

Forest Health Treatment Prioritization and Implementation

On State Trust Lands in Eastern Washington

A Report to the Washington State Legislature

Prepared by
Washington State Department
of Natural Resources

Office of the Commissioner of Public Lands, Hilary Franz
Forest Resources Division
December 2022



WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES

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Acknowledgments

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All photos courtesy DNR

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Executive Summary

Wildfire, insects, and disease continue to pose a threat to the forests of Eastern Washington. The 750,000 acres of forests managed by the Washington State Department of Natural Resources (DNR) east of the Cascades are no exception.

To manage these threats, DNR works to keep these forests healthy, using a variety of treatment options and management approaches to ensure these lands remain productive – whether that is through providing wood products for mills and nontax revenue for public services, or through fish and wildlife habitat and recreation opportunities.

Since the Legislature passed Engrossed Second Substitute House Bill 1711 during the 2017 session, DNR has developed and implemented a process to prioritize investment in forest health treatments to protect forested state lands. That process takes into account the value of the timber harvested in the treatments, the value of what the treatments protect, the impacts to recreation and tourism, and the ecosystem services provided. The bill directs DNR to report to the Legislature every other year about what state lands would benefit most from forest health treatments for the next two years, six years, and 20 years.

Since E2SHB -1711 was enacted, a number of supporting and complimentary bills and DNR strategic plans have been passed and developed. These have provided additional tools and funding mechanisms for state land management. Principally, 2SHB -1168 provided much needed funding for forest health treatments on state-managed lands.

Since the most recent edition of this report was submitted to the Legislature in 2020, DNR has performed more than 45,000 acres of treatments on forested state trust land it manages, with approximately one-third of treatment acres as commercial treatments and two-thirds as non-commercial treatments. For the remainder of the 2021-23 biennium and the upcoming 2023-25 biennium DNR has plans to conduct forest health treatments on more than 83,000 acres, the vast majority of which are in high- and medium-priority landscapes – those most in need of treatment.

Since prioritization began in 2018, there has been measurable change in the prioritization “index scores” for state managed-lands as well as “forest structure.” As management continues into the future, it is anticipated these trends will continue.

Increasing and maintaining the health of eastern Washington’s forests will require a concerted effort from all landowners, as pests and fire do not care about property lines. DNR is committed to partnering with public, private, and tribal landowners to continue this vital work – that commitment includes the ongoing treatments of DNR-managed lands.

Introduction

The Washington State Department of Natural Resources (DNR) manages more than 1 million acres of state trust land east of the Cascade Mountains. About 750,000 acres of these lands are forested and interspersed among federal, private, tribal, municipal, state, and commercial forestlands.

As part of being a prudent trust land manager, DNR manages these lands to fulfill multiple objectives, such as revenue generation, providing fish and wildlife habitat, recreational opportunities, and protecting ecosystem services. The health of these forests is vital to meeting these objectives and supporting rural communities.

Image 1. Loomis State Forest; Fall Larch, DNR's Northeast Region



Forest health is defined in [RCW 76.060.020](#) as “the condition of a forest being sound in ecological function, sustainable, resilient, and resistant to insects, diseases, fires and other disturbance, and having the capacity to meet landowner objectives.”

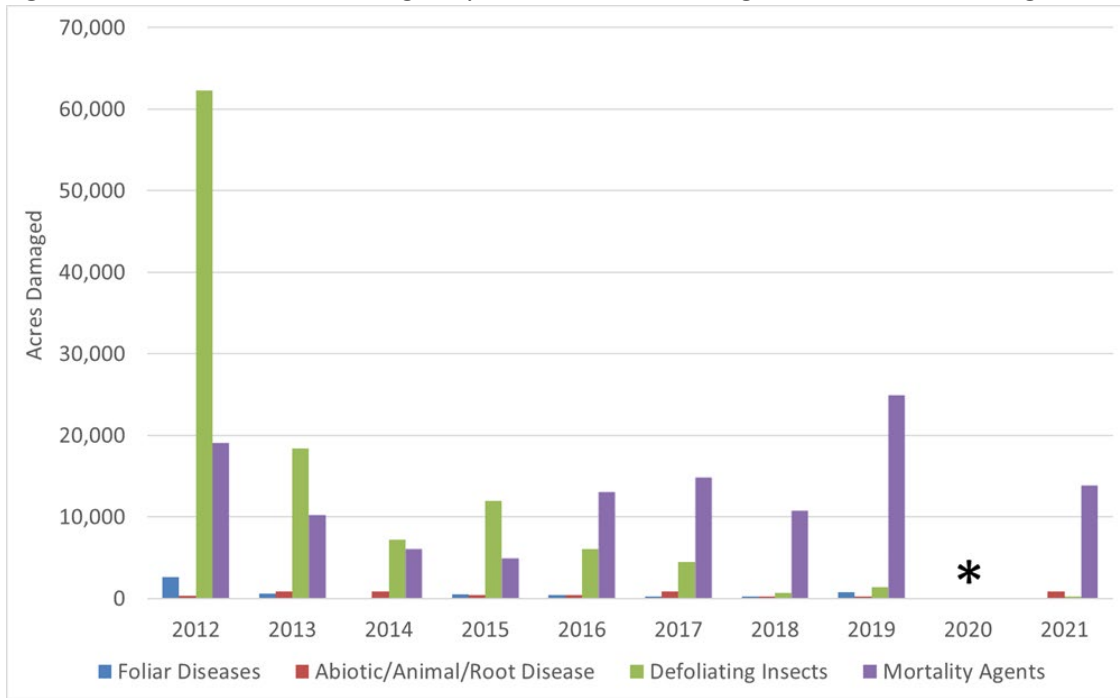
This report is written to meet the requirements of [Engrossed Second Substitute House Bill 1711](#), which specifies that DNR will report to the Legislature every even-numbered year on efforts to improve forest health on state trust lands in eastern Washington.

Trends in Forest Health Conditions

Over the past century, land use patterns and fire exclusion policies have altered natural fire regimes and ecosystem characteristics. Some forests have become more homogenized, with unnaturally high accumulations of live and dead fuels, many have had species shifts away from more fire-tolerant early-seral trees, and many of the old fire-tolerant trees have been lost due to wildfire and competition with shade-tolerant species. Forests with high stand densities on relatively dry sites use more water, increasing regional dryness and susceptibility to drought.

These changes have led to forests that are less resistant to disease and insect outbreaks, and more susceptible to large wildfires.

Figure 1. State Trust Lands Damaged by Insects and Disease Agents in Eastern Washington 2012-2021.

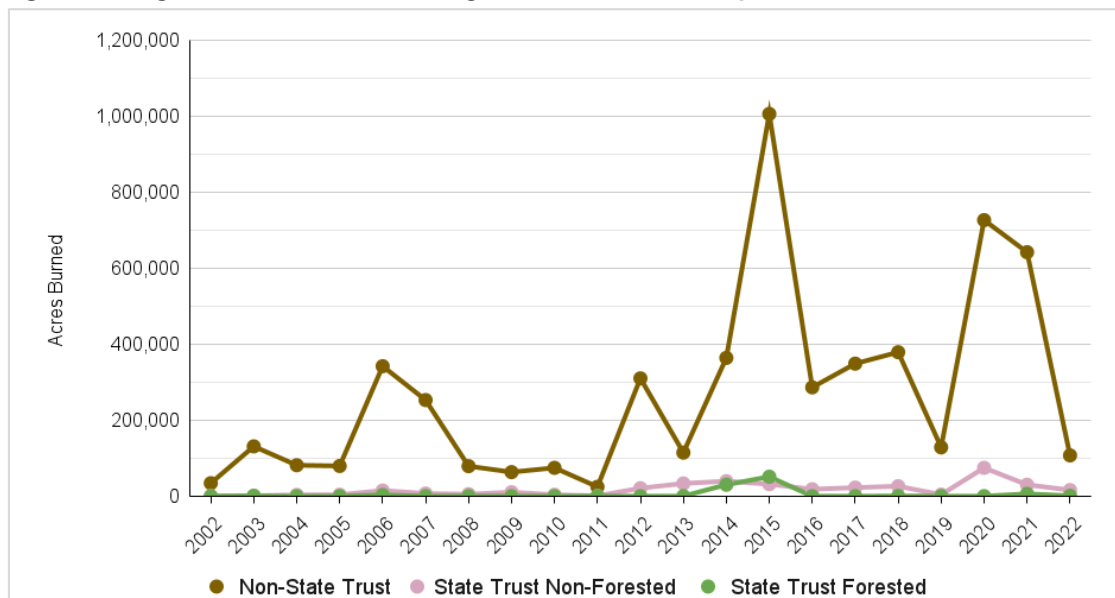


Source: [USDA Forest Service in cooperation with DNR, March 2022.](#)

* Due to the COVID-19 pandemic aerial, surveys were not conducted in 2020

In Figure 1, some of the damaged acres listed may have more than one pest or pathogen present, but the graph reports only the most damaging agent to eliminate double-counting of affected forest acres. Annual surveys have been occurring for over 70 years, the impacted acres listed are specific to the year surveyed not cumulative with previous years. For a description of the detection surveys and categories of damaging insects and disease, please see Appendix H.

Figure 2. Large Fires in Eastern Washington 2002-2022 (through 9/18/2022)



Healthy, productive forests in eastern Washington provide many benefits, including timber, recreation, clean water, and other ecosystem services. To improve overall health and protect forests from catastrophic fire and other disturbance, treatments such as variable retention harvest, thinning (commercial and non-commercial), prescribed fire, selective competition control, and planting of resilient site adapted tree species are needed to reduce and maintain forest density at ecologically appropriate levels and develop a balanced distribution of desirable species across the landscape.

Legislative Direction

E2SHB 1711

In 2017, the Legislature passed [Engrossed Second Substitute House Bill 1711 \(E2SHB 1711\)](#) *Prioritizing lands to receive forest health treatments*, directing DNR to develop and implement a policy for prioritizing investments in forest health treatments to protect state lands and state forestlands. The intent of the legislation and corresponding work is to reduce wildfire risk and losses from wildfire, reduce insect infestation and disease, and achieve the goal of improved forest health and resilience at a landscape scale.

The prioritization policy has to consider whether the state lands are within an area subject to forest health hazard warning.

The prioritization must be based on an evaluation of the economic and noneconomic value of:

- Timber or other commercial forest products removed during mechanical treatments.
- Timber or other commercial forest products likely to be spared from damage by wildfire.
- Homes, structures, agricultural products, and public infrastructure likely to be spared from damage by wildfire.
- Impacts to recreation and tourism.
- Ecosystem services such as wildlife habitat, water quality, air quality, or carbon sequestration.

DNR also was directed to identify state lands and state forestlands that would benefit from forest health treatments at the landscape level for the next 20 years, ones that would benefit most during the following six years, and prioritize and list specific lands for treatment during the subsequent biennium. DNR was directed to update the list by November 15 of each even-numbered year (see Appendix A, B and C).

2SSB 5546

Also passed in 2017, [Second Substitute Senate Bill 5546 \(2SSB 5546\)](#) *Concerning proactively addressing wildfire risk by creating a forest health treatment assessment* directed DNR to

establish a forest health assessment and treatment framework designed to proactively and systematically address the forest health issues facing the state across all land ownerships.

As part of 2SSB 5546, DNR's Forest Resilience Division is required to identify and select statewide forest health planning areas each biennium for landscape evaluations and treatment prescriptions.

