Terrestrial Resource Management Plan

Henry M. Jackson Hydroelectric Project

(FERC Project No. 2157)

Public Utility District No. 1 of Snohomish County

Everett, Washington

May 2009

TERRESTRIAL RESOURCE MANAGEMENT PLAN

For the

HENRY M. JACKSON HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION PROJECT NUMBER 2157

Submitted by:

PUBLIC UTILITY DISTRICT NO. 1
OF
SNOHOMISH COUNTY

Everett, Washington

May 2009

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1.0 INTRODUCTION

1.0 Introduction

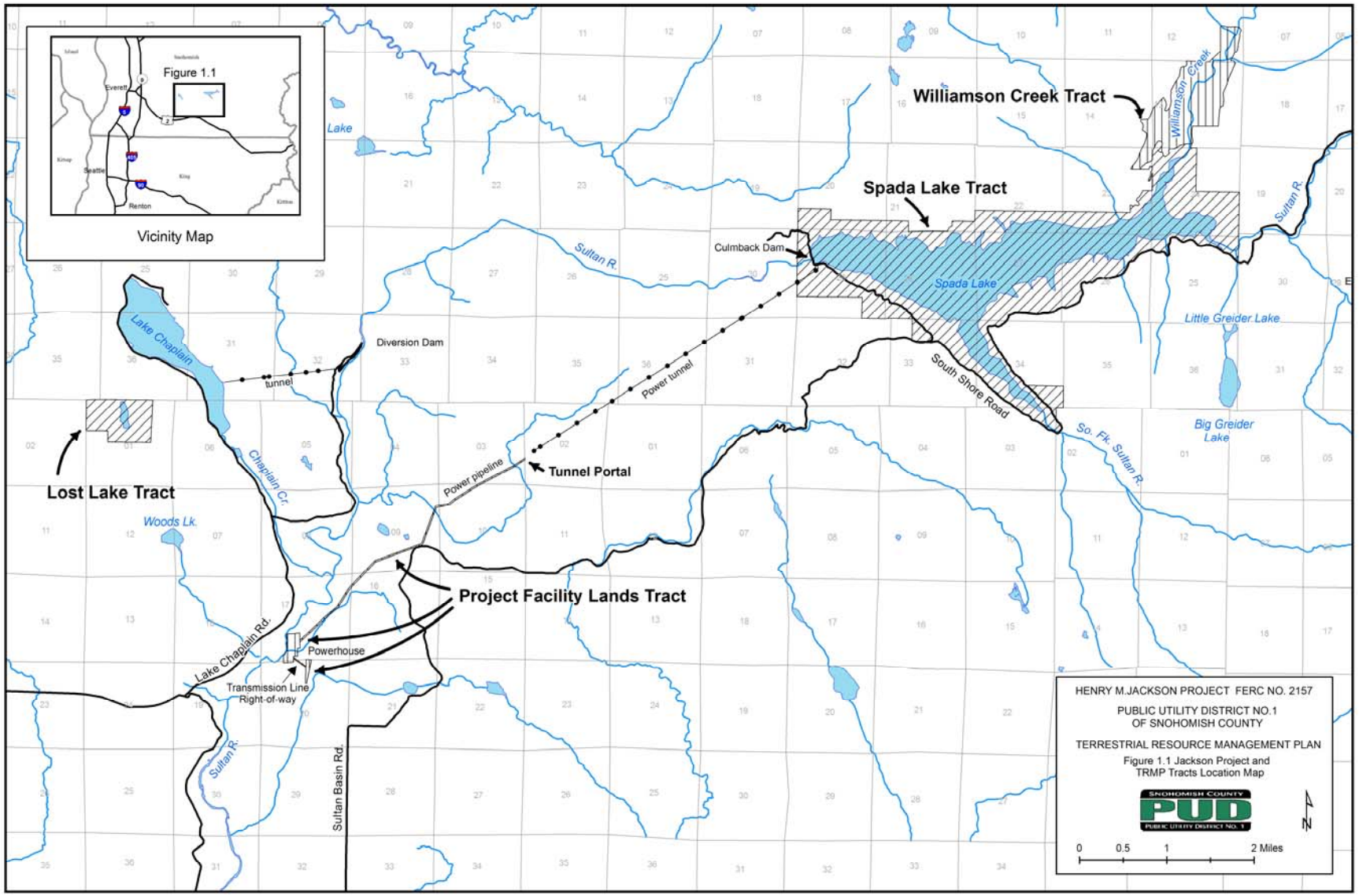
This Terrestrial Resource Management Plan (TRMP) describes the actions Public Utility District No. 1 of Snohomish County (District) will take to mitigate impacts to wildlife resources associated with the Henry M. Jackson Hydroelectric Project (FERC Project Number 2157). It is submitted in support of the District's Final License Application before the Federal Energy Regulatory Commission (FERC). It has been prepared in consultation with the U.S. Fish and Wildlife Service (USFWS), the U.S. Forest Service, Mt. Baker – Snoqualmie National Forest (USFS), the Washington Department of Fish and Wildlife (WDFW), and the Tulalip Tribes (Tribes).

1.1 Background

The District owns and operates the Jackson Project (Project) on the Sultan River in Snohomish County, Washington. The Project includes a 262-foot high rock-fill dam, a 1,870-acre reservoir (Spada Lake), 7.6 miles of tunnel and pipeline, and a powerhouse with a generating capacity of 112 megawatts (Figure 1.1). It provides fisheries enhancement, water supply, hydroelectric power and flood control. The Project was constructed in two stages between 1961 and 1984. Stage I was a 200-foot high dam and 750-acre reservoir completed in 1965. Stage I was operated only to provide water supply and fisheries instream flows. The dam was raised to 262 feet in 1983; enlarging the reservoir to its present size. The power facilities were added by 1984, completing Stage II development. Detailed descriptions of all Project features are provided in the District's Application for New License.

The original license for the Project issued in 1961 included the City of Everett (City) as a co-licensee. In 2007, the City and District requested and received FERC approval to remove the City as a co-licensee. The District will be the sole licensee for the Project in the new license term, and the sole party responsible for implementation of this TRMP.

The impacts of original Project construction and operation on fish and wildlife were estimated in studies conducted by the Washington Department of Game (currently WDFW) between 1979 and 1982 (WDG 1982). Wildlife impacts were assessed by collecting cursory population data and performing a habitat assessment using the USFWS Habitat Evaluation Procedures (HEP). At the direction of the FERC, the District and the City prepared a Wildlife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HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
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SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT NO. 1
0 0.5 1 2 Miles
N

Habitat Management Plan (WHMP) to mitigate impacts to wildlife from Project construction and operation. The WHMP was designed to mitigate for these impacts for 100 years (through 2060). The WHMP was prepared in cooperation with the USFWS, WDFW, Tribes and USFS, and was approved by the FERC in 1989. The District has managed most of the lands covered by this TRMP under the WHMP since 1989. The WHMP also covered the management of 2,657 acres of forest, wetland and lake owned by the City and known as the Lake Chaplain Tract.

District and City lands have been managed under the WHMP to provide early-successional forest, old-growth forest, riparian forest and wetlands. Habitat for early-successional species like the black-tailed deer, black-capped chickadee and ruffed grouse has been provided primarily in the Lake Chaplain Tract, concurrent with commercial timber production by the City. Habitat for late-successional and old-growth species like the pileated woodpecker, Douglas squirrel and marten, as well as riparian habitat for species such as black-tailed deer and ruffed grouse, has been provided primarily on District lands. Wetland habitat has been provided on both District and City lands.

Since 1989, the District has acquired additional early-successional, old-growth and wetland habitat, and the regional priorities for wildlife mitigation have shifted away from early-successional habitat and toward old-growth habitat. As a result, the Lake Chaplain Tract is no longer essential to Project mitigation. The District now has sufficient lands without Lake Chaplain to mitigate for Project impacts to high priority habitats such as old-growth forest, riparian forest and wetland. Consequently, the Lake Chaplain Tract is not covered by this TRMP.

1.2 Objectives

The primary objective of this plan is to direct the management of District owned and controlled wildlife mitigation lands for the term of the new license. Management under the TRMP will be a continuation of management established under the WHMP. The objectives of the TRMP are consistent with the objectives of the WHMP, except for updates in response to current regional priorities for habitat management. The following objectives were established for the WHMP by the District, City, USFWS, USFS, WDFW and Tribes and approved by the FERC. They will serve as the objectives for the TRMP as well, with updates and modifications as noted.

1.2.1 FERC Order Directives

1.2.1.1 Identify the Type of Habitat to be Used for Replacement

The TRMP lands include old-growth and second-growth conifer forest, mixed deciduous/conifer forest, riparian forest, wetland, lake and reservoir. The present conditions of all TRMP lands are summarized in Table 1.1. Detailed descriptions of all lands are provided in Chapter 3.0. Due to land acquisitions by the District since1989, the TRMP lands include a larger proportion of old-growth conifer forest and a smaller proportion of second-growth forest than the original WHMP.

1.2.1.2 Determine the Location and Number of Acres of Habitat to be Used for Replacement

The TRMP lands include 4,456 acres in four management tracts located in or directly adjacent to the Sultan River basin. None are more than 10 miles from the areas affected by the Project. The locations of all tracts are described in Chapter 3.0.

1.2.1.3 Provide a Schedule of Implementation

The TRMP will be implemented through the term of the new license. A summary schedule is provided in Chapter 5.

1.2.1.4 Develop a Monitoring Program to Determine the Effectiveness of the Mitigation Measures

The TRMP lands will be monitored regularly to ensure the habitat objectives outlined in this plan are met. Reports on implementation will be made annually to the USFWS, WDFW and Tribes, and every five years to the FERC. The monitoring program is presented in Chapter 4.0.

1.2.1.5 Document Agency Consultation on the Adequacy of the Plan

The plan has been prepared in consultation with the agencies. All written agency correspondence is included in Appendix B.

Table 1.1 Current distribution of cover types on the Jackson Project TRMP lands.

Cover Type	Acres by Management Tract				
	Lost Lake	Project Facility Lands	Spada Lake	Williamson Creek	All TRMP Lands
Early-successional Forest	0.0	6.4	10.6	1.0	18.0
Open Canopy Sapling / Pole Conifer Forest	0.0	0.0	25.0	0.0	25.0
Closed Canopy Sapling / Pole Conifer Forest	41.8	0.1	328.6	89.0	459.5
Small Sawtimber Conifer Forest	19.8	3.1	582.7	0.0	605.6
Large Sawtimber Conifer Forest	0.0	0.0	11.3	0.0	11.3
Old-growth Forest	0.0	0.0	226.7	275.0	501.7
Mixed Deciduous / Conifer Forest	114.8	2.6	300.8	36.8	455.0
Mosaic Deciduous / Conifer Forest	0.0	0.0	169.0	0.0	169.0
Deciduous Forest	0.3	0.0	46.5	3.4	50.2
Riparian Forest	0.0	0.0	18.4	38.5	56.9
Mixed Shrub / Brush	0.0	10.3	9.7	1.8	21.8
Grass / Meadow	0.0	18.6	1.2	0.5	20.3
Wetland	22.8	0.0	6.7	10.1	39.6
Rock	0.0	0.0	12.2	0.0	12.2
Landslide	0.0	0.0	2.9	0.0	2.9
Managed Right-of-Way	0.0	37.5	0.0	0.0	37.5
Natural Open Water	14.2	0.0	7.2	23.8	45.2
Reservoir	0.0	0.0	1,908.3	0.0	1908.3
Non-vegetated / Unclassified	0.0	1.5	13.6	0.8	15.9
Totals	**213.7**	**80.1**	**3,681.4**	**480.7**	**4,455.9**

1.2.2 Agency Habitat Priorities

The USFWS, WDW, USFS and Tribes provided the District with letters of comment on the Draft Revised Exhibit S in mid-December 1982 (District 1983). Additional input on habitat priorities was provided by the WDFW during the relicensing process in 2007 through 2009. Habitat priorities identified by the agencies and Tribes include the following:

1.2.2.1 Mitigate for the Loss of Terrestrial Habitat by Creating or Enhancing Habitat Similar to That Which was Lost

The Project caused the loss of old-growth forest, second-growth forest, riparian forest and wetlands. The losses of old-growth and mature forest due to the Project were relatively small because much of the Sultan Basin was already scheduled for logging prior to creation of the Project. However, old-growth forest and mature forest are currently management priorities in the lowlands of western Washington due to their relative scarcity. The TRMP therefore emphasizes the protection of old-growth and mature forest disproportionate to Project impacts. Conversely, second-growth forest, which is common in lowland western Washington, is deemphasized in the TRMP. Wetlands, which are a habitat priority in Washington, are protected in the TRMP as well. Management details are presented in Chapters 2.0 and 3.0.

1.2.2.2 Provide Mitigation Lands in the Vicinity of the Lost Habitat Whenever Possible

All of the TRMP lands are within or directly adjacent to the Sultan River basin and within 10 miles of the areas affected by the Project. Their locations are presented in Chapter 3.0.

1.2.2.3 Show a Priority or Preference for the Following Types of Habitat in the Management Plan: (a) Old-growth Coniferous Forest, (b) Mature Riparian Forest, (c) Wetland and (d) Young Riparian Forest

The TRMP calls for the preservation of 502 acres of existing old-growth conifer forest and management of 1,119 acres of second-growth conifer forest to promote the development of old-growth characteristics without even-aged timber harvest (clearcutting). Another 731 acres of mixed, deciduous and riparian forest will be managed in a similar way to promote old-growth or late-successional characteristics. Forty acres of wetlands also will be protected from human disturbance and maintained as high-quality habitat.

1.2.2.4 Compensate for the Average Annual Habitat Units (AAHU) Lost to the Project, as Estimated by the HEP Study Conducted by the WDW in 1982

The 1982 HEP report (WDG 1982) was updated in 1988 and included in the WHMP as documentation of compensation for original Project impacts. The HEP evaluated habitat impacts for ten representative species, including the black-tailed deer, black-capped chickadee, ruffed grouse, pileated woodpecker, Douglas squirrel, marten, beaver, osprey, common merganser and mallard. Management in the WHMP for the deer, chickadee and grouse emphasized early-successional forest, management for the woodpecker, squirrel and marten called for late-successional forest, and management for the remaining species occurred on reservoir and wetland habitat.

Since the preparation of the WHMP and completion of the 1988 HEP, there have been four developments that influence the assessment of compensation for AAHU lost to the Project. First, the priorities of the WDFW, USFWS, USFS and other stakeholder for wildlife habitat have shifted away from early-successional forest and toward old-growth and mature forest. Second, the FERC baseline condition for relicensing is now the existing (constructed) Project rather than the pre-project environment, so the 1988 HEP analysis is an overestimate of the wildlife impacts of relicensing. Third, 1,745 acres have been added to the Spada Lake Tract and 137 acres have been added at the Williamson Creek Tract; none of which are accounted for in the 1988 HEP analysis. Fourth, the Lake Chaplain Tract is not included in the TRMP. The net effect of these four changes is that the TRMP, with its increased emphasis on management for old-growth forest species, sufficiently compensates for the loss of AAHU associated with relicensing of the Project.

1.3 Management Lands

The TRMP lands consist of approximately 2,548 acres of upland, wetland and natural lake and 1,908 acres of reservoir in the Sultan River Basin of Snohomish County, Washington (Figure 1.2). The lands are divided into four management tracts based on location. The following paragraphs summarize the tracts. Detailed descriptions are provided in Chapter 3.0.

1.3.1 Lost Lake Tract

Lost Lake is a 14-acre natural lake located approximately 6 miles north-northwest of Sultan, Washington. The management tract also includes 23 acres of wetlands and 177 acres of second-growth forest (Table 1.1). The entire 214-acre tract has been managed under the WHMP since 1989. The lake and wetlands have been protected from site disturbance, and one of the forest stands has undergone precommercial thinning to open it up to promote accelerated tree growth and increased forage in the understory. Even-aged harvesting of the forest was scheduled under the WHMP, but never conducted. Under the TRMP, the lake and wetlands will continue to be protected and the forest will be allowed to develop into old-growth habitat. No even-aged timber harvesting will occur in the tract, and thinning will only occur outside lake and wetland buffers, and only where it will accelerate old-growth forest development. The killing or topping of trees for forest gaps, snags, live decaying trees and coarse woody debris will be the primary method of providing openings in the forest canopy.

1.3.2 Project Facility Lands Tract

Approximately 80 acres of right-of-way, grass, shrubs and forest under District control downstream of Spada Lake make up the Project Facility Lands Tract (Table 1.1). Lands include the power pipeline right-of-way, the transmission line right-of-way, the powerhouse site and a small stand of timber. Most lands in the tract must be maintained in non-forested upland vegetation (grass and shrubs) for operational and/or safety reasons. They have been enhanced to provide meadow, shrub and open woodland under the WHMP since 1989. Management for high-quality meadow, shrub and woodland habitat will continue under the TRMP.

1.3.3 Spada Lake Tract

The Spada Lake Tract consists of 1,908 acres of reservoir (normal maximum pool elevation 1,450 feet above mean sea level [MSL]) and 1,773 acres of adjacent land (Table 1.1). The reservoir and approximately 28 acres of upland were included in the WHMP in 1989. The remaining 1,745 acres were added to the tract after they were acquired from the USFS and Washington Department of Natural Resources (WDNR) in 1991. Roughly 1,720 acres of the tract are forested. All but 227 acres of the forest are second-growth (conifer, mixed, and deciduous) that originated after clearcutting since the 1960's. All forestlands in the tract will be managed for natural habitat conditions, except where precluded by operational constraints (primarily reservoir fluctuation) or recreational improvements. Existing old-growth forest will be

maintained without management intervention. Young upland conifer will be allowed to develop into old-growth forest. Deciduous and mixed forest stands will be allowed to remain in these states as long as natural processes allow. Periodic thinning and creation of gaps, snags, decaying live trees and coarse woody debris that began under the WHMP will continue, as needed, under the TRMP. These measures will be used to promote old-growth characteristics in conifer stands, allow deciduous trees to persist in deciduous and mixed forest stands, and increase understory vegetation in all stands.

1.3.4 Williamson Creek Tract

This tract consists of approximately 481 acres of upland forest, riparian forest and wetland along Williamson Creek, northeast of Spada Lake (Table 1.1). It contains one of the largest remaining low-elevation stands of old-growth forest in the Spada Lake Basin. The lands were acquired from WDNR and USFS in 1991. As part of the land exchange, an additional 137 acres were obtained beyond the original WHMP tract boundary and they are being added to the TRMP. Road access to the tract was eliminated in 1999. WHMP prescriptions for the tract called for minimal intervention. No activity has occurred in old-growth forest, and the creation of snags and decaying live trees has been the only activity in young forest. Management for old-growth habitat will continue under the TRMP. Existing old-growth will be maintained without intervention. Young conifer and mixed forest will be allowed to develop into old-growth forest, with periodic creation of snags, decaying live trees and coarse woody debris.

1.4 Changes from the Wildlife Habitat Management Plan

This TRMP is based on the WHMP approved by the FERC in 1989, as modified by annual reports from 1989 through 2007. It is an extension of the management prescribed in the WHMP, with the following modifications:

- Management of the Spada Lake Tract is based in part on the Spada Lake Tract Supplemental Plan (Spada Supplement) dated 31 January 2007 and approved by the FERC on 21 August 2007. The Spada Supplement addressed the addition of 1,745 acres of forestland above elevation 1,460 feet along Spada Lake that were not included in the original HEP analysis of WHMP benefits. The Spada Supplement has been incorporated into the TRMP, with modifications, to be consistent with the TRMP

emphasis on management for old-growth forest characteristics. All management of the Spada Lake Tract will now be directed by the TRMP. The Spada Supplement will no longer be necessary.

- The Williamson Creek Tract will increase by 137 acres. Three land parcels in Sections 12 and 13 of Township 29 North, Range 9 East, acquired by the District from the WDNR in 1991, will be added to the tract and managed to provide wetland and old-growth conifer forest habitat. These parcels were not included in the WHMP or associated HEP analysis of habitat benefits.

- Even-aged timber harvesting in the Lost Lake Tract and Spada Lake Tract will occur only with prior site-specific approval of the USFWS and WDFW. Single tree removal, variable density thinning, and patch clearings of up to 1.0 acre may occur without site-specific review and approval where determined necessary by the District to maintain or promote old-growth habitat conditions.

- Artificial nesting islands are not included in the TRMP because they have proven ineffective at increasing nesting by the target waterfowl species on TRMP lands.

- Osprey nest structures are not included in the TRMP because they have not received use in recent years.

- Prescriptions for the creation of snags, decaying live trees, forest canopy gaps and coarse woody debris have been updated based on the results of Revised Study Plan 6, as presented in *Habitat Management Methods Literature Review and Evaluation* (Tannenbaum and Schutt 2007).

- The Lake Chaplain Tract (441 acres of reservoir and 2,216 acres of forest and wetland owned by the City) will not be included in the TRMP.

1.5 Approach and Organization

The TRMP is presented in the form of land management prescriptions. The four tracts of TRMP lands (Chapter 3.0) are divided into stands, which are contiguous areas with homogeneous vegetative cover and site conditions (e.g., slope, access, etc). In forested areas,

stands are differentiated primarily on the basis of the age, species, size and density of the overstory trees; and each of these variables is fairly constant within a stand. The term stand is expanded in this TRMP to include non-forested ecological communities such as meadows and wetlands.

The TRMP will be in effect for the term of the new license. During that time, the theory and practice of wildlife habitat management may change. Also, certain existing techniques may be adapted and prove more effective for the TRMP lands. The TRMP is based on current theory and practice, but it would have limited long-term value if not open to future change. For that reason, the TRMP is designed to accommodate changes and improvements in wildlife habitat management as they become available. The overall objectives of the TRMP, which are adopted from the WHMP, are clearly stated in Section 1.2. These objectives will continue to serve as a guide for all future management. Adjustments have been made to the management prescriptions under the WHMP since 1989, and they will continue to be made under the TRMP, as needed. New techniques have been, and will continue to be, substituted for existing ones if they are more effective and/or economical, but all changes will be made within the single constraint of meeting the objectives of the TRMP.

2.0 HABITAT ENHANCEMENT METHODS

2.0 Habitat Enhancement Methods

2.1 Forest Vegetation Management

2.1.1 Background and Rationale

Conifer forest on TRMP lands will be managed to develop and maintain old-growth habitat conditions. Stands that are currently in an old-growth condition will be managed with minimal human intervention for the term of the TRMP. Young conifer forest stands with a history of timber harvesting will be enhanced by creating overstory gaps, snags, decaying live trees and coarse woody debris, all characteristic of old-growth forest (Franklin et al. 1981) that are typically lacking in young managed forest. Thinning of the overstory may also occur in young conifer stands where it is operationally feasible, economically viable, consistent with the maintenance of water quality, and would not inhibit wildlife use and movement. Once young stands reach 100 years of age, active management will cease and natural processes of plant succession and disturbance will be allowed to proceed without intervention.

The TRMP lands are predominantly conifer forest and mixed forest with a history of logging. Many stands are characterized by dense, uniform overstories of small trees and a general lack of legacy features (residual live trees, large snags and logs). Returning these stands to old-growth condition will require: a) overall increase in live tree size, b) reduction in total live tree density, c) introduction of heterogeneity (variable density and patchiness) to the overstory, d) establishment of understory shrubs, forbs and trees, and e) creation of snags, decaying live trees and coarse woody debris. These conditions will develop naturally over several decades or centuries (Oliver and Larson 1990), but they can be accelerated by creating gaps in the overstory (as defined in Section 2.1.3) to increase growing space for the remaining trees and accelerate the rate at which they grow in diameter. Gaps can also increase the amount of sunlight reaching the forest floor and stimulate the development of understory shrubs and forbs and the establishment of new trees. Snags, decaying live trees and coarse woody debris can also be created outside gaps by topping or killing live trees. Additional heterogeneity can be provided by variable density thinning of the overstory, but opportunities to thin are limited on the TRMP lands by steep terrain, poor access, water quality concerns, and limited markets for the thinned material. Thinning should only be considered where it does not require new roads, does not increase surface erosion, and does not result in accumulations of slash (tree

limbs and boles) that interfere with wildlife movement. During all forest management activities, noxious weeds and other invasive species will be managed in accordance with the Jackson Hydroelectric Project Noxious Weed Management Plan.

2.1.2 Old-growth Management

Existing old-growth stands will be preserved and managed with minimal intervention. No overstory thinning, gap creation, snag creation or coarse woody debris creation will occur in old-growth stands.

2.1.3 Young Forest Management

All conifer dominated forest on the TRMP lands that is less than 100 years old will be managed to accelerate natural succession and hasten the development of old-growth characteristics. Once a stand reaches 100 years, active management will cease and the forest will be treated the same as existing old-growth (Section 2.1.2).

Gaps will be created in young forest stands by felling, live-topping or otherwise treating all trees within small contiguous areas to create a collection of snags, decaying live trees and coarse woody debris. Gap creation will occur where needed to add structural diversity to dense, uniform overstories, to increase the amount of deer forage and understory production, or as part of snag and coarse woody debris creation, as determined by District biologists (see also Section 2.3.2). Live trees in gap areas may be felled and left as logs, topped and left as snags, live-topped to create decaying live trees, removed from the site during thinning, or a combination of these methods depending on the sizes of the trees and site-specific needs for snags, coarse woody debris and understory vegetation. Maximum gap size outside lake and wetland buffers will be 1.0 acre. Maximum gap size within lake and wetland buffers will be 0.25 acre, as specified in Section 2.2. No gaps will be created within the inner-most 50 feet of any buffer zone; however, snags, decaying live trees and coarse woody debris may be created within this area, where allowed under Forest Practices Rules.

Young forest stands will also be evaluated individually for overstory thinning. The evaluation will consider overstory age, species composition, management history and site conditions. Dense, overstocked conifer and mixed forest stands on upland sites may be thinned where it is operationally and economically feasible. Thinning will not occur where it would require new road construction, have a negative impact on water quality, or result in excessive

accumulations of logging debris. Where thinning is feasible and appropriate, it will occur at intervals of no less than 10 years within individual stands, and will reduce average stand canopy closure to no less than 60 percent or Relative Density (Curtis 1982) to no less than 30. The metric used to monitor thinning intensity (canopy closure or Relative Density) will be determined by the District on a stand by stand basis. Thinning intensity will vary within stands (variable density thinning), and at least 20 percent of each stand will be left unthinned to promote suppression mortality in accordance with Section 2.3.2.

Stands dominated by deciduous hardwood trees or mixtures of hardwoods and conifers may be managed like conifer dominated stands, or they may be left unthinned and allowed to develop naturally. Some mixed stands will progress toward old-growth conifer forest without management intervention, as the shorter-lived deciduous hardwoods die and create canopy gaps. Other deciduous and mixed stands may remain permanently in deciduous forest characterized by frequent natural disturbances, particularly in riparian areas and on unstable uplands. Because deciduous and mixed stands make up a small percentage of the TRMP lands, management of these types will focus on retention of deciduous trees where feasible. Periodic thinning and creation of gaps, snags, decaying live trees and coarse woody debris that began under the WHMP will continue in deciduous and mixed forest stands, as needed, with emphasis on the retention of deciduous trees. Deciduous and mixed forest that is the result of frequent natural disturbance or site-specific soil conditions (e.g., high water table) likely will not benefit from or require active manipulation of the overstory, so gap creation and thinning will be avoided in these stands.

2.1.4 Understory Management

Much of the second-growth forest on the TRMP lands is characterized by poorly developed shrub and forb communities because little direct sunlight reaches the ground. Studies conducted in an Oregon Douglas-fir forest by Witler (1975) showed an increase in herbaceous cover and shrub biomass in stands thinned to canopy closure of 70 percent or less.

Gap creation and thinning on TRMP lands will open the forest canopy, and the resulting understory growing space will be managed to increase the production of forage for deer and promote the development of shrub and herbaceous layers as habitat for smaller animals. Deer forage production may be increased by seeding gaps and thinned areas with grasses and forbs from the list in Table 2.1, or others approved by a District biologist.

Table 2.1 Plant species available for forage enhancement of forested TRMP lands.

Common Name	Scientific Name
GRASSES AND GRASSLIKE PLANTS	
Creeping Red Fescue [1]	*Festuca rubra*
Annual ryegrass [6]	*Lolium multiflorum*
Reedgrass [2, 3]	*Calamagrostis canadensis*
Bulrush [2]	*Scirpus microcarpus*
Mannagrass [3]	*Glyceria spp.* (except *maxima)*
Sedge [2]	*Carex spp.*
Rush [2]	*Juncus spp.*
White oats [6]	*Avena sativa*
Tufted hairgrass [6]	*Deschampsia cespitosa*
Slender wheatgrass [6]	*Elymus (Agropyron) trachycaulis*
Blue wildrye [6]	*Elymus glaucus*
Soft white winter wheat [6]	*Triticum aestivum*
Gala brome [6]	*Bromus stamineus*
Winter triticale [6]	*Triticum aestivum* x *Secale cereale*
FORBS	
Agoseris [4]	*Agoseris heterophylla*
Pearly-everlasting [4]	*Anaphalis margaritacea*
Subclover [6]	*Trifolium subterranium*
Plantain [4]	*Plantago spp*
Yarrow [4]	*Achillea lanulosa*
Speedwell [2]	*Veronica spp.*
Valerian [2]	*Valeriana spp.*
False Solomon's Seal [2]	*Smilacina spp.*
Prunella [l]	*Prunella vulgaris*
Fireweed [5]	*Epilobium angustifolium*
Willow-weed [2]	*Epilobium watsonii*
Fleabane [5]	*Erigeron spp.*
Hawksbeard [5]	*Crepis spp*
Austrian winter peas [6]	*Pisium sativum arvense*
Alsike clover [6]	*Trifolium hybridum*

[1] Raedeke and Taber 1983
[2] Hanley 1980
[3] Cowan 1945
[4] Brown 1961
[5] Campbell 1987
[6] Potash 2006

2.2 Lake, Wetland and Stream Buffers

2.2.1 Background and Rationale

The riparian interface between upland and aquatic habitats supports a wide variety of plant and animal species and forms an important part of the forest community. Riparian forest vegetation stabilizes streamside soils and provides shade, large woody debris and nutrients to the aquatic system (Franklin et al. 1981). With the proximity of surface water, riparian vegetation is typically more diverse and includes plant species not found in adjacent upland forest, thereby providing locally unique habitats. As a result, the density and diversity of wildlife species are greater in riparian zones and wetlands than in most adjacent uplands (Odum 1979). Of the 414 western Washington and Oregon wildlife species listed by Oakley et al. (1985), 359 use riparian habitats during all or part of their life cycles.

The management of riparian forest in Washington has evolved a great deal in recent years. A series of revisions to the Washington Forest Practices Rules (WAC 222-30) since 2001 have dramatically increased the width of riparian management zones and decreased the amount of tree removal (thinning) that can occur within them. Lake, wetland and stream buffers on the TRMP lands will meet or exceed the riparian management zone requirements of the current Washington Forest Practices Rules. In most cases, the TRMP buffers will be wider and more restrictive on thinning than those required under the Forest Practices Rules. Since there will be no even-aged timber harvesting on the TRMP lands (Section 2.1), the effective widths of buffers will be considerably greater than stated below.

