



# State Trust Lands Habitat Conservation Plan Annual Report

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For Fiscal Year 2020  
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Published September 2021

▲  
View of the Olympic Mountains  
from the Seattle Ridge  
timber sale unit boundary.



WASHINGTON STATE DEPT OF  
**NATURAL  
RESOURCES**



# State Trust Lands Habitat Conservation Plan Annual Report

For Fiscal Year 2020

Published September 2021

Prepared by  
Washington State Department  
of Natural Resources  
**Forest Resources Division**



WASHINGTON STATE DEPT OF  
**NATURAL  
RESOURCES**



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# Acronyms

dbh	Diameter at breast height
DFC	Desired future condition
DNR	Washington State Department of Natural Resources
ESA	Endangered Species Act
FEIS	Final environmental impact statement
FRIS	Forest Resource Inventory System
FY	Fiscal year
GIS	Geographic information system
HCP	State Trust Lands Habitat Conservation Plan
LPU	Landscape planning unit
LiDAR	Light detection and ranging
LRM	Land Resource Manager
LTFC	Long-term forest cover
MM	Marbled murrelet
MMLTCS	Marbled Murrelet Long-term Conservation Strategy
MoRF	Movement, roosting, and foraging
NAP	Natural Area Preserve
NRCA	Natural Resources Conservation Area
NRF	Nesting, roosting, and foraging
NSO	Northern spotted owl
NOAA	National Oceanic and Atmospheric Administration
OESF	Olympic Experimental State Forest
ONRC	(University of Washington) Olympic Natural Resource Center
P&T	Planning and tracking
PCT	Precommercial thinning
PhoDAR	Photogrammetric Detection and Ranging
QMD	Quadratic mean diameter
RCW	Revised Code of Washington
RD	Relative density
REF	Reference
RFRS	Riparian Forest Restoration Strategy
RMAP	Road maintenance and abandonment plan
RMZ	Riparian management zone
RS-FRIS	Remote-Sensing Forest Resource Inventory System
RVMP	Riparian Validation Monitoring Program
SEPA	(Washington) State Environmental Policy Act
SHA	Special habitat area
SFT	State forest transfer
SOMU	(Northern) Spotted owl management unit
TLT	Trust land transfer
UAS	Unmanned aircraft system
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
UW	University of Washington
WAU	Watershed administrative unit
WDFW	Washington Department of Fish and Wildlife



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## 1.0 Introduction

### *Appendix: Background on the State Trust Lands Habitat Conservation Plan*

Each year, the Washington State Department of Natural Resources (DNR) develops a State Trust Lands Habitat Conservation Plan (HCP) Annual Report based on commitments outlined in the HCP Implementation Agreement. The intended audience is the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries (collectively, “the Services”), and other interested parties.

The HCP Annual Report is a summary of management activities completed on DNR lands managed under the HCP, monitoring and research efforts, and conservation strategy progress. Unless otherwise noted, information about DNR programs included in this report covers fiscal year (FY) 2020 (July 1, 2019-June 30, 2020).

### 1.1 Highlights

In FY 2020, DNR accomplished several objectives affecting lands managed under the HCP. Highlights include:

- **Initial steps in setting the eastside Sustainable Harvest Level.** Began development of the eastside forest estate model, established a Technical Advisory Committee to review the model and address questions from the Board of Natural Resources.
- **Accomplishments in planning the Type 3 Watershed Experiment in the Olympic Experimental State Forest.** Held three virtual stakeholder outreach meetings, finalized study plans and implemented a passive acoustic monitoring study partially funded through the Earthwatch Institute with help from Earthwatch volunteers.
- **DNR added 1,641 acres to Natural Area Preserves and Natural Resources Conservation Areas within the area covered by the Habitat Conservation Plan.** These protection efforts added to nine existing natural areas. More information can be found in the [Natural Areas](#) section.

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## 2.0 Progress on Conservation Objectives

### Appendix: Background on Conservation Objectives

The HCP established numerous conservation strategies designed to minimize and mitigate the adverse effects of land management activities on the habitats of federally listed species and unlisted species of concern, as well as riparian and uncommon habitats that exist within the land base covered by the HCP. Habitat conservation strategies for northern spotted owl (NSO), marbled murrelet, riparian areas, and other species of concern are outlined in the HCP. Annual reporting on progress toward habitat objectives is outlined in the sections below.

## 2.1 Conservation Strategy Updates

The HCP conservation strategies are occasionally updated due to research, plan development, changes to laws, and/or adjustments to DNR administrative procedures.

### **2.1.1 Marbled Murrelet Long-Term Conservation Strategy**

In FY 2020, the Board of Natural Resources adopted a long-term conservation strategy for the marbled murrelet to replace the interim conservation strategy. The [Marbled Murrelet Section](#) below contains summary information for the long-term conservation strategy. Additional background information on the history and development of this conservation strategy update can be found in the [Appendix](#), the [FY 2019 HCP Annual Report](#) section titled “Marbled Murrelet Conservation Strategy Development,” as well as on the Marbled Murrelet webpage at [dnr.wa.gov/mmltcs](http://dnr.wa.gov/mmltcs).

### **2.1.2 RS-FRIS and NSO Habitat Delineation**

DNR developed and applied multiple queries to the Forest Resource Inventory System data to identify northern spotted owl habitat types across state-managed forestland. The DNR Forest Resource Inventory System (FRIS) has now been replaced by the Remote Sensing Forest Resource Inventory System (RS-FRIS). The FY 2019 HCP Annual Report provides a comprehensive review on this topic.

As outlined in the FY 2019 HCP Annual Report, the higher spatial precision of RS-FRIS data presented a unique challenge. A direct application of the habitat definitions to RS-FRIS data would have resulted in a pixelated scattering of habitat in units as small as 1/10 acre. To identify habitat patches of ecologically meaningful sizes and configurations, RS-FRIS data were smoothed, and habitat patches were delineated using a derivation of the [PatchMorph Algorithm](#). Additionally, during the transition to RS-FRIS, DNR made minor updates to the queries to reflect the attributes measured in RS-FRIS and better match the habitat definitions in the HCP (see [Table A-3](#) in the [Appendix](#)).

Updated queries:

- In Type A and Type B habitat, canopy closure has been updated to “>70” (from “≥70”) because the wording of the HCP is “greater than” (not greater than or equal to)
- In Type A and Type B habitat, “Primary species >10% and primary species ≤80% (multispec=yes)” has been updated to “Secondary species is not null”
- The height requirement for snags has been removed because RS-FRIS does not contain individual tree data
- “Canopy layers ≥ 2” now comes directly from RS-FRIS data instead of an FVS derivation

The FY 2019 HCP Annual Report reported northern spotted owl habitat percentages determined using FRIS data. In this FY 2020 HCP Annual Report, habitat percentages are based on RS-FRIS data for the North Puget, South Puget, and Columbia HCP planning units. In the FY 2021 HCP Annual Report, habitat percentages reported in the OESF will also be based on RS-FRIS data. The timeline for reporting habitat percentages based on RS-FRIS in the HCP Annual Report mirrors the timeline for implementing RS-FRIS within the DNR timber sales program – starting in FY 2020, sales sold in the westside planning units (excluding the OESF) were planned using RS-FRIS data, and sales sold in the OESF will use RS-FRIS data starting in FY 2021.

## 2.2 Northern Spotted Owl Conservation Strategy

### Appendix: Habitat Type Definitions

When the HCP was developed, areas were identified areas on DNR-managed lands that were most important to northern spotted owl conservation. These designated northern spotted owl management areas are managed for certain habitat classes and types that are defined in the HCP (p. IV.11–12) and [WAC 222-16-085](#). More information about habitat classifications and types for each westside northern spotted owl management area can be found in the [Appendix](#).

The DNR northern spotted owl (NSO) conservation strategy west of the Cascades involves maintaining thresholds of habitat in each spotted owl management unit (SOMU). Most designated nesting, roosting, and foraging (NRF) and dispersal SOMUs have a 50 percent overall habitat target. The Olympic Experimental State Forest (OESF) and South Puget HCP Planning Units each have two-tiered habitat threshold targets that are described later in this section.

Five primary factors can affect habitat percentages reported from year to year:

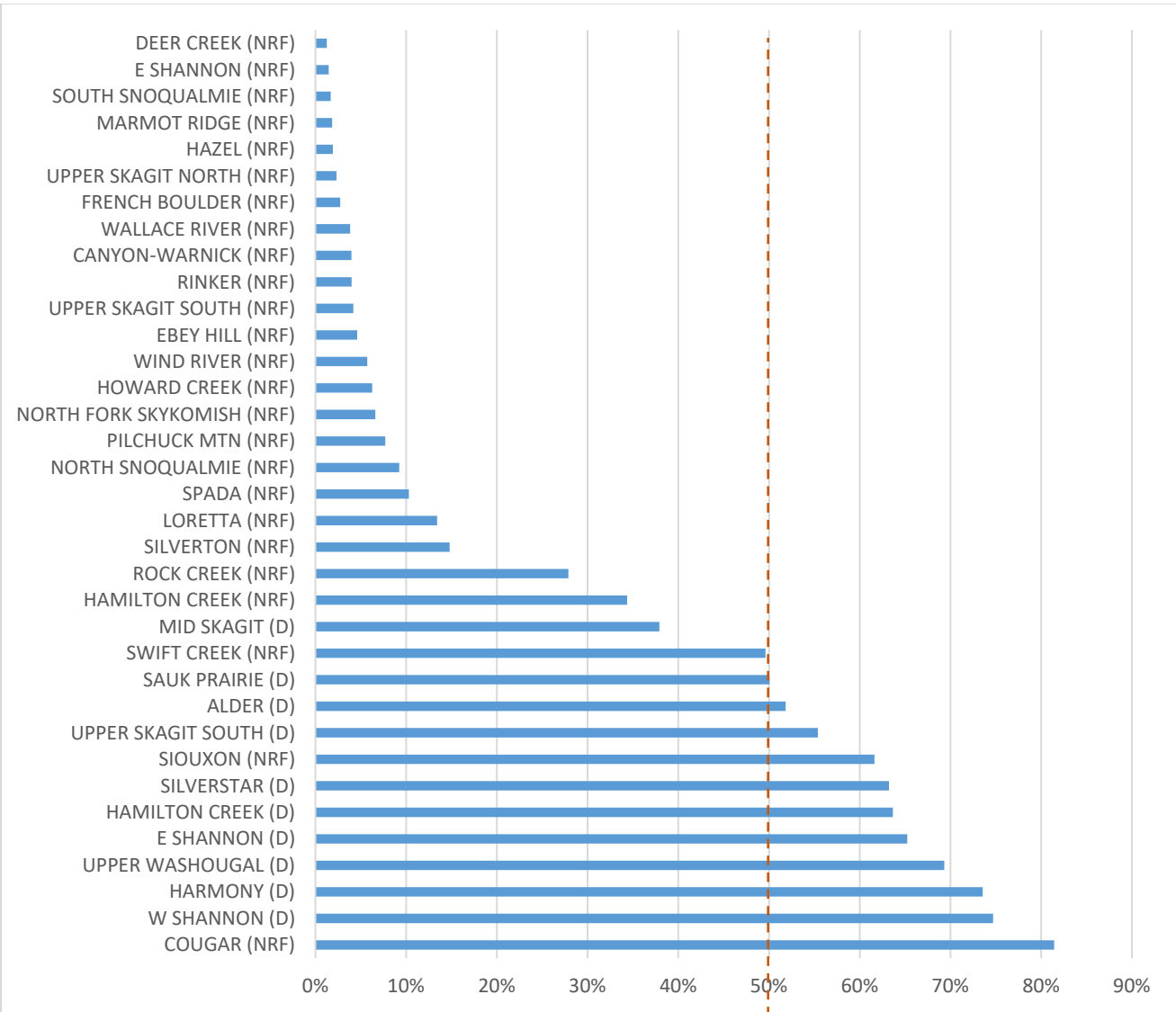
1. Land is acquired or disposed through a land transaction;
2. Stands are inventoried and their boundaries are refined and/or their habitat type is updated due to growth or an enhancement thinning;
3. A regeneration harvest is conducted within habitat in a SOMU that is over the habitat threshold target;
4. Refinements are made to cadastre data across the state; or
5. Candidate stands in the OESF are thinned to meet habitat requirements.

In some years, none of these factors may occur, while in other years, one or more of these factors may increase or decrease habitat percentages in a SOMU. The figures below show NSO habitat percentages, by HCP planning unit, as they existed on June 23, 2020, when the data was extracted from RS-FRIS.

SOMUs that are below their habitat thresholds have areas of non-habitat designated as “next best” to ensure each SOMU is on a trajectory to meet the habitat target. The sum of habitat and next best equals the SOMU habitat threshold target. SOMUs above their habitat thresholds do not have next best. Candidate stands in the OESF are described fully in the [OESF Forest Land Plan](#).

### **2.2.1 Columbia and North Puget HCP Planning Units**

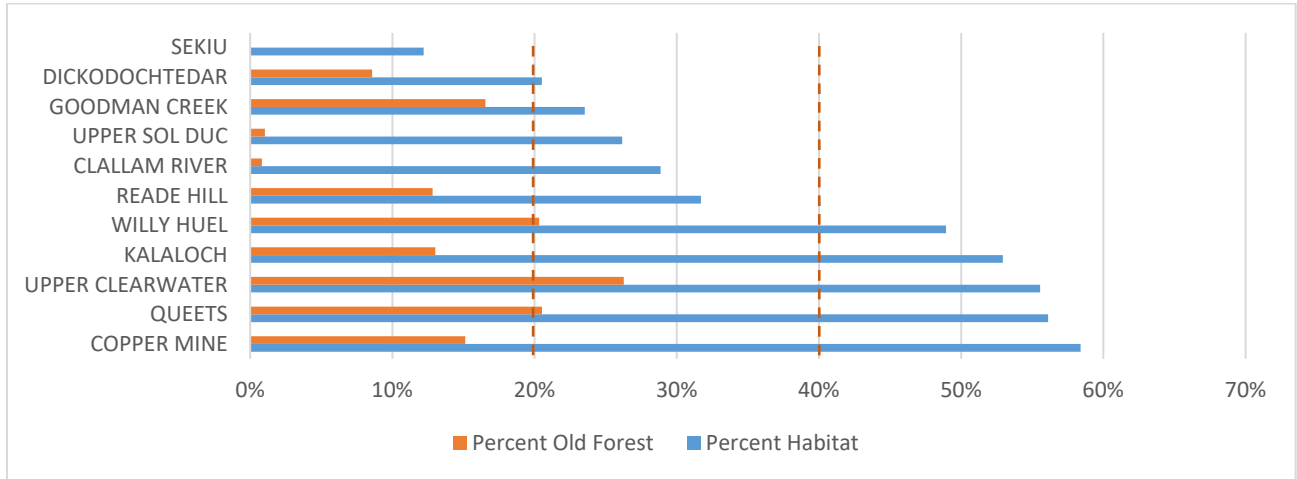
In the Columbia and North Puget HCP Planning Units, the HCP habitat goal is to restore and maintain at least 50 percent of NRF and dispersal (D) SOMUs as habitat. Figure 2-1 shows percent habitat for SOMUs in the Columbia and North Puget HCP Planning Units. Only SOMUs with more than 1 percent habitat are included in the figure.



**Figure 2-1: Habitat Percentages by SOMU in the Columbia and North Puget HCP Planning Units as of 6/23/2020.** The dashed line represents the habitat target. Habitat has been rounded to the nearest percent. The following NRF SOMUs are not included because they have less than 1 percent habitat: Cavanaugh, Clearwater, Mid Skagit, Sauk Prairie, South Fork Skykomish, Texas, Upper NF Stilly, and W Shannon Beginning in FY 2020, NSO habitat data in the Columbia and North Puget HCP planning units are derived from RS-FRIS.

### 2.2.2 Olympic Experimental State Forest HCP Planning Unit

In the OESF HCP Planning Unit, habitat is tracked based on 11 Landscape Planning Units (also generically referred to as SOMUs). DNR does not designate NRF or dispersal areas in the OESF. In each SOMU, the HCP habitat goal is to restore and maintain a minimum of 40 percent NSO habitat. Of that 40 percent, at least one-half, or 20 percent of the SOMU, must be Old Forest Habitat and the remaining habitat must be Structural or better. Figure 2-2 shows current total percent NSO habitat in OESF Planning Unit SOMUs.

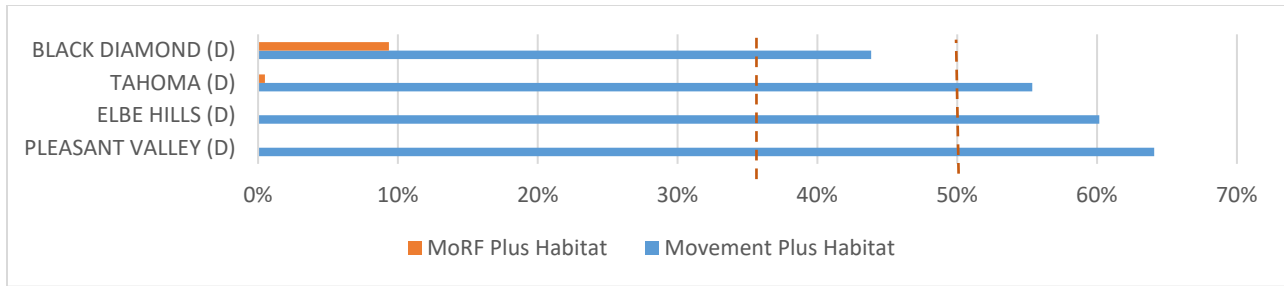


**Figure 2-2: Old Forest and Total Habitat Percentages by SOMU in the OESF HCP Planning Unit as of 6/23/2020.** Dashed lines represent habitat targets. Habitat has been rounded to the nearest percent. Data is from FRIS; beginning in FY 2021, NSO habitat data in the OESF HCP Planning Unit will be derived from RS-FRIS data.

### 2.2.3 South Puget HCP Planning Unit

The South Puget HCP Planning Unit is addressed separately because the requirements for dispersal differs here than elsewhere on the westside. The South Puget HCP Planning Unit has an overall habitat threshold target of 50 percent for each SOMU. Dispersal management areas have an additional target that at least 35 percent of each SOMU will be movement, roosting, and foraging (MoRF) habitat or better (MoRF Plus). The remaining habitat must be Movement habitat or better (Movement Plus). MoRF and Movement are two habitat types specific to dispersal management areas in South Puget HCP Planning Unit SOMUs identified in the 2010 *South Puget HCP Planning Unit Forest Land Plan Final EIS*.

The two NRF management areas within the South Puget HCP Planning Unit share the same habitat targets as other westside NRF management areas. As in Figure 2-2, SOMU habitat percentages are not displayed if they are under 1 percent. Because the Green and Pleasant Valley NRF SOMUs are under 1 percent, Figure 2-3 shows only NSO dispersal management area habitat percentages by SOMU in the South Puget HCP Planning Unit.



**Figure 2-3: MoRF Plus and Total Habitat Percentages by SOMU in the South Puget HCP Planning Unit as of 6/23/2020.** Dashed lines represent habitat targets. Habitat has been rounded to the nearest percent. Beginning in FY 2020, NSO habitat data in the South Puget HCP Planning Unit are derived from RS-FRIS. NRF SOMUs Green and Pleasant Valley are not included here because they are less than 1 percent habitat.

## 2.3 Marbled Murrelet Conservation Strategy

### Appendix: Background on the Marbled Murrelet Conservation Strategy

The Marbled Murrelet Long-Term Conservation Strategy is an Amendment to the 1997 *State Trust Lands Habitat Conservation Plan* (HCP), and replaced the interim marbled murrelet conservation strategy outlined in the HCP (hereafter called MM Amendment; see [Appendix](#) for more background). The MM Amendment was developed in close cooperation with the U.S. Fish and Wildlife Service (USFWS). As part of this process, USFWS issued DNR an amended incidental take permit for the marbled murrelet and other species covered by the amended 1997 HCP.

As previewed in the FY 2019 HCP Annual Report, the Board of Natural Resources (Board) voted to approve the [MM Amendment](#) through [Resolution #1559](#) in December 2019. Following Board approval, DNR began to implement the strategy, including developing administrative procedures, training staff, and developing methods to track and report on implementation.

### 2.3.1 *Habitat Reporting*

As discussed in the MM Amendment (page 19), marbled murrelet “habitat” does not solely include actual nest sites or nest trees and their surrounding forests. Implementation monitoring of the MM Amendment will periodically describe changes in landscape-level habitat conditions. Marbled murrelet reporting will include a summary of the quantity and quality of habitat (P-stage) in occupied sites, occupied site buffers, special habitat areas, and areas of long-term forest cover not included in the previous categories, by HCP planning unit in “gross” and “adjusted” acres (described below). Natural disturbance will be tracked through the reporting of salvage activities, and during the first decade of implementation, DNR will report on “metered” acres (see MM Amendment page 34).

More information is provided below on each of these concepts. For a full description, see the MM Amendment references given in each subsection.

#### *P-Stage*

P-Stage is a habitat classification system used in the development of the Marbled Murrelet Long-Term Conservation Strategy. It assigns a numeric value to forest stands based on the probability of their use by marbled murrelets for nesting. As described in the MM Amendment (page 19), P-stage values are used to represent forest stands that express the likelihood of being occupied by murrelets. P-stage is based on a mathematical model of marbled murrelet nesting habitat as it relates to stand development in natural forests. P-stage attempts to generalize and classify levels of habitat quality as they relate to forest stand characteristics. P-stage is constructed and used in a way that incorporates

the uncertainty between occupancy and actual nest sites. For the MM Amendment, it groups stands with varying probabilities of occupancy into six classes: 0.25, 0.36, 0.47, 0.62, 0.89, and 1.0. Refer to MM Amendment Appendix C, Attachment C-3 for a detailed description of the P-stage model.

#### *Adjusted Acres*

Adjusted acres refers to a quantity of marbled murrelet habitat (P-stage, in acres) that has been discounted or “adjusted” for factors that can reduce the benefit of that habitat to murrelets (see MM Amendment page 21) – for example, whether the acres are close to a forest edge that can attract predators, whether the acres are near or far from occupied sites, and whether the habitat is subject to disturbance.

Total “gross” or “raw” acres of habitat with P-stage values are estimated using DNR forest inventory. The total raw acres within each P-stage category (0.25, 0.36, 0.47, 0.62, 0.89, and 1.0) are then multiplied by their respective P-stage values, converting them to “adjusted acres,” which incorporates habitat quantity and quality, including edge effects, into one unit of measurement.

#### *Long-term Forest Cover*

Long-term forest cover (LTFC) refers to lands on which DNR maintains and grows forest cover for conservation purposes, including habitat conservation for the marbled murrelet, through the life of the HCP. MM Amendment Appendix C, Attachment C-4 provides a focus paper covering LTFC in depth. LTFC includes both murrelet-specific conservation areas and other areas that have multiple conservation objectives. All areas of long-term forest cover outside of occupied sites, occupied site buffers, and special habitat areas are referred to as “other LTFC.” Some elements of other LTFC have been verified in the murrelet GIS layer and do not need to be verified on the ground. These elements will be updated periodically when the marbled murrelet GIS layer is updated, and include:

- Natural Area Preserves and Natural Resources Conservation Areas
- High-quality northern spotted owl habitat, including Old Forest Habitat in the Olympic Experimental State Forest as of November 2018
- Gene pool reserves
- Field-verified old growth
- The following field-verified elements of State Lands (local) Knowledge GIS layer: balds, caves, cliffs, talus slopes, wetlands

Remaining elements of other LTFC need to be verified on the ground. LTFC associated with riparian areas, wetlands, and unstable slopes are examples requiring field inspections to verify boundaries.

#### *Occupied Sites and Buffers*

Occupied sites are habitat patches of varying size in which murrelets are assumed to nest, based on field observations. The MM Amendment (page 26), further clarifies that “occupied sites” means those sites that were delineated by the Science Team and described in Section 2.1 of the FEIS and are depicted in MM Amendment Appendix B, Figure B-2. Occupied sites are recorded in the DNR marbled murrelet GIS layer. Based on the Science Team-delineated marbled murrelet occupied sites, there are 59,331 acres within 388 occupied sites.