Appendix F shows the overlap of the DNR trust land prioritized landscapes under E2SHB 1711, and the 20-Year Forest Health Strategic Plan Priority Planning Areas identified under 2SSB 5546. For more information on the progress of this legislation and greater details about the work, please see DNR's legislative report "[Forest health assessment and treatment framework \(RCW 76.06.200\)](#)".

2SHB 1784

In 2019, the Legislature passed [Second Substitute House Bill 1784 \(2SHB 1784\) Concerning wildfire prevention](#). DNR was tasked with an initial goal of developing an assessment and treatment framework with a focus on land vulnerable to wildfire that is protected by DNR or land posing a threat to department protected land. This all-lands-focused legislation supported the 20-Year Forest Health Strategic Plan, expanded upon 2SSB 5546, and directed DNR to consider the dual benefit of forest health treatments for wildfire response. This dual benefit component is included in the landscape evaluations conducted under the 20-Year Forest Health Strategic plan. State trust land prioritization includes wildfire risk as a component of the scoring matrix to develop priority areas.

2SHB 1168

In 2021, the Legislature passed [Second Substitute House Bill 1168 \(2SHB 1168\) Concerning long-term forest health and the reduction of wildfire dangers](#). This historic legislation significantly increased available resources to address wildfire risk and the forest health crisis facing Washington State. The legislation states that "it is the intent of the legislature to take immediate action to increase the pace and scale of forest management across different land ownerships and fully fund the 20-Year Forest Health Strategic Plan and activities developed to facilitate implementation of the Washington State Forest Action Plan."

To fulfill this legislation, the Legislature increased funding to Washington State Parks, Washington State Department of Fish and Wildlife, the Washington State Recreation and Conservation Office, and DNR. A key component of House Bill 1168 is the establishment of a Wildfire Response, Forest Restoration, and Community Resilience Account (WRFRCRA) in the state treasury, where monies can be spent after appropriation for the sole purpose of fulfilling this legislation. The bill states that appropriations for forest health activities funded by this new account shall not be less than 25 percent of the funding appropriated each biennium.

House Bill 1168 builds on previous legislative direction (see SB 5546, HB 1711, 2SHB 1784), which established DNR's Forest Health Assessment Framework and set the goals that drive

Washington’s 20-Year Forest Health Strategic Plan, 10-Year Wildland Fire Protection Strategic Plan, and 2020 Washington State Forest Action Plan.

DNR’s History of Forest Health Management Activities

The Legislature defines forest health treatments as “actions taken by the department to restore forest health including, but not limited to, sub-landscape assessment and project planning, site preparation, reforestation, mechanical treatments including timber harvest, road realignment for fire protection and aquatic improvements, and prescribed burning ([RCW 79.10.520](#)).”

Although forest health continues to be a concern for the whole of Washington, some forests have been restored or have been maintained in a healthy condition. DNR has been working to build on those healthy forests and continues to improve conditions for increased forest resilience and ecosystem health. Washington forests are a complex interaction of biotic and abiotic variables that require sustained monitoring and treatment over time. Achieving and maintaining healthy forests is generally not limited to a one-off treatment - it requires multiple treatments over time.

DNR has implemented a variety of treatments and silvicultural techniques to reduce fuels and competing vegetation, thin overstocked stands, and promote resilience to disturbance. These treatments have reduced stand densities and promoted appropriate species to increase the forests’ resilience to wildfire and pathogens while also improving future revenue potential for trust beneficiaries. These treatments take into account stand conditions and objectives while complying with DNR’s [Policy for Sustainable Forests](#), the [State Trust Lands Habitat Conservation Plan](#), the [Lynx Habitat Management Plan](#), the [Loomis State Forest Final Landscape Plan](#), the [Teanaway Community Forest Management Plan](#), the [Klickitat Canyon Community Forest Management Plan](#), trust manager responsibilities, and other relevant regulations.

The various treatments and silvicultural techniques fall into two main categories: commercial activities and non-commercial activities. Commercial treatments generate revenue from the forest products removed from the forest (though sometimes they can lose money or just breakeven). Non-commercial treatments produce little or no valuable products that can offset the costs of treatments, yet they may move a stand towards a more desirable future condition, more resilient against disease, insects, and wildfire.

FOREST IMPROVEMENT TREATMENT ACTIVITIES

From Fiscal Years (FY)¹ 2005-2017, DNR completed roughly 60,000 acres of forest health treatments (both commercial and non-commercial) on state trust lands through the Forest

¹ DNR’s Fiscal Year (FY) begins on July 1 of the previous year and ends on June 30 of the stated year. For example, FY 2021 began on July 1, 2020, and ended on June 30, 2021.

Improvement Treatment (FIT) program. The FIT program leveraged DNR's contract harvest revolving account to fund treatments that would not normally be financially viable due to the low or negative value of the wood. The FIT program was additive treatment activities through this period. This program was discontinued after the Legislature created the Forest Health Revolving Account in 2017.

DNR used trust management funds, capital funding from the Legislature, the Forest Health Revolving Account, granted funds from the federal government, and other operating funds to complete an additional 294,000 acres of forest health treatments from FY 2005 through FY 2017.

Together, these treatments have reduced tree densities and promoted appropriate species to increase the forests' resilience to wildfire and pathogens while also improving future revenue potential for beneficiaries. It should be noted that some of the non-commercial treatments have occurred within the same footprint as FIT treatments and other commercial harvests. This is because managing for forest health and resilience is a continual activity across time and large landscapes.

FOREST HEALTH ACTIVITIES

Starting in FY 2018 under E2SHB 1711, nearly all revenues generated by forest health activities on state trust lands in eastern Washington have gone into the Forest Health Revolving Account. This funding has been used to cover commercial and non-commercial treatment costs. Since FY 2018, DNR has completed more than 115,000 acres of forest health treatments.

Table 1 lists the acres of commercial treatments and non-commercial treatments on state trust lands under the Forest Health Programs from FY 2018 through the first part of FY 2023. Many of the planned treatment acres in FY 2023 will occur throughout the rest of the fiscal year.

Table 1. Commercial and Non-Commercial Forest Health Treatments, FY 2018-2023 (as of 10/31/2022)

Fiscal Year	Commercial Treatment Acres*	Non-Commercial Treatment Acres	Total Treatment Acres
2018	7,646	12,821	20,467
2019	6,366	13,872	20,238
2020	6,990	14,381	21,370
2021	7,859	18,430	26,289
2022	6,852	11,708	18,560
2023 (first 5 months of FY)	2,438	6,433	8,871
Total	38,151	77,645	115,795

Source: DNR's Land Resource Manager System. Numbers may fluctuate as reporting is refined.

*Commercial treatment deliverables are tracked by date of auction and completion. The reported numbers for latter years will include sold in the FY but not yet completed acres.

DNR'S Prioritization Process

To implement E2SHB 1711, DNR developed a prioritization process for state trust lands.

The first step in this process was to group blocks of forested state trust lands into landscape planning units. Due to ownership distributions and mixed jurisdictional responsibilities, DNR landscape planning units are different than the 20-Year Forest Health Strategic Plan Priority Planning Areas, which are identified and prioritized under 2SSB 5546. See Appendix E for a map of DNR's landscapes.

The second step was to develop a geographic information system (GIS) model and use it to prioritize each landscape in a way that reflects DNR's management objectives. For example, as a trust land manager, DNR is concerned with the value of timber as well as forest health. DNR designed a model that computed individual, weighted scores for forest health and for other values at risk:

- Forest health scores were computed from individual, weighted scores for risks from insects, diseases, and wildfire risk (including both the probability of a wildfire occurring and the potential severity should it occur), restoration opportunities, and climate change influences.
- Values at risk represents criteria such as the timber value of commercial forest products, proximity of public and private infrastructure, and ecosystem services such as community watersheds, recreation opportunities, and fish-bearing waters. Each criterion also had an individual, weighted score.

Forest health and values at risk scores were combined into a single score for each pixel (1/10 acre in size) in each landscape. These scores were then aggregated to derive a final priority index score for each landscape, enabling DNR to rank all landscapes into an order of priority.

The third step was to prioritize landscapes within each of DNR's two eastern Washington regions (Northeast Region and Southeast Region). Within each region, the landscapes were divided into three prioritization categories (high, medium, and low priority) based on their priority index scores and on the total landscape acreage in each region (Table 2).

It is important to note that the priority ranking is only relative in comparison to other DNR landscapes on this list, and the landscape priority is only in comparison to the other landscapes within the same region. In Table 2, each region's landscapes are collated and sorted by priority. Landscape priorities are based on index scores, included in the table is the relative change in index score for each landscape. These scores drive priorities, as a result there have been priority shifts since 2018.

Table 2. Eastern Washington DNR Trust Lands - Landscape Priority and Ranking by Region

DNR Landscape	Region	2022 Landscape Priority	2022 Priority Ranking	2022 Priority Index Score	Index Score Change 2018-2022***	Total Landscape Acres**	Forested Landscape Acres**
Marble	Northeast	High	1	4.95	-0.22	5,647	4,922
Evans	Northeast	High	2	4.93	-0.06	11,913	10,612
Dunn	Northeast	High	3	4.92	-0.05	21,765	18,783
Little Pend Oreille*	Northeast	High	4	4.81	-0.07	17,598	16,459
Rice	Northeast	High	5	4.79	-0.13	11,028	9,528
Cottonwood	Northeast	High	6	4.73	-0.20	8,795	8,018
Usk	Northeast	High	7	4.72	0.11	10,509	9,131
Furport	Northeast	High	8	4.68	0.10	3,513	3,257
Republic	Northeast	High	9	4.67	-0.40	13,488	10,045
Orin	Northeast	High	10	4.66	0.02	2,518	2,091
Narcisse*	Northeast	High	11	4.64	-0.20	7,839	7,413
Elk	Northeast	High	12	4.64	0.01	10,398	9,420
Douglas	Northeast	High	13	4.60	-0.15	6,044	5,236
Lime	Northeast	High	14	4.57	-0.44	8,469	7,995
Carrs Corner	Northeast	High	15	4.55	-0.31	4,465	3,921
Patterson	Northeast	High	16	4.54	-0.33	5,071	4,420
Orient	Northeast	High	17	4.48	0.06	6,295	5,110
Boyds	Northeast	High	18	4.47	0.01	1,783	1,334
Bodie	Northeast	High	19	4.42	-0.37	15,143	10,505
Three Forks	Northeast	High	20	4.36	-0.44	2,473	2,348
Aeneas	Northeast	High	21	4.29	-0.47	8,832	5,852
Jumbo	Northeast	Medium	22	4.28	-0.22	8,872	7,193
Tum Tum	Northeast	Medium	23	4.26	-0.06	9,655	8,204
Curlew	Northeast	Medium	24	4.21	-0.29	11,638	9,309
Cayuse	Northeast	Medium	25	4.16	-0.04	6,957	835
LeClerc	Northeast	Medium	26	4.15	0.05	10,753	10,189
Fruitland	Northeast	Medium	27	4.12	0.02	21,731	20,238
Ione	Northeast	Medium	28	4.10	-0.51	5,461	5,261
Twisp	Northeast	Medium	29	4.08	-0.35	8,359	2,958
Tonasket	Northeast	Medium	30	4.06	-0.48	7,657	1,828
Molson	Northeast	Medium	31	4.04	-0.22	6,160	3,382
Nighthawk	Northeast	Medium	32	3.82	0.07	1,986	276
Rockford	Northeast	Medium	33	3.76	-0.34	9,256	4,096
Loup Loup	Northeast	Medium	34	3.75	-0.13	56,890	46,509
Leadpoint	Northeast	Medium	35	3.75	-0.41	1,812	1,685
Loomis*	Northeast	Low	36	3.66	-0.06	134,524	112,605
Espanola	Northeast	Low	37	3.63	-0.03	5,226	2,302

