SNOHOMISH COUNTY
PUD
PUBLIC UTILITY DISTRICT No. 1

2320 California St., Everett, Washington 98201 258-8211
Mailing Address: P. O. Box 1107, Everett, Washington 98206

May 20, 1988
PUD-17825

Mr. Kenneth F. Plumb, Secretary
Federal Energy Regulatory Commission
825 North Capitol St. N.E.
Washington, D.C. 20426

Dear Mr. Plumb:

Henry M. Jackson (Sultan River) Project - FERC No. 2157
License Article 53 - Wildlife Habitat Management Plan
Submittal of Revised Plan for Terrestrial Resources Mitigation

A revised mitigative plan for terrestrial resources, referred to as the Wildlife Habitat Management Plan (Plan), has been completed for the Jackson Project. The Plan is comprised of three separate volumes: Volume I - Plan and Appendices A-E; Volume II - Habitat Evaluation Procedures; and Volume III - Water Quality Constraints. Five copies, an original and four duplicates, of each volume are enclosed.

This Plan is intended to fulfill the requirements of Project License Article 53 in 17 FERC ¶ 61,056 issued on October 16, 1981, and as amended by Order paragraph (B) in 28 FERC ¶ 62,249 issued on August 22, 1984 (with subsequent time extensions). The Order states that the Licensee shall file "a revised terrestrial resources mitigative plan to protect and enhance terrestrial resources in the Sultan Project area. The plan shall include, but not be limited to: (1) identification of the type of habitat to be used for replacement; (2) a determination of the location and number of acres of habitat to be used for replacement; (3) a schedule of implementation; and (4) a monitoring program to determine the effectiveness of the mitigative measures. Documentation of agency consultation on the mitigative plan, and agency comments on the adequacy of the plan, shall be included in the filing."

The Plan was prepared by the Licensees in consultation with the Washington Department of Wildlife, the U.S. Fish and Wildlife Service, the U.S. Forest Service and the Tulalip Indian Tribes. The Washington Department of Natural Resources, Washington Department of Labor and Industries, Washington Department of Social and Health Services and Snohomish County Health District also were consulted. How the Plan specifically meets the requirements set forth in the above mentioned order is summarized in Section 1.2.1 "FERC Order Directives" of the Plan. "Agency Habitat Priorities" are addressed in Section 1.2.2.

0823T

The major features of the Plan include:

- Lake Chaplain Tract (2,657 acres) to be managed for wildlife habitat improvement;
- purchase of Lost Lake Tract (205 acres) adjoining the Lake Chaplain Tract to be managed for wildlife habitat improvement;
- Project Facility Lands (79 acres) to be managed for quality meadow, shrub, and open woodland habitat;
- Spada Lake Tract including management of the reservoir shoreline and, if and when obtained from the U. S. Forest Service, an estimated 700 acres to be managed for wildlife habitat improvement, emphasizing black-tailed deer; and
- acquisition of Williamson Creek Tract (344 acres) near Spada Lake to be managed for wildlife habitat improvement.

The Plan would be implemented through the year 2060. Overall, about 3,650 acres of land would be managed for wildlife habitat improvement. Within that area, about 1,300 acres in the Lake Chaplain Tract formerly closed to the general public for hunting access would be opened for public access and hunting. Additionally, 2,260 acres of water surface area are involved in the Plan. A summary of the areas included in the Plan is provided in Section 1.3 "Management Lands". Details and specific management prescriptions are provided in Chapter 3.0 "Management Tract Descriptions and Prescriptions".

The resource agencies requested that Habitat Evaluation Procedures (HEP) be used as a guideline for assessing the adequacy of the Plan for mitigating wildlife losses. HEP was used to assist in determining the direction and magnitude of mitigation measures. The final configuration and adequacy of the Plan were determined through consultation with the resource agencies. Using HEP, the value of the Plan was compared to the losses or gains resulting from Project construction and operation for each of ten evaluation species. Mallard, common merganser, osprey and beaver gained Average Annual Habitat Units (AAHUs) as a result of Project construction while the remaining six evaluation species lost AAHUs. According to the HEP analysis, implementation of the Plan will fully mitigate habitat losses to pileated woodpecker, pine marten, and Douglas squirrel, while mitigation will be substantial for black-tailed deer, ruffed grouse, and black-capped chickadee. Young and mature riparian habitat will be partially mitigated while old-growth forest and wetland habitat will be more than fully mitigated. Chapter 6.0 "HEP Assessment" details the beneficial effects of the proposed Plan to terrestrial wildlife resources.