As outlined in the MM Amendment (page 27), a 328-foot (100-meter) buffer is placed on the outer extent of all occupied sites. This buffer is recorded in the DNR marbled murrelet GIS layer. The MM Amendment establishes 32,777 acres of buffer around the 388 occupied sites.

### *Special Habitat Areas*

Special habitat areas (SHAs) are designed to increase marbled murrelet productivity by reducing edge and fragmentation (see MM Amendment page 28). Special habitat areas that do not contain occupied sites contain high-quality, current and modeled future murrelet habitat, and non-habitat that may function as security forest. As mentioned in the MM Amendment (page 30), security forest protects habitat from deleterious edge effects, including microclimate change, windthrow, predation, and disturbance.

The SHA network comprises 20 areas that together include 46,925 acres, and all but one of the SHAs contain at least one occupied site (see MM Amendment page 29). SHAs range in size from 338 acres to 7,549 acres and average 2,346 acres (see MM Amendment, Appendix A, Table A-6). Occupied sites and current habitat comprise 28,823 acres of the total acres within SHAs, another 5,052 acres is future habitat, and all but 1,014 acres of the remaining acreage is either security forest or future security forest.

### *Metered Acres*

As outlined in the MM Amendment (page 32), DNR will delay (or “meter”) harvest of 5,000 adjusted acres of marbled murrelet habitat that would otherwise be authorized to harvest, until the end of the first decade of implementation following the adoption of the MM Amendment (December 3, 2029). Metering was established to maintain habitat capacity while additional habitat develops under the MM Amendment. The specific location and quality of habitat to be metered will be determined at DNR’s discretion as outlined in the MM Amendment (page 32).

## **2.3.2 Implementation**

DNR will implement the MM Amendment in two phases. During Phase One, DNR will initially limit some of the flexibility provided in the MM Amendment to allow the development of a detailed implementation procedure and conduct staff training on implementation specifics. Implementing in phases also provides DNR and the trust beneficiaries and stakeholders time to become familiar with the LTCS approach and concepts before moving into full implementation.

Full implementation occurs in Phase Two. Activities that may be allowed in Phase Two with timing restrictions, consultation with USFWS, and/or other requirements are not encouraged during Phase One, without deliberate coordination. Although DNR has more flexibility in Phase Two, activities in occupied sites, occupied site buffers, SHAs, and other LTFC will still be limited.

Management activities are limited in areas being managed for conservation in order to minimize disturbance. Some management activities will result in limited harvest of murrelet habitat (P-stage) and, as outlined above, DNR has a budgeted number of acres allocated to these activities in the MM Amendment over the next 50 years.

Table A-4 of the MM Amendment (page A-5) describes the activities allowed and not allowed in the various habitat categories. Allowed activities typically must be performed during limited operating periods if undertaken during the murrelet nesting season, impacts to platform trees must be avoided when possible, and road reconstruction and maintenance must meet Washington State Forest Practices road standards.

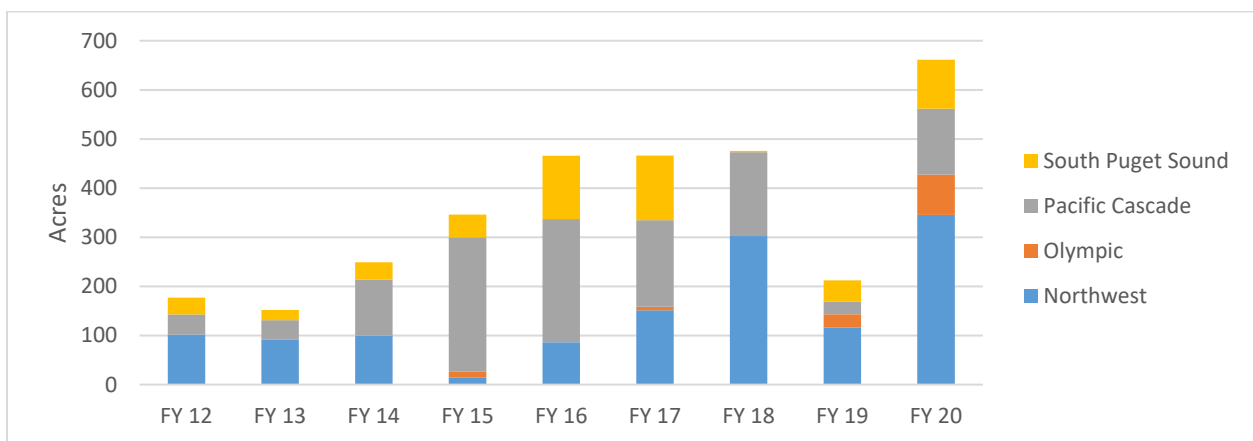
## **2.4 Riparian Conservation Strategy**

[Appendix: Background on the Riparian Conservation Strategy](#)



Restoration treatments in riparian management zones are conducted under guidance of the [Riparian Forest Restoration Strategy \(RFRS\)](#), the 2006 implementation procedures for the HCP Riparian Conservation Strategy. The RFRS applies to all westside planning units except the OESF and is implemented in concert with the timber sales program. Riparian restoration treatments are designed to provide growing space to encourage more complex stand structure, maintain overstory tree growth, enhance understory development, and provide large wood to streams. DNR tracks timber sales that include RFRS treatments to ensure that stand conditions are appropriate for treatment and to better understand the role of active management in meeting the long-term riparian habitat restoration goals outlined in the HCP.

Figure 2-4 shows the estimated acreage treated under the RFRS by DNR region. Since 2012, more than 2,500 acres have been treated to accelerate development of complex forest structure. DNR does not track riparian stands that would benefit from restoration but where the RFRS was not applied due to stand conditions or operational infeasibility.



**Figure 2-4. Estimated Acreage of RFRS Treatments by Region.** Data for Olympic Region excludes the OESF, where the RFRS does not apply. Acreage for FY 2020 was derived from LRM and reflects RFRS treatments associated with timber sales that were sold in FY 2020.

For FYs 2012-2018, acreage was reported using data from NaturE and Planning and Tracking (P&T), DNR’s financial management and previous forest management tracking software, respectively. Beginning in FY 2019, acreage is reported using data from Land Resource Manager (LRM), DNR’s forest management tracking system that replaced P&T. LRM is better equipped to track RFRS treatments.

Note that acreage data for FY 2020 reflects RFRS treatments associated with timber sales completed in FY 2020. This is consistent with DNR’s timber sales program, which reports volume of timber sold (rather than planned volume or volume of timber removed) to evaluate progress towards sustainable harvest targets.

## 2.5 Multispecies Conservation Strategy

The multispecies conservation strategy involves identification and protection of uncommon habitat types for unlisted species. These habitat types include caves, cliffs, talus slopes, wetlands, balds, mineral springs, snags, oak woodlands, and large structurally unique trees. These uncommon habitats provide nesting, roosting, hiding, and foraging opportunities for many species. No tracking is required for this conservation strategy and implementation is conducted through the [Implementation Monitoring](#) program. No changes or updates were made to this conservation strategy in FY 2020.

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## 3.0 Adaptive Management

### [Appendix: Background on Adaptive Management](#)

In FY 2020, the DNR State Lands Adaptive Management Program continued to develop links between scientific research and management. Several projects were published in technical reports and peer-reviewed journals (see [Publications](#) section). Findings from recently completed projects were presented at the State Lands Adaptive Management Committee meeting in April 2020.

The OESF adaptive management process, which is described in an administrative procedure adopted after the publication of the [OESF Forest Land Plan](#), describes how DNR managers and scientists will identify priority research projects and report project findings and their management implications. The OESF Adaptive Management Advisory Group met in early FY 2020 (fall of 2019) to strategize how the treatments of the T3 Watershed Experiment (see [Research](#) section) will meet DNR management needs. OESF Advisory Group members continue to work with project researchers on this topic.

## 3.1 Implementation Monitoring

### [Appendix: Background on Implementation Monitoring](#)

State lands managed by DNR are subject to complex forest management strategies necessary to achieve a variety of habitat conservation commitments. The objectives of the Implementation Monitoring Program are to confirm that these strategies are appropriately implemented, identify areas for continuous improvement, and respond to changing conditions and new information. DNR managers and field staff use the implementation monitoring findings to improve practices and reduce inconsistencies on the ground.

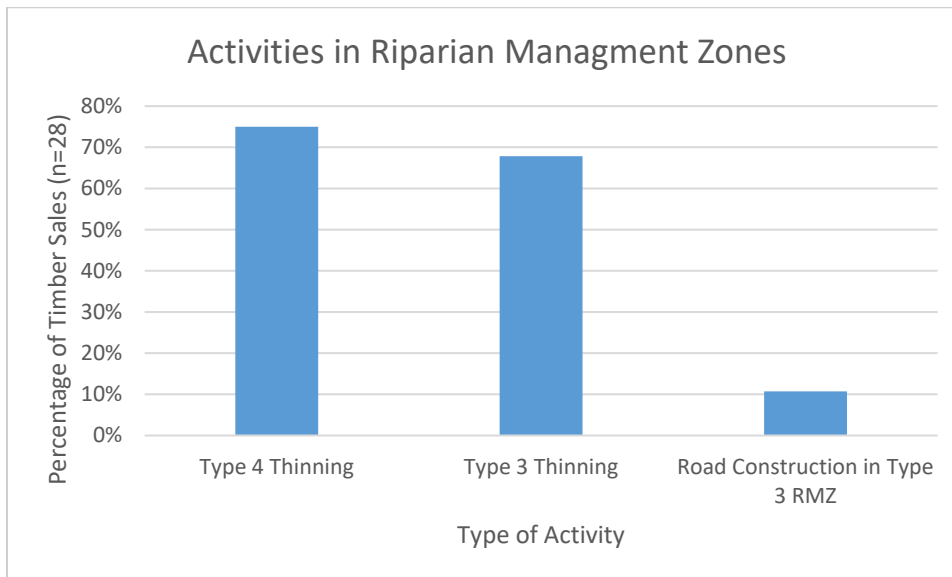
Implementation monitoring work in FY 2020 focused on documentation review of HCP conservation strategy component implementation. Results from this work will be used to inform future monitoring projects. A secondary screening of timber sales for specific components of the [Implementation Procedures for the Habitat Conservation Plan Riparian Forest Restoration Strategy](#) was also conducted to inform future monitoring efforts related to RFRS. Monitoring staff have also reviewed documentation in the past to help inform strategy implementation frequency and conservation strategy components that field monitoring projects should prioritize. It can also be used to identify timber sales that require field verification of appropriate strategy implementation.

For the overall strategy implementation review, all timber sales sold in FY 2020 (July 1, 2019, to June 30, 2020) in the six westside HCP planning units (Columbia, North Puget, OESF, South Puget, South Coast, and Straits) were included. Conservation strategy implementation data for each timber sale with an accompanying HCP checklist (104 timber sales) were entered into a database and summarized in Table 3-1. Strategy component implementation frequency from previous office reviews is provided for comparison with the 2020 frequencies. As can be seen in Table 3-1, recent conservation strategy component implementation frequency is fairly consistent with past implementation frequency.

**Table 3-1. Frequency of HCP conservation strategy component implementation.**

HCP Conservation Strategy/Component	Number of Timber Sales	% of Total Fiscal Year 2020 Timber Sales	% of Timber Sales Previous Fiscal Years*
Potentially Unstable Slopes	92	88%	63%
Hydrologic Maturity in the Rain-on-Snow Zone	27	26%	19%
Unmanaged Riparian Management Zone	100	96%	93%
Enhancement Activity in Riparian Management Zone	28	27%	24%
Unmanaged Wetland Management Zone	47	45%	46%
Enhancement Activity in Wetland Management Zone	24	23%	19%
Activity in Northern spotted Owl Management Area	13	13%	12%
Large, Structurally Unique Trees	100	96%	91%
Balds	9	9%	6%
Caves	2	2%	2%
Cliffs	10	10%	12%
Talus	4	4%	3%
Northern goshawk	1	1%	0%
*Previous results from 7/1/2013 to 4/20/2016			

The RFRS contains procedures for forest management activities in riparian management zones (RMZs). These procedures include mitigation requirements for tree removal associated with road-building activities (see [2016 Implementation Monitoring Report](#) for more details) through the inner zones of Type 3 (Type F) streams as well as stipulations for habitat enhancement treatments in Type 3 and Type 4 (Type Np, Non-fish bearing perennial) streams. HCP checklists from 28 timber sales indicated that restoration activities were occurring in RMZs associated with the sale. A review of the Forest Practices Application riparian addendum was conducted to discern the specifics of the riparian enhancement activity and any associated road activities through Type 3 stream RMZs (see Figure 3-2). Out of the 28 sales reviewed, 13 had both a Type 3 and Type 4 riparian thinning occurring. Road construction through Type 3 streams was uncommon and was associated with timber sales that had a Type 3 thinning.



**Figure 3-2. Summary of timber sales receiving Type 4 riparian thinnings, Type 3 riparian thinnings, and/or road construction through Type 3 RMZs.**

## 3.2 Effectiveness Monitoring

### [Appendix: Background on Effectiveness Monitoring](#)

The HCP requires DNR to conduct effectiveness monitoring to determine whether implementation of the conservation strategies results in anticipated habitat conditions. Effectiveness monitoring is intended to document changes in habitat conditions, including general forest structure, specialized habitat features, and northern spotted owl prey populations following timber harvest and other forest management activities. Over time, the results from this effectiveness monitoring may be used to modify management practices to enable DNR to better manage land in accordance with the conservation objectives described in the HCP. This section includes annual updates on the effectiveness monitoring programs for northern spotted owl (NSO) habitat, aquatic and riparian habitat in the OESF, and riparian silviculture.

#### **3.2.1 Northern Spotted Owl Effectiveness Monitoring Program**

The NSO Effectiveness Monitoring Program evaluates changes in habitat, including forest structure and specific habitat features, that result from timber harvest and other management activities carried out under the HCP. The status of the two primary components of this program through FY 2020 is noted below.

##### *Long-term tracking of the effects of variable density thinnings on improving habitat structure in stands designated as NSO habitat*

The first component of this program was initiated in 2004-2007 across five variable density thinning units in the North Puget (Whitehorse Flat timber sale), South Puget (Big Beaver and Cougarilla timber sales), Columbia (Lyons Share timber sale), and Klickitat (Loop timber sale) HCP planning units. The study design included two or three replications of treated stands and one untreated control stand at each site. All stands were measured prior to and immediately after treatment.

Between 2013 and 2015, the five- to seven-year re-measurement of all five permanent plots was conducted. Data analysis is currently underway to compare various metrics – such as tree density, canopy closure and cover, snags, and down wood – to measurements taken before and immediately after treatment. The final stage of this analysis involves processing historic aerial images to produce PhoDAR-based metrics of canopy cover for the pre- and post-treatment measurements. This will allow for consistent comparison of canopy cover and closure between the pre- and post-treatment measurements, and the five- to seven-year re-measurement.

In future years, DNR intends to identify additional effectiveness monitoring sites in stands classified as “next-best” NSO stands using Remote-Sensing Forest Resource Inventory System (RS-FRIS) data, with the objective of identifying variable density thinning treatments that accelerate stand trajectory from next-best to habitat.

##### *Landscape-scale monitoring of basic habitat indicators across the entire westside HCP land base*

The objective of this project is to determine whether broad-scale trends in basic habitat features such as tree height, mean tree size, and canopy layering appear to be meeting HCP goals. To accomplish this, DNR is using multiple datasets to cover all forestland in Pacific Coast states. Preliminary results suggest that on lands managed with conservation objectives in addition to economic objectives, the amount of large/complex forest structure is increasing since the signing of the HCP, a distinct change

in trend from the years prior to the HCP. Results for this project will be updated upon release of additional data that use a newer method and include additional years.

In addition to the monitoring activities described above, DNR is also conducting two research projects related to NSO effectiveness monitoring (Mind the Gap, and Westside Individuals, Clumps, and Openings). More information about both projects can be found in the [Research](#) section.

### **3.2.2 Status and Trends Monitoring of Riparian Habitat in the OESF**

The key objectives of the Status and Trends Monitoring Program are to provide empirical data to evaluate progress in meeting the HCP riparian conservation objectives and to reduce uncertainties around the integration of habitat conservation and timber production. The study's main hypothesis is that implementation of the HCP riparian conservation strategy for the OESF allows natural processes of ecological succession and disturbance to improve habitat conditions across managed watersheds over time.

In FY 2020, DNR and collaborators from the U.S. Forest Service (USFS) Pacific Northwest Research Station continued field sampling and data management for nine habitat indicators, including riparian vegetation, stream temperature, stream shade, stream channel morphology, and in-stream wood. Automated stream flow monitoring stations recording continuous flow measurements at 10 different streams were maintained and calibrated. The project team collaborated with a University of Washington post-doctoral researcher to analyze groundwater contributions to the monitored streams using an innovative approach based on our water and air temperature data.

### **3.2.3 Riparian Silviculture Effectiveness Monitoring Program**

The objective of the DNR effectiveness monitoring program for riparian silviculture is to determine whether various restoration thinning treatments are resulting in riparian habitat conditions that support salmon recovery efforts and contribute to the conservation of other riparian and aquatic species. Thinning treatments are consistent with the RFRS and are applied in riparian management zones in cooperation with the DNR timber sales program.

The effectiveness monitoring program uses an active study approach in which habitat metrics are measured before and after treatment. Treatments consist of thinning to Curtis relative density 40 (RD40) or 50 (RD50), thinning to RD50 with intentional canopy gaps (RD50 gap), or no thinning (REF). DNR established six monitoring sites between 2003 and 2008 in the OESF, South Puget, and North Puget HCP planning units. To assess changes in riparian habitat conditions, habitat metrics are measured at each monitoring site prior to harvest, after harvest, and periodically thereafter. A sampling history of the monitoring sites is included in Table 3-2.

**Table 3-2: Treatment Summary and Sampling History of Riparian Silviculture Effectiveness Monitoring Sites.**

Site/Timber Sale Name	Planning Unit	Treatments	Year Measured		
			Pre-treatment	Post-treatment	Latest Re-measurement
H1320	OESF	RD40, RD50, REF	2003	2006	2015
Salmon PC	OESF	RD40, RD50, REF	2004	2008	2013
Cougarilla	South Puget	RD40, RD50, RD50 gap, REF	2006	2008	2016
Big Beaver	South Puget	RD40, RD50, RD50 gap, REF	2006	2008	2016
Sumas Pass	North Puget	RD40, RD50, REF	2008	2013	2017
Pink Flamingo	North Puget	RD40, RD50, REF	2008	2010	2017

Several datasets have been prepared for analysis. These datasets include measurements of various habitat metrics, such as downed wood, and overstory and understory structure and composition. DNR scientists are currently organizing the existing data and exploring options for re-measurement of these sites. The program plans to develop a report and present findings following analysis.

### 3.3 Validation Monitoring

#### [Appendix: Background on Validation Monitoring](#)

The riparian validation monitoring program (RVMP) was formed to test the hypothesis that forest management practices implemented under the HCP will restore and maintain habitat capable of supporting viable salmonid populations within the OESF. If negative trends are detected in salmonid conditions (abundance, biomass, species composition, age structure, and number of spawning redds), monitoring will then seek to evaluate cause-and-effect relationships between DNR management activities, riparian habitat, and salmonids. Once underlying mechanisms are understood, DNR may use this information to adapt its management practices.

The RVMP uses an observational study approach to monitor 50 Type-3 watersheds within the OESF and 10 reference watersheds in the OESF, Olympic National Park, and Olympic National Forest. These 60 watersheds are the same watersheds used in the DNR Status and Trends Monitoring of Riparian and Aquatic Habitat Program. As not all of the 60 watersheds can be sampled within one summer, 20 watersheds are sampled annually (annual panel), while an additional 20 watersheds per year are sampled on a two-year rotation (even and odd years). In addition, a section of the Clearwater River, a Type-1 stream, is snorkel-surveyed to assess DNR management on some of the larger streams of the OESF.

In FY 2020, the lead of the RVMP, fish biologist Kyle Martens, continued to work on the Technical Review Group of the [Quinault Indian Nation Lead Entity](#), a group that coordinates salmon habitat restoration on the western Olympic Peninsula. As part of the Technical Review Group, the RVMP provides scientific expertise to inform and prioritize potential restoration projects.

The RVMP also completed fieldwork focusing on three primary efforts:

1. Multiple-pass removal of resident and juvenile salmonid abundance sampling in the annual and odd-year panel of watersheds (Figure 3-3);
2. Adult coho redd surveys in the annual panel as a measure of adult abundance;
3. Snorkeling and habitat surveys over a 12-kilometer stretch of the Clearwater River.

Monitoring has shown that fish populations have been trending upward within the annual panel of watersheds, primarily driven by age-0 trout. Age-1 or older coastal cutthroat trout and coho salmon have remained fairly stable. Overall, there have been large yearly and site variations in juvenile salmonid populations, showing the need for continuous (both annual and long-term) sampling to help separate fish responses between these natural variations and habitat responses. As sampling continues and more data becomes available, we are better suited to distinguish differences in management-related habitat changes from natural year-to-year variability in fish abundance and biomass (possibly associated with adult returns or seasonal weather trends). These patterns will be crucial for understanding the effects of DNR management on salmonid populations



**Figure 3-3: Juvenile Cutthroat Trout Collected From a Stream in the OESF.** Photo courtesy of Kyle Martens.

Again in FY 2020, the RVMP collaborated with the Status and Trends Monitoring Program to assess the effects of 18 years of passive restoration on riparian forests under implementation of the HCP. The study was published in the journal *Environmental Management*, and more information can be found in the [Status and Trends Monitoring](#) section.

More information on the RVMP can be found in the [2018 ArcGIS story map](#), [2016-2018 RVMP Status Report](#), and feature article in a recent edition of *The Learning Forest*.

### 3.4 Research

DNR continually conducts research on its forestlands to better understand how forest management practices affect habitat conditions and forest productivity. This section describes DNR research projects on HCP-covered lands that address the three research priorities defined in the HCP (p. V.6):

- **Priority 1 Research** is “research that is a necessary part of a conservation strategy.”
- **Priority 2 Research** is “research needed to assess or improve conservation strategies or to increase management options and commodity production opportunities.”
- **Priority 3 Research** is “research needed to improve general understanding of the animals, habitats, and ecosystems addressed by the HCP.”

Table 3-3 summarizes DNR research projects on HCP-covered lands and the priorities they address. Some projects address multiple research priorities and monitoring commitments. More information on each project is included below the table.

**Table 3-3: DNR’s Research and Monitoring Projects on HCP-Covered Lands.**

Project	Priority			Monitoring
	1	2	3	
A Rare Opportunity: Gaining Insights into Current and Future Forest Resilience to Wildfire in the Western Cascade Mountains			x	
Eastside NSO Habitat and Fire Risk Evaluation	x	x		
eDNA Research in OESF			x	x
Experiment in Long-Term Ecosystem Productivity		x	x	
Influence of Repeated Alternative Biodiversity Thinning on Young Stand Development Pathways		x		
Landscape-Scale Effectiveness Monitoring of Western Washington HCP Lands		x		x
Large-Scale Integrated Management Experiment on the OESF	x	x	x	x
Mind the Gap		x		
NSO Effectiveness Monitoring	x	x		x
Riparian Silviculture Effectiveness Monitoring	x	x		x
Riparian Validation Monitoring	x	x	x	x
Status and Trends Monitoring of Riparian and Aquatic Habitat on the OESF	x	x	x	x
Tracking Natural Tree Regeneration in Eastern Washington Forests Following Large Wildfires			x	
Using Passive Acoustic Monitoring to Evaluate Sustainability of Forest Management			x	x
Westside Individuals, Clumps, and Openings		x	x	

**A Rare Opportunity: Gaining Insights into Current and Future Forest Resilience to Wildfire in the Western Cascade Mountains:** The Norse Peak Fire burned more than 50,000 acres near Mount Rainier National Park in 2017 — one of the largest fires affecting the West Cascades since the early 1900s. This event provides a unique opportunity to enhance knowledge of fire ecology in forest types commonly found on DNR-managed land on the westside, and track how these systems are affected by increasing disturbance and a warming climate. The objectives of the study are twofold:

1. Examine landscape patterns of burn severity in the Norse Peak Fire and compare them to regional historical fire regimes.
2. Test how post-fire vegetation responds to the interaction of burn severity and past disturbance history (including forest management) under a warming climate.

