



State Trust Lands Habitat Conservation Plan 2015 Annual Report

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For Fiscal Year 2015
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Published April 2016

▲ Juvenile coho salmon observed by a DNR field crew while surveying a tributary to the Clearwater River on the Olympic Peninsula. Launched in 2015, DNR's Riparian Validation Monitoring Program will test whether current forest management practices in the Olympic Experimental State Forest will restore and maintain habitat capable of supporting viable salmonid populations.



WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands

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Prepared by
Washington State Department
of Natural Resources
Forest Resources Division



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Acronyms

BNR	Board of Natural Resources
dbh	Diameter at breast height
DFC	Desired future condition
DNR	[Washington State] Department of Natural Resources
EIS	Environmental impact statement
ESA	Endangered Species Act
FRIS	Forest resource inventory system
FVS	Forest Vegetation Simulator
FY	Fiscal year
GNN	Gradient nearest neighbor
HCP	(State Trust Lands) Habitat Conservation Plan
ITP	Incidental take permit
LIDAR	Light detection and ranging
MMLTCS	Marbled Murrelet Long-Term Conservation Strategy
MoRF	Movement, roosting, and foraging
NAP	Natural area preserve
NOAA	National Oceanic and Atmospheric Administration
NRCA	Natural resources conservation area
NRF	Nesting, roosting, and foraging
NSO	Northern spotted owl
OESF	Olympic Experimental State Forest
QMD	Quadratic mean diameter
P&T	DNR's forest management planning and tracking database
RCW	Revised Code of Washington
RD	Curtis's relative density
RFRS	Riparian Forest Restoration Strategy
RMAP	Road maintenance and abandonment plan
SCA	Student Conservation Association
SEPA	(Washington) State Environmental Policy Act
SFT	State Forest Transfer
SOMU	[Northern] spotted owl management unit
TLT	Trust Land Transfer
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VDT	Variable density thinning
VRH	Variable retention harvest
WAC	Washington Administrative Code
WAU	Watershed administrative unit
WDFW	Washington Department of Fish and Wildlife
"Services"	USFWS and NOAA Fisheries

Introduction

In fiscal year (FY) 2015, the Washington State Department of Natural Resources (DNR) continued to make progress on its three high-priority planning projects—the Marbled Murrelet Long-Term Conservation Strategy, the Olympic Experimental State Forest (OESF) Forest Land Plan, and the sustainable harvest calculation. These projects enable DNR, as manager of a set of fiduciary trusts, to better manage state trust forest lands in accordance with the multiple objectives reflected in the [Policy for Sustainable Forests](#).

DNR will continue to update [GIS data for lands covered by the HCP](#). This data has been made available to allow for public analysis and to facilitate comparisons between DNR’s data on HCP lands and relevant GIS layers maintained by the U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration Fisheries (NOAA) (collectively, “the Services”).

Report Organization

Starting in FY 2015, the Forest Resources Division began restructuring its approach to reporting on adaptive management. Though this work has just begun and will continue well beyond FY 2016, the restructured process is reflected in the [Adaptive Management](#) section of this report: implementation monitoring, effectiveness monitoring, validation monitoring, habitat-related research, and updates to the conservation strategies are now arranged “chronologically” to better reflect the adaptive management process itself.

During FY 2015 DNR’s HCP and Scientific Consultation Section, which is responsible for generating this report, upgraded its GIS capabilities. This improvement has provided this report with more accurate datasets, a change that is most noticeable in the Non-Timber Management Activity section. That section has been reorganized to provide additional clarity and detail.

Due to staffing limitations, DNR’s Forest Resources Division was unable to produce comprehensive reviews of program activities for inclusion in the FY 2015 HCP Annual Report. These comprehensive reviews of DNR’s HCP-related programs, which fulfil DNR’s commitment to produce decadal reviews of HCP program activities, will resume in the FY 2016 report.

Highlights for 2015

In 2015, DNR accomplished several objectives affecting DNR lands managed under the HCP. Highlights include:

- **Constructed an analytical framework for the marbled murrelet long-term conservation strategy to quantify potential impacts and mitigations to marbled murrelet habitat on DNR-managed lands.** Agreement with USFWS on an analytical framework allows DNR to move forward with calculating the potential impacts to murrelet habitat through time and, ultimately, evaluate potential effects on marbled murrelet populations.
- **Helped develop a stochastic meta-population model** to estimate the expected change in murrelet abundance under various scenarios related to murrelet habitat change on DNR-managed lands.
- **Identified a range of reasonable alternatives for the marbled murrelet long-term conservation strategy.** The Board of Natural Resources (BNR) approved six alternatives for

environmental and economic analysis which DNR will investigate in the draft environmental impact statement (DEIS).

- **Launched the Riparian Validation Monitoring Program.** This program will test DNR’s hypothesis that current forest management practices in the OESF will restore and maintain habitat that is capable of supporting viable salmonid populations within the OESF.
- **Adopted the Snoqualmie Corridor Recreation Plan.** The plan will guide management of recreation on approximately 53,500 acres of HCP-covered trust lands and natural resource conservation areas (NRCAs) in eastern King County over the next 10 to 15 years.
- **Protected nearly 5,000 acres of land covered by the HCP through the Natural Areas Program.** These protection efforts include additions to 14 existing HCP-covered natural areas.
- **Upgraded DNR’s internal and external websites.** DNR’s new website was designed to reduce clutter and increase accessibility. All links within this report reflect that update.

Progress toward Conservation Objectives

Background on Conservation Objectives

FY 2015 Northern Spotted Owl Habitat Data

Background on Northern Spotted Owl Habitat Data

DNR’s northern spotted owl (NSO) conservation strategy on the west side consists of two complementary habitat threshold targets:

1. In all west-side HCP planning units except the OESF, restore and maintain at least 50 percent of designated Nesting, Roosting, and Foraging (NRF) and Dispersal Management areas at the spotted owl management unit (SOMU) scale as habitat.
2. In the OESF, restore and maintain at least 40 percent of each SOMU as NSO habitat with at least 20 percent of each SOMU as Old Forest Habitat.

Below are updates (as of October 1, 2015) to west-side SOMU percentages by HCP planning unit.

The “Percent Habitat” data in the tables below show information as it existed on October 1, 2015, when it was extracted from DNR’s SOMU spatial layer overlaid with the NSO habitat spatial layer.

Columbia and North Puget HCP Planning Units

Within the Columbia a HCP Planning Unit, the Upper Washougal dispersal SOMU is above habitat threshold. In the Upper Washougal dispersal SOMU, percent of habitat decreased by 0.76 due to approximately 155 acres of variable retention harvest (VRH) in dispersal and sub-mature habitat through the Bunny Hill VRH and Variable Density Thinning (VDT) timber sale. This timber sale also included 14 acres of enhancement thinnings in dispersal and sub-mature habitat. At 56.71 percent, the Upper Washougal SOMU remains above the habitat threshold target of 50 percent NRF and Dispersal Management Areas.

Within the North Puget HCP Planning Unit, the Alder and Upper Skagit South SOMUs are above habitat threshold. In the Alder dispersal SOMU, percent of habitat decreased by 1.38 due to

approximately 92 acres of VRH in dispersal habitat through the Country Boy timber sale. At 53.69 percent, the Alder SOMU remains above the habitat threshold target of 50 percent NRF and Dispersal Management Areas. In the Upper Skagit South dispersal SOMU, percent of habitat decreased by 6.1 due to approximately 57 acres of VRH in dispersal habitat through the Day timber sale. At 52.46 percent, the Upper Skagit South Dispersal SOMU remains above the habitat threshold target of 50 percent NRF and Dispersal Management Areas.

Table 1 reflects the changes to the three SOMUs discussed above. No other SOMUs in either planning unit recorded changes in NSO habitat levels due to harvest activities in 2015.

Table 1: Habitat Thresholds per SOMU in Columbia and North Puget Planning Units as of 10/01/2015.

SOMU	Planning Unit	Management Area Type	Percent Habitat
Cougar	Columbia	NRF	41.44
Hamilton Creek Dispersal	Columbia	Dispersal	47.13
Hamilton Creek NRF	Columbia	NRF	13.52
Harmony	Columbia	Dispersal	34.85
Rock Creek	Columbia	NRF	24.01
Silverstar	Columbia	Dispersal	47.13
Siouxon	Columbia	NRF	46.72
Swift Creek	Columbia	NRF	19.76
Upper Washougal	Columbia	Dispersal	56.71
Wind River	Columbia	NRF	5.23
Alder	North Puget	Dispersal	53.69
Canyon-Warnick	North Puget	NRF	13.78
Cavanaugh	North Puget	NRF	0.00
Clearwater	North Puget	NRF	4.32
Deer Creek	North Puget	NRF	6.10
East Shannon Dispersal	North Puget	Dispersal	20.47
East Shannon NRF	North Puget	NRF	0.00
Ebey Hill	North Puget	NRF	0.00
French Boulder	North Puget	NRF	0.17
Hazel	North Puget	NRF	1.09
Howard Creek	North Puget	NRF	3.21
Loretta	North Puget	NRF	22.24
Marmot Ridge	North Puget	NRF	1.40
Mid Skagit Dispersal	North Puget	Dispersal	42.84
Mid Skagit NRF	North Puget	NRF	0.00
North Fork Skykomish	North Puget	NRF	4.02
North Snoqualmie	North Puget	NRF	2.73
Pilchuck Mountain	North Puget	NRF	1.34
Rinker	North Puget	NRF	6.66
Sauk Prairie Dispersal	North Puget	Dispersal	48.50

SOMU	Planning Unit	Management Area Type	Percent Habitat
Sauk Prairie NRF	North Puget	NRF	0.42
Silverton	North Puget	NRF	0.00
South Fork Skykomish	North Puget	NRF	0.00
South Snoqualmie	North Puget	NRF	3.06
Spada	North Puget	NRF	0.11
Tenas	North Puget	NRF	0.00
Upper North Fork Stilly	North Puget	NRF	0.00
Upper Skagit North	North Puget	NRF	0.00
Upper Skagit South Dispersal	North Puget	Dispersal	52.46
Upper Skagit South NRF	North Puget	NRF	1.27
West Shannon Dispersal	North Puget	Dispersal	35.11
West Shannon NRF	North Puget	NRF	0.00
Wallace River	North Puget	NRF	0.00

South Puget HCP Planning Unit

The 2010 *South Puget HCP Planning Unit Forest Land Plan Final EIS* identifies “a forest stand-level [NSO] habitat condition that contains forest stand structural components needed for movement (tree density, cover, and canopy layering), foraging (snags and coarse woody debris), and roosting (canopy layering)” (p. 32). This movement, roosting, and foraging (MoRF) habitat is a subset of habitat objectives within dispersal management areas in South Puget Planning Unit SOMUs. The South Puget Planning Unit has an overall habitat threshold target of 50 percent for each SOMU, and dispersal management areas there have a MoRF threshold target of 35 percent of each SOMU.

Table 2 shows current total NSO habitat percentages in South Puget Planning Unit SOMUs. There were no changes to NSO habitat percentages in the South Puget HCP Planning Unit during 2015.

Table 2: Habitat Thresholds per SOMU in South Puget HCP Planning Unit as of 10/01/2015.

SOMU	Planning Unit	Management Area Type	Percent Habitat	
			Movement, Roosting, and Foraging (MoRF)	Total Habitat
Black Diamond	South Puget	Dispersal	7.50	25.54
Elbe Hills	South Puget	Dispersal	1.81	37.01
Green	South Puget	NRF	-	23.64
Pleasant Valley Dispersal	South Puget	Dispersal	1.35	22.13
Pleasant Valley NRF	South Puget	NRF	-	0.84
Tahoma	South Puget	Dispersal	1.66	16.97

Olympic Experimental State Forest HCP Planning Unit

In the OESF HCP Planning Unit, SOMUs are based on eleven landscape planning units. The habitat goal for each SOMU within the OESF is that at least 40 percent of the landscape qualifies as NSO structural habitat. The Old Forest Habitat goal for each SOMU is at least 20 percent of the landscape. While no SOMUs in OESF currently meet the 40 percent total NSO habitat goal, two units (Queets and Upper Clearwater) meet the Old Forest Habitat Goal.

Table 3 shows current total NSO habitat percentages in OESF Planning Unit SOMUs. There were no changes to NSO habitat percentages in the OESF HCP Planning Unit during 2015.

Table 3: Habitat Thresholds per SOMU in the OESF HCP Planning Unit as of 10/01/2015.

SOMU	Planning Unit	Percent Habitat		
		Structural Habitat	Old Forest	Total Habitat
Clallam River	OESF	12.43	0.82	13.26
Copper Mine ¹	OESF	4.14	14.58	18.72
Dickodochtedar	OESF	15.64	8.57	24.21
Goodman Creek	OESF	8.78	16.81	25.59
Kalaloch	OESF	9.23	11.70	20.93
Queets	OESF	4.46	21.96	26.42
Reade Hill	OESF	16.23	14.41	30.64
Sekiu	OESF	4.33	0.00	4.33
Upper Clearwater	OESF	3.64	25.85	29.50
Upper Sol Duc	OESF	11.78	1.02	12.81
Willy Huel	OESF	6.22	18.79	25.01

¹Due to a typographical error in the 2014 HCP Annual Report, DNR reported the percentage of Structural Habitat in the Copper Mine SOMU as 4.41. The correct level is 4.14 percent, as reported here.

FY 2015 Riparian Habitat Forest Restoration Data

Background on the Riparian Conservation Strategy

Restoration thinning in riparian areas is a discretionary activity that is conducted under guidance of the 2006 [Riparian Forest Restoration Strategy \(RFRS\)](#) in concert with the timber sales program. Riparian restoration thinnings are designed to provide growing space to encourage older forest stand structures, maintain overstory tree growth, provide large wood to streams, and enhance understory development. DNR tracks timber sales that implement the RFRS to ensure that stand conditions are appropriate for thinning and to better understand the role of active management in meeting the long-term goal of riparian forest complexity. Table 4 provides a summary of the percentages, by DNR region, of completed timber sales that have implemented the RFRS since 2012.

Table 4: Percent of All West-Side Timber Sales Implementing the RFRS since 2012.

Region	Percent of All West-Side Timber Sales Implementing the RFRS			
	2012	2013	2014	2015
Northwest	22	33	22	5
Olympic ¹	0	0	0	25
Pacific Cascade	11	16	26	27
South Puget Sound	14	20	24	17
Total	13	21	23	19

¹ These numbers exclude the OESF HCP Planning Unit, where the RFRS is not used.

DNR does not track the number of timber sales that were evaluated for RFRS treatments and were rejected due to inadequate stand conditions, operational infeasibility, or prohibitive costs associated with additional road building or yarding systems.

Figure 1 shows each region’s estimated annual acreage thinned under the RFRS. DNR estimates that riparian restoration thinning was conducted on approximately 346 acres during calendar year 2015, compared to 249 acres in 2014. Similar to previous years, in 2015 the majority of the treatments (78 percent) were Type II thinnings (thinning in stands with some existing structural complexity), and the most mature stands treated were in the understory development stage. In 2015, there were only five acres of hardwood conversion treatments. Few RFRS sales focused on restoring a higher proportion of conifers in hardwood-dominated RMZs, which is commensurate with the risk- and cost-based priorities of the RFRS.

Wetland Management and the RFRS

Wetland Management Zones (WMZs) are currently managed under a set of standards that apply to both forested wetlands and WMZs and consist of short-term measures to maintain minimum acceptable wetland and buffer function (retention of at least 120 ft² basal area of the most wind-firm trees). In practice, forested wetlands are rarely thinned because there is generally insufficient basal area to meet the 120 ft² requirement and because thinning on saturated soils increases the risk of windthrow for the remaining trees.

Figure 2 shows a section of the Flair Thin and VRH timber sale where DNR applied an increasingly common prescription consistent with the RFRS. In both RMZs and WMZs, DNR thinned from below with a diameter limit and species selection. The prescription is easy to follow, and it accommodates and maintains the existing variation within the unit. WMZ habitat was improved with the addition of down wood in accordance with the RFRS.

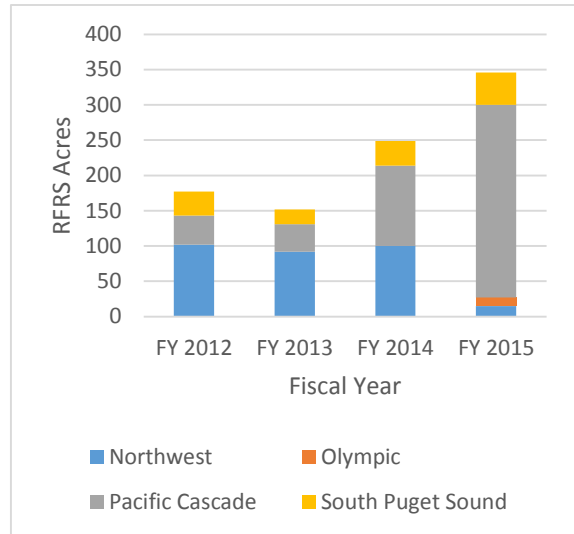


Figure 1: RFRS Restoration Thinning Acres by Region.