The resource agencies' comments on the adequacy of the Plan are favorable and supportive (see Plan Appendix E for the record of agency consultation, including written comments on the Plan). The Tulalip Tribes, however, specify two exceptions: (1) more old-growth forest is requested; and (2) provisions are requested for permanently securing unimpaired access to mitigation tracts by Tribal members for the purposes of hunting, gathering and religious ceremonies. We believe that the Tribes' Plan review may have overlooked the extent of mitigation provided for old-growth forest. The HEP analysis indicates Plan implementation would provide over 200 percent mitigation for old-growth forest losses. Also, a proposed land exchange in the Sultan Basin between the Licensees and the U.S. Forest Service under License Article 52 (Recreation Plan) would potentially increase the acreage

for exercising Tribal treaty rights above that existing before the Project. Both issues are addressed in detail in the Licensees' response to the Tribes (see Plan Appendix E). The Licensees propose to meet with the Tribes to discuss Tribal concerns.

The Licensees' lack of control over proposed mitigation lands previously was a resource agency concern with our License Article 53 - Exhibit S (revised) filing and continues now with this filing. Therefore, to respond effectively to that concern we have initiated the land acquisition/control actions reported herein above and in Plan Appendix D. The City of Everett owns all acreage proposed within the Lake Chaplain Tract. The District is the owner of the Lost Lake Tract as of January 10, 1988. Also, the Licensees in cooperation with the Washington Department of Natural Resources, have commenced actions preliminary to Licensee acquisition of the Williamson Creek Tract. The latter two actions toward gaining control of mitigation lands may be premature in light of the pending Plan review by the Commission, however, they were necessary to secure property which the agencies had indicated would be acceptable to them for mitigation purposes.

Those entities who were to be consulted by license requirements related to this filing have been served copies of this filing. A certificate of service to those entities is enclosed also.

Very truly yours,

Mayor Moore
City of Everett

Charles N. Earl
District Manager

Enclosure - Original + 4 duplicate copies of Jackson Project Wildlife Habitat Management Plan, Volumes I-III
Certificate of Service

Distribution List:
Mark Robinson, FERC
Quentin Edson, "
Jay Watson, U.S. Fish & Wildlife Service
Phyllis Green, U.S. Forest Service
Walt Dortch, "
Gary Engman, Washington Dept. of Wildlife
Dave Somers, Tulalip Tribes
Bell & Ingram "
Joseph Potter, Washington Dept. of Natural Resources
Don Farwell, "
Herb Williams, Washington Dept. of Labor & Industries
Lawrence Waters, Dept. of Social & Health Services
Robert Pekich, Snohomish Co. Health District

0823T

PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY, WASHINGTON
AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

for the

Henry M. Jackson Hydroelectric Project
Federal Energy Regulatory Commission
Project Number 2157

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list (or the restricted service list, if applicable) compiled by the Secretary in this proceeding.

Dated at Everett, Washington
this 23rd day of May,
1988.

Name James D. Mason
(if applicable)

Address P. O. Box 1107
Everett, WA 98206

Telephone No. (206) 347-4301

1165U

WILDLIFE HABITAT
MANAGEMENT PLAN

for the

HENRY M. JACKSON HYDROELECTRIC PROJECT
FEDERAL ENERGY REGULATORY COMMISSION
PROJECT NUMBER 2157

VOLUME I
MAIN PLAN
and
APPENDICES A THROUGH E

Submitted by

PUBLIC UTILITY DISTRICT NO. 1
OF
SNOHOMISH COUNTY
AND
THE CITY OF EVERETT, WASHINGTON

May 1988

TABLE OF CONTENTS

VOLUME I

LIST OF FIGURES

LIST OF TABLES

LIST OF PARTICIPANTS

NAME	AFFILIATION	RESPONSIBILITY
Roy Metzgar	Snohomish County PUD	Project Supervision
Karen Bedrossian	Snohomish County PUD	Project Management & HEP
Robert Schneider	Snohomish County PUD	Project Administration
L. Chet Grimes	Snohomish County PUD	Project Administration
Martin Hatscher	Snohomish County PUD	Project Administration
Clair Olivers	City of Everett	City Review
Dan Lowell	City of Everett	City Review
Gary Byron	City of Everett	City Review
Gary Graves	City of Everett	City Review
R. Gary Engman	Washington Dept. of Wildlife	Agency Review & HEP
Charles Dunn	U.S. Fish and Wildlife Service	Agency Review
Gwill Ging	U.S. Fish and Wildlife Service	Agency Review & HEP
James Bartelme	U.S. Forest Service	Agency Review & HEP
Roger Williams	U.S. Forest Service	Agency Review
Duane Simmons	U.S. Forest Service	Agency Review
Marsha Kearney	U.S. Forest Service	Agency Review & HEP
Leslie Weldon	U.S. Forest Service	Agency Review & HEP
Deborah Raphael	U.S. Forest Service	Agency Review
David Sommers	Tulalip Indian Tribes	Tribal Review & HEP
Joe Potter	Washington Dept. of Nat. Res.	Agency Review
Don Farwell	Washington Dept. of Nat. Res.	Agency Review
Lawrence Waters	Washington Dept. of Social and Health Services	Agency Review
Herb Williams	Washington Dept. of Labor & Ind.	Agency Review
Jim West	Washington Dept. of Labor & Ind.	Agency Review
Robert Pekich	Snohomish County Health District	Agency Review
Paul Whitney	Beak Consultants Incorporated	Project Review
Martin Vaughn	Beak Consultants Incorporated	Project Management & HEP
Dave Hays	Beak Consultants Incorporated	Wildlife Biology & HEP
Leslie Ades	Beak Consultants Incorporated	HEP
Judith Baumert	Beak Consultants Incorporated	HEP
Kathe Hawe	Beak Consultants Incorporated	Technical Editor
Ken Raedeke	Beak Consultants Incorporated	Big Game Biology
Dorothy Raedeke	Beak Consultants Incorporated	Wetland Ecology
Todd Hansen	Pacific Forest Consultants	Forest Resources
Dennis Callegari	Pacific Forest Consultants	Forest Resources
Bradford Baily	Pacific Forest Consultants	Forest Resources
Timothy Manley	Pacific Forest Consultants	Forest Resources
Gregory Kirmeyer	Economic & Engineering Services	Water Quality
John Maxwell	Economic & Engineering Services	Economics
Dan Syverson	Syverson Seed Co.	Vegetation Planning
Frank Westerlund	Independent	Vegetation Mapping
Jerry Roppe	Independent	Consultation