To date, researchers have established and collected data in 56 2.5-acre permanent plots. Data collected includes tree overstory conditions, post-fire seedling regeneration, and understory response. Data will be analyzed during the winter and spring of 2022 to address questions pertaining to forest resilience and recovery across different fire severities, pre-fire stand structures, and forest zones. Researchers will also examine above-ground carbon changes due to fire, develop a natural range of variability in complex early-seral conditions, and identify locations where huckleberry (an important



species for tribes) is more or less likely to persist and positively respond to wildfire. This research is being conducted in collaboration with the University of Washington and Mount Baker-Snoqualmie National Forest. For more information, contact Joshua Halofsky: [Joshua.Halofsky@dnr.wa.gov](mailto:Joshua.Halofsky@dnr.wa.gov).

**Eastside NSO Habitat and Fire Risk Evaluation:** This project is assessing historic, current, and future NSO habitat across all available lands in the eastern Washington Cascades. DNR hopes to answer two fundamental questions:

1. How much late-successional, complex-structure habitat can likely be sustained in these fire-prone landscapes?
2. Where on the landscape is such habitat most likely to develop and persist the longest?

Results from this project will help the agency determine the degree to which the current approach for managing eastside NSO habitat under the HCP is likely to be sustainable for the life of the HCP. This research will also help inform other DNR priorities, such as sustainable harvest calculations and forestland planning efforts. To examine question 1, researchers have analyzed nearly 300,000 acres of DNR's original mapped inventory (circa 1960) to estimate potential NSO habitat abundance in the near past. As a second line of evidence, DNR has also conducted extensive modeling to estimate likely ranges in historical NSO abundance prior to Euro-American settlement. To answer question 2, researchers examined over 200 known NSO nest site locations using LiDAR to better understand how the amount and configuration of habitat used by nesting owls differ from locations where owls are not known to nest. This analysis was used to derive a NSO structural suitability map.

Concurrently, researchers also developed maps representing current forest zones, and how those forest zones shift under climate change. Once combined, the two maps will identify locations where the structures and types of forest used by NSO are likely to persist through mid-century, areas that are currently habitat but are less likely to persist, and areas that are not currently habitat but are more likely to become habitat in the future. This project is a collaboration between DNR, UW, and USFS. Two manuscripts from this project will be submitted to peer-reviewed journals by spring of 2022. For more information, contact Joshua Halofsky: [Joshua.Halofsky@dnr.wa.gov](mailto:Joshua.Halofsky@dnr.wa.gov).

**eDNA Research in the OESF:** Many aquatic species that occupy streams of the OESF are found in low densities and are often difficult to detect. In 2016 and 2017, DNR's Riparian Validation Monitoring program partnered with the USFS Pacific Northwest Research Station to collect water samples for environmental DNA (eDNA) analysis. By filtering water in streams of the OESF, researchers can identify the DNA left behind by the aquatic species that recently occupied or currently occupy each stream. Data from eDNA analyses, along with DNR fish abundance data, may help to develop tools for understanding the presence, abundance, and genetic variability of multiple aquatic species including fish, amphibians, and macroinvertebrates. In addition, results from this work will help DNR better understand the aquatic communities that occupy streams of the OESF. Data from this project are currently being analyzed by the USFS with the hope of developing a manuscript in the near future. For more information, contact Kyle Martens: [Kyle.Martens@dnr.wa.gov](mailto:Kyle.Martens@dnr.wa.gov).

**Experiment in Long-Term Ecosystem Productivity:** Models suggest that intensively harvested conifer plantations experience long-term degradation of productivity due to a slow drain of nutrients, especially nitrogen. This project, a collaborative effort between the Pacific Northwest Research Station, Oregon State University, the University of Washington, Western Washington University, and DNR, tests the influence of stand composition and the level of wood removal on tree and soil productivity, soil structure, and plant species diversity. The cooperative, multiple-decade study has been replicated at four sites in the Pacific Northwest: three national forests in Oregon (Willamette,

Siskiyou, and Siuslaw) and the OESF. The OESF permanent plot installation in Sappho was established in 1995 and was re-measured in 2000 and 2016. A summary of this project is available on the [OESF webpage](#). For more information, contact Teodora Minkova: [Teodora.Minkova@dnr.wa.gov](mailto:Teodora.Minkova@dnr.wa.gov).

### **Influence of Repeated Alternative Biodiversity Thinning on Young Stand Development**

**Pathways:** This project was initiated in the late 1990s and stemmed from DNR’s interest in testing pre-commercial thinning (PCT) as a way to set young stands on development pathways to increase forest structural complexity and habitat diversity. In 1998, five treatments were replicated at five sites on the OESF. Treatments included one control plus two different densities of PCT with or without the addition of gaps (Figure 3-4). In 2017, the sites were thinned again and additional gaps installed to explore the influence of gap timing on structural complexity. Information gained from this project will inform agency decisions about the value of different treatment options in meeting multiple management objectives under the biodiversity pathways approach. As of 2020, this research is ongoing and a summary of this project is available on the OESF webpage. For more information, contact Warren Devine: [Warren.Devine@dnr.wa.gov](mailto:Warren.Devine@dnr.wa.gov).



**Figure 3-4: Understory Vegetation Community in a Young Stand in the OESF.** This stand was pre-commercially thinned in 1998 and gaps were created to foster development of structural complexity and habitat diversity. Photo courtesy of Richard Bigley.

**Landscape-Scale Effectiveness Monitoring of Western Washington HCP Lands:** The goal of this project is to determine how landscape-scale habitat conditions have changed since the implementation of the HCP. More information can be found in the [NSO Effectiveness Monitoring](#) section. For more information, contact Daniel Donato: [Daniel.Donato@dnr.wa.gov](mailto:Daniel.Donato@dnr.wa.gov).

**Large-Scale Integrated Management Experiment on the OESF (T3 Watershed Experiment):** In FY 2020, DNR and ONRC collaborated with the U.S. Forest Service Pacific Northwest Research Station, Washington State University, and NOAA Fisheries to develop a study plan for the riparian component of the experiment. The plan was peer reviewed. Five different riparian treatments will be tested and compared across the 16 experimental watersheds. Pre-treatment monitoring started at two stream reaches in each watershed for a total of 32 riparian monitoring sites. The protocols include sampling of stream habitat characteristics, fish, and riparian vegetation. DNR, Olympic Natural Resources Center and external collaborators started development of a study plan for the uplands with several treatments expected to be implemented through timber harvest on up to 13 percent of the watershed area.

Legislative funding for partial implementation of the project was secured for FY 2020 and FY 2021. Fully funding the monitoring, analyses, stakeholder participation, and other project costs continued to be a challenge in 2020, and DNR and UW are exploring multiple grants and collaborative opportunities. For more information, contact Teodora Minkova: [Teodora.Minkova@dnr.wa.gov](mailto:Teodora.Minkova@dnr.wa.gov).

**Mind the Gap:** The goal of this DNR-funded project is to better match silvicultural gap treatments with the late-successional forests they aim to emulate. This study has three phases:

- Phase I: A retrospective study of 10-year-old silvicultural gaps.
- Phase II: An observational study of natural gap structures in primary (never managed) old-growth forests, which will establish critical reference information.
- Phase III: A replicated silvicultural experiment to test novel gap treatments (informed by the structures found in primary forests) within a variable density thinning treatment.

DNR is tracking tree recruitment, understory vegetation response, branching/crown responses, decadence (dead wood) creation around gap edges, and post-treatment dynamics of gap contraction and expansion (i.e., blowdown). Results from this study are relevant to providing structural diversity and habitat in managed forests. The project was initiated and peer-reviewed in 2014, with data collection for Phase I completed that summer. Data analysis for Phase II is ongoing, including high-resolution LiDAR processing, gap delineation, field validation, and spatial analyses. Thinning treatments and pre- and post-treatment measurements have been conducted for Phase III. This study is now in a waiting period until the next set of measurements are taken, which are planned for 5-10 year intervals. A summary of this project is available on the [OESF webpage](#). For more information, contact Daniel Donato: [Daniel.Donato@dnr.wa.gov](mailto:Daniel.Donato@dnr.wa.gov).

**NSO Effectiveness Monitoring:** The NSO Effectiveness Monitoring Program evaluates whether the HCP strategies and associated silvicultural treatments maintain or enhance NRF and dispersal habitat. More details can be found in the [NSO Effectiveness Monitoring](#) section. For more information, contact Daniel Donato: [Daniel.Donato@dnr.wa.gov](mailto:Daniel.Donato@dnr.wa.gov).

**Riparian Silviculture Effectiveness Monitoring:** Since 2006, DNR has documented site responses to silvicultural treatments designed to meet the management objectives specified in the RFRS. More details about this ongoing research can be found in the [Riparian Silviculture Effectiveness Monitoring](#) section. For more information, contact Daniel Donato: [Daniel.Donato@dnr.wa.gov](mailto:Daniel.Donato@dnr.wa.gov).

**Riparian Validation Monitoring:** The RVMP determines whether DNR's current forest management practices restore and maintain habitat capable of supporting viable salmonid populations. A summary of this work can be found in the [Validation Monitoring](#) section. For more information, contact Kyle Martens: [Kyle.Martens@dnr.wa.gov](mailto:Kyle.Martens@dnr.wa.gov).

**Status and Trends Monitoring of Riparian and Aquatic Habitat on the OESF:** This project evaluates changes to riparian and aquatic habitat conditions in managed watersheds of small fish-bearing streams across the OESF. More details on this work can be found in the [Effectiveness Monitoring](#) section. For more information, contact Teodora Minkova: [Teodora.Minkova@dnr.wa.gov](mailto:Teodora.Minkova@dnr.wa.gov).

**Tracking Natural Tree Regeneration in Eastern Washington Forests Following Large Wildfires:** Between 2012 and 2015, more than 2.1 million acres burned in Washington, primarily east of the Cascade crest. Most projections suggest fire activity will increase and catalyze ecosystem change under a warming climate. Limited reforestation funds and the expanding burn acreage means that natural regeneration will determine the capacity of many eastside forests to provide goods, services, and management options over the long term. DNR is conducting one of the first regionwide studies of post-fire regeneration in eastern Washington, focusing on all large fires on public forestlands that burned during 2012-2017. The project objectives are to quantify the rate, density, and composition of tree and non-tree vegetation regeneration as influenced by burn severity and environmental setting, and to evaluate the potential for regeneration failure in warm, dry sites near the lower treeline. The study was initiated in 2016 with the establishment of approximately 60 field plots. Fifty additional plots were established in 2017, and another 80 plots were established in 2018.

Plot establishment will continue through 2022, with a plan to monitor plots at 5-10 year intervals. For more information, contact Daniel Donato: [Daniel.Donato@dnr.wa.gov](mailto:Daniel.Donato@dnr.wa.gov).

**Using Passive Acoustic Monitoring to Evaluate Sustainability of Forest Management:** This project assesses the response of indicator bird species to habitat changes caused by forest management. Results will help DNR compare the effectiveness of current upland habitat



**Figure 3-5: Acoustic recording unit is installed as part of the Passive Acoustic Monitoring Study.** Photo courtesy of Teodora Minkova.

conservation strategies to alternative approaches. The study is implemented across the 16 watersheds designated for the Large-Scale Integrated Management Experiment described above. The [study plan](#) was developed and peer reviewed in 2020. The project is partially funded by a grant from the EarthWatch Institute and includes a citizen science component: Researchers worked with volunteers to collect and analyze sound recordings of 10 indicator bird species and conduct forest habitat surveys. Sites in a variety of forest developmental stages ranging from early seral to old-

growth will be sampled in each watershed before and after treatment, and occupancy models will be developed for the indicator bird species. DNR researchers and Omfinsient Consulting managed to establish 213 recording stations and collect 10 days of acoustic data each (Figure 3-5). For more information, contact Teodora Minkova at [teodora.minkova@dnr.wa.gov](mailto:teodora.minkova@dnr.wa.gov).

**Westside Individuals, Clumps, and Openings:** Adapting recently developed methods for restoration thinnings on the eastern slopes of the Cascades, this study aims to characterize patterns of stems in old forest reference stands (focusing on known NSO nest sites and territories) and evaluate the degree to which these patterns can be emulated in variable density thinning treatments. Stems in three pilot early old-growth stands and three thinned second-growth stands in westside planning units have been mapped; other qualified stands are being sought. DNR is conducting this project in partial collaboration with University of Washington. For more information, contact Daniel Donato: [Daniel.Donato@dnr.wa.gov](mailto:Daniel.Donato@dnr.wa.gov).

## 3.5 OESF Research and Monitoring Program

### *Appendix: Background on the Research and Monitoring Program*

In FY 2020, the OESF Research and Monitoring Program continued implementing two HCP monitoring projects ([Status and Trends Monitoring of Aquatic and Riparian Habitat](#) and [Riparian Validation Monitoring](#)), started implementing the T3 Watershed Experiment, a [large-scale integrated management experiment](#) in cooperation with University of Washington's Olympic Natural Resources Center (ONRC), and continued the implementation of two research projects: Passive Acoustic Monitoring to Evaluate Sustainability of Forest Management and Cable-Assisted Logging System Experiment. Information about these projects can be found in the [Research](#) section of this report and on the [OESF webpage](#).



**Figure 3-6: DNR field technicians working during the COVID pandemic.**

Photo courtesy of Teodora Minkova.

Despite the COVID-19 pandemic, DNR researchers and field staff were able to complete most of the planned work flowing federal, state, and DNR agency safety protocols (Figure 3-6).

The fourth annual OESF Science Conference planned for April 2020 was canceled due to public gathering restrictions imposed by COVID safety protocols.

The OESF Research and Monitoring Program and the ONRC continued to publish the joint biannual electronic newsletter *The Learning Forest* in the spring and fall. All issues are available on the [OESF website](#). The publication is distributed to the internal networks of DNR and UW, and an additional 200 email subscribers.

In FY 2020, the program secured three external sources of funding to support several research projects on the Olympic Peninsula: a three-year grant from the Earthwatch Institute to conduct passive acoustic monitoring by engaging volunteers to collect field data; legislative funding for FY 2020 and FY 2021 to coordinate with ONRC on four research projects; and one year of funding through the Good Neighbor Authority agreement between DNR and the U.S. Forest Service to conduct stream monitoring.

## 3.6 Publications and Presentations

In addition to conducting research on DNR-managed forestlands, DNR researchers also write and contribute to publications and presentations relevant to forest management in the Pacific Northwest. DNR authors denoted in bold text contributed to the articles and presentations listed below published in 2020.

### 3.6.1 Publications

**Donato D.C.\***, **J.S. Halofsky\***, M.J. Reilly. 2020. Corraling a black swan: Natural range of variation in a forest landscape driven by rare, extreme events. *Ecological Applications* 30(1): e02013. (\*co-first authors)

Franklin J.F., **D.C. Donato**. 2020. Variable retention harvesting in the Douglas-fir region. *Ecological Processes* 9(1): 1-10.

Johnson, Zachary C., Brittany G. Johnson, Martin A. Briggs, **Warren D. Devine**, Craig D. Snyder, Nathaniel P. Hitt, Danielle K. Hare, and **Teodora V. Minkova**. Paired air-water annual temperature patterns reveal hydrogeological controls on stream thermal regimes at watershed to continental scales. *Journal of Hydrology* 587:124929. 2020.

[\[https://www.sciencedirect.com/science/article/pii/S0022169420303899?via%3Dihub\]](https://www.sciencedirect.com/science/article/pii/S0022169420303899?via%3Dihub)

- Using OESF and other data, this study explored a recently developed analytical approach that uses paired measurements of stream water temperature and near-stream air

temperature. This approach revealed the influence of groundwater, whether the groundwater was coming from shallow or deep sources, and influence of various watershed characteristics on stream temperature patterns.

**Martens, Kyle D., Daniel C. Donato, Joshua S. Halofsky, Warren D. Devine, and Teodora V. Minkova.** 2020. Linking instream wood recruitment to adjacent forest development in landscapes driven by stand-replacing disturbances: a conceptual model to inform riparian and stream management. *Environmental Reviews* 28(4):517-527.  
2020. [<https://cdnsiencepub.com/doi/10.1139/er-2020-0035>]

- In-stream wood plays an important role in stream morphology and creation of fish habitat, but many streams currently have reduced wood as a result of past forest management activities. This paper presents a conceptual model that links forest development and disturbance to the recruitment of in-stream wood. The model indicates that, under passive restoration, many streams in second-growth forests will be deficient of in-stream wood until they are more than 200 years old.

### **3.6.2 Presentations**

**Halofsky, J.S., Donato, D.C.,** and M.J. Reilly. November 2020. *Western Washington wildfires and the 2020 fire season*. Olympia City Hall.

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## 4.0 Forest Inventory

A comprehensive review of the DNR Remote Sensing Forest Resource Inventory System (RS-FRIS) was provided in the [FY 2019 HCP Annual Report](#). As a reminder, RS-FRIS relies largely on remotely sensed data instead of field plots. With the adoption of RS-FRIS, DNR’s inventory coverage has expanded considerably, and a new inventory is produced every two years using newly acquired remotely sensed data rather than relying on growth and yield models to grow data forward in time.

DNR is currently processing both the field-collected and remotely sensed data for the fourth iteration of its inventory, RS-FRIS 4.0, scheduled for release in fall 2021. RS-FRIS 4.0 will report conditions as of 2019-2020. Extensive wildfire smoke in 2019 prevented collection of some remote-sensing data, necessitating return flights in 2020.

Earlier versions of RS-FRIS reported conditions as of 2013 (RS-FRIS 1.0), 2015 (RS-FRIS 2.0), and 2017 (RS-FRIS 3.0). With each subsequent release, coverage has expanded, and RS-FRIS 4.0 will cover approximately 99.9 percent and 98.3 percent of DNR-managed forest lands in western and eastern Washington, respectively.

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## 5.0 Silvicultural Activity

### [Appendix: Background on Silvicultural Activity](#)

Information and analysis provided in this section are based on activities designated as “complete” in DNR’s forest management activity tracking database, Land Resource Manager (LRM), as of December 9, 2020. LRM is a tabular database that integrates a Geographic Information System (GIS) and allows for the spatial tracking of individual forest management activities on the landscape.

Five major silviculture activity types are discussed in this report: timber harvest, site preparation, forest regeneration, vegetation management, and pre-commercial thinning (PCT). These activities typically occur in this order following final harvest of standing timber (Figure 5-1). Table 5-1 shows completed acres of silvicultural activities for FY 2020 and Table 5-2 shows the mean annual acres of each activity for the last five fiscal years by HCP planning unit. FY 2020 data for OESF is shown in Figure 5-2.



**Figure 5-1: Dispersed Retention on a Variable Retention Harvest Unit in Northwest Region.** Photo courtesy of Zak Thomas.

## 5.1 Timber Harvest

The rights to harvest timber from state trust lands are purchased at regional public auctions held each month. A timber sale contract allows the purchaser to remove timber, typically over a one- to two-year period. Thus, the number of timber sales sold may stay relatively stable from year to year while timber removals or levels of completed activities may vary based on when purchasers choose to harvest (and thus complete) the sale.

Across all HCP planning units, acres of variable retention harvest (VRH) completed in FY 2020 were about 10 percent above the five-year mean, acres of variable density thinning (VDT) were 5 percent above the five-year mean, and acres of commercial thinning were 46 percent below the five-year mean. In the eastside planning units in FY 2020, acres of completed uneven-aged management was 88 percent above the five-year mean while acres of variable retention harvest were 45 percent below the mean.

## 5.2 Forest Site Preparation

Total acreage of forest site preparation completed in FY 2020 was 32 percent lower than the five-year mean. In westside planning units not including the OESF, ground herbicide treatment acres were 26 percent below the mean. In the OESF, there were zero completed acres of chemical site preparation, but this is an artifact of the variable seasonality of this activity. In eastside planning units, there was also zero acres of chemical or mechanical site preparation, but these activities are generally rare in these areas.

## 5.3 Forest Regeneration

Total acreage of forest regeneration completed in FY 2020 was 14 percent higher than the five-year mean. There was 46 acres of completed natural regeneration, representing less than 0.5 percent of all reforested acres. Acres of completed hand planting in eastside planning units and the OESF was 33 percent and 123 percent higher than the five-year mean, respectively. The large increase in hand planting in the OESF is in response to the increased level of variable retention timber harvest activities in this area in recent years.

## 5.4 Vegetation Management

Acres of completed vegetation management in FY 2020 were 46 percent below the five-year mean. Ground herbicide and hand cutting treatments were 15 percent and 49 percent below the five-year mean, respectively, as contract labor costs continue to reduce capacity to do this work.

## 5.5 Pre-Commercial Thinning

The total acreage of PCT completed in FY 2020 was 33 percent below the five-year mean. Westside planning units not including the OESF, where 75 percent of PCT treatment occurred in the last five years, was 46 percent below the five-year mean. As with vegetation management, higher contract labor costs have resulted in a lower capacity to do PCT treatments in western Washington.



**Table 5-1: Acres of Silviculture Activities Completed in FY 2020 on State Trust Lands Managed under the HCP (OESF FY 2020 is included on Table 5-2).**

	FY 2020							
	EAST			WEST				
	Chelan	Klickitat	Yakima	Columbia	North Puget	South Coast	South Puget	Straits
<b>Timber Harvest</b>								
Commercial Thinning				869	7		215	
Shelterwood Removal Cut								90
Uneven-Aged Management	672		269					16
Variable Density Thinning				478	954	43	502	
Variable Retention Harvest			73	3,941	2,457	3,593	1,169	1,169
<b>Total timber harvest</b>	<b>672</b>		<b>342</b>	<b>5,288</b>	<b>3,419</b>	<b>3,635</b>	<b>1,887</b>	<b>1,275</b>
<b>Forest site preparation</b>								
Aerial Herbicide				1,276		1,751		
Ground Herbicide				421	1,725	286	428	
Ground Mechanical								
<b>Total forest site preparation</b>				<b>1,697</b>	<b>1,725</b>	<b>2,037</b>	<b>428</b>	
<b>Forest regeneration</b>								
Hand Planting		670	73	2,209	2,370	3,956	1,323	1,065
Natural Regeneration			46					
<b>Total forest regeneration</b>		<b>670</b>	<b>119</b>	<b>2,209</b>	<b>2,370</b>	<b>3,956</b>	<b>1,323</b>	<b>1,065</b>
<b>Vegetation management</b>								
Fuels Management								
Ground Herbicide				93	1,036	97		409
Hand Cutting				760	1,360	342		663
Hand Pulling				33		53		
<b>Total vegetation management</b>				<b>886</b>	<b>2,396</b>	<b>492</b>		<b>1,072</b>
<b>Pre-commercial thinning</b>								
<b>Total pre-commercial thinning</b>			<b>440</b>	<b>1,106</b>		<b>1,357</b>	<b>81</b>	
<b>Grand Total</b>	<b>672</b>	<b>670</b>	<b>902</b>	<b>11,186</b>	<b>9,910</b>	<b>11,478</b>	<b>3,718</b>	<b>3,412</b>

**Table 5-2: Combined Acres of Silviculture Activities Completed in FY 2020 (grouped into East, West, and OESF) Compared to the Five-year Mean Acres of Silviculture Activities Completed on State Trust Lands Managed under the HCP.**

	FY 2020 Totals (Five-year Mean: FY16–20)			
	East	West	OESF	Total
<b>Timber Harvest</b>				
Commercial Thinning	0 (0)	1,090 (1,591)	0 (436)	1,090 (2,027)
Shelterwood Removal Cut	0 (0)	90 (18)	0 (0)	90 (18)
Uneven-Aged Management	941 (499)	15 (54)	0 (0)	957 (553)
Variable Density Thinning	0 (336)	1,977 (1,005)	1,009 (1,495)	2,987 (2,837)
Variable Retention Harvest	73 (132)	12,329 (11,315)	1,408 (1,084)	13,811 (12,533)
<b>Total timber harvest</b>	<b>1,014 (968)</b>	<b>15,504 (13,985)</b>	<b>2,418 (3,016)</b>	<b>18,936 (17,970)</b>
<b>Forest site preparation</b>				
Aerial Herbicide	0 (0)	3,027 (2,669)	0 (0)	3,027 (2,669)
Ground Herbicide	0 (0)	2,860 (5,271)	0 (469)	2,860 (5,741)
Ground Mechanical	0 (203)	0 (0)	0 (0)	0 (203)
<b>Total forest site preparation</b>	<b>0 (203)</b>	<b>5,887 (7,940)</b>	<b>0 (469)</b>	<b>5,887 (8,613)</b>
<b>Forest regeneration</b>				
Hand Planting	743 (560)	10,922 (10,629)	2,480 (1,111)	14,147 (12,301)
Natural Regeneration	46 (98)	0 (0)	0 (9)	46 (107)
<b>Total forest regeneration</b>	<b>789 (658)</b>	<b>10,922 (10,629)</b>	<b>2,480 (1,120)</b>	<b>14,193 (12,408)</b>
<b>Vegetation management</b>				
Fuels Management	0 (50)	0 (0)	0 (0)	0 (50)
Ground Herbicide	0 (0)	1,634 (1,848)	30 (102)	1,665 (1,951)
Hand Cutting	0 (0)	3,124 (6,401)	334 (386)	3,458 (6,788)
Hand Pulling	0 (0)	85 (905)	0 (0)	85 (905)
<b>Total vegetation management</b>	<b>0 (50)</b>	<b>4,845 (9,155)</b>	<b>364 (488)</b>	<b>5,209 (9,694)</b>
<b>Pre-commercial thinning</b>				
<b>Total pre-commercial thinning</b>	<b>440 (981)</b>	<b>2,544 (4,684)</b>	<b>1,191 (611)</b>	<b>4,176 (6,276)</b>
<b>Grand Total</b>	<b>2,244 (2,861)</b>	<b>39,704 (46,396)</b>	<b>6,455 (5,707)</b>	<b>48,404 (54,965)</b>

## 5.6 Salvage

Table 5-3 compares acres of salvage harvest completed in FY 2020 to the five-year mean by harvest type. Overall, the total acreage of salvage harvest was 32 percent below the five-year mean. In westside HCP planning units including the OESF, there were two units salvaged for a total of 213 acres in FY 2020, compared to the five-year mean of 74 acres. There were zero acres of completed salvaged harvest in eastside planning unit in FY 2020.