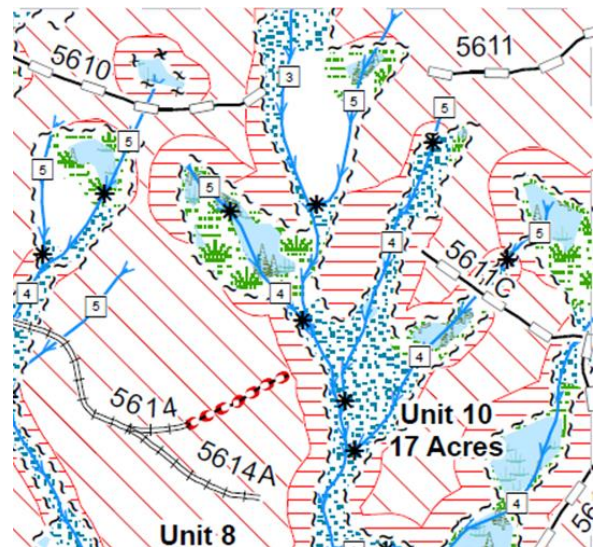


Figure 2: Thinning RMZs and WMZs with a Common Prescription. The horizontally crosshatched areas (RMZs and WMZs) of the Flair Thin and VRH sale received thinning prescriptions in accordance with the RFRS.

Marbled Murrelet Conservation Strategy Development

Background on the Marbled Murrelet Conservation Strategy

Long-Term Conservation Strategy

DNR and the USFWS (together, the “joint agencies”) are working together to develop a Marbled Murrelet Long-Term Conservation Strategy (MMLTCS) for the six western Washington HCP planning units. The strategy will help conserve marbled murrelet habitat on state trust lands while allowing for timber harvest and other activities that earn revenue for public schools, counties, and other trust land beneficiaries.

To analyze potential environmental impacts for the MMLTCS, the joint agencies are developing an environmental impact statement (EIS) to satisfy both the State Environmental Policy Act (SEPA) and National Environmental Policy Act (NEPA). Building on the work completed by both agencies through 2014, which included two sets of scoping meetings and a set of joint needs, purposes, and objectives for the draft EIS, the agencies completed two milestones for the conservation strategy in 2015:

1. Established an “analytical framework” to quantify potential impacts to murrelet habitat and sources of mitigation on DNR-managed lands.
2. Identified a range of reasonable alternatives for the conservation strategy.

The analytical framework is a methodology that will be applied to each alternative to provide objective, repeatable, science-based estimates of potential impacts and mitigation to marbled murrelet habitat from DNR’s land management activities under the HCP. The analytical framework determines the location, quality, and quantity of marbled murrelet habitat on DNR-managed lands. It also calculates the potential impacts to habitat and mitigation through time on DNR lands.

The analytical framework identifies three categories of potential incidental impacts to marbled murrelet habitat that may occur on state-managed lands: harvest-related impacts, edge-influenced impacts, and disturbance-related impacts. Harvest impacts result from removal of potential marbled murrelet habitat through harvest activities. Edge-influenced impacts occur when harvests take place adjacent to habitat. Adjacent harvests can degrade habitat by creating a high-contrast edge that exposes the habitat to altered microclimate effects including the loss of platform-bearing trees to windthrow, loss of moss within the nesting substrate, reduced canopy cover, altered forest composition, and increased risk of nest predation. Disturbance-related impacts include the degradation of habitat due to sights and sounds from forest management activities. These impacts can result in disruption of marbled murrelets during their nesting season when they are incubating eggs and caring for their young.

The analytical framework identifies the expected growth of marbled murrelet habitat in conserved areas through the end of the HCP as potential mitigation for the three types of incidental impacts to marbled murrelet habitat. The framework indicates that this mitigation will occur in “areas of long-term forest cover,” which include areas within DNR’s existing conservation commitments as well as areas conserved solely for developing or protecting marbled murrelet habitat. The framework also adjusts the mitigation value of the marbled murrelet habitat within these areas of forest cover based on geographic location as well as the point in time when it becomes habitat.

To complete the analytical framework, the joint agencies assessed how potential impacts and mitigation of habitat for each alternative might impact marbled murrelet populations. To ensure this approach was science based, both agencies contracted with marbled murrelet population expert Professor M. Zach Peery, Ph.D. to conduct the work (Figure 3).



Figure 3: Professor Zach Peery Presenting to a Special BNR Meeting. Dr. Peery provided preliminary results of marbled murrelet population viability analyses for each proposed marbled murrelet alternative.

With the guidance of the analytical framework, scoping comments, and key questions identified by the joint agencies, the agencies developed a range of potential alternatives that represent conservation strategies to meet the need and purpose statement. Each alternative builds a conservation strategy around areas of long-term forest cover. Alternative A, the no-action alternative, continues DNR operations as authorized under the 1997 HCP. Alternative B focuses on protecting the known locations of marbled murrelet occupied sites on forested state trust lands. Alternative C is designed to protect occupied sites and existing high-quality habitat, and it has conservation areas (emphasis and special habitat areas) in strategic locations across the range of the marbled murrelet. Alternative D only concentrates conservation into special habitat areas in strategic locations across the range of the marbled murrelet. Alternative E is a combination of the conservation strategies in Alternatives C and D. Alternative F is based on the conservation recommendations presented in the 2008 Science Team report and establishes large conservation areas in strategic areas across the range of the marbled murrelet.

Both agencies proposed the alternatives to the BNR at a special board meeting on October 15, 2015. On November 3, 2015, the BNR approved the six alternatives for environmental and economic analysis. The next step for the strategy is to publish a draft environmental impact statement (DEIS). A DEIS provides an opportunity for agencies, affected tribes, and the public to review the document and provide suggestions for improving the adequacy of the environmental analysis.

Interim Conservation Strategy

Negotiations between DNR and the USFWS surrounding the MMLTCS began on July 8, 2013. DNR will continue to implement the Marbled Murrelet Interim Conservation Strategy throughout western Washington until a long-term conservation strategy is completed. DNR continues to discuss and inform implementation topics with USFWS. Through the marbled murrelet interim conservation strategy, stands on DNR-managed lands were classified by a habitat relationship model. These “reclassified habitat” stands were predicted to contain occupied sites, and the reclassified habitat that was predicted to contain 95 percent of the occupied sites had protocol surveys conducted to determine occupancy.

Within the areas where surveys were completed, DNR identified 17,327 acres of unoccupied reclassified habitat in which some of the habitat could be harvested. Some surveyed, unoccupied habitat has been released from deferral status as directed in Step 4 of the marbled murrelet interim conservation strategy in the HCP (p. IV.40). Of the original 4,788 acres available for harvest under the interim conservation strategy, 1,586 acres, or 33 percent of available acres, have been harvested.

Inventory surveys using the [2003 Pacific Seabird Group murrelet survey protocol](#) were completed for the Straits, South Coast, and Columbia HCP Planning Units and documented to USFWS on December 2, 2003. Reclassified habitat within the Columbia Planning Unit is located solely within Southwest Washington, which was recently made available for some harvests due to negotiations with USFWS on the MMLTCS. No harvest within reclassified habitat has yet occurred within the Columbia Planning Unit. Table 5 shows the amount of released, reclassified marbled murrelet habitat in the Straits and South Coast planning units and acres harvested within each watershed administrative unit (WAU).

Table 5: Released Reclassified Marbled Murrelet Habitat.

WAU Name	Total Reclassified Area in Acres¹	Area of Reclassified Habitat Available for Harvest	Harvested Acres as of 6/30/2015²
Straits HCP Planning Unit			
Bell Creek	222	0	0
Big Quil	122	61	1

WAU Name	Total Reclassified Area in Acres ¹	Area of Reclassified Habitat Available for Harvest	Harvested Acres as of 6/30/2015 ²
Chimakum	13	6	0
Cushman	15	8	0
Dabob	22	11	0
Discovery Bay	1,161	581	297
Dungeness Valley	1,410	265	39
Hamma Hamma	184	92	29
Lake Crescent	156	0	0
Lilliwaup	573	287	39
Little Quil	97	49	0
Ludlow	94	47	45
Lyre	636	19	0
Morse Creek	308	8	3
Port Angeles	1,441	154	67
Salt	2,418	745	238
Sequim Bay	1,959	450	253
Siebert McDonald	1,857	607	169
Skokomish, Lower NF	71	36	10
Sutherland-Aldwell	1,925	561	167
Twins	731	347	58
South Coast HCP Planning Unit, North of Highways 8 and 12			
Cook-Elk	230	0	0
Copalis River	249	21	0
Hoquiam, EF	8	4	1
Hoquiam, WF-MF	57	0	0
Humtulsips, Middle	110	55	66
Humtulsips, WF	253	30	1
Joe-Moclips	635	158	27
Skookumchuck, Lower	91	45	5
Stevens Creek	107	54	49
South Coast HCP Planning Unit, East of I-5			
Newaukum, Lower NF	5	3	0
Scatter Creek	167	84	22

¹ The Skokomish (Straits); Wishkah, Lower (South Coast, North of Highways 8 and 12); and Hanaford (South Coast, East of I-5) WAUs have no reclassified habitat, so they are not displayed in this table.

² Data originated in DNR's Planning and Tracking (P&T) system. Subsequent new data or corrections are not reflected here. The P&T data has been overlaid with the Marbled Murrelet Habitat GIS layer queried 1/7/2016 to identify timber sale activities (sold and completed, FYs 2004–2015) in released habitat. Values have been rounded to the nearest acre.

Adaptive Management

Background on Adaptive Management

Over the past two years, DNR State Lands' adaptive management group focused on better documenting and coordinating active research on state lands. With this complete, the research and monitoring work that makes up DNR's Adaptive Management Program can more easily facilitate the execution of the department's adaptive management missions:

- Setting research priorities
- Managing research projects
- Reviewing results
- Making changes to DNR's forest management practices
- Monitoring management activities to help inform needs

The adaptive management process for the OESF is at a different stage. An earlier description of the process and a draft adaptive management procedure was included in the [Revised Draft EIS for the OESF Forest Land Plan](#) in response to several HCP commitments for the OESF. Since then, the Forest Resources Division and Olympic Region have worked together to clarify elements such as the scope of adaptive management, the process to identify and prioritize scientific uncertainties, roles and responsibilities, and the budget to implement the procedure. A description of the process accompanied by an administrative procedure will be included in the final OESF Forest Land Plan (scheduled for release in 2016).

Implementation Monitoring

Background on Implementation Monitoring

Implementation monitoring, or the tracking and reporting of activities as DNR implements the HCP, is an important component of adaptive management. The Implementation Monitoring Program is responsible for documenting DNR's conformance to the HCP as well as other guiding documents and regulatory requirements. The program informs DNR management and field staff of implementation practices in order to continuously improve and to reduce the frequency of inconsistencies on the ground.

When determining monitoring priorities, the Implementation Monitoring Program emphasizes HCP topics. However, higher priority may be given to monitoring projects that can simultaneously address other agency priorities, questions, or program areas while providing DNR staff with information that may be used to make better management decisions. Monitoring priorities are determined through a collaborative process between region and division staff. This process takes into account a variety of factors including regulatory requirements, the level of management discretion, frequency of implementation, the consistency of compliance, the amount of time passed since last reviewed, and the resources required to conduct monitoring.

In FY 2015, the Implementation Monitoring Program reported on the implementation of NSO habitat maintenance treatments. Monitoring staff visited 11 forest management units from six timber sales that took place in designated NSO habitat in below-threshold management units. At each, a post-harvest stand-level Curtis relative density (RD) greater than or equal to 48 was used to assess HCP compliance (RD \geq 48 is used as a surrogate for 70 percent canopy closure, a component of the NSO habitat

definitions). Implementation Monitoring Program staff found all these units to be compliant with the HCP. Current and past reports produced by the Implementation Monitoring program can be found on [DNR's Monitoring and Reporting webpage](#).

Effectiveness Monitoring

Background on Effectiveness Monitoring

NSO Effectiveness Monitoring Program

Background on the NSO Effectiveness Monitoring Program

The NSO Effectiveness Monitoring Program evaluates whether the HCP strategies and associated silvicultural treatments maintain and/or enhance NRF and dispersal habitat. In calendar year 2015, DNR made progress on the four primary components of the program.

1. Long-term tracking of the effects of VDTs to improve habitat structure in stands designated as habitat.
 - The five- to seven-year remeasurement of all five installations was completed in the fall of 2015. DNR is currently performing quality checks and integrating new data with prior measurements.
2. Measurement of the response of habitat features to small-gap creation within thinned stands. This research, which was discussed under the title “Mind the Gap” in the OESF Research and Monitoring Program section of the [2014 HCP Annual Report](#), is discussed in further detail in the
3. 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.
 - Stem mapping has been completed for three recently thinned stands and one control stand (unthinned second-growth) within designated habitat areas in the Elbe State Forest (South Puget HCP Planning Unit) and the Siouxon Block (Columbia HCP Planning Unit). Measurements in additional stands will continue as field technicians become available. Identification of “early old-growth” reference sites is ongoing in collaboration with University of Washington forestry scientists, and initial data collection has begun at a few pilot sites. Analysis of gap structures in old forests within the OESF is also ongoing.
4. Monitoring of west-side landscape-scale HCP habitat indicators.
 - In a project to gain an understanding of how habitat conditions have changed since the implementation of the HCP, DNR conducted a two-stage validation of the United States Forest Service (USFS)’s Gradient Nearest Neighbor (GNN) data set for all west-side DNR lands. The GNN data show relatively stable comparisons with DNR’s forest inventory data over the entire analysis period of 1984–2012, indicating that temporal analyses should reflect real habitat trends and not data artifact or bias. Also, the GNN data for 2012 correspond reasonably well with similar metrics obtained from DNR’s remote-sensed inventory for the same year, indicating that the GNN data provide relevant structural metrics at the relatively coarse landscape scale at which DNR is analyzing them. With these comparisons complete, initial analyses by time period (i.e. pre- and post-HCP) and land designation are underway.

Riparian Silviculture Effectiveness Monitoring

Riparian effectiveness monitoring increases management confidence, clarifies options, and supports continual improvement of HCP procedures related to the RFRS. DNR's Effectiveness Monitoring of Riparian Silviculture for the DNR HCP Riparian Ecosystem Conservation Strategies describes effectiveness monitoring at both stand and landscape levels. DNR initiated stand-level monitoring in 2005 to document site responses to silvicultural treatments designed to meet the management objectives specified in the RFRS. In 2013, DNR resumed field measurement of the existing monitoring sites after several years of budget shortfalls.

To evaluate differences between treatments, DNR assesses a collection of variables in each treatment area before harvest, immediately following harvest, and periodically thereafter. Variables of interest are overstory structure and composition, understory structure and composition, canopy structure, and down wood. In FY 2013, DNR completed overstory stand structure and composition re-measurements, which involved measuring the diameter at breast height (dbh) on all overstory trees within the effectiveness monitoring sites. Newly established trees less than 10 centimeters dbh are measured and tagged during periodic visits. Repeated measurements on individual trees are tracked through time and compared with the management expectations of the treatments. In 2014 DNR started re-measurement of understory and vegetation response. As soon as funding becomes available, these measurements will be completed, concluding the 10-year measurements on the monitoring sites. DNR is currently analyzing these data.

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

This Status and Trends Monitoring of Aquatic and Riparian Habitat project characterizes the current conditions and change over time of riparian and aquatic habitat across the OESF as DNR implements existing land management procedures under the HCP. This project will assess the effectiveness of the HCP riparian conservation strategy for the OESF; test current assumptions about ecological relationships between in-stream, riparian, and upland conditions; and provide habitat data for riparian validation monitoring (fish response to managed landscapes).

The project started in 2012 and is expected to continue for at least ten years. Seven aquatic indicators (stream temperature, shade, discharge, coarse substrate, large wood, habitat units, and channel morphology) and two riparian indicators (microclimate, measured through air temperature and humidity, and vegetation) are monitored in 50 type 3 streams (the smallest fish-bearing streams) in the OESF and four reference basins in the Olympic National Park. DNR provides the majority of the funding for this project, while the USFS Pacific Northwest Research Station, DNR's main collaborator on the study, provides scientific expertise and field support.