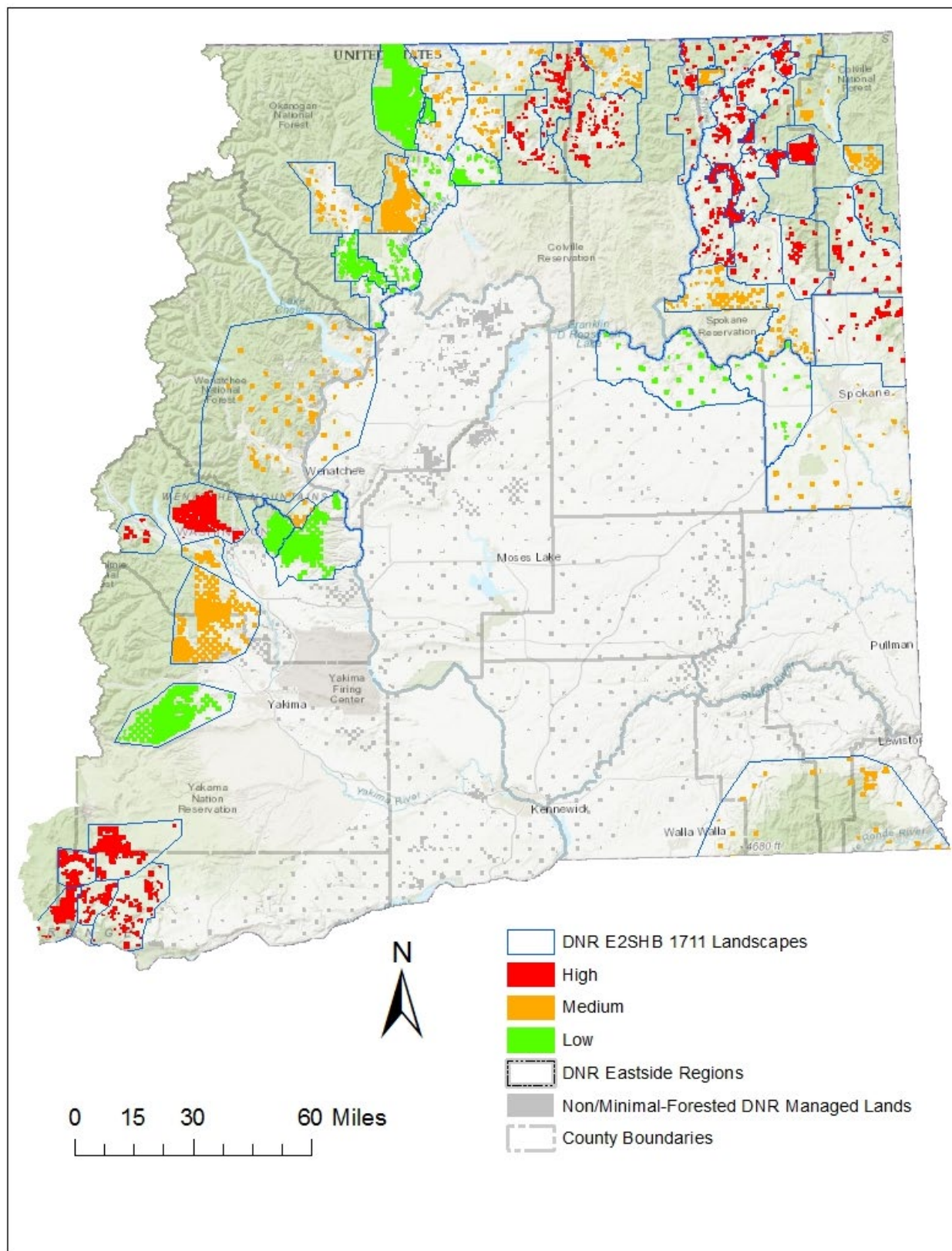
DNR Landscape	Region	2022 Landscape Priority	2022 Priority Ranking	2022 Priority Index Score	Index Score Change 2018-2022***	Total Landscape Acres**	Forested Landscape Acres**
Pateros	Northeast	Low	38	3.57	-0.02	3,239	390
Knowlton	Northeast	Low	39	3.39	-0.05	30,847	9,652
Riverside	Northeast	Low	40	3.31	-0.04	5,991	933
Miles	Northeast	Low	41	3.22	-0.06	11,471	4,585
Brewster	Northeast	Low	42	3.21	-0.05	8,836	1,690
Synarep	Northeast	Low	43	3.19	-0.62	13,154	5,658
Buck Creek*	Southeast	High	1	7.25	-0.07	21,691	20,347
Trout Lake*	Southeast	High	2	6.77	-0.07	18,568	17,017
Rattlesnake Creek*	Southeast	High	3	5.98	-0.11	9,875	8,935
Appleton	Southeast	High	4	5.37	-0.15	15,287	12,760
Cabin Creek*	Southeast	High	5	5.33	0.20	3,879	3,551
Glenwood*	Southeast	High	6	4.87	-0.15	36,434	35,245
Teanaway*	Southeast	High	7	4.77	-0.08	52,517	48,112
Wenatchee*	Southeast	Medium	8	4.74	-0.15	27,276	14,078
Taneum*	Southeast	Medium	9	4.73	-0.49	8,340	7,077
Stemilt	Southeast	Medium	10	4.29	-0.14	4,570	3,393
Naches /Wenas*	Southeast	Medium	11	4.12	-0.31	90,862	49,126
Blue Mountains	Southeast	Medium	12	4.12	-0.09	15,810	2,264
Ahtanum*	Southeast	Low	14	3.77	0.04	82,638	56,975
Colockum	Southeast	Low	14	3.75	0.03	60,970	33,426
Naneum*	Southeast	Low	15	3.26	-0.12	29,009	23,236
Grand Total						1,041,787	751,722

* Achieving FH objectives inhibited by habitat requirements from HCP for owl habitat and Lynx Management Plan for Canada lynx habitat.

** Since 2018, there have been minor changes in these acreages due to land transactions and improvements in land type classification.

*** Index score values indicate a relative change in conditions within individual landscapes. A negative value indicates an improvement in forest health condition as compared to 2018 GIS model.

Figure 3. DNR Trust Land High, Medium, and Low 2022 Priority Landscapes



Another important factor to understand is that the landscape priority, priority index score, and priority ranking do not necessarily reflect the potential diversity of the on-the-ground forest health conditions across the landscape. Also, these landscapes have been compared to forested lands under ownership other than DNR. However, the primary focus of this prioritization is on the forest condition of state lands. As a result, state lands may have high-priority landscapes that are not within the 20-Year Forest Health Strategic Plan planning areas. Likewise, the state lands priorities may be low within a 20-Year planning area due to recent state land treatments.

The fourth step was to assess forest structure and conditions to determine the areas with the highest priority for treatment within each landscape. DNR assessed forest structure using forest metrics from its forest inventory program, Remote Sensing – Forest Resource Inventory System (RS-FRIS) data. Gradient nearest neighbor (GNN) data was used for a small percentage of the total areas that lacked RS-FRIS data (Ohmann et al. 2013²). The combined data enabled DNR to categorize state trust lands by forest structure category, such as open or closed canopy. Closed canopy stands are usually considered higher priority for treatment as those stands are typically most at risk of loss from pests, pathogens, and catastrophic wildfire.

The fifth and final step was to prioritize treatment needs for the next 2, 6, and 20 years (Appendices A, B, and C, respectively). The schedule of treatments for the next biennium (July 2023 through June 2025) was done using forest surveys of stand conditions along with the landscape and treatment needs prioritizations. Although these forest surveys are an important part of the development of the prioritized treatment list for the next biennium, they are not included as treatment acres in this report.

Determining Forest Health Treatments

FOREST STRUCTURE CLASSES

As discussed in the fourth step in the prioritization process above, forest structure and conditions on DNR trust lands were assessed to help prioritize areas for treatment. Forest structure and conditions change over time due to a number of factors, including natural growth, completed commercial and non-commercial forest health treatments, mortality from insects and disease, and natural disturbance, such as wind throw and wildfire. Additionally, advances in survey technology and updates to forest inventory and conditions will be reflected in the amount of forested acres in each structure category.

In general, closed forest structure classes are considered to be at somewhat higher risk of impacts from forest stand disturbances such as wildfire, pests, and disease. This does not mean that all

² Ohmann, J. L., M. J. Gregory, E. B. Henderson, and H. M. Roberts. 2011. Mapping gradients of community composition with nearest-neighbor imputation: Extending plot data for landscape analysis. *Journal of Vegetation Science* 22:660-676.

closed forests are considered unhealthy; field surveys are needed to make site-specific forest condition assessments and to develop appropriate treatment prescriptions if needed.

Table 3 shows the approximate acres of state trust lands in each forest structure category by landscape prioritization. See Appendix D for a more in-depth discussion of the factors that help determine forest structure.

Table 3. Forested State Trust Lands Acres by Forest Structure Category and Landscape Priority (see Appendix D for description of forest structure)

Landscape Priority	Early Open	Mid Open	Late Open	Early Closed	Mid Closed	Late Closed	Grand Total*
High Priority	45,716	153,334	599	2,717	94,554	5,446	302,366
Medium Priority	60,836	116,281	20	583	20,097	83	197,901
Low Priority	63,864	159,636		2,666	25,231	57	251,454
Grand Total	170,416	429,251	619	5,966	139,882	5,586	751,722

Source: RS-FRIS Forest Inventory System (07/14/2022), WA DNR Forest Resources Division

COMMERCIAL AND NON-COMMERCIAL TREATMENTS

As discussed previously, DNR uses a variety of commercial and non-commercial treatments to meet landscape and forest health objectives. Table 4 lists some example forest health treatments that may be used on DNR-managed lands. This list is not exhaustive of all treatment types. For descriptions of commercial and non-commercial treatments, please see Appendix G.

Table 4. Commercial and Non-Commercial Treatments

Commercial Treatments	Non-Commercial Treatments	
	Fuels	Other
Commercial thinning Seed tree intermediate cut Uneven-aged management Variable density thinning Variable retention harvest	Pruning Broadcast burning Pile and burn Mastication Shaded fuel break/hazard abatement	Pre-commercial thinning Reforestation Site preparation Vegetation management Biomass removal* Slashing

* This activity in some cases is commercial

Other Trust Lands Management Objectives and Constraints

State trust lands are managed to achieve multiple objectives, including generating trust revenue, protecting water quality, providing fish and wildlife habitat, offering public access and recreation opportunities, as well as attaining overall forest health and environmental health goals.