**Table 5-3: Acres Salvaged by Harvest Type in FY 2020 Compared to the Five-year Mean (FY16–20).**

		FY 2020 (Five-year Mean: FY16–20)			
		East	West	OESF	Total
Harvest type	Commercial thinning	0 (0)	0 (0.2)	0 (0)	0 (0)
	Uneven-aged management	0 (126)	0 (0)	0 (0)	0 (127)
	Variable density thinning	0 (0)	164 (33)	0 (0)	164 (33)
	Variable retention harvest	0 (113)	48 (26)	0 (13)	48 (153)
	Total	<b>0 (240)</b>	<b>212 (60)</b>	<b>0 (13)</b>	<b>212 (314)</b>

## 6.0 Road Management Activity

### 6.1 Forest Roads Program

#### Appendix: Background on Road Management Activity

The Forest Roads Program continues to improve DNR’s forest road infrastructure across the state. Unlike most activities described in this report, DNR reports road management activities by calendar year instead of fiscal year because of the complexities of collecting data and reporting road-related activities during the height of the construction season. The information presented here is for calendar year 2019.

In 2019, 22 barriers were removed from the fish-barrier worklist on DNR-managed lands, representing an investment of more than \$1.1 million. DNR removed or replaced 18 of the barriers, opening an estimated 8.4 miles of fish habitat on DNR-managed lands (Figure 6-1). The four remaining fish-passage barriers were removed from the work list for one of the following reasons:

- The stream designation was downgraded from “fish” to “non-fish” following protocol survey requirements.
- The fish-passage barrier removal would result in very limited habitat gain (usually less than 200 meters). With consensus from WDFW and DNR Forest Practices, these culverts were reprioritized for replacement at the end of their useful life.

Through land transactions and inventory activities in 2019, DNR acquired 14 new fish passage barriers that need to be corrected. The Forest Roads Program is committed to remediating new barriers within six years of their identification. At the end of 2019, 44 fish barriers remained on DNR-managed lands.

On lands managed under the HCP, 49 miles of road were abandoned or decommissioned and 78 miles were constructed in 2019. There was a net increase of total road miles on HCP-managed lands from 10,607 to 10,653 due to land transactions, construction, and updates to the road inventory. Table 6-1 summarizes DNR’s road management activity on both HCP-covered and non-HCP-covered lands in 2019.



**Figure 6-1: Fish-Barrier Removal on an Unnamed Tributary to Kalaloch Creek.** This project replaced a 60-inch corrugated metal pipe (left) with a 16-foot-diameter multi-plate culvert (right). A total of 0.7 miles of salmon and trout habitat were opened up as a result of this project. Photos courtesy of Jeremy Tryall.

**Table 6-1: Road Management Activity Summary for Calendar Year 2019.** All mileage data has been rounded to the nearest mile.

	Miles					Barriers
	New Road Constructed	Road Reconstructed	Road Abandoned	Road Decommissioned	Inventoried Road <sup>1</sup>	Fish Barriers Removed
Chelan	0	0	0	0	46	0
Columbia	13	11	8	2	1,247	3
Klickitat	0	1	0	0	581	0
North Puget	27	10	20	0	1,497	1
OESF	3	3	0	2	1,901	13
South Coast	16	3	2	1	1,730	3
South Puget	8	2	6	3	1,348	0
Straits	12	6	1	2	932	1
Yakima <sup>2</sup>	0	3	1	2	1,374	0
<b>TOTAL, HCP-Covered Lands</b>	<b>78</b>	<b>40</b>	<b>38</b>	<b>11</b>	<b>10,653</b>	<b>21</b>
<b>Non-HCP-Covered Lands</b>	<b>7</b>	<b>12</b>	<b>4</b>	<b>5</b>	<b>3,473</b>	<b>1</b>

<sup>1</sup> Inventoried road includes forest roads (according to [WAC 222-160-010](#)) and decommissioned roads. It does not include abandoned or orphaned roads.

<sup>2</sup> Data for the Yakima HCP Planning Unit does not include roads on land co-managed by DNR and WDFW in the Teanaway Community Forest, as this land is not covered by the HCP.

## 6.2 Easements

### Appendix: Background on Easements

DNR grants easements across state trust lands to individuals, private organizations, and other public agencies for a variety of purposes, including road and utilities access. DNR also acquires easements across private or public lands to gain access to DNR-managed lands. In addition to granting and acquiring easements, DNR acquires new lands that are subject to existing easement rights.

#### **6.2.1 Road Easement GIS and Spatial NaturE**

DNR is digitally mapping all existing and new easements in the Road Easement GIS. Mapping of easements granted to DNR was completed in 2014. Initial mapping of road easements granted over DNR-managed trust lands in all regions was completed at the end of 2016. In FY 2020, DNR continued to make progress on the Spatial NaturE project that maps encumbrances on state lands that are not connected to DNR’s road system, such as utility corridors, communication sites, commercial leases, weather monitoring systems, irrigation infrastructure, water rights, agriculture and grazing leases, railroads, recreation sites, special use permits, and land use restrictions

#### **6.2.2 Road Easements, Road Use Permits, and Utility Easements**

Table 6-2 reports easements granted in FY 2020 that created a new footprint (i.e. timber was cut to create open space). Easements granted during the reporting period that created no new footprint

because they overlap with existing easements or agricultural leases are not reported. DNR did not grant any utility easements that created a new footprint in FY 2020.

**Table 6-2: Road Easements and Road Use Permits (New Footprint) Granted in FY 2020.**

		Columbia	North Puget	OESF	South Coast	Straits	Klickitat	Total
Road easements and road use permits	Miles	0.13	1.44	0.01	0.04	0.0	0.0*	1.62
	Acres	1	4.19	0.03	0.4	0.0	1.3	6.92

\*Note for Klickitat (Miles): Part of the calculation of new footprint construction was a site for a water treatment/diversion area off Buck Creek. This easement area is not along a road corridor and therefore cannot be measured in miles.

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## 7.0 Land Transaction Activity

### Appendix: Background on Land Transaction Activity

Below is a summary of land acquisitions, dispositions, and transfers completed in FY 2020 by HCP planning unit. All newly acquired parcels listed in this section are now covered under the HCP and have been designated as “no role for northern spotted owl habitat,” although this designation may be revised based on the outcome of future field surveys. All disposed parcels were classified as “no role for northern spotted owl habitat” and are no longer covered under the HCP, unless otherwise noted.

Because the narrative portion of this section incorporates acreage data from land surveys conducted during transactions and Table 7-1 incorporates numbers from the DNR GIS layers, the numbers in the narrative may not match exactly the numbers in the table. The acreage data in the narrative is rounded to the nearest whole acre.

### 7.1 Activity by HCP Planning Unit

#### 7.1.1 *Chelan*

No applicable transactions occurred in Chelan during the fiscal year.

#### 7.1.2 *Columbia*

**Acquired:** DNR purchased 10 acres of conservation land for Lacamas Prairie NAP in Clark County. DNR purchased 28 acres of conservation land for Washougal Oaks NAP in Clark County. DNR purchased 14 acres of conservation land for Washougal Oaks NRCA in Clark County.

**Trust Land Transfer (TLT) / State Forest Transfer (SFT):** In Wahkiakum County, 51 acres was transferred to Skamokawa Creek NRCA. In Skamania County, 168 acres was transferred to Stevenson Ridge NRCA.

#### 7.1.3 *Klickitat*

No applicable transactions occurred in Chelan during the fiscal year.

#### 7.1.4 *North Puget*

**Acquired:** DNR purchased 630 acres of forest land in Skagit County. DNR purchased 267 acres of forest land in Snohomish County. DNR purchased 82 acres of forest land in Whatcom County.

**TLT/SFT:** In Skagit County, 641 acres was transferred to Blanchard Core NRCA.

#### 7.1.5 *OESF*

No applicable transactions occurred in OESF during the fiscal year.

#### 7.1.6 *South Coast*

**Disposed:** DNR transferred 311 acres of forest land in Grays Harbor County.

**TLT/SFT:** In Pacific County, 139 acres was transferred to Naselle Highlands NRCA.

### **7.1.7 South Puget**

**Acquired:** DNR purchased 27 acres of conservation land for Kennedy Creek NAP in Mason County. DNR purchased 563 acres of conservation land for Kennedy Creek NRCA in Thurston County. DNR purchased 33 acres of forest land in Kitsap County.

**Disposed:** DNR transferred 10 acres of forest land in Kitsap County.

### **7.1.8 Straits**

**Acquired:** DNR purchased 61 acres of forest land in Clallam County.

**Disposed:** DNR transferred 68 acres of forest land in Clallam County.

### **7.1.9 Yakima**

No applicable transactions occurred in OESF during the fiscal year.



**Table 7-1: Acquisitions and Disposals Completed in FY 2020 within the HCP Boundary.**

		HCP Planning Unit					
		Columbia	North Puget	South Coast	South Puget	Straits	Totals
		<b>Acquired Lands<sup>1</sup></b>					
Stream miles by stream type	Type 1	0.05	2.11	-	5.84	-	<b>8.00</b>
	Type 2	-	0.15	-	0.02	-	<b>0.17</b>
	Type 3	-	0.72	-	0.63	0.24	<b>1.59</b>
	Type 4	-	0.94	-	0.32	-	<b>1.26</b>
	Type 5	0.24	0.95	-	0.35	-	<b>1.54</b>
	Type 9	-	0.91	-	3.39	-	<b>4.30</b>
	<b>Total miles acquired</b>	<b>0.29</b>	<b>5.77</b>	-	<b>10.56</b>	<b>0.24</b>	<b>16.86</b>
<b>Acres acquired in rain-on-snow zones</b>			100.76	-	-	-	-
Acres per asset class <sup>2, 3</sup>	Forested	-	979	-	33	61	<b>1073</b>
	Conservation	52	-	-	589	-	<b>641</b>
<b>Total acres acquired<sup>3</sup></b>		<b>52</b>	<b>979</b>	-	<b>623</b>	<b>61</b>	<b>1,715</b>
		<b>Disposed Lands</b>					
Stream miles by stream type	Type 1	-	-	-	-	-	-
	Type 2	-	-	-	-	-	-
	Type 3	-	-	1.52	-	0.24	<b>1.76</b>
	Type 4	-	-	0.28	-	0.26	<b>0.54</b>
	Type 5	-	-	1.28	-	-	<b>1.28</b>
	Type 9	-	-	-	-	-	-
	<b>Total miles disposed</b>	-	-	<b>3.08</b>	-	<b>0.50</b>	<b>3.58</b>
<b>Acres disposed in rain-on-snow zones<sup>4</sup></b>		-	-	-	-	-	-
Acres per age class <sup>3</sup>	Open (0–10 years)	-	-	-	-	-	-
	Regeneration (11–20 years)	-	-	183	-	-	<b>183</b>
	Pole (21–40 years)	-	-	-	-	-	-
	Closed (41–70 years)	-	-	90	-	63	<b>153</b>
	Complex (71–100 years)	-	-	38	-	-	<b>38</b>
	Complex (101–150 years)	-	-	-	8	-	<b>8</b>
	Functional (150+ years)	-	-	-	-	-	-
	Non-forested	-	-	-	2	5	<b>7</b>
Unknown	-	-	-	-	-	-	
<b>Total acres disposed<sup>3</sup></b>		-	-	<b>311</b>	<b>10</b>	<b>68</b>	<b>389</b>

<sup>1</sup> Data for acquired lands are estimates that have not yet been field-verified.

<sup>2</sup> Asset-class data on acquired lands is obtained from deeds and other information relative to the holdings on the land. Over time, DNR will inventory acquired parcels and replace asset class information with more specific age-class data.

<sup>3</sup> Acres rounded to nearest whole number.

<sup>4</sup> Rain-on-Snow (ROS) data is derived from the DNR corporate GIS layer.

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## 8.0 Natural Areas Program

### Appendix: Background on the Natural Areas Program

In FY 2020, the Natural Areas Program protected an additional 1,972.5 acres in Natural Area Preserves (NAPs) and Natural Resource Conservation Areas (NRCAs), all within the area covered by the HCP. These protection efforts added to seven existing natural areas and established two new natural areas. The most significant of these were:

- **Crowberry Bog NAP:** 236 acres of DNR trust lands were transferred into Natural Area Preserve status<sup>1</sup>, creating the newest Natural Area Preserve within the program. This bog system on this preserve is globally significant, as it is the first documented raised, plateau bog in the western United States and the southernmost in western North America. The central portion of this bog is elevated up to 9 feet above the outer portions due to thousands of years of peat accumulation. The site also supports a population of the rare June's copper butterfly.



**Figure 8-1: Shore pines and bog vegetation at the newly-established Crowberry Bog NAP.** Photo courtesy of Joe Rocchio.

- **Lacamas Prairie NAP:** A 10-acre parcel was added to this site, securing protection of wetland and riparian habitat as well as a large portion of a recently discovered population of tall beardstongue, a rare plant species. This species was thought to be extinct until small populations were identified in Oregon in 2008. This is the only known occurrence of the species in Washington.
- **Blanchard Core NRCA:** 661.5 acres of DNR trust lands were transferred into Natural Resources Conservation Area status, creating this new natural area. These lands protect mixed-age forest, including mature stands, as well as wetlands and a bat hibernaculum. The site is also a popular recreation destination.
- **Naselle Highlands NRCA, Skamokawa NRCA, and Stevenson Ridge NRCA:** A total of 429.2 acres were added to these three NRCAs to enhance protection of mature and late-successional forests that provide nesting habitat for marbled murrelet and northern spotted owl.

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<sup>1</sup> This was a direct transfer and thus not reflected in the Transactions Section.

In addition to land acquisitions, the Natural Areas Program continued to actively manage and enhance habitat on natural areas in FY 2020 to benefit federally listed species such as Bradshaw’s lomatium (Lacamas Prairie NAP/NRCA), Wenatchee Mountains checker-mallow (Camas Meadows NAP, Figure 8-2), Island marble butterfly (Cattle Point NRCA), Oregon spotted frog (Trout Lake NAP), and Puget Sound/Hood Canal salmon runs (Dabob Bay NAP/NRCA).



**Figure 8-2: Washington Conservation Corps members planting at Cattle Point NRCA to enhance habitat for the Island marble butterfly.** Photo courtesy of David Wilderman.

Table 8-1 lists acreage added to Natural Area Preserves located within the HCP boundary. Natural areas in bold text are composed primarily of mature forests and/or late-seral forests.

**Table 8-1: Acres Added to Natural Area Preserves within HCP-Covered Lands in FY 2020.**

Natural Area	County	Acres Added in FY 2020 <sup>1</sup>	Total Current Acres
Admiralty Inlet NAP	Island	-	79.5
<b>Ashford NRCA</b>	Pierce	-	78.4
Bald Hill NAP	Thurston	-	313.7
<b>Blanchard Core NRCA</b>	Skagit	661.5	661.5
Bone River NAP	Pacific		2799.7
Camas Meadows NAP	Chelan	-	2017.8
Carlisle Bog NAP	Grays Harbor	-	310
Cattle Point NRCA	San Juan	-	112.1
<b>Charley Creek NAP</b>	King	-	1966
Chehalis River Surge Plain NAP	Grays Harbor	-	4493.6
Clearwater Bogs NAP	Jefferson	-	504.1
<b>Clearwater Corridor NRCA</b>	Jefferson	-	2323
<b>Columbia Falls NAP</b>	Skamania	-	1233.8
Crowberry Bog NAP	Jefferson	236	236
Cypress Highlands NAP	Skagit	0	1072.4
Cypress Island NRCA	Skagit	0	4135.1
Dabob Bay NAP/NRCA	Jefferson	0	3209.8
Dailey Prairie NAP	Whatcom	0	228.8
Devils Lake NRCA	Jefferson	0	80
Elk River NRCA	Grays Harbor	0	5560
<b>Ellsworth Creek NRCA</b>	Pacific	0	557
Goose Island NAP	Grays Harbor	0	12
<b>Granite Lakes NRCA</b>	Skagit	0	603.2
Gunpowder Island NAP	Pacific	0	152
Hamma Hamma Balds NAP	Mason	0	957
Hat Island NRCA	Skagit	0	91.2
<b>Hendrickson Canyon NRCA</b>	Wahkiakum	0	159
Ink Blot NAP	Mason	0	183.6
Kennedy Creek NAP/NRCA	Mason	592.9	933.2

Natural Area	County	Acres Added in FY 2020 <sup>1</sup>	Total Current Acres
Kings Lake Bog NAP	King	0	309.2
<b>Kitsap Forest NAP</b>	Kitsap	0	571.9
<b>Klickitat Canyon NRCA</b>	Yakima	0	2335.2
Lacamas Prairie NAP/NRCA	Clallam	10	211.1
Lake Louise NRCA	Whatcom	0	137.7
Lummi Island NRCA	Whatcom	0	671.5
Merrill Lake NRCA	Cowlitz	0	114.2
<b>Middle Fork Snoqualmie NRCA</b>	King	0	9198.4
Mima Mounds NAP	Thurston	0	640.5
<b>Monte Cristo NAP</b>	Klickitat	0	1151
<b>Morning Star NRCA</b>	Snohomish	0	37841.9
<b>Mount Si NRCA</b>	King	0	13734.9
<b>Naselle Highlands NRCA</b>	Pacific	138	326.9
Niawiakum River NAP	Pacific	0	1097.8
North Bay NAP	Grays Harbor	0	1214.9
Oak Patch NAP	Mason	0	17.3
Olivine Bridge NAP	Skagit	0	148
Point Doughty NAP	San Juan	0	56.5
Queets River NRCA	Jefferson	0	601
<b>Rattlesnake Mtn Scenic Area</b>	King	0	1875.7
Rocky Prairie NAP	Thurston	0	35
Sand Island NAP	Grays Harbor	0	8
Shipwreck Point NRCA	Clallam	0	471.8
Schumacher Creek NAP	Mason	0	498.8
<b>Skagit Bald Eagle NAP</b>	Skagit	0	1546
<b>Skamokawa Creek NRCA</b>	Wahkiakum	122.8	503.9
Skookum Inlet NAP	Mason	0	142.6
Snoqualmie Bog NAP	King	0	110.5
<b>South Nemah NRCA</b>	Pacific	0	2439.5
<b>South Nolan NRCA</b>	Jefferson	0	213
<b>Stavis NRCA</b>	Kitsap	0	2996.2
<b>Stevenson Ridge NRCA</b>	Skamania	168.4	752.3
<b>Table Mountain NRCA</b>	Skamania	0	2836.5
<b>Tahoma Forest NRCA</b>	Lewis	0	230
Teal Slough NRCA	Pacific	0	8.4
Trout Lake NAP	Klickitat	0	2014
Washougal Oaks NAP/NRCA	Clark	41.7	318.5
<b>West Tiger Mountain NRCA</b>	King	1.2	3915.5
Whitcomb Flats NAP	Grays Harbor	0	5
White Salmon Oak NRCA	Klickitat	0	551.2
<b>Willapa Divide NAP</b>	Pacific	0	587
Woodard Bay NRCA	Thurston	0	917.5
	<b>Total Acres</b>	<b>1,972.5</b>	<b>128,420.3</b>

<sup>1</sup> Acreage data comes from the database maintained by the Land Transactions Program. This data represents acreage determined through surveys at the time of transaction and may not necessarily match the "GIS acres" of transacted land in the DNR GIS system.

Table 8-2 lists the federally threatened and endangered species found in natural areas covered by the HCP, and Table 8-3 lists other species of concern in these areas.