SUMMARY

The Wildlife Habitat Management Plan is a detailed plan for mitigating the impacts to terrestrial wildlife resulting from the construction and operation of the Henry M. Jackson Project (Project) on the Sultan River in Snohomish County, Washington. It was prepared under the joint supervision of Public Utility District No. 1 of Snohomish County (District) and the City of Everett, Washington (City), in consultation with the Washington Department of Wildlife (WDW), the U.S. Fish and Wildlife Service (USFWS), the U.S. Forest Service (USFS) and the Tulalip Indian Tribes (Tribes). It was prepared to meet the requirements of the Federal Energy Regulatory Commission (FERC) as stated in an order issued on August 22, 1984.

The Project includes a 262-foot high dam and a 1,870-acre reservoir operated for fisheries habitat enhancement, water supply, hydroelectric power and flood control. It was built in two stages between 1961 and 1984. Impacts to wildlife were assessed in 1982 by the WDW, using the USFWS Habitat Evaluation Procedures (HEP). The 1982 HEP report was updated by the District in 1986 and used as a basis for determining the habitat emphasis of this management plan. The final configuration and adequacy of the plan were determined through consultation with the wildlife resource agencies.

The plan is based on the management of forest, wetland and lake habitat to enhance their value for wildlife and offset the loss of similar habitats inundated or altered by the Project. Detailed management plans were developed for 5,223 acres; including 2,960 acres of terrestrial, wetland and lake habitat and 2,263 acres of reservoir. An additional 700 acres or more of forest and wetland near Spada Lake currently administered by the USFS and proposed for exchange will be added upon acquisition by the co-licensees. The lands are situated in five tracts located in or directly adjacent to the Sultan River Basin. The largest is the Lake Chaplain Tract; 2,216 acres of forest and wetland and 441 acres of reservoir owned by the City and managed as a municipal watershed. The Lost Lake Tract lies adjacent to the Lake Chaplain Tract, and includes 29 acres of lake/wetland and 176 acres of

forest that were intended for residential development. Seventy-nine acres of right-of-way and forest land under District control below Spada Lake comprise the Project Facility Lands Tract. Approximately 116 acres of Spada Lake shoreline and a minimum of 700 acres of forest and wetland currently owned by the USFS constitute the Spada Lake Tract. The Project Facility Lands and Spada Lake Tracts will be managed within the confines of Project operation to enhance their wildlife habitat value. The Williamson Creek Tract is 344 acres of old-growth forest, riparian forest and wetlands that will be protected from logging and enhanced for wildlife.

The management program described in this plan will run from 1988 through 2060. It will emphasize the protection and enhancement for wildlife of old-growth forest, riparian forest, deciduous forest, mixed deciduous/coniferous forest and wetlands. It will also include the management of 1,292 acres of second growth coniferous forest on a 60-year harvest rotation designed to maximize habitat conditions for the wide range of wildlife species affected by the Project. The timing, arrangement and method of timber harvests are planned to provide optimal habitat for black-tailed deer, ruffed grouse, black-capped chickadee and other species that benefit from a mixture of second growth forest types. Habitat improvements will include the creation of snags and logs for woodpeckers and other snag-dependent wildlife, maintenance of green tree clumps, seeding of grasses and forbs to provide forage for deer and the maintenance of permanent forest buffer zones around wetlands and along streams.

Some lands included in the management plan lie within municipal watersheds for the City of Everett and town of Sultan. All management activities on these lands will comply with local, state and federal laws and policies for the protection of water quality, as identified in the Water Quality Constraints Document (Appendix G) prepared for the plan.