In FY 2015, DNR field crews completed stream surveys in all monitored basins in the OESF and riparian vegetation sampling in 40 basins (Figure 4). Microclimate, stream temperature, and hydrology data were downloaded from continuously recording data loggers. Stream discharge measurements and installation maintenance in 14 basins monitored for hydrologic regimes continued as scheduled. DNR established relationships between stream discharge and water level, which are currently used for building hydrographs. Electronic databases were designed and populated for all monitoring protocols. Data quality procedures were developed and implemented for several protocols. The project's progress report for 2014 and other documents are available on the [OESF webpage](#).



Figure 4: Field Technicians Conducting Stream Surveys in the OESF.
Photo courtesy of Teodora Minkova.

Analyses of all field data are underway. DNR expects to release the first status report on habitat conditions in the spring of 2016. DNR presented preliminary results on stream temperature monitoring at the American Fisheries Society Annual Meeting in the summer of 2015.

Validation Monitoring

Background on Validation Monitoring

In FY 2015, DNR launched the Riparian Validation Monitoring Program. The program will test DNR's hypothesis that current forest management practices in the OESF restore and maintain habitat that is capable of supporting viable salmonid populations within the OESF (Figure 5). In answering this question, DNR will evaluate changes in salmonid and habitat indicators over time; test assumptions made in the [OESF Forest Land Plan Revised Draft Environmental Impact Statement \(RDEIS\)](#); and identify cause and effect relationships among salmonids, habitat, and management activities.



Figure 5: Juvenile Coho Salmon. While no fish sampling has been completed within the 50 potential sites for validation monitoring on the OESF, habitat field crews documented the presence of fish while conducting field surveys. Photo courtesy of Ellis Cropper.

In FY 2015, the Riparian Validation Monitoring Program began researching other regional fish monitoring programs and compiling the existing literature and fish distribution layers on salmonids within the OESF. DNR's Status and Trend Monitoring of Riparian and Aquatic Habitat Program already has a body of usable habitat data on 50 sites in the OESF. However, to determine the suitability of the 50 sites, the Validation

Monitoring Program must first conduct fish surveys to determine whether fish are present and, if so, each site's species composition. By the end of FY 2015, DNR's Validation Monitoring Program secured all necessary state and federal permits required to conduct these surveys. In FY 2016, exploratory fish sampling will begin and a study plan will be developed.

Research

DNR continually conducts research on its forested trust lands to better understand how different forest management practices affect forest productivity and habitat protection. This section organizes DNR's research projects on HCP-covered lands under the research priorities defined in the HCP:

- **Priority 1 Research** is “research that is a necessary part of a conservation strategy” (p. V.6).
- **Priority 2 Research** is “research needed to assess or improve conservation strategies or to increase management options and commodity production opportunities” (p. V.6).
- **Priority 3 Research** is “research needed to improve general understanding of the animals, habitats, and ecosystems addressed by the HCP” (p. V.6).

Priority 1

Evaluating Persistence of Northern Spotted Owl Habitat in the Eastern Washington Cascades

In the eastern Cascades, DNR is challenged with sustaining northern spotted owl habitat while maintaining fire-resilient forests. Quality owl habitat is characterized by higher tree densities, canopy layering, and fuel continuity—structures that can increase the likelihood of severe wildfires. Balancing these objectives requires a landscape approach, as not every stand or watershed is equally suited to managing for these attributes. This critical relationship between the stand and landscape scale is recognized in the HCP, but planning and implementation have mostly focused on the stand scale), resulting in uncertainty that the agency will achieve its social, economic, and ecological objectives.

In 1997, the HCP originally stipulated that, on the east side, DNR would attempt to achieve NSO habitat thresholds on 50 percent of each habitat-designated landscape. Since then, several analyses have suggested that realistic thresholds on the east side may be lower than 50 percent. In addition, some portions of the landscape are better suited to sustaining owl habitat over time than others, and these “fire refugia” may or may not be where DNR currently manages for habitat. To date, an updated assessment of a sustainable quantity and distribution of NSO habitat has not been conducted for all state forest lands on the east side.

This project includes a scientific assessment of historic, current, and future NSO habitat on state 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?

DNR's approach to this research will include analyses of historic and current forest conditions; historic, current, and future wildfire probability maps; inherent site capacities; local knowledge of regional DNR staff; contemporary landscape conditions; and future climate change. Inferences from this study will help inform several mission-critical activities for DNR, including possible updates to eastside habitat management under the HCP as well as sustainable harvest calculations.

Mind the Gap

DNR has begun analyzing structural and vegetation responses to gap creation (Figure 6). The data indicate robust regeneration and growth of trees within the half-acre gaps, with growth rates better than anticipated for such small canopy openings. Shrubs co-dominate but are not overtopping the entire tree cohort. Overstory trees at the gap edge are beginning to show increased horizontal and vertical branching, but, one decade following harvest, effect sizes are relatively minor. DNR researchers presented these initial findings at a reforestation workshop for DNR regional staff and to Forest Resources Division managers.



Figure 6: Natural Regeneration in a Wind-Created Gap. A small opening in the South Nemah NRCA exemplifies vegetation responses to small gaps. Photo courtesy of Dan Donato.

Other Priority 1 Projects

Mind the Gap: This project involves monitoring the responses of habitat features to small-gap creation within thinned stands in the OESF. More detail can be found in the [NSO Effectiveness Monitoring](#) section.

Thinning in NSO Habitat: In this project, researchers compare the spatial structure of both thinned and unthinned stands designated as habitat to late-successional reference stands known to function as NSO habitat. More detail can be found in the [NSO Effectiveness Monitoring](#) section.

Response to RFRS Treatments: Beginning in 2005, DNR has been documenting 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 Silvicultural Effectiveness Monitoring](#) section.

Priority 2

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, will test the influence of stand composition and the level of wood removed on tree and soil productivity, soil structure, and plant species diversity. The cooperative, multiple-decade study has been replicated in four experiment sites in the OESF and three national forests in Oregon (the Willamette, Siskiyou, and Siuslaw).

The OESF-based installation in Sappho was initiated in 1995 with funding provided by the USFS Pacific Northwest Research Station and DNR. Ten-year postharvest measurements were conducted in the summer of 2014. A summary of this project is available on the [OESF webpage](#).

Other Priority 2 Projects

Riparian Ecosystem Management Study: This small-scale pilot study compares the biological and physical characteristics of a sample of headwaters basins before and after logging. Data collected through this research will help guide development of long-term policy for headwaters basins on HCP

lands. More information on this collaborative project between the Washington Department of Ecology, the USFS, and DNR can be found on the [Department of Ecology's website](#).

Western Washington Climate Change Modeling: DNR is integrating vegetation dynamics, management options, and natural disturbances under different climate change scenarios across all of western Washington to better understand potential changes in vegetation and forest structure under different climate and management assumptions. This work will be incorporated into both the marbled murrelet DEIS and the upcoming sustainable harvest calculation.

Landscape-Scale Effectiveness Monitoring: DNR has validated the accuracy of USFS's historic GNN data through comparison to DNR's LiDAR data. GNN data will help DNR study forest-structure metrics. More detail can be found in the [NSO Effectiveness Monitoring](#) section.

Status and Trends Monitoring of Riparian and Aquatic Habitat: This project characterizes the current conditions and change over time of riparian and aquatic habitat across the OESF. A summary of this work can be found in the [Status and Trends Monitoring](#) section.

Riparian Validation Monitoring: This work will help determine whether DNR's current forest management practices in the OESF restore and maintain habitat that is capable of supporting viable salmonid populations within the OESF. A summary of this work can be found in the [Validation Monitoring](#) section.

Priority 3

Influence of Repeated Alternative Biodiversity Thinning Treatments on Coastal Forests

In the late 1990s DNR used pre-commercial thinning (PCT) across the landscape including in riparian and wetland areas and in sites adjacent to quality older forest habitat. Managers recognized the power of PCT to influence stand development trajectory and were interested in exploring a wide variety of alternative approaches to increase future wildlife habitat by increasing forest structural diversity. Setting stands on different development pathways was recognized as important to meeting the management goal of balancing timber and non-timber management on the OESF.

The project was initiated in 1999 in cooperation with Olympic Region staff. DNR implemented five thinning treatments in five locations (a replicated randomized block design) to test biodiversity stand management pathways with PCT treatments primarily by varying spacing and including canopy gaps. The second phase of the project was initiated in 2014 when Olympic Region staff designed commercial thinning treatments over the original PCT sites. These treatments allow DNR to continue to observe the effects of canopy gapping with PCT treatments versus with commercial thinning on wood products and wildlife habitat development.

This project allows DNR to measure the influence of repeated thinnings on both vegetation structure and timber production. Treatment responses are quantified by measuring a permanent plot network and analyzing LiDAR-derived canopy metrics. 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. A summary of this project is available on the [OESF webpage](#).

OESF Research and Monitoring Program

Background on the Research and Monitoring Program

The OESF Research and Monitoring Program has several objectives:

- Implement and coordinate research and monitoring projects on the OESF.
- Establish and maintain research partnerships with universities, colleges, federal agencies, and other organizations.
- Collaborate with local land managers, tribes, environmental organizations, and regulators on research and monitoring projects.
- Facilitate the adaptive management process at DNR.
- Provide educational opportunities such as internships and field trips.

DNR organized and partially sponsored an adaptive management workshop on April 2015 as part of the annual joint meeting of the Washington Chapters of the Society of American Foresters and The Wildlife Society. Practitioners presented and discussed lessons learned from implementing adaptive management on private, state, and federal lands. The information from this workshop is being used by the OESF research and monitoring program to develop effective and an efficient adaptive management process for the OESF.

An expired memorandum of understanding between DNR, University of Washington Olympic Natural Resources Center, Olympic National Forest, and the USFS Pacific Northwest Research Station was renewed in 2015. The agreement advances collaboration between the four parties on research, monitoring, and adaptive management of forest ecosystems on the Olympic Peninsula.

An OESF research tracking database was designed and partially populated. It includes metadata on ongoing research and monitoring projects related to natural resource management and ecology conducted by DNR or external parties and stores all scientific and administrative documents on projects implementation.

Two paid interns from The Evergreen State College worked on the OESF riparian monitoring project in the summer of 2015. They helped DNR researchers by establishing and measuring riparian vegetation monitoring plots and analyzing hydrology data from monitored streams.

International participants from EarthCorps and high-school students from Student Conservation Association (SCA) helped with riparian vegetation monitoring and stream surveys in the OESF for two weeks in the summer of 2015 (Figure 7). The crews reported excellent experiences with DNR staff along with opportunities to learn about management of public lands, monitoring environmental resources, and technical skills for field work.



Figure 7: SCA Volunteer. A student volunteer helps conduct stream surveys in the OESF in the summer of 2015. Photo courtesy of Teodora Minkova.

Conservation Strategy Updates

Background on Conservation Objectives

The HCP established numerous conservation strategies designed to minimize and mitigate the negative effects of land management activities on the habitats of federally listed species, riparian habitats, unlisted species of concern, and uncommon habitats that exist within the land base covered by the HCP.

DNR's conservation strategies are occasionally updated. These changes come out of research, plan development, changes to laws, and/or adjustments to DNR's administrative procedures. DNR made updates to the following conservation strategies during FY 2015.

Other Federally Listed Species

DNR's peregrine falcon, Aleutian Canada goose, and bald eagle, procedures were adopted under the HCP and DNR's incidental take permit (ITP). The procedures were required for implementation of forest management activities because all three species were federally listed when the HCP was established in 1997. Since then, all three species have been delisted (the peregrine falcon in 1999, the Aleutian Canada goose in 2001, and the bald eagle in 2007). As a result, all three species no longer require federal assurances against take, and the peregrine falcon, Aleutian Canada goose, and bald eagle procedures have been removed from DNR's Forestry Handbook. Removing these procedures represents an administrative clean-up of the handbook. Other relevant federal and/or state direction guide DNR's management practices as they pertain to the Aleutian Canada goose, bald eagle, and peregrine falcon.

Headwaters Conservation Strategy

DNR is preparing a revision of the 2007 draft Headwaters Conservation Strategy to complete the HCP riparian conservation strategy. In 2007 a draft strategy representing a multi-year collaborative effort between the Services, the scientific community, and DNR managers was completed. It was determined, however, that the new strategy would require a high level of spatial tracking to comply and document and would necessitate a considerable number of management decisions to complete each timber sale. A simpler alternative headwaters strategy is in development that will meet the original conservation objective of the previous draft. The strategy incorporates emerging ideas about the importance of non-fish-bearing stream habitat for ecosystem conservation and the linkage to downstream fish habitat quality.

Silvicultural Activity for FY 2015

Background on Silvicultural Activity

Information and analysis provided in this section are based on activities designated as "complete" in DNR's planning and tracking database (P&T) as of January 9, 2016. P&T is a dynamic system in which data is continually updated.

Five major silvicultural activity types are discussed in this report: timber harvest, site preparation, forest regeneration, vegetation management, and pre-commercial thinning. These activities usually occur in this chronological sequence for a unit where timber has been harvested. Timber harvests are the primary driving force for other silvicultural activities, as most harvests remove enough trees to require reforestation of the stand. Table 6 shows completed acres of silvicultural activities for fiscal year 2015 as well as the mean annual acres of each activity for the last five fiscal years.

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 levels of sold timber sales may stay relatively stable from year to year. However, timber removals or levels of completed activities may vary based on the purchaser's choice of when to harvest (and thus complete) the sale.

The level of acres where VRH occurred in FY 2015 was about 24 percent below the five-year mean, commercial thinning acres were 55 percent above the five-year mean, and variable density thinning acres were 78 percent above the five-year mean.

Forest Site Preparation

Due to lower levels of VRHs in FY 2014, forest site preparation acreage was 18 percent below the five-year mean. Aerial herbicide treatments were 59 percent below average. Ground herbicide treatments were 18 percent above the five-year mean.

Forest Regeneration

Due to lower levels of VRHs in FY 2014, forest regeneration acreage was 26 percent lower than the five-year mean. Natural regeneration was only 0.1 percent of the FY 2015 total.

Vegetation Management

Vegetation management activities in FY 2015 were 41 percent higher than the five-year mean. This increase is likely due to increased funding since FY 2012 for vegetation management after several years of budget cuts, during which time treatments of many forest management units were postponed or cancelled. Hand-cutting treatments accounted for most of the increase in FY 2015. Ground herbicide treatments were roughly equal to the five-year mean. Hand pulling was almost three times the five-year mean due to increased emphasis on treatment of noxious weeds.

Pre-Commercial Thinning

Due to budget limitations, essentially no pre-commercial thinning was completed from FY 2010–FY 2012. Funding again became available in FY 2013–FY 2015 for this activity. Accordingly, the 11,256 acres treated in FY 2015 are 46 percent above the five-year mean of 7,688 acres.

Salvage

Salvaged acres are not classified as a discrete harvest type in P&T. Instead, salvage areas are included in the harvest activity type that best fits the silvicultural prescription for the stand being managed. They are then flagged so they can be tracked separately. Table 7 compares the FY 2015 completed salvage acres to the five-year mean annual salvage acres by P&T timber harvest activity type. Overall, salvage levels were 44 percent above the five-year mean, most likely due to above-average wildfire seasons

Table 6: Acres of Completed Silvicultural Activities on State Trust Lands Managed under the HCP from FY 2011–FY 2015.