**Table 8-2: Federally Threatened and Endangered Species on Natural Areas Covered by the HCP.**

<b>Species</b>	<b>Federal Status</b>	<b>Natural Area</b>
<b>Northern Spotted Owl</b>	Threatened	Camas Meadows NAP, Granite Lakes NRCA, Skagit Bald Eagle NAP, Morning Star NRCA, South Nemah NRCA, Stevenson Ridge NRCA, Table Mountain NRCA, Teal Slough NRCA, Trout Lake NAP
<b>Marbled Murrelet</b>	Threatened	Ashford NRCA, Bone River NAP, Clearwater Bogs NAP, Clearwater Corridor NRCA, Dabob Bay NAP/NRCA, Elk River NRCA, Morning Star NRCA, Naselle Highlands NRCA, Niawiakum River NAP, Queets River NRCA, Skamokawa Creek NRCA, South Nemah NRCA, South Nolan NRCA, Teal Slough NRCA, Willapa Divide NAP
<b>Bull Trout</b>	Threatened	Chehalis River Surge Plain NAP, Carlisle Bog NAP, Olivine Bridge NAP, Skagit Bald Eagle NAP, Morning Star NRCA, Clearwater Corridor NRCA
<b>Chinook Salmon – Puget Sound</b>	Threatened	Dabob Bay NAP/NRCA, Kitsap Forest NAP, Mt. Si NRCA, West Tiger Mountain NRCA, Olivine Bridge NAP, Skagit Bald Eagle NAP, Stavis NRCA
<b>Chinook Salmon – Lower Columbia</b>	Threatened	Klickitat Canyon NRCA
<b>Steelhead – Lower Columbia</b>	Threatened	Klickitat Canyon NRCA, Table Mountain NRCA, Washougal Oaks NAP/NRCA
<b>Steelhead – Puget Sound</b>	Threatened	Dabob Bay NAP/NRCA, Stavis NRCA
<b>Coho Salmon – Lower Columbia/ SW Washington</b>	Threatened	Washougal Oaks NAP/NRCA
<b>Chum Salmon – Hood Canal</b>	Threatened	Dabob Bay NAP/NRCA
<b>Island Marble Butterfly</b>	Endangered	Cattle Point NRCA
<b>Oregon Spotted Frog</b>	Threatened	Trout Lake NAP
<b>Eulachon</b>	Threatened	Dabob Bay NAP/NRCA
<b>Mazama Pocket Gopher</b>	Threatened	Rocky Prairie NAP
<b>Bradshaw’s Lomatium</b>	Endangered	Lacamas Prairie NAP/NRCA
<b>Golden Paintbrush</b>	Threatened	Rocky Prairie NAP, Admiralty Inlet NAP
<b>Wenatchee Mountains Checker-Mallow</b>	Endangered	Camas Meadows NAP

**Table 8-3: Special Status Species Located in Natural Areas Covered by the HCP.**

Species	Natural Area <sup>1</sup>
<b>Federal Species of Concern</b>	
Bald Eagle	Numerous sites
Beller's Ground Beetle	Snoqualmie Bog NAP, Kings Lake Bog NAP
Cascades Frog	Morning Star NRCA
Columbia Torrent Salamander	Ellsworth Creek NRCA
Fringed Myotis	Camas Meadows NAP
Gorge Daisy	Columbia Falls NAP
Harlequin Duck	Morning Star NRCA
Hatch's Click Beetle	Kings Lake Bog NAP
Howell's Daisy	Columbia Falls NAP, Table Mountain NRCA
Larch Mountain Salamander	Table Mountain NRCA, Columbia Falls NAP
June's Copper	North Bay NAP, Carlisle Bog NAP, Clearwater Bogs NAP, Crowberry Bog NAP
Northern Goshawk	Clearwater Corridor NRCA, Morning Star NRCA
Northern Red-Legged Frog	Carlisle Bog NAP, North Bay NAP, Table Mountain NRCA, Morning Star NRCA, Ellsworth Creek NRCA, Kings Lake Bog NAP
Olive-Sided Flycatcher	Numerous sites
Oregon Sullivantia	Columbia Falls NAP
Pale Blue-Eyed Grass	Trout Lake NAP
Peregrine Falcon	Table Mountain NRCA, Cypress Highlands NAP, Mount Si NRCA, Elk River NRCA, Hat Island NRCA, Lummi Island NRCA, North Bay NAP
Puget Sound Coho Salmon	Dabob Bay NAP/NRCA
Slender-Billed White-Breasted Nuthatch	Washougal Oaks NAP/NRCA, Lacamas Prairie NAP/NRCA
Suksdorf's Desert-Parsley	White Salmon Oak NRCA
Tailed Frog	Table Mountain NRCA, Morning Star NRCA
Tall Bugbane	Washougal Oaks NAP, Columbia Falls NAP
Valley Silverspot	Mima Mounds NAP
Van Dyke's Salamander	South Nemah NRCA, Ellsworth Creek NRCA
Wenatchee Larkspur	Camas Meadows NAP
White-Top Aster	Rocky Prairie NAP, Mima Mounds NAP
Yuma Myotis	Woodard Bay NRCA
<b>State Listed – No Federal Status</b>	
Olympic Mudminnow (State Sensitive)	Carlisle Bog NAP, Chehalis River Surge Plain NAP, West Tiger Mountain NRCA
Sandhill Crane (State Endangered)	Trout Lake NAP, Klickitat Canyon NRCA
<b>State Candidate – No Federal Status</b>	
Cascade Torrent Salamander	Table Mountain NRCA
Dunn's Salamander	Teal Slough NRCA, South Nemah NRCA
Lewis's Woodpecker	Camas Meadows NAP
Bog Idol Leaf Beetle (Formerly Long-horned Leaf Beetle)	King's Lake Bog NAP
Olympia Oyster	Dabob Bay NAP/NRCA, Woodard Bay NRCA

Species	Natural Area <sup>1</sup>
Pacific Herring	Dabob Bay NAP/NRCA, Stavis NRCA, Elk River NRCA
Pileated Woodpecker	Table Mountain NRCA, Morning Star NRCA, Kitsap Forest NAP, and others
Puget Blue	Rocky Prairie NAP
Purple Martin	Woodard Bay NRCA, Kennedy Creek NAP
Sand Verbena Moth	Cattle Point NRCA
Townsend's big-eared bat	Blanchard Core NRCA
Western Toad	Dabob Bay NAP/NRCA, Morning Star NRCA, Oak Patch NAP, Stavis NRCA
White-headed Woodpecker	Camas Meadows NAP
Vaux's Swift	Numerous sites

<sup>1</sup> Location information was determined by consulting the Washington Natural Heritage database and the following WDFW databases: Animal Occurrences, Northern Spotted Owl Site Centers, Priority Habitat, and Streamnet.

## 9.0 Non-Timber Management Activity

### 9.1 Special Forest Products

#### Appendix: Background on Special Forest Products

DNR’s South Puget Sound, Olympic, and Pacific Cascade region offices auction leases and sell permits to gather special forest products in the OESF, South Coast, South Puget, Columbia, and Straits HCP planning units. These leases and permits provide small businesses and individuals access to gather a variety of valuable non-timber forest products including Christmas trees, brush, boughs, beargrass, evergreen huckleberry, moss, salal, and sword fern, though not every lease or permit includes all these products and not all of the area in these leases or permits have actual gathering.

DNR region offices may also offer direct sales of some of the same special forest products. In South Puget Sound and Pacific Cascade regions, direct sales are made for products gathered from areas too small to be offered under a lease. Table 9-1 summarizes DNR’s sales of special forest products on HCP-covered forestlands in FY 2020.

**Table 9-1: Sales of Special Forest Products on HCP-Covered Areas in FY 2020.**

Region	Permits		Leases		Direct Sales	
	Occurrences	Acres	Occurrences	Acres	Occurrences	Acres
South Puget	98	84,469	21	69,222	3	4,653
Olympic	61	170,930	0	0	0	0
Pacific Cascade	90	126,850	0	0	1	1
<b>Total</b>	<b>188</b>	<b>211,319</b>	<b>21</b>	<b>69,222</b>	<b>4</b>	<b>4,654</b>

### 9.2 Leases

#### Appendix: Background on Leases

#### **9.2.1 Grazing Permits and Leases**

Most DNR-managed grazing takes place on non-forested state trust lands east of the Cascade crest on lands that are not managed under the HCP. Grazing is selectively allowed on forested state trust lands managed under the HCP in both eastern and western Washington. In eastern Washington, state trust lands are grazed under permits and leases. Table 9-2 summarizes grazing permit and lease information for FY 2020.

#### **9.2.2 Communication Sites Leases**

In FY 2020, there were 71 communication sites leased within the HCP boundary, totaling approximately 77 acres. There were a total of 288 leases from individual tenants on the 71 communication sites.



**Table 9-2: Grazing Permits and Leases on DNR-managed Lands in FY 2020.**

HCP Planning Unit	Acres of Grazing Leases	Acres of Permit Range	Acres of Grazing Leases in Forest	Acres of Permit Range in Forest	Acres of Grazing Leases on HCP Lands	Acres of Permit Range on HCP Lands	Acres of Grazing Leases on Forested HCP Lands	Acres of Permit Range on Forested HCP Lands
Chelan	8,066	0	3,453	0	4,300	0	3,450	0
Columbia	40	0	0	0	12	0	0	0
Klickitat	10,807	36,832	9,499	35,525	10,159	36,714	9,495	35,515
N. Puget	39	0	0	0	38	0	0	0
OESF	0	0	0	0	0	0	0	0
S. Coast	177	0	100	0	118	0	100	0
S. Puget	0	0	0	0	0	0	0	0
Straits	0	0	0	0	0	0	0	0
Yakima	135,690	56,497	91,172	47,261	87,775	53,735	65,342	47,256
<b>Sub-Total</b>	<b>154,819</b>	<b>93,329</b>	<b>104,224</b>	<b>82,786</b>	<b>102,403</b>	<b>90,449</b>	<b>78,388</b>	<b>82,771</b>
<b>Non-HCP</b>	406,237	221,536	101,468	171,697	1	0	0	0
<b>Total Acres</b>	<b>561,056</b>	<b>314,865</b>	<b>205,692</b>	<b>254,484</b>	<b>102,404</b>	<b>90,449</b>	<b>78,388</b>	<b>82,771</b>

### 9.3 Valuable Material Sales

*Appendix: Background on Valuable Material Sales*

In FY 2020, DNR had six active sand, gravel, and rock contracts within the HCP boundary, totaling approximately 580 acres. Table 9-3 summarizes those contracts. These contracts were approved by the Board of Natural Resources and awarded through a public auction process.

**Table 9-3: Sand, Gravel, and Rock Contracts Active in FY 2020.**

Lease Name	Commodity	HCP Planning Unit	Acres
Jordan Road	Sand, gravel	North Puget	61
Lewis Gravel Pit - Winthrop	Rock, sand, gavel	Chelan	14
Livingston Quarry	Road rock	Columbia	170
Kilowatt Quarry	Road rock	Klickitat	15
High Rock	Rock, sand, gavel	North Puget	320
Jordan Road	Sand, gravel	North Puget	61
<b>Total Acres</b>			<b>580</b>

In addition to the contracts listed above, DNR occasionally sells valuable material through a direct sale, a one-time agreement for the removal of a small amount of a resource (a maximum of \$25,000 in value) that does not require Board of Natural Resources approval.

### 9.4 Recreation Program

*Appendix: Background on Recreation Program*

Information for the recreation program is compiled on a calendar year basis, and was not yet available for inclusion in the FY 2020 HCP Annual Report. The FY 2021 report will include information on recreation projects from calendar years 2020-2021.

## 10.0 HCP Implementation Documentation

Implementation of the Washington State Department of Natural Resources (DNR)'s HCP often requires interpretation of its conservation strategies and how they apply to HCP-covered management activities. There are times when strict compliance would result in the wrong outcome, endanger human life, or conflict with other HCP objectives. There are also times when an activity unintentionally or inadvertently deviates from an HCP conservation strategy. Under these circumstances, DNR staff may seek guidance to devise appropriate plans of action for complying with HCP objectives and conservation strategies, develop alternative plans of action to avoid conflict with HCP objectives, or rectify the unintended consequences of an activity. Table 10-1 describes activities that have been documented but may not yet have taken place.

HCP consultation represents the cooperative problem solving that is necessary in the course of HCP implementation. Documentation of these discussions and agreements includes the following:

- **Implementation consultations:** Agreements between DNR's HCP and Scientific Consultation Section and regions or programs related to operational challenges where assistance and approval for a mitigation plan has been requested.
- **Joint concurrences:** Agreements between DNR and the Services related to strategy modifications and updates.
- **Non-compliances:** Unapproved deviations from HCP conservation strategies and/or objectives.
- **Other:** Informational documented issues and activities associated with HCP strategies, objectives, or implementation.

**Table 10-3: Summary of FY 2020 HCP Implementation Documentation.**

Region/ Division	Approval Date	Type	Associated Project	HCP Strategy	Activity Summary
Olympic	6/7/2019 <sup>1</sup>	Implementation Consultation	Right of Way	Marbled Murrelet	Right of way harvesting by Rayonier in and adjacent to a marbled murrelet occupied site.
Northwest	6/10/2019 <sup>1</sup>	Other	7-Upp Timber Sale	Marbled Murrelet	Documenting GIS discrepancy found with a marbled murrelet occupied site.
Olympic	6/15/2019 <sup>1</sup>	Implementation Consultation	Flutterby Timber Sale	Multispecies / Uncommon Habitats	Taylor's Checkerspot Butterfly habitat enhancement for Eden Valley and Kelly Ridge sites.

Region/ Division	Approval Date	Type	Associated Project	HCP Strategy	Activity Summary
Pacific Cascade	7/9/2019	Implementation Consultation	Gung Ho Rock Pit	Riparian	Expand the rock pit, which is partially located in a Type 3 RMZ.
Northwest	7/16/2019	Implementation Consultation	Sky Rider Timber Sale	Marbled Murrelet	Tail holds within suitable marbled murrelet habitat.
Northwest	10/23/2019	Implementation Consultation	Credence Timber Sale	Marbled Murrelet	Operational access through previously identified, unoccupied marbled murrelet habitat.
Northwest	11/6/2019	Implementation Consultation	Extravehicular Timber Sale	Northern Spotted Owl	Reopening of an existing road grade within NSO nest patch buffer.
Northwest	12/3/2019	Implementation Consultation	Yellow Bear Timber Sale	Multispecies / Uncommon Habitats	Implementation of the draft cave procedure.
Forest Resources Division	12/3/2019	Joint Concurrence	HCP	Marbled Murrelet	Final State Trust Lands Habitat Conservation Plan Amendment for the Marbled Murrelet Long-term Conservation Strategy.

<sup>1</sup> These FY 2019 memos were not included in last year's report so are included here.



## Appendix A: Background

This appendix contains background information about DNR-managed forestlands under the *State Trust Lands Habitat Conservation Plan*.

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### State Trust Lands Habitat Conservation Plan

The *State Trust Lands Habitat Conservation Plan* (HCP) is a long-term land management plan that is authorized under the Endangered Species Act (ESA) and prepared in partnership with the United States Fish and Wildlife Service and NOAA Fisheries (the Services). The HCP describes, in a suite of habitat conservation strategies, how the Washington State Department of Natural Resources (DNR) will restore and enhance habitat for threatened and endangered species such as the northern spotted owl, marbled murrelet, and salmon in conjunction with timber harvest and other forest management activities. These strategies range from passive (for example, protecting unique habitats such as cliffs and springs) to active (thinning forests to speed development of habitat). Each strategy is written in the context of an integrated approach to management, in which commercial forest stands are managed to provide both revenue and ecological values such as biodiversity. Through these strategies, DNR offsets the potential harm of forest management activities on individual members of a species by providing for conservation of the species as a whole.



**The Changing Landscape**

DNR uses harvest methods that promote development of structurally diverse forests. These harvest methods, in combination with the HCP's northern spotted owl, riparian, and other habitat conservation strategies, promote biodiversity and fundamentally change the landscape from past forest practices.

Land managed by DNR under the HCP and covered by the incidental take permit (ITP) are referred to in the HCP, ITP, and implementation agreement variously as “DNR-managed lands in the area covered by the HCP,” “PERMIT LANDS,” the “DNR forest lands,” the “DNR-managed lands,” the “lands within the planning units,” and other similar terms. All such terms, unless otherwise indicated used in the HCP, ITP, or the implementation agreement refer to those lands identified in Map I.1 of the HCP as “DNR-managed HCP lands” in addition to those lands that have been added to the HCP planning units through land transactions. (See HCP Appendix B, p. 3, 15.0 for further discussion.)

An HCP is required to obtain an incidental take permit, which allows incidental take of a threatened or endangered species. Incidental take means harming or killing individuals of a listed species “if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity” such as a timber harvest [[16 U.S. Code 1539 \(a\)\(1\)\(B\)](#)].

By meeting the terms of the HCP and incidental take permit, DNR fulfills its obligations under the ESA. In this way, the HCP and incidental take permit provide DNR the stability, certainty, and flexibility needed to meet its fiduciary and ecological responsibilities as a trust lands manager to provide a perpetual source of revenue to trust beneficiaries while simultaneously developing a

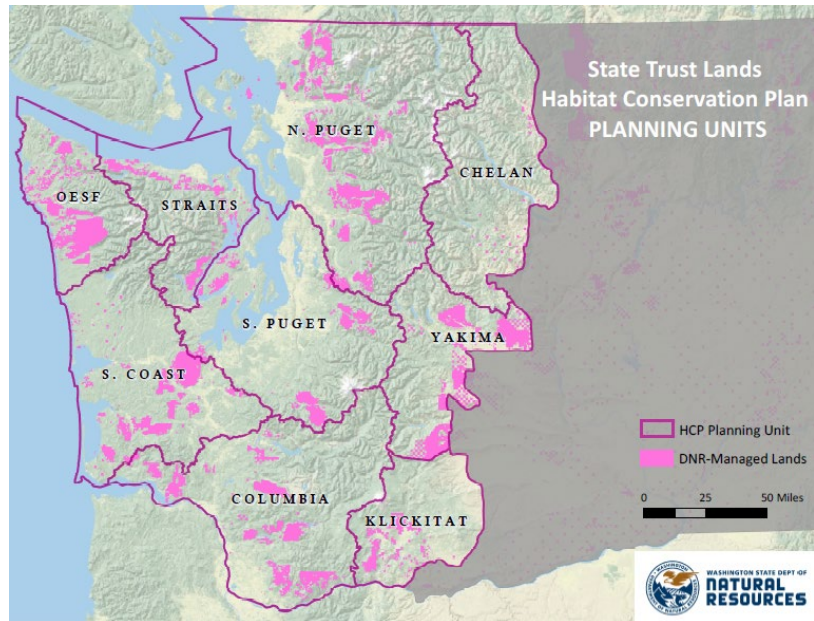
complex, healthy, resilient forest ecosystem capable of supporting native species. The HCP was signed in January 1997.

## Lands Covered by the HCP

DNR manages approximately 2.4 million acres of forestland statewide. Of this amount, the HCP guides management of approximately 1.9 million acres of forestland within the range of the northern spotted owl (*Strix occidentalis caurina*). In general, these 1.9 million acres are located between the western coast and eastern slopes of the Cascade Range in Washington, from the Canadian border to the Columbia River. To manage these areas more effectively and efficiently, DNR divided this area into nine planning units based primarily on large watersheds (Map A-1).

Implementation of the HCP conservation objectives for the nine planning units is grouped into the three areas: 1) the five westside planning units except the OESF (HCP, p. IV.3), 2) the OESF (HCP, p. IV.86), and 3) the three eastside planning units (HCP, p. IV.19). The five westside planning units are Straits, North Puget, South Puget, South Coast, and Columbia. The three eastside planning units are Yakima, Chelan, and Klickitat.

DNR provides [GIS data for lands covered by the HCP](#) to allow for public analysis and to facilitate comparisons with relevant GIS layers maintained by the Services.



Map A-1: HCP Planning Units

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## Comprehensive Reviews

The HCP Implementation Agreement (Section 21.0, p. B.8) requires periodic comprehensive reviews of the HCP, the Incidental Take Permit, and the Implementation Agreement, as well as consultation in good faith between DNR and the Federal Services to identify amendments that might more effectively and economically mitigate incidental take. In 2012, DNR and the Federal Services agreed to conduct annual comprehensive review by subject as funding and staffing allow. Table A-1 provides a summary of the comprehensive reviews completed since 2012.

Table A-1: Comprehensive Reviews Developed for HCP Annual Reports

Link to Report <sup>1</sup>	Subject
<a href="#">FY 2012 Annual Report</a>	Road Management
<a href="#">FY 2013 Annual Report</a>	Silviculture Activities
	Northern Spotted Owl Data

<a href="#">FY 2014 Annual Report</a>	Land Transactions
	Natural Areas
<a href="#">FY 2016 Annual Report</a>	Implementation Monitoring
	Effectiveness Monitoring
<a href="#">FY 2017 Annual Report</a>	Recreation
<a href="#">FY 2018 Annual Report</a>	Riparian Forest Habitat Restoration
<a href="#">FY 2019 Annual Report</a>	Forest Inventory

<sup>1</sup>A comprehensive review was not completed for the FY 2015 or FY 2020 report due to limited staff capacity.

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## Conservation Objectives for ESA-Listed and Other Species

The HCP includes habitat conservation strategies for the northern spotted owl, the marbled murrelet, riparian areas, and other species of concern. These four strategies are individually described in the HCP, but each is linked to and benefits from the other strategies.

### Northern Spotted Owl Conservation Strategy

#### *Northern Spotted Owl Management Areas*

DNR is committed to providing habitat to help maintain nesting and foraging areas for northern spotted owls and to facilitate the owl's movement through the landscape. When the HCP was developed, DNR identified DNR-managed lands that were most important to northern spotted owl conservation. These designated northern spotted owl management areas include three subsets:

- **Nesting, roosting, and foraging (NRF) management areas:** Areas likely to provide demographic support and contribute to maintaining species distribution. Demographic support is the contribution of individual, territorial northern spotted owls or clusters of northern spotted owl sites to the stability and viability of the entire population. Maintenance of species distribution supports the continued presence of a northern spotted owl population in as much of its historic range as possible (HCP, p. IV.1). NRF management areas on the westside were identified in the North Puget, South Puget, and Columbia planning units.
- **Dispersal management areas:** Areas important for facilitating northern spotted owl dispersal (movement of young owls from nesting sites to new breeding sites). Dispersal management areas on the westside were identified in the North Puget, South Puget, and Columbia planning units.
- **OESF management area:** DNR-managed lands in the OESF; refer to [Northern Spotted Owl Conservation in the OESF HCP Planning Unit](#) later in this section for more information.



Northern Spotted Owl. Photo courtesy of USFWS.

In 2006, DNR designated another type of northern spotted owl management area called an “owl area.” Owl areas are lands outlined in section I.C.1 of the Settlement Agreement *Washington Environmental Council, et al. v. Sutherland, et al.* (King County Superior Court No. 04-2-26461-8SEA, vacated April 7, 2006). These areas were a) designated in HCP Implementation Memorandum No. 1 (January 12, 1998), (b) located within Washington Department of Fish and Wildlife (WDFW) Status 1-R (reproductive) owl circles, and (c) located within the four areas identified in DNR’s Standard Practice Memorandum 03-07 (*Management of Northern Spotted Owl Circles and the Identification of Northern Spotted Owl Habitat in Southwest Washington*). Owl areas are intended to sunset when the commitments of the Settlement Agreement are met.

### Northern Spotted Owl Habitat Classes and Types

Each northern spotted owl management area is managed for certain habitat classes, and each habitat class includes specific habitat types. Table A-2 provides habitat classifications and types for each westside northern spotted owl management area

Through HCP research and monitoring commitments, DNR is working to develop a better understanding of what constitutes functional northern spotted owl habitat and to learn which silvicultural techniques create owl habitat.

Table A-2: Habitat Classifications and Types for Each Westside Northern Spotted Owl Management Area.

Northern Spotted Owl Management Area		Habitat Class		Habitat Type	
NRF		NRF habitat	High-quality habitat	High-quality nesting Type A Type B	
			Sub-mature habitat	Sub-mature	
Dispersal	All other westside planning units	Dispersal habitat	High-quality habitat	High-quality nesting Type A Type B	
			Sub-mature habitat	Sub-mature	
			Dispersal habitat	Young forest marginal Dispersal	
	South Puget HCP Planning Unit only	Dispersal habitat	Movement, roosting, and foraging (MoRF) plus habitat	High-quality nesting Type A Type B MoRF	
			Movement plus habitat	Sub-mature Young forest marginal Movement	
OESF		Old Forest Habitat		Old forest High-quality nesting Type A Type B	
			Structural habitat	Sub-mature Young forest marginal	
		Owl Area		High-quality habitat	High-quality nesting Type A Type B
				Low quality habitat	Sub-mature Young forest marginal



As noted in this year's Conservation Strategy Updates ([Section 2.1.2](#)), northern spotted owl habitat is now calculated using data from the DNR Remotely Sensed Forest Resources Information System (RS-FRIS; see the [FY 2019 HCP Annual Report](#) for background on RS-FRIS).

With the adoption of RS-FRIS, the queries listed in Table A-3 were slightly modified to account for the higher precision of RS-FRIS data and to better match the wording in the HCP (see [Section 2.1.2](#) for specifics). Table A-3 includes the definitions of each habitat type as well as the queries DNR uses to identify it using RS-FRIS data.

Table A-3: Northern Spotted Owl Habitat Types, Definitions, and Data Queries.