1.0 INTRODUCTION

This detailed plan for mitigating wildlife impacts resulting from the construction and operation of the Henry M. Jackson Hydroelectric Project (Project) is submitted in response to the Federal Energy Regulatory Commission (FERC) Order Approving Aquatic Resources Mitigation Plan and Requiring Revised Terrestrial Resource Mitigation Plan for Project No. 2157, issued on August 22, 1984 (28 FERC ¶62,249). It has been prepared in cooperation with the U.S. Fish and Wildlife Service (USFWS), the Washington Department of Wildlife (WDW; formerly the Washington Department of Game), the U.S. Forest Service, Mt. Baker-Snoqualmie National Forest (USFS) and the Tulalip Indian Tribes (Tribes). Assistance was also provided by the Washington Departments of Natural Resources (DNR), Social and Health Services (DSHS) and Labor and Industries (WDLI).

1.1 BACKGROUND

Snohomish County Public Utility District No. 1 (District) and the City of Everett (City) are co-licensees for the Jackson 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, a powerhouse with a generating capacity of 112 megawatts and 3.75 miles of 115-kilovolt transmission line (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 License Amendment submitted to the FERC in 1979.

Echo Lake

Lake Chaplain

Tunnel

Rd.

Diversion Dam

Sultan River

Culmback Dam

Spada Lake

No. Fk. Sultan R.

Little Greider Lake

Big Greider Lake

So. Fk. Sultan R.

Power tunnel

Power pipeline

Tunnel Portal

Diversion Dam

Chaplain Ck.

Lost Lake

Woods Lake

Woods Lake Rd.

Lake Chaplain Rd.

Powerhouse

Road

Sultan Basin

Sultan

Skykomish River

T29N
T28N
T27N

R7E R8E R9E R10E

U.S. Forest Service land under consideration for acquisition by the D.N.R. and co-licensees

0 1/2 1 2 MILES NORTH

0 3000 6000 9000 FEET

KEY MAP

EVERETT

SEATTLE

5 20 2 90 410 5 97

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 1.1 Project Location Map

Project-related impacts to fish and wildlife were estimated in studies conducted by the WDW 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). The WDW study was used in preparing a revised Exhibit S (Fish and Wildlife Plan) submitted by the District to the FERC in January 1983 (District 1983). The FERC accepted the District's proposed mitigation measures for aquatic resources, but ordered the District to prepare a revised plan for mitigating impacts to wildlife. This document is submitted in response to that order.

1.2 OBJECTIVES

The primary objective of this plan is to describe mitigation for wildlife habitat lost to the construction and operation of the Project. The plan is presented in sufficient detail to demonstrate its technical merit and feasibility and enable an accurate estimation of its value to wildlife. The plan was prepared in consultation with the FERC, WDW, USFWS, USFS and Tribes. The remainder of this section is a list of the objectives set forth by the agencies and Tribes and a summary of how the plan meets those objectives. Objectives specific to each management tract are identified in Chapter 3.0.

1.2.1 FERC Order Directives

1.2.1.1 Identify the Type of Habitat to be Used for Replacement

The wildlife management lands for this plan include old-growth and second growth coniferous forest, mixed deciduous/coniferous forest, riparian forest and wetlands. The present and future habitat conditions of all management lands are summarized in Table 1.1. A summary of all lands is presented in Section 1.4, and detailed descriptions are provided in Chapter 3.0.

Table 1.1. Existing (1987) and future (2060) distribution of cover types on the Jackson Project wildlife management lands. (Note: The distribution of cover types will change gradually between 1987 and 2060, and the two sets of numbers shown here represent only the beginning and end points of the process).

		Future Cover Type (Acres)												
Existing Cover Type	1987 Acres	Young Second Growth Coniferous Forest	Mature Second Growth Coniferous Forest	Old-Growth Forest	60-year Rotation Mixed Forest	Mature Mixed Forest	Young Riparian Forest	Mature Riparian Forest	Deciduous Forest	Shrub Brush	Grass Meadow	Wetland	Road	Lake
Young Second Growth Coniferous Forest[1]	1,773	1,292	338	0	58	31	0	0	0	0	0	0	54	0
Mature Second Growth Coniferous Forest[2]	27	0	27	0	0	0	0	0	0	0	0	0	0	0
Old-Growth Forest	327	0	0	327	0	0	0	0	0	0	0	0	0	0
Mixed Forest	428	0	27	0	38	354	0	0	0	0	0	0	9	0
Young Riparian Forest	50	0	0	0	0	0	50	0	0	0	0	0	0	0
Mature Riparian Forest	52	0	0	0	0	0	0	52	0	0	0	0	0	0
Deciduous Forest	57	0	0	0	0	0	0	0	56	0	0	0	1	0
Shrub/Brush	33	0	0	0	0	22	0	0	0	11	0	0	0	0
Grass Meadow	94	0	0	0	0	0	0	0	0	0	94	0	0	0
Wetland	98	0	0	0	0	0	0	0	0	0	0	98	0	0
Road	7	0	0	0	0	0	0	0	0	0	0	0	7	0
Lake	14	0	0	0	0	0	0	0	0	0	0	0	0	14
TOTAL	2,960[3]	1,292	392	327	96	407	50	52	56	11	94	98	71	14

[1] Young Second Growth Coniferous Forest includes all coniferous forest stand conditions from early-successional to large sawtimber up to 60 years of age. See Appendix A for a description of all cover types.