	FY 2015							FY 2015 Totals				FY 11–15 Mean Annual Acres ¹			
	EAST		WEST					East	West	OESF	Total	East	West	OESF	Total
	Klickitat	Yakima	Columbia	North Puget	South Coast	South Puget	Straits								
Timber Harvest															
Clearcut	-	-	-	-	5	-	-	-	5	-	5	-	7	-	7
Commercial thinning	-	-	750	260	139	214	1,100	-	2,463	573	3,036	222	1,513	225	1,960
Seed tree removal cut	-	-	-	-	-	-	-	-	-	-	-	51	-	-	51
Selective product logging	-	-	106	-	-	-	-	-	106	-	106	-	207	-	207
Shelterwood intermediate cut	113	-	-	-	-	-	-	113	-	-	113	23	-	-	23
Shelterwood removal cut	-	-	-	-	-	-	-	-	-	-	-	15	1	-	16
Uneven-aged management	223	238	-	-	-	-	9	461	9	-	470	423	40	-	462
Variable density thinning	118	1,770	184	600	-	-	-	1,888	784	421	3,093	790	764	180	1,734
Variable retention harvest	31	-	3,272	2,402	1,700	727	468	31	8,569	862	9,462	255	11,240	916	12,411
Salvage ²	Salvage is not a stand-alone timber harvest activity type. Instead, it is included in other timber harvest types. Refer to Table 7 for more information.														
Total timber harvest	485	2,008	4,312	3,262	1,844	941	1,577	2,493	11,936	1,856	16,285	1,778	13,772	1,320	16,870
Forest Site Preparation															
Aerial herbicide	-	-	1,107	-	908	49	-	-	2,064	-	2,064	-	4,926	107	5,033
Ground herbicide	-	-	1,055	1,131	758	541	361	-	3,846	348	4,194	108	2,961	472	3,541
Ground mechanical	-	-	-	-	-	-	-	-	-	-	-	391	1	-	393
Hand cutting	-	-	-	-	-	-	-	-	-	-	-	-	-	18	18
Pile and burn ³	143	1,626	16	-	205	-	-	1,769	221	-	1,990	875	171	-	1,046
Total forest site preparation	143	1,626	2,178	1,131	1,871	590	361	1,769	6,131	348	8,248	1,374	8,060	597	10,030
Forest Regeneration															
Hand planting	111	768	2,557	2,149	2,472	738	989	879	8,905	933	10,717	812	12,012	1,182	14,006
Natural regeneration	-	11	-	-	-	-	-	11	-	-	11	489	12	-	501
Total forest regeneration	111	779	2,557	2,149	2,472	738	989	890	8,905	933	10,728	1,301	12,024	1,182	14,507
Vegetation Management															
Aerial herbicide	-	-	-	-	-	-	-	-	-	-	-	-	556	-	556
Ground herbicide	-	-	221	1,563	473	393	852	-	3,502	74	3,576	-	3,558	158	3,717
Hand cutting	-	-	1,507	4,350	3,968	1,874	1,778	-	13,477	244	13,721	121	7,920	243	8,283
Hand pulling	-	-	-	-	331	413	-	-	744	-	744	-	254	-	254
Seeding grass ⁴	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Total vegetation management	-	-	1,728	5,913	4,772	2,680	2,630	-	17,723	318	18,041	122	12,289	401	12,811

	FY 2015							FY 2015 Totals				FY 11–15 Mean Annual Acres ¹			
	EAST		WEST					East	West	OESF	Total	East	West	OESF	Total
	Klickitat	Yakima	Columbia	North Puget	South Coast	South Puget	Straits								
Pre-Commercial Thinning															
Total pre-commercial thinning	-	1,319	354	5,224	885	2,644	521	1,319	9,628	309	11,256	1,221	5,618	849	7,688
Other															
Shielding or fencing	-	-	128	-	191	-	-	-	319	-	319	-	268	45	313
Ground fertilization	-	-	-	183	-	-	-	-	183	-	183	-	37	-	37
Biomass piles	-	-	-	-	-	-	232	-	232	-	232	-	258	-	258
Total other	-	-	128	183	191	-	232	-	734	-	734	-	563	45	608
Grand Total	739	5,732	11,257	17,862	12,035	7,593	6,310	6,471	55,057	3,764	65,292	5,796	52,326	4,393	62,515

¹ Completed acres from P&T as of January 9, 2016 have been converted to mean annual acres for the time period of July 1, 2010–June 30, 2015.

² Salvage activities are recorded in P&T under the harvest activity type that best fits the silvicultural prescription for the stand being managed.

³ Data reporting for “pile and burn” is highly inconsistent. In some cases, spatial data for the footprints of the burn piles is included, while in other cases, acreage data for entire units is counted.

⁴ Seeding grass is rarely implemented as a silvicultural prescription, usually for wildfire restoration or for addressing large noxious weed infestations.

Table 7: Completed Salvage Acres for FY 2015 and Mean Annual Salvage Acres for 2011–2015 by Harvest Type.

	FY 2015 Completed Salvaged Acres				FY 2011–2015 Completed Mean Annual Salvaged Acres ¹			
	East	West	OESF	Total	East	West	OESF	Total
Harvest Type								
Clearcut	-	-	-	-	-	3	-	3
Selective product logging	-	-	-	-	-	-	-	-
Uneven-aged management	238	-	-	238	96	4	-	101
Variable density thinning	755	-	-	755	389	3	-	392
Variable retention harvest	-	12	-	12	136	65	-	201
Total	993	12	-	1,005	621	76	-	697

¹ Completed acres from P&T as of January 9, 2016 have been converted to mean annual acres for the time period of July 1, 2010–June 30, 2015.

Road Management Activity

Background on Road Management Activity

Forest Roads Program

The Forest Roads Program continues to improve DNR’s forest-road infrastructure across the state. Unlike most activities addressed in this report, road management activities are reported 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. Data reported here comes from calendar year 2014.

During the 2014 legislative session, DNR requested \$5 million for fish barrier correction. To fund the request, DNR received \$2 million through State Building Construction Account funds and \$3 million through an agreement with the Office of Financial Management (OFM). The \$3 million from OFM was designated for the correction of man-made fish barriers under the jurisdiction of the March 29, 2013 federal injunction that applies to barrier and passable culverts on salmon and steelhead streams within the Puget Sound and Olympic Peninsula drainage areas of western Washington (Water Resource Inventory Units 1–23).

In 2014, DNR applied for and received extensions for road maintenance and abandonment plans (RMAPs) in four regions to change the deadline from October 2016 to October 2021. These extensions cover a relatively small number of projects and extend an even smaller number past the original October 2016 deadline. For example, DNR submitted 181 fish barriers for rescheduling and only 37 of them are scheduled beyond the original October 2016 date; this represents 19 percent of the fish barriers remaining as of January 1, 2014.

Through land transactions and inventory activities, DNR acquired 54 new fish passage barriers that will need to be corrected. These new culverts are not part of the RMAP extension but were scheduled for repair by 2021.

In calendar year 2014, 103 barriers were removed from the fish-barrier work list, representing an investment of \$3.97 million. DNR physically removed or replaced 90 barriers, opening up an estimated 45 miles of fish habitat on DNR-managed lands (Figure 8). The remaining 13 fish-passage barriers were removed from the work list for the following reasons:

- The stream designation was downgraded from “fish” to “non-fish” following protocol survey requirements.



Figure 8: Fish Passage on an Unnamed Tributary of the Hoh River. DNR replaced a 60-inch culvert and debris rack and an adjacent 42-inch culvert with a 60-foot concrete bridge, opening up 1,500 feet of fish habitat. Photos courtesy of Candace Montoya.

- The fish-passage barrier was on a road that was not on state trust lands or not managed under Forest Practices rules (for instance, a road through agricultural or commercial properties, or a county road or highway).
- The fish-passage barrier would result in very limited habitat gain—usually less than 200 meters. These barriers were reprioritized for replacement at the end of the culvert’s useful life with consensus from Washington Department of Fish and Wildlife (WDFW) and DNR Forest Practices Division staff.

On lands managed under the HCP, 140 miles of road were abandoned or decommissioned. DNR showed a net gain of total road miles on HCP-managed lands from 10,074 to 10,727 due to land transactions and better road inventory in 2014. Table 8 summarizes DNR’s road management activity on both HCP- and non-HCP-covered lands.

Table 8: Road Management Activity Summary for Calendar Year 2014, including HCP- and Non-HCP-Covered Lands.

	Chelan	Columbia	Klickitat	North Puget	OESF	South Coast	South Puget	Straits	Yakima	Non-HCP Lands	Total
Miles of New Road Constructed	-	15.01	0.26	27.95	1.85	17.09	9.85	7.71	2.92	14.28	96.93
Miles of Road Reconstructed	-	9.47	0.10	83.07	4.17	4.50	6.96	3.01	1.36	7.54	120.18
Miles of Forest Road Abandoned	-	21.70	1.36	86.07	-	12.92	1.60	1.47	1.50	2.31	128.93
Miles of Forest Road Decommissioned	-	-	0.05	-	7.38	1.97	0.10	0.07	4.20	5.22	18.99
Miles of Inventoried Road	45.86	1350	587.56	1483	1793	1533	1306	841	1787.62	3050.84	13777.88
Fish Barriers Removed	-	18	3	14	40	9	12	1	3	3	103

Easements

Background on Easements

Road Easement GIS

Easements are granted to DNR by private individuals, entities, or other agencies. They provide access to DNR-managed lands across private or other public lands. DNR also occasionally acquires easements as part of land transactions.

DNR is digitally mapping all existing and new easements in the Road Easement GIS. Mapping of easements granted to DNR by private individuals, entities, or other agencies was completed in 2014. As of the end of calendar year 2015, easements granted over DNR-managed trust lands have been incorporated for the Northeast, Northwest, South Puget Sound, Pacific Cascade, and Olympic regions. Southeast Region mapping is in progress. Once mapping of road easements is complete, the project will begin mapping utility corridor easements across DNR-managed trust lands.

Road Easements, Road Use Permits, and Utility Easements

Table 9 reports the new easements and road use permits that created a new footprint, and Table 10 reports the new utility easements that created a new footprint. Both types of easements required that timber be cut to create open space. Table 11 reports the acres and mileage of utility easements granted during the reporting period that created no new footprint because they overlap with existing easements or agricultural leases.

Table 9: Road Easements and Road Use Permits (New Footprint).

	HCP Planning Unit			Total
	OESF	Columbia	North Puget	
Miles of Road Constructed	0.26	0.01	0.39	0.66
Acres Impacted	0.91	0.1	2.56	3.57

Table 10: Utility Easements (New Footprint).

	North Puget HCP Planning Unit
Miles Constructed	0.04
Acres Impacted	0.17

Table 11: Utility Easements (No New Footprint).

	Chelan HCP Planning Unit
Miles Constructed	2.4
Acres Impacted	4.6

Land Transaction Activity

Background on Land Transactions

Below is a summary by HCP planning unit of land acquisitions, dispositions, and transfers concluded during FY 2015. Because this section incorporates acreage data from land surveys conducted during transactions as well as acres extracted from DNR's GIS layers, the acreage numbers in the narrative portion of this section may not exactly match the numbers in Table 12. The acreage data in this section is rounded to the nearest whole acre.

Activity by HCP Planning Unit

Chelan

Acquired: DNR added 20 acres to the Camas Meadows Natural Area Preserve (NAP) in Chelan County.

Disposed: None

Trust Land Transfer/State Forest Transfer (TLT/SFT): None

Columbia

Acquired: None

Disposed: DNR sold 157 acres near Spud Mountain to Clark County.

TLT/SFT: Two parcels were transferred out of trust status in 2015 but will continue to be managed under the conditions of DNR’s HCP: 40 acres for Columbia Falls NAP and 43 acres to Stevenson Ridge NRCA.

Klickitat

Acquired: None

Disposed: None

TLT/SFT: DNR transferred 819 acres to the Klickitat Canyon NRCA, including parcels in both Klickitat and Yakima Counties. This property will remain part of the HCP permit lands.

North Puget

Acquired: DNR purchased 41 forested acres in Snohomish County for the school trust. Cypress Island NRCA in Skagit County acquired 43 acres in two parcels, and Mount Si NRCA in King County acquired 377 acres, for a total of 461 acres added to this planning unit.

Disposed: None

TLT/SFT: DNR transferred 2,445 acres from school trust to Morning Star NRCA in Snohomish County. This property will remain part of the HCP permit lands.

Olympic Experimental State Forest

Acquired: DNR acquired 1,720 forested acres for the school trust in Clallam County.

Disposed: None

TLT/SFT: None

South Coast

Acquired: DNR acquired 250 acres of forest land in two parcels: 130 acres in Pacific County and 120 acres in Thurston County (Figure 9).

Disposed: None

TLT/SFT: Seventeen acres in Pacific County were transferred to Naselle Highlands NRCA, 49 acres in Wahkiakum County were transferred to Skamokawa Creek NRCA, and 194 acres in Grays Harbor County were added to Elk River NRCA, for a total of 260 acres. These properties will remain part of HCP permit lands.



Figure 9: 120-Acre Addition to School Trust Land in Thurston County. Photo courtesy of Julie Armbruster.

South Puget

Acquired: DNR acquired 34 acres for three natural areas: five acres for Kennedy Creek NAP in Thurston County, 19 acres for Woodard Bay in Thurston County, and 10 acres for Stavis NRCA in Kitsap County.

Disposed: DNR sold 186 acres near Poulsbo to Kitsap County for a park and sold 78 acres to King County for use as open space.

TLT/SFT: Several school trust properties totaling 553 acres were transferred to the Stavis NRCA in Kitsap County. These properties will remain part of HCP permit lands.

In addition to the transactions listed above, Tacoma Public Utilities received 547 acres of school trust land in Thurston County that will remain part of HCP permit lands.

Straits

Acquired: DNR acquired 80 forested acres for the school trust in Clallam County and 142 acres for Dabob Bay NRCA in Jefferson County.

Disposed: One 305-acre parcel of school trust land was transferred to Jefferson County for a park.

TLT/SFT: None

Yakima

Acquired: DNR acquired 647 forested acres for the School trust in Yakima County.

Disposed: DNR exchanged 80 acres of School trust land in Yakima County to a private owner.

TLT/SFT: None

In addition to the transactions listed above, WDFW received 1,267 acres in Chelan County that will remain part of HCP permit lands.

Table 12 provides summaries of transaction activities for the reporting period. Acreages and miles reported for acquired lands are estimates that have not yet been field verified.

Table 12: HCP-Covered Land Transactions for FY 2015.

		HCP Planning Unit ¹									
		Chelan	Columbia	Klickitat	North Puget	OESF	South Coast	South Puget	Straits	Yakima	Totals
Acquired Lands											
Stream miles by stream type²	Type 1	-	-	-	-	-	-	-	-	-	-
	Type 2	-	-	-	-	0.5	-	0.1	-	-	0.6
	Type 3	-	-	-	-	3.9	0.1	-	0.7	0.6	5.3
	Type 4	-	-	-	1.2	0.8	0.3	0.1	-	0.7	3.1
	Type 5	-	-	-	0.8	6.5	1.5	0.1	1.3	1.0	11.3
	Type 9	0.5	-	-	0.9	-	1.4	-	-	0.9	3.7
	Total miles acquired	0.5	-	-	3.0	11.8	3.3	0.2	2.0	3.2	24.0
Acres acquired in rain-on-snow zones³		-	-	-	-	-	-	-	-	564	564
Acres per asset class⁴	Forested	-	-	-	40	1,712	249	-	80	620	2,701
	Conservation	20	-	-	401	-	-	34	142	-	597
	Non-forested	-	-	-	-	-	-	-	-	-	-
Total acres acquired		20	-	-	441	1,712	249	34	222	620	3,298

		HCP Planning Unit ¹									
		Chelan	Columbia	Klickitat	North Puget	OESF	South Coast	South Puget	Straits	Yakima	Totals
Disposed Lands											
Stream miles by stream type²	Type 1	-	-	-	-	-	-	-	-	-	-
	Type 2	-	-	-	-	-	-	-	-	-	-
	Type 3	-	0.2	-	-	-	-	0.4	-	-	0.6
	Type 4	-	-	-	-	-	-	0.5	-	-	0.5
	Type 5	-	0.8	-	-	-	-	0.5	0.4	-	1.8
	Type 9	-	-	-	-	-	-	0.1	0.1	-	0.2
	Total miles disposed	-	1.0	-	-	-	-	1.5	0.5	-	3.0
Acres disposed in rain-on-snow zones³		-	50	-	-	-	-	-	-	77	127
Acres per age class	Open (0–10 years)	-	-	-	-	-	-	39	54	-	93
	Regeneration (11–20 years)	-	-	-	-	-	-	97	-	-	97
	Pole (21–40 years)	-	5	-	-	-	-	-	54	-	59
	Closed (41–70 years)	-	145	-	-	-	-	-	115	-	261
	Complex (71–100 years)	-	4	-	-	-	-	34	-	-	38
	Complex (101–150 years)	-	-	-	-	-	-	15	1	34	50
	Functional (150+ years)	-	-	-	-	-	-	73	-	-	73
	Non-forested	-	2	-	-	-	-	6	13	43	65
	Unknown	-	-	-	-	-	-	1	65	-	66
Total acres disposed		-	157	-	-	-	-	264	302	77	801

¹ This data is intended to provide a broad picture of transaction activities for the reporting period. Data for acquired lands are estimates that have not yet been field verified. This information is provided to the Services through the HCP annual reports to provide a general understanding of what stand types and habitat conditions are being transacted.

² Stream-type data is derived from the Forest Practices Hydro Layer at the time of land acquisition to maintain consistency throughout the HCP annual reports (it has been used in State Trust Lands HCP annual reports since the first report was published in 1999). At the time of the transaction, the Land Transactions Program evaluates stream typing using an old forest practices water-typing system (which included water types 1–5 and 9) embedded within the DNR GIS hydrology layer. It may be decades before the streams are field verified and upgraded to the more accurate HCP water-typing system.

³ Rain-on-Snow (ROS) data is derived from DNR's corporate ROS GIS layer.

⁴ 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.