In managing lands in eastern Washington, DNR has and will continue to implement a variety of treatments and silvicultural techniques to reduce fuels, competing vegetation, stand densities, and risk from disturbances. These treatments take into account current stand conditions and objectives while also considering [Washington Forest Practice Rules \(Title 222 WAC\)](#), [State Environmental Policy Act](#), DNR's [Policy for Sustainable Forests](#), [State Trust Lands Habitat Conservation Plan](#), [Lynx Habitat Management Plan](#), [Loomis State Forest Final Landscape Plan](#), [Teanaway Community Forest Management Plan](#), [Klickitat Canyon Community Forest Management Plan](#), and fiduciary responsibilities, which incorporate the common law duties of a trustee.

Each DNR landscape has a unique mix of management objectives, as well as policy, legal, and operational constraints. Examples include riparian areas, fish and wildlife habitat objectives, and areas that are deferred from harvest, such as natural areas, legacy trees, research plots, and areas without operational access.

It is important to understand the conditions and the various objectives and constraints of a given forest stand because they directly affect the locations and types of forest health treatments that can be implemented. Stands with closed canopy structure are typically more at risk of pests, pathogens, and large wildfires. Treatments in the “mid-closed” and “late closed” structure classes are generally considered to have greater commercial potential than those in the mid-open and late open classes. Treatments in the early classes are typically considered non-commercial. See Appendix D for forest structure description.

Unless there is a specific habitat or land management directive, forest management objectives on trust land are not to maintain any specific type of forest structure as forest stands shift over time from one structure to another (early to mid to late). DNR attempts to identify and conduct treatments across landscapes and within forest stands that will increase forest health while increasing the value to the trust beneficiaries. For example, in many cases, a late open forest structure created through timber harvest is also an early open forest structure due to the configuration of large open-grown leave trees with a recently regenerated young stand of future crop trees. DNR will often tend the young stand of trees while allowing the large trees to grow free and assume legacy tree characteristics. Given time and intensive management, this same stand will develop a mid-closed forest structure, at which point DNR may manage that stand, which has developed commercial products. Depending on the management strategy, this is the

next opportunity to recruit new legacies and protect existing legacies. The result is a continuous management of trust land forests through forest structure classes over time and space. The change in forest structure is a function of the canopy cover and tree size of the existing stand. As forest stands grow, the canopy closes and diameters increase. When two or more cohorts exist within a stand, the metrics used for defining forest structure will drive classification.

NORTHERN SPOTTED OWL MANAGEMENT

One notable example among these various objectives and constraints are the habitat requirements for the northern spotted owl. The northern spotted owl is strongly associated in much of its range with late successional and old-growth forest habitats with higher canopy closure. Areas of state trust lands identified for development and retention of northern spotted owl habitat may be intentionally managed to maintain or develop a closed canopy structure. This can significantly limit the types and amounts of forest health treatments that can occur in these areas.

Table 5 shows the landscapes where DNR manages to provide northern spotted owl habitat in the Southeast Region and the acres of northern spotted owl management areas. The Habitat Conservation Plan defines three main types of northern spotted owl management areas:

- *Nesting, Roosting, and Foraging (NRF)* – These management areas are intended to provide the appropriate cover and stand conditions for owls and their prey. Nesting, roosting, and foraging management areas typically require 50 percent of the area to be in a suitable habitat condition. In the Klickitat, the target is two-thirds of the area in a suitable habitat condition. These conditions account for much of the mid-closed and late closed canopy stands in these landscapes.
- *Dispersal (DISP)* – These management areas are found in stands between areas of nesting, roosting, and foraging areas and large federal reserves, and they are managed to provide enough cover from predation to protect owls traveling (or dispersing) through these areas. Half of the acres in these areas are required to meet habitat conditions, which is a condition generally between mid-open and mid-closed forest structure.
- *Desired Future Conditions (DFC)* – These management areas seek to provide a modified dispersal condition that is tailored to be ecologically stable based on forest cover types. Desired future conditions areas provide cover for owls from predation and require a 50 percent habitat condition. This condition can be found in both the mid-open to mid-closed forest structure.

Additionally, DNR manages *Ponderosa Pine Desired Future Condition (PPDFC)* areas in these landscapes. Although they are described in the HCP amendment, these stands generally do not support owl habitat. They are actively managed for long-term ecologically stable conditions for the ponderosa pine.

Table 5. DNR Landscapes with Northern Spotted Owl Habitat Management Areas in Southeast Region

DNR Landscape Name	Landscape Priority	DFC	DISP	NRF	PPDFC	Total Acres Managed for NSO*	Total Landscape Acres
Ahtanum	Low		31,676	2,604		34,280	82,638
Buck Creek	High	489		19,107		19,596	21,691
Cabin Creek	High		625	1,365		1,990	3,879
Glenwood	High	7,463		7,883	15,965	31,311	36,434
Naches/Wenas	Medium			2,814		2,814	90,862
Naneum	Low			4,056		4,056	29,009
Rattlesnake Creek	High	3,964			16	3,980	9,875
Taneum	Medium			336		336	8,340
Teaway	High		1,252	1,895		3,147	52,517
Trout Lake	High	4,077		12,377		16,454	18,568
Wenatchee	Medium			4,487		4,487	27,276
Grand Total		15,993	33,553	56,924	15,981	122,451	381,089

*Though exact targets vary by landscape and northern spotted owl management category, in general 50 to 67 percent of the total northern spotted owl management acres will be maintained in a habitat condition. Forest health treatments can be conducted within some of these habitat areas, though there are limits on how much live and dead woody material can be removed.

Image 2. Northern Spotted Owl**Image 3.** Canada Lynx

CANADA LYNX MANAGEMENT

In the Northeast Region, DNR landscapes with lynx habitat objectives may also have significant constraints on the locations, timing, and types of forest health treatments that may be implemented. Constraints associated with lynx habitat management per the [Lynx Habitat Management Plan for DNR-Managed Lands, April 2006](#) include maintaining ratios of different lynx habitat components, limitations on how much forested lynx habitat can be converted out of habitat status within a 10-year period, restrictions on harvest size and configuration, surveying of habitat conditions prior to harvest activities, and pre-commercial thinning restrictions that effectively prohibit this non-commercial treatment in some locations. In addition, there is interim guidance ([Okanogan Lynx Management Zone Interim Management Guidelines and Recommendations](#)) within the Okanogan Lynx Management Zone that requires additional management considerations prior to forest management activities to ensure there is no net loss of high-quality foraging habitat.

To begin addressing the inherent conflicts associated with restrictions in density management and forest health in managed lynx habitat, DNR is funding a research project in conjunction with Washington State University to test different young stand density management techniques and their effects on lynx foraging. This four-year research project will explore how snowshoe hare, the primary food source for Canada lynx, interact with young stand thinning. A Ph.D. student will manage the project, and will use GPS collars to track snowshoe hare use and dispersal over time across multiple density management techniques as compared to control sites. DNR is interested in using this information to develop young stand treatment prescriptions and management options going into the next revision of the Lynx Habitat Management Plan.

Table 6. DNR Landscapes with Lynx Habitat Management Areas in Northeast Region

DNR Landscape Name	Landscape Priority	Total Acres Managed for Lynx	Total Landscape Acres
Little Pend Oreille	High	14,484	17,598
Loomis	Low	92,305	134,524
Narcisse	High	769	7,839
Grand Total		107,558	159,956

For more information on habitat requirements and management actions associated with the northern spotted owl, see the [1997 State Trust Lands Habitat Conservation Plan \(HCP\)](#) and [HCP Amendment No. 1 – Administrative Amendment to the Northern Spotted Owl Conservation Strategy for the Klickitat HCP Planning Unit](#). For more information on lynx habitat and management requirements, please see the [Lynx Habitat Management Plan for DNR-Managed Lands, April 2006](#) and the [Okanogan Lynx Management Zone Interim Management Guidelines and Recommendations](#).

The northern spotted owl, Canada lynx, and other landscape/habitat objectives and constraints present challenges in meeting forest health goals, which will require DNR to work to resolve conflicts and synergize goals as opportunities present themselves. DNR will continue to implement forest health treatments as appropriate and look for new ways to simultaneously improve forest health and meet other land management goals.

Progress on the 2021-2023 Biennium Prioritization List

As directed in E2SHB 1711, this report provides a brief summary of the department's progress toward treating the state lands and state forestlands included in the previous biennium's prioritization list. The 2-year prioritization list from the 2020 report is summarized in Table 7.

Table 7. Acres of Commercial and Non-Commercial Treatments Planned for the 2021-2023 Biennium (As shown in the [2020 Forest Health Treatment Prioritization and Implementation Legislative Report](#))

Fiscal Year	2020 Landscape Priority	Planned Commercial Treatment Acres	Planned Non-commercial Treatment Acres*	Total Treatment Acres	% of Fiscal Year
2022	High	2,940	7,805	10,745	40%
	Medium	2,381	7,135	9,515	35%
	Low	1,115	5,562	6,677	25%
	Total	6,435	20,502	26,938	
2023	High	3,020	2,838	5,857	28%
	Medium	2,562	5,173	7,735	37%
	Low	989	6,463	7,453	35%
	Total	6,571	14,474	21,045	
Planned Biennium Total		13,006	34,976	47,982	

The criteria for commercial forest health treatment acres has changed somewhat since the 2020 Legislative Report. DNR no longer includes land use conversion or clear cuts as forest health treatments in its planned or completed activities. This resulted in a reduction of 21 reported acres since 2015. These techniques are a minor component of DNR management and are used for specific activities (e.g. road right of way clearing).

Table 8 provides a summary of the progress made towards the 2021-23 biennium's planned forest health activities. The data collection for this progress summary was completed on October 31, 2022, a bit more than halfway through the 2021-23 biennium. Much of the planned treatment acres for FY 2023 will occur throughout the remainder of the fiscal year.

Table 8. Progress on Forest Health Treatment Acres on DNR Trust Lands for the 2021-2023 Biennium by 2020 Landscape Priority

Fiscal Year	2020 Final Landscape Priority	Completed/Sold Commercial Treatment Acres	Completed Non-Commercial Treatment Acres	Total Treatment Acres	% of FY Treatment Acres
2022 (as of 10/31/2022)	High	2,687	5,303	7,990	43%
	Medium	2,715	4,223	6,938	37%
	Low	1,450	2,182	3,632	20%
	Total	6,852	11,708	18,560	
2023 (as of 10/31/2022)	High	813	3,175	3,988	45%
	Medium	1,625	1,530	3,155	36%
	Low		1,728	1,728	19%
	Total	2,438	6,433	8,871	
Grand Total		9,290	18,141	27,431	

E2SHB 1711 also directed DNR to provide a new 2-year prioritization for the 2023-25 biennium, as shown in Table 9. A list of planned commercial and non-commercial forest health treatments for the 2023-25 biennium by DNR landscape and treatment type is provided in Appendix A.

Table 9. Planned Commercial and Non-Commercial Forest Health Treatment Acres on DNR Trust Lands for the 2023-2025 Biennium by 2022 Landscape Priority

Fiscal Year	2022 Landscape Priority	Planned Commercial Treatment Acres	Planned Non-Commercial Treatment Acres	Planned Total Treatment Acres	% of FY Planned Treatment Acres
2024 (as of 10/31/2022)	High	4,545	7,420	11,965	36%
	Medium	2,268	13,564	15,831	48%
	Low	217	5,174	5,391	16%
	Total	7,030	26,157	33,188	
2025 (as of 10/31/2022)	High	2,395	10,510	12,905	52%
	Medium	1,695	4,949	6,644	27%
	Low	1,843	3,211	5,054	21%
	Total	5,933	18,670	24,603	
Planned Biennium Total		12,963	44,827	57,791	

Some of the treatment acres reported in Tables 7 through Table 9 may include multiple treatments on the same area of land. For example, a variable retention harvest may occur with a follow-up site preparation and planting on some or all of the same treatment footprint.