[2] Mature Second Growth Coniferous Forest includes large sawtimber stands greater than 80 years of age.

[3] Total does not include lands to be acquired near Spada Lake in trade from the U.S. Forest Service (minimum of 700 acres).

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

The wildlife management lands are arranged in five tracts located in or directly adjacent to the Sultan River basin. None are more than 10 miles from the areas affected by the Project. Detailed management plans were developed for 5,223 acres. This includes 2,960 acres of terrestrial, wetland and lake habitat and 2,263 acres of reservoir. An additional 700 acres or more of forest and wetland currently administered by the USFS will be added upon acquisition by the co-licensees. The locations of all tracts are described in Chapter 3.0.

1.2.1.3 Provide a Schedule of Implementation

This plan will be carried out in two phases. Phase I will run from 1988 through 1995, and will involve the construction of physical improvements (i.e., nest boxes and nesting islands) and the initiation of long-term management programs. Phase II will run from 1996 through 2060 and will consist of the ongoing management and monitoring of the lands. A complete schedule is included in Chapter 5.0.

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

The management lands will be monitored regularly to ensure that the habitat objectives outlined in this plan are met. Reports on habitat condition will be made to the agencies annually during Phase I and every five years during Phase II. The monitoring program is presented in Chapter 4.0.

1.2.1.5 Document Agency Consultation on Development of the Plan and Agency Comments on the Adequacy of the Plan

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

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). 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 management lands are of the same general cover types, but in most of the forests the trees are younger than those that were present on the impacted lands at the time of Project construction. The plan therefore includes preservation and enhancement of upland and riparian forest to produce older forests of the type that were removed to create Spada Lake, and protection of wetlands scheduled for residential development. 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 management 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 plan calls for the preservation of 327 acres of old-growth coniferous forest and management of 855 acres of second growth coniferous, mixed and deciduous forest without harvesting to promote old-growth or late-successional characteristics. An additional 1,388 acres of second growth

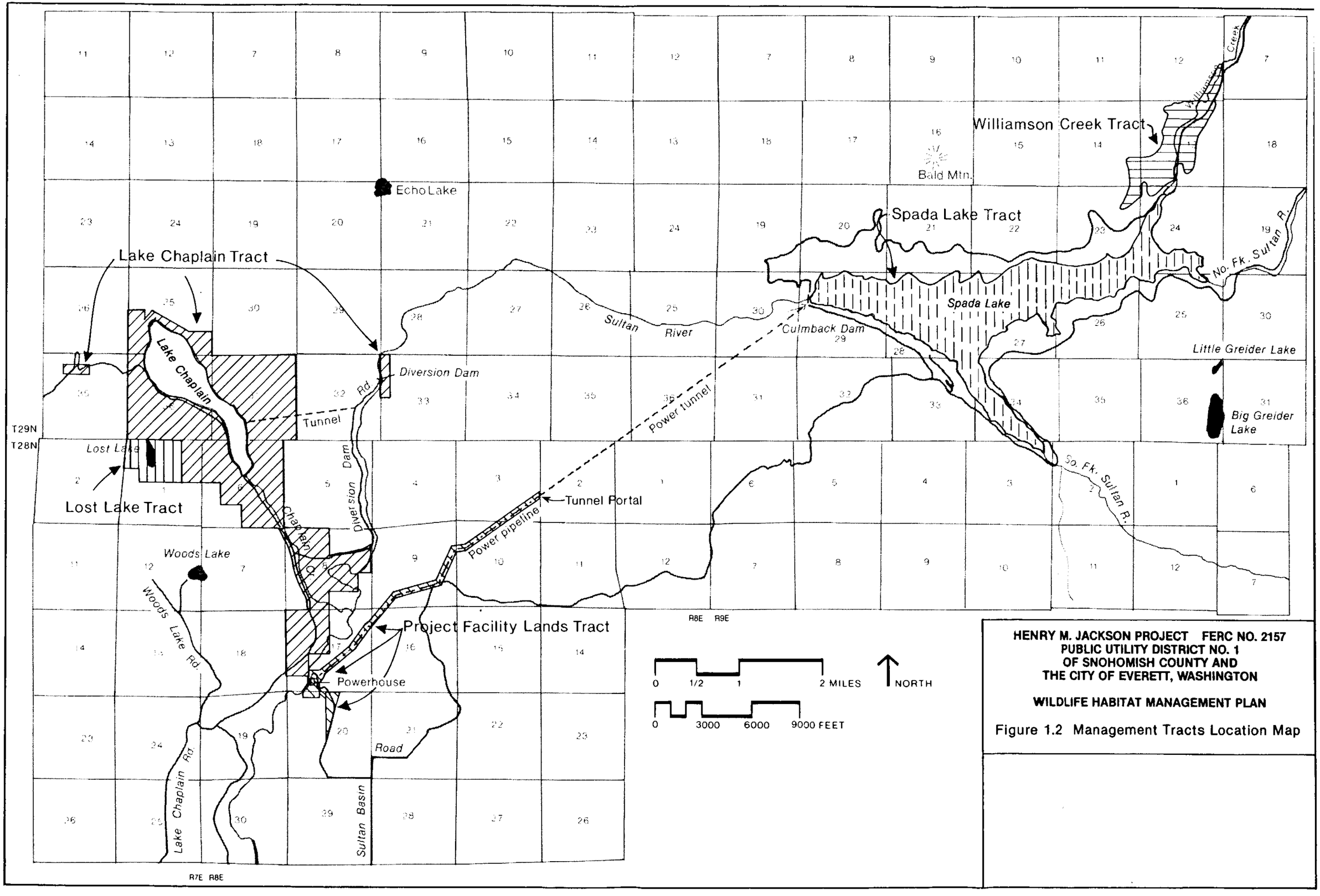
forest will be managed on a 60-year sustained yield rotation with specific measures to promote late-successional habitat characteristics. One hundred-two acres of young and mature riparian forest will be protected from logging and 15 acres of wetlands will be protected from residential development.