2.2.2 Lake and Wetland Buffers

Overstory management activities will be restricted within 500 feet of Lost Lake (and its associated wetland complex), Spada Lake, and other non-forested wetlands of 0.25 acre and larger (Table 2.2). Thinning will not occur within 200 feet and forest gap creation will not occur within 100 feet (measured horizontally) of the outer edge of the bankfull width or wetland boundary, whichever is greater. However, snags, decaying live trees and coarse woody debris may be created up to the lake or wetland edge, where allowed under Forest Practices Rules. These will typically be individuals or small groupings of these woody habitat structures. Gap creation (Section 2.1) would provide structural diversity to the overstory and/or increase understory vegetation. Maximum gap size within a lake or wetland buffer will be 0.25 acre. Thinning (Section 2.1) would also increase understory vegetation or accelerate the development

of old-growth forest conditions in dense second-growth stands. Minimum post-thinning canopy closure will be 60 percent. Alternately, the District may use the Relative Density (RD) metric described by Curtis (1982) to monitor thinning. The minimum post-thinning RD will be 30. The minimum time between thinnings in individual stands will be 10 years. No thinning or gap creation will occur within forested wetlands, but snag and coarse woody debris creation may occur in accordance with Section 2.3.

Table 2.2 Lake and non-forested wetland overstory management buffers.

Horizontal Distance from Bankfull Width or Wetland Edge	Overstory Management Activities Allowed [1]
0 – 100 feet	- Snag and decaying live tree creation - Coarse woody debris creation
101 – 200 feet	- Snag and decaying live tree creation - Coarse woody debris creation - Gap creation [2]
201 – 500 feet	- Snag and decaying live tree creation - Coarse woody debris creation - Gap creation [2] - Thinning [3]

[1] All activities will be subject to compliance with Washington Forest Practices Rules

[2] Maximum gap size of 0.25 acre

[3] Minimum post-thinning canopy closure of 60 percent or Relative Density of 30; minimum interval between thinnings of 10 years

2.2.3 Stream Buffers

Buffers will be maintained along all streams and rivers on the TRMP lands in accordance with the Riparian Management Zone requirements of the Washington Forest Practices Rules (WAC 222-30). In addition, 50-foot buffers will be extended to include both sides of all perennial non-fish (WDNR Type Np) and seasonal non-fish (WDNR Type Ns) streams. Buffer width on all streams will be measured horizontally from the outer edge of the bankfull width or channel migration zone, whichever is greater. Buffer width may be increased on steep and/or unstable soils or between roads and streams where additional distance is needed to adequately protect the stream. No overstory thinning or creation of gaps will occur within the first 50 feet of buffer closest to the stream. Thinning and gap creation may occur beyond 50 feet as allowed under Washington Forest Practices Rules. Snags, decaying live trees and coarse woody debris may be created within the first 50 feet, where allowed under Washington Forest Practices Rules. Tree removal may also occur within a buffer to construct new stream-crossing roads or yarding corridors.

2.3 Snags and Decaying Live Trees

2.3.1 Background and Rationale

Snags (dead trees) and decaying live trees are important habitat components for many species of wildlife. They are used extensively for a number of activities, including nesting, hiding, foraging, and food storage (Neitro et al. 1985). Cavity-dwelling birds can represent 30 to 45 percent of the total bird population in forested areas (Raphael and White 1984), and the absence of suitable nest sites can be a major factor limiting their populations. Numerous studies have documented the importance of snags. More recently, decaying live trees have also been recognized as important for cavity-nesting birds (Rose et al. 2001). For example, studies have shown substantial use of decaying live trees by nesting woodpeckers in the Pacific Northwest (Aubry and Raley 1992, Aubry and Raley 2002, Duncan 2003).

Naturally-created snags and decaying live trees can be divided into three general types based on origin: a) residual snags, b) suppression killed snags, and c) codominant cohort snags. Residual snags are remnants of a previous stand found in early and mid-successional forest. They survived the stand replacement event (e.g., fire, windstorm or even-aged timber harvest) so they are typically larger than the live trees in the stand and in middle to advanced

stages of decay. Residual snags are rare in commercial forests because past timber harvest methods and safety concerns generally mandated their removal.

Suppression killed snags result from competition-induced mortality in early and mid-successional forest. As trees in a fully-stocked stand increase in size they compete for growing space (Oliver and Larson 1990). Smaller and slower-growing trees are over-shadowed by their larger neighbors and they eventually succumb to pathogens or simple lack of photosynthesis. Suppression killed snags are typically smaller than the live trees in the stand. Since they have high ratios of sapwood to heartwood, suppression killed snags tend to decay and fall faster than large residual snags. They also decay from the outside in, providing foraging habitat for insectivorous animals and nesting habitat for weak excavators like chickadees and some woodpeckers. Suppression killed snags are often the most abundant snags in the forest (Cline et al. 1980), but their numbers and sizes are highly variable and dependent on live tree density. Small suppression killed snags can be plentiful in forest with high seedling density, where competition between live trees begins early. Many of the naturally-regenerated stands in the Spada Lake Tract are in this condition. Suppression killed snags can be less common, or occur later in stand development, if initial live tree density is low due to poor regeneration or if thinning occurs before competition between live trees results in mortality.

Codominant cohort snags are the result of mortality among the trees that survive competition during the early stages of stand development and become the codominant cohort of overstory trees in mid- and late-successional forest. Wind, lightning, insects and pathogens can kill otherwise healthy individuals or clumps of trees at any time. Depending on the cause of mortality (e.g., wind breakage vs. root rot), a codominant cohort snag may persist several decades or it may fall within a few years of death. At the time they are created, codominant cohort snags are representative of the average size of overstory trees. If they persist as snags, they are eventually smaller than the average live tree. Codominant cohort snags are generally larger than suppression killed snags, and more likely than suppression-killed snags to form hard snags that provide habitat for strong cavity nesters. Cline et al. (1980) found that codominant cohort snags make up a small percentage of the total snag resource in young unmanaged forest, and do not become common until after stand age 50.

Decaying live trees typically come from the codominant cohort of a stand, although they or the snags they become may persist to become residuals in the next stand. Decaying live trees result from damage to the top or bark of a tree that allows heart rot fungus to enter while the

tree is still alive. The fungus thrives in live trees, so the extent of heart rot depends on how long the tree survives after infection. In western Washington, heart rot is most common in western redcedar and Pacific silver fir, and these are the two species most commonly selected for nesting by the preeminent cavity nester in the region, the pileated woodpecker (Aubry and Raley 2002). Western hemlock is also used by cavity nesters, but less than western redcedar and Pacific silver fir because it tends to rot more quickly from the outside. Most primary cavity nesters seek snags and live trees with hard outer wood and soft inner wood. Hard outer wood allows birds to control the size of the cavity opening and thus protect eggs and nestlings from predators, while soft inner wood makes excavation of the cavity easier.

Snag management prescriptions should account for all three types of snags as well as decaying live trees, but the ability of forest managers to create these will vary with the type of snag or live tree and the condition of the forest. Residual snags are survivors of stand initiation that persist into early and mid-successional stages. They can be provided in managed forests by retaining some of the largest snags and live trees present at the time of timber harvest (i.e., clearcutting). The TRMP lands will be managed without clearcutting unless approved by the WDFW and USFWS on a site-specific basis, and most stands are well into mid-successional stages where residual snags play a decreasing role. Existing residual snags will be retained on TRMP lands where it is safe and operationally feasible to do so, but there will be little opportunity to create new residual snags because existing stands contain very few residual trees. Suppression killed snags can be replaced relatively easily by killing live trees from the smaller size classes, but they can also be provided by retaining portions of managed stands at sufficient tree densities to cause natural suppression mortality. Variable density thinning will be the primary tool for providing suppression killed snags on TRMP lands, with augmentation by direct snag creation in those portions of stands that are thinned to provide deer forage and/or promote old-growth conditions. Codominant cohort snags and decaying live trees are expected to be the most prevalent cavity resources on TRMP lands due to the management histories and ages of most of the forest stands. These are best created by topping of live trees to kill the tree or initiate natural decay processes while the tree is still alive.

The sizes and numbers of snags and decaying live trees to be created in managed forest are determined by a number of considerations. The three most important considerations are the cavity needs of native wildlife species; the sizes, densities and decay stages of snags and decaying live trees found in natural forests of the type being managed; and the sizes and numbers of healthy live trees available in the forest stands being managed.

The snag needs of native wildlife species can be estimated from the work of Neitro et al. (1985). They relied upon three basic assumptions to determine the numbers of snags needed for snag-dependent wildlife in managed forests:

a) The snag requirements of most snag-dependent species will be met if the breeding requirements of all woodpeckers are met;

b) Large snags can be substituted for small snags but not vice versa; and

c) The total number of snags required in a forest stand is the sum of the snag requirements of the individual primary cavity nesting species (woodpeckers) present (Table 2.3). Snags are frequently used by different individuals of the same or different wildlife species in subsequent years, but they are rarely shared during the same year.

Table 2.3 Snag size and density requirements of primary cavity nesters common to the Jackson Project TRMP lands (from Neitro et al. 1985).

Species	Snags / 100 acres	Hard	Soft	Minimum size	
				DBH (inches)	Height (feet)
Red-breasted sapsucker	45	x		15	20
Downy woodpecker	16		x	11	10
Hairy woodpecker	192		x	15	20
Common flicker	48		x	17	10
Pileated woodpecker	6	x		25	40
Total	307	-	-	-	-

According to Neitro et al. (1985), a total of 307 snags per 100 acres, ranging in DBH from 11 inches to 25 inches, would be needed to provide optimal habitat conditions. This should provide 100 percent of the snag needs of the primary and secondary cavity nesters common to the area (Table 2.4).

Table 2.4 Snag size requirements of secondary cavity nesters common to the Jackson Project TRMP lands (from Neitro et al. 1985).

Species	Minimum Size	
	DBH (inches)	Height (feet)
Douglas squirrel	17	20
Black-capped chickadee	9	10
Pine marten	17	20
Common merganser	25	10

The approach suggested by Neitro et al. (1985) may be appropriate for commercial timberlands, where each created snag can reduce final timber harvest volume. The TRMP lands are not constrained by timber harvest objectives, however, so management under the TRMP will consider snags in a broader context. The sizes and numbers of snags present in unmanaged forest are important to consider because snag targets based solely on the nesting requirements of cavity-dwelling species can underestimate total snag needs for all life requisites (including foraging) over the long term (Aubrey and Raley 2002, Brett 1997, Knutson and Naef 1995, Rose et al. 2001).

Accurate estimation of natural snag sizes and densities is complicated by the fact that both can vary widely with the age and history of the stand. Cline et al. (1980) reported total snag densities of 7.4 to 19.5 per acre, including residual snag densities of 2.1 to 5.8 per acre, in forest of 100 yeas and older in western Oregon. The average size of snags in measured stands was as high as 28.3 inches DBH. Ohmann and Waddell (2002) estimated the density of all snags over 10 inches DBH in “late-successional” forest of western Oregon and Washington to be 13.8 per acre, with 6.3 of these snags per acre over 20 inches DBH. Despite the differences in terminology and classification of forest types between the two sources, the results are similar. They suggest a target for stands over 100 years old of 14 snags per acre, including 6 residual snags per acre. Since there are no opportunities to create new residual snags on the TRMP lands, the full target of 14 snags per acre will need to come from codominant cohort snags

The above estimates by Cline at al. (1980) and Ohmann and Waddell (2002) are from mid- and late-successional stands, so they include limited numbers of suppression killed snags.

Data for younger forest, where suppression kills make up a larger proportion of the total snag resource, are not nearly as consistent. Cline et al. (1980) found total snag densities in unmanaged forest 35 to 40 years old ranged from 45.2 to 329.9 per acre. Management targets within this range would be impractical in most managed stands, as they would require managers to either hold stand densities at very high levels, thereby counteracting efforts to accelerate tree growth rates, or kill large numbers of trees and thereby threaten long-term viability of the stands. Targets for suppression killed snags will therefore be based on site-specific operational and economic considerations, as explained below.

Few studies have documented the numbers of decaying trees present in unmanaged forest or distinguished decaying live trees from snags. For purposes of the TRMP, decaying live trees will be included in the management targets based on codominant cohort snags.

Cline et al. (1980) also provided data on the rate at which snags decay and fall over. They identified five stages of deterioration, with Stage 1 being hard, recently-killed snags and Stage 5 being soft, highly decayed snags. They found that large snags (>18.5 inches DBH) persist 50 to 100 years or more and spend 7 to 18 years in Stage 1. Those of medium size (7.5 – 18.5 inches DBH) persist from 30 to 60 years and spend 6 to 13 years in Stage 1. Small snags, which are predominantly suppression killed, persist less than 20 years and spend 5 to 8 years in Stage 1. Since Stage 1 are the only snags that can be created directly from live trees, snag management needs to focus on providing enough Stage 1 snags at appropriate intervals to produce the total numbers and decay stages found in unmanaged stands. An appropriate management prescription for medium and large snags in mid- to late-successional forest, based on Cline et al. (1980), would be to create three snags per acre every 10 years. Of the three created snags, two should come from the larger live trees in the stand at the time of creation (a subset of the codominant cohort) and one could come from the overall codominant cohort. In this way, the size of created snags would increase in each successive 10-year period as the size of live trees increases. To avoid underestimating snag creation needs, this prescription assumes: a) the overall target at age 100 years is 14 snags per acre, b) a minimum of 25 percent of all snags are in Stage 1, c) Stage 1 lasts a maximum of 10 years, and d) attrition of created snags is balanced over time by the appearance of natural snags. Over five decades, the result would be15 large created snags of varying decay stages per acre. Snags that appear naturally would provide additional habitat value.

The management history of the TRMP lands will also play a role in determining the need for snag and decaying live tree creation. The TRMP lands contain forest stands of two basic types; those that originated after commercial timber harvest in the past (managed stands) and those of natural origin (unmanaged stands). Managed stands range in age from 20 to 100 years, although most are the result of even-aged timber harvesting in the 1960's. Unmanaged stands are 160 years and older. Managed stands tend to have dense, uniform overstories, variable numbers of small snags, and few large snags or decaying live trees. Thinning and gap creation will continue in managed stands until they reach an age of 100 years (see Section 2.1). The District has managed young stands since 1989 to increase the numbers of snags and decaying live trees. Snag and decaying live tree creation will continue under the TRMP until stand age 100 years to provide the full range of natural snag sizes and decay stages. Unmanaged stands also have variable snag and decaying live tree numbers, but natural tree mortality processes are at work in these stands. Consequently, no snag or decaying live tree creation will occur in unmanaged stands.

2.3.2 Snag Management

Codominant cohort snags and decaying live trees will be created in forest stands less than 100 years old that have at least 40 live trees per acre over 10 inches DBH. No minimum diameter is specified for snags, but the District biologist and contractor must agree that the tree is safe to be climbed. Individual stands will be entered at intervals of 8 to 12 years (as determined by operational and annual budgeting constraints) to create three snags or decaying live trees per acre. All three will be created from the larger live trees (by DBH) in the stand. Snags will be created by removing all live limbs. Decaying live trees will be created by topping trees but leaving enough live limbs to keep the tree alive for at least 5 years. At least one of the three will be a created snag and one will be a decaying live tree. The third will be determined on a site-specific basis by District biologists, based on the species of live trees present, the observed numbers of natural snags and decaying live trees present, the observed persistence of created snags and decaying live trees and the observed wildlife use of created snags and decaying live trees (see Section 4.0, Monitoring). The species composition of created snags and decaying live trees will be representative of the species composition of the live trees in the codominant cohort. Created snag and decaying live tree densities will be averaged across a stand or management unit. They may be in clumps or dispersed evenly throughout the unit, depending on live tree distribution, safety considerations, and operational constraints. To minimize firewood cutting, snags and decaying live trees will not be created within 200 feet of

roads that are open to the public. Snags and decaying live trees will be protected from felling during subsequent thinning and gap creation, except where they conflict with operational or safety considerations.

Suppression killed snags will be produced naturally by maintaining high tree densities in portions of young stands. When a stand less than 100 years old is thinned, at least 20 percent of the stand will be left unthinned to allow suppression to occur. An unthinned lake or wetland buffer within or adjacent to a management unit may be counted toward the unthinned 20 percent for that management unit. If the stand is thinned multiple times, the same area will be left unthinned in all entries.

2.4 Coarse Woody Debris

2.4.1 Background and Rationale

Coarse woody debris serves a number of wildlife habitat functions in the forested environment. Logs can provide cover for small mammals, birds and amphibians, a source of food for insectivorous and herbivorous species, and drumming sites for birds like the ruffed grouse (Bartels et al. 1985). The size and amount of coarse woody debris in natural forest stands is quite variable, depending on the species composition, microclimate and fire history of the site. Franklin et al. (1981) found an average of 24 percent (range 11 to 35%) of the ground surface occupied by logs in the old-growth Douglas-fir forests of western Oregon, but noted the optimum amount for wildlife was unknown. Defining good wildlife habitat is complicated by the fact that each species of wildlife probably finds optimal habitat in different amounts of coarse woody debris. For example, large amounts of material may provide good cover and travel lanes for small mammals, but seriously inhibit big game movement. Stage of decomposition is also important. Franklin et al. (1981) identified five decay classes for logs in Douglas-fir forests, and discussed unique wildlife values of each. Bartels et al. (1985) re-emphasized that each decay class is important, but again pointed out that the amount of each class needed to provide good wildlife habitat is unknown.

2.4.2 Coarse Woody Debris Management

Existing logs will be retained on all forested TRMP lands, and new logs will be created in stands less than 100 years old. All existing logs will be left on-site during thinning and gap creation in young forest stands, although some logs may need to be moved or disturbed during

felling and yarding, or for safety or access. New coarse woody debris will be created in forest stands less than 100 years old by felling four live trees per acre from the larger live trees (by DBH) every 8 to 12 years. The timing of coarse woody debris creation will be adjusted within this range to accommodate annual budgetary and operational considerations. Coarse woody debris creation will be timed to coincide with gap, snag and decaying live tree creation where operationally feasible. Trees felled during gap creation may be counted as coarse woody debris if they originate from the codominant cohort. Trees felled by natural causes (e.g., wind and root rot) also may be counted as coarse woody debris if they originate from the codominant cohort and are in Log Decomposition Class 1 (Maser et al. 1979). Felled trees may be limbed and/or bucked into logs no less than 20 feet long for safety or operational reasons. The species of felled trees will be representative of the species composition of the codominant overstory. Felled trees may be distributed throughout a management unit, or left in patches such as those resulting from gap creation. To discourage firewood gathering, coarse woody debris trees will not be felled within 200 feet of roads that are open to the public.

2.5 Right-of-Way Management

Permanent meadows and grasslands are rare in western Washington where natural succession favors dense conifer forest. Grasslands that are created and maintained artificially, such as powerline rights-of-way, provide locally unique habitats that typically receive heavy wildlife use (Taber 1977). They create edge where they adjoin forest and wetland, they provide travel lanes for large and small mammals, and they support persistent communities of shrubs and grasses that provide habitat and forage for birds and mammals, including deer.

The Project Facility Lands Tract includes the power pipeline right-of-way and a short segment of transmission line right-of-way. These lands are managed primarily for power generation and transmission, but enhancement for wildlife habitat will also occur where it is consistent with safe and efficient operation of the Project. Habitat management on the rights-of-way will continue to emphasize three main factors: a) increased production of grasses, forbs and shrubs for deer forage, b) placement of trees, shrubs and brush piles for cover and habitat diversity, and c) limited human use, particularly off-road vehicle use on the power pipeline right-of-way. A list of species suitable for right-of-way planting is presented in Table 2.5. This list will be updated, if needed, to remove any that become designated as noxious weeds.

Table 2.5 Plant species suitable for wildlife habitat enhancement on TRMP rights-of-way.

Common Name	Scientific Name
GRASSES	
Annual ryegrass[1]	*Lolium multiflorum*
Blue wildrye[3]	*Elymus glaucus*
Creeping red fescue[1,3]	*Festuca rubra*
Chewings fescue	*Festuca rubra var. commutata*
Gala brome[3]	*Bromus stamineus*
Tufted hairgrass[2,3]	*Deschampsia cespitosa*
Slender wheatgrass[3]	*Elymus (Agropyron) trachycaulis*
Soft white winter wheat[2,3]	*Triticum aestivum*
Winter triticale[2,3]	*Triticum aestivum* x *Secale cereale*
White oats[2,3]	*Avena sativa*
FORBS	
Plantain	*Plantago spp.*
Alsike clover[2,3]	*Trifolium aestivum*
Subclover	*Trifolium subterranium*
Austrian winter peas[2,3]	*Pisum sativum arvense*
Fireweed	*Epilobium angustifolium*
Willow-weed	*Epilobium watsonii*
SHRUBS	
Trailing blackberry	*Rubus ursinus*
Elderberry	*Sambucus spp.*
Huckleberry[1]	*Vaccinium spp.*
Thimbleberry[1]	*Rubus parviflorus*
Nootka Rose[1]	*Rosa nutkana*
Salmonberry[1]	*Rubus spectabilis*
Snowberry	*Symphoricarpos albus*
Serviceberry[1]	*Amelanchier alnifolia*
Spiraea[1]	*Spiraea douglasii*
Red-flowering currant	*Ribes sanguineum*
Vine maple	*Acer circinatum*
Oceanspray	*Holodiscus discolor*
Willow	*Salix spp.*
TREES	
Cottonwood	*Populus spp.*
Dogwood	*Cornus spp.*
Cherry	*Prunus spp.*
Bigleaf maple	*Acer macrophyllum*
Apple	*Pyrus spp.*
Hazelnut	*Corylus cornuta*
Oregon ash[1]	*Fraxinus latifolia*
Black hawthorne[1]	*Crataegus douglasii*
Red alder	*Alnus rubra*
Douglas-fir[1]	*Pseudotsuga menziesii*
Western redcedar[1]	*Thuja plicata*

[1] Used on ROW lands prior to 2011, as recorded in Annual Reports 1989-2007.
[2] U.S. Forest Service 2005
[3] Potash 2006

2.6 Waterfowl Nest Boxes

Cavity nesting ducks are listed as Priority Species in Washington. Numerous studies have demonstrated the value of nest boxes in enhancing wood duck populations. Bellrose (1976) provided an extensive summary of research on wood duck use of nest boxes. Additional species utilize boxes designed for wood ducks; common and hooded mergansers are both known to nest in wood duck boxes in the Sultan Basin.

The WDFW recommends providing potential nest cavities near open water wetlands. They also recommend that boxes be placed at least 150 feet apart to reduce predation. Boxes that are hidden from view have lower rates of nest parasitism (Semel and Sherman 1995).

Waterfowl nest boxes will be placed at Lost Lake. Boxes will be made of rough-cut cedar and attached 12 to 20 feet above the ground on snags in the water or trees adjacent to the water. They will be lined with 3 to 4 inches of wood chips that will be replaced as needed. Boxes may be replaced as needed due to bear damage or predation, and they may be moved to new areas if original locations become prone to predation by bears or other predators. Nest boxes will be checked soon after the end of each nesting season to avoid disturbing nesting waterfowl and to ensure accurate determination of use.

3.0 MANAGEMENT TRACT DESCRIPTIONS AND PRESCRIPTIONS

3.0 Management Tract Descriptions and Prescriptions

3.1 Lost Lake Tract

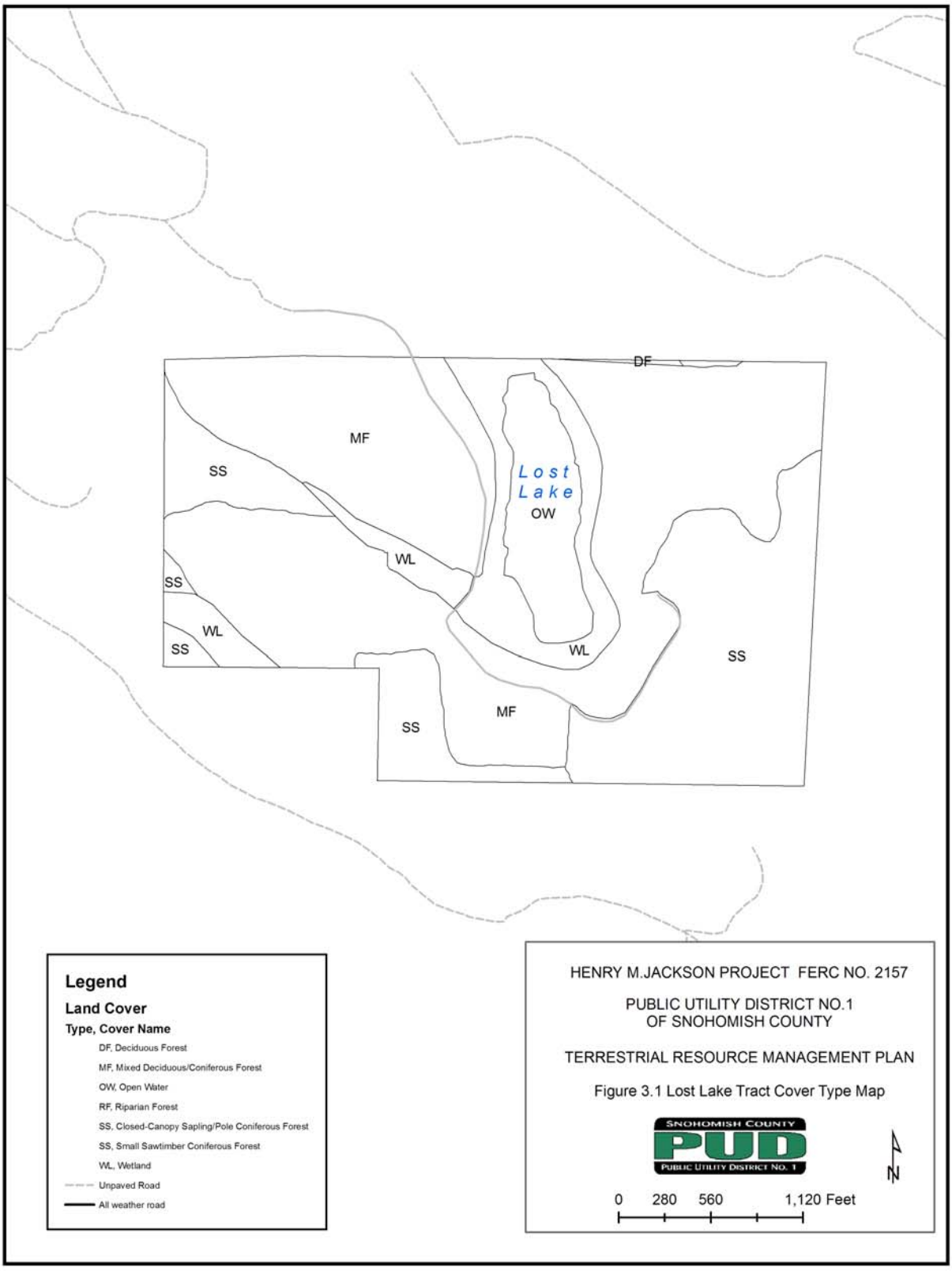
3.1.1 Existing Habitat Conditions

The Lost Lake Tract consists of approximately 37 acres of lake and wetland and 177 acres of young second-growth forest (Figure 3.1). It is located approximately 6 miles north-northwest of the Town of Sultan. The tract was proposed for subdivision into 20-acre suburban residential lots by the previous owner. The District acquired the tract in 1988 as part of the WHMP and is managing it for wildlife habitat.

The Lost Lake tract lies within the *Tsuga heterophylla* Zone described by Franklin and Dyrness (1973). The dominant vegetation on upland sites in this zone is dense forest of western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*) and western redcedar (*Thuja plicata*). Scattered throughout the conifer forests are individuals and small stands of red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*) and black cottonwood (*Populus trichocarpa*). Hardwoods are found primarily on wet and/or recently disturbed soils.

All upland sites on the Lost Lake Tract have been logged at least once in the past 100 years and left to regenerate naturally. Some sites were high-graded in the 1970s. All are now dominated by mixed second-growth stands of hemlock, red alder, Douglas-fir, cedar, bigleaf maple and black cottonwood (Figure 3.1).

The primary wetland complex within the tract consists of 14 acres of open water (Lost Lake) surrounded by persistent emergent, deciduous scrub-shrub, evergreen scrub-shrub (peat bog) and deciduous forest wetland. The large number and even distribution of wetland types make this a diverse, high-quality wetland complex. Human disturbance of the tract is minimal because access is by hike-in only, to protect the wildlife values of the lake, wetlands, and surrounding uplands. A fishing platform on Lost Lake is maintained cooperatively by the Snohomish Sportsman's Club and the District to provide fishing access and protect the floating bog around Lost Lake. A smaller wetland, surrounded by mixed forest, exists in the southwest corner of the tract.


DF
MF
SS
Lost
Lake
OW
WL
SS
WL
SS
WL
SS
MF
SS
Legend
Land Cover
Type, Cover Name
DF, Deciduous Forest
MF, Mixed Deciduous/Coniferous Forest
OW, Open Water
RF, Riparian Forest
SS, Closed-Canopy Sapling/Pole Coniferous Forest
SS, Small Sawtimber Coniferous Forest
WL, Wetland
Unpaved Road
All weather road
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.1 Lost Lake Tract Cover Type Map
SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT NO. 1
N
0 280 560 1,120 Feet

3.1.2 Existing Habitat Value

The mixed forest cover type which dominates the tract has high wildlife value for species such as ruffed grouse, black-capped chickadee and black-tailed deer due to the large amount of edge adjacent to the wetland complex, quality forage, and high diversity of overstory tree species. The existing forest provides good forage for deer and ruffed grouse, but forage quality is decreasing as young conifers begin to dominate the site and crowd out palatable shrubs and forbs. Food and nesting sites for late-successional species such as pileated woodpecker and marten can be limited in mixed forest and small sawtimber forest due to the absence of snags, large diameter logs and large diameter trees. The WHMP snag program has been implemented on the Lost Lake tract and there are currently at least three snags per acre in the forested stands, most in the early stages of decay.

The wetland complex has high habitat value because of its diversity of wetland types. The lake was stocked with trout from 1964 through 1979 and has been stocked annually since 1989. The resulting fish population provides a food source for species such as osprey and hooded mergansers. The ratio of open water and emergent vegetation is favorable for mallard nesting. The District has provided waterfowl nest boxes for wood ducks, hooded mergansers and bufflehead since 1989. The abundance of young deciduous trees in the surrounding uplands provides an excellent food source for beaver.

3.1.3 Management Constraints

Management constraints affecting wildlife enhancement of the Lost Lake Tract are minimal. The lake is not covered under the County's Shoreline Management Master Program because it is less than 20 acres. Washington Forest Practices Rules, Snohomish County Critical Areas Ordinance, and general zoning apply to the tract, but they do not restrict any potential management activities proposed in this plan.

The north end of Lost Lake is contained by a low earthen dam. The City is concerned that water from Lost Lake could drain into Lake Chaplain, the municipal water supply for most of Snohomish County, in the event of a flood and/or dam breach. The City therefore periodically monitors use of Lost Lake and encourages low impact activity on the tract.

3.1.4 Habitat Management Objectives

a) Continue to protect the tract from development for the term of the new license.

b) Protect and enhance the wetland by maintaining a forested buffer zone around it, providing and maintaining waterfowl nest boxes.

c) Manage forested lands outside the buffer zone for mixed forest and late–successional conifer forest wildlife by creating gaps and thinning the overstory.

d) Implement the snag, decaying live tree and coarse woody debris management programs on forested lands.