Natural Areas Program

Background on the Natural Areas Program

In FY 2015, the Natural Areas Program protected an additional 5,699 acres in NAPs and NRCAs, nearly 5,000 acres of which fall within the area covered by the HCP. These statewide protection efforts

included one newly established natural area (outside the HCP) and additions to 14 existing HCP-covered natural areas. The most significant of these were:

- **Morningstar NRCA:** 2,445 acres were added to the Morningstar NRCA through the TLT program. These lands include mature forest and remnant old-growth forest stands that support northern spotted owl and marbled murrelet. They also contain subalpine wetlands, ponds, and riparian systems.
- **Klickitat Canyon NRCA:** DNR added 819.4 acres to the Klickitat Canyon NRCA through the TLT program, including ponderosa pine – Douglas fir forest and seasonally wet meadows that are habitat for several rare plant species. The addition also supports potential foraging areas for greater Sandhill cranes that nest on the site.
- **Camas Meadows NAP:** DNR purchased 19.8 acres of mixed conifer forest and riparian meadow containing occurrences of the Wenatchee Mountains checker-mallow, a federally listed endangered plant (Figure 10). The purchased land borders the large wet meadow that is the core habitat for the checker-mallow at this natural area, and it is connected to the meadow hydrologically, making it of particular importance for protection at this site.
- **Stavis NRCA:** DNR added 562.7 acres of low-elevation forest, wetlands, and riparian habitat to the Stavis NRCA. These lands include areas of relatively rare intact examples of the Douglas fir – western hemlock / evergreen huckleberry forest type, and the streams and wetlands support populations of resident cutthroat trout and coho salmon.



Figure 10: Wenatchee Mountains Checker-Mallow at Camas Meadows NAP. Photo courtesy of David Wilderman.

Table 13 lists the natural areas that are located in areas managed under the HCP and indicates which natural areas are composed primarily of mature forests and/or late-seral forests.

Table 13: Acres Added to Natural Areas within HCP-Covered Lands.

Natural Area	County	Primarily Mature/Late-Seral Forest	Acres Added in FY 2015 ¹	Total Current Acres
Admiralty Inlet NAP	Island	No	-	79.5
Ashford NRCA	Pierce	Yes	-	78.4
Bald Hill NAP	Thurston	No	-	313.7
Bone River NAP	Pacific	No	-	2,565.0
Camas Meadows NAP	Chelan	No	19.8	2,007.0
Carlisle Bog NAP	Grays Harbor	No	-	310.0
Cattle Point NRCA	San Juan	No	-	112.1

Natural Area	County	Primarily Mature/Late-Sereral Forest	Acres Added in FY 2015 ¹	Total Current Acres
Charley Creek NAP	King	Yes	-	1,966.0
Chehalis River Surge Plain NAP	Grays Harbor	No	-	3,024.4
Clearwater Bogs NAP	Jefferson	No	-	504.1
Clearwater Corridor NRCA	Jefferson	Yes	-	2,323.0
Columbia Falls NAP	Skamania	Yes	39.9	1,233.8
Cypress Highlands NAP	Skagit	No	-	1,075.9
Cypress Island NRCA	Skagit	No	43.0	4,131.5
Dabob Bay NAP/NRCA	Jefferson	No	142.4	2,505.9
Dailey Prairie NAP	Whatcom	No	-	228.8
Devils Lake NRCA	Jefferson	No	-	80.0
Elk River NRCA	Grays Harbor	No	194.2	5,607.0
Ellsworth Creek NRCA	Pacific	Yes	-	557.0
Goose Island NAP	Grays Harbor	No	-	12.0
Granite Lakes NRCA	Skagit	Yes	-	603.2
Gunpowder Island NAP	Pacific	No	-	152.0
Hamma Hamma Balds NAP	Mason	No	-	957.0
Hat Island NRCA	Skagit	No	-	91.2
Hendrickson Canyon NRCA	Wahkiakum	Yes	-	159.0
Ink Blot NAP	Mason	No	-	183.6
Kennedy Creek NAP	Mason	No	5.4	208.0
Kings Lake Bog NAP	King	No	-	309.2
Kitsap Forest NAP	Kitsap	Yes	-	571.9
Klickitat Canyon NRCA	Yakima	Yes	819.4	2,335.2
Lacamas Prairie NAP/NRCA	Clallam	No	-	201.1
Lake Louise NRCA	Whatcom	No	-	137.7
Lummi Island NRCA	Whatcom	No	-	671.5
Merrill Lake NRCA	Cowlitz	No	-	114.2
Middle Fork Snoqualmie NRCA	King	Yes	-	9,000.0
Mima Mounds NAP	Thurston	No	-	640.5
Monte Cristo NAP	Klickitat	Yes	-	1,151.0
Morning Star NRCA	Snohomish	Yes	2445.0	36,037.0
Mount Si NRCA	King	Yes	540.2	13,072.9
Naselle Highlands NRCA	Pacific	Yes	16.7	44.6
Niawiakum River NAP	Pacific	No	-	1,097.8
North Bay NAP	Grays Harbor	No	-	1,214.9
Oak Patch NAP	Mason	No	-	17.3
Olivine Bridge NAP	Skagit	No	-	148.0
Point Doughty NAP	San Juan	No	-	56.5

Natural Area	County	Primarily Mature/Late-Seral Forest	Acres Added in FY 2015 ¹	Total Current Acres
Rattlesnake Ridge NRCA	King	Yes	-	1,771.4
Rocky Prairie NAP	Thurston	No	-	35.0
Sand Island NAP	Grays Harbor	No	-	8.0
Shipwreck Point NRCA	Clallam	No	-	471.8
Shumocher Creek NAP	Mason	No	-	493.7
Skagit Bald Eagle NAP	Skagit	Yes	-	1,546.0
Skamokawa Creek NRCA	Wahkiakum	Yes	48.9	115.9
Skookum Inlet NAP	Mason	No	-	142.6
Snoqualmie Bog NAP	King	No	-	110.5
South Nemah NRCA	Pacific	Yes	-	2,439.5
South Nolan NRCA	Jefferson	Yes	-	213.0
Stavis NRCA	Kitsap	Yes	562.7	2,856.4
Stevenson Ridge NRCA	Skamania	Yes	42.5	127.9
Table Mountain NRCA	Skamania	Yes	-	2,836.5
Tahoma NRCA	Lewis	Yes	-	230.0
Teal Slough NRCA	Pacific	No	-	8.4
Trout Lake NAP	Klickitat	No	-	2,014.0
Washougal Oaks NAP/NRCA	Clark	No	-	264.2
West Tiger Mountain NRCA	King	Yes	-	3,907.9
Whitcomb Flats NAP	Grays Harbor	No	-	5.0
White Salmon Oak NRCA	Klickitat	No	-	551.2
Willapa Divide NAP	Pacific	Yes	-	587.0
Woodard Bay NRCA	Thurston	No	18.7	886.5
Total Acres:			4,939	119,513

¹Acres data in this column comes from the TransactionsAll and HCP2 databases 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 as calculated by DNR's GIS system.

Table 14 lists the threatened and endangered species found in natural areas located in areas managed under the HCP, and Table 15 lists other species of concern in these areas.

Table 14: Threatened and Endangered Species on Natural Areas Covered by the HCP.

Species	Federal Status	Natural Area
Bradshaw's Lomatium	Endangered	Lacamas Prairie NAP/NRCA
Bull Trout	Threatened	Chehalis River Surge Plain NAP, Carlisle Bog NAP, Olivine Bridge NAP, Skagit Bald Eagle NAP, Morning Star NRCA
Chinook Salmon – Lower Columbia	Threatened	Klickitat Canyon NRCA

Species	Federal Status	Natural Area
Chinook Salmon – Puget Sound	Threatened	Kitsap Forest NAP, Mount Si NRCA, West Tiger Mountain NRCA, Olivine Bridge NAP, Skagit Bald Eagle NAP
Coho Salmon – Lower Columbia/SW Washington	Threatened	Washougal Oaks NAP/NRCA
Golden Paintbrush	Threatened	Rocky Prairie NAP, Admiralty Inlet NAP
Marbled Murrelet	Threatened	Ashford NRCA, Bone River NAP, Clearwater Bogs NAP, Clearwater Corridor NRCA, Elk River NRCA, Morning Star NRCA, Naselle Highlands NRCA, Niawiakum River NAP, Skamokawa Creek NRCA, South Nemah NRCA, South Nolan NRCA, Teal Slough NRCA, Willapa Divide NAP
Mazama Pocket Gopher	Threatened	Rocky Prairie NAP
Northern Spotted Owl	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
Oregon Spotted Frog	Threatened	Trout Lake NAP
Steelhead – Lower Columbia	Threatened	Klickitat Canyon NRCA, Table Mountain NRCA, Washougal Oaks NAP/NRCA
Wenatchee Mountains Checker-Mallow	Endangered	Camas Meadows NAP

Table 15: Special Status Species Located in Natural Areas Covered by the HCP.

Species	Natural Area ¹
Federal Species of Concern	
Beller's Ground Beetle	Snoqualamie Bog NAP, Kings Lake Bog NAP
California Bighorn Sheep	Morning Star NRCA
Cascades Frog	Mount Pilchuck 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
Makah Copper	North Bay NAP, Carlisle Bog NAP, Clearwater Bogs 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

Species	Natural Area ¹
Peregrine Falcon	Table Mountain NRCA, Cypress Island NAP, Mount Si NRCA, Elk River NRCA, Hat Island NRCA, Lummi Island NRCA, North Bay NAP
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
State Listed Species – No Federal Status	
Sandhill Crane (State Endangered)	Trout Lake NAP, Klickitat Canyon NRCA
State Candidate Species – No Federal Status	
Dunn's Salamander	Teal Slough NRCA, South Nemah 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
Vaux's Swift	Numerous sites
State Sensitive or State Monitor Species	
Olympic Mudminnow	Carlisle Bog NAP, Chehalis River Surge Plain NAP, West Tiger Mountain NRCA
Western Bluebird	Rocky Prairie NAP, Mima Mounds NAP

¹Location 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.

Non-Timber Management Activity

Special Forest Products

Background on Special Forest Products

DNR's South Puget and OESF region offices sell leases and permits to gather special forest products in the OESF, South Coast, South Puget, and Straits HCP planning units. These leases and permits provide individuals access to gather a variety of valuable non-timber forest products including beargrass, evergreen huckleberry, moss, salal, sword fern, Douglas fir boughs, western red cedar boughs, and western white pine boughs, though not every lease or permit includes all these products.

DNR also offers direct sales of some of the same special forest products. In South Puget Region, direct sales are made to existing lessees through amendments to their lease contracts. Table 16 summarizes DNR's FY 2015 sales of special forest products on HCP-covered forest lands.

Table 16: FY 2015 Special Forest Product Sales on HCP-Covered Areas.

Region	Permits		Leases		Direct Sales	
	Occurrences	Acres	Occurrences	Acres	Occurrences	Acres
South Puget	96	100,000	21	63,490	5	27,939
OESF	56	270,000	-	-	1	159
Total	152	370,000	21	63,490	6	28,098

Leases

Background on Leases

Oil and Gas Leases

DNR did not have any active oil and gas leases in FY 2015.

Grazing Permits and Leases

There were no west-side grazing permits or leases during FY 2015. However, there are numerous grazing permits and leases on DNR's HCP lands east of the Cascade crest. In Northeast Region, spatial data on grazing permits and leases is not regularly updated. Fortunately, the vast majority of east-side grazing permits and leases on HCP-covered lands are in Southeast Region. In Southeast Region, as of February 4, 2016, there were 83,092 acres of grazing permits on HCP lands and 83,445 acres of grazing leases.

Communication Sites and Leases

In FY 2015, there were 75 leased communication sites on DNR lands covered by the HCP, totaling 61 acres. There are a total of 317 leases from individual tenants on the 75 communication sites.

Sand, Gravel, and Rock Sales

Background on Valuable Material Sales

In FY 2015, DNR had six active commercial sand, gravel, and rock contracts within the HCP boundary, totaling approximately 657 acres. Table 17 summarizes those contracts.

Table 17: Sand, Gravel, and Rock Leases.

Lease Name	Commodity	HCP Unit	Acres
Elbow Coulee – Okanagan	Sand, gravel	Chelan	6.65
Lewis Gravel Pit – Winthrop	Sand, gravel, rock	Chelan	40
Livingston Quarry	Road rock	Columbia	170
Glenwood Pit ¹	Sand, gravel	Klickitat	40
High Rock	Sand, gravel, rock	North Puget	320
Jordan Road	Sand, gravel	North Puget	80
Total Acres:			656.65

¹The Glenwood Pit mine in the Klickitat HCP Planning Unit has been mined out and is in the process of being reclaimed.

Recreation Program

Background on Recreation

DNR’s Recreation Program continued to design, construct, maintain, and manage a variety of projects, many of which included erosion control measures to protect habitat. Some highlights from this past year’s work are summarized below.

Development

Northwest Region

Blanchard Forest, Skagit County: In FY 2015, DNR reconstructed 1,500 feet of the Samish Bay trail and revegetated 500 feet of unauthorized trail to improve the safety of the recreation site and protect against resource damage. The recreation program also removed hazard trees at the Samish Overlook Day Use Site to improve safety for hang gliders and paragliders.

Harry Osborne Forest, Skagit County: DNR reconstructed 500 feet of the Four Firs trail with new rock surfacing, reconstructed 1,000 feet of the Firebreak trail to improve trail safety and reduce resource impacts, and initiated the process to obtain trail easement to provide public access from DNR’s Les Hilde trailhead to state lands.

Reiter Foothills Forest, Snohomish County: DNR completed 1.5 miles of motorcycle trail, 0.9 miles of all-terrain vehicle trail, and 1.9 miles of four-by-four trail.

Walker Valley, Skagit County: The Recreation Program completed a number of maintenance projects in Walker Valley that contribute to a more environmentally sustainable outdoor recreational vehicle trail system. With the help of Washington Conservation Corps crews, they installed and maintained numerous culverts, water bars, drain dips and ditches and removed over a mile of trail to address resource damage. A half mile of existing trail was hardened to mitigate erosion and make the trail safer.

Pacific Cascade Region

Yacolt Burn State Forest, Clark County: DNR completed and opened the Larch Mountain Trailhead, the Yacolt Burn Trailhead, the Hagen Creek Four-by-four trail system, and the Thrillium mountain bike trail. The Recreation Program held the 12th annual “Pick up the Burn” volunteer event during which volunteers removed more than 40 yards of garbage from the Yacolt Burn State Forest.

South Puget Sound Region

Capitol Forest, Thurston County: DNR’s Recreation Program installed six new vault toilets to replace very old structures and improve access for users with disabilities. Through the Great Gravel Pack In, over 200 volunteers placed 30 yards of gravel on over 900 feet of trail (Figure 11). Hardening trails minimizes sediment generation and off-trail use. In total, 80 miles of non-motorized trails were maintained by DNR-directed volunteers or correctional crews. DNR also oversaw the maintenance of over 40 miles of motorized trails.



Figure 11: The Great Gravel Pack In.
Photo courtesy of Phil Wolff.

On the McLane Creek Nature Trails, DNR rebuilt 200 feet of boardwalk, improved 300 feet of boardwalk, relocated 400 feet of trail beside a pond to a drier site, and improved 500 feet of trail located in a low area. DNR also abandoned 800 feet of trail on the North Side of McLane Creek.

Middle Fork Snoqualmie NRCA, King County: DNR’s Recreation and Natural Areas programs coordinated to complete a 50-foot trail bridge at the Granite Creek Trail, a 30-foot trail bridge at the Mine Creek Day Use Site, and the quarter-mile Champion Beach Trail (which includes a 30-foot trail bridge). DNR began construction on the 1.3-mile Granite Creek Connector Trail and the three-mile Dirty Harry’s Peak Trail reroute.

Mount Si NRCA, King County: In collaboration with the Natural Areas Programs, the Recreation Program converted 6.5 miles of roads into hiking trails at Mount Teneriffe. The project included installation of three 50-foot trail bridges.

Olallie State Park, King County: In partnership with the Washington State Parks and Recreation Commission, DNR’s Recreation Program designed and began construction on the 8.7-mile Olallie Trail within Olallie State Park.

Tiger Mountain State Forest, King County: The Recreation Program completed 2.3 miles of new mountain bike trails, including installation of a 30-foot, 40-foot, and 80-foot bridge. The Recreation Program also began construction on the 2.5 mile length mountain bike ascent trail.

West Tiger Mountain NRCA, King County: In collaboration with the Natural Areas Program, DNR’s Recreation Program completed a 200-foot trail bridge across High Point Creek on the Tiger Mountain Trail.

Southeast Region

Ahtanum State Forest, Yakima County: The Recreation Program completed 3.5 miles of non-motorized trail on Whites Ridge and constructed new access to BBQ Flats including 1.5 miles of elk fence and one mile of stock fence.

Planning and Design

Northwest Region

Harry Osborne Forest, Skagit County: DNR began planning with Skagit County Backcountry Horsemen to reconstruct and improve the safety of Donna’s Trail and improve Butterfly Trail.

Reiter Foothills Forest, Snohomish County: In cooperation with Washington State Parks, DNR began planning Phase 2 of the non-motorized trail system – a trail to the new Wallace River Bridge to connect with State Parks’ existing Wallace River Trail (Figure 12).