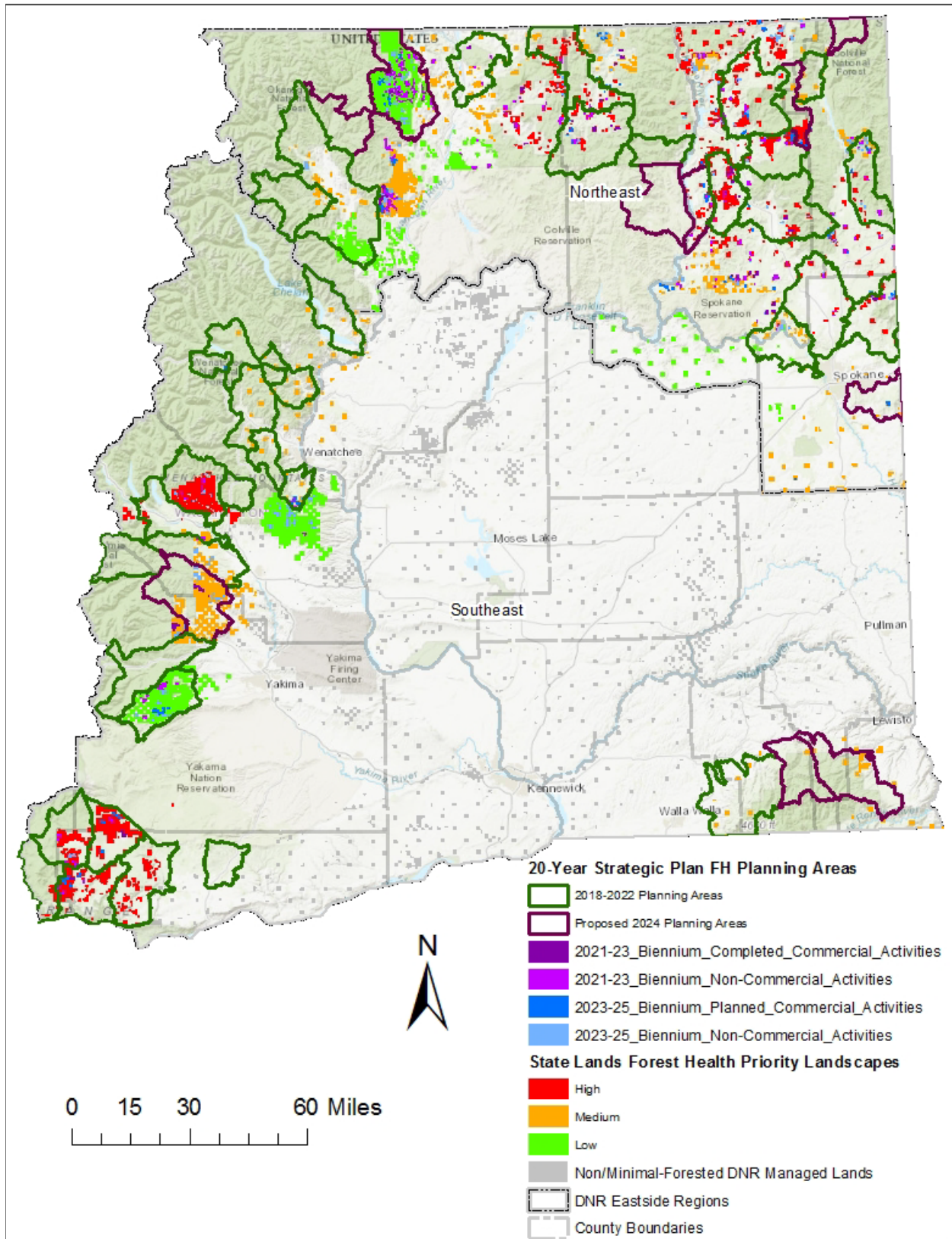
Coordination with Nearby Landowners and Statewide DNR Assessments

Consistent with direction in E2SHB 1711, DNR has consulted with and taken into account the land management plans and activities of nearby landowners in planning, collaborative implementation, and monitoring of forest health work.

DNR's [20-Year Forest Health Strategic Plan](#) for eastern Washington takes an all-lands, all-hands approach that integrates the management of DNR state trust lands and provides a collaborative setting to forest health prioritization and treatments on state trust lands. The forest health assessments at the regional and priority planning area scale identify and prioritize the treatment need across all land ownerships. The monitoring and treatment tracking for the 20-Year Forest Health Strategic Plan for eastern Washington also increases agency awareness of planned and completed forest health treatments on adjacent state, federal, private, municipal, and tribal lands.

In addition, DNR staff at the division and region level engage directly with partners in forest collaboratives, fire-adapted communities, and direct partner coordination. For example, DNR is a founding signatory organization to the Tapash Sustainable Forest Collaborative in the Southeast Region alongside Washington Department of Fish and Wildlife, Yakama Nation, USDA Forest Service, and The Nature Conservancy. DNR's work with its partners – whether through a formal collaborative body, community engagement, or direct coordination – informs and integrates the work on state lands into a collective strategy to increase forest health and reduce wildfire risk across eastern Washington. For further information on DNR's all-lands approach to forest health, see DNR's legislative report [Forest Health Assessment and Treatment Framework 2020 \(RCW 76.06.200\)](#).

Figure 4. Forest Health Treatments on DNR State Trust Lands for the 2021-23 biennium and the 2023-25 biennium with the 20-year Forest Health Strategic Plan Planning Areas (planned and completed activities)



Forest Health Treatment Case Study

The Phelps Creek area had not experienced fire or been thinned for 90 years. As a result, the forest was overstocked and at risk of disease, insect infestation, and stand-replacing fire (Image 5). The Phelps Creek timber sale in the DNR Southeast Region Klickitat Planning Unit near Husum required that foresters and biologists collaborate on management activities in this northern spotted owl habitat that is at risk. One objective of the timber sale was to address forest resilience concerns. However, the primary objective is to nudge this single-canopy forest toward habitat conditions for the northern spotted owl (Image 4). This threatened species forages and nests in forests with large trees, snags, down wood, and multiple canopy layers, including midstory trees and a healthy understory. Creating these conditions in an overstocked, structurally simple forest is challenging. It becomes even more challenging when this fuel-rich habitat also must be protected from fire.

DNR managers used an innovative approach assisted by the sale site's characteristics – the presence of a few legacy trees, some down wood, and small snags. Because there was some measure of existing habitat structure, staff developed a silvicultural prescription around proportional thinning rather than the standard thinning from below. The proportional thinning allowed harvesters to select from small and non-legacy large trees that have thinning crowns and are not expected to respond to treatment. This approach naturally creates gaps, establishing an understory component. This more structurally diverse stand moves the needle closer to desired habitat conditions (Image 6).

Although wildlife habitat is the primary driver for management in the Klickitat Planning Unit, this treatment was able to reduce density of underperforming trees, increasing resistance to insects and disease, create gaps to reduce possibility of sustained crown fires, and remove

Image 4. Northern spotted owl



Photo: Danielle Munzing

Image 5. Phelps Creek Pre-Treatment



Image 6. Phelps Creek Post-Treatment



fuels to decrease possible fire intensity – all while supporting local communities and improving habitat.

Updating and Adjusting Prioritization

The DNR trust lands forest health landscape prioritization in this report reflects new information based on completed forest health activities, updated forest inventory, and changing conditions in forest health measurement criteria. Because of these updates, landscapes may have changed priority or rankings since 2018 and 2020.

As forest health treatments continue and new information becomes available, future reports will likely also have adjustments to the DNR trust lands forest health prioritization. Forest conditions can also change due to a number of factors outside of DNR's control, such as climate change, wildfire, and storm events. Future 6-year and 20-year prioritization lists are also likely to reflect these changes.

Funding

E2SHB 1711 ([RCW 79.64.130](#)) created the Forest Health Revolving Account, which directed all receipts from the proceeds of forest health treatment sales (as defined in the bill) and legislative transfers, gifts, grants, and federal funds to be deposited into the account.

Table 10 displays a summary of forest health related revenues and expenses, including those in the Forest Health Revolving Account, for FY 2018-2023.

Table 10. Forest Health Budget FY 2018-2023 (As of 09/15/2022)

Forest Health Revolving Account	FY18	FY19	FY20	FY21	FY22	FY23 (projected)
Starting balance	-	\$3,864,049	\$11,818,620	\$14,256,326	\$22,333,599	\$26,285,353
Gross revenue*	\$13,990,559	\$17,389,943	\$15,266,515	\$18,543,811	\$14,549,492	\$17,550,000
Commercial harvest contractor	\$8,026,011	\$6,700,439	\$5,661,632	\$3,299,841	\$1,995,636	\$5,800,000
DNR commercial	\$1,829,533	\$2,144,426	\$3,520,227	\$3,419,338	\$3,853,295	\$3,963,300
DNR non-commercial	\$29	\$315,660	\$1,717,833	\$2,065,561	\$2,359,713	\$2,655,000
Agency overhead	\$270,938	\$274,846	\$1,717,833	\$1,681,797	\$2,389,094	\$3,169,851
Ending balance	\$3,864,049	\$11,818,620	\$14,256,326	\$22,333,599	\$26,285,353	\$28,247,202
Operating (RMCA/FDA/AG /WRFRCRA)	FY18	FY19	FY20	FY21	FY22	FY23 (projected)
DNR commercial	\$1,536,381	\$438,509	\$69,040	\$7,777	\$72,256	\$130,200
DNR non-commercial	\$2,072,646	\$439,596	\$27,747	\$40,873	\$7,808	\$45,400
1168 Commercial	-	-	-	-	\$165,568	\$121,100
1168 Non-commercial	-	-	-	-	\$655,129	\$803,400
1168 Division FH	-	-	-	-	\$135,334	\$269,400
Capital - State Building Construction Account	FY18	FY19	FY20	FY21	FY22	FY23 (projected)
DNR commercial	\$4,733	\$224,198	\$137,703	\$5,109	\$2,195	-
DNR non-commercial	\$516,675	\$3,175,117	\$936,615	\$1,239,811	\$598,107	\$400,000

*Gross revenue includes earnings from commercial activities and earned interest as reported by the State Treasurer

Also directed in E2SHB 1711 ([RCW 79.64.130](#)), any unobligated amounts less than \$10 million at the end of the *calendar year* are not subject to disbursement, but any unobligated amounts in

excess of \$10 million at the end of the calendar year must be disbursed to the appropriate trust beneficiaries.

Table 11 shows the ending balances of the Forest Health Revolving Account for calendar year (CY) 2017-2021. At the end of CY 2021, the ending balance exceeded \$10 million after accounting for obligated funds. DNR budget and fund managers recently distributed the listed Calendar Year 2021 unobligated funds.

Table 11. Forest Health Revolving Account End of Calendar Year Balances

Calendar Year	Forest Health Revolving Account ending balance	Obligated Funds towards the following calendar year	Unobligated Funds subject to disbursement
2017	\$0	N/A	N/A
2018	\$9,121,372	N/A	N/A
2019	\$15,051,210	\$7,630,933	N/A
2020	\$18,734,168	\$13,049,300	N/A
2021	\$27,363,733	\$12,295,952	\$5,067,781

Table 12 provides recommended funding amounts required to carry out the listed planned treatment acres for the 2023-25 biennium, including non-timber revenue sources.