3.1.5 Habitat Management

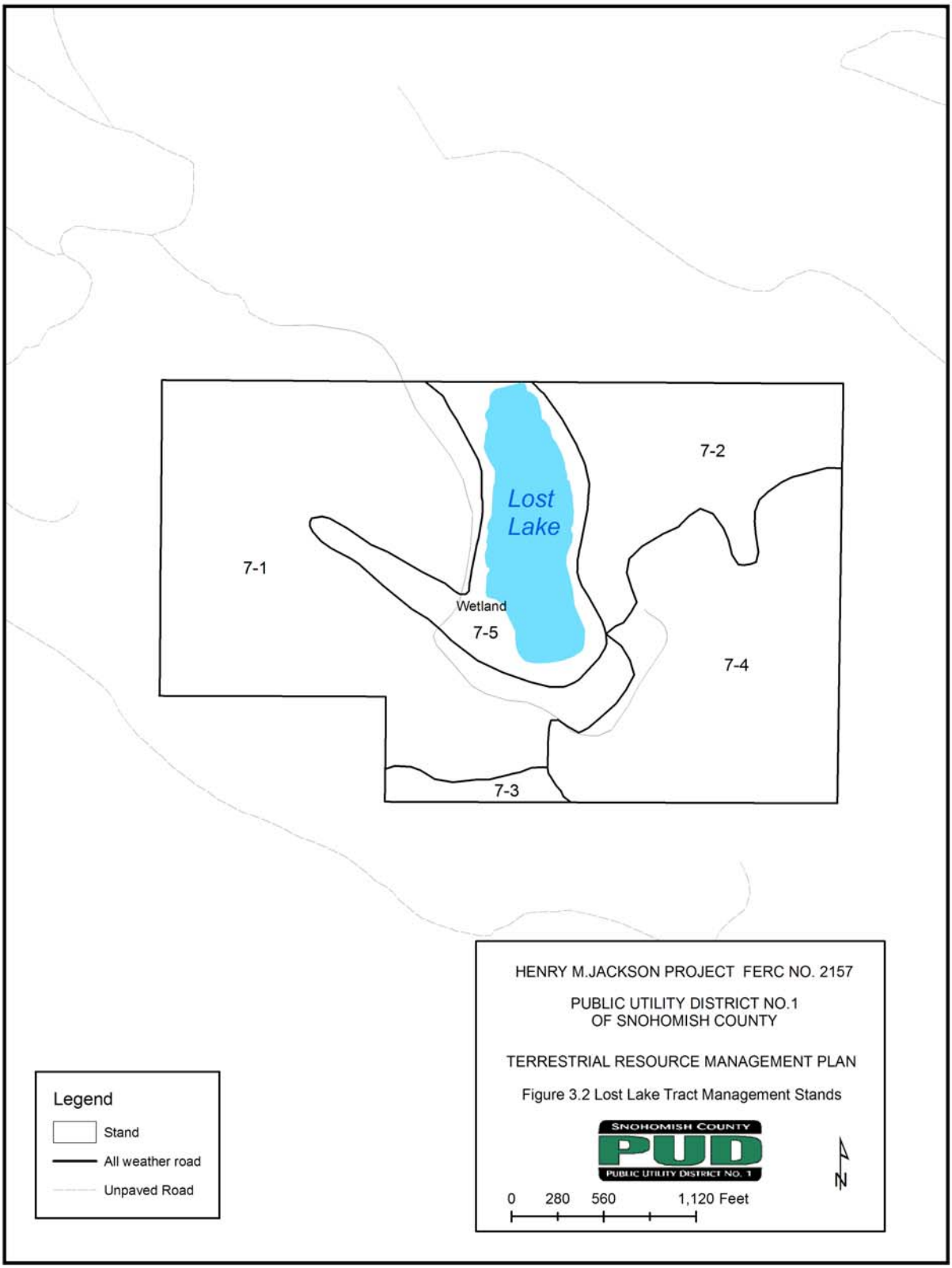
Management of the tract will involve three major habitat systems: 1) lake/wetland, 2) wetland buffer and 3) young forest management (Figure 3.2). These elements are described in the following sections and in Chapter 2.

3.1.5.1 Lake/Wetland Management

The Lost Lake/wetland complex and the smaller wetland on the southwest portion of the tract will be retained for the term of the new license. They will be protected by limiting human access to the tract to hike-in only.

3.1.5.2 Wetland Buffer Zone Management

Approximately 80 acres of second-growth forest will be maintained as a 500-foot wide permanent buffer surrounding the Lost Lake/wetland complex. The buffer will be managed in four zones following the guidelines in Section 2.2.2 and Table 2.2. Waterfowl nesting boxes will be maintained and replaced, as needed, in trees directly adjacent to the lake/wetland following the guidelines described in Section 2.6.


Lost Lake
7-1
7-2
7-3
7-4
7-5
Wetland
Legend
Stand
All weather road
Unpaved Road
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.2 Lost Lake Tract Management Stands
SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT NO. 1
0 280 560 1,120 Feet
N

3.1.5.3 Forest Management

Forestland outside the wetland buffer zone will be managed following the protocols described in Section 2.1.3, Young Forest Management, and Section 2.1.4, Understory Management. Retention of the hardwood component to the extent site conditions allow will be an objective in mixed forest stands. Gap creation will be the primary tool for promoting a healthy understory where needed. Variable density thinning will be considered where access is feasible. Snags, decaying live trees and coarse woody debris will be provided as described in Sections 2.3 and 2.4.

3.1.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Lost Lake Tract over the life of this TRMP. Each prescription contains a summary of the management constraints, habitat objectives and enhancement methods applicable to a particular stand. Each is intended to be used in conjunction with the details provided in other sections of this TRMP, particularly the enhancement measures in Chapter 2.0.

Stands 7-1, 7-2, 7-3

Area: 7-1 = 81.0 acres
7-2 = 37.0 acres
7-3 = 4.0 acres

Year of Origin: 1934-1938

Site Index: 126

Cover Types: Stand 7-1 – Mixed Forest
Stand 7-2 – Mixed Forest
Stand 7-3 – Small Sawtimber Conifer Forest

Constraints: None

Notable Features: Adjacent to Lost Lake, wetlands

Access: Fair to excellent; level site, adjacent to existing road system

Management: Augment natural forest processes through overstory thinning and gap creation to accelerate late-successional forest development.

Restrict activity within 500 feet of Lost Lake and wetlands, as per Section 2.2.

Implement snag, decaying live tree and coarse woody debris creation until stand age 100 years.

Perpetuate mixed forest conditions by retaining live deciduous trees during gap creation, overstory thinning, snag creation, decaying live tree creation, and coarse woody debris creation.

Stand 7-4

Area: 65.0 acres **Year of Origin:** 1970 **Site Index:** 126

Cover Types: Closed Canopy Sapling/Pole Conifer Forest and Mixed-Shrub/Brush

Constraints: Small Drainage

Notable Features: None

Access: Good to excellent; level site, adjacent to existing road system

Management: Augment natural forest processes through overstory thinning and gap creation to accelerate late-successional forest development.

Restrict activity within 500 feet of Lost Lake and non-forest wetlands, as per Section 2.2.

Implement snag, decaying live tree and coarse woody debris creation until stand age 100 years.

Stand 7-5 (Lost Lake and associated wetland)

Area: 27.0 acres **Year of Origin:** N/A **Site Index:** N/A

Cover Types: Lake and Wetland

Constraints: None

Notable Features: Lake/wetland complex

Access: Good; gravel road to site

Management: Preserve and protect existing wetland by restricting vehicle access.

Improve value as wetland habitat by maintaining waterfowl nest boxes.

3.2 Project Facility Lands Tract

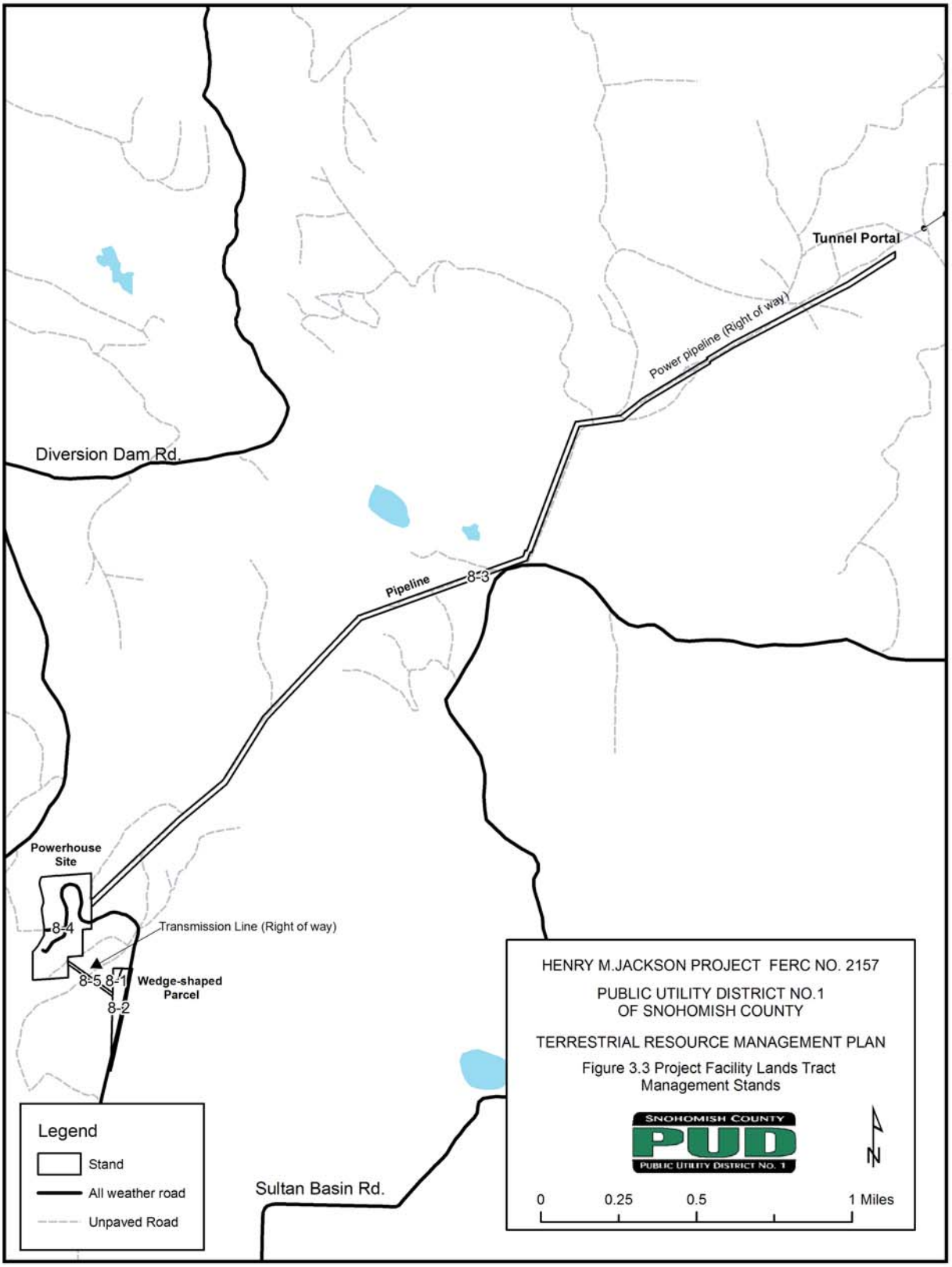
3.2.1 Existing Habitat Conditions

Approximately 80 acres of Project facility lands downstream of Spada Lake are available for management and enhancement as wildlife habitat. They include the power pipeline right-of-way between the tunnel and the powerhouse (41 acres), the powerhouse site (27 acres), a portion of the transmission line right-of-way (1 acre), and a wedge-shaped parcel of land adjacent to the powerhouse access road (11 acres) (Figure 3.3). All lands in the tract are owned and/or controlled by the District.

The permanent power pipeline right-of-way is 90 feet wide and 3.7 miles long. It is moderately level with a few very steep slopes. Soils are coarse and rocky and were heavily disturbed during the burial of the pipeline. A 200-foot wide right-of-way was cleared for original construction, but only the permanent right-of-way, which is held in easement by the District, is available for wildlife management. The portion not in permanent right-of-way has been planted with Douglas-fir trees. The lands outside the 200-foot right-of-way were predominantly second-growth commercial timberland, most of which have been logged a second time since 1989. The right-of-way also crosses Marsh Creek and its associated wetland for a distance of approximately 500 feet.

Immediately after Project construction, the pipeline right-of-way was sparsely vegetated with young red alder and other pioneering species. Brush piles have been placed along the pipeline right of way over the past 20 years as part of WHMP implementation to provide cover and structural diversity, and limit ORV use, which was a problem for habitat restoration efforts when implementation of the WHMP began. Gates and an aggressive program by the District to place barriers and rocks at strategic points of access have reduced vehicle access problems. Seeding and annual fertilizing during the first 20 years of the WHMP have resulted in a healthy herbaceous layer over the majority of the right-of-way. Native shrubs were also planted during this time. A program of placing biosolids on the pipeline right-of-way was implemented in 2008 to help augment soils.

The powerhouse site is predominantly steep terrain of grass, shrub and early-successional forest. The grassy slope above the powerhouse was re-contoured and seeded to grasses following Project construction. Portions of the site that were harvested prior to construction have been allowed to re-vegetate naturally and now consist of shrubby vegetation.


Tunnel Portal
Power pipeline (Right of way)
Diversion Dam Rd.
Pipeline
8-3
Powerhouse Site
8-4
Transmission Line (Right of way)
8-5
8-1
Wedge-shaped Parcel
8-2
Legend
Stand
All weather road
Unpaved Road
Sultan Basin Rd.
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1 OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.3 Project Facility Lands Tract Management Stands
SNOHOMISH COUNTY PUD PUBLIC UTILITY DISTRICT NO. 1
N
0 0.25 0.5 1 Miles

A riparian strip along the Sultan River supports deciduous trees and shrubs that regenerated naturally after construction. Shrubs and small trees were planted at the powerhouse site in 1993 and 2003. At the top of the slope above the powerhouse there is approximately 1 acre of small sawtimber Douglas-fir forest.

The transmission line right-of-way is 50 feet wide and extends 800 feet from the powerhouse to the powerhouse access road. A portion is occupied by a graveled access road. The remainder is maintained in low-growing vegetation that is available to be managed for wildlife.

The wedge-shaped parcel along the powerhouse access road supports a young stand of shrubs, hardwood trees and conifers that invaded the site after it was logged in the late 1970s. Part of the site (less than 2 acres) was logged and replanted in 1960 and now contains a well-stocked stand of Douglas-fir.

3.2.2 Existing Habitat Value

Prior to WHMP implementation, the pipeline right-of-way was sparsely vegetated and provided minimal forage or hiding cover. Successful seeding and plantings since 1989 have added forage and hiding cover. Brush piles have been placed along the pipeline right-of-way and shrubs have been planted close to them to inhibit vehicle access and provide structure and hiding cover. The powerhouse site provides habitat for species using early-successional cover types, but lacked hiding cover prior to 1989. Plantings during the first years of WHMP implementation and natural vegetation growth have added hiding cover. The transmission line right-of-way and most of the wedge-shaped parcel provide habitat for species requiring early-successional vegetation. All four sites provide edge habitat, and their habitat quality is improving with management.

3.2.3 Management Constraints

The center of the pipeline right-of-way must remain in shallow-rooted vegetation (grasses and shrubs) to facilitate pipeline maintenance and avoid root damage to the pipeline. Only grasses, forbs and shallow rooted shrubs may be planted directly above the pipeline (30-foot wide strip centered over the pipeline). Vehicle access to service points must also be maintained. A portion of the pipeline right-of-way passes through the Town of Sultan's watershed. Currently, no fertilizer or herbicides may be applied to the right-of-way within the

watershed, but noxious weed treatment will be approached on a case-by-case basis and the City of Sultan would be consulted prior to any application of herbicide in this area.

The powerhouse site is on a steep slope adjacent to the Sultan River. Heavy equipment should not be used in this area, as erosion and sloughing could have serious consequences on Project operation. Vegetation should not be planted where it might obstruct the view of traffic on the access road or cause a road-related hazard. Tall-growing vegetation is also prohibited in the microwave transmission pathway and the transmission line right-of-way. Applications of fertilizer or herbicide will follow all applicable laws regarding buffer distance, application timing, etc.

3.2.4 Habitat Management Objectives

a) Enhance early-successional habitats by seeding with grasses and forbs, planting shrubs and trees, fertilizing, and creating brush piles to benefit black-tailed deer, ruffed grouse and black-capped chickadee.

b) Preserve existing forested stands and create snags to facilitate the development of late-successional habitat.

3.2.5 Habitat Management

The Project Facility Lands consist of 5 stands. They will all be managed to enhance habitat for early-successional and mixed forest wildlife species as described in Section 2.5 within the context of project operations and facility needs.

3.2.5.1 Wedge-shaped Parcel

The two small stands of coniferous and mixed forest will be retained in forest cover with no even-aged timber harvesting for the term of the license to provide permanent cover. Snag and decaying live tree creation will be implemented.

3.2.5.2 Pipeline Right-of-Way

The pipeline right-of-way has been seeded with a mixture of grasses and forbs suited to the site as part of WHMP implementation. Reseeding will continue as needed. Hedgerows and clumps of shrubs and trees will continue to be planted as needed (at a maximum spacing of 600 feet). In addition, when material is available, brush piles will continue to be placed along the

right-of-way as appropriate to improve habitat. The brush piles will be placed in strategic locations to control off-road vehicle use and break up the line of sight (Figure 3.4). Operational requirements to inspect and maintain the pipeline right-of-way will be included in the decision-making process for placement of brush piles and other right-of-way enhancements.

3.2.5.3 Powerhouse Site

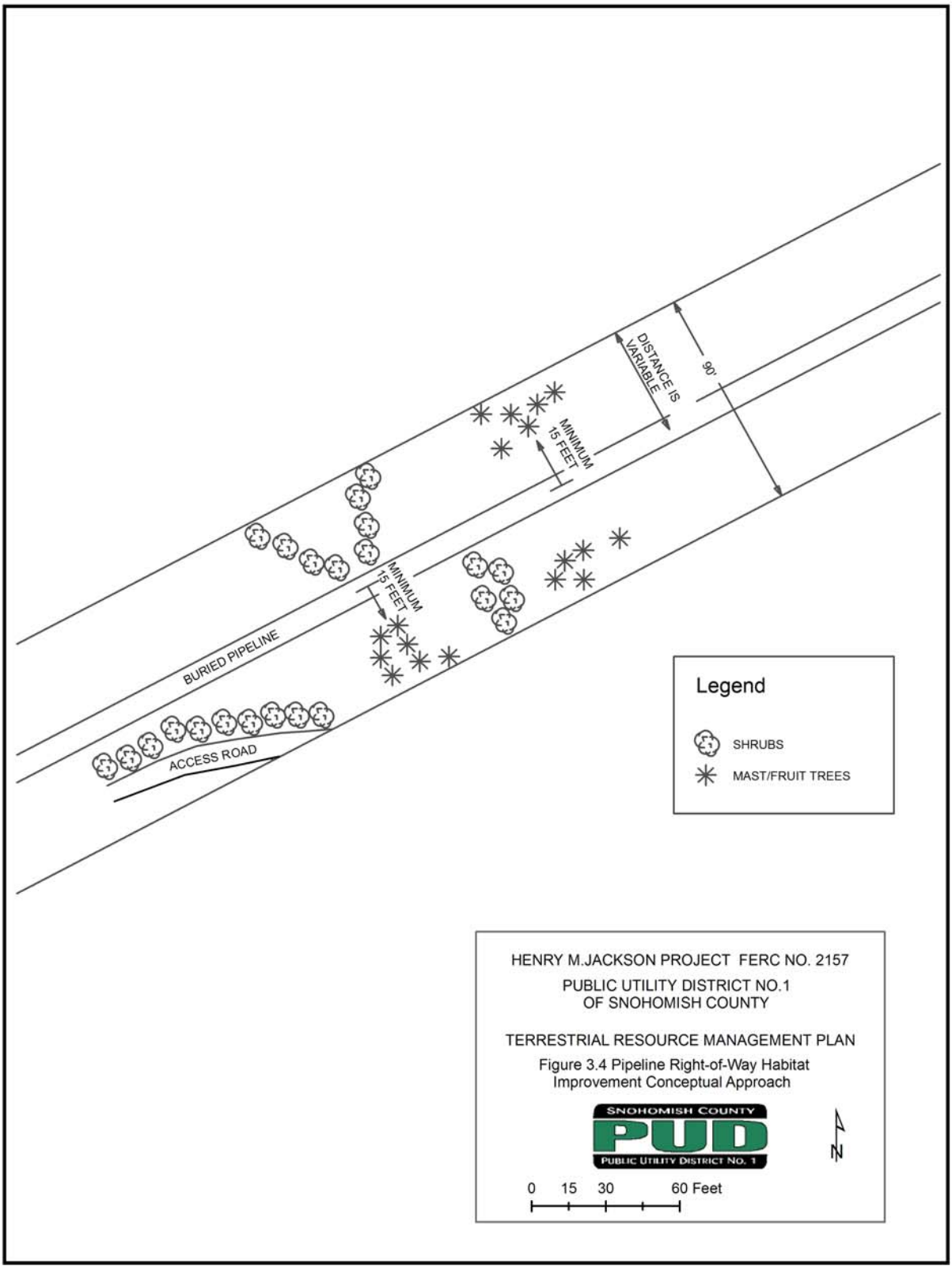
Those portions of the powerhouse site presently in grasses will be maintained permanently as a grass/shrub community. Grasses and forbs will be seeded and fertilized as needed to maintain ground cover, and hedgerows of native shrubs will be planted. Fruit trees have been and will continue to be planted throughout the area to provide food, nest sites and perches for birds. The forested portions of the powerhouse site will be maintained and allowed to mature into conifer and riparian forest, with minimal intervention. Large trees will be retained along the Sultan River to serve as perches for osprey and bald eagles that occasionally use the area. Small operational improvements may be made at the Powerhouse site over the term of the TRMP. District biologists will be involved in the design and construction monitoring of any operational improvements within the Project Facility Lands Tract.

3.2.5.4 Transmission Line Right-of-Way

The portion of the transmission line right-of-way not maintained as access road will be managed as low-growing vegetation for the term of the new license. Trees will be removed manually when they exceed a height of 10 feet.

3.2.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Project Facility Lands Tract over the life of this plan. They each contain a summary of the management constraints, habitat objectives and enhancement methods applicable to a particular stand. They are intended to be used in conjunction with the details provided in other sections of this plan, particularly the enhancement measures in Chapter 2.0.


DISTANCE IS VARIABLE
90'
MINIMUM 15 FEET
MINIMUM 15 FEET
BURIED PIPELINE
ACCESS ROAD
Legend
SHRUBS
MAST/FRUIT TREES
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.4 Pipeline Right-of-Way Habitat
Improvement Conceptual Approach
SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT NO. 1
N
0 15 30 60 Feet

Stand 8-1 (Wedge-shaped Parcel)

Area: 1.7 acres **Year of Origin:** 1960 **Site Index:** N/A

Cover Types: Closed Canopy Sapling/Pole Coniferous Forest

Constraints: Adjacent to the transmission line right-of-way

Notable Features: Small, isolated stand

Access: Excellent; level site, near existing road system

Management: Allow natural forest processes.

Implement snag, decaying live tree and coarse woody debris creation until stand age 100 years.

Stand 8-2 (Wedge-shaped Parcel)

Area: 9.3 acres **Year of Origin:** 1982 **Site Index:** N/A

Cover Type: Mixed Shrub/Brush

Constraints: Adjacent to the transmission line right-of-way and access road

Notable Features: Small, isolated stand

Access: Excellent; level site, adjacent to existing road

Management: Allow natural forest processes.

Implement snag, decaying live tree and coarse woody debris creation until stand age 100 years.

Stand 8-3 (Pipeline Right-of-Way)

Area: 41.0 acres **Year of Origin:** 1982 **Site Index:** N/A

Cover Types: Grass/Meadow

Constraints: No trees or large shrubs allowed within 15 feet of the center of the pipeline.

Vehicular access must be maintained to service points.

Microwave pathway cannot be obstructed.

Fertilizer may not be applied within the Town of Sultan watershed.

Fertilizer may not be applied directly to surface water or allowed to drift into surface water during application.

Fertilizer may not be applied during periods of heavy precipitation.

Notable Features: Linear feature

Access: Excellent; permanent access road maintained

Management: Manage as permanent grass/meadow or shrub/brush with scattered trees to maximize habitat value for early-successional species.

Seed with locally adapted grasses and forbs and fertilize to compensate for poor soils (except no fertilizing adjacent to the town of Sultan watershed and Marsh Creek).

Plant hedgerows and/or clumps of shrubs and trees with a maximum spacing of 600 feet. See Table 2.3 for appropriate species.

Prevent off-road vehicle access.

Place brush and stump piles to add structural diversity and reduce off-road vehicle access when appropriate and materials are available.

Stand 8-4 (Powerhouse Site)

Area: 27.0 acres **Year of Origin:** 1960-1982 **Site Index:** N/A

Cover Types: Grass/Meadow, Early-Successional, Sapling Pole Conifer Forest and Mixed Forest

Constraints: No heavy equipment is allowed on steep slopes or highly erodible soils.

The area is exposed to daily human activity.

The area is partially within 200 feet of the Sultan River.

The powerhouse and access road must be kept clear of visual obstructions and shade.

Fertilizer may not be applied within 100 feet of Cascade Creek or the Sultan River, or allowed to enter surface water during application.

Fertilizer may not be applied during periods of heavy precipitation.

Notable Features: None

Access: Excellent; permanent all-weather road

Management: Manage as permanent grass/shrub with small pockets of cover to maximize habitat value for early-successional species.

Fertilize existing grasses to maintain productivity.

Seed desirable forbs such as clover as needed.

Retain existing conifer and mixed forest stands to provide habitat diversity to the surrounding area.

Stand 8-5 (Transmission Line Right-of-Way)

Area: 1.0 acre **Year of Origin:** N/A **Site Index:** N/A

Cover Types: Mixed Shrub/Brush

Constraints: Vegetation beneath power lines must be low-growing.

Fertilizer may not be applied within 100 feet of surface waters or allowed to enter surface water during application.

Fertilize may not be applied during periods of heavy precipitation.

Notable Features: Long, narrow shape

Access: Good; level site, near existing road

Management: Maintain non-roaded portion as mixed shrub and brush to maximize its value as edge and for early-successional species such as black-tailed deer and ruffed grouse.

Seed with grasses and forbs and fertilize to provide complete ground cover.

3.3 Spada Lake Tract

3.3.1 Existing Habitat Conditions

The Spada Lake Tract consists of the reservoir and shoreline up to elevation 1,460 feet MSL (Figure 3.5). It also includes the approximately 1,745 acres of forest and wetland above elevation 1,460 feet that were acquired by the District in 1991.

The 1987 Project boundary around Spada Lake was at elevation 1,460 feet MSL. The normal maximum pool elevation of the lake is 1,450 feet. Between these two elevations lie patches of young conifer forest, mixed forest and deciduous forest. Between elevation 1,450 feet and the preferred maximum operating pool at 1,445 feet lie additional patches of deciduous riparian forest that are occasionally inundated. Below elevation 1,445 feet, the reservoir bottom is mostly unvegetated, except for scattered live and dead alder and cottonwood trees and willows between 1,445 and 1,440 feet, and varying densities of sedges, rushes, forbs and grasses as low as 1,435 feet.

During preparation of the WHMP, the District, USFS and WDNR were in the process of conducting an exchange for lands under and surrounding Spada Lake. The WHMP stated that if and when lands above elevation 1,460 feet were acquired by the District, they would be managed for black-tailed deer, with due regard for other species. Management of the acquired Spada Lake lands was to be compatible with the Jackson Project Recreation Plan, and the lands were to be open to public access subject to water quality protection constraints. It was estimated that at least 700 acres above elevation 1,460 feet would be obtained by the District in the exchange.

The Spada Lake land exchange was completed in 1991 when the District acquired approximately 1,549 acres from the USFS and 196 acres from the WDNR above elevation 1,460 feet. None of the lands acquired in the exchange were included in the HEP assessment or accounted for in the summary of wildlife habitat benefits associated with the WHMP. Management of the acquired lands has been directed by the *Wildlife Habitat Management Plan Supplement for the Spada Lake Tract* (District 1997, 2007) (Spada Supplement). All acquired lands are now included in the TRMP lands, and the management direction prescribed in the Spada Supplement is incorporated into this TRMP, as appropriate. The Spada Supplement will no longer direct the management of the Spada Lake Tract.