North Mountain, Skagit County: DNR is working with the City of Darrington and the Evergreen Mountain Bike Association to plan and design a non-motorized trail system.

Walker Valley, Skagit County: DNR designed one bridge replacement project, which was permitted in 2015.



Figure 12: View of Wallace Falls from the Wallace River Trail Extension in Reiter Foothills Forest. Photo courtesy of Jason Goldstein.

Pacific Cascade Region

Yacolt Burn State Forest, Clark County: DNR began planning and designing 17 miles of non-motorized trails for mountain bike, hiker, and equestrian recreation.

Southeast Region

Ahtanum State Forest: The Recreation Program began planning for 1.5 miles of new motorized trail on the North Fork Ahtanum.

South Puget Region

Snoqualmie Corridor, King County: DNR adopted the Snoqualmie Corridor Recreation Plan, which will guide management of recreation on approximately 53,500 acres of trust lands and NRCAs in eastern King County over the next 10–15 years. South Puget Sound Region recreation planners completed schematic designs for four water-access sites along the Middle Fork Snoqualmie River, which were identified as top priorities by the Snoqualmie Corridor Recreation Plan.

Tahoma State Forest, Lewis County: The Recreation Program designed a small Americans with Disabilities Act-compliant campground and fishing facility near two high-elevation lakes in Tahoma State Forest. The design called for the removal of existing campsites away from environmentally sensitive lakeside locations and proposed 11 new campsites, two fishing platforms, new restrooms, parking, and sustainable lake access trails.

Tahuya State Forest, Mason County: Planning was completed for water access locations in the Tahuya, Green Mountain and Hood Canal forests. This project included an inventory and analysis of water opportunities, a prioritized list of projects, construction documents for relocating an existing non-motorized boat launch to a different location on Howell Lake, and schematic designs for proposed improvements at eight other water-access sites.

HCP Implementation Documentation

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.

Click [here](#) for documentation of consultations and other discussions from FY 2015.

Appendix A: Background

This appendix contains background information about DNR management of forested state trust lands under the *State Trust Lands Habitat Conservation Plan*.

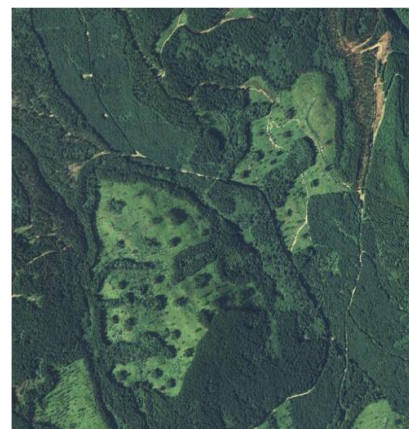
State Trust Lands Habitat Conservation Plan

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 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.

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 it needs 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.



The Changing Landscape

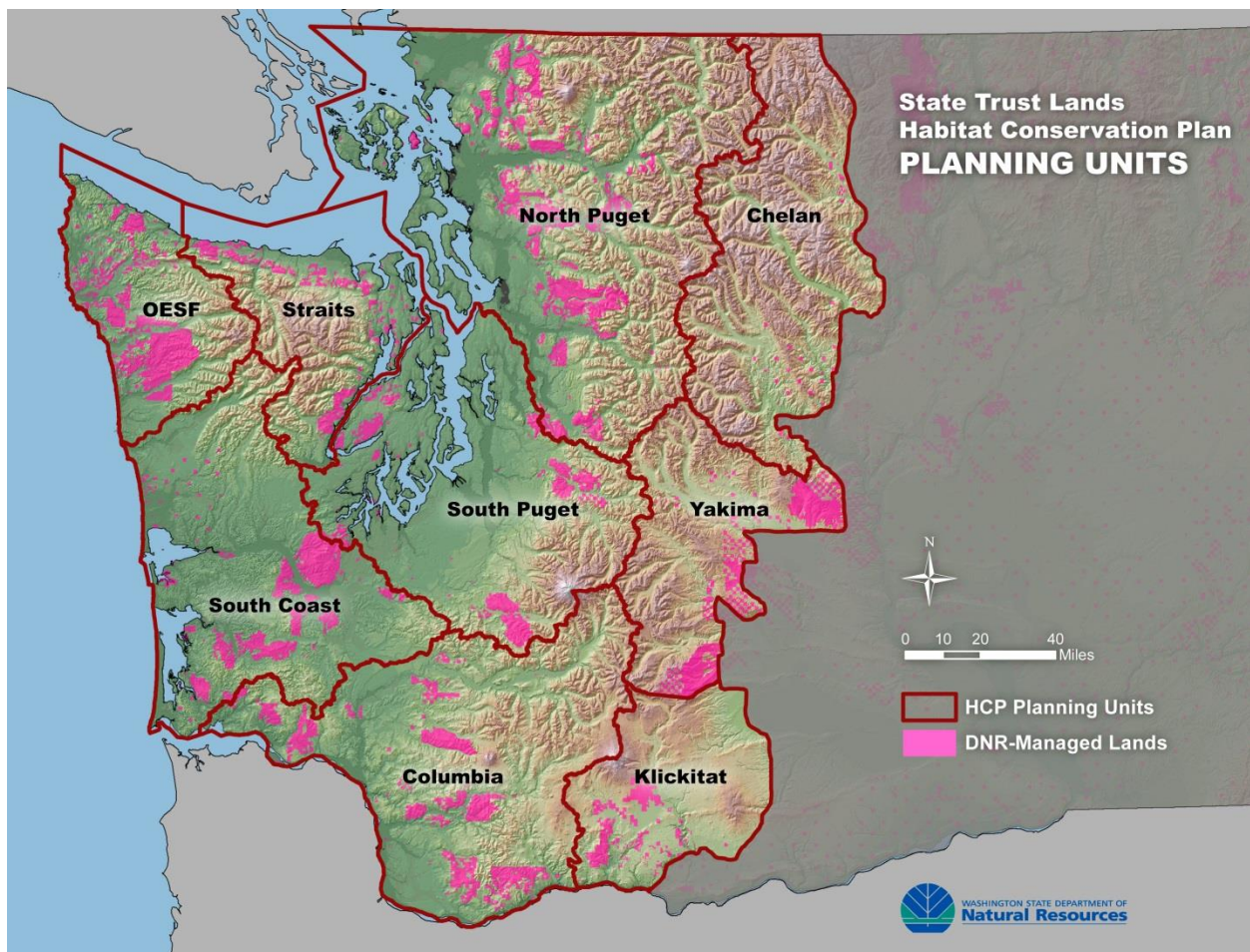
DNR uses harvest methods that promote development of structurally diverse forests. These harvest methods, in combination with the HCP’s northern spotted owl, riparian, and other habitat conservation strategies, promote biodiversity and fundamentally change the landscape from past forest practices.

Lands Covered by the HCP

DNR manages 2.1 million acres of forested state trust lands statewide. Of this amount, the HCP guides management of approximately 1.8 million acres of land within the range of the northern spotted owl (*Strix occidentalis caurina*). In general, these 1.8 million acres are located on the western 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 DNR’s HCP conservation objectives for the nine HCP planning units is grouped into the five west-side planning units except for the OESF (HCP, p. IV.3), the OESF (HCP, p. IV.86), and the three east-side planning units (HCP, p.IV.19). The five west-side planning units are the Straits, North Puget, South Puget, South Coast, and Columbia. The three east-side planning units are the Yakima, Chelan, and Klickitat.

Map A-1: HCP Planning Units.



[Back to the 2015 HCP Annual Report](#)

Conservation Objectives for ESA-Listed and Other Species

The HCP is built around 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).
- **Dispersal management areas:** Areas important for facilitating northern spotted owl dispersal (movement of young owls from nesting sites to new breeding sites).
- **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.

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. For example:

- Within NRF management areas, DNR manages for NRF habitat. NRF habitat is primarily high-quality roosting and foraging habitat with enough interspersed nesting structure to allow the whole area to be utilized by reproducing owls.
- NRF habitat is composed of two habitat classes: high-quality habitat and sub-mature habitat. High-quality habitat includes high-quality nesting, Type A, and Type B habitats.
- The OESF contains two habitat classes: Old Forest and structural habitat. Old Forest includes Old Forest, high-quality nesting, Type A, and Type B habitats. Structural habitat includes both sub-mature and young forest marginal habitat types.

Appendix A

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-1 provides habitat classifications and types for each west-side northern spotted owl management area, and Table A-2 includes the definitions of each habitat type as well as the data queries DNR uses to identify it.

Table A-1: Habitat Classifications and Types for Each West-Side 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 west-side 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
			Young forest marginal	
Owl Area		High-quality habitat		High-quality nesting
				Type A
				Type B
		Low quality habitat		Sub-mature
				Young forest marginal

Table A-2: Northern Spotted Owl Habitat Types, Definitions, and Data Queries.

Habitat Type	Habitat Definitions (HCP p. IV.11 through 12 and WAC 222-16-085)	Data Query Used to Interpret Habitat Definitions
High-Quality Nesting	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 and (Live trees \geq 31" diameter class) \geq 15 trees per acre and
	At least 12 snags per acre larger than 21" dbh	(Snags \geq 21" diameter class and \geq 16' tall) \geq 12 trees per acre and
	A minimum of 70% canopy closure	(Relative density of live trees \geq 4" diameter class) \geq 48 and
	A minimum of 5% ground cover of large woody debris	(Down wood \geq 4" diameter class) \geq 2,400 ft. ³ per acre
	At least three of the 31 trees \geq 21" dbh have broken tops	Not in query
Type A	A multi-layered, multispecies canopy dominated by large (\geq 30" dbh) overstory trees (typically 15–75 trees per acre)	(FVS-derived number of canopy layers) \geq 2 and (Primary species \geq 4 diameter class) $>$ 10% and (Primary species \geq 4 dbh) \leq 80% (multispec = yes) and (Live trees \geq 30" diameter class) \geq 15 trees per acre and \leq 75 trees per acre and
	Greater than 70% canopy closure	(Relative density of live trees \geq 4" diameter class) \geq 48 and
	More than two large snags per acre, 30" dbh or larger	(Snags \geq 30" diameter class and \geq 16' tall) \geq 2.5 trees per acre and
	Large accumulations of fallen trees and other woody debris on the ground	(Down wood \geq 4" diameter class) \geq 2,400 ft. ³ per acre
	A high incidence of large trees with various deformities such as large cavities, broken tops, and dwarf mistletoe infection	Not in query
	Type 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		(Relative density of live trees \geq 4" diameter class) \geq 48 and

Habitat Type	Habitat Definitions (HCP p. IV.11 through 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 and \geq 16 ft. tall) \geq 1 tree per acre and
	Accumulations of fallen trees and other woody debris on the ground	(Down wood \geq 4" diameter class) \geq 2,400 ft. ³ per acre
	Some large trees with various deformities	Not in query
MoRF	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 and
	At least 70% canopy closure	(Relative density of live trees \geq 4" diameter class) \geq 48 and
	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 and
	Dominant and co-dominant trees at least 85' tall	(Largest 40 live trees per acre) \geq 85' tall and
	Minimum of 5% ground cover of large down woody debris	(Down wood \geq 4" diameter class) \geq 2,400 ft. ³ per acre and
	At least three snags or cavity trees per acre that are at least 15" dbh	(Snags \geq 15" diameter class and \geq 16 ft. tall) \geq 3 trees/acre and
	At least two canopy layers	(FVS-derived number of canopy layers) \geq 2
Sub-Mature	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 and
	At least 70% canopy closure	(Relative density of live trees \geq 4" diameter class) \geq 48 and
	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 and
	Dominant and co-dominant trees at least 85' tall	(Largest 40 live trees/acre) \geq 85' tall and
	At least three snags or cavity trees per acre that are at least 20"	(Snags \geq 20" diameter class and \geq 16 ft. tall) \geq 3 trees per acre and
	Minimum of 5% ground cover of large down woody debris	(Down wood \geq 4" diameter class) \geq 2,400 ft. ³ per acre

Habitat Type	Habitat Definitions (HCP p. IV.11 through 12 and WAC 222-16-085)	Data Query Used to Interpret Habitat Definitions
Young Forest Marginal (Same as Sub-Mature Except for Snag and Down Wood Requirements)	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 and
	At least 70% canopy closure	(Relative density of live trees \geq 4"diameter class) \geq 48 and
	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 and
	Dominant and co-dominant trees at least 85 feet tall	(Largest 40 live trees/acre) \geq 85' tall and
	Snags greater than or equal to 2 per acre (greater than or equal to 20 inches dbh and 16" tall) OR \geq 10% of the ground covered with 4" diameter or larger wood, with 25–60% shrub cover	(Snags \geq 20" diameter class and \geq 16 ft. tall) \geq 2 trees per acre or (Down wood \geq 4" diameter class) \geq 4,800 ft. ³ per acre
Movement	Canopy closure at least 70%	(Relative density of live trees \geq 4" diameter class) \geq 48 and
	Quadratic mean diameter of 11" dbh for the 100 largest trees per acre in a stand	(Largest 100 live trees per acre) \geq 11" quadratic mean diameter (QMD) and
	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 and
	Tree density no more than 280 trees per acre \geq 3; 5" dbh	(Live trees \geq 4" diameter class \leq 280 trees per acre and
	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) \geq 85' tall
	At least four trees per acre from the largest size class retained for future snag and cavity tree recruitment	Not in query
Dispersal	Canopy cover at least 70%	(Relative density of live trees \geq 4" diameter class) \geq 48 and
	Quadratic mean diameter of 11" dbh for 100 largest trees per acre in a stand	(Largest 100 live trees per acre) \geq 11" QMD and
	Top height of at least 85'	(Largest 40 live trees per acre) \geq 85' tall

Habitat Type	Habitat Definitions (HCP p. IV.11 through 12 and WAC 222-16-085)	Data Query Used to Interpret Habitat Definitions
	At least four trees per acre from the largest size class retained for future snag and cavity tree recruitment	Not in query

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 east-side dispersal management areas, SOMUs are derived from ¼ townships.
- 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 (sub-landscapes are used only in the Klickitat Planning unit and were defined through an [amendment to the HCP](#)).

The HCP's northern spotted owl conservation strategy involves maintaining thresholds of habitat in each SOMU.

- Most designated NRF and dispersal SOMUs have a 50 percent overall habitat threshold objective.
- For the OESF and South Puget HCP Planning Units, habitat thresholds are two-tiered or have two threshold objectives. For example, the OESF has a 40 percent overall habitat threshold objective. This threshold is further defined as restoring and maintaining at least 20 percent of each SOMU as Old Forest Habitat with the rest made up of structural or better habitat. In the South Puget HCP Planning Unit, dispersal management areas have an overall 50 percent threshold, 35 percent of which is MoRF plus habitat, and 15 percent of which is movement plus habitat.

Table A-3 describes habitat thresholds for selected HCP planning units. Refer to Table A-2 for habitat definitions.

Table A-3: Habitat Thresholds for HCP Planning Units

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

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 no special zones are 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

Appendix A

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.

For more information on integrated management, refer to the [OESF HCP Planning Unit Forest Land Plan Revised Draft Environmental Impact Statement](#).

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.

Northern Spotted Owl Data

DNR’s tracking and management of northern spotted owl data for west-side HCP planning units and the OESF has evolved since the HCP was implemented. This section initially appeared in the [2013 State Trust Lands HCP Annual Report](#).

In writing the HCP, DNR identified those lands that were most important to northern spotted owl conservation using age class. These lands were designated as northern spotted owl management areas. Three types of areas were identified in the HCP: nesting, roosting, and foraging (NRF) management areas; dispersal management areas; and the OESF.

The HCP’s northern spotted owl conservation strategy involves maintaining thresholds of habitat in each northern spotted owl management area or OESF landscape unit. Per the HCP, the spatial unit at which DNR would track habitat thresholds differed by HCP planning unit.



Northern Spotted Owl.
Image courtesy of USFWS.

The HCP's northern spotted owl conservation strategy involves maintaining thresholds of habitat in each northern spotted owl management area or OESF landscape unit. Per the HCP, the spatial unit at which DNR would track habitat thresholds differed by HCP planning unit.

- In most west-side HCP planning units, DNR would maintain at least 50 percent of designated NRF and dispersal watershed administrative units (WAUs) as habitat.
- In the OESF HCP planning unit, DNR would maintain at least 40 percent of each landscape planning unit as habitat. (The OESF is divided into 11 landscape planning units, which are administrative areas designated primarily along watershed boundaries.)

To help DNR implement the northern spotted owl conservation strategy, the department developed the RIUOWLWAW spatial data layer using the best data available at that time. DNR used forest resource inventory system (FRIS) data to screen for habitat parameters and identified forest inventory units that were expected to meet HCP northern spotted owl habitat requirements.