Table 12. Forest Health Budget Requests and Projected Costs for the 2023-2025 Biennium*

Forest Health Revolving Account	FY24	FY25
Starting balance	\$28,247,202	\$31,647,202
Gross revenue	\$15,000,000	\$15,000,000
Commercial harvest contractor	\$5,600,000	\$5,600,000
DNR commercial	\$3,300,000	\$3,300,000
DNR non-commercial	\$2,700,000	\$2,700,000
Ending balance	\$31,647,202	\$35,047,202
Operating (RMCA/FDA/AG/1168)	FY24	FY25
DNR commercial	\$75,000	\$75,000
DNR non-commercial	\$50,000	\$50,000
1168 commercial	\$150,000	\$150,000
1168 non-commercial	\$850,000	\$850,000
1168 Division FH	\$200,000	\$200,000
Total	\$1,325,000	\$1,325,000

*DNR is very early in the budget process for the 2023-25 biennium. All numbers are subject to change.

Next Steps

DNR will continue to implement forest health treatments, conduct surveys, update data, and coordinate with nearby landowners to achieve better forest health conditions on state trust lands and throughout eastern Washington as a whole. With continued resolve, hard work, and collaboration, DNR strives toward a future with healthy forests, robust rural economies, and valuable partnerships that benefit all Washingtonians.

APPENDIX A: 2-Year Forest Health Treatments Prioritization

Forest health treatments on state trust lands in eastern Washington prioritized in the 2023-2025 Biennium as of 10/31/2022, listed by landscape, landscape priority, treatment type, and acres.

DNR Landscape	2022 Landscape Priority	Commercial Treatment Acres Total	Non Commercial Treatment Acres		Non-Commercial Treatment Acres Total
			Fuels	Other	
Aeneas	High			398	398
Bodie	High		516	1048	1,564
Buck Creek	High	864		96	96
Carrs Comer	High	158		138	138
Cottonwood	High		465	1064	1529
Douglas	High	218		466	466
Dunn	High	107	630	1981	2,611
Elk	High	277		1674	1,674
Evans	High		362	1512	1875
Furport	High	177		283	283
Glenwood	High	975			
Lime	High		209	1248	1432
Little Pend Oreille	High	730			
Marble	High		237	474	711
Narcisse	High			154	154
Orient	High	393	100	200	300
Orin	High			49	49
Patterson	High	387			
Rattlesnake Creek	High	251			
Republic	High	1,055	317	1818	2,136
Rice	High	942	10	208	218
Teanaway	High			472	472
Three Forks	High		57	114	171
Trout Lake	High			286	286
Usk	High	405	119	1249	1,368
Wenatchee	Medium	486	100		100
Curlew	Medium	560	244	2143	2,387
Fruitland	Medium	1,590		1880	1880
Jumbo	Medium		454	1489	1943
Leadpoint	Medium		171	444	615
LeClerc	Medium	211		1761	1761

DNR Landscape	2022 Landscape Priority	Commercial Treatment Acres Total	Non Commercial Treatment Acres		Non-Commercial Treatment Acres Total
			Fuels	Other	
Loup Loup	Medium	567	1580	1723	3,304
Naches/Wenas	Medium		1,650	1673	3323
Rockford	Medium	346			
Stemilt	Medium	203		232	232
Taneum	Medium			77	77
Tum Tum	Medium		118	2101	2,219
Twisp	Medium		672		672
Autanum	Low	1,169			
Colockum	Low		426	297	723
Espanola	Low		279	304	583
Loomis	Low	891	1340	5137	6477
Nanum	Low		413	189	602
Grand Total		12,963	10,446	34,382	44,827
All Activities	57,790				

APPENDIX B: 6-Year Prioritization

State Lands landscapes in eastern Washington prioritized for forest health treatments over the next six years (FY 2024-2030).

DNR Landscape	Landscape Acres	Forested Acres	2022 Priority Ranking	2022 Landscape Priority	20-Year Forest Health Priority Planning Areas*
Buck Creek	21,691	20,347	1	High	Little White/Trout Lake/White Salmon
Trout Lake	18,568	17,017	2	High	Glenwood, Trout Lake, White Salmon
Rattlesnake Creek	9,875	8,935	3	High	Republic, Toroda-Tonata
Marble	5,647	4,922	6	High	Mill Creek
Evans	11,913	10,612	7	High	Mill Creek
Dunn	21,675	18,783	8	High	Chewelah, Stranger
Glenwood	36,434	35,245	9	High	Glenwood, Klickitat, Trout Lake
Little Pend Oreille	17,598	16,459	10	High	Mill Creek, Little Pend Oreille, Meadow**
Rice	11,028	9,528	11	High	Stranger, Gifford**
Teanaway	52,517	48,112	12	Medium	Cle Elum/Teanaway/Upper Swauk
Wenatchee	27,276	14,078	13	High	Chumstick to LP/Mad Roaring Mills/Nason Creek/Stemil/Tillicum/Upper Wenatchee/Chelan/Mission
Cottonwood	8,795	8,018	14	High	Chewelah, Deer Park
Taneum	8,340	7,077	15	Medium	Cle Elum, Teanaway, Manastash Taneum
Usk	10,509	9,131	16	High	Chewelah/Deer Park
Furport	3,513	3,257	17	High	Trail
Republic	13,488	10,045	18	High	Republic, Toroda-Tonata
Orin	2,518	2,091	19	High	Chewelah/Mill Creek/Stanger/Little Pend Oreille
Narcisse	7,839	7,413	20	High	Mill Creek/Little Pend Oreille
Elk	10,398	9,420	21	High	Mt Spokane, Deer Park
Douglas	6,044	5,236	22	High	Mill Creek
Lime	8,469	7,995	23	High	
Carrs Corner	4,465	3,921	24	High	Chewelah, Stranger
Patterson	5,071	4,420	25	High	
Orient	6,295	5,110	26	High	
Boyds	1,783	1,334	27	High	Dollar
Bodie	15,143	10,505	28	High	Toroda-Tonata

Three Forks	2,473	2,348	29	High	Mill Creek
Aeneas	8,832	5,852	30	High	Republic
Stemilt	4,570	3,393	31	Medium	Stemilt
Jumbo	8,872	7,193	32	Medium	
Tum Tum	9,655	8,204	33	Medium	Long Lake/Deer Park
Curlew	11,638	9,309	34	Medium	Toroda-Tonab
LeClerc	10,753	10,189	36	Medium	Trail
Fruitland	21,731	20,238	37	Medium	
Naches/Wenas	90,862	49,126	38	Medium	Tieton, Manastash Taneum, Naches-Wenas**
Ione	5,461	5,261	40	Medium	Ion, Meadow**
Twisp	8,359	2,958	41	Medium	Methow Valley, Twisp River
Tonasket	7,657	1,828	42	Medium	Mt Hull
Ahtanum	82,638	56,975	45	Low	Ahtanum, Tieton
Rockford	9,256	4,096	46	Medium	Mica**
Loup Loup	56,890	46,509	47	Medium	Methow Valley
Leadpoint	1,812	1,685	48	Medium	
Colockum	60,970	33,426	49	Low	Stemilt
Loomis	134,524	112,605	50	Low	Loomis**
Espanola	5,226	2,302	51	Low	Long Lake
Naneum	29,009	23,236	55	Low	Stemilt
Miles	11,471	4,585	56	Low	

**Indicates an overlap between DNR-managed landscapes and 20-Year Forest Health Strategic Plan Priority Planning Areas, which are watersheds prioritized under 2SSB 5546.*

*** Proposed 20-Year Forest Health Priority Planning Area for 2024*

APPENDIX C: 20-Year Prioritization

DNR landscapes in eastern Washington prioritized for forest health treatments over the next 20 years.

DNR Landscape	Region	2022 Landscape Priority	Priority Rank*	Landscape Acres	Forested Acres	20-Year Forest Health Priority Planning Areas**	Sum of Closed Forest Structure Acres
Buck Creek	Southeast	High	1	21,691	20,347	Little White, Trout Lake, White Salmon	18,787
Trout Lake	Southeast	High	2	18,568	17,017	Glenwood, Trout Lake, White Salmon	14,422
Rattlesnake Creek	Southeast	High	3	9,875	8,935	Glenwood, Trout Lake, White Salmon	6,886
Appleton	Southeast	High	4	15,287	12,760	Klickitat, White Salmon	6,088
Cabin Creek	Southeast	High	5	3,879	3,551	Cle Elum	3,247
Marble	Northeast	High	6	5,647	4,922	Mill Creek	1,665
Evans	Northeast	High	7	11,913	10,612	Mill Creek	2,440
Dunn	Northeast	High	8	21,765	18,783	Chewelah, Stranger	6,707
Glenwood	Southeast	High	9	36,434	35,245	Glenwood, Klickitat, Trout Lake	7,777
Little Pend Oreille	Northeast	High	10	17,598	16,459	Mill Creek, Little Pend Oreille, Meadow***	6,291
Rice	Northeast	High	11	11,028	9,528	Stranger, Gifford***	1,782
Teaway	Southeast	High	12	52,517	48,112	Cle Elum, Teaway, Upper Swauk	8,694
Wenatchee	Southeast	Medium	13	27,276	14,078	Chumstick to LP, Mad Roaring Mills, Nason Creek, Stemilt, Tillicum, Upper Wenatchee, Chelan, Mission	2,906
Cottonwood	Northeast	High	14	8,795	8,018	Chewelah, Deer Park	839
Taneum	Southeast	Medium	15	8,340	7,077	Cle Elum, Teaway, Manastash Tanum	502
Usk	Northeast	High	16	10,509	9,131	Chewelah, Deer Park	2,606
Furport	Northeast	High	17	3,513	3,257	Trail	550
Republic	Northeast	High	18	13,488	10,045	Republic, Toroda-Tonata	508

DNR Landscape	Region	2022 Landscape Priority	Priority Rank*	Landscape Acres	Forested Acres	20-Year Forest Health Priority Planning Areas**	Sum of Closed Forest Structure Acres
Orin	Northeast	High	19	2,518	2,091	Chewelah, Mill Creek, Stranger, Little Pend Oreille	199
Narcisse	Northeast	High	20	7,839	7,413	Mill Creek, Little Pend Oreille	2,219
Elk	Northeast	High	21	10,398	9,420	Mt Spokane, Deer Park	2,269
Douglas	Northeast	High	22	6,044	5,236	Mill Creek	1,489
Lime	Northeast	High	23	8,469	7,995		3,042
Carrs Corner	Northeast	High	24	4,465	3,921	Chewelah, Stranger	793
Patterson	Northeast	High	25	5,071	4,420		2,049
Orient	Northeast	High	26	6,295	5,110		579
Boyds	Northeast	High	27	1,783	1,334	Dollar	187
Bodie	Northeast	High	28	15,143	10,505	Torda-Tonata	251
Three Forks	Northeast	High	29	2,473	2,348	Mill Creek	299
Aeneas	Northeast	High	30	8,832	5,852	Republic	54
Stemilt	Southeast	Medium	31	4,570	3,393	Stemilt	609
Jumbo	Northeast	Medium	32	8,872	7,193		1,880
Tum Tum	Northeast	Medium	33	9,655	8,204	Long Lake, Deer Park	47
Curlew	Northeast	Medium	34	11,638	9,309	Toroda-Tonata	1,459
Cayuse	Northeast	Medium	35	6,957	835	MtHull	86
LeClerc	Northeast	Medium	36	10,753	10,189	Trail	2,719
Fruitland	Northeast	Medium	37	21,731	20,238		2,029
Naches/Wenas	Southeast	Medium	38	90,862	49,126	Tieton, Manastash Taneum, Naches-Wenas***	4,884
Blue Mountains	Southeast	Medium	39	15,810	2,264	Asotin, Touchet-Mill, Tucannon***	733
Ion	Northeast	Medium	40	5,461	5,261	lone, Meadow***	1,138
Twisp	Northeast	Medium	41	8,359	2,958	Methow Valley, Twisp River	365
Tonasket	Northeast	Medium	42	7,657	1,828	MtHull	0
Molson	Northeast	Medium	43	6,160	3,382	MtHull, Toroda-Tonata	86
Nighthawk	Northeast	Medium	44	1,986	276		0
Ahtanum	Southeast	Low	45	82,638	56,975	Ahtanum, Tieton	11,035