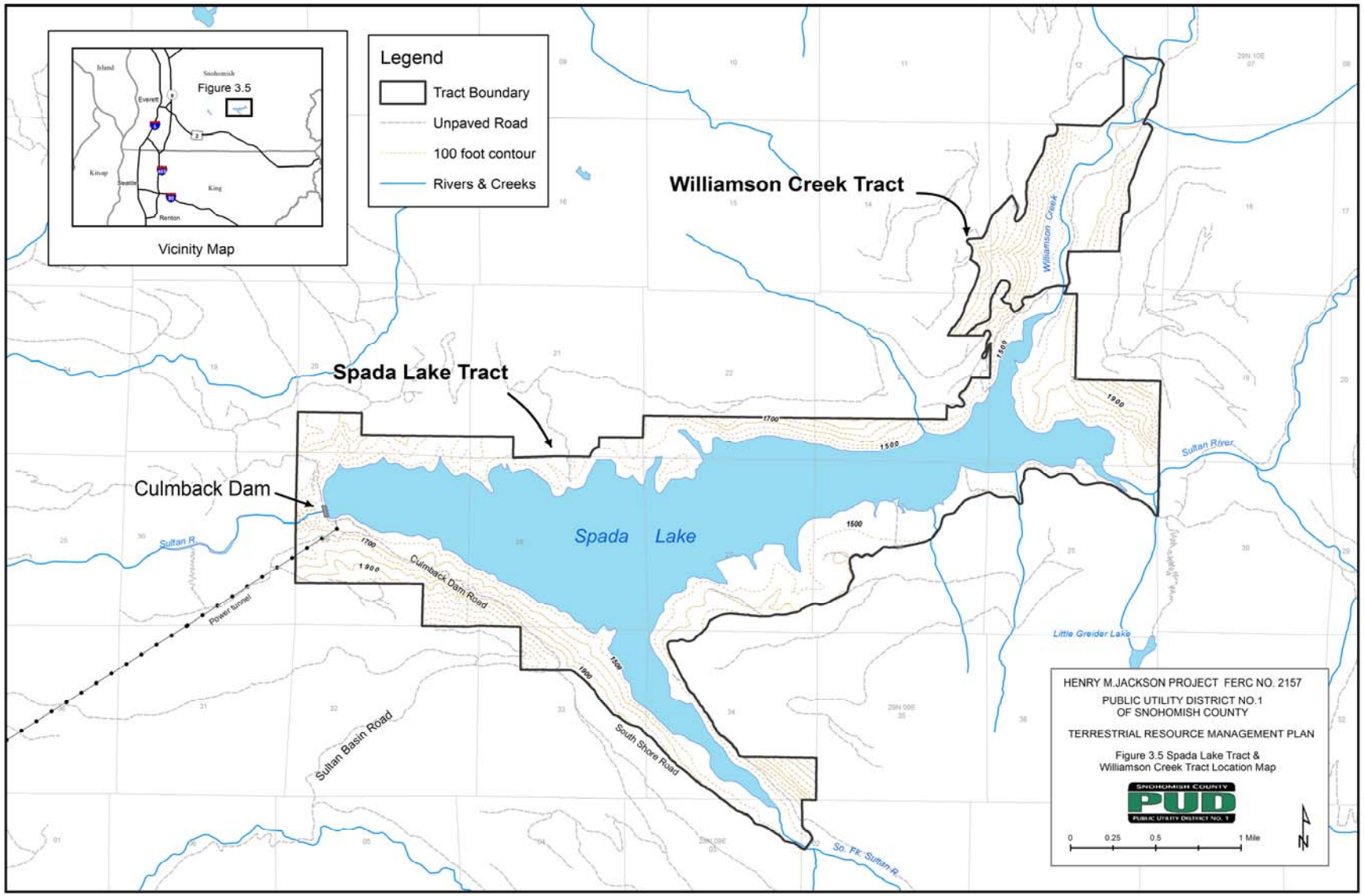


Figure 3.5
Vicinity Map
Legend
Tract Boundary
Unpaved Road
100 foot contour
Rivers & Creeks
Williamson Creek Tract
Spada Lake Tract
Culmback Dam
Spada Lake
Sultan R.
Sultan River
Culmback Dam Road
Power tunnel
Sultan Basin Road
South Shore Road
Little Greider Lake
So. Fk. Sultan R.
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.5 Spada Lake Tract &
Williamson Creek Tract Location Map
0 0.25 0.5 1 Mile

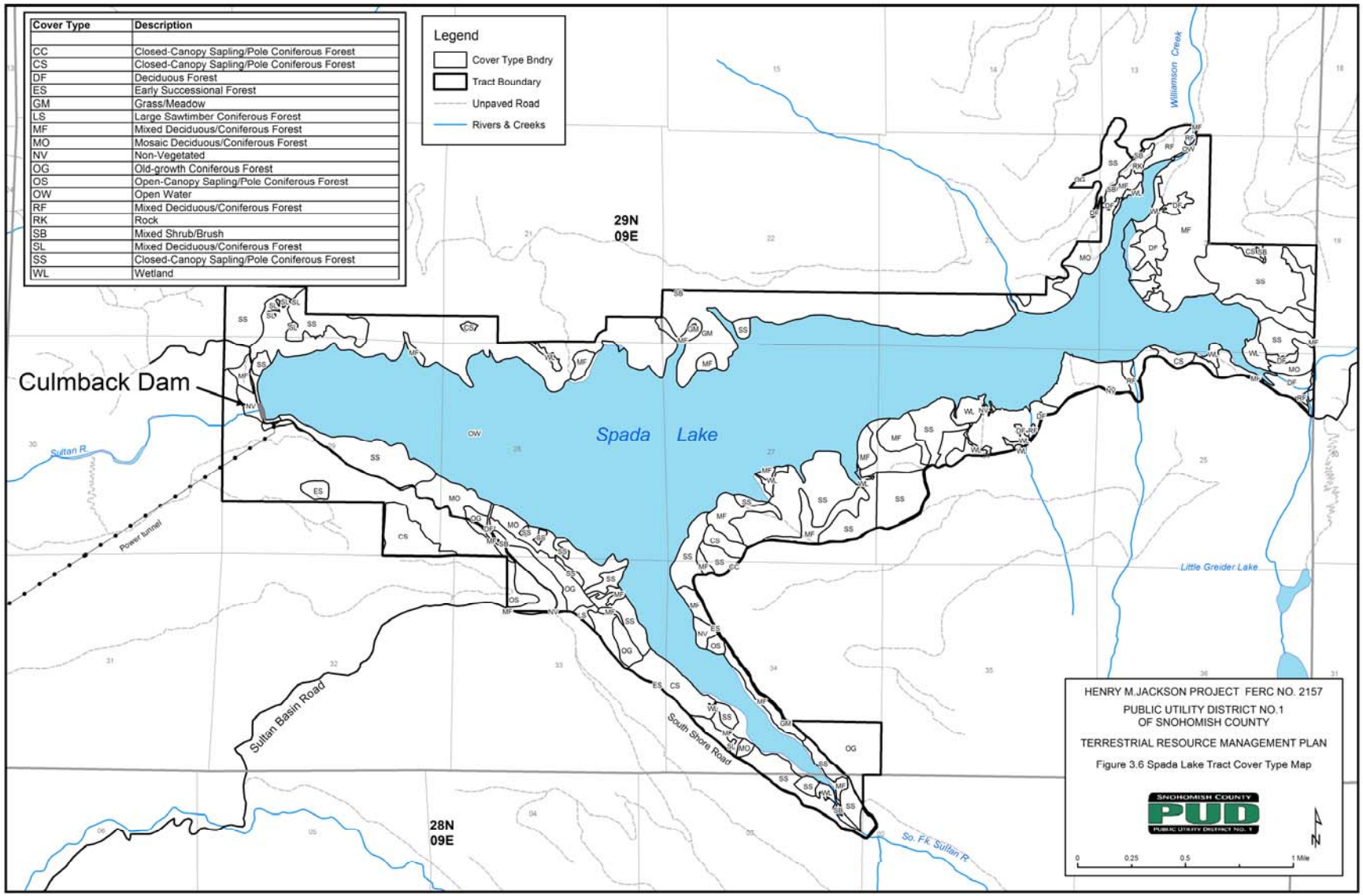
Spada Lake lies in the *Abies amabilis* Zone of the Northern Cascades Physiographic Province (Franklin and Dyrness 1973), where the native vegetation is dense forests of Pacific silver fir (*Abies amabilis*), western hemlock, Douglas-fir, western redcedar, red alder, bigleaf maple and black cottonwood. Most of the Spada Lake Basin, including what is now the shoreline of Spada Lake, was logged between 1950 and 1965. It is now dominated by 40- to 55-year-old stands of pure conifer, mixed forest and hardwood forest that are the result of planting and natural regeneration, as modified by a number of silvicultural practices (Figure 3.6). There are also small patches of old-growth forest and wetland within the tract. The slope of the shoreline is variable, ranging from gentle (0-10%) to vertical cliff. The moderate slopes are poorly drained and dominated by alder, cottonwood and maple, while the steeper, well-drained soils support mixed stands or stands of pure conifers.

The target reservoir elevation for Spada Lake in the spring is 1,445 feet. The water level is lowered during August and September to provide water supply for the City, instream flows for the fishery below Culmback Dam, and flood storage capacity for fall runoff. The normal annual fluctuation is 40 feet. This is an unnatural water regime for freshwater systems in the Pacific Northwest, and the local flora offers a limited number of species that can survive these extreme conditions (Whitlow and Harris 1979). Flooding restricts the availability of free oxygen to plant roots, increases soil carbon dioxide accumulation, induces toxin production and creates anaerobic conditions around the inundated roots (Gill 1970).

As part of WHMP implementation, the District planted test species to determine rates of survival and ability to reproduce in the drawdown zone of Spada Lake. Test plots of five wetland emergent species (*Carex obnupta, C. utriulata [formerly C. rostrata], Sparganium species, Scirpus acutus and Scirpus microcarpus*) were planted at two sites in 1994 and monitored annually through 2000. Most plantings were damaged by wave action and floating debris. Two sedge species and small-fruited bulrush became established and spread vegetatively at one site in the Williamson Creek arm. Natural in-seeding of wetland plants, especially small fruited bulrush and other herbaceous species, has been far more effective at providing ground cover than the test plantings.

3.3.2 Existing Habitat Value

The Spada Lake Tract supports a variety of wildlife species typical of undeveloped areas in the *Abies amabilis* Zone. Black-tailed deer, black bear, mountain lion, bobcat, beaver,


Cover Type | Description
CC | Closed-Canopy Sapling/Pole Coniferous Forest
CS | Closed-Canopy Sapling/Pole Coniferous Forest
DF | Deciduous Forest
ES | Early Successional Forest
GM | Grass/Meadow
LS | Large Sawtimber Coniferous Forest
MF | Mixed Deciduous/Coniferous Forest
MO | Mosaic Deciduous/Coniferous Forest
NV | Non-Vegetated
OG | Old-growth Coniferous Forest
OS | Open-Canopy Sapling/Pole Coniferous Forest
OW | Open Water
RF | Mixed Deciduous/Coniferous Forest
RK | Rock
SB | Mixed Shrub/Brush
SL | Mixed Deciduous/Coniferous Forest
SS | Closed-Canopy Sapling/Pole Coniferous Forest
WL | Wetland
Legend
Cover Type Bndry
Tract Boundary
Unpaved Road
Rivers & Creeks
29N
09E
28N
09E
Culmback Dam
Spada Lake
Sultan R.
Power tunnel
Sultan Basin Road
South Shore Road
Williamson Creek
Little Greider Lake
So. Fk. Sultan R.
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.6 Spada Lake Tract Cover Type Map
SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT NO. 1
N
0
0.25
0.5
1 Mile

mountain beaver, raccoon, mink, coyote, otter, and chipmunks or their sign are frequently observed by District biologists in forested portions of the tract. Many species of birds are observed including common mergansers, common loon, goldeneye, osprey, woodpeckers, and owls. The principal limitation to wildlife use of the tract, as in much of the Spada Lake Basin, is the dense, over-stocked nature of much of the second-growth forest. Average overstory tree size is small, thereby limiting habitat for species that nest, roost or forage in large trees. Understory vegetation and the animal species associated with it are generally scarce due to a lack of sunlight reaching the forest floor. Cavity nesting birds have made some use of the small snags left standing below elevation 1,450 feet. The area between 1,445 feet and 1,440 feet is vegetated with shrubs, grass and forbs, including willow and fireweed. Vegetation is sparse where slopes are steep. The area below 1,440 feet receives limited wildlife use due to the general lack of live vegetation. Patches of dense wetland vegetation have established in relatively flat areas between 1,437 and 1,445 feet. Where slopes are gentle, vegetation is present but often sparse, patchy and interspersed with mud and gravel deposits, stumps and woody debris. Sparse sedges, rushes, grasses and forbs occur as low as 1,435 feet.

3.3.3 Management Constraints

Under the Snohomish County Shoreline Management Master Program, the Spada Lake shoreline is a Shoreline of State-wide Significance with a designation of Conservancy Shoreline. Development is restricted within 200 feet of the reservoir, and timber harvest is limited to no more than 30 percent of the merchantable volume in any 10-year period. A proposed revision to the Program would re-designate it as a, “Municipal Watershed Utility Shoreline Environment.”

Spada Lake and the Sultan River are components of the City’s municipal drinking water supply system. Spada Lake reservoir and the surrounding shoreline are managed to ensure that water quality is maintained for the municipal supply. The City and District, with the support of Washington Department of Health, developed use restrictions in the form of regulations that apply to the reservoir, its shorelines, and the watershed as a whole. These regulations are described in District Directive Number 73, FERC license article 44, and Snohomish County Codes 12.08.030 and 12.28.020.

Spada Lake is operated for hydroelectric power, water supply, fisheries enhancement and flood control and the reservoir level is dictated by those concerns. Any other management activities on the reservoir must conform to the established water level regime.

Several aspects of the Washington Forest Practices Rules have been modified since the WHMP and the Spada Supplement were first prepared. These include restrictions on timber harvest, including snag and coarse woody debris creation, in forest that is occupied by spotted owls or marbled murrelets (WAC 222-16), and increased riparian protection along fish-bearing and perennial non-fish streams (WAC 222-30). Altogether, these regulatory restrictions may affect roughly 40 percent of the forested acreage in the Spada Lake Tract.

3.3.4 Habitat Management Objectives

a) Protect old-growth and other forest stands over 100 years old.

b) Manage second-growth forest to promote late-successional conifer forest characteristics by creating overstory gaps and thinning.

c) Create snags, decaying live trees and coarse woody debris in forest stands less than 100 years old.

d) Protect and enhance existing wetlands by maintaining forested buffers around them.

e) Manage the land adjacent to the Spada Lake shoreline as a permanent forested buffer to promote late-successional and mixed forest habitat features.

3.3.5 Habitat Management

Management of the tract will focus on four types of habitat: a) old-growth forest, b) young forest, c) wetland buffers, and d) Spada Lake reservoir and shoreline. These habitats, and protection and enhancement measures for them, are described in the following sections and in Chapter 2.

3.3.5.1 Old-growth Forest Management

Existing old-growth stands and stands of 100 years or older in the Spada Lake Tract will be preserved and managed with minimal intervention.

3.3.5.2 Young Forest Management

Forest outside of lake, stream and wetland buffers will be managed as described in Section 2.1.3, Young Forest Management, and Section 2.1.4, Understory Management. Gap

creation will be the primary tool for promoting a healthy understory where needed. Variable density thinning will be considered where access is feasible. Snags, decaying live trees and coarse woody debris will be created as described in Sections 2.3 and 2.4. Young forest at Spada Lake can be divided into three different types for management purposes: Young conifer forest, mixed forest and deciduous forest.

Young Conifer Forest: Approximately 958 acres of second-growth conifer forest exist in the Tract. These are closed canopy sapling pole, small sawtimber, and large sawtimber conifer forest.

Mixed Forest: The Spada Lake Tract contains 301 acres of mixed deciduous / conifer forest and 169 acres of mosaic deciduous / conifer forest. Many stands typed as mixed deciduous / conifer forests in previous documents were re-typed as mosaic forest in the 2007 Spada Supplement to more accurately reflect the clumped spatial distribution of deciduous and conifer trees. Mixed and mosaic forest stands will be managed to preserve their current qualities, where feasible. Some deciduous and mixed stands will likely remain in this condition with little intervention. Management measures may include thinning, gap creation, or selective tree removal to promote hardwood or mixed characteristics. Others will become coniferous stands over time, and will be managed under the second-growth coniferous forest management guidelines.

Deciduous Forest: Deciduous forest covers about 47 acres of the Spada Lake Tract. Areas within this cover type currently do not require treatment. In the long term, these stands may develop a shade-tolerant conifer understory.

3.3.5.3 Wetland Buffers

Wetland buffers will be managed by following the guidelines in Section 2.2.2 and Table 2.2. Management of the wetlands in the Spada Lake Tract consists primarily of designating appropriate buffer zones around them, and prohibiting most activities within them.

3.3.5.4 Spada Lake Reservoir and Shoreline

The forested areas on the shoreline of Spada Lake will be managed as permanent forest buffer. Existing snags will be retained. Native vegetation will be protected by limiting ORV access to the shoreline.

3.3.6 Detailed Prescriptions

The following prescriptions direct the management of stands within the Spada Lake Tract. They each contain a summary of the management constraints and enhancement methods applicable to a particular type of stand. They are intended to be used in conjunction with the details provided in other sections of this plan, particularly the measures in Chapter 2.0.

Old-growth Forest

Area: 227.0 acres	**Date of Origin:** 1850 - 1910	**Site Index:** N/A
Cover Types:	Old-growth Conifer Forest	
Constraints:	Municipal watershed Steep and unstable slopes Lake, wetland and stream buffers Shoreline of Statewide Significance Occupied marbled murrelet habitat	
Notable Features:	Old-growth forest	
Access:	Good to moderate via South Shore Road or Culmback Dam Road	
Management:	Retain as old-growth with minimal intervention.	

Second-growth Forest

Area: 1,493.0 acres

Date of Origin: 1960 - 1989

Site Index: 80 - 111 (50-year Western Hemlock)

Cover Types:

Open Canopy Sapling / Pole Conifer Forest
Closed Canopy Sapling / Pole Conifer Forest
Small Sawtimber Conifer Forest
Mixed Deciduous / Conifer Forest
Mosaic Deciduous / Conifer Forest

Constraints:

Municipal watershed
Steep and unstable slopes
Loose, erosive soils
Lake, wetland and stream buffers
Shorelines of Statewide Significance
Occupied marbled murrelet habitat
Areas of dwarf-mistletoe infection

Notable Features:

Adjacent to old-growth forest
Scattered large residual redcedar, hemlock and cottonwood
Wetlands

Access:

Good to poor via South Shore Road, remaining portion of North Shore Road, Culmback Dam Road or boat

Management:

Augment natural forest processes through overstory thinning and gap creation to accelerate late-successional forest development until stand age of 100 years.

Implement snag, decaying live tree and coarse woody debris creation until stand age 100 years.

Perpetuate mixed forest conditions by retaining live deciduous trees during gap creation, overstory thinning, snag creation, decaying live tree creation, and coarse woody debris creation.

Maintain redcedar as a component of conifer stands by selectively retaining live redcedar trees during gap creation, overstory thinning, snag creation, decaying live tree creation, and coarse woody debris creation.

Restrict activity within lake, stream and wetland buffers as per Chapter 2.

Spada Lake and Shoreline (below elevation 1,450 feet MSL)

Area: 1,908.0 acres **Year of Origin:** 1925 -1984 **Site Index:** N/A

Cover Types:
Grass / Meadow
Early-successional Forest
Closed Canopy Sapling / Pole Conifer Forest
Small Sawtimber Conifer Forest
Mixed Forest
Deciduous Forest
Riparian Forest
Reservoir

Constraints:
Municipal watershed
Steep and unstable slopes
Loose, erosive soils
Lake and stream buffers
Shorelines of Statewide Significance

Notable Features: Reservoir and shoreline

Access: Poor; lake access only in limited locations

Management: Retain permanent forested buffer around shoreline.

3.4 Williamson Creek Tract

3.4.1 Existing Habitat Conditions

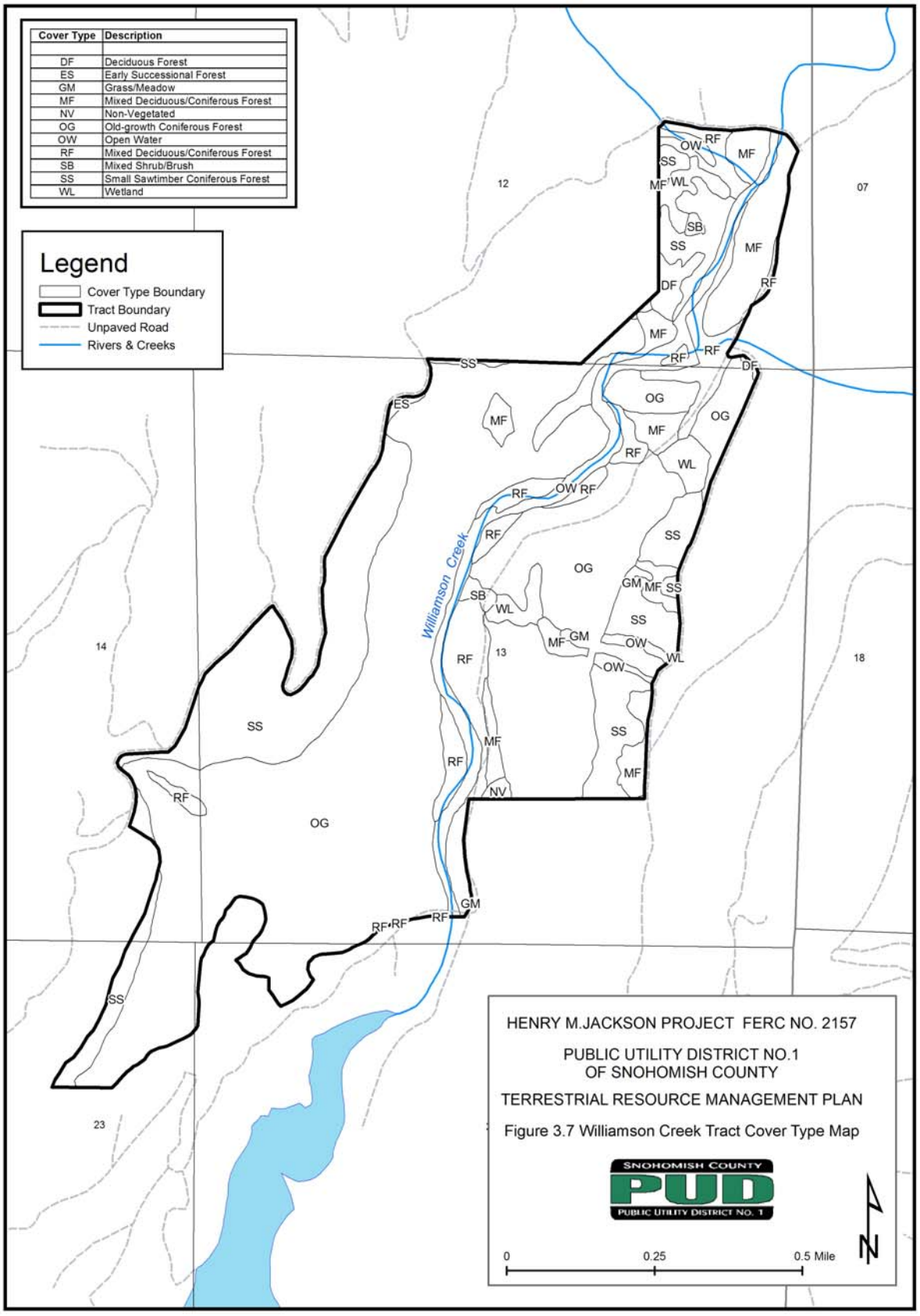
The Williamson Creek Tract consists of approximately 481 acres located 0.5 mile northeast of Spada Lake (Figure 3.5). It contains one of the last stands of low-elevation old-growth forest in the Sultan Basin. This tract was owned by WDNR and USFS at the initiation of the WHMP in 1989, but the District acquired the land through a land exchange in 1991. Most of the tract, particularly the old-growth, was scheduled for even-aged timber harvest by the mid 1980's, but logging was postponed during WHMP development and the tract is now part of the TRMP. The WHMP Williamson Creek Tract consisted of 344 acres. Three additional stands have been added for management under the TRMP.

The elevation of the Williamson Creek Tract varies from 1,480 feet to 2,500 feet MSL. Slopes range from very flat along the creek to very steep (greater than 100%) in some of the old-growth. The tract is within the *Abies amabilis* Zone as described by Franklin and Dyrness (1973) (See Section 3.3.1 for a more detailed description of this zone). The tract contains approximately 275 acres of old-growth, 89 acres of second-growth conifer forest, 37 acres of mixed forest, 3 acres of deciduous forest, 39 acres of riparian forest, 2 acres of mixed shrub/brush, 1 acre of grass/meadow and 10 acres of wetland (Figure 3.7). Old-growth stands contain trees of two distinct age classes; 155 years and 270+ years. Trees range in size from 10 to 50+ inches DBH. Canopy closure varies between 50 and 80 percent. Snags and logs greater than 30 inches in diameter are common. The second-growth forest is mostly small sawtimber or mixed forest that is about 95 years old.

The riparian forest is composed of alder, black cottonwood, western hemlock, Douglas-fir, Pacific silver fir and western redcedar. The riparian areas lie in narrow strips adjacent to Williamson Creek and receive some seasonal flooding. At least two small wetlands occur east of Williamson Creek and a high quality wetland has been added to the northwest corner of the Tract, west of the creek. Beaver activity influences the size and condition of these wetlands.

3.4.2 Existing Habitat Value

The old-growth forest at Williamson Creek has high value for late-successional species such as pileated woodpecker and marten that require large diameter trees, large snags and logs for foraging and nesting. The old-growth also provides good cover and forage for black-tailed


Cover Type | Description
DF | Deciduous Forest
ES | Early Successional Forest
GM | Grass/Meadow
MF | Mixed Deciduous/Coniferous Forest
NV | Non-Vegetated
OG | Old-growth Coniferous Forest
OW | Open Water
RF | Mixed Deciduous/Coniferous Forest
SB | Mixed Shrub/Brush
SS | Small Sawtimber Coniferous Forest
WL | Wetland
Legend
Cover Type Boundary
Tract Boundary
Unpaved Road
Rivers & Creeks
Williamson Creek
12
07
14
13
18
23
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.7 Williamson Creek Tract Cover Type Map
SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT NO. 1
0
0.25
0.5 Mile
N

deer and moderate habitat for Douglas squirrel. The second-growth forest is structurally diverse for second-growth, and provides average to good habitat for many late-successional species.

The riparian forest along Williamson Creek has high habitat value for early- and mid-successional species like deer, grouse and chickadee. The overstory is mostly hardwoods (red alder, bigleaf maple and black cottonwood) and relatively open, allowing for a well developed shrub layer.

The wetlands provide diversity and a developed shrub layer for early-successional and edge species, as well as open water and emergent vegetation for wetland species such as mallard, common merganser and wood duck.

3.4.3 Management Constraints

Williamson Creek is a Shoreline of the State with a designation of Natural, and a Type S stream under Washington Forest Practices Rules. Activities such as road construction, timber harvesting and chemical application are regulated within 140 feet of the outer edge of the bankfull width or channel migration zone, whichever is greater.

Williamson Creek is a tributary to Spada Lake. Spada Lake and the Sultan River are components of the City's municipal drinking water supply system. Spada Lake reservoir and the surrounding shoreline are managed to ensure that water quality is maintained for the municipal supply. The City and District, with the support of Washington Department of Health, developed use restrictions in the form of regulations that apply to the reservoir, its shorelines, and the watershed as a whole. These regulations are described in District Directive Number 73, FERC license article 44, and Snohomish County Codes 12.08.030 and 12.28.020.

The WDNR abandoned the road to the Williamson Tract in1999, so it is now only accessible by boat and on foot.

3.4.4 Habitat Management Objectives

a) Retain all existing old-growth.

b) Retain riparian lands along Williamson Creek and enhance their value for late-successional wildlife species by creating snags where appropriate.

c) Protect existing wetlands and allow natural wetland processes to occur.

d) Retain all other forested areas and enhance their value for late-successional wildlife species by creating snags.

3.4.5 Habitat Management

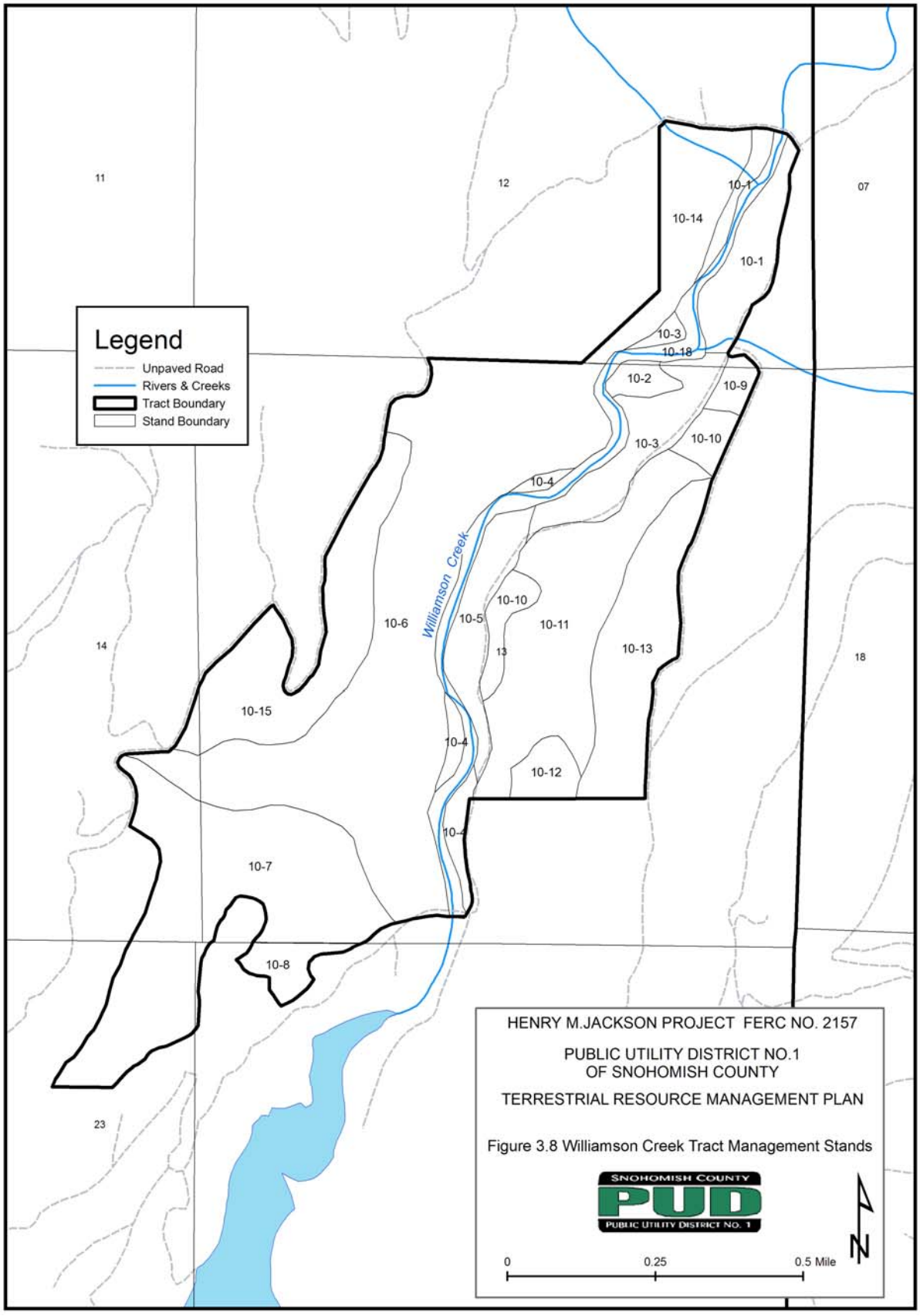
The Williamson Creek Tract is a single management unit with 15 stands (Figure 3.8). The tract will be managed to preserve existing old-growth forest, riparian forest and wetlands, and allow second-growth forest to develop into old-growth. Management activities in second-growth forest and wetlands will be limited to the creation of snags and logs for dead wood-dependent species such as black-capped chickadee, pileated woodpecker, pine marten and Douglas squirrel. Baseline inventories for snags, coarse woody debris, and understory vegetation were completed in 2003. As of 2009, 338 snags have been created in the Williamson Creek Tract.

3.4.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Williamson Creek Tract over the life of the TRMP. They each contain a summary of the management constraints, and enhancement methods applicable to a particular stand. They are intended to be used in conjunction with the details provided in other sections of this plan, particularly Chapter 2.0.

Stand 10-1

Area: 29.7 acres	**Year of Origin:** 1958	**Site Index:** 113
Cover Types:	Large Sawtimber Conifer Forest Riparian Forest Mixed Forest	
Constraints:	Partially within 200 feet of Williamson Creek	
Notable Features:	Williamson Creek, flooded forest	
Access:	Moderate terrain, no road access, distant from Spada Lake access point	
Management:	Allow natural forest processes to occur. Create snags, decaying live trees and coarse woody debris outside riparian core zone and channel migration zone until stand age 100 years.	