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 required up-dating before use in evaluating management plan alternatives. The 1982 HEP did not assess all evaluation species in all habitats; it underestimated the rates of logging that would have occurred in the basin without the Project; it did not address beneficial aspects of the Project; and it combined all AAHUs for all species into a single number. The last item, in particular, precluded the identification of gains and losses of specific habitats, such as old-growth forest, as requested by the agencies. Consequently, the District, in cooperation with the agencies, updated the 1982 HEP following current USFWS HEP procedures and utilizing as much of the original 1982 data as possible. Results of the HEP update are presented in Chapter 6.0.

1.3 MANAGEMENT LANDS

The management lands consist of 2,960 acres of upland, wetland and lake and 2,263 acres of reservoir habitat in the vicinity of the Project (Figure 1.2). An additional 700 acres or more of forest and wetland currently administered by the USFS will be added upon acquisition by the co-licensees. The lands are divided into five major tracts based on location and ownership. The following paragraphs summarize the tracts. Detailed descriptions are provided in Chapter 3.0.



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 1.2 Management Tracts Location Map

1.3.1 Lake Chaplain Tract

The 2,657-acre Lake Chaplain Tract is the largest in the management plan. It encompasses 55 acres of old-growth forest, 1,688 acres of coniferous second growth, 321 acres of mixed and deciduous forest, 17 acres of riparian forest, 79 acres of wetlands, a 441-acre reservoir (Lake Chaplain) and 56 acres of non-forested upland habitat. It is owned by the City and managed as a municipal watershed. The protection of water quality for public water supply is a principal concern in the tract. The wildlife management plan calls for the preservation of existing old-growth, mixed forest, deciduous forest and wetland habitats and the management of second growth coniferous forest to maximize habitat value for a wide range of wildlife species.

1.3.2 Lost Lake Tract

Lost Lake is a 14-acre natural lake located approximately 1 mile southwest of Lake Chaplain. The tract also includes 15 acres of high-quality wetlands and 176 acres of second growth forest and recent clearcuts. The entire 205-acre tract was previously held in private ownership and was being considered for suburban residential development. As part of the wildlife habitat management plan the lake and wetlands will be preserved and a 500-foot buffer zone will be provided around them. The forest outside of the buffer zone will be managed to optimize its value to species such as black-tailed deer and ruffed grouse.

1.3.3 Project Facility Lands Tract

Approximately 79 acres of right-of-way and forest land under District control downstream of Spada Lake will be enhanced for wildlife. These include the pipeline right-of-way, the transmission line right-of-way and the powerhouse site. Most of these lands are maintained in non-forested upland vegetation (grass and shrubs). They will be managed to provide meadow, shrub and open woodland habitat on a permanent basis.

1.3.4 Spada Lake Tract

The Spada Lake Tract includes the 1,870-acre reservoir (at normal maximum operating pool elevation of 1,450 feet above mean sea level (MSL)) and approximately 68 acres of land above the reservoir (elevation 1,450 feet to 1,460 feet MSL). The forest above the reservoir (up to elevation 1,460 feet MSL) and the riparian zone (elevation 1,445 to 1,450 feet MSL) will be maintained in permanent forested cover. A test planting program will be conducted on the shoreline between elevation 1,435 and 1,445 feet MSL to determine if the shoreline can be re-vegetated. Upon acquisition by the co-licensees, at least 700 acres of land currently administered by the USFS adjacent to Spada Lake will be included in the plan.

1.3.5 Williamson Creek Tract

This tract consists of 344 acres of old-growth, second growth and riparian forest along Williamson Creek, northeast of Spada Lake. It represents one of the last remaining stands of old-growth forest in the Spada Lake Basin. Most of this tract is owned and administered by the DNR. Two small parcels (totaling less than 40 acres) are federal lands administered by the USFS. Most of the tract was scheduled for harvest in the mid-1980's, but it has been kept intact at the request of the District for potential use as mitigation land. The co-licensees will obtain control of the tract. Under the management plan, the tract will be preserved as old-growth and riparian forest and managed for late-successional wildlife species.