DNR Landscape	Region	2022 Landscape Priority	Priority Rank*	Landscape Acres	Forested Acres	20-Year Forest Health Priority Planning Areas**	Sum of Closed Forest Structure Acres
Rockford	Northeast	Medium	46	9,256	4,096	Mica***	354
Loup Loup	Northeast	Medium	47	56,890	46,509	Methow Valley	409
Leadpoint	Northeast	Medium	48	1,812	1,685		555
Colockum	Southeast	Low	49	60,970	33,426	Stemilt	1,055
Loomis	Northeast	Low	50	134,524	112,605	Loomis***	14,772
Espanola	Northeast	Low	51	5,226	2,302	Long Lake	11
Pateros	Northeast	Low	52	3,239	390		0
Knowlton	Northeast	Low	53	30,847	9,652	Methow Valley	78
Riverside	Northeast	Low	54	5,991	933		0
Naneum	Southeast	Low	55	29,009	23,236	Stemilt	1,002
Miles	Northeast	Low	56	11,471	4,585		1
Brewster	Northeast	Low	57	8,836	1,690		0
Synarep	Northeast	Low	58	13,154	5,658		0

*Table 2 shows priority ranking by eastern Washington. This ranking is based on total eastside ranking regardless of Region.

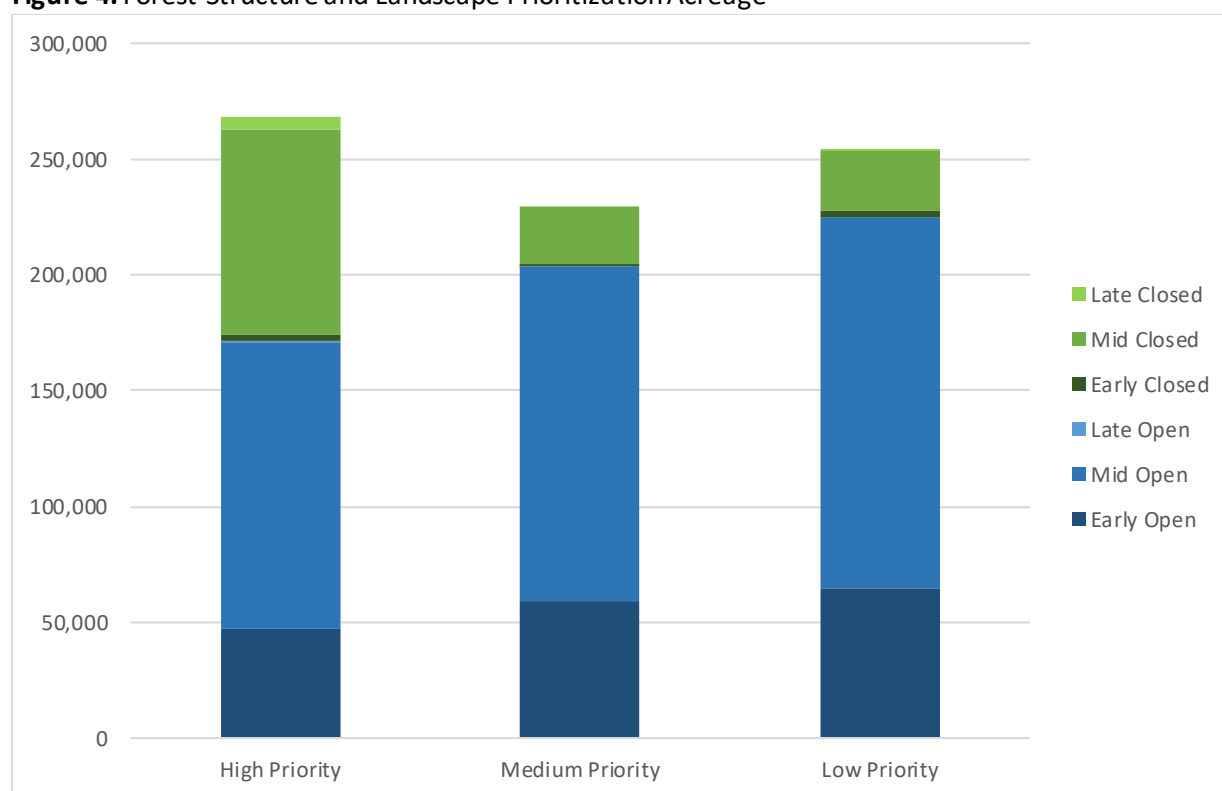
**Indicates an overlap between DNR-managed landscape and 20-Year Forest Health Strategic Plan Priority Planning Areas, which are watersheds prioritized under 2SSB 5546.

***Proposed 20-Year Forest Health Priority Planning Area for 2024

APPENDIX D: Forest Structure

The first factor used to determine forest structure is canopy cover. An “Open” canopy is defined as having less than 60 percent canopy cover, and “Closed” is defined as stands with greater than 60 percent canopy cover. Canopy cover is a measure of the proportion of ground surface area that contains tree canopy directly above the ground at any height, with a maximum value of 100 percent. Stands with greater canopy cover often contain larger trees and/or a greater number of trees per acre. In both cases, as the canopy cover increases, the between-tree competition for resources in the stand increases, which can lead to decreased growth, increased risk of mortality, and decreased resilience to pathogens.

Figure 4. Forest Structure and Landscape Prioritization Acreage



Source: RS-FRIS Forest Inventory System (07/14/2022), WA DNR Forest Resources Division

Canopy cover can be reduced with various commercial and non-commercial treatments, including variable retention harvest, pre-commercial thinning, commercial thinning, variable density thinning, and shaded fuel breaks. The use of pruning or prescribed fire may also reduce canopy cover, though canopy cover reduction is generally not the primary goal of these treatments.

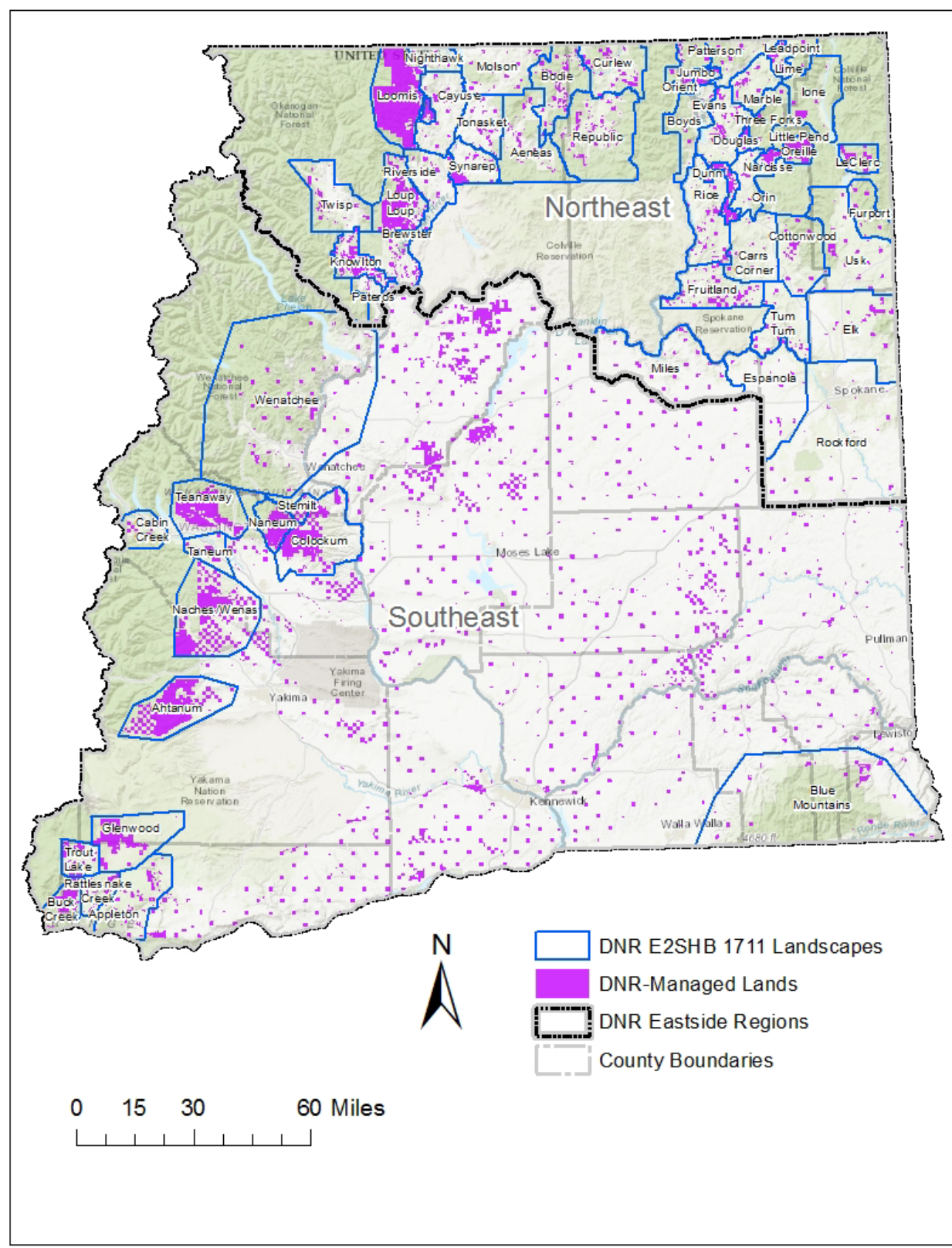
Another key element in determining forest structure in this analysis is the stage of forest succession. Forest succession is a natural process of growth and change after a major

disturbance, such as timber harvest or wildfire. This analysis measures the quadratic mean diameter (QMD) of all trees in the stand six inches or larger at breast height (4.5 feet above soil surface). QMD can be used as a surrogate for age as it reflects the biologic condition of the forest when used with other metrics such as canopy cover.