Legend
Unpaved Road
Rivers & Creeks
Tract Boundary
Stand Boundary
Williamson Creek
11
12
07
14
13
18
23
10-1
10-14
10-1
10-3
10-18
10-2
10-9
10-3
10-10
10-4
10-10
10-5
10-6
10-11
10-13
10-15
10-4
10-12
10-4
10-7
10-8
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
TERRESTRIAL RESOURCE MANAGEMENT PLAN
Figure 3.8 Williamson Creek Tract Management Stands
SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT NO. 1
0
0.25
0.5 Mile
N

Stands 10-2, 10-6, 10-7, 10-8, 10-9, 10-11, 10-12

Area: 10-2 = 4.3 acres
10-6 = 125.9 acres
10-7 = 71.1 acres
10-8 = 9.6 acres
10-9 = 6.7 acres
10-11 = 42.8 acres
10-12 = 12.0 acres

Year of Origin: pre-1850

Site Index: 108-127

Cover Types: Old-growth Conifer Forest

Constraints: Steep slopes,
Many drainages
Partially within 200 feet of Williamson Creek

Notable Features: Williamson Creek, old-growth trees

Access: Steep slopes, no road access, variable distances from Spada Lake access point

Management: Allow natural forest processes to occur.

Stand 10-3

Area: 12.0 acres

Year of Origin: 1940

Site Index: 65

Cover Types: Mixed Forest
Deciduous Forest
Riparian Forest

Constraints: Partially within 200 feet of Williamson Creek

Notable Features: Williamson Creek

Access: Moderate terrain, no road access, distant from Spada Lake access point

Management: Allow natural forest processes to occur.

Create snags, decaying live trees and coarse woody debris outside riparian core zone and channel migration zone until stand age 100 years.

Stand 10-4

Area: 11.0 acres **Year of Origin:** 1945 **Site Index:** 72

Cover Types: Riparian Forest

Constraints: Mostly within 200 feet of Williamson Creek

Notable Features: Williamson Creek

Access: Moderate terrain, no road access, variable distance from Spada Lake access point

Management: Allow natural forest processes to occur.

Create snags, decaying live trees and coarse woody debris outside riparian core zone and channel migration zone until stand age 100.

Stand 10-5

Area: 13.5 acres **Year of Origin:** 1850-1910 **Site Index:** 124

Cover Types: Small Sawtimber Conifer Forest
Riparian Forest

Constraints: Partially within 200 feet of Williamson Creek

Notable Features: Williamson Creek

Access: Moderate terrain, no road access, variable distance from Spada Lake access point

Management: Allow natural forest processes to occur.

Stand 10-10

Area: 5.4 acres **Year of Origin:** N/A **Site Index:** N/A

Cover Types: Wetland and Mixed Shrub/Brush

Constraints: Difficult access

Notable Features: Wetland, adjacent old-growth coniferous forest

Access: Moderate terrain, no road access, distant from Spada Lake

Management: Allow natural wetland processes to occur.

Stands 10-13, 10-15

Area: unknown **Year of Origin:** unknown **Site Index:** unknown

Cover Types:
Old-growth Conifer Forest
Small Sawtimber Conifer Forest
Mixed Deciduous/Conifer Forest
Grass/Meadow
Wetland

Constraints: Steep Slopes, difficult access

Notable Features: Isolated stand, no vehicular access, adjacent to old-growth forest

Access: Moderate to steep terrain, no road access, variable distances from Spada Lake access point

Management: Augment natural forest processes through gap creation to accelerate late-seral forest development.

Create snags, decaying live trees and coarse woody debris outside riparian core zones and channel migration zones until stand age 100 years.

Stand 10-14

Area: unknown **Year of Origin:** unknown **Site Index:** unknown

Cover Types:
Old-growth Conifer Forest
Riparian Forest
Deciduous Forest
Mixed Deciduous/Conifer Forest
Small Sawtimber Conifer Forest
Wetland

Constraints: Partially within 200 feet of Williamson Creek and Everett Creek

Notable Features: High-quality Wetland

Access: Moderate to steep terrain, no road access, distant from Spada Lake access point

Management: Allow natural wetland processes to occur.

Augment natural forest processes through gap creation to accelerate late-seral forest development.

Create snags, decaying live trees and coarse woody debris outside riparian core zones and channel migration zones until stand age 100 years.

4.0 MONITORING AND REPORTING

4.0 Monitoring and Reporting

Two types of habitat enhancement monitoring will occur on TRMP lands. Compliance monitoring will occur during the implementation of habitat enhancement activities, and will be documented in annual reports. Long-term effectiveness monitoring will also be conducted to verify that desired habitat conditions are being achieved. All implementation and monitoring of the TRMP will occur under the supervision of a wildlife biologist. The term "District biologist," as used in this chapter, includes wildlife biologists that are employed by or under contract to the District. The term "District," as used in this chapter, implies the monitoring may be done by someone other than a wildlife biologist, who is directly supervised by a wildlife biologist.

Compliance monitoring is relatively straight-forward. A District biologist will be directly involved in the design of enhancement activities (e.g., gap creation, thinning, snag creation), the development of performance specifications, and the supervision of implementation contractors. Effectiveness monitoring will require the long-term qualitative or quantitative measurement of specific habitat features, and the comparison of observed values to target values or assumptions made in this TRMP. Adjustments to habitat enhancement methods can be made through the adaptive management process if effectiveness monitoring suggests the habitat objectives of the TRMP are not being achieved. Monitoring will be done as described in the following sections.

4.1 Forest Overstory

4.1.1 Purpose

Compliance Monitoring: Forest overstory condition will be monitored to verify the TRMP lands are being managed for the desired habitat conditions. Individual forest overstory management activities will be designed and monitored by District biologists to ensure they conform to the requirements of the TRMP.

Effectiveness Monitoring: A sample of the overstory gaps will be monitored for understory vegetation response and wildlife use of created snags. Thinned stands will be monitored to document overstory and understory response and determine the need for additional thinning.

4.1.2 Tracts to be Monitored

Lost Lake, Project Facility Lands, Spada Lake and Williamson Creek

4.1.3 Methods

Compliance Monitoring: The District will maintain current cover type maps for all TRMP lands. Maps will be updated at intervals of no more than 10 years based on direct field evaluation and/or examination of remotely-sensed data. The first update will be completed within 10 years after license issuance. Biologists will also maintain written and electronic records (i.e., GPS data to be entered into the GIS database) of all overstory thinning and gap creation conducted in forest stands.

District biologists will determine the need for overstory thinning and gap creation on a stand by stand basis. When thinning or gap creation is warranted, a District biologist will design the activity, prepare detailed contract specifications, mark trees as needed to direct contractors, provide contractors with written and verbal instructions, observe and/or supervise contractors in the field, and inspect treated stands for contract compliance. Opportunities for improvement to activity design and contract administration will also be noted during inspections.

Effectiveness Monitoring: Ten percent of created gaps will be monitored at 5 and 10 years after creation to evaluate understory vegetation response. Understory vegetation will be evaluated by visually estimating canopy cover (percent of total ground area covered) of shrubs, grasses and forbs combined in gaps and adjacent forests, and by photographically documenting understory conditions in the gaps and adjacent forest. If gaps do not have at least 50 percent canopy cover of shrubs, grasses and forbs combined at 10 years after creation, District biologists will identify modifications to gap size and/or creation methods to increase understory vegetation. Adjustments to gap creation methods beyond the limits described in Section 2.1.3 will only be made with the approval of the USFWS, WDFW and Tulalip Tribes. Sample gaps selected through 2020 will also form part of the snag and coarse woody debris samples described in Section 4.2.3, and monitored for snag persistence.

All stands that have been thinned will be visited 10 years after thinning to evaluate overstory response and determine the need for additional thinning. Live trees will be visually examined for signs of competition (overlapping crowns, slow diameter growth, recent or imminent mortality of smaller trees) and a sample will be cored to examine annual growth rings.

Stands with less than 70 percent overstory canopy closure and continuing signs of moderate to rapid diameter growth (as determined by examination of annual growth rings) will be left to grow without additional thinning. Stands with greater than 70 percent canopy closure and signs of slowing diameter growth or competition-induced mortality will be considered for additional thinning. The decision to conduct additional thinning will also account for other site-specific conditions and management objectives for the stand.

4.1.4 Data to be Collected

Compliance Monitoring: Cover type maps will indicate the vegetative cover type of each stand or management unit on the TRMP lands according to the definitions in Appendix A, or an appropriate substitute. Records of management activities will include the year of the activity, the type of activity (thinning or gap creation), a summary of the activity (e.g., size in acres, number of trees felled), and any recommendations for adjustment to future activities.

Effectiveness Monitoring: Snag and decaying live tree data will be collected in sample gaps as described in Section 4.2. Understory vegetation data will include a list of the dominant understory species present, a visual estimate of average understory vegetation canopy cover, and photographs of understory vegetation within each sample gap. Photographs of understory vegetation will also be taken in the adjacent forest in all four cardinal directions from each sample gap. Data for thinned stands will include visual estimates of average overstory canopy closure, qualitative descriptions of overstory health and vigor, and qualitative descriptions of tree growth rings from cored trees.

4.1.5 Use of Data

Compliance Monitoring: Current cover type maps will be produced to document the maintenance of existing old-growth forest on the TRMP lands. Forest habitat management activities will be summarized in annual TRMP reports to document the enhancement of young forest for old-growth habitat conditions.

Effectiveness Monitoring: Snag and decaying live tree data from gaps will be used to evaluate and improve the snag and decaying live tree program, as described in Section 4.2. Understory vegetation data from gaps will be used to evaluate and improve the gap creation program. Data on overstory response to thinning will be used to determine the need for additional thinning.

4.2 Snags and Decaying Live Trees

4.2.1 Purpose

Compliance Monitoring: Snags and decaying live trees will be created at a rate of three per acre every 10 years in forest stands under 100 years old. Implementation of snag and decaying live tree creation will be supervised by a District biologist to ensure the specified numbers and types are being created.

Effectiveness Monitoring: Snags and decaying live trees will be created at regular intervals to achieve a full range of decay stages by a stand age of 100 years. A sample of created snags and decaying live trees will be visited at regular intervals to: a) observe the rate of decay and subsequent distribution of snags among decay stages, and b) observe wildlife use of snags and decaying live trees.

4.2.2 Tracts to be Monitored

Lost Lake, Project Facility Lands, Spada Lake and Williamson Creek

4.2.3 Methods

Compliance Monitoring: The District will prepare detailed contract specifications for all snag and decaying live tree creation activities, mark trees as needed to direct contractors, provide contractors with written and verbal instructions, observe and/or supervise contractors in the field, and inspect stands for contract compliance. Opportunities for improvement to creation methods and contract administration will also be noted during inspections.

Effectiveness Monitoring: Up to ten percent of all snags and ten percent of all decaying live trees created between 1990 and 2020 will be selected for long-term monitoring. For efficiency, gaps selected for sampling during this period (see Subsection 4.1.3) will form part of the snag sample as well. Those that are selected will be permanently marked with numbered tags, and their locations will be recorded by GPS to aid in relocation. Date of creation, identification number, type (snag or decaying live tree), species, height (after topping), DBH and spatial distribution (individual or group) will be recorded at the time of initial marking. All selected snags and decaying live trees will be visited at 10-year intervals beginning in 2021 and ending when the oldest snags (those created in 1990) reach 50 years of age (2041). Current height, decay stage (Cline at al. 1980), and signs of wildlife use will be recorded for each

selected snag and decaying live tree on each visit. Snags and decaying live trees of natural origin will also be reported if observed during visits.

4.2.4 Data to be Collected

Compliance Monitoring: District biologists will record the numbers, species, types and sizes (height and DBH) of snags and decaying live trees created in each stand or management unit in each year. They will also report annually on any difficulties encountered during implementation, and any adjustments made to the snag and decaying live tree creation program.

Effectiveness Monitoring: District biologists or contractors will record the date of creation, identification number, type (snag or decaying live tree), species, height (after topping), DBH and spatial distribution (individual or group) for each created snag and decaying live tree selected for monitoring. At each subsequent re-visit, current height, decay stage (Cline at al. 1980), and signs of wildlife use will be reported.

4.2.5 Use of Data

Compliance Monitoring: Data on the numbers, species, types and sizes of created snags and decaying live trees will be provided in annual reports to demonstrate compliance with the TRMP.

Effectiveness Monitoring: Data on snag persistence and use will be evaluated in 2022, 2032 and 2042 to determine whether snag and decaying live tree creation methods, rates and/or frequencies should be modified to increase persistence and/or wildlife use. The snag program may be adjusted after 2022 if monitoring data indicate low persistence or disproportionately low wildlife use of one or more types of snags or decaying live trees. The sampling program will be evaluated no later than 2022 to determine whether the sample size can be reduced. Sample size will be reduced to less than 10 percent if it is determined a smaller sample will provide sufficient statistical power for given use of the data.

4.3 Coarse Woody Debris

4.3.1 Purpose

Compliance Monitoring: Coarse woody debris will be created by felling codominant trees in forest stands under 100 years old. Implementation of coarse woody debris creation will be supervised by a District biologist to ensure the specified numbers and types of trees are felled.

Effectiveness Monitoring: Live trees will be felled at regular intervals to produce a range of log sizes and decay stages. A sample of the felled trees will be visited at regular intervals to monitor decay rates and wildlife use.

4.3.2 Tracts to be Monitored

Lost Lake, Spada Lake, and Williamson Creek

4.3.3 Methods

Compliance Monitoring: The District will prepare detailed contract specifications for all coarse woody debris creation, mark trees as needed to direct contractors, provide contractors with written and verbal instructions, observe and/or supervise contractors in the field, and inspect stands for contract compliance. Opportunities for improvement to coarse woody debris creation methods and contract administration will also be noted during inspections.

Effectiveness Monitoring: Ten percent of all trees felled for coarse woody debris from 1997 through 2020 will be selected for long-term monitoring. For efficiency, gaps selected for sampling during this period (see Subsection 4.1.3) will form part of the coarse woody debris sample as well. Selected coarse woody debris will be permanently marked with numbered tags, and their locations will be recorded by GPS to aid in relocation. Date of felling, identification number, species, length, butt diameter, and spatial distribution (individual or group) will be recorded at the time of initial marking. All selected trees will be visited at 10-year intervals beginning in 2021 and ending in 2041. Decomposition class (Maser at al. 1979) and signs of wildlife use will be recorded for each selected tree in each visit.

4.3.4 Data to be Collected

Compliance Monitoring: District biologists will report the numbers and species of trees felled to create coarse woody debris in each stand or management unit in each year. They will

also report annually on any difficulties encountered during implementation, and any adjustments made to the coarse woody debris creation program.

Effectiveness Monitoring: District biologists or contractors will record the date of creation, identification number, species, length, butt diameter and spatial distribution (individual or group) for each felled tree selected for monitoring. Decomposition class and signs of wildlife use will be reported at each subsequent visit.

4.3.5 Use of Data

Compliance Monitoring: Data on the numbers and species of felled trees will be provided in annual reports to demonstrate compliance with the TRMP.

Effectiveness Monitoring: Data on log decay and use will be evaluated in 2022, 2032 and 2042 to determine whether coarse woody debris creation methods, rates and/or frequencies should be modified to increase persistence and/or wildlife use. The coarse woody debris program may be adjusted after 2022 if monitoring data indicate low persistence or disproportionately low wildlife use of one or more types of felled trees. The sampling program will also be evaluated in 2022 to determine whether the sample size can be reduced. Sample size will be reduced to less than 10 percent after 2022 if it determined a smaller sample will provide sufficient statistical power for given use of the data.

4.4 Waterfowl Nest Boxes

4.4.1 Purpose

Compliance Monitoring: Nest boxes have been placed at Lost Lake to enhance habitat for cavity-nesting waterfowl. Compliance monitoring by District biologists will ensure the boxes are maintained and repaired as needed.

Effectiveness Monitoring: Waterfowl use of nest boxes will be monitored to verify the boxes are having a benefit to wildlife. Lack of use by waterfowl may result in modification to the nest box design, movement of boxes, or replacement of the boxes with nest boxes designed for species that are more likely to use them on TRMP lands.

4.4.2 Tract to be Monitored

Lost Lake

4.4.3 Methods

Compliance Monitoring: Nest boxes will be checked, cleaned, and provided with fresh nesting material each year prior to the waterfowl breeding season. Damaged or deteriorated boxes will be repaired or replaced as needed.

Effectiveness Monitoring: All waterfowl nest boxes will be visited at least once each year during or immediately after the breeding season to determine use and productivity. Nest boxes that show signs of unsuccessful use by waterfowl will be modified, as needed, to increase the potential for nesting success. Boxes that show no sign of waterfowl use for three consecutive years will be modified, moved to locations more likely to receive waterfowl use, or replaced with boxes designed for wildlife species that are more likely to benefit from nest boxes on the TRMP lands.

4.4.4 Data to be Collected

Compliance Monitoring: District biologists will document the dates each nest box is visited each year, the condition of the box, and the actions taken to keep the box functional.

Effectiveness Monitoring: Each box will be visited annually to record the species and nesting success (estimated number of young hatched) of waterfowl using the box.

4.4.5 Use of Data

Compliance Monitoring: Data on nest box condition and maintenance will be used to ensure the boxes remain functional and to document compliance with the TRMP.

Effectiveness Monitoring: Data on waterfowl use of nest boxes will be used to determine whether nest box design and/or location should be modified, or whether the box should be replace with one more likely to benefit wildlife on the TRMP lands.

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4.5 Reporting

4.5.1 Purpose

Reports will be prepared at regular intervals and submitted to the USFWS, WDFW, Tribes and FERC to document implementation of the TRMP, verify the success of enhancement measures, and initiate discussion on items requiring review or modification.

4.5.2 Tracts

Lost Lake, Project Facility Lands, Spada Lake and Williamson Creek

4.5.3 Methods

Reports will be submitted annually to the USFWS, WDFW and Tulalip Tribes, and every 5 years to the FERC. Reports will summarize activities during the intervening period and identify those planned for the next period. Monitoring data will be presented in summary form and analyzed. Problems and proposed changes in the TRMP, if any, will be discussed in the reports. Review meetings will be scheduled by the District after reports are provided to the above listed parties, unless none of the parties desires a meeting. The District will summarize the information in the reports at the meetings.

4.5.4 Information to be Provided in Reports

a) Summary of forest management measures, including acres thinned, gaps created, etc.;

b) Documentation of other habitat enhancement measures, including snag and live decaying tree creation, coarse woody debris creation, and nest box maintenance;

c) Results of monitoring programs;

d) Activities planned for the next year (or five years in the reports submitted to the FERC);

e) Discussion of problems or changes needed; and

f) Updated maps of TRMP lands showing the current distribution of cover types (every 10 years).

4.5.5 Use of Reports

The reports will serve as written documentation of TRMP implementation and success, and a focal point for meetings between the District, the agencies, and the tribes.

5.0 SCHEDULE

5.0 Schedule

Table 5.1 Summary schedule for implementation of the Jackson Project TRMP.

PROGRAM	ACTIVITY	SCHEDULE
Forest Gaps	- Evaluate all forest stands less than 100 years old to identify those in need of gap creation	Within 10 years after license issuance
	- Complete initial round of forest gap creation where needed	Within 10 years after license issuance
	- Create additional forest gaps where needed after 2021	As needed
Forest Overstory Thinning	- Evaluate forest stands less than 100 years old to idnetify those in need of overstory thinning	Within 10 years after license issuance
	- Conduct overstory thinning where needed and feasible	As needed
Snags and Decaying Live Trees	- Complete first round of snag and decaying live tree creation in all forest stands less than 100 years old	Within 10 years after license issuance
	- Complete subsequent rounds of snag and decaying live tree creation in all stands less than 100 years old	Every 8 – 12 years thereafter
Coarse Woody Debris	- Complete first round of coarse woody debris creation in all forest stands less than 100 years old	Within 10 years after license issuance
	- Complete subsequent rounds of coarse woody debris creation in all stands less than 100 years old	Every 8 – 12 years thereafter
Waterfowl Nest Boxes	- Install waterfowl nest boxes at Lost Lake	By March 1 of first full year after license issuance
Pipeline Right-of-Way Management	- Reseed with grasses and forbs palatable to deer	As needed
	- Plant hedgerows and shrubs for visual screening	As needed
	- Place brush piles to restrict public vehicle access	As needed
Powerhouse Site Management	- Seed and fertilize existing grasses and forbs	As needed
	- Plant hedgerows and shrubs for visual screening	As needed
	- Plant fruit trees for forage and perches	As needed

Table 5.1 (continued).

PROGRAM	ACTIVITY	SCHEDULE
Compliance Monitoring	- Prepare initial update of cover type maps for all TRMP lands	Within 10 years after license issuance
	- Prepare subsequent updates to cover type maps for all TRMP lands	Every 10 years thereafter
	- Maintain written records of overstory thinning and gap creation	Annually
	- Design, supervise and monitor overstory thinning and gap creation	As needed
	- Design, supervise and monitor creation of snags, decaying live trees and coarse woody debris	As needed
	- Check, clean and repair waterfowl nest boxes	Annually by March 1
Effectiveness Monitoring	- Evaluate 10 percent of created gaps for understory response	5 and 10 years after creation
	- Evaluate thinned forest stands	10 years after thinning
	- Evaluate 10 percent of snags and decaying live trees created between 1990 and 2020	2021, 2031 and 2041
	- Evaluate 10 percent of coarse woody debris created between 1997 and 2020	2021, 2031 and 2041
	- Check waterfowl nest boxes for signs of use	Annually by June 30
Reporting	- Reports to USFWS, WDFW and Tulalip Tribes	Annually
	- Reports to the FERC	Every 5 years

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7.0 GLOSSARY

7.0 Glossary

Average Annual Habitat Units (AAHU) - the total number of habitat units lost or gained as a result of a project or proposed action, divided by the life of the project or action.

Age Class - an aggregation of trees with a range in age between the oldest and the youngest of no more than 20 years.

Canopy - the continuous cover of branches and foliage formed by the crowns of adjacent trees and other woody growth.

Canopy Closure - a measure of the percent of potential open space occupied by the collective tree crowns in a stand.

Codominant Trees – a tree that extends its crown into the canopy and receives direct sunlight from above but limited sunlight from the sides.

Cover - vegetation and/or physiographic features used by wildlife for protection from predators or to lessen the effects of weather.

Cover Type - a classification of environmental conditions based upon plant associations or physiography.

Decaying Live Tree – (decadent tree) – a tree topped above sufficient whorls of live limbs such that the tree will remain living for a period of time, with the intention being that heart rot fungus can infiltrate the tree and begin cavity creation.

Diameter at Breast Height (DBH) - a measurement taken of tree diameter at the breast height of a person standing next to the tree (usually considered 42 inches).

Dominant Trees - trees in the forest stand whose crowns rise above the general canopy level and receive sunlight from the top and sides.

Drumming Site - usually a log or stump used by a ruffed grouse for drumming courtship display.

Early-successional Species - wildlife species that find optimal habitat in early-successional stand condition forests.

Edge - the unique set of habitat conditions formed at the boundary between two or more plant communities of differing structure, such as forest and meadow.

Emergent Vegetation - aquatic plants that are rooted below water but not wholly submerged.

Emergent Wetland - wetland area dominated by perennial plants like herbaceous hydrophytes, excluding mosses and lichens; vegetation is present for most of the growing season in most years.

Forage - vegetation used for food by wildlife

Forb - a non-woody, broadleaf plant.

Forested Wetland - wetland area characterized by woody vegetation at least 20 feet tall.

Gap – An opening in the forest canopy large enough to allow sunlight to reach the forest floor and understory vegetation to grow

Habitat Evaluation Procedures (HEP) - a method devised by the U.S. Fish and Wildlife Service to quantify and assess impacts and relative values of wildlife habitat changes.

Hardwoods - trees distinguished by the presence of vessels in wood; usually broad-leaved trees such as alder, maple, cottonwood and madrone.

Hard Snag - a snag composed of sound wood, often merchantable.

Harvest - see Timber Harvest.

Heart Rot - fungal rot confined to the heartwood of a tree and typically leading to the death of the tree.

Herbaceous Vegetation - vegetation growing close to the ground that does not develop persistent woody tissue, usually lasting for a single growing season.

Hiding Cover - any vegetation capable of hiding 90 percent of standing adult deer from the view of a human at a distance of 200 feet or more.

Late-successional Species - wildlife species that find optimal habitat in late-successional stand condition forests.

Management Unit - a subdivision of a management tract based on topography, management constraints or some other concern; made up of a number of stands.

Multi-layered Canopy - forest stand condition with two or more distinct tree layers in the canopy.

Old-growth Forest - coniferous forest that is at least 200 years old and has minimal history of human disturbance.

Overstory - a collective term for the trees in a forest stand that are greater than 20 feet tall.

Pre-commercial Thin - the practice of removing some trees of less than merchantable size from a stand to alter tree growth and form and/or alter habitat.

Primary Cavity Nester (Excavator) - wildlife species that excavate cavities in snags.

Riparian - transitional area between true wetlands and upland terrestrial areas where the vegetation and microclimate are influenced by perennial or seasonal water; may extend inland for considerable distances.

Sapling - a young deciduous or coniferous tree with a DBH between 1 and 4 inches.

Scrub-shrub Wetland - wetland area dominated by woody vegetation less than 20 feet tall; includes trees or shrubs that are small or stunted because of environmental conditions.

Secondary Cavity Nester - wildlife species that nest in cavities created by cavity excavating species.

Secondary Roads - temporarily or seasonally used gravel roads that may be unfit for passenger cars.

Second-growth Forest - term commonly used to refer to a forest that is in the process of regrowth after timber harvest of old-growth.

Site Index - a measurement of forest site productivity based upon the average height of the dominant trees at a specified age, typically 50 years.

Slash - the residue, usually branches, logs and small trees left on the ground following timber harvest.

Snag - a standing dead tree.

Soft Snag - a snag composed of wood primarily in advanced stages of decay.

Stand - a forest or other community sufficiently uniform in species composition, age or arrangement to be distinguished from other communities.

Succession - the predictable process of change in species composition and structure of a forest community as it develops after fire or logging.

Timber Harvest - removal of trees from all or part of a forested stand; can include even-aged harvest (clearcutting) and partial harvest (thinning).

Tract - one of the five major parcels of the management lands.

Understory - vegetation growing beneath a forest canopy up to a height of approximately 20 feet.

Upland - term used to distinguish terrestrial habitat from aquatic, wetland, or low-lying habitat.

Watershed - the geographic area that contributes surface water to a single river, lake or reservoir.

Wetland - lands that are covered by shallow water or are seasonally or permanently saturated with water at, near or above the soil surface; usually supports the growth of hydrophytes.

APPENDIX A

DESCRIPTIONS OF VEGETATION COVER TYPES

Appendix A

Descriptions of Vegetation Cover Types

Introduction

These summary descriptions of the major vegetation cover types for the wildlife habitat management lands include existing as well as future cover types that will be created by the proposed management. Cover type classifications are derived from the combined perspectives of forestry and wildlife habitat. Forested cover types are separated by species composition into conifer, deciduous and mixed forest. The wetlands fall into a number of palustrine classes as described by Cowardin et al. (1979) but they are all grouped into the single category of wetland for this plan.

Conifer Forest Cover Type

The conifer forest type is separated into successional stand conditions in a manner similar to Hall et al. (1985), which takes into account the characteristics that contribute to wildlife habitat. Stand conditions change dramatically over time as stands mature, and as they are affected by natural events or management activities. On the TRMP lands, past management practices have had a significant impact on stand development and current stand characteristics, including tree size and density, canopy closure, snag and coarse woody debris density, and the composition and abundance of understory vegetation.

Early-Successional Stand Condition

The early-successional condition is characterized by small coniferous trees, shrubs and herbaceous vegetation. Trees are generally less than 1 inch in diameter, and less than 15 feet tall, providing no greater than 30 percent canopy cover. Dominant shrub species include vine maple, salal, Oregon grape, salmonberry, red huckleberry and thimbleberry. This stage may last for 10 to 15 years after even-aged timber harvest or forest fire depending on management. Amounts of coarse woody debris vary depending on stand conditions prior to timber harvest and post-harvest management practices.

Open Canopy Sapling/Pole Stand Condition

This condition is dominated by coniferous trees between 15 and 40 feet tall. Tree canopy closure is generally less than 60 percent and a shrub understory is present. This condition usually follows early-successional forest as a result of tree height growth. Trees are generally between 10 and 30 years of age, depending on management. The herbaceous and shrub layers are sparser and less diverse than in the early-successional stand conditions due to shading by the dominant tree layer, but some shrubs such as huckleberry, Oregon grape and salal may persist. Sword fern and moss dominate the herbaceous layer. The amount of coarse woody debris varies greatly between stands, but most is in later stages of decay (Class 3 or older). Snags are usually absent unless intentionally left during timber harvest to enhance wildlife habitat.

Closed Canopy Sapling/Pole Stand Condition

Trees in the closed canopy sapling/pole condition are generally 20 to 40 years of age and between 30 and 60 feet tall, depending on management. Canopy closure is often greater than 90 percent, resulting in a sparsely vegetated understory of low-growing shrubs such as Oregon grape and sword fern. Snags are generally absent unless intentionally left during previous timber harvests or created to enhance wildlife habitat. Coarse woody debris is usually absent or in late stages of decay.

Small Sawtimber Stand Condition

The small sawtimber condition is characterized by trees between 9 and 20 inches DBH and between 50 and 100 feet tall. Ground vegetation is usually more developed than the closed sapling/pole stage, but is still sparse, and often dominated by moss and sword fern. Existing unmanaged small sawtimber stands are usually between 40 and 80 years of age, while ages will range from 30 to 50 years under managed conditions. Canopy closure is generally uniform within the stand, averaging between 60 and 100 percent. Conifers are usually of a cone-bearing age. Snags are generally suppression killed and of small diameter. Some stands in this condition have had snags created in them, resulting in an average of 3 snags per acre. Coarse woody debris is often small in diameter or in late stages of decay (Class 3 or older).

Large Sawtimber Stand Condition

Large sawtimber is generally characterized by trees greater than 20 inches DBH and an increase in the development of ground vegetation as compared to the sapling/pole and small sawtimber stand conditions. Scattered deciduous trees such as vine maple are usually present along with a distinct shrub layer. Average tree height is greater than 100 feet. Existing unmanaged large sawtimber stands are greater than 80 years of age, while stands under managed conditions will be as young as 50 years. Large-diameter snags, coarse woody debris and a multi-layered canopy are usually absent, although smaller coarse woody debris may persist from earlier suppression-related mortality of the small sawtimber stage. Canopy closure is generally uniform within the stand, varying between 60 and nearly 100 percent.

Old-Growth Stand Condition

Characteristics of the old-growth condition include live trees, snags and coarse woody debris greater than 24 inches DBH, a multi-layered canopy with understory trees between 10 and 40 feet tall, and highly variable canopy closure ranging from 30 to 90 percent within a stand. Shrub layers are well developed and composed of both tall and low-growing species. Average age of dominant overstory trees is 200 years or older. Scattered deciduous trees, such as vine maple, black cottonwood and bigleaf maple are often present.

Mixed Deciduous/Coniferous Forest Cover Type and Mosaic Deciduous/Coniferous Forest Cover Type

Both mosaic and mixed deciduous/coniferous forest cover types are a mosaic of small stands of deciduous trees such as red alder, bigleaf maple and black cottonwood, interspersed with small stands of Douglas-fir, western hemlock, Pacific silver fir and western redcedar. Deciduous trees provide between 30 and 70 percent of the canopy cover in these mosaics. A dense and varied shrub layer often dominates the understory. Stands defined as mixed or mosaic deciduous/coniferous reach this condition when trees are 15 to 20 years old, and remain in this cover type until hardwoods become scarce and coniferous trees dominate the stand, unless site conditions such as high soil saturation or slope instability preclude advancement into confer forest. The transition generally occurs when dominant trees are between 100 and 150 years old. Densities of snags and logs vary widely in this cover type.