Habitat Type	Habitat Definitions (HCP p. IV.11-12 and WAC 222-16-085)	Data Query Used to Interpret Habitat Definitions
<b>High-Quality Nesting</b>	At least 31 trees per acre are greater than or equal to 21 inches diameter at breast height (dbh) with at least 15 trees, of those 31 trees, per acre greater than or equal to 31" dbh	(Live trees $\geq$ 21" diameter class) $\geq$ 31 trees per acre <b>and</b> (Live trees $\geq$ 31" diameter class) $\geq$ 15 trees per acre <b>and</b>
	At least 12 snags per acre larger than 21" dbh	(Snags $\geq$ 21" diameter class) $\geq$ 12 trees per acre <b>and</b>
	A minimum of 70% canopy closure	Canopy closure $\geq$ 70 <b>and</b>
	A minimum of 5% ground cover of large woody debris	(Down wood $\geq$ 4" diameter class) $\geq$ 2,400 ft. <sup>3</sup> per acre
	At least three of the 31 trees $\geq$ 21" dbh have broken tops	Not in query
<b>Type A</b>	A multi-layered, multispecies canopy dominated by large ( $\geq$ 30" dbh) overstory trees (typically 15–75 trees per acre)	Canopy layers $\geq$ 2 <b>and</b> Secondary species is not null <b>and</b> (Live trees $\geq$ 30" diameter class) $\geq$ 15 trees per acre and $\leq$ 75 trees per acre <b>and</b>
	Greater than 70% canopy closure	Canopy closure $>$ 70 <b>and</b>
	More than two large snags per acre, 30" dbh or larger	(Snags $\geq$ 30" diameter class) $\geq$ 2.5 trees per acre <b>and</b>
	Large accumulations of fallen trees and other woody debris on the ground	(Down wood $\geq$ 4" diameter class) $\geq$ 2,400 ft. <sup>3</sup> per acre
	A high incidence of large trees with various deformities such as large cavities, broken tops, and dwarf mistletoe infection	Not in query
	<b>Type B</b>	Few canopy layers, multispecies canopy dominated by large (greater than 20" dbh) overstory trees (typically 75–100 trees per acre, but can be fewer if larger trees are present)
Greater than 70% canopy closure		Canopy closure $>$ 70 <b>and</b>

Appendix A

Habitat Type	Habitat Definitions (HCP p. IV.11-12 and WAC 222-16-085)	Data Query Used to Interpret Habitat Definitions
	Large (greater than 20" dbh) snags present	(Snags $\geq$ 20" diameter class) $\geq$ 1 tree per acre <b>and</b>
	Accumulations of fallen trees and other woody debris on the ground	(Down wood $\geq$ 4" diameter class) $\geq$ 2,400 ft. <sup>3</sup> per acre
	Some large trees with various deformities	Not in query
<b>MoRF</b>	Forest community dominated by conifers, or in mixed conifer/hardwood forest, community composed of at least 30% conifers (measured as stems per acre dominant, co-dominant, and intermediate trees)	(Live conifers $\geq$ 4" diameter class) $\geq$ 30% of all live trees per acre <b>and</b>
	At least 70% canopy closure	Canopy closure $\geq$ 70 <b>and</b>
	Tree density between 115 and 280 trees greater than 4" dbh per acre	(Live trees $\geq$ 4" diameter class) $\geq$ 115 and $\leq$ 280 trees per acre <b>and</b>
	Dominant and co-dominant trees at least 85' tall	(Largest 40 live trees per acre) $\geq$ 85' tall <b>and</b>
	Minimum of 5% ground cover of large down woody debris	(Down wood $\geq$ 4" diameter class) $\geq$ 2,400 ft. <sup>3</sup> per acre <b>and</b>
	At least three snags or cavity trees per acre that are at least 15" dbh	(Snags $\geq$ 15" diameter class) $\geq$ 3 trees/acre <b>and</b>
	At least two canopy layers	Canopy layers $\geq$ 2
<b>Sub-Mature</b>	Forest community dominated by conifers, or in mixed conifer/hardwood forest, community composed of at least 30% conifers (measured as stems per acre dominant, co-dominant, and intermediate trees)	(Live conifers $\geq$ 4" diameter class) $\geq$ 30% of all live tree/acres <b>and</b>
	At least 70% canopy closure	Canopy closure $\geq$ 70 <b>and</b>
	Tree density of between 115 and 280 trees greater than 4" dbh per acre	(Live trees $\geq$ 4" diameter class) $\geq$ 115 and $\leq$ 280 trees per acre <b>and</b>
	Dominant and co-dominant trees at least 85' tall	(Largest 40 live trees/acre) $\geq$ 85' tall <b>and</b>
	At least three snags or cavity trees per acre that are at least 20"	(Snags $\geq$ 20" diameter class) $\geq$ 3 trees per acre <b>and</b>
<b>Young Forest Marginal (Same as Sub-Mature Except for Snag and Down Wood Requirements)</b>	Forest community dominated by conifers, or in mixed conifer/hardwood forest, community composed of at least 30% conifers (measured as stems per acre dominant, co-dominant, and intermediate trees)	(Live conifers $\geq$ 4" diameter class) $\geq$ 30% of all live trees per acre <b>and</b>
	At least 70% canopy closure	Canopy closure $\geq$ 70 <b>and</b>
	Tree density between 115 and 280 trees greater than 4" dbh per acre	(Live trees $\geq$ 4" diameter class) $\geq$ 115 and $\leq$ 280 trees per acre <b>and</b>
	Dominant and co-dominant trees at least 85 feet tall	(Largest 40 live trees/acre) $\geq$ 85' tall <b>and</b>

Habitat Type	Habitat Definitions (HCP p. IV.11-12 and WAC 222-16-085)	Data Query Used to Interpret Habitat Definitions
	Snags greater than or equal to 2 per acre (greater than or equal to 20 inches dbh and 16" tall) OR ≥ 10% of the ground covered with 4" diameter or larger wood, with 25–60% shrub cover	(Snags ≥ 20" diameter class) ≥ 2 trees per acre <b>or</b> (Down wood ≥ 4" diameter class) ≥ 4,800 ft. <sup>3</sup> per acre
<b>Movement</b>	Canopy closure at least 70%	Canopy closure ≥ 70 <b>and</b>
	Quadratic mean diameter of 11" dbh for the 100 largest trees per acre in a stand	(Largest 100 live trees per acre) ≥ 11" quadratic mean diameter (QMD) <b>and</b>
	Forest community dominated by conifers, or in mixed conifer/hardwood forest, community composed of at least 30% conifers (measured as stems per acre dominant, co-dominant, and intermediate trees)	(Live conifers ≥ 4" diameter class) ≥ 30% of all live trees per acre <b>and</b>
	Tree density no more than 280 trees per acre ≥ 3; 5" dbh	(Live trees ≥ 4" diameter class ≤ 280 trees per acre <b>and</b>
	Top height of at least 85 feet (top height is the average height of the 40 largest diameter trees per acre)	(Largest 40 live trees per acre) ≥ 85' tall
	At least four trees per acre from the largest size class retained for future snag and cavity tree recruitment	Not in query
<b>Dispersal</b>	Canopy cover at least 70%	Canopy closure > 70 <b>and</b>
	Quadratic mean diameter of 11" dbh for 100 largest trees per acre in a stand	(Largest 100 live trees per acre) ≥ 11" QMD <b>and</b>
	Top height of at least 85'	(Largest 40 live trees per acre) ≥ 85' tall
	At least four trees per acre from the largest size class retained for future snag and cavity tree recruitment	Not in query
<b>Old Forest</b>	Stands classified as the old forest habitat type were identified through implementation of the interim marbled murrelet conservation strategy. As part of the strategy, DNR conducted map and field reviews to delineate remnant patches of older forest to estimate how much potential murrelet habitat was present in the OESF. Although more than 40,000 acres were initially delineated for the purposes of eventually conducting murrelet surveys, the stands also coincided with unknown and suitable NSO habitat. In 2005 and 2006, during the Settlement Agreement negotiations, the Settlement Agreement Partners agreed to include those 40,000+ acres of older forest stands as the old forest habitat type, a fourth habitat type in the old forest habitat class.	

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#### **Tracking Northern Spotted Owl Habitat**

Within each northern spotted owl management area, DNR tracks habitat using spotted owl management units (SOMUs).

- In most HCP planning units, SOMUs are derived from 1997 watershed administrative units (WAUs) and in some cases modified, in accordance with the HCP, to improve conservation and management capability. For eastside dispersal management areas, SOMUs are derived from ¼ townships.

Appendix A

- In the OESF HCP Planning Unit, SOMUs are derived from landscape planning units, not WAUs (the OESF is divided into 11 landscape planning units, which are administrative areas designated primarily along watershed boundaries).
- In the South Puget HCP Planning Unit, SOMUs are based on designated dispersal management landscapes (dispersal management landscapes are used only in the South Puget HCP Planning Unit and were defined through forest land planning).
- For the Klickitat HCP Planning unit, SOMUs are based on sub-landscapes which were defined through an [amendment to the HCP](#). Sub-landscapes are used only in this unit.

The NSO conservation strategy in the HCP involves maintaining thresholds of habitat in each SOMU. Most designated NRF and dispersal SOMUs have a 50 percent overall habitat threshold.

For the OESF and South Puget HCP Planning Units, habitat thresholds have two objectives. For example, the OESF has a 40 percent overall habitat threshold objective which is further defined as restoring and maintaining at least 20 percent of each SOMU as old forest habitat with the rest composed of structural or better habitat. In the South Puget HCP Planning Unit, dispersal management areas have a 50 percent overall threshold, 35 percent of which is MoRF-plus habitat, and 15 percent of which is Movement-plus habitat.

Table A-4 describes habitat thresholds for selected HCP planning units.

Table A-4: Habitat Thresholds for HCP Planning Units

HCP Planning Unit	Habitat Threshold		Habitat Classification	Habitat Types
<b>OESF</b>	40% of each SOMU	At least 20%	Old Forest Habitat	Old Forest
				High-quality nesting
				Type A
				Type B
		20%	Structural habitat	Sub-mature
			Young forest marginal	
<b>South Puget</b>	50% of each NRF SOMU		High-quality habitat	High-quality nesting
				Type A
			Type B	
			Sub-mature habitat	Sub-mature
	50% of each dispersal SOMU	At least 35%	MoRF plus habitat	High-quality nesting
				Type A
			Type B	
			MoRF	
	15%	Movement plus habitat	Sub-mature	
			Young forest marginal	
			Movement	
<b>All Other Westside Planning Units</b>	50% of each NRF SOMU		High-quality habitat	High-quality nesting
				Type A
			Type B	
			Sub-mature habitat	Sub-mature
	50% of each dispersal SOMU	High-quality habitat		High-quality nesting
				Type A
			Type B	
		Dispersal habitat		Sub-mature
Young forest marginal				
			Dispersal	

In general, harvest activities must not increase the amount of time required to achieve habitat goals beyond what would be expected in an unmanaged stand. To ensure that procedures are being followed and goals are being met, DNR tracks the types and amounts of silvicultural activities in designated NRF and dispersal management areas.

### ***Northern Spotted Owl Conservation in the OESF HCP Planning Unit***

The HCP describes the management approach for the OESF as “unzoned,” in that special zones are not set aside for either ecological values or revenue production. The goal behind this experimental management approach is to learn how to integrate revenue production and ecological values across state trust lands in the OESF.

However, DNR acknowledges that the OESF has fixed geographic features that require special management considerations. Examples include riparian areas, wetlands, potentially unstable slopes, and talus fields. Therefore, DNR currently uses the term “integrated” instead of “unzoned” to describe the management approach for the OESF.

Under this approach, DNR does not designate NRF or dispersal areas. Instead, in each of the OESF’s 11 SOMUs, DNR restores and maintains the following minimum habitat thresholds: 40 percent northern spotted owl habitat, of which at least 20 percent is old forest habitat, and the remaining 20 percent is structural habitat or better. This strategy, which restores northern spotted owl habitat capability, is based on working hypotheses concerning the necessary quality, quantity, and distribution of habitat.

In October 2016, DNR adopted the [OESF Forest Land Plan](#) that will guide management of more than 270,000 acres of forestland on the Olympia Peninsula. DNR’s approach to assessing and mapping the current extent of NSO habitat for the OESF Forest Land Plan involved modeling numerous forest attributes from 2009 to 2109, including the presence of snags and down wood, which had been previously included as static features in NSO habitat models. Modeling snags and down wood allowed DNR to more accurately map NSO habitat across the OESF.

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### ***Northern Spotted Owl Conservation in the Klickitat HCP Planning Unit***

In the Klickitat HCP Planning Unit, many stands are overstocked with tree species that are susceptible to stand-replacing fires, drought, disease, and insect infestations. In addition, some lands originally designated as NRF management areas are not — nor will they ever be — capable of sustaining northern spotted owl habitat. This makes the original habitat goal for this unit difficult to achieve.

In April 2004, DNR implemented an amended spotted owl conservation strategy ([\*HCP Amendment No.1, Administrative Amendment to the Northern Spotted Owl Conservation Strategy for the Klickitat HCP Planning Unit\*](#)) to address these issues in the Klickitat HCP Planning Unit. This amended strategy involves designating four sub-landscapes within the planning unit and using field assessments, forest inventory data, and spotted owl demography data to create habitat targets for each sub-landscape.

In addition, DNR renamed dispersal management areas as desired future condition (DFC) management areas. Klickitat DFC management areas have the same habitat commitments as dispersal management areas, but they are managed by vegetation series with the goal of maintaining 50 percent of each vegetation series, by sub-landscape, in a mature DFC (at least 60 years old). Areas

incapable of growing and sustaining habitat and those better suited for a different habitat classification have been reclassified.

DNR also adjusted the Klickitat HCP Planning Unit boundaries to exclude approximately 23,000 acres of dispersal management area. These acres, which are located north of Yakama Nation Lands, are now part of the Yakima HCP Planning Unit.

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## Marbled Murrelet Conservation Strategy

When the HCP was signed in 1997, DNR had insufficient information to create a long-term conservation strategy for the marbled murrelet. Murrelet ecology and habitat use were not well understood at the time, particularly in relation to nesting habitat on DNR-managed lands. To address this, the HCP specified that an interim strategy be implemented while DNR conducted inventories, surveys, and additional research to support development of a long-term strategy.

In November 2019, DNR and the USFWS released a [final environmental impact statement](#) (FEIS) on a long-term strategy for marbled murrelet conservation for the six western Washington HCP planning units. Concurrent with the release of the FEIS, DNR published a proposed amendment to the HCP that would replace the interim marbled murrelet conservation strategy with a long-term strategy. At this same time, the USFWS published several documents related to the marbled murrelet long-term conservation strategy:

- [Biological Opinion](#)
- [Record of Decision](#)
- [Findings and Recommendations](#)
- [Incidental Take Permit](#)

Following extensive research, public consultation, input from an independent science team, and several years of consultation with USFWS on the development of alternatives for a long-term conservation strategy, the Board of Natural Resources adopted a long-term strategy in December 2019. Additional information can be found at the [Marbled Murrelet](#) and the [Long-Term Conservation Strategy](#) webpages.

The marbled murrelet long-term conservation strategy (the [MM Amendment](#)) replaces the interim strategy; close-out information for the interim strategy is provided in the FY 2019 HCP Annual Report.

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Figure A-5: An Occupied Site in the OESF HCP Planning Unit. Photo courtesy of Heidi Tate.



## Riparian Conservation Strategy

For the five westside HCP planning units, the HCP riparian conservation strategy was developed with two specific objectives:

- Maintain or restore freshwater habitat for salmonids on state trust lands, and
- Contribute to the conservation of other species that depend on aquatic and riparian habitats, including wetlands (HCP, p. IV.55).

Meeting these objectives means using RMZs and WMZs to provide clean water, shade, and large logs for streams. It also means preventing sediment delivery to streams and wetlands through management standards for road building and for conducting forest management activities on potentially unstable slopes and rain-on-snow areas.

Adopted in 2006, the [Riparian Forest Restoration Strategy \(RFRS\)](#) is part of the HCP riparian conservation strategy. The RFRS, which applies to all westside HCP planning units except the OESF, was developed by a technical review committee consisting of technical staff from DNR, NOAA, USFWS, Northwest Indian Fisheries Commission, and WDFW.

Under the RFRS, DNR designs riparian forest thinnings to restore older forest structure and species composition in areas where historic timber harvest created stands that were even-aged and overstocked. DNR uses canopy gaps and “skips” — areas that are left unmanaged — to help increase structural diversity and accelerate the development of habitat. Candidate stands for RFRS treatments are often missing long-lived conifer species like western red cedar, or are dominated by short-lived species like red alder. Accelerating the growth of large conifer trees is an important part of the RFRS. Over time, these trees will provide shade and nutrient-rich litter to streams when they are alive and large woody debris when they die and fall over. Large woody debris in the stream channel creates pools and cover which are important for salmon habitat. Once the riparian forest is on a developmental trajectory to reach an older forest structural condition, further restoration activities are low priority and site-specific. During the initial RFRS implementation period, thinning in stands 70 years of age or older was conducted on a site-specific basis in consultation with the Services. This restriction was lifted in 2012 through a [joint concurrence letter](#) signed by DNR and the Services.

### ***Headwaters Conservation Strategy***

In 2007, DNR collaborated with the Services and the scientific community to develop a draft Headwaters Conservation Strategy to guide forest management along Type 5 streams and complete the HCP riparian conservation strategy. It was determined, however, that the draft strategy would have required a high level of spatial tracking to comply and document, and it would have introduced a prohibitive number of management decisions to complete each timber sale. As a result, a simpler alternative draft headwaters strategy is being developed that will meet the original conservation objectives of the previous version. This alternative strategy incorporates emerging ideas about the importance of non-fish-bearing stream habitat for ecosystem conservation and downstream fish habitat quality.

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## Multispecies Conservation Strategy

In addition to providing habitat for ESA-listed species, the conservation objectives developed for the HCP were designed to provide appropriate habitat protection for many native species not currently listed or protected under the ESA. The HCP also specifies habitat protection for numerous Washington state-listed plant and animal species of concern.

### *Uncommon Habitat Objectives*

The multispecies conservation strategy involves identification and protection of uncommon habitat types for unlisted species. These habitat types include caves, cliffs, talus slopes, wetlands, balds, mineral springs, snags, oak woodlands, and large structurally unique trees. These habitat types provide nesting, roosting, hiding, and foraging opportunities for many species.



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## Adaptive Management, Monitoring, and Research

Monitoring and research provide the information necessary to improve the implementation and effectiveness of the conservation strategies in the HCP. Monitoring and research also help DNR document how well different plans and actions are working to achieve the desired outcomes. The information gained can be used to adjust or adapt DNR's management practices as needed.

Since the HCP was adopted in 1997, there have been advances in understanding the ecology of northern spotted owl, marbled murrelet, and other species addressed by the HCP and how they are affected by land management. However, much remains to be learned, and new systems and techniques continue to be developed and tested. Monitoring and research support the completion of conservation strategies, evaluate their implementation and effectiveness, test promising alternatives to current conservation approaches, and contribute to the ecological foundation of habitat management on DNR-managed lands.

The adaptive management process outlined in the HCP allows changes to DNR forest management techniques and activities when results from the research and monitoring programs or new information from scientific literature indicate that such changes are warranted. For example, adaptive management has resulted in management modifications such as the [Riparian Forest Restoration Strategy](#), the [Administrative Amendment to the Northern Spotted Owl Conservation Strategy for the Klickitat HCP Planning Unit](#), and a [legacy tree procedure for eastern Washington](#) that protects old-growth trees and stands.

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## Adaptive Management and the Conservation Strategies

Adaptive management is a way to manage natural resources when knowledge of ecosystem functions or the effects of human actions is incomplete. New scientific developments and information obtained through research and monitoring can identify changes in DNR management practices that would help address the needs of specific species or improve habitat conditions. For this reason, the HCP includes



provisions for a dynamic, science-based adaptive management process that allows for continual improvement of management strategies and practices. The adaptive management process includes the following tasks:

- Set research priorities
- Develop study plans
- Manage research projects
- Review results
- Make changes to DNR’s forest management practices if necessary
- Monitor management activities to inform continuous improvement

Currently, adaptive management is implemented through two processes: the State Lands Adaptive Management Program and the OESF adaptive management process. These processes are closely linked, though they differ in scope and level of formalization. The State Lands Adaptive Management Program includes activities throughout DNR managed lands, while the OESF adaptive management process focuses on activities in the OESF. Unlike the statewide program, the OESF process is guided by an administrative procedure, adopted in FY 2017, which describes the steps of the process and the responsible parties. Development of the OESF Forest Land Plan resulted in the separate OESF adaptive management process, as this process is an integral part of the management of the OESF.

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## Implementation, Effectiveness, and Validation Monitoring

A science-informed adaptive management program relies primarily on research and monitoring to provide new, relevant information for increasing confidence in current management or developing new management options. A system consisting of three types of monitoring — implementation, effectiveness, and validation — has become a common organizational framework for monitoring programs in forest management.

- **Implementation monitoring** determines whether or not the HCP is being implemented properly on the ground, and is sometimes referred to as compliance monitoring.
- **Effectiveness monitoring** determines whether or not the HCP strategies are producing the desired habitat conditions.
- **Validation monitoring** determines whether or not a certain species responds to the desired habitat conditions as anticipated.

### *Implementation Monitoring*

The HCP requires DNR to monitor its implementation of the conservation strategies to ensure that the physical outcomes of management activities match DNR’s intention as described in the HCP. Conservation strategies are selected for implementation monitoring based on a number of criteria. These criteria may include the level of risk or uncertainty associated with the strategy, the level of management discretion, the cost and timeliness of monitoring results, new information, and input from the Services and DNR managers. Examples of monitoring projects include monitoring large, structurally unique trees left on timber sales following harvest, monitoring for compliance with the northern spotted owl conservation strategy, and monitoring of management activities in WMZs and RMZs.

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### ***Effectiveness Monitoring and Research for HCP Conservation Strategies***

Effectiveness monitoring documents changes in habitat conditions, including general forest structure and specialized habitat features that result from timber harvest and other forest management activities. Only habitat areas addressed by the conservation strategies are monitored for effectiveness.

Information from this type of monitoring increases DNR's ability to understand the influence of land management on aquatic and upland habitat conditions, and to effectively implement the conservation strategies to reach the goals of the HCP.

#### **Northern Spotted Owl Conservation Strategy Effectiveness Monitoring**

The objective of northern spotted owl research and effectiveness monitoring is to help DNR better understand the habitat needs of the northern spotted owl and how to effectively manage forest stands and landscapes to create and sustain suitable habitat. The effectiveness monitoring program evaluates whether the HCP strategies and associated silvicultural treatments maintain or enhance NRF and dispersal habitat. Effectiveness monitoring also supports the adaptive management goals for the northern spotted owl conservation strategy, such as developing better stand- and landscape-level habitat definitions.

The NSO Effectiveness Monitoring Program currently consists of two primary components:

- Long-term tracking of the effects of variable density thinnings on habitat structure in stands designated as habitat.
- Landscape-scale monitoring of basic habitat indicators across the entire westside HCP land base.

DNR is also conducting two research projects related to NSO effectiveness monitoring:

- Measurement of the response of habitat features to small-gap creation within thinned stands.
- Comparison of the spatial structure of both thinned and unthinned stands designated as habitat to late-successional reference stands known to function as NSO habitat.

#### **Status and Trends Monitoring of Aquatic and Riparian Habitat in the OESF**

The key objectives of the Status and Trends Monitoring Program are to provide empirical data to evaluate DNR's progress in meeting the HCP riparian conservation objectives and to reduce uncertainties around the integration of habitat conservation and timber production. The study's main hypothesis is that implementation of the HCP riparian conservation strategy for the OESF allows natural processes of ecological succession and disturbance to improve habitat conditions across managed watersheds over time. Starting in 2012, DNR has monitored stream reaches and adjacent riparian forests in 50 Type 3 watersheds representative of the OESF and four reference sites in the Olympic National Park. In 2018, DNR added six unmanaged or minimally managed watersheds on the western Olympic National Forest to the network of reference sites.

Nine habitat attributes — including stream temperature, shade, and microclimate — are field-sampled at reach level. Watershed-level disturbances such as windthrow, timber sales, and road management are sampled remotely and through operational records. When integrated with information on management activities in the OESF, the monitoring data from this project will allow DNR to make inferences about the effects of specific forest management operations on habitat, thus helping DNR fulfill its commitments for effectiveness monitoring and implementation of adaptive

management under the HCP. The project is conducted and funded by DNR in collaboration with the USFS Pacific Northwest Research Station and the Olympic National Forest.

