources.

4 Climatic Drought Stress and Biophysical Alignment Analysis

To assess vulnerability to drought stress and where vegetation is out of alignment with soils, topography, and current and projected future climate.

OUTPUT: Map of current and future moisture deficit, plus drought vulnerability. Map of locations most suitable for dense as well as open forest, as well as areas where forest may transition to woodland or grassland.

5 Aquatic Evaluation

To better understand aquatic and riparian forest function in the watershed and determine restoration needs and priorities. This could include a fish habitat assessment, road impacts analysis (e.g. GRAIP), water yield analysis, and/or assessment of fire risk to drinking water areas.

OUTPUT: Prioritized list of potential restoration projects including road related, instream habitat, fish passage or others. Map of high vs. low functioning areas with related forest management needs.

Step 2: Conduct a landscape evaluation for planning area

6 Identify Resource Focus Areas

For focal wildlife species habitat, cultural resources, areas of high insect mortality risk, unstable slopes, and biological hotspots such as aspen stands, wet meadows, etc.

OUTPUT: Maps for each resource that rate or classify the planning area and identify key areas for no-management or active restoration to protect or improve the resource.

7 Economic and Operational Analysis

That identifies treatment opportunities and estimates potential revenue and costs by taking into account road access, logging systems, forest conditions, and log market availability.

OUTPUT: Map of potential treatment areas on public lands that are revenue positive, neutral, or will require funding. Include anticipated harvests or potential treatments on private land as appropriate. Estimates of total volume production by species and sort should be included as well.

Step 3: Develop Landscape Prescription

The information from step 2 should be synthesized into a landscape prescription that summarizes current conditions and risks; lays out management direction for vegetation structure, composition, and pattern; and includes treatment targets with associated cost/revenue and volume estimates. These should be further broken down by management zone (see step 1), forest type (cold, moist, or dry forest), and potentially smaller project areas within the planning area. Maps that show priority areas for different kinds of forest and aquatic treatments should also be included. Guidelines, targets, and spatial locations for treatments will likely be more specific for public lands and more general for private lands. Formal decision support and/or scenario planning tools may be utilized to synthesize all of the information from step 2 if sufficient planning time and resources are available.

Stakeholders and managers will need to assess and discuss the extent to which ecological and resilience goals can be met given the revenue needs of landowners, WUI fire risk reduction needs, regulatory constraints, and land use patterns. Ideally, there will be options in most watersheds to balance tradeoffs among multiple objectives and meet the needs of different landowners, while achieving the overarching goals of increasing resilience and reducing risks from uncharacteristic wildfires.

The landscape prescription can be used to coordinate, guide, and accelerate Forest Service NEPA planning and DNR and WDWF treatment priorities, as well as inform private and tribal management. It can also be incorporated into small landowner extension programs. The landscape prescription will be the basis for packaging treatments together for funding requests to the state legislature.

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Appendix 2

Previous Planning Efforts

The following table describes recent forest health reports, dating back to 2004, that provide important context as land management agencies and partners consider addressing forest health issues in eastern Washington.

Report	Key Findings
A Desirable Forest Health Program For Washington’s Forests: Forest Health Strategy Work Group Report (DNR 2004)	<p>The report was written in response to SB 6144. The report advanced the goal that “the forests of Washington, on all ownerships, are resistant to uncharacteristic, economically or environmentally undesirable wildfire, windstorm, pests, disease, and other damaging agents and are able to recover following disturbance.” At the time the report was written primary forest health concerns included: tree mortality due to pine and fir bark beetles in eastern Washington, western spruce budworm in Yakima and Klickitat counties, rising fire suppression costs, degraded wildlife conditions and loss of forest structure characteristic of older forests due to fire suppression and fuel loading, and risk of wildfires in riparian areas due to overcrowded forest conditions.</p>
Forest Health Implementation Status Report and Strategy Development (DNR 2009)	<p>The Forest Health Strategy Working Group, with staffing support from the DNR, identified three primary needs to develop a comprehensive forest health plan, including: data needs and analysis capacity, targeted communications to affected landowners, and technical assistance for landowners.</p>
Forest Health Hazard Warning Areas (DNR 2012)	<p>In 2012, the DNR designated Forest Health Hazard Warning Areas in northeast and southeast Washington. The Department secured state appropriations through their capital budget request for fuel hazard reduction and forest health treatments and established a forest health treatment goal of 25,000 acres of implemented projects per year.</p>
Eastern Washington Forest Health: Hazards, Accomplishments, and Restoration Strategy (DNR 2014)	<p>This report identifies five key strategies to “move Washington state’s forest restoration and community protection priorities” between 2015-2020, to 1) increase the pace and scale of forest restoration, 2) strengthen collaborative processes that engage all forest landowners and stakeholders, 3) promote fire adapted communities, 4) increase workforce capacity and expertise for forest restoration, and 5) strengthen existing and create new markets for small diameter wood.</p>

Douglas-firs severely defoliated by Douglas-fir tussock moth caterpillars in 2009 above Palmer Lake in Okanogan County.

Report	Key Findings
<p>National Insect and Disease Risk Map (2014)</p>	<p>This national dataset produced by the U.S. Forest Service quantifies the hazard or probability of tree mortality from different insects and diseases based on current forest conditions, climate, proximity to known insect and disease disturbances, soils, topography and other factors.</p>
<p>The Nature Conservancy Restoration Needs Analysis (2015)</p>	<p>This analysis found that 2.7 million acres, nearly 30 percent of forestland in eastern Washington, is in need of forest restoration. It defines three management pathways to address forest health: 1) thin and burn, 2) thin/burn and grow, and 3) grow only. The research showed that there are significantly more dense, closed canopy forests than would have been historically present on the landscape. The report suggests that forest stands will often require multiple entries of mechanical treatment and prescribed fire over time in order to achieve restoration objectives.</p>
<p>Anchor Forests: Sustainable Forest Ecosystems through Cross-Boundary, Landscape-Scale Collaborative Management (2016)</p>	<p>The Anchor Forest Pilot Project is focused on maintaining working forestlands and supporting the connection between forest landscapes and rural economies. The report advances the idea that “multi-ownership land based areas... will support sustainable long-term wood and biomass production levels backed by local infrastructure and technical expertise, endorsed politically and publicly to achieve desired land management objectives.”</p>



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BROKE MANY RECORDS,
PREDICTIONS INDICATE
THAT THE PACIFIC
NORTHWEST MAY
EXPERIENCE FOUR TIMES
MORE ACRES BURNED
ANNUALLY IN THE 2080s
COMPARED TO THE
MEDIAN ANNUAL AREA
BURNED FROM
1916 TO 2006.**

LITTELL ET AL. 2010