These two cover types are differentiated by the distribution of coniferous trees: Mosaic deciduous/coniferous have a distinctly clumped distribution of deciduous and conifers trees; the majority of upper canopy conifer trees are contained in groups covering one or more acres. Mixed deciduous/conifer forests tend to have a more uniform distribution of deciduous trees and conifers. Though somewhat subjective, the difference between the two types is readily distinguished on aerial photographs.

The distinction between these two types is important from the standpoint of habitat management. Understory forage is usually present in deciduous stands and is usually absent from conifer stands, which are generally in the closed-canopy condition. These conifer stands are better suited for winter thermal cover. Mosaic stands may offer a valuable interspersion of cover and forage not found in uniformly-distributed mixed stands.

Deciduous Forest Cover Type

Deciduous forests within the TRMP lands are composed of greater than 70 percent deciduous species, including red alder, bigleaf maple and black cottonwood. Conifers are often scattered through both the overstory and understory, and a tall, dense shrub layer is usually present. Canopy closure ranges from 50 to 90 percent. Soils are often saturated and/or unstable. Snags and coarse woody debris are generally small in diameter and uncommon. Individual stand area does not exceed 20 acres.

Young Riparian Forest Cover Type

Young riparian forest is primarily composed of deciduous and coniferous trees and shrubs such as red alder, western redcedar, black cottonwood, vine maple, bigleaf maple, red huckleberry, snowberry and salal. The canopy is fairly open, allowing development of the shrub layer. Stand age ranges from 1 to 20 years. Because these stands are associated with waterways, soils are usually either saturated and/or unstable. Frequent disturbance (i.e., flooding) is common.

Mature Riparian Forest Cover Type

Mature riparian forests are similar to young riparian forests except that stands are generally older than 20 years of age. Average tree DBH ranges from 10 to 15 inches. Larger (15 to 50 inches DBH) black cottonwood and bigleaf maple trees are often interspersed with

smaller red alders. Snags and coarse woody debris are generally small in diameter but common.

Mixed Shrub/Brush Cover Type

This cover type is primarily composed of small deciduous trees and shrubs. Shrubs generally dominate the stand, varying widely in species composition. Red alder is the dominant tree species present. Coniferous trees make up less than 5 percent of the canopy cover. Trees are generally less than 20 feet tall and less than 15 years of age. Larger trees may be present, but they will be widely scattered throughout the stand. This stand condition often occurs after timber harvest when a clearcut area has not been replanted and coniferous trees have not re-established themselves naturally.

Grass/Meadow Cover Type

The grass/meadow cover type is composed of both naturally occurring meadow areas with shallow soils and areas maintained artificially in low growing vegetation. It is included as a separate cover type from early-successional forest because it is often permanently maintained in the grass/meadow condition and is generally not associated with timber harvest. Grasses, forbs and scattered low-growing shrubs are characteristic of this cover type. Coarse woody debris is usually absent.

Wetland Cover Types

Wetlands are transitional lands between terrestrial and aquatic habitats, where the water table is at or near the surface or the land is covered by shallow water. Both forested and non-forested wetlands are found on TRMP lands. Non-forested wetlands contain open water, emergent, and scrub-shrub habitat types resulting in high structural diversity. The amount and distribution of the habitat types varies due to a number of factors, including beaver activity and road construction. Wetland vegetation includes cat-tail, sedges, rushes, hardhack spirea, devil's club, skunk cabbage, red-osier dogwood and pondweed. Devil's club and skunk cabbage are common among forested wetlands. Willow, red alder, black cottonwood, vine maple and western redcedar are commonly found at the wetland perimeter.

Rock/Talus Cover Type

This cover type represents areas of rock outcrop and/or talus. Because of limited soil development, vegetation is not likely to develop along successional pathways typical of the assigned cover type. This distinction is also important because the WDFW designates cliffs and talus as Priority Habitats. Talus is defined as homogenous areas of rock rubble ranging in average size from 0.5 to 6.5 feet, composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. Cliffs, which may be associated with talus, are greater than 25 feet high and occur below 5,000 feet in elevation.

REFERENCES

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Hall, F.C., L.W. Breser, J.F. Franklin and R.L. Werner. 1985. Plant communities and stand conditions. Pages 17-31 in E.R. Brown, ed. Management of wildlife and fish habitats in forests of western Oregon and Washington, Parts 1 and 2. U.S. For. Serv. Publ. No. R6-F&WL-192-1985, Portland, OR.

APPENDIX B

STAKEHOLDER CONSULTATION

Appendix B

STAKEHOLDER CONSULTATION

Record of Consultation

The Washington Department of Fish and Wildlife (WDFW), U. S. Fish and Wildlife Service (USFWS), U. S. Forest Service (USFS) and Tulalip Tribes (Tribes) have been actively involved in wildlife habitat management at the Jackson Project since the initial development of the Wildlife Habitat Management Plan (WHMP) in the mid 1980's. The USFS requested to be removed from consultation once the District completed a land exchange with the federal government to obtain mitigation lands in 1991, but the other three stakeholders have remained involved. All three stakeholders received annual reports on implementation of the WHMP and participated in meetings that were held in conjunction with the annual reports whenever changes in the management techniques were proposed by the District, or when one or more of the stakeholders accepted the District's annual invitation to meet. It was through these annual meetings that proposed terrestrial studies for relicensing were first discussed.

Relicensing stakeholders, including WDFW, USFWS, USFS, the Tribes and others, were consulted prior to the submittal of the Notice of Intent to relicense (NOI) and Pre-application Document (PAD), and again during the scoping and study proposal process. They were informed of study progress and received drafts and final versions of the terrestrial resources studies (See the Updated Study Report for more information). On 8 September 2008, a meeting was held for the Jackson Project Relicensing Terrestrial Resources Group (TRG) to review the terrestrial study reports and to discuss proposed Protection, Mitigation and Enhancement (PM&E) measures for terrestrial resources, including a proposed Terrestrial Resources Management Plan (TRMP). A PowerPoint presentation was given at the meeting and paper copies of the presentation and of draft PM&E measures were distributed to those in attendance. Digital copies were also emailed to all TRG members. Meeting minutes are included in Appendix C.

The Preliminary License Proposal (PLP) that was filed with the FERC on 31 December 2008 included the proposed TRMP PM&E measure, a draft outline of the TRMP, and a discussion of the terrestrial resources in the Project area. The only written comments regarding the TRMP presentation in the PLP were received from the FERC (See Appendix A of the Final License Application [FLA]). The FERC requested that the District develop the TRMP, including an implementation schedule, and file it along with the FLA.

A meeting for the TRG was held on 23 February 2009 to discuss the terrestrial PM&E measures that were presented in the PLP and solicit input on preparation of the draft TRMP. Meeting minutes and comments are included in Appendix C.

The District developed a draft TRMP based on the above described stakeholder consultations. A preliminary draft of the TRMP was sent to WDFW representatives (Richard Johnson and Mark Hunter) to accommodate their schedules, as promised in the 23 February 2009 meeting minutes. Following favorable review of the preliminary draft by WDFW, the TRMP was completed and a draft was sent to the full TRG membership on 31 March 2009 for a 30-day review. Comments on the full draft were received from USFS; these are included in the comment matrix (Table B-1).

A conference call meeting with the TRG was scheduled for 21 April 2009 to address comments or questions regarding the draft TRMP, but no stakeholders participated. One stakeholder provided written comments; these are included in the matrix (Table B-1). During and after the 30-day review period for the draft TRMP, the District also engaged in informal discussions with WDFW and USFWS representatives regarding the contents of the TRMP.

As directed by the FERC, the District is filing the TRMP with the FLA. The District has included discussions of the terrestrial resource benefits of TRMP implementation within the TRMP, as well as in the Environmental Analysis section of the FLA. Cost estimates are included in the Cost of Environmental Measures section of the FLA.

Table B-1. Stakeholder comments on the TRMP, and District responses to comments.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
WDFW, Rich Johnson via email dated October 1, 2008	
The WDFW finds the PUD's proposed PMEs for lands to be included in the new Terrestrial Management Plan will meet the objectives of providing diverse habitat with an emphasis on mature forest characteristics.	Comment noted.
WDFW recommends inclusion of some of the potential relevant alternative techniques listed in Appendix 4 of the Habitat Management Methods Literature Review and Evaluation, November 2007, including the creation of canopy gaps; the creation of roosting snags; the creation of nesting snags; and the protection and creation of decadent live trees.	As recommended by WDFW, the TRMP incorporates management techniques for the creation of canopy gaps, the creation of roosting snags, the creation of nesting snags, and the protection and creation of decadent live trees as described in Appendix 4 of the Habitat Management Methods Literature Review and Evaluation.
WDFW recommends a change in the management of the 1,100 acres in the Lake Chaplain tract currently managed for a 60-year harvest rotation using even-age (clear-cut) harvest in 26-acre units. The existing Wildlife Habitat Management Plan for Lake Chaplain was developed to modify a previous timber harvest plan into a plan that provides better habitat for black-tailed deer. The WHMP does provide for better deer habitat than the previous timber harvest plan, however, between the age of 15 and 80, even-age stands generally provide poor habitat for deer and for most other wildlife species. Under the existing plan, at any given time 75% of the harvest units will fall into the age class that provides poor habitat.	The TRMP no longer covers management of the Lake Chaplain Tract. The City of Everett intends to continue managing the tract outside the FERC license to benefit a variety of species, including black-tailed deer, as described in the WHMP. Management of even-aged stands in the WHMP was specifically designed to increase the amount of time stands would remain in a higher quality habitat condition (See WHMP Section 2.1). According to the Jackson Project HEP prepared by the District, City, WDFW and USFWS in 1988, it would be incorrect to assume that managed forest up to 80 years old is poor habitat for all wildlife. The variation in forest habitat conditions between the ages of 15 and 80 years is substantial under any management regime, and particularly dramatic under the WHMP. As noted in the HEP, the black-tailed deer Habitat Suitability Index (HSI) for forest managed under the WHMP is 0.9 (out of a possible maximum of 1.0) from age 15 to 20 years, 0.3 from age 20 to 30, 0.6 from age 30 to 50, and 0.8 from age 50 to 60. By comparison, old-growth forest has an HSI of 0.9 for black-tailed deer. The HSI values for the pileated woodpecker, a species generally associated with mature forest, are 0.2 from age 15 to 20 years, 0.3 from age 20 to 30, 0.8 from age 30 to 50, and 0.9 after age 50. There are clearly differences in habitat quality over time, and reduced habitat values for some species during the early stages of forest stand development, but a

STAKEHOLDER COMMENT	DISTRICT RESPONSE
	generalization that all forest less than 80 years old is poor quality wildlife habitat is not supported by the scientific literature.
To provide both browse and cover for deer over a long period of time, and to provide diverse habitat for other species, the WHMP should be adapted to a primarily uneven age harvest (selective tree removal) regime. This change will still allow the commercial harvest of timber, but with an emphasis of providing understory browse vegetation within a multi-aged tree stand. This could include pre-commercial and commercial thinning over large areas of existing even-age forest, and gap creation by the removal of all trees in areas generally less that an acre in size. Evaluation of the stand characteristics may result in the decision to clear-cut certain units, but with a goal of moving to an uneven age management for those units.	In response to concerns expressed by the WDFW and others, even-aged timber harvesting (clearcutting) has been eliminated from the TRMP. All forested TRMP lands, including the 1,745 acres added to the Spada Lake Tract since the WHMP was developed, will be managed to protect old-growth forest where it currently exists and promote its development where it does not exist due to past timber harvesting. Selective tree removal will be employed to accelerate the development of old-growth forest, but only when it can meet environmental and economic criteria stated in the TRMP. The City of Everett intends to continue managing the Lake Chaplain Tract on an even-aged timber harvest regime as described in the WHMP. When the District, City, WDFW, USFWS and the Tulalip Tribes developed the WHMP, they considered it desirable to manage the Lake Chaplain Tract for a combination of early-seral and late-seral wildlife species. Portions of the tract are set aside as old-growth management areas, and the remaining forestlands are managed on a 60-year even-aged harvest rotation with enhancements (residual live trees, snags and logs) for late-seral wildlife species. The resulting balance of commercial forestry and wildlife habitat enhancement was made deliberately by all parties involved in development of the WHMP, and is integral to its continued implementation. Conversion to an uneven-aged forest management regime would reduce the amount of forage for early-seral species like black-tailed deer in the short to mid-term, and modify the overstory species composition of the forest to the detriment of other target wildlife species in the long term. Uneven-aged management favors shade tolerant trees like western hemlock, and excludes intolerant species like Douglas-fir that require periodic large-scale disturbance to persist. A reduction in Douglas-fir would lead to decreased habitat value for at least two of the late-seral wildlife species addressed in the Jackson Project HEP (Douglas squirrel and marten).

STAKEHOLDER COMMENT	DISTRICT RESPONSE
This proposed change would also help provide habitat linkage between the now isolated smaller units of riparian, multi-species, and mature stands of timber that are not part of a harvest plan, and thus would provide more critical habitat for a multitude of wildlife species.	The management of all TRMP lands for the development and protection of old-growth forest will eliminate the potential for individual stands within the tracts to become isolated. The potential for riparian, multi-species and mature forest stands in the Lake Chaplain Tract to become isolated and in need of linkage is low. Few wildlife species are sensitive to habitat fragmentation at the scale that could occur within the 2,657-acre tract, and those that are sensitive are addressed by the spatial and temporal constraints on even-aged harvesting already incorporated into the WHMP. The issue of habitat isolation was raised when the WHMP was initially prepared, and the harvest constraints were developed specifically to address it.
WDFW prefers the Lake Chaplain unit be retained as part of the project unless the long-term wildlife habitat objectives of providing more multi-storied mature forest habitat can be achieved through an off-license agreement for the management of this tract.	The District, City, WDFW and Tribes are working on an off-license agreement for the management of Lake Chaplain lands according to the WHMP.
Tulalip Tribes, letter dated October 20, 2008	
The following recommendations are meant to serve as a starting point for the discussion and development of Protection, Mitigation and Enhancement measures (PMEs) designed to protect terrestrial resources. The PMEs include those for implementation of a Terrestrial Resource Management Plan (TRMP), formalization of a Noxious Weed Plan, and development of a Marbled Murrelet Habitat Protection Plan. These recommendations should be considered preliminary and will need to be refined further under the direction of the Terrestrial Resources Work Group (or its successor).	Comment noted.
The Tulalip Tribes appreciates the opportunity to provide Project input, and is generally satisfied with the information contained within the Terrestrial Resources PMEs. Recommendations that follow reflect our ideas to further promote the success of the Project.	Comment noted.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
Abbreviated terms should be specified at first use for the following: Page 1 Paragraph 1: "WDFW" and "USFWS" Page 1 Paragraph 2: "FERC" Page 1 Paragraph 3: "PME". Additionally, on page 3 *Description of the Action*, TRMP and WHMP were specified previously in the document.	The District agrees with these suggested acronyms. All abbreviations and acronyms will be defined at their first use in the TRMP.
The Tulalip Tribes recognize that the City of Everett will not be a co-licensee under the new license. The Tribes encourage prompt development of a Memorandum of Agreement for management of wildlife resources within the Lake Chaplain Tract between the Snohomish County Public Utilities Department (District) and the City of Everett.	The District, City, WDFW and Tribes are working on an off-license agreement for the management of Lake Chaplain lands according to the WHMP.
The Tulalip Tribes believe that habitat **protection and minimization** of habitat loss should be of greater focus for all lands in the TRMP as the current objectives seem to be heavily focused on mitigation of already lost habitat. The Tribes are not aware of a system or decision process in place to promote habitat protection or minimization of habitat loss rather than mitigation, and highly recommends the use of this type of system. Management of this process by a dedicated committee and establishment of a credit/debit program is also suggested.	Avoidance and minimization of wildlife habitat impacts were considered at the time of project construction. The WHMP was then prepared to address all remaining impacts through the creation and enhancement of wildlife habitat on City and District lands. The USFWS Habitat Evaluation Procedures (HEP) methodology was used to quantify the habitat impacts of the Project and the habitat benefits of the WHMP. Since there will be no further Project construction, there are no further opportunities to avoid or minimize the impacts of construction and operation on wildlife. There are, however, opportunities to improve the effectiveness of the WHMP at creating and enhancing habitat for wildlife on the mitigation lands. Since 1988, these opportunities have been identified, and implemented where appropriate, through the adaptive management process. The WHMP annual reports and the Spada Supplement, all of which are available on the Jackson Project relicensing website, document the improvements that have been made to the WHMP since 1988. All improvements, except those pertaining to the Lake Chaplain Tract, are incorporated into the TRMP. Additional improvements have been included in the TRMP in response to Study Plan 6 (Habitat Management Methods Literature Review and Evaluation). The District will continue to consider the Tribes part of this established adaptive management process for the TRMP, along with the USFWS and WDFW.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
WDFW, Rich Johnson via email dated March 23, 2009	
I did read through chapter 2 and a bit of chapter 3 of the draft TRMP. It looks very good.	Comment noted.
US Forest Service, Ann Risvold via email dated April 9, 2009 (comments dated April 8, 2009)	
Section 2.5 and Table 2.5, pages 26 and 28: this section discusses habitat management on right-of-way lands including increased production of grasses and forbs for deer forage. Included in the list of suitable plant species for wildlife enhancement are several grasses and one forb which the Forest Service stopped using long ago because they are invasive and/or very persistent in the environment. These species are perennial ryegrass (*Lolium perenne*), tall fescue, (*Festuca arundinaceae*), bentgrass (*Agrostis alba*) orchard-grass (*Dactylis glomerata*), and clover (*Trifolium spp*). The Forest Service does use Alsike clover (*Trifolium hybridum*) in some applications where it will eventually be over-topped and shaded out; otherwise it will persist as well. It appears that the TRMP proposes to use some or all of these species over the power tunnel across NF lands. Because it is our national policy to use only locally adapted native species, we would not be in favor of these particular species being used on right-of-way lands. Further, we would encourage the PUD to refrain from using these species in any areas where movement onto the NF is likely to occur. The other forbs, the shrubs, and the trees listed in Table 2.5 are very appropriate.	Table 2.5 has been modified to remove the following species of concern to the Forest Service: perennial ryegrass (*Lolium perenne*), tall fescue (*Festuca arundinaceae*), bentgrass (*Agrostis alba*), orchard-grass (*Dactylis glomerata*), and generic clover (*Trifolium spp*). Alsike and subclover (*Trifolium aestivum* and *T. subterranium*) are included on the list of suitable species. No seeding or planting is proposed to occur above the power tunnel on NFS lands. The species on Table 2.5 are proposed only for use on the power pipeline right-of-way, located on District lands. Habitats on NFS lands are far from the power pipeline right-of-way, forested, and do not receive regular disturbance by humans; therefore, movement of these right-of-way species onto NFS lands is not anticipated.
Section 3.2.6, page 41, Stand 8-4: the paragraph under “Management” again describes “seeding desirable forbs such as clover” in this area. Comments are same as above regarding the invasive and persistent nature of most clovers.	Table 2.5 has been modified to remove the generic listing of clover (*Trifolium spp*). Alsike and subclover (*Trifolium aestivum* and *T. subterranium*) are included on the list of suitable species.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
North Cascades Conservation Council / Alpine Lakes Protection Society / Pilchuck Audubon Society, Rick McGuire via email dated April 21, 2009	
The one question I had for the PUD was to hopefully get some clarification about what is meant by "timber harvest." I was pleased to read that there will be 2000 more acres managed without "timber harvest" under the TRMP compared to the WHMP. However, reading further, I kept seeing references to thinning in nearly all the tracts other than the Williamson Creek old growth. So, my question is, do you define "timber harvest" only as even aged cutting, or clearcutting? Do you not count thinning as "timber harvest?"	As specified in TRMP Section 2.1.3, there will be no removal of trees from stands over 100 years old, and no even-aged harvesting or clearcutting in younger stands unless approved on a site-specific basis by WDFW and USFWS. Thinning (selective removal of a portion of the trees), gap creation (removal of all trees in patches of up to 1 acre), snag creation, decaying live tree creation, and coarse woody debris (log) creation may occur in stands less than 100 years old to reduce tree density and accelerate the development of old-growth characteristics. Most second-growth stands on the TRMP lands originated after clearcutting in the mid 1900's. Unlike natural stands that originate after wildfires or windstorms, these second-growth stands have very dense overstories of small, uniformly-sized trees, and little or no residual wood (large trees, snags and logs). Because of the unusually high tree densities in these second-growth stands, they have a tendency to stagnate if left unmanaged. Judicious thinning early in stand development (prior to age 100) can increase the rate of growth among the remaining trees. Creation of snags, decaying live trees, logs and overstory gaps will provide additional structural diversity characteristic of natural stands. Active management of the overstory will cease at stand age 100 and the forest will be treated the same as existing old-growth. The District agrees that the definition of harvest in the draft TRMP as only total overstory removal was somewhat confusing, so we have changed that definition in the TRMP to include thinning and we have reworded the TRMP accordingly. We do have thinning included as one of the methods for accelerating tree growth, reducing tree density, introducing heterogeneity (variable density and patchiness) to the overstory and increasing the understory of shrubs, forbs and small trees. Thinning may be commercial or non-commercial depending on the stand. Opportunities to thin are limited by the steep terrain, poor access, and water quality concerns. Thinning will only be considered where it does not

STAKEHOLDER COMMENT	DISTRICT RESPONSE
	require new roads, does not increase surface erosion and does not result in accumulations of slash that interfere with wildlife movement.

APPENDIX C

STAKEHOLDER MEETING SUMMARIES

Jackson Project Relicensing
Terrestrial Resources Group

Monday, September 8, 2008

Meeting Summary

Start Time: 9:05 a.m.	**End Time:** 12:10 p.m.
Subject: Terrestrial Resource Group Meeting Summary	

Attendees:

- American Whitewater – Tom O'Keefe
- Biota Pacific – Marty Vaughn
- City of Everett – Julie Sklare
- District – Karen Bedrossian, Jeff Kallstrom, Bruce Meaker, Kim Moore, Dawn Presler
- FERC – David Turner (via conference phone)
- Meridian Environmental Inc – Pam Klatt
- North Cascades Conservation Council et al. – Rick McGuire
- Smayda Environmental Associates, Inc.– Kathy Smayda
- US Forest Service – Don Gay, Ann Risvold
- WA Dept of Fish and Wildlife – Rich Johnson

DISCUSSION ITEMS

Introductions

The group introduced themselves and their organizations.

Study Results Presentation

Karen, Kathy and Marty presented study results information contained in the attached slides.

Special Status Plant Survey discussion included the following:
Four lichens considered rare by the US Forest Service were located during the survey. Three of the species were in locations on non-NFS lands that are not impacted by the project. The fourth species was found on both NFS and private lands and is fairly common in the Project vicinity, despite its rare status. No special management methods were recommended by the FS for this species.

Noxious Weed Survey discussion included the following:
Blackberry is considered an invasive species, but it is not included on Snohomish County's noxious weed list. It is very common throughout the county. The District has a District-wide Vegetation Management Plan that covers general weed management for all District properties, including Jackson.

Wetland Survey discussion included the following:
Rich noted that the wetland rating system is misleading to persons unfamiliar with it. The rating system can somewhat counter-intuitively assign high scores to wetlands in the poor condition The pristine wetlands in the project area ended up with low ratings because of their limited opportunities for improving water quality and reducing flooding and erosion. Karen noted that reading the descriptions of the wetlands provides a better understanding of the quality of the wetland rather than reviewing the rating alone, that the system provided a standardized method of describing the wetlands, that the habitat scores and descriptions are useful, and that this system is the accepted method at both the state and county level. She and Bernice Tannenbaum discussed this issue with the author of the rating system while taking his wetlands rating class. (Note: this issue is addressed on the first page of the Western Washington Wetland Rating System ([Ecology Publication # 04-06-025.]).

- **Action:** Karen – per Rich's request, provide a cross reference for SP10 Amphibian wetland numbers with those from the SP9 Wetland Survey, since the two studies numbered the wetlands differently.

- **Action:** Dawn – resend link to SP9 and SP10 draft report appendices on web site.

Amphibian Survey discussion included the following:
Slide 21 should state that three (not four) state monitor species are potentially present. A fourth species, Oregon spotted frog, is listed as State Endangered, but its presence in the area is very unlikely.

Bull frogs (an invasive species) were found at Lost Lake, Chaplain Marsh and off-channel habitats along the lower Sultan River. While they are common in lowlands throughout western Washington, they were not found in the upper Sultan Basin.

Rich noted that there may be opportunities for management in the fluctuation zone and river channel to provide better habitat for amphibians; management activities could include timing and amount of flows/drawdown. Although, he is not necessarily saying the District should do so based on other resource needs/benefits. Karen noted that in the report conclusion it states that increase in flows on the river could have a negative impact on amphibians, and that existing conditions at the reservoir indicate that the amphibians are using areas outside the drawdown, so impacts from stranding are minimal.

Marbled Murrelet Survey discussion included the following:
The District has been operating as if the Culmback Dam West and East are occupied habitat since presence was first detected in the 1990s. Rich expressed gratitude that the District was treating the extent of occupancy as the entire survey area, as per PSG protocols.

Spotted Owl Survey discussion included the following:
The definition used during the study for suitable habitat is pretty broad since spotted owls have been found in non-typical or marginal habitat. Incidental potential sightings of spotted owls were treated as a possible sighting during the study and additional stations were added in those areas.

Karen noted that "owl detection" on the maps does not refer to spotted owls but to other species.

Marty discussed the latest research on the interaction of spotted and barred owls. They are competitors for the same habitat/food sources; this competition displaces the spotted owl. There is also some evidence of predation; however, the two species are not natural predators. There is some potential for spotted owl habitat improvement over the long term in the region, particularly on public lands, but the prospects for recovery of the species are still not good because of the presence of the barred owl.

Proposed Protection, Mitigation and Enhancement (PM&E) Measures Presentation

Karen, Kathy and Marty presented proposed PM&E information contained in the attached slides.

Noxious Weed Management Plan discussion included the following:
The District proposes a plan for the management of the 7 noxious weed species for which control must be provided under State and County regulations. The plan calls for an annual report and meeting, and review for additions/deletions from the County's list. The State gives authority for noxious weed control to the County governments.

During the discussion several stakeholders questioned why all noxious weeds would not be managed under the proposed plan. Karen stated that the plan will focus on the noxious weeds that are required to be controlled by state and county regulation. The survey included other noxious weeds and invasive species not listed as noxious weeds. The weed management plan will include general measures to prevent the introduction and spread of weeds, which will be effective both on the target weed species and other invasive species. The plan will bring prevention and management into the planning stages of ground-disturbing activities. Marty noted that the number of weeds for management is a concern due to the cost; managing for all invasive species, including those that have become widespread like blackberry and reed canarygrass, could be cost prohibitive.

The FS noted that they have concerns about the potential spread of weed species onto NFS lands, including several species not included in the draft weed management plan. They indicated that they recognize the difficulty of managing for species that are very common and widespread, such as blackberry and reed canarygrass, but would like to have other, less widespread species considered for addition to the plan. Ann Risvold indicated she will provide a list of FS weed species of concern to Karen.

Ann asked if the District uses herbicides. Karen responded that herbicides are not allowed in the watersheds due to water quality concerns as the water is for municipal drinking water supply. The two areas where knotweed is located are outside the watersheds and herbicides have been used, in combination with cutting, to treat those locations.

David noted that there are two options for the plan: 1) have a separate weed management plan or 2) incorporate the plan into the Terrestrial Resource Management Plan.

- **Action: Ann** – forward list of USFS weeds of concern to Karen.

- **Action**: Kathy – finalize draft Noxious Weed Plan for stakeholder review ASAP so it can be included in the PLP.

Marbled Murrelet Protection Plan discussion included the following:
The District proposes a plan for the protection of marbled murrelet habitat as it relates to road maintenance. Additional activities to be included in the plan are snag management and trails development; Marty will update accordingly for stakeholder review and comment. The District currently ensures protection of marbled murrelet habitat through the Washington Forest Practices Rules. Marty explained the implications of continuing to work through the Forest Practices Rules versus a PME with an incidental take statement for murrelets. A PME and incidental take statement are recommended because they would consolidate and clarify all murrelet habitat protection for District activities (including recreation trail development), and give the District more operational flexibility than the Forest Practices Rules.

A danger tree is one that is defined as having the potential to fall over a road or other facility where it could cause damage, restrict access or cause bodily harm.

Terrestrial Resources Management Plan discussion included the following:
The District is proposing a TRMP to cover the lands the District owns, including 1,745 additional acres around Spada Lake not covered in the original HEP analysis and 139 acres near Williamson Creek not currently in the WHMP or original HEP analysis. The City's lands on the Lake Chaplain Tract, which are used primarily for filtration plant/water supply purposes, as well as timber management, would not be in the TRMP, but would be managed under the current WHMP as an off-license agreement through which the District would maintain oversight of wildlife management activities. The City of Everett will no longer be a co-licensee for the project, and the preference is to continue managing the tract according to the WHMP, but under a separate, off-license agreement. Karen noted that the City of Everett had a timber management plan for the land prior to the preparation of the WHMP and proposed to include the Chaplain Tract in the WHMP as a means to provide more mitigation, while still harvesting timber. By implementing the harvesting plan in the WHMP rather than implementing the existing more aggressive timber management plan for the tract, wildlife habitat was improved. The value to the WHMP was measured by the HEP analysis as the difference between the two plans. The intention of including the lands in the WHMP was not to optimize the wildlife values, but to improve them over the original timber harvesting plan.

Rick expressed concern that there are differing beliefs on the management goals for these lands, the WHMP was outdated when it was written, more lands should be acquired, and the WHMP should be totally re-evaluated. He and Rich both suggested the WHMP places too much emphasis on management for deer. Rich expressed that he had very little disagreement with our current management but that he would like to see a change in management to less even-age stand management and focus on SP6 changes. Karen understands that there are differing philosophies on the management goals; however, the District is managing according to the goals established by the stakeholders under the WHMP's development and the objectives established by the State's current management plan, which includes managing habitat for deer. The WHMP emphasizes habitat for old-growth wildlife species because this was clearly a priority when it was written in the late 1980's, but it also includes management for deer because "in-kind" habitat mitigation was requested by the wildlife agencies as well. Don Gay, USFS asked if WDFW had had a recent change in policy to de-emphasize management for deer. Karen noted that a detailed response to NCCC comments was provided in the ICP response filed with FERC and that FERC made a determination on requests for modifications to study plans.

Rich expressed concern about not having regulatory authority over the Lake Chaplain lands if they are not in the project boundary. Enforcement efforts would be the obligation of the State rather than FERC. He did support the efforts currently underway at the Spada Lake Tract to promote late successional habitat. The District stated that the side agreement could include some oversight provisions, and that the side agreement warrants further discussion.

David Turner stated that the licensee needs to demonstrate to FERC that the Lake Chaplain lands are no longer needed within the project boundary for their original purpose (wildlife mitigation) or for any new purpose, such as recreation.