The RIUOWLWAW data layer was used to calculate the percentage of northern spotted owl habitat within each WAW. However, in this calculation DNR evaluated only the minimum habitat type for each NRF and dispersal management area (for example, sub-mature habitat for NRF and dispersal habitat for dispersal management areas). This process essentially missed higher-quality habitat and resulted in an erroneous (lower) habitat percentage for each WAW. This was a major shortcoming of the RIUOWLWAW data layer.

In addition, WAW boundaries were originally based on the 1997 forest practices designation. Since that time, WAW boundaries have shifted based on new or more current hydrographic information. Managing multiple WAW layers for different HCP objectives became problematic (that is, DNR used one WAW layer for northern spotted owl management and another layer to manage hydrologic maturity). Also, the RIUOWLWAW data layer was not corrected for any timber sales until 2002, when DNR's Forest Resources Inventory Program implemented a system to model growth and activity updates of the sample inventory.

With the completion of the 2004 sustainable harvest calculation (*Final EIS on Alternatives for Sustainable Forest Management of State Trust Lands in Western Washington and for Determining the Sustainable Harvest Level, July 2004*), the onset of forest land planning, and the implementation of a new northern spotted owl procedure (PR 14-004-120, September 2004), the Forest Resources Inventory Program initiated development of an improved, detailed dataset for northern spotted owl habitat in western Washington. For this northern spotted owl dataset (2004 dataset), DNR used model-grown data that was updated from a 2004 inventory dataset and sample inventory. The 2004 dataset identified all northern spotted owl habitat types in western Washington as determined by a hierarchical assessment. When forest stands met multiple habitat types, DNR assigned them the highest quality habitat type and corresponding habitat code. Any given area had to meet each of multiple parameter thresholds in order to be identified as a specific habitat type (see [habitat types and definitions](#)).

However, before the 2004 dataset could be fully implemented as a core dataset, DNR entered into the 2006 Settlement Agreement (*Washington Environmental Council, et al v. Sutherland, et al (King County Superior court No. 04-2-26461-8SEA, vacated April 7, 2006)*). As a result of this agreement:

- DNR designated a fourth type of owl management area, called an "owl area." Owl areas are those areas which 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 Standard Practice Memorandum SPM 03-07 (*Management of Northern Spotted Owl Circles And The Identification Of Northern Spotted Owl Habitat In Southwest Washington*). Owl areas do not include any areas within NRF or dispersal management areas or the OESF.

Appendix A

- DNR used the 2004 dataset, along with maps and acreage summaries, to re-delineate northern spotted owl habitat in all northern spotted owl management areas in western Washington, including the new owl areas. The 2004 dataset was renamed the Settlement Agreement habitat layer.
- For the OESF, DNR included non-FRIS identified older forest stands in the Settlement Agreement habitat layer as “Old Forest.” These stands had been identified through a field and map review and approval process.

Around this time, DNR obtained a concurrence letter from USFWS allowing the WAU boundaries used for habitat thresholds to be modified slightly and renamed as spotted owl management units (SOMUs) to distinguish them from WAUs. A spatial layer was created displaying SOMU boundaries. This SOMU layer contained a table showing the percent of habitat for NRF and dispersal management areas using the habitat categories in the Settlement Agreement habitat layer. The SOMU layer also displays habitat percentages in the 11 landscape planning units of the OESF.

Also around this time, DNR compared the method used to evaluate each habitat parameter for the 2004 dataset and for the Settlement Agreement habitat layer. With a few exceptions, it became apparent that most habitat parameters were evaluated in the same way. DNR also recognized the importance of updating and maintaining the Settlement Agreement habitat layer in an accurate and current status.

Between 2007 and 2009, DNR held conversations with the settlement partner representatives to negotiate the best way to update the Settlement Agreement habitat layer and habitat maps outlined in section 1.D.1 of the Settlement Agreement. From those discussions, it was concluded that DNR would update the Settlement Agreement habitat layer (renamed the NSO habitat layer) as needed to respond to information accuracy triggers and would consult with settlement partner representatives and the Services, should updates be required due to habitat-based triggers. Information accuracy triggers are day-to-day operational updates that need to take place in order for the maps to reflect accurate on-the-ground conditions (for example, timber harvest events, new or updated inventory, data clarification, next best designations, land transactions, and resolved settlement agreement items). Habitat-based triggers are those updates involving habitat type changes that require consultation and/or approval from the settlement partners and the Services (for example, re-designation of northern spotted owl management areas and habitat definition adjustments).

Currently, DNR uses the NSO habitat layer to track acres of both habitat and non-habitat within northern spotted owl management areas. Per the agreement, DNR updates this layer regularly to reflect accurate on-the-ground conditions (information accuracy triggers).

Age Class versus Structure

Estimates of current and future northern spotted owl habitat have evolved over time. Initially, the HCP used age-class distribution as a surrogate for habitat, acknowledging that age-class does not necessarily equate to habitat (p. IV.29). Table IV.16 in the “Forest Management Activities” section of the HCP (p. IV.212) provides an estimate of the number of acres of habitat expected to develop on state trust lands managed under the HCP in west-side planning units including the OESF at the end of the first decade, based on age class. Table IV.16 from the HCP has been reproduced below.

Table A-4: Estimated amount of habitat on DNR-Managed lands in the area covered by the HCP at the end of the first decade of the HCP.

Type of Habitat	East-Side Planning Units	West-Side Planning Units	OESF Planning Unit
Dispersal	34,000	58,000	N/A
NRF ¹	25,000	66,000	56,000
Riparian	N/A	23,000	10,000

¹ NRF habitat, not to be confused with NRF management areas; refer to p. IV.88 in the HCP and Hanson et al 1993.

Since the HCP was adopted, DNR has transitioned to northern spotted owl habitat definitions that are based on forest structure (rather than age class) because forest structure is a more effective way to define habitat. For example, it is difficult to predict the development of forest structures such as down wood or snags through age class alone. DNR has also, through planning processes such as development of the South Puget HCP Planning Unit Forest Land Plan, adjusted habitat definitions to better reflect the owls' needs in particular areas. Because of these changes, and because DNR is no longer using age class as a surrogate for habitat, it is not possible to directly compare NSO habit estimates from 1997 (Table IV.16 in the HCP) to current estimates. The most appropriate and accurate way to capture current acreages is to report habitat within northern spotted owl management areas at a particular point in time. Estimates as of August 28, 2013 are presented in Table A-5.

Table A-5: Estimated Number of Acres of Habitat and Non-Habitat in NSO Management Areas in West-Side and OESF HCP Planning Units as of 8/28/2013.

Northern spotted owl (NSO) management area		Habitat class	Habitat type ¹	Habitat acres	Non-habitat acres	Unknown acres ²	Next best acres ³	Total NSO mgmt. area acres	
NRF		NRF habitat	High quality habitat	High-quality nesting	0	64,582	12,750	69,492	166,132
			Type A	1,122					
			Type B	150					
		Sub-mature habitat	Sub-mature	18,036					
Dispersal	All west-side planning units other than South Puget HCP Planning Unit	Dispersal habitat	High quality habitat	High-quality nesting	0	18,832	1,674	2,919	125,245
			Type A	74					
			Type B	0					
		Sub-mature habitat	Sub-mature	4,064					
		Dispersal habitat	Young forest marginal	3,751					
		Dispersal	15,892						
	South Puget HCP Planning Unit	Movement, roosting, and foraging (MoRF) plus habitat		High quality nesting	0	31,410	7,152	19,671	
				Type A	522				
				Type B	107				
				MoRF	2,097				

Appendix A

Northern spotted owl (NSO) management area		Habitat class	Habitat type ¹	Habitat acres	Non-habitat acres	Unknown acres ²	Next best acres ³	Total NSO mgmt. area acres
		Movement plus habitat	Sub-mature	461				
			Young forest marginal	3,075				
			Movement	13,546				
OESF		Old Forest	Old Forest	40,085	199,839	9,513	n/a	271,867
			High-quality nesting	8				
			Type A	541				
			Type B	99				
		Structural habitat	Sub-mature	7,486				
			Young forest marginal	14,297				
Owl area		High-quality habitat	High-quality nesting	0	87,421	5,378	n/a	97,860
			Type A	2				
			Type B	0				
		Low quality habitat	Sub-mature	536				
			Young forest marginal	4,523				

¹ Definitions of northern spotted owl habitat types can be found in the Northern Spotted Owl Conservation Strategy background section.

² Unknown stands are stands containing insufficient FRIS information to query and classify the stand. Any unknown stands greater than 25 years of age must have a FRIS inventory conducted to adequately classify it prior to any harvest activity. Once a new inventory is completed for the stand, it will be updated according to the new/updated inventory trigger and subsequent habitat classification. Stand ages are based upon the current FRIS origin date and are assessed at each layer update.

³ Next best stands are those non-habitat or unknown stands that have been identified as most likely to meet a northern spotted owl habitat classification in the shortest possible time, with or without silvicultural treatment.

Riparian Conservation Strategy

For the five west-side HCP planning units, the HCP riparian conservation strategy was developed with the following 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 providing clean water, shade, and large logs for streams through the use of riparian and wetland management zones. 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 applies to all HCP planning units except the OESF, and 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 species and forest structure in streamside forests in which historic timber harvest created forest stands that were even-aged and often overstocked. DNR uses canopy gaps and “skips”—areas that are left unmanaged—to help increase structural diversity and accelerate the development of habitat. 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-fall to the stream when they are alive, and large woody debris to the stream channel 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, there will be no further harvest next to the stream.

During the three-year RFRS implementation period, thinning in stands 70 years of age or older was addressed on a site-specific basis with the Services. This restriction was lifted in 2012 through a [joint concurrence letter](#) signed by DNR and the Services.

When the HCP was adopted in 1997, DNR did not have enough information on the functions and protection needs of headwater streams (also known as first-order streams or type 5 streams) to develop a full strategy for these streams. For this reason, headwater streams are currently managed through an interim strategy. The interim strategy protects these streams when they are associated with unstable slopes and when such protection is necessary for water quality, fish habitat, stream banks, wildlife, and other important elements of the aquatic system. In addition, the HCP specifies that DNR will conduct research on the effects of forest management on headwater streams, in preparation for developing a long-term headwater strategy. Research and writing of this strategy is complete. However, competing priorities have prevented DNR from completing the steps necessary for adoption and implementation.

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.

Following extensive research and input from an independent science team, DNR now has enough information to develop a long-term strategy. Although previously delayed by budgetary and staffing shortfalls, development of the long-term conservation strategy resumed as a top agency priority.

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



Marbled Murrelet Nest

Marbled murrelets nest on large limbs covered with moss or other natural substances that create a relatively flat platform. Their nests are usually in mature or old conifer forests. Photo courtesy of Tom Bloxton.

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.

Adaptive Management and the Conservation Strategies

Information obtained through research and monitoring and new scientific developments sometimes identifies changes in management practices that would help address the needs of specific species and habitat conditions. For this reason, the HCP includes provisions for a dynamic, scientifically based adaptive management process that allows continual improvements of its implementation.

Silvicultural Activities

Silviculture is the art and science of managing forests to meet objectives. Through silviculture, DNR works with the number, size, species, and spacing of trees in the forest to provide both quality timber for harvest and ecological values including 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 will accomplish them (activities) in a forest management unit over an entire rotation. A forest management unit is an 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 writes specific "rotation objectives" for the unit in that context. For example, a unit that contributes to northern spotted owl habitat landscape objectives may have a rotation objective to "attain sub-mature NRF habitat." Rotation 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 rotation objectives.

Activities

Once DNR defines the rotation 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 reassess it to ensure it is on track to meet its objectives.

Tracking Silvicultural Activities

Data on silvicultural activities for HCP annual reports comes from DNR's forest management planning and tracking (P&T) database, in which DNR records information about planned and implemented silvicultural activities. Using P&T, DNR summarizes acres of activities across all state trust lands managed under the HCP in five categories: timber harvest, forest site preparation, forest regeneration, vegetation management, and pre-commercial thinning.

The number of acres of activities DNR reports each year may be different than what actually took place on the ground during that year. These discrepancies are caused by differences in each DNR region's procedure for recording activities in P&T. For example, some regions may wait to record individual activities until a sequence of activities is completed. If so, activities completed one year may not be entered into P&T until a subsequent year. This is especially true for timber harvests. Most timber sales have multiple units, and it is common for individual units to be completed in different fiscal years. When this occurs, foresters usually do not report an earlier unit as complete in the database until all road abandonment and logging debris cleanup has occurred, which typically happens for an individual sale after all units are complete. When this occurs, the unit where harvesting was completed in the earlier fiscal year will reflect that year because harvesting is considered more reflective of the overall activity than road abandonment or debris cleanup.

Significant increases or decreases in timber harvest volumes will usually be followed by corresponding decreases or increases in the overall 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, 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 separately tracks and reports on 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), un-thinned patches (skips), and varying stand densities to achieve specific objectives, such as 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 ten 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.
- **Temporary retention first cut:** This is a partial-cut timber harvest in which selected overstory trees are left for a portion of the next rotation. The purpose of this harvest method is to retain overstory trees without diminishing establishment of a new stand. These overstory trees can be removed through a temporary retention removal cut, or they can be left through the entire rotation, potentially resulting in a two-aged stand.
- **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 clearcut, in which all or nearly all of the existing stand is removed.
- **Clearcut:** According to Washington forest practices rules, a clearcut is a harvest method in which the entire stand of trees is removed in one timber harvesting operation. In the 1990s, DNR began doing variable retention harvest instead of clearcuts on the majority of its timber sales. However, between the adoption of the HCP in 1997 and fiscal year 2008, variable retention harvests were still reported as clearcuts even though the vast majority of those harvests met the



A Variable Density Thinning in the OESF

definition of variable retention harvest. From 2009 on, very few acres have been reported as clearcuts.

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.

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

During a pre-commercial thinning, DNR removes the less-desirable trees to maintain the growth and stability of the retained trees. Pre-commercial thinnings 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.

Pre-commercial thinning 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. Pre-commercial thinning 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, pre-commercial thinning improves height-to-diameter ratios, a measure of stem stability, reducing risk of windthrow or stem buckling if partial cutting treatments are applied.

Pre-commercial thinning 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.

Non-Timber Management Activities

Numerous non-timber management activities take place on DNR-managed lands. This section discusses recreation and public use on state trust lands and the steps DNR takes to minimize the impacts of these activities on ecological systems. This section also includes information on DNR's Natural Areas Program which manages and protects rare native ecosystems, habitats, and unique natural features.

DNR works continually to improve methods for tracking and reporting non-timber activities. As these systems improve, and DNR is able to collect more accurate data, DNR may make changes to reporting methods or make corrections to the data.

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 promotes 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 are selectively granted to prevent habitat degradation.

Oil and Gas Leases

Oil and gas exploration leases allow a lessee to reserve the right to explore for underground deposits. The lessee has the sole and exclusive right to explore for, drill, extract, or remove oil and gas. However, any proposed on-the-ground activities must undergo State Environmental Policy Act (SEPA) review and have a plan of operations, which must be approved by DNR.

One of the early steps of this process is acquiring a drilling permit. If the lessee then wants to actively drill or thump (measure seismological tremors caused by the dropping of large weights or detonation of explosives), the lessee must obtain an “active” lease. Regulations exist to protect water and air quality, and any exploration holes must be plugged following use. Any new permits are subject to SEPA review. 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.

Prospecting Leases and Mining Contracts

Like oil and gas leases, prospecting and mining leases are exploration agreements that allow a lessee to search for mineral deposits. A lease must be converted to a 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. 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 must be met, such as turnout and removal dates and the number of animals allowed on the range. Leases cover smaller areas than permits, and they include a resource management plan. These leases can allow grazing at any time during the year, as long as guidelines in the plan are followed.

DNR’s current tracking methodology does not distinguish acres of grazing on forested versus non-forested state trust lands in eastern Washington. Thus the number of acres reported for grazing may be inflated. As that tracking methodology is refined, DNR should be able to separate forested from non-forested grazing to improve the accuracy of reports.

Land transactions, including large-scale exchanges can influence which lands will be managed under the HCP and where grazing will be allowed.

Communication Site Leases

Communication site leases allow private and public entities to build new towers or attach communication equipment to existing towers (for example, cell phone 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.

Valuable Materials Sales

Rock, sand, and gravel (valuable materials) sales from commercial pits are handled under special sale contracts. Most of DNR’s active commercial pits are not in forested areas. Generally, the few commercial contracts DNR maintains on forested trust lands are small sales from silvicultural pits (pits used primarily for construction of forest roads).

The number of silvicultural pits and inactive commercial pits was not tracked until fiscal year 2003, when DNR initiated an inventory of all such pits. Since the initial inventory, changes—such as abandoning pits or creating new ones—have not been consistently tracked.