1.3.6 Summary of Management Lands

The cover types provided by the management lands have been summarized on a tract-by-tract basis (Table 1.2). The table includes both existing and future habitat conditions under full implementation of the management plan.

Table 1.2. Existing (E) and future (F) cover types on the Jackson Project wildlife management lands. (Existing figures are for 1987, future figures are for 2060).

	Acres by Tract											
	Lake Chaplain		Lost Lake		Project Facility Lands		Spada Lake		Williamson Creek		Totals	
Cover Type	E	F	E	F	E	F	E	F	E	F	E	F
Young Second Growth Coniferous Forest[1]	1,674	1,290	69	0	2	2	28	0	0	0	1,773	1,292
Mature Second Growth Coniferous Forest[2]	14	324	0	0	0	0	0	55	13	13	27	392
Old-Growth Forest	55	55	0	0	0	0	0	0	272	272	327	327
Mixed Forest	268	290	107	176	8	17	27	0	18	20	428	503
Young Riparian Forest	0	0	0	0	0	0	50	50	0	0	50	50
Mature Riparian Forest	17	17	0	0	0	0	0	0	35	35	52	52
Deciduous Forest	53	52	0	0	0	0	4	4	0	0	57	56
Shrub/Brush	22	11	0	0	9	0	0	0	2	0	33	11
Grass Meadow	34	34	0	0	60	60	0	0	0	0	94	94
Wetland	79	79	15	15	0	0	0	0	4	4	98	98
Lake	0	0	14	14	0	0	0	0	0	0	14	14
Reservoir	441	441	0	0	0	0	1,822	1,822	0	0	2,263	2,263
Road	0	64	0	0	0	0	7	7	0	0	7	71
TOTALS	2,657	2,657	205	205	79	79	1,938	1,938[3]	344	344	5,223	5,223

[1] Young Second Growth Coniferous Forest includes all coniferous forest stand conditions from early-successional to large sawtimber up to 60 years of age. See Appendix A for a description of all cover types.

[2] Mature Second Growth Coniferous Forest includes large sawtimber stands greater than 80 years of age.

[3] Total does not include lands to be acquired near Spada Lake in trade from the U.S. Forest Service (minimum of 700 acres).

1.4 APPROACH AND ORGANIZATION

This wildlife habitat management plan is based on two assumptions: a) optimal habitat conditions can be described for a given species, and b) habitat can be managed to produce optimal or near optimal conditions where they do not already exist. The measures prescribed in this plan are designed to protect or modify existing forest, meadow and wetland habitats in the Project vicinity and enhance their value for the ten evaluation species used in the HEP analysis (Chapter 6.0). The methods are derived from forest management and wildlife habitat enhancement techniques. The specific habitat objectives are derived from current wildlife literature, including the habitat suitability index models used in the HEP assessment (Appendices B and F).

The plan is presented in the form of forest land management prescriptions. The five tracts of management lands (Chapter 3.0) are divided into management units, which are further divided into stands. A stand is a contiguous piece of land with homogeneous vegetation cover. In forested areas, stands are differentiated on the basis of the age, species, size and density of overstory trees; and each of these variables is fairly constant within a stand. The term stand is expanded in this plan to include non-forested ecological communities such as meadows and wetlands. Stand size ranges from 2 to 221 acres. Forested stands are divided into cutting units (Section 2.1). Cutting unit size ranges from 3 to 26 acres.

The plan will be in effect from 1988 through 2060. During those 73 years the theory and practice of wildlife habitat management may change. Also, certain existing techniques may be adapted and prove more effective within the management lands. The plan is based on current theory and practice, but it would be seriously handicapped if not open to future change. For that reason, it is designed to accommodate changes and improvements in wildlife habitat management as they become available. The overall objectives of this plan are clearly stated in Section 1.2, and these will serve as a guide to all future management. Adjustments will be made to the existing prescriptions as needed, and new techniques will 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 this plan.

The detailed prescriptions in Chapter 3.0 serve two purposes. First, they guide the implementation of this plan. Second, they demonstrate that the objectives of this plan can be met on the management lands with existing management techniques. It is assumed, however, that the detailed schedule of overstory harvest will be adjusted during the next 73 years to accommodate site conditions, natural perturbations, management conflicts and economics. As with changes to management techniques, changes to the prescriptions will be made only when they will not compromise the overall objectives of this plan.