Tom asked if any lands would be added to the TRMP to replace the Lake Chaplain tract. Karen explained how the 1,745 acres at Spada Lake were added after the HEP analysis was conducted and 139 acres at Williamson Creek would be added, and how the total mitigation value and acreage would be more than adequate under the current FERC view of continuing project impacts.

- **Action: Rich** – identify specific habitat enhancement activities in SP6 that WDFW (including game management) would like to see occur on the mitigation lands so the District can begin analysis cost/benefit for the license application.

- **Action: Jeff** – develop bullet points or whitepaper on TRMP as it relates to an off license agreement relating to Lake Chaplain so Rich has something to give to his AG's Office for their review and approval of direction and for review by the TRG.

- **Action**: **Dawn** – route ICP response and FERC's study plan determination to TRG.

Next Steps for Process

The District will consider and update the PM&E documents based on comments received today at the meeting; the updated PM&Es will be routed via email for TRG review and comment next week. The TRG will have a 2-week comment period. The District seeks TRG input so what is proposed in the Preliminary Licensing Proposal (PLP) is close to/if not the final. In order for input into the PLP, Karen needs to have a "final" proposal ready for analysis by November 1.

Members can contact Karen via email and phone to discuss the proposals. A meeting will be scheduled for October 1, 9:00-11:00 to continue discussion of PM&E issues that do not get resolved between this and the next meeting.

- **Action: Marty** – forward the updated Marbled Murrelet PME to Don Gay for review.

END MEETING

Jackson Project Relicensing
Terrestrial Resources Group

Monday, February 23, 2009

Meeting Summary

Start Time: 2:05 p.m.	**End Time:** 3:40 p.m.
Subject: Terrestrial Resource Group Meeting Summary	
Attendees: • Biota Pacific – Marty Vaughn • City of Everett (City) – Julie Sklare • District – Karen Bedrossian, Jeff Kallstrom, Bruce Meaker, Kim Moore, Dawn Presler, Matt Love (outside counsel at VanNessFeldman) • Snohomish County (SnoCo) – Carly Summers (via phone) • Tulalip Tribes (Tribes) – Reid Allison • US Forest Service (USFS) – Kristen Bonanno (via phone) • WA Dept of Fish and Wildlife (WDFW) – Rich Johnson	

DISCUSSION ITEMS

Introductions

The group introduced themselves and their organizations.

Status of Relicensing; Settlement Process and Protocols

The entire Terrestrial Resources Group (TRG) was invited to this meeting. Since the attendees were familiar with the status of relicensing and the settlement process, these topics were not heavily discussed. The Confidentiality Agreement and Ground Rules are ready for signature by the agencies with an expectation of a required sign-off by each party by the March 11 Aquatic Resources Settlement Group meeting.

Review of PM&Es in PLP

Karen reviewed the PM&Es and Management Plans (in PLP Appendices) for terrestrial resources including the 1) TRMP, 2) Noxious Weed Plan, and 3) Marbled Murrelet Habitat Protection Plan.

TRMP – see handout

- Williamson Creek – additional acres (not in current WHMP) contain second-growth and wetland and are contiguous with Williamson Creek. Rich stated that WDFW prefers active management to accelerate habitat growth/diversity to allow for a variety of species.
- Lost Lake – no commercial harvest has been done there by the District but it is economically feasible to do so.

Noxious Weed Plan – no comments

Marbled Murrelet Habitat Protection Plan – received comments from Don Gay (USFS) which were incorporated into the version filed in the PLP. Tim Romanski provided comments to Karen on PLP version stating that USFWS is not likely to allow "take" for marbled murrelets. Access trail in upper river gorge area in marbled murrelet habitat could pose a problem. Karen will further discuss with Tim.

Issues

WDFW would like to see in TRMP:

- bigger gaps (1/4 acre), not necessarily more gaps, to provide a variety of habitat and not monocultural habitat
- Snag creation in mature growth areas, including larger diameter snags but in balance with the needs of marbled murrelets
- Fewer roads the better - better for wildlife
- Annual review good, but due to staffing concerns not sure if they will actively participate. 10 years for plan review too long to be proactive. 3-5 years may be better for plan review.
- Flexibility in the plan. Provide management concepts but not as detailed prescriptions as in current WHMP.

Karen and Biota are currently working on a draft TRMP. The District will provide a copy of the working draft to Rich and Mark Hunter by 16 March to be reviewed/commented on before Rich's one-month vacation that begins on 25 March. The TRG review of the TRMP will occur following that review.

WDFW expressed a desire to ensure that the general public continues to have the ability to access Project lands during state-approved hunting seasons. The Tribe expressed a similar interest for their members; no other terrestrial resource issues were identified. WDFW also mentioned concern that the Lake Chaplain Tract is managed for deer; however, the public is not allowed in the area for hunting.

Lake Chaplain Tract (LCT)

The City would like to have a meeting with WDFW and the City forester to discuss the management of the LCT. Rich said that he is interested in the meeting and site visit in March up to the 20th.

A list of issues Rich noted for the LCT were:

- Current clear cuts – he believes there is a short term gain but it is lost within 15 years when it doesn't provide browse any more and stays unproductive until the next cut.
- Minimize the use of clear cuts in favor of thinning
- Minimize size of clear cuts
- Lengthen seral stage (increase length of rotation)
- Minimize number of roads
- Develop corridors between the different habitat types
- Land not open to public should be managed for old growth

Rich would prefer management that targets critters losing habitat rather than target for deer. Karen pointed out that the WHMP was designed specifically to avoid and reduce the unproductive stages of clear cuts and that the overall wildlife habitat management program for Jackson Project will provide well over 100% of mitigation for late seral species. Rich would like for the District and City to look at the overall landscape. Karen said that mitigation was designed to make up for losses resulting from the Project (project nexus).

LCT management plan would be an off-license agreement signed by the District, City of Everett, WDFW and possibly the Tribes. USFS and Snohomish County indicated they were unlikely to be a signing party but would like to see drafts of the TRMP and LCT management plan.

Assignments:

Karen, Rich and Julie will set up a meeting for Rich and anyone else he wants to attend from WDFW to talk to the City forester in March.

Karen will send Rich and Mark Hunter a working draft version of the TRMP by 16 March so that Rich can review it prior to being gone during the month of April when the other stakeholders will be reviewing the draft plan.

Dawn will provide Karen with Justin Casing and Carly Summers' email addresses and will send terrestrial related emails to both Justin and Carly as requested by Carly.

END MEETING

Appendix F

Matrix of Pathways and Indicators

Table F-1. MATRIX of PATHWAYS AND INDICATORS (the ranges of criteria presented here are not absolute, and they may be adjusted for unique watersheds).

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality:	Temperature	50-57° F[1]	57-60° (spawning) 57-64° (migration &rearing)[2]	> 60° (spawning) > 64° (migration & rearing)[2]
	Sediment/Turbidity	< 12% fines (<0.85mm) in gravel[3], turbidity low	12-17% (west-side)[3], 12-20% (east-side)[2], turbidity moderate	>17% (west-side)[3], >20% (east side)[2] fines at surface or depth in spawning habitat[2], turbidity high
	Chemical Contamination/ Nutrients	low levels of chemical contamination from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches[5]	moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach[5]	high levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach[5]
Habitat Access:	Physical Barriers	any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate	dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%[3]	gravel and cobble is subdominant, or if dominant, embeddedness 20-30%[3]	bedrock, sand, silt or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%[2]
	Large Woody Debris	Coast: >80 pieces/mile >24"diameter >50 ft. length[4]; East-side: >20 pieces/ mile >12"diameter >35 ft. length[2]; and adequate sources of woody debris recruitment in riparian areas	currently meets standards for properly functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard	does not meet standards for properly functioning and lacks potential large woody debris recruitment

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
	Pool Frequency channel width / # pools/ mile [6] 5 feet 184 10 " 96 15 " 70 20 " 56 25 " 47 50 " 26 75 " 23 100 " 18	meets pool frequency standards (left) and large woody debris recruitment standards for properly functioning habitat (above)	meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time	does not meet pool frequency standards
	Pool Quality	pools >1 meter deep (holding pools) with good cover and cool water[3], minor reduction of pool volume by fine sediment	few deeper pools (>1 meter) present or inadequate cover/temperature[3], moderate reduction of pool volume by fine sediment	no deep pools (>1 meter) and inadequate cover/temperature[3], major reduction of pool volume by fine sediment
	Off-channel Habitat	backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)[3]	some backwaters and high energy side channels[3]	few or no backwaters, no off-channel ponds[3]
	Refugia (important remnant habitat for sensitive aquatic species)	habitat refugia exist and are adequately buffered (e.g., by intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations[7]	habitat refugia exist but are not adequately buffered (e.g., by intact riparian reserves); existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations[7]	adequate habitat refugia do not exist[7]
Channel Condition & Dynamics:	Streambank Condition	>90% stable; i.e., on average, less than 10% of banks are actively eroding[2]	80-90% stable	<80% stable

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
	Floodplain Connectivity	off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession	severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly
Flow/ Hydrology:	Change in Peak/Base Flows	watershed hydrograph indicates peak flow, base flow and flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography	some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography	pronounced changes in peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography
Watershed Conditions:	Road Density & Location	<2 mi/mi^2 [11], no valley bottom roads	2-3 mi/mi^2, some valley bottom roads	>3 mi/mi^2, many valley bottom roads
	Disturbance History	<15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area (except AMAs), 15% retention of LSOG in watershed[10]	<15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area (except AMAs), 15% retention of LSOG in watershed[10]	>15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; does not meet NWFP standard for LSOG retention

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
	Riparian Reserves	the riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition >50%[12]	moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (70-80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better[12]	riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition <25%[12]

1 Bjornn, T.C. and D.W. Reiser, 1991. Habitat Requirements of Salmonids in Streams. American Fisheries Society Special Publication 19:83-138. Meehan, W.R., ed.

2 Biological Opinion on Land and Resource Management Plans for the: Boise, Challis, Nez Perce, Payette, Salmon, Sawtooth, Umatilla, and Wallowa-Whitman National Forests. March 1, 1995.

3 Washington Timber/Fish Wildlife Cooperative Monitoring Evaluation and Research Committee, 1993. Watershed Analysis Manual (Version 2.0). Washington Department of Natural Resources.

4 Biological Opinion on Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). National Marine Fisheries Service, Northwest Region, January 23, 1995.

5 A Federal Agency Guide for Pilot Watershed Analysis (Version 1.2), 1994.

6 USDA Forest Service, 1994. Section 7 Fish Habitat Monitoring Protocol for the Upper Columbia River Basin.

7 Frissell, C.A., Liss, W.J., and David Bayles, 1993. An Integrated Biophysical Strategy for Ecological Restoration of Large Watersheds. Proceedings from the Symposium on Changing Roles in Water Resources Management and Policy, June 27-30, 1993 (American Water Resources Association), p. 449-456.

8 Wemple, B.C., 1994. Hydrologic Integration of Forest Roads with Stream Networks in Two Basins, Western Cascades, Oregon. M.S. Thesis, Geosciences Department, Oregon State University.

9 e.g., see Elk River Watershed Analysis Report, 1995. Siskiyou National Forest, Oregon.

10 Northwest Forest Plan, 1994. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. USDA Forest Service and USDI Bureau of Land Management.

11 USDA Forest Service, 1993. Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities.

12 Winward, A.H., 1989 Ecological Status of Vegetation as a base for Multiple Product Management. Abstracts 42nd annual meeting, Society for Range Management, Billings MT, Denver CO: Society For Range Management: p277.

Appendix G

Marbled Murrelet Habitat Protection Plan

Marbled Murrelet Habitat Protection Plan

Henry M. Jackson Hydroelectric Project

(FERC Project No. 2157)

Public Utility District No. 1 of Snohomish County

Everett, Washington

May 2009

MARBLED MURRELET
HABITAT PROTECTION PLAN

For the

HENRY M. JACKSON HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION
PROJECT NUMBER 2157

Submitted by:

PUBLIC UTILITY DISTRICT NO. 1
OF
SNOHOMISH COUNTY

Everett, Washington

May 2009

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1.0 Introduction

The Marbled Murrelet Habitat Protection Plan (MMHPP) describes the specific measures Public Utility District No. 1 of Snohomish County (District) will implement to avoid or minimize the Project-related impacts to marbled murrelets and their habitat. The MMHPP will be in effect for the term of the new license.

Recent surveys by the District and others have documented the presence of marbled murrelets (a federally-listed threatened species) in the Sultan Basin, and have resulted in the designation of forest in and near the Jackson Hydroelectric Project (Project) boundary as "occupied" by nesting marbled murrelets.

Three general types of Project-related activities have the potential to impact nesting marbled murrelets and/or their habitat: 1) the pruning, topping and felling of road-side danger trees; 2) overstory thinning and creation of snags, decaying live trees, coarse woody debris and forest canopy gaps during implementation of the Jackson Project Terrestrial Resource Management Plan (TRMP); and 3) the creation of new recreation trails and associated facilities as required under the new Federal Energy Regulatory Commission (FERC) license.

The goal of the Marbled Murrelet Habitat Protection Plan (MMHPP) is to avoid or minimize potential impacts to nesting marbled murrelets and suitable marbled murrelet nesting habitat during routine road maintenance on and near Project lands, during implementation of the TRMP, and during the creation, use and maintenance of new recreation trails and associated facilities. While conducting these activities, the District will identify potential marbled murrelet nest trees and protect them from modification or felling. Nearby live conifers that are large enough to provide lateral cover to potential nest trees will also be protected where feasible. To help ensure effective implementation of the MMHPP, the District will also maintain current maps of suitable and occupied marbled murrelet nesting habitat on Project lands.

1.1 Project Lands

The Project area consists of approximately 2,548 acres of upland, wetland and natural lake along with 1,908 acres of reservoir, all in the Sultan River Basin of Snohomish County, Washington (Figure 1-1). The TRMP divides the Project lands into four management tracts: Lost Lake, Project Facility Lands, Spada Lake, and Williamson Creek (see TRMP for detailed

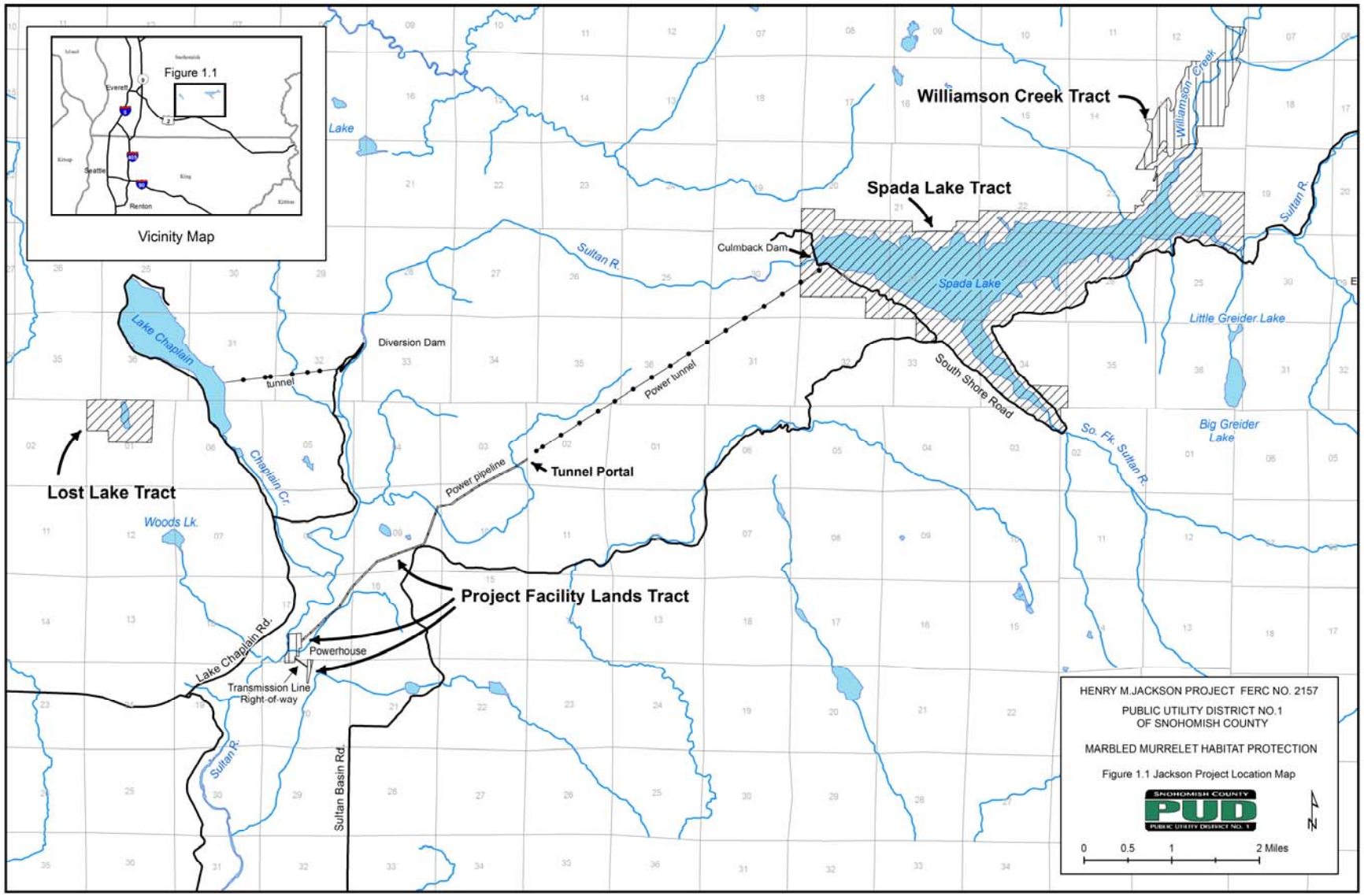
Figure 1.1
Vicinity Map
Everett
Seattle
Renton
Williamson Creek Tract
Williamson Creek
Spada Lake Tract
Culmback Dam
Spada Lake
Sultan R.
Little Greider Lake
Big Greider Lake
South Shore Road
So. Fk. Sultan R.
Lake Chaplain
Diversion Dam
tunnel
Power tunnel
Tunnel Portal
Power pipeline
Lost Lake Tract
Woods Lk.
Chaplain Cr.
Project Facility Lands Tract
Powerhouse
Transmission Line
Right-of-way
Lake Chaplain Rd.
Sultan Basin Rd.
HENRY M.JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO.1
OF SNOHOMISH COUNTY
MARBLED MURRELET HABITAT PROTECTION
Figure 1.1 Jackson Project Location Map
SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT NO. 1
0 0.5 1 2 Miles
N

descriptions of all tracts). This MMHPP will be applicable to suitable marbled murrelet habitat (current and future) on all TRMP lands. As of 2009, suitable and occupied marbled murrelet habitat are only present in the Spada Lake and Williamson Creek tracts, so the MMHPP will only be implemented in those areas at the time of issuance of the new license. If suitable marbled murrelet habitat develops and/or marbled murrelets are detected in other tracts over the term of the license, the MMHPP will be implemented there as well.

1.2 Regulatory Restrictions on Marbled Murrelet Habitat

The Federal Endangered Species Act (ESA) lists the marbled murrelet as a threatened species and restricts take throughout its range. The U.S. Fish and Wildlife Service (USFWS) provides informal guidance on steps that can be taken to avoid take of marbled murrelets, and consults formally with other Federal agencies that have identified the potential for their actions to affect the species. The issuance of a hydropower license by the FERC is a Federal action that is subject to compliance with the ESA. The FERC has designated the District as the Commission's non-federal representative for purposes of conducting informal consultation under Section 7 of the ESA. This MMHPP has been prepared to support that consultation.

Take of marbled murrelets on non-federal forestlands in Washington is largely avoided through implementation of the Washington Forest Practices Rules (FPR; Washington Administrative Code 222), which have been promulgated by the Washington Forest Practices Board under the authority of the Forest Practices Act (Revised Code of Washington 76.09). Specific provisions in the current (2009) FPR define suitable and occupied marbled murrelet habitat in Washington, and specify protocols for identifying habitat and surveying for the presence of marbled murrelets. Those definitions and protocols are used in this MMHPP as well.

The FPR classify timber harvesting and other forest management activities with the potential to cause take as Class IV – Special forest practices, and provide detailed guidelines for determining whether a forest practice is a Class IV – Special with regard to marbled murrelets. Most forest landowners design their activities to avoid designation as Class IV – Special, thereby eliminating the potential for take. That is the approach taken in this MMHPP as well. The measures described in Section 2.2 have been designed to avoid impacts to marbled murrelets wherever feasible, and to minimize impacts where avoidance may not be feasible (e.g., emergency road maintenance).

This MMHPP has been prepared to be consistent with the FPR. In implementing the MMHPP, the District will continue to comply with the FPR, including acquisition of the appropriate Forest Practices Approvals where needed.

2.0 HABITAT PROTECTION

2.1 Background

2.1.1 Current (2008) Distribution of Occupied and Suitable Habitat

Old-growth and mature conifer forest in the Spada Lake Tract was assessed as suitable marbled murrelet habitat according to the FPR definition (WAC-222-12-090) in 2007. The suitable habitat was surveyed for marbled murrelets as four survey areas (Culmback West, Culmback East, Olney Pass and South Fork Spada Inlet) in 2007 and 2008 according to Pacific Seabird Group protocol (Evans et al. 2003) (Figure 2-1). Occupancy was confirmed in the Culmback West survey area, and presence was confirmed in the other three (Biota Pacific 2008). Since Culmback West, Culmback East and Olney Pass survey areas are contiguous, all are considered occupied. While no occupancy detections were made at South Fork Spada Inlet in 2007 or 2008, the survey area is contiguous with occupancy detections on State lands from the 1990s (Northwest ¼ of Section 2, Township 28 North, Range 9 East), and is considered occupied as well.

Stands of contiguous mature and old-growth forest in Williamson Creek were also assessed as suitable. They were surveyed as two survey areas (Williamson Creek North and Williamson Creek South) (Figure 2-2) (Biota Pacific 2008). Occupancy was confirmed in the Williamson Creek North survey area in 2007. While no occupancy or presence detections were made at Williamson Creek South in 2007, the survey area is contiguous with Williamson Creek North, and is considered occupied as well.

2.1.2 Potential Future Habitat Conditions

The Project lands contain stands of second-growth forest that are not currently classified as marbled murrelet habitat. Many of these stands are being managed for late-seral forest under the TRMP, and could develop conditions that would trigger a reclassification as suitable marbled murrelet habitat under the FPR definition (WAC 222-16-010). These lands should be reassessed when habitat maps are updated each decade (see Section 2.2.1). Spada Lake, Williamson Creek, and Lost Lake tracts are the most likely locations for reclassified habitat, as the majority of the Project Facility Lands Tract is being managed for early seral forest and non-forest habitats.

Figure 2-1 Marbled murrelet survey areas in the Spada Lake Tract.

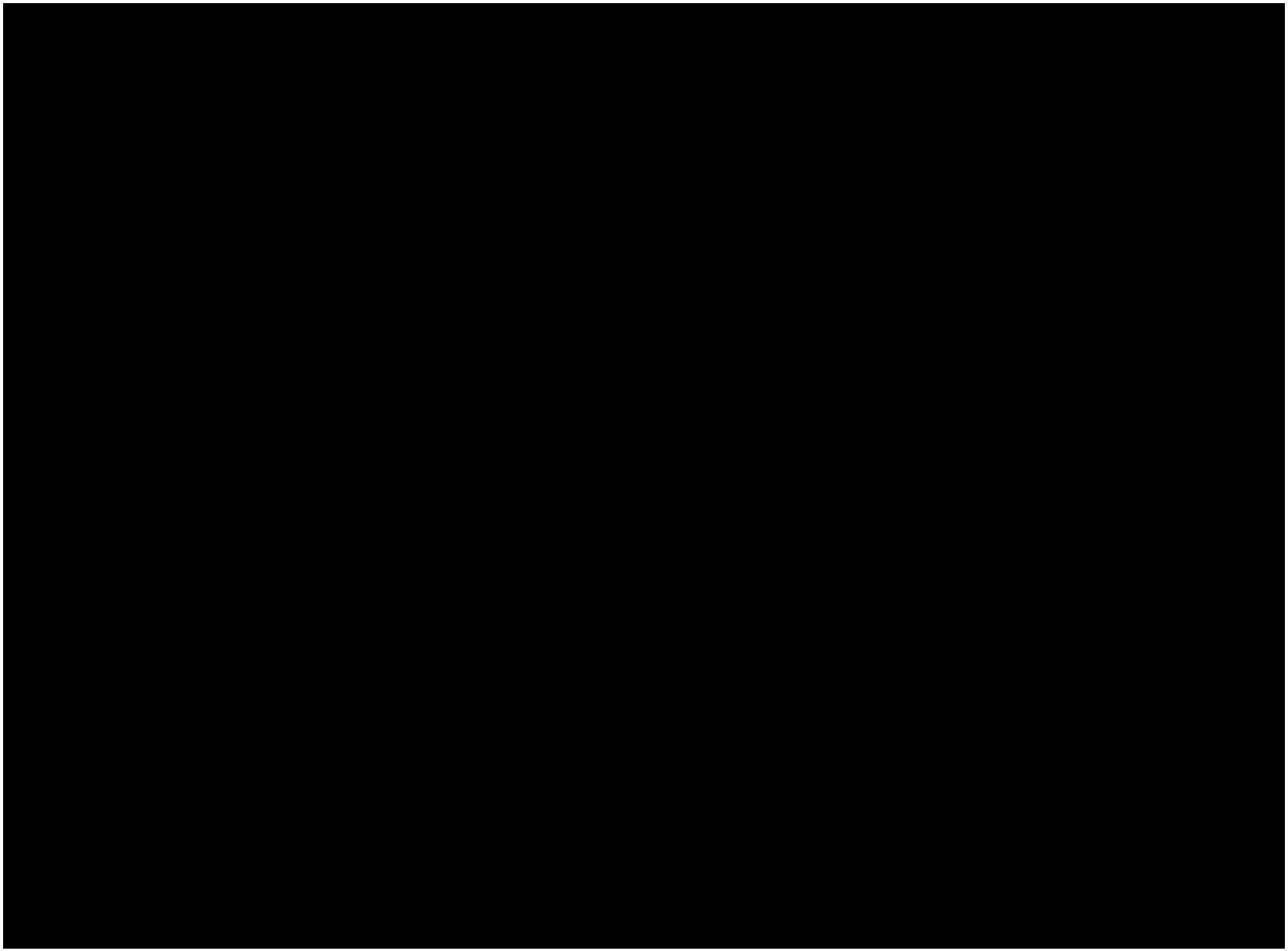

Figure 2-2 Marbled murrelet survey areas in the Williamson Creek Tract

2.1.3 TRMP Prescriptions for Occupied and Buffer Habitat

All occupied marbled murrelet habitat within the Project boundary is in mature and old-growth stands designated for passive management under the TRMP. These stands will be preserved as old-growth forest with minimal intervention. There will be no timber harvesting, snag creation, coarse woody debris, or gap creation within occupied stands.

Second-growth conifer and mosaic (mixed) forest stands adjacent to occupied habitat will also be managed for late-seral conditions, but they will require varying levels of active manipulation until they reach a stand age of 100 years. Overstory thinning, snag creation, coarse woody debris creation and gap creation may all occur as needed in second-growth stands. Active management in second-growth stands that are also serving as buffers to occupied marbled murrelet habitat (within 300 feet of occupied habitat) will be conducted in a manner consistent with the FPR to minimize impacts to occupied habitat.

2.2 Impact Avoidance and Minimization Measures

2.2.1 Updating of Habitat Information

The District will prepare and maintain maps of the Project lands and adjacent areas showing suitable marbled murrelet habitat, occupied marbled murrelet habitat, and other forest within 300 feet of suitable and occupied marbled murrelet habitat. For mapping purposes, suitable and occupied marbled murrelet habitats will be defined according to the FPR. At intervals of 10 years or less, the District will update the maps to reflect current habitat conditions. The District may conduct surveys for nesting marbled murrelets in all suitable habitat that is not known to be occupied and has not been surveyed for 10 or more years. If the District chooses not to survey suitable habitat, such habitat will be considered occupied for purposes of this MMHPP. Hereafter in this MMHPP, all references to occupied habitat include suitable habitat that has not been surveyed for 10 or more years. Surveys will be conducted according to the current protocol of the Pacific Seabird Group, or another protocol endorsed by the USFWS and WDFW.

2.2.2 Roadside Danger Trees

Relevance to the Project

An estimated 3 miles of Project roads pass through occupied habitat, or through forest that is within 300 feet of occupied forest. This number of affected road miles could increase during the term of the new license as forests in and near the Project boundary mature and additional acres become suitable for marbled murrelet nesting, or if the District assumes management responsibility for additional miles of existing Washington Department of Natural Resources (WDNR) roads along the south shore of Spada Lake. Among the routine maintenance activities conducted by the District are the pruning, topping and felling of roadside danger trees (trees capable of falling onto and blocking the road and/or striking passing vehicles). Conducting these activities in forest that is occupied or could be occupied by marbled murrelets has the potential to directly or indirectly impact nesting success. The pruning, topping or felling of trees in which marbled murrelets are present during the nesting season could lead to the injury or death of young birds. Similar activities outside the nesting season could reduce the availability of suitable nest sites in successive seasons. The pruning, topping or felling of other dominant or codominant overstory trees in forest surrounding occupied nesting habitat could expose nest trees to increased wind damage and make individual nests more vulnerable to disturbance and predation.

Avoidance and Minimization Measures

Prior to the scheduled pruning, topping or felling of roadside danger trees in occupied marbled murrelet habitat, District biologists will evaluate each tree proposed for such activity. The District will not prune, top or fell roadside danger trees in occupied habitat that contain marbled murrelet nesting platforms (as defined in the FPR), unless the roadside danger tree poses an imminent threat to the operation of the Project or safe use of a Project road. A roadside danger tree will be considered an imminent threat if it is leaning toward a road at an angle of greater than 20 degrees from vertical, is upslope from a road and being undercut by erosion, or is otherwise in a condition that would lead a professional forester or other similarly qualified person to conclude it has a reasonable potential to fall on or across the road without warning.

The District will not prune, top or fell roadside danger trees in or within 300 feet of occupied habitat during the critical marbled murrelet nesting season (April 1 through August 31),

unless the roadside dangers tree poses an imminent threat to the operation of the Project or safe use of a Project road, as described in the previous paragraph. Outside the critical marbled murrelet nesting season and regardless of imminent threat to the operation of the Project or safe use of a Project road, the District may prune, top or fell roadside danger trees in or within 300 feet of occupied habitat that do not contain marbled murrelet nesting platforms. Any tree-felling in or within 300 feet of occupied habitat that takes place within the critical nesting season will not be performed during the daily peak activity period defined in the FPR (one hour before official sunrise to two hours after official sunrise, and one hour before official sunset to one hour after official sunset).

2.2.3 TRMP Implementation

Relevance to the Project

Second-growth forest on the Project lands will be enhanced for late-seral wildlife species by thinning the overstory and creating snags, decaying live trees, coarse woody debris and small openings (gaps) in the canopy. The TRMP sets a goal of creating three snags and decaying live trees per acre every 8 to 12 years. It also prescribes the felling of live trees to create coarse woody debris. Gaps will be created at the discretion of District biologists, and thinning will be done on a limited basis where it is economically and operationally feasible and likely to accelerate late-seral forest development. Once second-growth stands reach 100 years old, the District will conduct no more thinning and create no more snags, decaying live trees, coarse woody debris, or gaps.