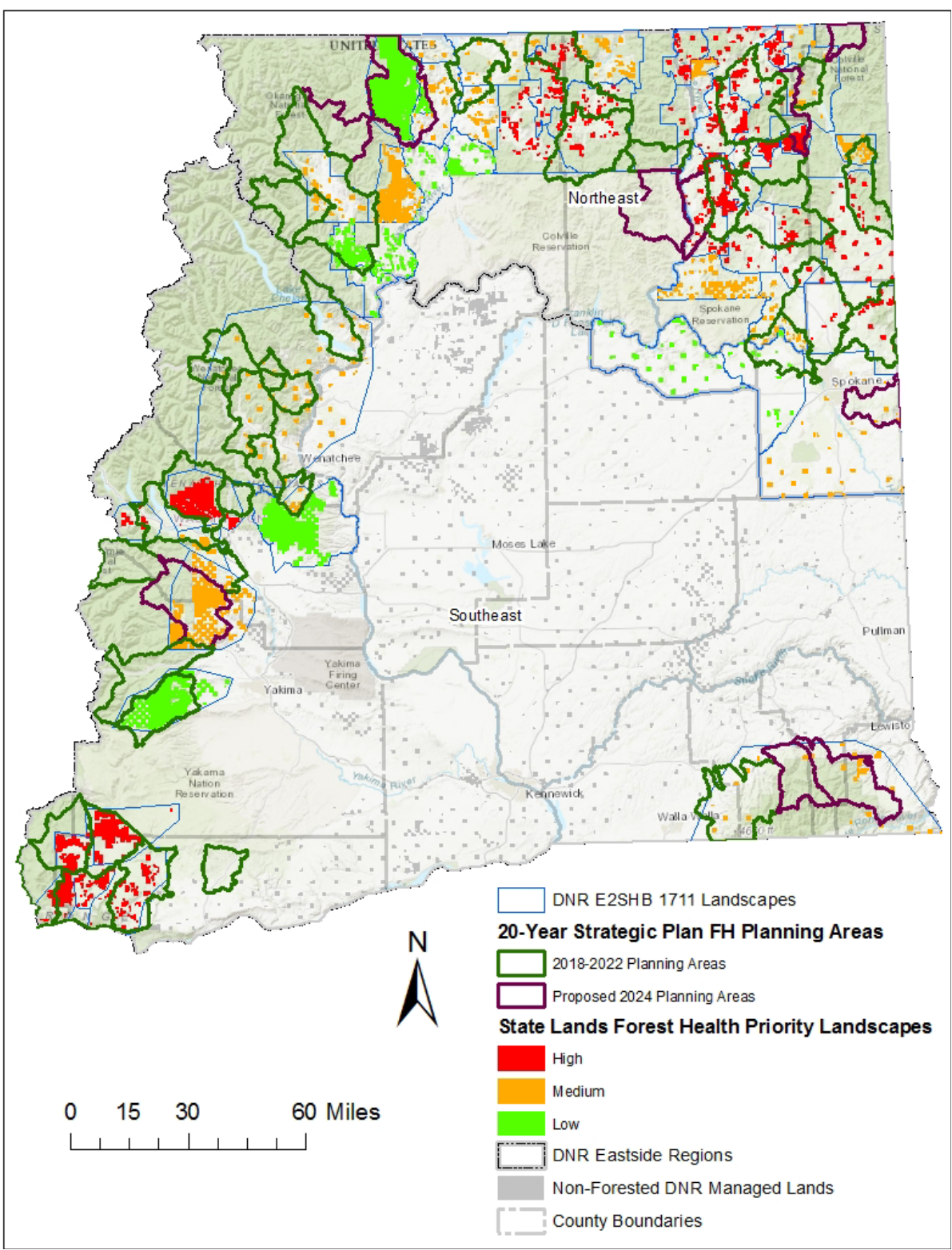
Stands with a QMD less than 10 inches are considered “Early” and are generally only suitable for non-commercial treatments such as pre-commercial thinning, pruning, and possibly prescribed burning. Currently, the small size of the trees in these stands does not allow for commercial use of logs from these treatments. Stands with a QMD between 10 inches and 20 inches are considered “Mid” while stands with a QMD greater than 20 inches are considered “Late”.

Stands in the “Mid” and “Late” categories are more likely to be suitable for commercial treatments, such as commercial thinning, variable density thinning, and regeneration harvest. They might also be suitable for non-commercial treatments, such as prescribed burning, road realignment and maintenance, as well as shaded fuel breaks. Stands in the “Early” categories are more likely to be considered for non-commercial treatments. Proper treatment selection within these categories relies upon the knowledge of local field staff to assess the stand condition, species present, and forest health concerns, as well as operability and market feasibility.

APPENDIX E: DNR's Landscapes in Eastern Washington



APPENDIX F: DNR's Landscapes and 20-Year Forest Health Strategic Plan Priority Planning Areas



APPENDIX G: Commercial and Non-Commercial Forest Health Treatment Descriptions

Commercial thinning – A commercial thinning reduces stand density before competition-induced mortality occurs within the stand. Trees removed are of commercial value and are removed from the site. In general, commercial thinnings remove the smaller trees, leaving the biggest and healthier crop trees, or they remove trees of all size classes. Residual trees are selected based upon species priorities, individual tree health, and growth potential, as well as habitat potential.

Pest management – Monitoring and managing forest pests using preventative, biological, cultural, and/or chemical techniques to reduce pest damage below levels of concern.

Pre-commercial thinning (PCT) – Stand density reduction treatment conducted in young stands that do not yet contain merchantable-size trees (generally less than 6-inch diameter at stump height), with the objective of removing trees that will likely succumb to competition-induced mortality and allow for greater resource allocation (water, nutrients, and sunlight) to remaining trees.

Prescribed burning – The intentional, controlled application of fire to a forested area to accomplish specific objectives, including site preparation, understory maintenance, influencing overstory species composition, and reducing fuels.

Pruning – Removing branches flush with the tree trunk to improve tree health, increase commercial value, hasten maturity, and reduce certain forest health and ladder fuel risks.

Reforestation – Following a stand-replacing disturbance, the stand will often be “regenerated” through natural or artificial methods. Natural regeneration relies upon residual trees and seed banks to populate the freshly bare ground with seedlings. Although natural regeneration uses seed from local trees, the seed distribution and seed germination success can be highly variable. Following timber harvest, the most common method of regeneration is hand planting of seedlings. Foresters choose seedling species based upon the natural conditions of the site to ensure success in obtaining stand objectives. Seeds for the planted seedlings are from a similar geographic location and elevation to ensure genetic resources that are consistent with local conditions. Although natural regeneration results in a range of <50 trees per acre to more than 1,000 trees per acre, artificial regeneration, usually requires hand planting of 150 to 350 trees per acre, depending upon species and site conditions.

Shaded fuel breaks/hazard abatement – Used to mitigate the threat of wildfire in areas where natural fire regimes have been suppressed, leading to a dangerous buildup of combustible vegetation. This can be described as a strategically located wide block or strip in which dense, heavy, or highly flammable vegetation is removed or changed to one of lower fuel volume or reduced flammability. This can be done by altering surface fuels, increasing the height to the base of the live crown, and opening the tree canopy. These are different from a firebreak, which tends to be narrower than a shaded fuel break.

Site preparation – Site preparation is used to prepare planting spots and control competing vegetation to allow for increased water, nutrients, and light to planted trees to increase survival and growth in the first two to three years after planting. Site preparation can include manual weed cutting, mechanical treatments such as mastication, tilling, or brush pulling, as well as herbicide treatments.

Uneven-aged management – A silvicultural system in which multiple thinning treatments are implemented over several decades with the intent of managing for total stand density to reduce competition-induced mortality while providing openings for natural or planted seedlings to grow with an end goal of a stand with multiple age classes, crown levels, and species.

Variable density thinning – Variable density thinnings can be an intermediate treatment when using even-aged or uneven-aged management. Variable density thinnings are often conducted after trees have reached at least 40 years old and are designed to reduce stand density while encouraging vertical and horizontal heterogeneity by leaving “skips” in which no trees are removed and “gaps” in which all trees are removed with the intent of reforestation or recruitment of desired shrub species within the “gap.” Residual trees are generally selected to retain desired species, larger trees, and trees with potential wildlife habitat value. Variable density thinnings often result in removal of merchantable pulp and saw logs.

Variable retention harvest – Harvest technique based on the natural model of biological tendencies that are typically left behind following natural disturbances such as wildfire, wind, and flood. It is a primary silvicultural approach used by DNR, which emphasizes retaining at least 20 trees per hectare (6 trees per acre) in a mix of dispersed and aggregated spatial patterns, providing no major voids within timber units. The overall objective is to maintain and promote large, structurally unique trees, snags, and down wood over time.

Vegetation management – Vegetation management is the removal of competing species from young stands to allow for increased water, nutrients, and light for planted and naturally regenerated trees, usually conducted within the first decade after a regeneration harvest.

APPENDIX H: Aerial Insect and Disease Detection Survey

Methods and Reporting Categories

The USDA Forest Service, in cooperation with DNR, conducts an annual insect and disease aerial detection survey (ADS) in Washington state, which has been ongoing since 1947.

From a fixed-wing aircraft, observers record polygons (fixed areas) or points where recently killed or defoliated trees are visible from the air. Polygons are coded with the most likely damage-causing agent and a measure of damage intensity. Some polygons may be coded with more than one damage agent. The damage codes assigned are inferred from “signatures” of tree size, species, crown color, and pattern of damage. Signature recognition is developed through training and ground observations. Unknown signatures are prioritized for ground-checking, but most damage polygons are not ground-checked. Some damage signatures attributed to a specific pest may have other causes. It is challenging to accurately identify and record damage observations at this large scale. Mistakes can occur, and sometimes the wrong pest may be identified.

For reporting purposes, damage agents are assigned to four damage type categories: mortality agents, defoliating insects, foliar diseases, and abiotic/animal/root disease.

Mortality agents are primarily nine different species of tree-killing bark beetles that include mountain pine beetle, western pine beetle, Douglas-fir beetle, fir engraver, spruce beetle, and others. This category also includes mortality in tree species that are rarely killed by bark beetles that can't be attributed to a specific causal agent. These include the “dying hemlock” and “dying cedar” codes. Balsam woolly adelgid is an aphid-like sucking insect that is sometimes categorized as a mortality agent.

Defoliating insects are a wide variety of insect pests that feed on tree foliage by chewing, sucking sap, or mining inside foliage, causing enough damage and discoloration to the crown that it is visible from the air. Chewing defoliators are primarily moth caterpillars such as western spruce budworm, Douglas-fir tussock moth, larch casebearer, western hemlock looper, and tent caterpillars, but also include sawfly larvae. Sucking defoliators include aphids, scale insects, and adelgids such as spruce aphid, black pineleaf scale, and balsam woolly adelgid. Leaf or needle miners include aspen leaf miner and ponderosa needle miner.

Foliar diseases include needle casts, needle blights, and rusts caused by fungal pathogens that discolor foliage, such as Swiss needle cast, larch needle cast, pine needle casts, larch needle blight, poplar rust, and white pine blister rust. This category also includes hardwood declines that cause crown dieback attributed to more than one agent, such as Pacific madrone decline, maple decline, aspen decline, and oak decline.

The **abiotic/animal/root disease** category includes several weather-related or non-biological causes of tree mortality, such as windthrow, flooding, frost damage, hail damage, landslides, and wildfire. Wildfire damage is often only recorded in aerial survey if it is associated with other damage agents, such as bark beetles. This category also includes bear damage, which results in scattered mortality in young conifer stands; that signature is also seen frequently due to root disease. Mortality from root diseases in mature stands is difficult to detect from the air, but is also included in this category. Damage polygons coded as bark beetles may sometimes be related to root disease centers.