Early in the implementation of the HCP, DNR had a substantial number of rock, sand, and gravel sales. Since then, that number has decreased. This primarily is due to two factors: (1) the lengthy contract-development process, including requirements for more valuable or long-term contracts to be reviewed and approved by the Board of Natural Resources; and (2) periodic changes to keep contracts alive regardless of whether or not there were removals. Most rock, sand, and gravel sales are now from private pits, which have fewer time and procedural constraints. Direct sales are one-time agreements that remove only small amounts of a resource (a maximum of \$25,000 in value) and do not require Board of Natural Resources approval. Other (non-direct) sales are active for longer periods of time and/or have larger maximum removal value limits.

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.



Trail Restoration

These box steps were built as part of a trail restoration project and will help minimize erosion by providing a stable and water-permeable hiking surface.

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 one-of-a-kind features unique to this region.

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 Resources 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 nearly 157,000 acres in 56 NAPs and 36 NRCAs. More than 119,000 of those acres fall within the area managed under the HCP, protecting habitat for 12 species listed as threatened or endangered under the ESA and another 34 special status species. This total includes 74,000 acres that DNR has added to the program since the HCP was signed in 1997. An additional 17,800 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*) (determined in 2011 to be 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 Mountain 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, and others) identified in the HCP. Examples include butterflies like the Valley silverspot (*Speyeria zerene bremnerii*) and Puget blue (*Icaricia icarioides blackmorei*) that are associated with prairie habitat, 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 Morningstar 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.

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. DNR recently 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 Makah copper butterfly (*Lycæna 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 two sites (Washougal Oaks NAP/NRCA and Bald Hill NAP) by removing competing conifer trees, planting oak seedlings, and replanting native understory species. In addition, DNR is restoring Puget Sound estuary and near-shore habitats at Stavis and Woodard Bay NRCAs by removing bulkheads, fill, and creosote-treated structures.

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, which can potentially harm salmon and other aquatic and riparian-obligate species. Current road-building and maintenance practices create better roads that minimize damage 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.

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, upgrading, 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 HCP Planning Unit and underway in the OESF HCP Planning Unit). 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 on 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).

Easements and Road Use Permits

DNR generally 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 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.

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 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 acquire 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 assess 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](#), which applies only to Common School trust lands. Through this 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.

Adaptive Management

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 biology of northern spotted owls, marbled murrelets, and other species addressed by the HCP. 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, test promising alternatives to current methods, and contribute to the ecological foundation of DNR’s management.

The HCP’s adaptive management process allows changes to DNR’s forest management when results from the 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.

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 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 marbled murrelet

interim conservation strategy and the northern spotted owl conservation strategy, and monitoring of wetland and riparian management areas.

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.

Riparian Effectiveness Monitoring

The objectives of effectiveness monitoring for the riparian conservation strategy fall under four main categories:

- **Riparian forest restoration management:** Provide information on proper management to achieve older stand conditions in riparian areas by testing existing and promising alternative approaches to integrating biodiversity-type thinning into DNR's management options.
- **Headwaters conservation:** Support the development and future implementation of the headwaters conservation strategy, including assessing the strategy's effectiveness.
- **Riparian forest integrity:** Support the department's understanding of the loss of riparian area integrity due to blown down trees using long-term measurements of windthrow.
- **In-stream conditions:** Provide linkage between management techniques in riparian management zone forests, and in-stream habitat conditions, habitat trends, and water quality.

Northern Spotted Owl 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 four components:

1. Long-term tracking of the effects of variable density thinnings (VDTs) to improve habitat structure in stands designated as habitat.
2. Measurement of the response of habitat features to small-gap creation within thinned stands.
3. 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.
4. Landscape-scale monitoring of basic habitat indicators across the entire west-side HCP land base.

The first component was initiated in 2005–2008 across five VDTs 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) Planning Units. These five timber sales were designed to

Appendix A

maintain or accelerate the development of structural NSO habitat in stands ranging from approximately 50 to 80 years old. The study design includes two or three replications of treated stands and one untreated control stand at each site. All stands were measured prior to treatment and again immediately after treatment. This process will allow DNR to observe how the trajectories of stand development differ between thinned and unthinned stands and evaluate these findings against the habitat definitions described in the HCP (p. IV.22). Consistent with the monitoring objectives in the HCP (p. V.2), DNR's intent is to track habitat conditions in these treatments at approximately five-year intervals over the life of the HCP.

The second component of the NSO Effectiveness Monitoring Program is being conducted in the Olympic Experimental State Forest (OESF) with a focus on silvicultural gap treatments. Much of the managed landscape is regrowing after past harvests and is in a relatively uniform stage of competitive exclusion with simple canopy structure. DNR has been creating gaps within VDTs to introduce structural heterogeneity to encourage variable light environments; greater canopy complexity; multiple canopy layers; and specific habitat features such as crown expansion, branch platforms, and deadwood. Recently acquired LiDAR data for the OESF will be used to analyze effects on canopy complexity relative to thinned stands without gaps, unthinned second growth, and older forest habitats.

The third component of the NSO Effectiveness Monitoring Program aims to develop innovative approaches for using spatial structure analysis to create higher-quality habitat in managed second-growth forests. Current habitat definitions are based on the relatively simple presence or abundance of certain structural features (such as large trees and snags), but they do not capture the fine-scale spatial structure of older forests that function as habitat, such as the arrangement of large and small trees that determines cover, flyways, and prey distribution for forest raptors such as NSOs. 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 VDT treatments. Methodologies to evaluate these patterns will include field stem-mapping as well as analysis of LiDAR data in a series of old forest sites, unthinned second growth, and recently thinned second growth (using other monitored stands described above in the first two components). This project is being conducted in partial collaboration with University of Washington forest scientists. Stem-mapping has begun in monitoring sites, and DNR is currently identifying candidate old forest reference stands.

The fourth component of the program is a landscape-scale assessment of HCP effectiveness for NSO habitat across all west-side HCP lands. The objective is to determine whether broad-scale trends in basic habitat features such as tree height, mean tree size, and canopy layering meet HCP goals. To accomplish this, DNR is using Gradient Nearest Neighbor (GNN) data, a regional data set produced by the United States Forest Service (USFS) that covers all forestland in all Pacific Coast states. GNN data map the distribution of vegetative characteristics across the landscape, and despite limitations at the single-pixel or small-stand scale, it is sufficiently accurate for assessments over broad spatial extents. GNN also provides an independent, quantitative dataset back to 1984, affording a look at both pre-HCP and post-HCP trends. Of particular interest is whether SOMUs are showing different trends than other non-DNR-managed lands.

OESF Research and Monitoring Program

The OESF is unique among HCP planning units in both management and purpose. The OESF is a place for applied research and monitoring to learn how to integrate revenue production and ecosystem values more effectively across state trust lands. This learning is achieved through a strong emphasis on adaptive management.

The long-term vision for the OESF is a productive, resilient, and biologically diverse commercial forest in which both revenue generation for trust beneficiaries and ecological values are maintained through integrated management. The intent behind integrated management is to actively manage as much of state trust lands as possible using innovative silviculture, landscape-level planning, and quick application of new knowledge.

The OESF Research and Monitoring Program furthers the OESF mission by implementing or coordinating research and monitoring projects; establishing and maintaining research partnerships; reaching out to stakeholders, tribes, and the general public; managing information; and linking management activities and new knowledge through a structured adaptive management process.

In 2009, the OESF joined the Experimental Forest and Range Network (EFRN), in an agreement between DNR and the USFS Pacific Northwest Research Station that encouraged collaboration between OESF and USFS scientists. More information about the OESF's participation in EFRN can be found on the [OESF website](#).

Past and Current Research and Monitoring in the OESF

Silviculture and fish research has been conducted on state trust lands on the western Olympic Peninsula since the 1970s. After the designation of the OESF in 1992, it intensified and broadened to cover forest and wildlife ecology, geology, and riparian management among other topics. The majority of the past research and monitoring activities are listed in the OESF [Research and Monitoring Catalog](#), published by DNR in 2008. More information on [recently completed](#) and [ongoing](#) research in the OESF can be found on the OESF website.

The OESF research and monitoring program is focused on DNR's needs for efficient revenue production, environmental protection, and long-term sustainability. The majority of the agency and collaborative projects are applied research and monitoring of innovative silviculture techniques, riparian and aquatic monitoring, and wildlife habitat development. Some of these projects were funded and conducted by DNR. Others were implemented through research partnerships such as silvicultural research cooperatives.

Online Data

The OESF Research and Monitoring Program is currently supplying environmental data to two online databases:

- Stream temperature data from 50 sites in the OESF and four sites in the Olympic National Park are available at the [NorWeST webpage](#).
- Air temperature and precipitation data from the local NOAA stations and stream discharge data from the local USGS stations are available at the [CLIMDB/HYDRODB webpage](#).

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

Linkage with the OESF Forest Land Plan

Policy direction for management of the OESF is provided by the HCP and the [Policy for Sustainable Forests](#). The policies in these documents are implemented, in part, through a series of planning processes including the sustainable harvest calculation and forest land planning.

OESF research, monitoring, and adaptive management are described in the final forestland plan for the OESF, scheduled for publication in 2016. The forestland plan will include goals, objectives, strategies, and implementation procedures for land management as well as scientific uncertainties and priorities for research and monitoring and administrative procedures for implementing adaptive management. DNR

Appendix A

intends to use the OESF Forest Land Plan to integrate forest management and learning and to institutionalize the adaptive management process for the OESF.

Appendix B: Glossary

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

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.

Activity objective: A measurable and possibly transient condition sought at the conclusion of an activity, such as a certain number of trees left following a timber harvest to serve as habitat and a seed source.

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.

Aerial pesticide: Application of an insecticide or other pesticide from a helicopter or airplane.

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.

Animal repellent: Chemicals or other products applied to discourage animals from damaging seedlings.

B

Biosolids: The nutrient-rich organic materials resulting from the treatment of sewage sludge. When properly treated and processed in a sewage treatment facility, biosolids can be safely applied as fertilizer to maintain productive soil and stimulate tree growth.

Blowdown (or windthrow): A natural disturbance event during which wind knocks over, blows the tops out of, or otherwise significantly damages trees.

Broadcast burn: Allowing prescribed fire to burn over a designated area to achieve site preparation or vegetation management objectives.

C

Certification: See forest certification.

Clearcut: According to Washington forest practices rules, a clearcut is a harvest method in which the entire stand of trees is removed in one timber harvesting operation. In the 1990s, DNR began doing variable retention harvest instead of clearcuts on the majority of its timber sales. However, between the adoption of the State Trust Lands Habitat Conservation Plan in 1997 and fiscal year 2008, variable retention harvests were still being reported as clearcuts even though the majority of

those harvests met the definition for variable retention harvest. Since 2009, few harvests have met the definition of, or been reported as, clearcuts.

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.

D

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.

Demography: The study of populations or communities, including births, deaths, movement, and distribution.

Desired future condition (DFC): 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.

Diameter at breast height (dbh): The diameter of a tree measured 4.5 feet above the ground on the uphill side of the tree.

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.

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.

Ecoregion: An area with generally similar ecosystems and types, quality, and quantities of environmental resources. It is designed to provide a spatial framework for research and monitoring of ecosystems and their components.

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.

Endemic: A species that is a native of, prevalent in, or confined to a specific region.

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 clearcut, seed tree, variable retention harvest, and shelterwood.

F

Fencing: See shielding.

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.

First order stream: A stream that does not have any other streams intersecting or feeding into it.

Forest certification: A confirmation process by an independent auditor that shows that a landowner manages forests by a set of standards that demonstrate environmentally responsible, socially beneficial, and economically viable practices. It is also known as “green” certification.

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

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 practice: Any activity conducted on or directly pertaining to forest land and relating to growing, harvesting, or processing timber or forest biomass, including but not limited to road and trail construction, harvesting (final and intermediate), pre-commercial thinning, reforestation, fertilization, prevention and suppression of diseases and insects, tree salvage, and brush control.

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

G

Grazing lease: A DNR lease agreement covering smaller areas of land (as compared to the larger rangeland of a grazing permit) which 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 allowing livestock to graze over large areas. Grazing permits include resource management plans 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.

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 hand-held 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.

Hydrologic maturity: The degree to which hydrologic processes (e.g., interception, evapotranspiration, snow accumulation, snowmelt, infiltration, runoff) and outputs (e.g., water yield and peak discharge) in a particular forest stand approach those expected in a late seral stand under the same climatic and site conditions. In DNR's HCP, a "hydrologically mature forest," with respect to rain-on-snow runoff, is a well-stocked conifer stand at age 25 years or older.

I

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

Inholding: A parcel of land owned by one party that is entirely surrounded by another ownership. In terms of DNR land transactions, private land surrounded by state-owned property.

L

Landslide hazard zonation: A screening tool in which watershed-scale maps are created that show and describe all areas of potentially unstable slopes in a watershed as well as potential mitigation measures to minimize damage.

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.

Late-rotation thinning (or, older-stand thinning): A partial-cut timber harvest that extends the rotation age of a stand, generally to more than 80 years, or achieves a visual or habitat objective that requires larger trees. Stands eligible for late-rotation thinning are typically 45 to 70 years old and contain a diversity of tree sizes.

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.

M

Marbled murrelet management area: Proposed areas managed to protect occupied sites and develop future marbled murrelet habitat in areas that are not occupied.

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 out-standing example of a native ecosystem or natural feature; habitat for endangered, threatened, or sensitive species; or a scenic landscape.

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.

Non-commercial pit: Also called a “silvicultural pit.” A rock, sand, or gravel pit primarily used to supply materials for DNR’s silviculture-related activities, primarily building forest roads and logging landings.

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.

Overstory: The upper canopy in a multi-canopy stand.

P

Pest management: Treatments or management decisions designed to prevent pest populations from reaching levels that present an unacceptable risk of damage to forest stands.

Phased patch regeneration cut: An even-age timber harvest method using small patch cuts (one to five acres) to progressively harvest and regenerate a single stand over a period of up to 15 years. Several separate patches are simultaneously harvested within a forest management unit. After an adequate green-up period (five to ten years), additional patches are harvested and the process is repeated until the forest management unit is completely harvested.

Pile and burn: A process where logging slash is placed in piles, generally using mechanized equipment, and the piles are burned under controlled conditions.

Planning unit: In the State Trust Lands Habitat Conservation Plan, a management unit based on large watersheds. The approximately 1.8 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 is 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.

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.

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.

R

Radio telemetry: A tracking system in which wildlife are outfitted with collars that transmit individual signals that can be monitored to track their movement.

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.

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 USFS biometrician who developed the measure.

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 five 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 DNR document 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 by establishing young trees through natural seeding or planting sites—usually those sites that were harvested or burned in a wildfire.

Repositioning: A land transaction process in which DNR exchanges, sells, or transfers state trust land, using the proceeds to acquire more suitable property for the affected trust(s). Repositioning occurs on lands that do not fit with management strategies or that are not appropriate for long-term revenue production for the trusts.

Riparian desired future condition: In the Riparian Forest Management 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.

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 ten 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 (selective cutting): 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-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 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.

Shielding: A physical barrier used to prevent animals from entering an area and damaging trees or other resources.

Silvicultural pit: Also called a non-commercial pit. A rock, sand, or gravel pit primarily used for construction of DNR forest roads and timber sale landings. DNR sometimes sells valuable materials (rock, sand, or gravel) from silvicultural pits through a one-time direct sale (a sale with a value of no more than \$25,000). Silvicultural pits are distinct from commercial pits, from which DNR sells rock, sand or gravel through direct sales or longer-term leases.

Silvicultural regime: The specific sequence of activities defined in a silvicultural prescription.

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 delimiting.

Smallwood thinning: A partial-cut timber harvest in young stands (typically less than 40 years of age) that maintains or enhances the stand's growth potential and improves the quality of the remaining trees.

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, often best described as “miscellaneous” 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 resources 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).

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's normal behavior.

Temporary retention first cut: A partial-cut timber harvest in which selected overstory trees are left for a portion of the next rotation. The purpose of this harvest method is to retain overstory trees without diminishing establishment of a new stand. If these overstory trees are left through the entire rotation, the result may be a two-aged stand.

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).

Type II thinning: A commercial thinning that increases stand stability and diameter growth, protects existing legacy structures, maintains species diversity, and provides large woody and down woody debris to the forest system.

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.

V

Validation monitoring: For the State Trust Lands Habitat Conservation Plan, a data-collection system 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 (but at least 12” on small end by 20’ long).

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

Vegetation series: A conceptual grouping of related plant associations that have, in the absence of disturbance, the same predicted, dominant conifer species; also known as potential vegetation. In practice, vegetation series represents a way to stratify growing sites by ecological characteristics that determine the bounds of tree species occurrence, growth rates, management potential, and vulnerabilities to climate change and other risk factors.

W

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

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

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