All currently-identified stands of occupied habitat on the Project lands are more than 100 years old, so none of the TRMP activities will be conducted within currently-identified occupied habitat. Maps of suitable habitat on the Project lands will be updated every 10 years (see Section 2.2.1), and new suitable marbled murrelet habitat will be surveyed or treated as occupied. New suitable habitat could be less than 100 years old, however, so the potential for TRMP activities to occur in suitable or occupied habitat needs to be addressed. TRMP activities also could occur in second-growth forest adjacent to occupied habitat, where avoidance and minimization measures will need to be followed.

Avoidance and Minimization Measures

The following restrictions will apply during implementation of the TRMP:

a) No thinning, snag creation, decaying live tree creation, coarse woody debris creation or gap creation will occur within occupied marbled murrelet habitat.

b) Thinning, snag creation, decaying live tree creation, coarse woody debris creation and gap creation may occur within 300 feet of occupied marbled murrelet habitat, provided that:

   i) The activity must result in a residual stand density of at least 75 trees per acre greater than 6 inches diameter at breast height (DBH), of which at least 25 trees per acre are greater than 12 inches DBH and at least 5 trees per acre are greater than 20 inches DBH.

   ii) No live coniferous trees with marbled murrelet nesting platforms (as defined in the FPR), live coniferous trees with a DBH of 32 inches or greater, or other live dominant or codominant trees within 100 feet of either of these two types of trees, may be modified or felled, except that live western redcedar and Pacific silver fir of any size may be modified to create snags or decaying live trees at a density of up to one per 20 acres per decade.

   iii) No activity may be conducted during the critical marbled murrelet nesting season.

c) No thinning, snag creation, decaying live tree creation, coarse woody debris creation or gap creation will be conducted within 0.25 mile of occupied marbled murrelet habitat during the daily peak activity period (one hour before official sunrise to two hours after official sunrise, and one hour before official sunset to one hour after official sunset) in the critical marbled murrelet nesting season.

2.2.4 New Recreation Trails and Associated Facilities

Relevance to the Project

At the request of stakeholders, the District has included in the Jackson Project Recreation Resource Management Plan (RRMP) the creation of new trails and associated trailhead

facilities (picnic sites, restrooms and parking area) to improve public access to the Sultan River and to the north side of Spada Lake. A portion of the new trail to the Sultan River and the associated trailhead facilities could be in occupied marbled murrelet habitat, and might require the felling of large trees. Such felling could impact marbled murrelet habitat by eliminating existing nest trees, reducing the number of potential future nest trees, or making remaining trees more vulnerable to wind damage and predation. If the felling takes place within the marbled murrelet nesting season, it could disrupt actively nesting birds. Another potential impact could be increased human activity along the trail or at the trailhead/picnic area, which could disrupt actively nesting marbled murrelets or make them more vulnerable to predation.

Avoidance and Minimization Measures

The following conditions will apply to new recreation trails and associated facilities created on non-federal lands in or within 300 feet of occupied marbled murrelet habitat:

a) The District will lay out trails and associated facilities to minimize the total area of trail and/or facility within 100 feet of potential nest trees (coniferous trees with marbled murrelet nesting platforms), while giving due consideration to other potential environmental and safety considerations.

b) The District will not fell coniferous trees with marbled murrelet nesting platforms, or live dominant or codominant trees directly adjacent to coniferous trees with platforms, to create a new recreation trail or associated facilities, unless doing so is necessary to make the trail or associated facilities safe, keep the overall area of site disturbance to a reasonable level, and/or avoid impacting slope stability, surface erosion or water quality. If the District determines that the felling of such trees is necessary, the District will fell such trees outside the critical marbled murrelet nesting season (April 1 through August 31).

c) The District will provide wildlife-resistant containers for human refuse during trail and associated facility construction and use, and will empty as needed to prevent wildlife access to refuse. The District will post signs alerting users of the need to contain all refuse.

d) The District will not conduct the following activities within the specified threshold distances of occupied marbled murrelet habitat during the daily peak activity period

(one hour before official sunrise to two hours after official sunrise, and one hour before official sunset to one hour after official sunset) in the critical marbled murrelet nesting season.

Activity	Threshold Distance
Blast > 2 pounds	1.0 mile
Blast ≤ 2 pounds	120 yards
Impact pile driver, jackhammer, rock drill	60 yards
Helicopter, single-engine airplane	120 yards
Chainsaw	45 yards
Heavy equipment	35 yards

3.0 MONITORING AND REPORTING

The District will update maps of occupied and suitable habitat will be regularly updated, as described in 2.2.1 of this MMHPP. Survey results or important changes to suitable or occupied habitat will be communicated with FERC every 5 years.

4.0 IMPLEMENTATION SCHEDULE

The District will update maps of suitable and occupied habitat at intervals of 10 years or less, as described in Section 2.2.1 of this document. Minimization measures will be applied as needed, whenever danger trees are felled or TRMP activities are conducted within 300 feet of occupied habitat. The measures will also be applied if new recreation trails are created in or within 300 feet of occupied habitat.

5.0 REFERENCES

Biota Pacific Environmental Sciences. 2008. Jackson Hydroelectric Project (FERC Project No. 2157) Revised Study Plan 11: Marbled Murrelet Surveys Final Technical Report. Prepared for Public Utility District No. 1 of Snohomish County, Everett, WA.

Evans Mack, D., W.P. Ritchie, S.K. Nelson, E. Kuo-Harrison, P. Harrison, and T.E. Hamer. 2003. Methods for surveying Marbled Murrelets in forests: a revised protocol for land management and research. Pacific Seabird Group Technical Publication Number 2. Available from http://www.pacificseabirdgroup.org.

APPENDIX A

STAKEHOLDER CONSULTATION

Appendix A

STAKEHOLDER CONSULTATION

Record of Consultation

Relicensing stakeholders, including WDFW, USFWS, USFS, the Tribes and others, were consulted prior to the submittal of the Notice of Intent to relicense (NOI) and Pre-application Document (PAD), and again during the scoping and study proposal process. They were informed of study progress and received drafts and final versions of the terrestrial resources studies (See the Updated Study Report for more information). On 8 September 2008, a meeting was held for the Jackson Project Relicensing Terrestrial Resources Group (TRG) to review the terrestrial study reports and to discuss proposed Protection, Mitigation and Enhancement (PM&E) measures for terrestrial resources, including a proposed Marbled Murrelet Habitat Protection Plan (MMHPP). A PowerPoint presentation was given at the meeting and paper copies of the presentation and of draft PM&E measures were distributed to those in attendance. Digital copies were also emailed to all TRG members. Meeting minutes are included in Appendix B. Comments were received from the USFS and were incorporated into the Marbled Murrelet PM&E and the MMHPP.

The Preliminary License Proposal (PLP) that was filed with the FERC on 31 December 2008 included the proposed Marbled Murrelet PM&E measure and a discussion of marbled murrelets in the Project area. No comments were received regarding marbled murrelets.

A meeting for the TRG was held on 23 February 2009 to discuss terrestrial PM&E measures and plans in the PLP. Meeting minutes and comments are included in Appendix B.

The District has engaged in discussions with WDFW, USFS and USFWS representatives regarding the contents of the Marbled Murrelet PM&E and the MMHPP. The MMHPP was expanded from the PM&E measure to include measures suggested by the Stakeholders, put into a format consistent with the other terrestrial plans, and included in the FLA.

Table A-1. Stakeholder comments on the Marbled Murrelet PM&E and MMHPP, and District responses to comments.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
US Forest Service, Don Gay via email dated September 19, 2008	
On the draft murrelet PME, in the summary, I would suggest that the measure be expanded to protect/conserve/minimize removal of not only nest trees, but those adjacent trees that provide cover to potential nest sites (at least for the trail portion that would occur on National Forest System lands). This is provided for in the second bullet under specifics of trails on page 12.	As suggested in the comment, the PM&E was revised to clarify the District's intent to protect/conserve/minimize the removal of adjacent trees that provide cover to potential marbled murrelet nest trees in occupied habitat on all Project lands. These revisions were carried forward into the MMHPP.
On the first bullet on that page, I'm not sure that the trail layout should consider all coniferous trees w/in 100' of potential nest platforms, just those that provide cover to the potential platform. There could be areas with lots of small (< 15') conifers that would have no influence on nesting suitability for murrelets. For the second bullet, I have the same comment (specify the types of conifers of concern).	The PM&E was revised to specify the protection of live dominant and codominant trees directly adjacent to coniferous trees with marbled murrelet nesting platforms, as these are the trees most likely to provide cover for marbled murrelet nests. Smaller trees would not need to be protected. These revisions were carried forward into the MMHPP.
Not having seen the trail proposal, I don't know if there is any plan/possibility of refuse cans at the parking area/trailhead, but if there is, the third bullet would apply to the trail to access the river. Thank you for considering these suggestions.	The PME and MMHPP state the District will provide wildlife-resistant containers for human refuse during trail and associated facility construction and use. As suggested in the comment, this would include parking areas and trailheads in the vicinity of occupied marbled murrelet habitat.
Tulalip Tribes, letter dated October 20, 2008	
The following recommendations are meant to serve as a starting point for the discussion and development of Protection, Mitigation and Enhancement measures (PMEs) designed to protect terrestrial resources. The PMEs include those for implementation of a Terrestrial Resource Management Plan (TRMP), formalization of a Noxious Weed Plan, and development of a Marbled Murrelet Habitat Protection Plan. These recommendations should be considered preliminary and will need to be refined further under the direction of the Terrestrial Resources Work Group (or its successor).	Comment noted.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
The Tulalip Tribes appreciates the opportunity to provide Project input, and is generally satisfied with the information contained within the Terrestrial Resources PMEs. Recommendations that follow reflect our ideas to further promote the success of the Project.	Comment noted.
Abbreviated terms should be specified at first use for the following: Page 1 Paragraph 1: "WDFW" and "USFWS" Page 1 Paragraph 2: "FERC" Page 1 Paragraph 3: "PME". Additionally, on page 3 *Description of the Action*, TRMP and WHMP were specified previously in the document.	The District agrees with these suggested acronyms. All abbreviations and acronyms will be defined at their first use in the MMHPP.
Physical habitat alteration seems to be the prime Project-related impact. While physical habitat alteration is an important component to address, the overall habitat impacts that are listed initially should include noise and other permanent disturbances to nesting and fledging birds. More specifically, trails and associated facilities will create a permanent disturbance to nesting marbled murrelets thereby reducing the amount of available suitable habitat. Restricting public access during sensitive periods should be considered, and suitable or occupied habitat buffers should be employed.	While the scientific literature suggests marbled murrelets are not particularly sensitive to human presence in the vicinity of active nests, the MMHPP contains a number measures to avoid or minimize human disturbance. Most District activities with the potential to disturb nesting marbled murrelets (felling of roadside danger trees, forest habitat enhancement and recreation trail construction) are restricted near suitable and occupied habitat during the marbled murrelet nesting season (April 1 through August 31). Those activities that might need to occur near suitable or occupied habitat during the nesting season, such as the felling of danger trees, would be conducted outside the marbled murrelet daily peak activity periods at dawn and dusk to further reduce the potential for disturbance. Comparable restrictions on public recreation access would be impractical, however, because the marbled murrelet nesting season coincides with most of the summer recreation season.
The Marbled Murrelet Habitat Protection Plan (MMHPP) should also place a greater emphasis on minimizing impacts from predation such as nest predation by corvids. An increase in human use via recreational activities (i.e., trails) and routine maintenance, as well as a patchwork habitat due to habitat enhancement or maintenance will likely cause an increase in corvid species. Furthermore, the MMHPP should include limitations on the amount of alteration conducted as a result of enhancement/restoration activities within suitable or occupied marbled murrelet habitat to ensure	The MMHPP requires the placement of wildlife-resistant refuse containers at trailheads and picnic areas to minimize the attraction of ravens, crows and jays (potential corvid predators of marbled murrelets). The MMHPP also prohibits all wildlife habitat enhancement and restoration activities, including gap creation and snag creation, within occupied marbled murrelet habitat and suitable habitat that has not been surveyed for marbled murrelets. On the remaining Project lands, the Jackson

STAKEHOLDER COMMENT	DISTRICT RESPONSE
that habitat is not rendered unsuitable.	Project Terrestrial Resource Management Plan (TRMP) prohibits even-aged timber harvesting, and the associated potential for habitat fragmentation, except in site-specific locations where WDFW and USFWS determine it is needed for habitat enhancement. It is anticipated these measures will minimize the fragmentation and degradation of suitable and occupied marbled murrelet habitat, and the attraction of corvids.
Within the *New Recreation Trails and Associated Facilities* section, the first bullet should be clarified. It is unclear whether trails and associated facilities will be constructed within marbled murrelet habitat. The Tulalip Tribes strongly recommend that trails and associated facilities avoid occupied or suitable habitat, and recommend a larger buffer than 100 feet. In addition, the Tribes recommend changing the language in the second bullet: "permission is granted to remove suitable nesting trees if a slope is unstable or considered unsafe". We recommend that the same process of review utilized for Roadside Danger Trees be employed for removal of trees associated with trails and other facilities.	A small portion of the proposed Culmback Dam Trail would run through occupied marbled murrelet habitat, but construction and use of the trail would be expected to have negligible impacts on nesting marbled murrelets. The felling of potential nest trees and adjacent cover trees would be kept to a minimum, and all felling and construction activity would occur outside the marbled murrelet nesting season. Human activity on the trail is expected to be light, and human use of hiking trails is not considered to be particularly harmful to marbled murrelets.
While most data in Washington suggests that marbled murrelet fledging activities would have occurred prior to August 31, more conservative dates limiting activities between April 1 and September 15 will further minimize disturbance to fledglings.	As noted in the comment, most data for Washington suggest marbled murrelet fledging is completed by August 31. This is reflected in Washington Forest Practices Rules, which define the marbled murrelet critical nesting season as April 1 through August 31. Restrictions on Project-related activities in occupied habitat after August 31 would be overly conservative, particularly given the limited nature of the activities (felling of roadside danger trees and recreational trail construction). With a few exceptions, these activities would not involve the felling or modification of nest trees, potential nest trees or trees providing cover to nest trees, so they would have relatively little potential to impact nesting marbled murrelets at any time during the nesting season. Prohibiting them from occurring through September 15 would leave the District with little time to complete them before winter snow accumulations make doing so impossible.

STAKEHOLDER COMMENT	DISTRICT RESPONSE
The Tulalip Tribes understands that the District will consider all unsurveyed habitat as occupied; however, we recommend that surveys be conducted more frequently than every ten years to ensure that the most appropriate marbled murrelet management decisions will be employed for the purposes of the project.	Surveys are proposed at 10-year intervals to account for new suitable marbled murrelet habitat that grows during the term of the license. Occupied habitat will not be resurveyed; it will be considered occupied for the term of the license and protected accordingly. Given the slow rate at which new marbled murrelet habitat develops, and the all-inclusive approach the District takes to identifying suitable habitat, it is believed that a 10-year interval is frequent enough to identify and protect all occupied habitat on Project lands. When evaluating habitat for marbled murrelet surveys, the District intentionally applies a broad definition of suitability to include all areas that could develop potential nest structures in the near future. The majority of the lands that are not currently considered occupied are young second-growth forest that will not develop potential marbled murrelet nest structures for several decades. It is therefore highly unlikely that any of the unsurveyed forest will become suitable marbled murrelet habitat between survey years.

APPENDIX B

STAKEHOLDER MEETING SUMMARIES

Jackson Project Relicensing
Terrestrial Resources Group

Monday, September 8, 2008

Meeting Summary

Start Time: 9:05 a.m.	**End Time:** 12:10 p.m.
Subject: Terrestrial Resource Group Meeting Summary	

Attendees:

- American Whitewater – Tom O'Keefe
- Biota Pacific – Marty Vaughn
- City of Everett – Julie Sklare
- District – Karen Bedrossian, Jeff Kallstrom, Bruce Meaker, Kim Moore, Dawn Presler
- FERC – David Turner (via conference phone)
- Meridian Environmental Inc – Pam Klatt
- North Cascades Conservation Council et al. – Rick McGuire
- Smayda Environmental Associates, Inc.– Kathy Smayda
- US Forest Service – Don Gay, Ann Risvold
- WA Dept of Fish and Wildlife – Rich Johnson

DISCUSSION ITEMS

Introductions

The group introduced themselves and their organizations.

Study Results Presentation

Karen, Kathy and Marty presented study results information contained in the attached slides.

Special Status Plant Survey discussion included the following:
Four lichens considered rare by the US Forest Service were located during the survey. Three of the species were in locations on non-NFS lands that are not impacted by the project. The fourth species was found on both NFS and private lands and is fairly common in the Project vicinity, despite its rare status. No special management methods were recommended by the FS for this species.

Noxious Weed Survey discussion included the following:
Blackberry is considered an invasive species, but it is not included on Snohomish County's noxious weed list. It is very common throughout the county. The District has a District-wide Vegetation Management Plan that covers general weed management for all District properties, including Jackson.

Wetland Survey discussion included the following:
Rich noted that the wetland rating system is misleading to persons unfamiliar with it. The rating system can somewhat counter-intuitively assign high scores to wetlands in the poor condition The pristine wetlands in the project area ended up with low ratings because of their limited opportunities for improving water quality and reducing flooding and erosion. Karen noted that reading the descriptions of the wetlands provides a better understanding of the quality of the wetland rather than reviewing the rating alone, that the system provided a standardized method of describing the wetlands, that the habitat scores and descriptions are useful, and that this system is the accepted method at both the state and county level. She and Bernice Tannenbaum discussed this issue with the author of the rating system while taking his wetlands rating class. (Note: this issue is addressed on the first page of the Western Washington Wetland Rating System ([Ecology Publication # 04-06-025.]).

- **Action:** Karen – per Rich's request, provide a cross reference for SP10 Amphibian wetland numbers with those from the SP9 Wetland Survey, since the two studies numbered the wetlands differently.

- **Action:** Dawn – resend link to SP9 and SP10 draft report appendices on web site.

Amphibian Survey discussion included the following:
Slide 21 should state that three (not four) state monitor species are potentially present. A fourth species, Oregon spotted frog, is listed as State Endangered, but its presence in the area is very unlikely.

Bull frogs (an invasive species) were found at Lost Lake, Chaplain Marsh and off-channel habitats along the lower Sultan River. While they are common in lowlands throughout western Washington, they were not found in the upper Sultan Basin.

Rich noted that there may be opportunities for management in the fluctuation zone and river channel to provide better habitat for amphibians; management activities could include timing and amount of flows/drawdown. Although, he is not necessarily saying the District should do so based on other resource needs/benefits. Karen noted that in the report conclusion it states that increase in flows on the river could have a negative impact on amphibians, and that existing conditions at the reservoir indicate that the amphibians are using areas outside the drawdown, so impacts from stranding are minimal.

Marbled Murrelet Survey discussion included the following:
The District has been operating as if the Culmback Dam West and East are occupied habitat since presence was first detected in the 1990s. Rich expressed gratitude that the District was treating the extent of occupancy as the entire survey area, as per PSG protocols.

Spotted Owl Survey discussion included the following:
The definition used during the study for suitable habitat is pretty broad since spotted owls have been found in non-typical or marginal habitat. Incidental potential sightings of spotted owls were treated as a possible sighting during the study and additional stations were added in those areas.

Karen noted that "owl detection" on the maps does not refer to spotted owls but to other species.

Marty discussed the latest research on the interaction of spotted and barred owls. They are competitors for the same habitat/food sources; this competition displaces the spotted owl. There is also some evidence of predation; however, the two species are not natural predators. There is some potential for spotted owl habitat improvement over the long term in the region, particularly on public lands, but the prospects for recovery of the species are still not good because of the presence of the barred owl.

Proposed Protection, Mitigation and Enhancement (PM&E) Measures Presentation

Karen, Kathy and Marty presented proposed PM&E information contained in the attached slides.

Noxious Weed Management Plan discussion included the following:
The District proposes a plan for the management of the 7 noxious weed species for which control must be provided under State and County regulations. The plan calls for an annual report and meeting, and review for additions/deletions from the County's list. The State gives authority for noxious weed control to the County governments.

During the discussion several stakeholders questioned why all noxious weeds would not be managed under the proposed plan. Karen stated that the plan will focus on the noxious weeds that are required to be controlled by state and county regulation. The survey included other noxious weeds and invasive species not listed as noxious weeds. The weed management plan will include general measures to prevent the introduction and spread of weeds, which will be effective both on the target weed species and other invasive species. The plan will bring prevention and management into the planning stages of ground-disturbing activities. Marty noted that the number of weeds for management is a concern due to the cost; managing for all invasive species, including those that have become widespread like blackberry and reed canarygrass, could be cost prohibitive.

The FS noted that they have concerns about the potential spread of weed species onto NFS lands, including several species not included in the draft weed management plan. They indicated that they recognize the difficulty of managing for species that are very common and widespread, such as blackberry and reed canarygrass, but would like to have other, less widespread species considered for addition to the plan. Ann Risvold indicated she will provide a list of FS weed species of concern to Karen.

Ann asked if the District uses herbicides. Karen responded that herbicides are not allowed in the watersheds due to water quality concerns as the water is for municipal drinking water supply. The two areas where knotweed is located are outside the watersheds and herbicides have been used, in combination with cutting, to treat those locations.

David noted that there are two options for the plan: 1) have a separate weed management plan or 2) incorporate the plan into the Terrestrial Resource Management Plan.

- **Action: Ann** – forward list of USFS weeds of concern to Karen.

- **Action**: Kathy – finalize draft Noxious Weed Plan for stakeholder review ASAP so it can be included in the PLP.

Marbled Murrelet Protection Plan discussion included the following:
The District proposes a plan for the protection of marbled murrelet habitat as it relates to road maintenance. Additional activities to be included in the plan are snag management and trails development; Marty will update accordingly for stakeholder review and comment. The District currently ensures protection of marbled murrelet habitat through the Washington Forest Practices Rules. Marty explained the implications of continuing to work through the Forest Practices Rules versus a PME with an incidental take statement for murrelets. A PME and incidental take statement are recommended because they would consolidate and clarify all murrelet habitat protection for District activities (including recreation trail development), and give the District more operational flexibility than the Forest Practices Rules.

A danger tree is one that is defined as having the potential to fall over a road or other facility where it could cause damage, restrict access or cause bodily harm.

Terrestrial Resources Management Plan discussion included the following:
The District is proposing a TRMP to cover the lands the District owns, including 1,745 additional acres around Spada Lake not covered in the original HEP analysis and 139 acres near Williamson Creek not currently in the WHMP or original HEP analysis. The City's lands on the Lake Chaplain Tract, which are used primarily for filtration plant/water supply purposes, as well as timber management, would not be in the TRMP, but would be managed under the current WHMP as an off-license agreement through which the District would maintain oversight of wildlife management activities. The City of Everett will no longer be a co-licensee for the project, and the preference is to continue managing the tract according to the WHMP, but under a separate, off-license agreement. Karen noted that the City of Everett had a timber management plan for the land prior to the preparation of the WHMP and proposed to include the Chaplain Tract in the WHMP as a means to provide more mitigation, while still harvesting timber. By implementing the harvesting plan in the WHMP rather than implementing the existing more aggressive timber management plan for the tract, wildlife habitat was improved. The value to the WHMP was measured by the HEP analysis as the difference between the two plans. The intention of including the lands in the WHMP was not to optimize the wildlife values, but to improve them over the original timber harvesting plan.

Rick expressed concern that there are differing beliefs on the management goals for these lands, the WHMP was outdated when it was written, more lands should be acquired, and the WHMP should be totally re-evaluated. He and Rich both suggested the WHMP places too much emphasis on management for deer. Rich expressed that he had very little disagreement with our current management but that he would like to see a change in management to less even-age stand management and focus on SP6 changes. Karen understands that there are differing philosophies on the management goals; however, the District is managing according to the goals established by the stakeholders under the WHMP's development and the objectives established by the State's current management plan, which includes managing habitat for deer. The WHMP emphasizes habitat for old-growth wildlife species because this was clearly a priority when it was written in the late 1980's, but it also includes management for deer because "in-kind" habitat mitigation was requested by the wildlife agencies as well. Don Gay, USFS asked if WDFW had had a recent change in policy to de-emphasize management for deer. Karen noted that a detailed response to NCCC comments was provided in the ICP response filed with FERC and that FERC made a determination on requests for modifications to study plans.

Rich expressed concern about not having regulatory authority over the Lake Chaplain lands if they are not in the project boundary. Enforcement efforts would be the obligation of the State rather than FERC. He did support the efforts currently underway at the Spada Lake Tract to promote late successional habitat. The District stated that the side agreement could include some oversight provisions, and that the side agreement warrants further discussion.

David Turner stated that the licensee needs to demonstrate to FERC that the Lake Chaplain lands are no longer needed within the project boundary for their original purpose (wildlife mitigation) or for any new purpose, such as recreation.

Tom asked if any lands would be added to the TRMP to replace the Lake Chaplain tract. Karen explained how the 1,745 acres at Spada Lake were added after the HEP analysis was conducted and 139 acres at Williamson Creek would be added, and how the total mitigation value and acreage would be more than adequate under the current FERC view of continuing project impacts.

- **Action: Rich** – identify specific habitat enhancement activities in SP6 that WDFW (including game management) would like to see occur on the mitigation lands so the District can begin analysis cost/benefit for the license application.

- **Action: Jeff** – develop bullet points or whitepaper on TRMP as it relates to an off license agreement relating to Lake Chaplain so Rich has something to give to his AG's Office for their review and approval of direction and for review by the TRG.

- **Action**: **Dawn** – route ICP response and FERC's study plan determination to TRG.

Next Steps for Process

The District will consider and update the PM&E documents based on comments received today at the meeting; the updated PM&Es will be routed via email for TRG review and comment next week. The TRG will have a 2-week comment period. The District seeks TRG input so what is proposed in the Preliminary Licensing Proposal (PLP) is close to/if not the final. In order for input into the PLP, Karen needs to have a "final" proposal ready for analysis by November 1.

Members can contact Karen via email and phone to discuss the proposals. A meeting will be scheduled for October 1, 9:00-11:00 to continue discussion of PM&E issues that do not get resolved between this and the next meeting.

- **Action: Marty** – forward the updated Marbled Murrelet PME to Don Gay for review.

END MEETING

Jackson Project Relicensing
Terrestrial Resources Group

Monday, February 23, 2009

Meeting Summary

Start Time: 2:05 p.m.	**End Time:** 3:40 p.m.
Subject: Terrestrial Resource Group Meeting Summary	

Attendees:

- Biota Pacific – Marty Vaughn
- City of Everett (City) – Julie Sklare
- District – Karen Bedrossian, Jeff Kallstrom, Bruce Meaker, Kim Moore, Dawn Presler, Matt Love (outside counsel at VanNessFeldman)
- Snohomish County (SnoCo) – Carly Summers (via phone)
- Tulalip Tribes (Tribes) – Reid Allison
- US Forest Service (USFS) – Kristen Bonanno (via phone)
- WA Dept of Fish and Wildlife (WDFW) – Rich Johnson

DISCUSSION ITEMS

Introductions

The group introduced themselves and their organizations.

Status of Relicensing; Settlement Process and Protocols

The entire Terrestrial Resources Group (TRG) was invited to this meeting. Since the attendees were familiar with the status of relicensing and the settlement process, these topics were not heavily discussed. The Confidentiality Agreement and Ground Rules are ready for signature by the agencies with an expectation of a required sign-off by each party by the March 11 Aquatic Resources Settlement Group meeting.

Review of PM&Es in PLP

Karen reviewed the PM&Es and Management Plans (in PLP Appendices) for terrestrial resources including the 1) TRMP, 2) Noxious Weed Plan, and 3) Marbled Murrelet Habitat Protection Plan.

TRMP – see handout

- Williamson Creek – additional acres (not in current WHMP) contain second-growth and wetland and are contiguous with Williamson Creek. Rich stated that WDFW prefers active management to accelerate habitat growth/diversity to allow for a variety of species.
- Lost Lake – no commercial harvest has been done there by the District but it is economically feasible to do so.

Noxious Weed Plan – no comments

Marbled Murrelet Habitat Protection Plan – received comments from Don Gay (USFS) which were incorporated into the version filed in the PLP. Tim Romanski provided comments to Karen on PLP version stating that USFWS is not likely to allow "take" for marbled murrelets. Access trail in upper river gorge area in marbled murrelet habitat could pose a problem. Karen will further discuss with Tim.

Issues

WDFW would like to see in TRMP:

- bigger gaps (1/4 acre), not necessarily more gaps, to provide a variety of habitat and not monocultural habitat
- Snag creation in mature growth areas, including larger diameter snags but in balance with the needs of marbled murrelets
- Fewer roads the better - better for wildlife
- Annual review good, but due to staffing concerns not sure if they will actively participate. 10 years for plan review too long to be proactive. 3-5 years may be better for plan review.
- Flexibility in the plan. Provide management concepts but not as detailed prescriptions as in current WHMP.

Karen and Biota are currently working on a draft TRMP. The District will provide a copy of the working draft to Rich and Mark Hunter by 16 March to be reviewed/commented on before Rich's one-month vacation that begins on 25 March. The TRG review of the TRMP will occur following that review.

WDFW expressed a desire to ensure that the general public continues to have the ability to access Project lands during state-approved hunting seasons. The Tribe expressed a similar interest for their members; no other terrestrial resource issues were identified. WDFW also mentioned concern that the Lake Chaplain Tract is managed for deer; however, the public is not allowed in the area for hunting.

Lake Chaplain Tract (LCT)

The City would like to have a meeting with WDFW and the City forester to discuss the management of the LCT. Rich said that he is interested in the meeting and site visit in March up to the 20th.

A list of issues Rich noted for the LCT were:

- Current clear cuts – he believes there is a short term gain but it is lost within 15 years when it doesn't provide browse any more and stays unproductive until the next cut.
- Minimize the use of clear cuts in favor of thinning
- Minimize size of clear cuts
- Lengthen seral stage (increase length of rotation)
- Minimize number of roads
- Develop corridors between the different habitat types
- Land not open to public should be managed for old growth

Rich would prefer management that targets critters losing habitat rather than target for deer. Karen pointed out that the WHMP was designed specifically to avoid and reduce the unproductive stages of clear cuts and that the overall wildlife habitat management program for Jackson Project will provide well over 100% of mitigation for late seral species. Rich would like for the District and City to look at the overall landscape. Karen said that mitigation was designed to make up for losses resulting from the Project (project nexus).

LCT management plan would be an off-license agreement signed by the District, City of Everett, WDFW and possibly the Tribes. USFS and Snohomish County indicated they were unlikely to be a signing party but would like to see drafts of the TRMP and LCT management plan.

Assignments:

Karen, Rich and Julie will set up a meeting for Rich and anyone else he wants to attend from WDFW to talk to the City forester in March.

Karen will send Rich and Mark Hunter a working draft version of the TRMP by 16 March so that Rich can review it prior to being gone during the month of April when the other stakeholders will be reviewing the draft plan.

Dawn will provide Karen with Justin Casing and Carly Summers' email addresses and will send terrestrial related emails to both Justin and Carly as requested by Carly.

END MEETING