### Riparian Silviculture Effectiveness Monitoring

The objective of effectiveness monitoring for riparian silviculture is to determine whether various restoration thinning treatments are resulting in riparian habitat conditions that support salmon recovery efforts and contribute to the conservation of other riparian and aquatic species. To achieve this, DNR has established several permanent monitoring sites in the OESF, North Puget, and South Puget HCP planning units in which various habitat metrics are measured immediately before and after thinning treatments, and periodically thereafter. Thinning treatments are characteristic of treatments implemented under the 2006 Riparian Forest Restoration Strategy and are intended to facilitate the development of structurally complex riparian forests.

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### *Validation Monitoring*

The HCP requires that DNR conduct riparian validation monitoring across the conglomeration of state-managed lands in the OESF. Validation monitoring is defined in the HCP as monitoring “to evaluate cause-and-effect relationships between habitat conditions resulting from implementation of the conservation strategies and the animal populations these strategies are intended to benefit (V.2).” The riparian conservation strategy for the OESF in the HCP was designed to protect or improve habitat for viable salmonid populations. The strategy consists of: (1) interior-core buffers to protect soils on floodplains and unstable stream banks, incised stream valleys, and adjoining unstable slopes; (2) exterior, or wind buffers adjacent to interior buffers, as needed, to protect against blowdown; (3) a comprehensive program of road management, maintenance, and improvement including stabilizing and decommissioning particularly risky roads; and (4) protecting forested wetlands. Riparian validation monitoring will determine if the riparian conservation strategy is maintaining or improving salmonid habitat and expressing stable or positive effects on salmonids as anticipated in the HCP.

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## OESF Research and Monitoring Program

The Olympic Experimental State Forest (OESF) is designated with the objective of learning how to integrate revenue production (primarily through timber harvesting) and ecological values (primarily habitat conservation). New scientific knowledge is applied by DNR to continually improve land management practices through a formal process of adaptive management. Knowledge gained is expected to benefit other land managers facing similar challenges of meeting multiple objectives in a working forest.

The OESF Research and Monitoring Program implements and coordinates research and monitoring projects on the OESF; facilitates the adaptive management process at DNR; fosters science communication and outreach; manages research and monitoring information; establishes and maintains research partnerships with universities, colleges, federal agencies and other organizations; collaborates with local land managers, tribes, environmental organizations and regulators on research and monitoring projects; and provides educational opportunities.

### *Current and Past Research and Monitoring in the OESF*

Information on [recently completed](#) and [ongoing](#) research in the OESF can be found on the OESF website. These projects are focused on DNR’s needs for revenue generation, environmental

protection, and long-term sustainability. The majority of the past research and monitoring activities are listed in the OESF [Research and Monitoring Catalog](#), published by DNR in 2008.

### ***Adaptive Management***

Adaptive management is an HCP commitment. In the [OESF Forest Land Plan](#), it is defined as a formal process for continually improving management practices by learning from the outcomes of operational and experimental activities. Adaptive management in the OESF focuses on integration of revenue production and ecological values, and its theoretical foundation, goal, and scope are described in the OESF Forest Land Plan. DNR follows an administrative procedure for adaptive management in the OESF, which describes the step-by-step process and identifies the parties responsible for implementation.

### ***Communication, Outreach, and Education***

Through effective communication, DNR shares the scientific knowledge developed in the OESF, builds public confidence in the sustainability of forest management practices and the effectiveness of the HCP conservation strategies.

The OESF Research and Monitoring Program publishes a biannual electronic newsletter (“[The Learning Forest](#),” a joint effort with the University of Washington ONRC, to share scientific knowledge on sustainable land management on the Olympic Peninsula. The newsletter is distributed in the spring and fall to about 180 subscribers and to DNR and University of Washington students and staff. Current and past issues are posted on the [OESF](#) and [ONRC](#) websites.

The purpose of the annual OESF Science Conference is to communicate results of research and monitoring activities taking place in the OESF and their relevance to land management uncertainties faced by DNR and other land managers. The conference takes place in Forks at the end of April and is attended by natural resource specialists, land managers, students, scientists, and the public.

Several pages on the [DNR website](#) contain information about the OESF, ongoing research and monitoring projects, news, and recent publications. The program’s informal outreach and communication activities include presentations at scientific and public forums, scientific publications, project reports, booths at college fairs, field trips, and other activities.

Educational opportunities in the OESF include internships for undergraduate and graduate students, field trips for K-12 and college students, and lectures and presentations at colleges and universities. The topics covered in these activities range from specific ecological questions to descriptions of environmental monitoring and adaptive management.

### ***Information Management***

The OESF research tracking database includes metadata on ongoing research and monitoring projects related to natural resource management and ecology conducted by DNR or external parties on the OESF. The database stores all scientific and administrative documents on project implementation, as well as references to project GIS data in DNR’s statewide research areas GIS layer.

Individual project data are available upon request. More information, including contact information, can be found on the [OESF website](#).

## Research Partnerships

DNR maintains two formal agreements related to the OESF:

- A memorandum of understanding with USFS Pacific Northwest Research Station for OESF participation in the Experimental Forest and Range Network (a national network of 80 forests and ranches). It encourages collaboration between OESF and USFS scientists and increases the OESF's visibility nationwide.
- A memorandum of understanding between DNR, University of Washington Olympic Natural Resources Center (ONRC), Olympic National Forest, and the USFS Pacific Northwest Research Station. It advances collaboration between the four parties on research, monitoring, and adaptive management of forest ecosystems on the Olympic Peninsula.

Multiple informal partnerships and collaborations are organized and maintained on a project-by-project basis.

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## Silvicultural Activities

Silviculture is the art and science of managing forests to meet objectives. Through silviculture, DNR manages the density and composition of trees in the forest to provide both quality timber for harvest and ecological values such as habitat for threatened and endangered species, healthy watersheds, biodiversity, and resiliency to disease and insects.

### Selecting Silvicultural Activities

DNR implements an array of silvicultural activities (harvest, regeneration, vegetation management, etc.). Which activities are implemented, when, and how often are determined through the silvicultural prescription.

The silvicultural prescription defines desired outcomes (objectives) and how DNR plans to accomplish them (via silvicultural activities) in a forest management unit over an entire rotation. A forest management unit is a contiguous area that is ecologically similar enough to be managed to meet common objectives, and a rotation is the length of time between stand replacement harvests.

#### Objectives

When writing a silvicultural prescription, DNR begins by understanding the unit's contribution to landscape-level objectives set by DNR policies, including the HCP and the *Policy for Sustainable Forests*. Examples of landscape-level objectives include maintaining a certain percentage of the forested landscape as northern spotted owl habitat, or maintaining enough hydrologically mature forest in a watershed to prevent periods of peak flow (periods of high stream flow after storm events).

DNR then applies specific "rotational objectives" to the unit in that context. For example, a unit that contributes to northern spotted owl habitat landscape objectives may have a rotational objective to "attain sub-mature NRF habitat." Rotational objectives are based on the biological capability of the site, including the trees suitable to the site, the site's productive capacity, the presence or absence of competing vegetation, insect and disease issues, and other considerations. Financial and budget constraints also play a role in the selection of rotational objectives.

## Activities

Once DNR defines the rotational objectives and threshold targets, the next step is to determine the sequence of silvicultural activities that are necessary to meet them. The frequency and type of activities DNR selects will depend on the biological capability of the site and the complexity of the prescription. Budget allocations and market conditions also influence the timing and extent of silvicultural activities chosen, and activities may be prioritized based on available resources and relative benefits. Other important considerations include market conditions, ecological constraints, operational constraints (like potentially unstable slopes), new and existing policies and procedures, and new scientific discoveries. As the stand grows, DNR periodically reassesses it to ensure it is on track to meet its objectives.

## Tracking Silvicultural Activities

DNR tracks planned and completed silvicultural activities using a database called Land Resource Manager (LRM). LRM is a tabular database that contains information about the activities that DNR implements on the landscape. For example, for a timber harvest, DNR uses LRM to track information such as harvest method and land class (riparian vs. upland area), or the density and species composition planted during a regeneration activity. In addition to tracking tabular data, LRM integrates a Geographic Information System (GIS) that allows for the spatial tracking of individual forest management activities on the landscape. The previous system used by DNR (Planning and Tracking, P&T), which supplied data for previous HCP Annual Reports until FY 18, lacked the functionality to spatially track individual activities.

Year-to-year variation in the volume of timber harvest is common and is typically associated with variation in the level of silvicultural activity. For example, more stand-replacement harvest in one year will typically lead to more site preparation and planting in the next fiscal year, as well as increased levels of other activities in subsequent years. However, because of the possible lag time between when an activity is implemented and when it is recorded in LRM, it may be a year or more before changes in timber harvest volume and other activities are reflected in the number of acres summarized in this report.

## Descriptions of Silvicultural Activities

### Timber Harvest

DNR tracks each of the following types of harvests:

- **Commercial thinning:** Commercial thinning generates revenue and is performed to meet a wide range of objectives, including improving the growth of the stand, enhancing stand health, reducing tree mortality, or accelerating the development of habitat. Regeneration of a stand is not an objective of thinning.
- **Variable density thinning:** Variable density thinning is a type of commercial thinning that creates a mixture of small openings (gaps), unthinned patches (skips), and varying stand densities to achieve specific objectives, such as



A Variable Density Thinning in the OESF

accelerating development of a complex stand structure. Variable density thinning may also include treatments to create or encourage development of large down wood and snags.

- **Selective product logging:** This type of harvest removes trees of certain species and sizes that are highly valuable such as trees that function well as utility poles or logs for cabins.
- **Seed tree intermediate cut:** A seed tree intermediate cut is the first in a series of harvests that is conducted as part of the even-aged seed tree silvicultural harvest system. The purpose of this harvest type is to provide a desirable seed source to establish seedlings. Typically, about 10 overstory trees per acre may be left following this harvest; once the new trees are established, some of these seed trees may be harvested in a seed tree removal cut.
- **Shelterwood intermediate cut:** This harvest is the first in a series of harvests conducted as part of the even-aged shelterwood harvest system. The purpose of this harvest is to provide shelter (typically shade) and possibly a seed source for the seedlings that are regenerating in the stand. Compared to a seed tree intermediate cut, a shelterwood cut typically retains more overstory trees per acre following harvest; retained trees are generally dispersed across the stand. Once the new trees are established, some of these shelter trees may be harvested in a shelterwood removal cut.
- **Seed tree, shelterwood, or temporary retention removal cut:** In these cuts, some overstory trees retained in the earlier harvests are removed.
- **Uneven-aged management:** In uneven-aged management, trees are removed from a multi-aged forest stand while maintaining multiple age classes within that stand. Uneven-aged management is often used on sites with poor soils on which more intensive management is not cost effective. This type of management may also be used in fire-prone areas to mimic the effects of periodic, lower-intensity fires that do not remove all of the trees.
- **Variable retention harvest:** Variable retention harvest is a type of regeneration, or stand-replacement harvest. With this type of harvest, DNR removes most of the existing forest stand to make room for regeneration of a new stand, while leaving elements of the existing stand, such as down wood, snags, and live leave trees (trees that are not harvested), for incorporation into the new stand. Variable retention harvest is different from a clear-cut, in which all or nearly all of the existing stand is removed.

### ***Forest Site Preparation***

After a stand replacement harvest and before planting the new stand, DNR may remove slash (residue of logging, such as tree limbs) and undesirable plants that would compete with seedlings for nutrients, water, and light. Site preparation may be performed during logging, for example by pulling up and disposing of brush clumps, or after logging by piling and burning slash, manually cutting undesirable vegetation, applying herbicide to undesirable tree and brush species, or a combination of methods.

### ***Forest Regeneration***

Following a stand-replacing harvest, DNR establishes new stands by planting seedlings or allowing the site to seed naturally from adjacent stands or trees that are retained within the harvested area. DNR typically only tracks natural regeneration as an activity in LRM when the associated timber harvest Forest Practices Application (FPA) has a natural regeneration plan; natural regeneration occurs following certain timber harvest methods, such as uneven-aged management, but these trees are tracked using stocking surveys over the life of the stand.

### ***Vegetation Management***

After the site has been planted but before the seedlings have become fully established, DNR may remove competing vegetation to give the new seedlings room to grow. Vegetation may be removed by hand, by mechanical means, or through application of herbicide. Vegetation management is done when competing vegetation will have a negative effect on the stand's ability to meet its objectives.

### ***Pre-Commercial Thinning (PCT)***

During a pre-commercial thinning, DNR removes the less-desirable trees to maintain the growth and stability of the retained trees. PCTs are performed before the trees are large enough to be marketable. This type of thinning does not generate revenue, and cut trees are left on site to decompose.

PCT is needed in some stands to reduce high stem densities. When implemented within the optimal timeframe, this prescription increases the chances that stand development will lead to desired future forest conditions. Proper thinning helps maintain individual tree vigor and accelerates diameter growth, resulting in more rapid attainment of size requirements for product or habitat goals. PCT is a particularly important strategy for addressing forest health concerns, because maintaining lower stand densities with good individual tree vigor is important for making stands more resistant to insect attack. In addition, PCT improves height-to-diameter ratios, a measure of stem stability, reducing risk of windthrow or stem buckling if partial cutting treatments are applied.

PCT does not immediately create habitat for endangered species such as the northern spotted owl or marbled murrelet. However, it can set thinned stands on a developmental trajectory that is more likely to produce future habitat because thinning accelerates the development of large, live trees with stable tree architecture.

### ***Unmanned Aircraft Systems (UAS)***

Throughout the life of a stand, DNR periodically conducts field surveys to assess stand conditions and evaluate the need for future treatment. DNR is beginning to use UAS to supplement or replace young stand surveys as UAS can provide a more cost-effective and safer way to collect data. Footage derived from UAS flights includes information on tree height and density, providing foresters with an additional decision-making tool to refine silviculture prescriptions.

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## **Non-Timber Management Activities**

### **Road Management Activities**

Roads that are improperly constructed or maintained can negatively impact habitat in a number of ways. Such roads can increase the rates of slope failure, contribute sediment to streams, and block fish passages, all of which can potentially harm salmon and other aquatic and riparian-obligate species. Current road-building and maintenance practices create better roads that minimize impacts while also allowing DNR to abandon or improve poorly built roads.

In 2001, Washington's state Forest Practices rules were updated to reflect "Forests and Fish" legislation passed in 1999. This legislation required all large forest landowners to manage forest roads constructed or used for timber harvest and other forest activities after 1974 under an approved road maintenance and abandonment plan (RMAP) by July 1, 2006. The legislation also stipulated



that all forest roads must be improved and maintained to the standards established in WAC 222-24 by 2016. DNR completed a full stream-crossing assessment in 2001 and a road assessment for all forested state trust lands in 2006. In 2015, RMAP rules were changed to allow forest landowners to apply for an extension of the completion date to October 2021. DNR received RMAP block extensions in the following HCP units: South Puget, OESF, Straits, South Coast, Columbia and Yakima. The RMAP work in the other three planning units was completed by the 2016 deadline.

Under the HCP, DNR made a commitment to develop and institute a process to achieve comprehensive, landscape-based road network management. The major components of this process include the following:

- Minimization of active road density.
- A site-specific assessment of alternatives to new road construction (for example, yarding systems) and the use of such alternatives where practicable and consistent with conservation objectives.
- A baseline inventory of all roads and stream crossings.
- Prioritization of roads for decommissioning, upgrades, and maintenance.
- Identification of fish passage blockages caused by stream crossings, and a prioritization of their retrofitting or removal.

DNR evaluates overall active road density through forest land planning (completed for the South Puget and OESF HCP Planning Units). The department conducts site-specific assessments of alternatives to new road construction at the operational level when planning individual activities, and DNR addresses the last three components of this process through implementation of RMAPs.

As part of meeting HCP annual reporting requirements, DNR tracks and reports the number of road miles constructed (newly built roads), reconstructed (existing roads improved to a timber-haul standard), decommissioned (roads stabilized and made impassable to vehicular traffic), or abandoned (roads stabilized and abandoned to forest practices standards), as well as total active forest road miles and the total number of fish barriers removed.

Unlike other activities, road management activities are reported on a calendar year (rather than fiscal year) basis because the end of the fiscal year is at the start of the busiest time of the construction season. Most road work is subject to a hydraulic “work window” that limits in- or near-stream work to the summer (typically June 15 through September 30).

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## Easements and Road Use Permits

DNR grants access across its lands, and acquires access to its lands, through easements and road use permits. Easements are long-term (typically permanent) agreements in which property owners grant the rights to cross their land to another individual or entity.

Easements are an interest in real property, and most transfer with the land, serving landowner after landowner. DNR also receives easements when it acquires lands.

Road use permits are usually short-term rights that do not convey any interest in property and are revocable by the entity that grants them. Permits are generally non-transferrable.

DNR primarily grants easements and road use permits to other governmental entities for public roads and utilities, and to forest and agricultural landowners for access to valuable materials such as timber or rock. DNR also grants easements and road use permits for many other uses, such as irrigation pipelines and railroads. The department acquires easements and road use permits from private individuals and government agencies to allow staff to access DNR-managed lands.

Unlike other categories of non-timber activities, DNR does not report easements and road use permits on a cumulative basis. Only new easements and permits that create a new “footprint” on state trust lands managed under the HCP are reported for each fiscal year. These include easements for new roads and utilities. DNR does not currently have a system to tally total easement acres, primarily because many easements were granted in the early 1900s and hand-entered on records that are now archived. However, easement mapping under the Road Easement GIS and Spatial NaturE projects is helping to address this issue.

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## Land Transactions

DNR’s Land Transactions Program is designed to reposition state trust lands for better long-term management and increased revenue for each of the trusts. Repositioning simply means disposing of properties that do not fit DNR’s management strategies or objectives and acquiring replacement properties that are more suitable. When DNR sells parcels at public auction or transfers (sells) them to other public owners, the department uses the proceeds to acquire replacement lands for the trusts to keep the trust whole.

Land transactions affect the amount of habitat or potential habitat on state trust lands. Transactions may be carried out to consolidate state trust lands in certain areas. Consolidation allows for more cost-effective management and offers opportunities to optimize trust revenue while maintaining habitat and allowing public recreation where appropriate. DNR often consolidates state trust lands by working with owners of adjacent lands to trade their properties for scattered parcels of state trust lands elsewhere.

Often, lands that DNR identifies for disposal are better suited to other public benefits, such as parks or habitat for rare, native species. The department may transfer state trust lands out of trust status into protected status as a NAP or NRCA in the Natural Areas Program. DNR may also transfer state trust



**DNR Staff Reviewing a Proposed Easement**

Photo courtesy of Kaerlek Janislampi.

lands to other government agencies to be used as parks or open space or for public facilities. When this happens the department compensates the trust at fair market value and acquires replacement properties to maintain trust assets over time. Acquired lands are assessed to determine if they should be included as HCP permit lands (managed subject to the commitments in the HCP). If they are found to qualify, DNR determines whether they should be designated as northern spotted owl NRF or dispersal management areas. DNR also assesses their potential role in other HCP conservation strategies.

Some state trust lands have important social or ecological values. These state trust lands are best managed for protection of these special values and uses, rather than for income production. These lands may be candidates for the [Trust Land Transfer Program \(TLT\)](#), which applies only to Common School trust lands, or the State Forest Trust Land Replacement Program (SFT), which applies only to State Forest trust lands. Through the TLT program, DNR transfers state trust lands to WDFW, the State Parks and Recreation Commission, county governments, city governments, or the Natural Areas Program. The value of the timber (which is not cut) is given to the Common School Construction Account, which helps fund K–12 schools statewide. The value of the land is used to purchase replacement property for the trust. State trust lands transferred to the Natural Areas Program contribute to the objectives of the HCP. State trust lands that are transferred to entities outside of DNR are evaluated for their HCP conservation value. If their conservation value is high, the department either does not transfer them, or DNR issues a deed restriction stipulating their continued management under the HCP. Through the SFT program, DNR transfers State Forest trust lands in low-population, timber-dependent counties to NRCAs managed by the Natural Areas Program. To be eligible for the SFT program, the property must be encumbered by harvest restrictions due to species listed under the Endangered Species Act. The value of the timber (which is not cut) from each transferred property goes to the county where the land is located, and the land value is held in a replacement account which is used to buy forestlands for the State Forest trust.

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## Natural Areas Program

DNR's [Natural Areas Program](#) protects outstanding examples of the state's extraordinary biodiversity. Lands managed under this program represent the finest natural, undisturbed ecosystems in state ownership and often have features unique to this region. The high-quality condition of these sites, and the broad diversity of ecosystems they represent, make them foundational to maintaining the resilience of Washington's natural heritage in the face of climate change.

The Washington State Legislature established the system of Natural Area Preserves (NAPs) in 1972 to protect the highest quality examples of native ecosystems, rare plant and animal species, and other natural features of state, regional, or national significance. The Washington State Legislature established the system of Natural Resource Conservation Areas (NRCAs) in 1987 to protect areas that are a high priority for conservation because they contain critical wildlife habitat, prime natural features, or examples of native ecological communities. Together, these natural areas include Puget prairies, estuaries, native forests, bogs, ponderosa pine forests, shrub-steppe communities, alpine lakes and meadows, scenic vistas, and significant geological features. These areas provide opportunities for research, education and, where appropriate, low-impact public use. In addition, these areas help meet statewide conservation priorities and DNR's HCP obligations.

### **Habitat for Listed, Candidate, and Sensitive Species**

Statewide, Washington's natural areas protect over 164,000 acres in 56 NAPs and 38 NRCAs. Over 126,000 of those acres fall within the area managed under the HCP, protecting habitat for 15 species listed as threatened or endangered under the ESA and another 43 special status species. This total includes 81,051 acres that DNR has added to the program since the HCP was signed in 1997. An additional 18,100 acres have been added to the program since 1997 in areas not managed under the HCP. Outside of HCP-managed areas, the Canada lynx (*Lynx canadensis*) is found in the Loomis NRCA, the Loomis NRCA and Chopaka Mountain NAP support substantial populations of whitebark pine (*Pinus albicaulis*) (a candidate species for federal listing), and several natural areas provide suitable habitat for grizzly bears (*Ursus arctos horribilis*).

Federally listed species living on natural areas include the largest and healthiest population of golden paintbrush (*Castilleja levisecta*); the largest and most viable population of Wenatchee Mountains checker-mallow (*Sidalcea oregana* var. *calva*); the only Washington population of Bradshaw's lomatium (*Lomatium bradshawii*); the second-largest population and Washington's highest-quality native habitat for the Oregon spotted frog (*Rana pretiosa*), one occurrence of the Tenino subspecies of the Mazama pocket gopher (*Thomomys mazama*), more than 15 established territories for the northern spotted owl (*Strix occidentalis caurina*); and waters that contain listed runs of Lower Columbia and Puget Sound chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*); steelhead trout (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*). Ten of DNR's natural areas contain occupied marbled murrelet (*Brachyramphus marmoratus*) sites. At South Nemah NRCA, more than 30 marbled murrelet occupancies have been recorded, including a confirmed murrelet nest site.

Natural areas also provide habitat for other sensitive species (federal species of concern, state-listed, state candidate) identified in the HCP. Examples include: insects like the Makah copper butterfly (*Lycaena mariposa charlottensis*), Beller's ground beetle (*Agonum belleri*), and Hatch's click beetle (*Eanus hatchi*) that are found only in bog habitats; amphibians like the Larch Mountain salamander (*Plethodon larselli*) that depend on forested talus slopes; birds like the harlequin duck (*Histrionicus histrionicus*) that are associated with mountain streams and rivers; bats that depend on maternal colonies like the colony found at Woodard Bay NRCA; and mammals like the California bighorn sheep (*Ovis canadensis sierrae*) in Loomis NRCA that depend on high-elevation rocky outcrops and alpine communities.

### **Native Forests**

A number of DNR's natural areas were established because of their high-quality native forest ecosystems. These areas are dominated by mature and/or late-seral forests. Late-seral forests and trees with potential nesting platforms are important to both the northern spotted owl and the marbled murrelet. The native forests on these natural areas also represent some of the highest quality examples of globally imperiled forest ecosystems.



**Golden Paintbrush at Rocky Prairie NAP**

DNR's natural areas provide habitat for federally listed species such as the golden paintbrush (*Castilleja levisecta*). Photo courtesy of David Wilderman.

## Estuaries

In the Natural Areas Program, there are five high-quality estuaries, including three on Washington's coast and two on the shores of the Puget Sound. These sites protect rare tidal wetland communities and provide important foraging and cover habitat for anadromous fish during the critical transition from a freshwater to a marine environment. In addition, estuaries help dissipate potentially damaging wave energy before it reaches the land and provide a sink for sediments and wastes derived from both land and sea. Estuaries are some of the most biologically productive systems in the world.

## Rare Species

NAPs and NRCAs protect a broad representation of ecological communities and contribute to the conservation of many species, which is important since DNR's inventory of the state's biodiversity is incomplete. For example, Mima Mounds NAP was originally established to protect unusual geologic formations and high-quality prairie habitat. Thirty-five years later, DNR learned that it also has the only known population of the ground-dwelling lichen *Cladonia ciliata* in the United States. Similarly, North Bay and Carlisle Bog NAPs were established to protect high-quality wetlands. DNR later discovered that they both contain populations of the rare June's copper butterfly (*Lycaena mariposa junia*), formerly known as the Makah copper butterfly (*Lycaena mariposa charlottensis*).



**Oregon Spotted Frog**

DNR's natural areas provide habitat for Oregon spotted frogs (*Rana pretiosa*) and other amphibians. Photo courtesy of W.P. Leonard.

## Restoration and Research

DNR is actively working to restore and enhance habitat for special-status species at a number of NAPs and NRCAs. At Mima Mounds and Rocky Prairie NAPs, for example, DNR is using prescribed fire, invasive species control, and seeding of native grassland plants to restore native prairie habitats that have been heavily fragmented and degraded over most of their range. The Natural Areas Program is restoring and enhancing oak woodland habitat at several sites (Washougal Oaks NAP/NRCA, Bald Hill NAP, Lacamas Prairie NAP, and Oak Patch NAP) by removing competing conifer trees, planting oak seedlings, and replanting native understory species. In addition, DNR is restoring Puget Sound estuary and nearshore habitats at Stavis, Cypress Island, and Woodard Bay NRCAs by removing bulkheads, fill, and creosote-treated structures.

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## Special Forest Products

Special forest products are Christmas greens, medicinal plants, western greens (typically used by florists), mushrooms, or other items that can be harvested from forested state trust lands but do not fall into traditional timber or fiber categories. DNR allows commercial and/or recreational harvest of special forest products when doing so will benefit the trusts and will have an insignificant, or *de minimis*, impact on the environment. Permits, leases, and direct sales are selectively granted to prevent habitat degradation.

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## **Oil and Gas Leases**

Oil and gas leases allow a lessee to reserve the right to explore for underground deposits. They also give the lessee the sole and exclusive right to drill, extract, or remove oil and gas. Any proposed on-the-ground activities must undergo State Environmental Policy Act (SEPA) review, and the lessee must have a DNR-approved plan of operations and the proper drill permit. Regulations exist to protect water and air quality, and any exploration holes must be plugged following use. There has been only one active oil and gas lease involving drilling on lands that are now managed under the HCP (in 1996), and the well has since been abandoned and plugged. There have not been any since.

## **Mineral Prospecting Leases and Mining Contracts**

Like oil and gas leases, mineral prospecting leases are exploration agreements that allow a lessee to search for mineral deposits. They are allowed for a period of up to seven years and may encompass up to 640 acres. A mineral prospecting lease must be converted to a mining contract before the lessee can begin active mining operations. Before any surface-disturbing work is conducted, the lessee must submit a plan of operations for review and approval and may be subject to SEPA review, depending on the type of exploration activity proposed. In 1996, when the HCP was written, there were no active mining operations (activities that actually extract minerals) on lands managed under the HCP. There have not been any since.

## **Grazing Permits and Leases**

Most DNR-managed grazing takes place on non-forested state trust lands east of the Cascade crest on lands that are not managed under the HCP. Grazing is selectively allowed on forested state trust lands managed under the HCP in both eastern and western Washington, though the number of acres permitted in western Washington is minimal.

In eastern Washington, state trust lands are grazed under permits and leases. Permits cover large acreages, and each permit includes a resource management plan with ecosystem standards that the permit holder must meet, such as turnout and removal dates, riparian protections, and the number of animals allowed on the range. Leases cover smaller areas than permits, and they also include resource management plans. These leases can allow grazing at any time during the year, as long as lessees follow the management plans.

## **Communication Site Leases**

Communication site leases allow private and public entities to build new towers or attach communication equipment to existing towers (for example, cellphone towers). These sites typically are located on non-forested mountaintops or along second-growth highway corridors and are less than an acre in size. They are accessed by the same road systems used for forest management activities and are subject to the same management practices.

## **Special-Use Leases**

Special-use leases are issued for a wide variety of commercial and other uses on state trust lands. Some examples include golf courses, small commercial businesses and buildings, commercial recreation facilities, colleges, takeoff or landing sites for paragliding, governmental or public use facilities, honeybee hive sites, and stockpile sites. Special use leases do not cover major urban commercial uses or aquatic land uses. Often, but not always, these leases are for “interim uses,” and,

as such, they contain language that allows for termination should DNR choose to take advantage of a “higher and better use” of the land.

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## Valuable Materials Sales

DNR sells rock, sand, and gravel (valuable materials) through public auctions and direct sales. Contracts awarded through the public auction process are subject to review and approval by the Board of Natural Resources. Occasionally, DNR will conduct a direct sale, a one-time agreement for the removal of a small amount of a resource (a maximum of \$25,000 in value) that does not require Board of Natural Resources approval.

Early in the implementation of the HCP, DNR had a substantial number of rock, sand, and gravel sales. Since then, that number has decreased, primarily due to the lengthy contract-development process and limited staff capacity.

DNR maintains many small rock pits on state land that are primarily used to construct forest roads during timber sales. Companies that purchase DNR timber sales may be permitted to utilize existing rock pits or develop new ones according to the specifications in the contract.

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## Recreation Sites

Recreation sites allow public recreation on forested state trust lands as long as it is compatible with state laws and the objectives of the *Policy for Sustainable Forests* and the HCP. Sanctioned recreational activities on state trust lands include hiking, biking, horseback riding, off-road vehicle use, hunting, fishing, gathering, and camping. DNR’s vision statement for recreation and public access is to “Manage public and trust lands in a manner that provides quality, safe recreational experiences that are sustainable and consistent with DNR’s environmental, financial and social responsibilities.” DNR is developing recreation plans for many of the areas it manages. Plans are developed with extensive involvement of local recreation groups and the public, many of whom also volunteer to help maintain recreation sites.

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## Appendix B: Glossary

This appendix contains a glossary of terms used in this annual report.

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### A

**Abandoned road:** A road that is stabilized and removed from use to Washington forest practices standards, including removing water crossings, providing erosion control, and making the road impassible to vehicles.

**Adaptive management:** A process of periodically reviewing and adjusting management practices based on feedback from internal and external research and monitoring.

**Aerial herbicide:** Application of herbicides from a helicopter or plane to achieve site preparation or vegetation management objectives.

**Age class:** A grouping of trees in the same age group used to simplify data that describes age composition for a stand or landscape. Age classes are often divided into decadal groups to portray the distribution of tree ages within a stand, or stand origin dates on a landscape.

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### B

**Blowdown (windthrow):** A tree that has been knocked over or had its top blown out by wind.

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### C

**Cadastre:** An official register of the ownership, extent, and value of real property in a given area, i.e. property lines.

**Commercial thinning:** Commercial thinning generates revenue and is performed to meet a wide range of objectives including improving stand growth or health, reducing tree mortality, or accelerating the development of habitat. Regeneration is not an objective of thinning.

**Curtis relative density:** See relative density.

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### D

**dbh:** Diameter at breast height, which is the diameter of a tree measured 4.5 feet above the ground on the uphill side of the tree.

**de minimis:** A legal term for a level of activity that is too small or insignificant to merit consideration.

**Decommissioned road:** A road made impassible to vehicles.

**Desired future condition:** A set of parameters that can be compared to current conditions, showing any management changes needed to achieve specific goals. In the Administrative Amendment to the Northern Spotted Owl Conservation Strategy for the Klickitat Habitat Conservation Plan Planning Unit, DFC habitat represents a sustainable set of stand characteristics (canopy closure level, maximum tree height, etc.) that could realistically be achieved in a 60-year old stand that has been properly managed.

**Direct sale:** A one-time agreement that removes only small amounts (a maximum of \$25,000 in value) of a resource such as gravel or trees from state trust lands and is not subject to public auction or advertisement.

**Dispersal habitat:** Habitat used by northern spotted owls when moving from one area of nesting, roosting, and foraging habitat to another, often to establish new breeding sites.

**Dispersal:** The movement of an animal from one subpopulation to another or movement from one area to another, often to establish a new nesting area.

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## E

**Easement:** Permission given by one person or business to another, allowing one to access their property by crossing through property owned by the other.

**Effectiveness monitoring:** For the State Trust Lands Habitat Conservation Plan, a system used to determine whether or not a management plan and its specific strategies are producing the desired habitat conditions.

**Even-aged management:** A set of final harvest systems defined as a method to “regenerate a stand with a single age-class” (Society of American Foresters). For purposes of managing forested state trust lands, even-aged includes final harvest systems of seed tree, variable retention harvest, and shelterwood.

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## F

**Fertilization:** Ground or aerial-based fertilization of forest stands using chemical fertilizers or biosolids to enhance growth.

**Final harvest:** The harvest that signifies the end of a rotation by harvesting trees within a forest management unit in order to make room for regeneration of a new stand.

**Forest land planning:** A DNR process — focused at the scale of State Trust Lands Habitat Conservation Plan planning units — to integrate sociocultural, economic, and ecological issues into management strategies for forested state trust lands.

**Forest management unit:** A forested area with conditions that are ecologically similar enough to allow it to be managed to obtain specific objectives; the unit for which a silvicultural prescription is written.

**Forest Practices:** The administrative branch of DNR responsible for regulating forest practice activities on all state and private forestlands.

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## G

**Grazing lease:** A DNR lease agreement covering smaller areas of land (as compared to the larger rangeland of a grazing permit) that includes a resource management plan to protect natural resources. It allows grazing at any time of year as long as the plan’s guidelines are followed.

**Grazing permit:** A DNR agreement covering large areas that includes a resource management plan containing specific details regarding the number of animals allowed and when the animals may be on the land.

**Ground herbicide:** Ground-based applications of herbicides used to achieve site preparation or vegetation management objectives. Using ground herbicides allows for application in smaller work areas, thus avoiding spraying areas where herbicides are not desired (i.e., streams, wetlands, and adjacent properties).

**Ground mechanical:** In forestry, using mechanized equipment to achieve site preparation objectives.

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## H

**Habitat conservation plan:** A long-term management plan authorized under the Endangered Species Act to conserve threatened and endangered species across a large landscape while allowing activities to occur under specific conditions.

**Hand planting:** In forestry, planting seedlings of various species or species mixes.

**Hand cutting:** In forestry, using handheld equipment to cut stems of existing vegetation to achieve site preparation or vegetation management objectives, such as removing invasive species.

**Habitat Conservation Plan permit lands:** Lands that are managed subject to the commitments in the State Trust Lands Habitat Conservation Plan.

**Headwater stream:** A small, first- or second-order stream that forms the beginning of a river. It is often seasonal and forms where saturated ground flow first emerges as a recognizable watercourse.

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## I

**Implementation monitoring:** For the State Trust Lands Habitat Conservation Plan, a form of monitoring that determines whether or not a management plan or its components are implemented as written.

**Inholding:** A parcel of land owned by one party that is entirely surrounded by another ownership.

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## L

**Large, structurally unique tree:** A tree that is tall and/or has a large diameter and contains structural elements which are important for habitat such as a hollow trunk, broken top, open crown, or large, strong limbs.

**Leave tree:** A live tree left on a timber sale after harvest, intended to provide habitat and structure in the developing stand.

**LiDAR:** Short for “light detection and ranging,” a remote sensing technology that uses lasers to detect distant objects and determine their position, velocity, or other characteristics by analyzing reflections. It has a wide variety of uses, including measuring tree canopy heights, making topographical maps, and mapping floodplains.

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## M

**Multiple-pass removal:** A field sampling method used to estimate fish populations in a stream that involves placing nets across a stream at the beginning and end of a reach (typically around 100 meters) to confine fish to that area. A backpack electrofisher is then used to temporarily disable fish, which are then captured, measured, and released. Each reach is sampled multiple times within a day until the desired precision in the population estimate is achieved.

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## N

**Natural Area Preserve:** A state-designated area that protects a high-quality, ecologically important natural feature or rare plant and animal species and their habitat. It often contains a unique feature or one that is typical of Washington state or the Pacific Northwest.

**Natural regeneration:** Allowing naturally produced seedlings to grow after harvest and produce a new forest without human intervention. DNR assesses success by carrying out a thorough regeneration survey of the stand.

**Natural Resources Conservation Area:** A state-designated area managed to protect an outstanding example of a native ecosystem or natural feature; habitat for endangered, threatened, or sensitive species; or a scenic landscape.

**Nature:** The database that keeps track of all contracts and financial data on DNR managed lands.

**Nesting, roosting, and foraging habitat:** A forested area with the right forest structure, a large enough size, and adequate food to meet the needs of a nesting pair of northern spotted owls.

**Next-best stands:** Within spotted owl management units that are below the habitat threshold, next-best stands are considered non-habitat, but are predicted to attain the structural characteristics that define northern spotted owl habitat either through passive or active management relatively sooner than other non-habitat stands. Next best stands count towards the target amount of suitable habitat, but are still considered non-habitat. Remaining stands not identified as habitat or next best are available for the full range of silvicultural activities.

**No-role lands:** A term used by DNR's Land Transactions Program to refer to lands not designated as a nesting, roosting, and foraging, dispersal, or desired future condition management area and thus having no role in northern spotted owl management under the State Trust Lands Habitat Conservation Plan.

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## O

**Oil and gas lease:** An agreement that allows the leaseholder to reserve the right to explore for underground oil and/or gas deposits on state trust land. Before active drilling or thumping can occur, the proposal must undergo State Environmental Policy Act review and have a plan of operations approved by DNR.

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## P

**Planning unit:** In the State Trust Lands Habitat Conservation Plan, a management unit based on large watersheds. The approximately 1.9 million acres managed under the Habitat Conservation Plan are divided into nine planning units to allow for more efficient planning and management.

**Pre-commercial thinning:** Removal of less desirable trees to maintain the growth and stability of retained trees. Pre-commercial thinning does not generate revenue and is performed before the trees are large enough to be marketable. Cut trees are left on site to decompose.

**Prospecting and mining lease:** An exploration agreement that allows the holder to search for mineral deposits on state lands; if the leaseholder wants to begin active mining operations (extraction and removal of valuable materials) that could alter habitat, they must convert the lease to a contract which includes a plan of operations and undergoes State Environmental Policy Act review.

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**Q**

**Quadratic mean diameter:** The measure of average tree diameter, conventionally used in forestry. The quadratic mean diameter is the diameter of a tree with average stand basal area.

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**R**

**Rain-on-snow zone:** Generally, an elevation band in which it is common for snow pack to be partially or completely melted during rainstorms several times during the winter.

**Reclassified habitat:** Two classes of marbled murrelet habitat, identified based on a predictive model:

1. **Marginal habitat:** Those lands expected to contain a maximum of 5 percent of the occupied sites on state trust lands within each State Trust Lands HCP planning unit. These areas were made available for harvest. All known occupied sites were deferred from harvest, and were not included in this habitat designation.
2. **Higher-quality habitat:** In contrast to marginal habitat, those lands expected to contain at least 95 percent of the occupied sites on state trust lands within each HCP planning unit. This habitat is frequently referred to simply as “reclassified habitat.”

**Recreation plan:** A plan for a forest block or landscape outlining what types of recreation are appropriate in what portions of that block or landscape, as well as what facilities are needed. It includes broad management guidelines and a plan to implement them.

**Regeneration:** The act of renewing or reestablishing tree cover in a forest through natural seeding or hand planting, typically on sites that were harvested or burned in a wildfire.

**Relative density:** A mathematically derived parameter that indicates the level of intra-stand competition between trees, and consequently, a theoretical optimal range for thinning. Relative density guidelines for thinning vary by species and sometimes other factors, such as climatic zones. A commonly used version of relative density is formally known as Curtis’ RD after Bob Curtis, a U.S. Forest Service biometrician who developed the measure.

**Riparian desired future condition:** In the Riparian Forest Restoration Strategy, the riparian desired future condition refers to six measureable target stand conditions that are intended to eventually develop into the Fully Functional stand development stage.

**Riparian management zone:** A buffer of trees and shrubs applied along a stream to protect the stream and habitat for salmon and other species.

**Road abandonment:** The permanent closure of forest roads in compliance with DNR guidelines and state forest practices standards. Abandonment work includes placing road barriers to prevent vehicle traffic, removing all culverts and bridges, and vegetating exposed soils to prevent erosion and sediment delivery to surface waters. In some circumstances, the road prism is rehabilitated to resemble the conditions that existed prior to road building. Abandoned roads are exempt from further maintenance.

**Road construction:** The building of new roads in compliance with DNR policy and state forest practices standards.

**Road maintenance and abandonment plan:** A plan that covers all forest roads on a landowner's property constructed or used for forest practices after 1974. It is based on a complete inventory that also shows streams and wetlands adjacent to or crossed by roads. The plan lays out a strategy for maintaining existing roads to meet state standards and shows areas of planned or potential road abandonment.

**Road reconstruction:** A process of bringing existing roads back to drivable conditions in compliance with DNR policy and state forest practices standards.

**Rotation:** The length of time between when a stand of trees is planted or naturally regenerates and when a final harvest occurs.

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## S

**Salvage cut:** A type of timber harvest used to log trees that are dead, dying, or deteriorating due to fire, insect damage, wind, disease, or injuries.

**Seed tree intermediate cut:** The first timber harvest in a series conducted as part of the even-aged seed tree silvicultural harvest system. The purpose is to provide a desirable seed source to establish seedlings. Typically, about 10 trees per acre may be left following this harvest; once the new trees are established, some of these seed trees may be harvested.

**Selective product logging:** A timber harvest that removes only specific species from certain size classes which are highly valuable, for example trees that function well as poles or logs for cabins.

**Seral:** Relating to the stages of an ecological sere.

**Sere:** The sequential stages in forest succession; the gradual replacement of one community of plants by another.

**Shelterwood intermediate cut:** The first harvest in a series of harvests conducted as part of the even-age shelterwood harvest system. The purpose of this harvest is to provide shelter (typically shade) and possibly a seed source for the seedlings that are regenerating in the stand. Compared to a seed tree intermediate cut, a shelterwood typically retains more trees per acre following harvest; retained trees are generally dispersed across the stand.

**Shelterwood removal cut:** The second or final harvest in a series of harvests conducted as part of the even-aged shelterwood harvest system. The purpose is to remove overstory trees that create shade levels that are too high to allow the new understory to thrive.

**Silviculture:** The art and science of managing or cultivating trees and forests to achieve particular goals and objectives.

**Site preparation:** Activities performed to increase the probability of successful regeneration in a harvested unit by reducing slash and/or undesirable plants that would compete with seedlings for nutrients, water, and light. Site preparation may be performed concurrently with logging (by, for example, pulling up and disposing of brush clumps or it may be performed through piling and burning logging slash; through broadcast- or under-burning logging slash; by manually cutting undesirable vegetation; by applying herbicide (aerial or ground) to undesirable tree and brush species prior to planting; or by other methods or combinations of methods.

**Slash:** The residue (for example, tree tops and branches) that is left on the ground after logging or following a storm, fire, girdling, or de-limbing.

**Spatial NaturE:** The update process to digitize (spatially) current NaturE contracts.

**Special forest products:** Items that can be harvested from forests but do not fall in traditional timber or fiber categories, such as Christmas trees and boughs, medicinal plants, and floral greens.

**Special use lease:** A DNR lease for state trust lands that is issued for one of a wide variety of commercial or other uses (for example, golf courses, paragliding landing sites, and public use facilities).

**Stand:** A group of trees that is similar enough in composition, structure, age, spatial arrangement, or condition to distinguish it from adjacent groups of trees.

**Stand development stage:** A developmental phase of a forest, defined using a classification system based on the structural conditions and developmental processes occurring within a forest stand.

**State Environmental Policy Act:** A state law that provides a process for reviewing proposals that require permits or other forms of agency approval. It requires government agencies to consider the potential environmental consequences of their actions and incorporate environmental values into their decision-making processes. It also involves the public and provides the agency decision-maker with supplemental authority to mitigate identified impacts.

**State Forest Transfer (State Forest Trust Replacement):** A program in which State Forest Trust (formerly known as Forest Board) lands in timber-dependent counties are transferred from trust status to natural resource conservation areas. The state Legislature provides funds to pay for the land and timber on certain properties considered not harvestable due to the presence of federally listed endangered species. The timber value is distributed to the counties as revenue, and the land value is placed in an account for purchasing replacement property for the State Forest Trust.

**State trust lands:** DNR-managed lands held as a fiduciary trust and managed to benefit specific trust beneficiaries (public K–12 schools and universities, capitol buildings, counties, and local services such as libraries).

**Suitable northern spotted owl habitat:** Each northern spotted owl management area is managed for certain habitat classes that include specific habitat types. Habitat types include high-quality nesting, Type A or B, movement roosting and foraging, sub-mature, young forest marginal, movement, dispersal, and old forest. Forest stands that meet the definition of habitat types within the specific management area are considered suitable habitat.

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## T

**Take:** As used in the Endangered Species Act, refers to harming, hunting, wounding, collecting, capturing, or killing an endangered or threatened species or disturbing habitat in a way that disrupts a species' normal behavior.

**Thumping:** The exploration for oil or gas deposits by measuring seismological tremors caused by dropping large weights or by detonating explosives.

**Trust Land Transfer program:** A program in which Common School state trust land is transferred from DNR to another public agency or conservation program. The state Legislature provides the value of the timber (which is not cut) to the Common School Construction account to build K-12 public schools. The value of the land is placed in an account used to purchase replacement property for the school trust. Land can be transferred to the State Parks and Recreation Commission,

Washington Department of Fish and Wildlife, a county or city government, or DNR's Natural Areas Program.

**Trust:** A legal term for a relationship in which one person, company, or entity (the trustee) holds title to a property and/or manages it for the benefit of another person, company, or entity (the beneficiary).

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## U

**Uneven-aged management:** Removal of trees from a multi-aged forest stand while maintaining multiple age classes within that stand. Uneven-aged management is often used on sites with poor soils on which more intensive management is not cost effective. This type of management also may be used in fire-prone areas to mimic the effects of periodic, lower-intensity fires that do not remove all of the trees.

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## V

**Validation monitoring:** For the State Trust Lands Habitat Conservation Plan, a form of monitoring that determines whether or not certain species respond as expected to habitat conditions created by following a management plan and its strategies.

**Variable density thinning:** Thinning to create a mosaic of different stand densities, with canopy openings generally between 0.25 and one acre that capitalizes on landforms and stand features. DNR uses variable density thinning to encourage development of structural diversity in areas where spotted owl habitat is needed or to meet other objectives. Diversity is created by thinning to different residual tree densities, retaining large trees, and, in some cases, adding down woody debris and snags.

**Variable retention harvest:** An approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand for integration into the new stand to achieve various ecological objectives. The following threshold targets apply under the State Trust Lands Habitat Conservation Plan:

- Retention of at least eight trees per acre. Of these:
  - At least two per acre are suitable for wildlife, and are from the largest size class,
  - At least three per acre are snag recruits, and
  - At least three per acre are snags, provided that safety requirements are met; if snags are not available, then three live trees will be retained.
- There are at least two down logs per acre of largest size class (at least 12" on small end by 20' long).

**Vegetation management:** Using hand-cutting, herbicide, mechanical, or other means to remove competing vegetation in a stand after planting but before seedlings become fully established.

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## W

**Washington Administrative Code:** Administrative regulations, or rules, adopted by state agencies to enact legislation and the [Revised Code of Washington \(RCW\)](#).

**Windthrow (blowdown):** A tree that has been knocked over or had its top blown out by wind.