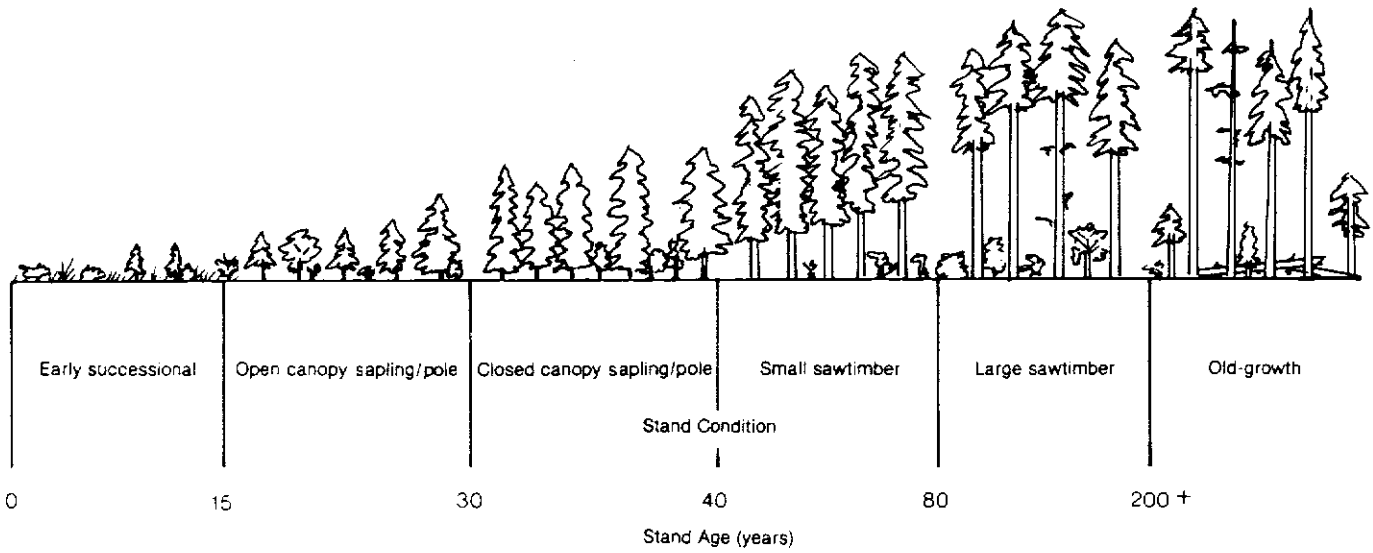
2.0 HABITAT ENHANCEMENT METHODS

2.1 FOREST VEGETATION MANAGEMENT

The wildlife management lands are predominantly coniferous forest and mixed forest. The most effective means of altering the habitat of forested lands is manipulation of the overstory. The overstory influences the physical structure, microclimate and floristic diversity of a site, and ultimately determines the quantity and quality of wildlife habitat available. Accordingly, this management plan is based upon the use of forest management techniques, such as thinning, fertilization (where permitted), planting and harvest to manipulate the forest overstory and enhance habitat for the evaluation species. In conjunction with this, the forest understory will be manipulated to improve stand diversity and increase the production of deer forage.

A forest stand is a dynamic entity that is constantly changing in physical structure and biotic composition. The structural character of the stand changes as trees grow from seedlings to maturity. Species composition changes as fast growing pioneer species are succeeded by slow growing, shade tolerant species that emerge from the understory. Management of the stand is management of this successional process and not just management of the existing trees. Manipulation of the stand (e.g., harvest or thinning) will delay or advance succession, but it will not stop the process, and perpetuation a particular condition, such as early-successional or mixed forest, cannot be accomplished without manipulation to slow succession.

Successional models have been prepared to describe the processes of growth and development in western Washington coniferous forest. Without manipulation, the management lands would proceed through a series of predictable conditions as shown in Figure 2.1. Each condition has different value as wildlife habitat, and one way to increase overall wildlife habitat value is to minimize the amount of time management lands remain within those conditions with the lowest value. For example, small sawtimber has low value for deer because forage is limited. By fertilizing



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON
WILDLIFE HABITAT MANAGEMENT PLAN

Figure 2.1 Successional model for western Washington coniferous forest following clearcutting or fire (from Hall et al. 1985).

the stand at the end of the seedling/sapling stand condition, and thinning the overstory 10 to 15 years later, the large sawtimber condition can be achieved in much less time than under natural succession.

Some species, like deer and grouse, need multiple stand conditions in close proximity to meet their life requirements. This can be achieved by organizing the distribution of various stand conditions in time and space to provide optimal availability and interspersion for the evaluation species. The most effective way to alter the stand condition is to set succession back by removing the overstory. Small scale overstory removal (i.e., patch harvest) will therefore be the primary tool used to create interspersion.

Forested lands will be managed according to four general silvicultural systems:

a) The majority of the second-growth coniferous forest will be put into a 60-year rotation emphasizing a coniferous overstory;

b) Existing old-growth stands and adjoining younger stands will be retained without overstory harvest to emphasize late-successional forest habitat;

c) Some lands that are presently dominated by mixed forest or deciduous forest will also be retained without overstory harvest to provide mature mixed forest habitat; and

d) Part of the mixed forest at Lost Lake will be managed on a 60-year rotation for black-tailed deer, ruffed grouse and black-capped chickadee.

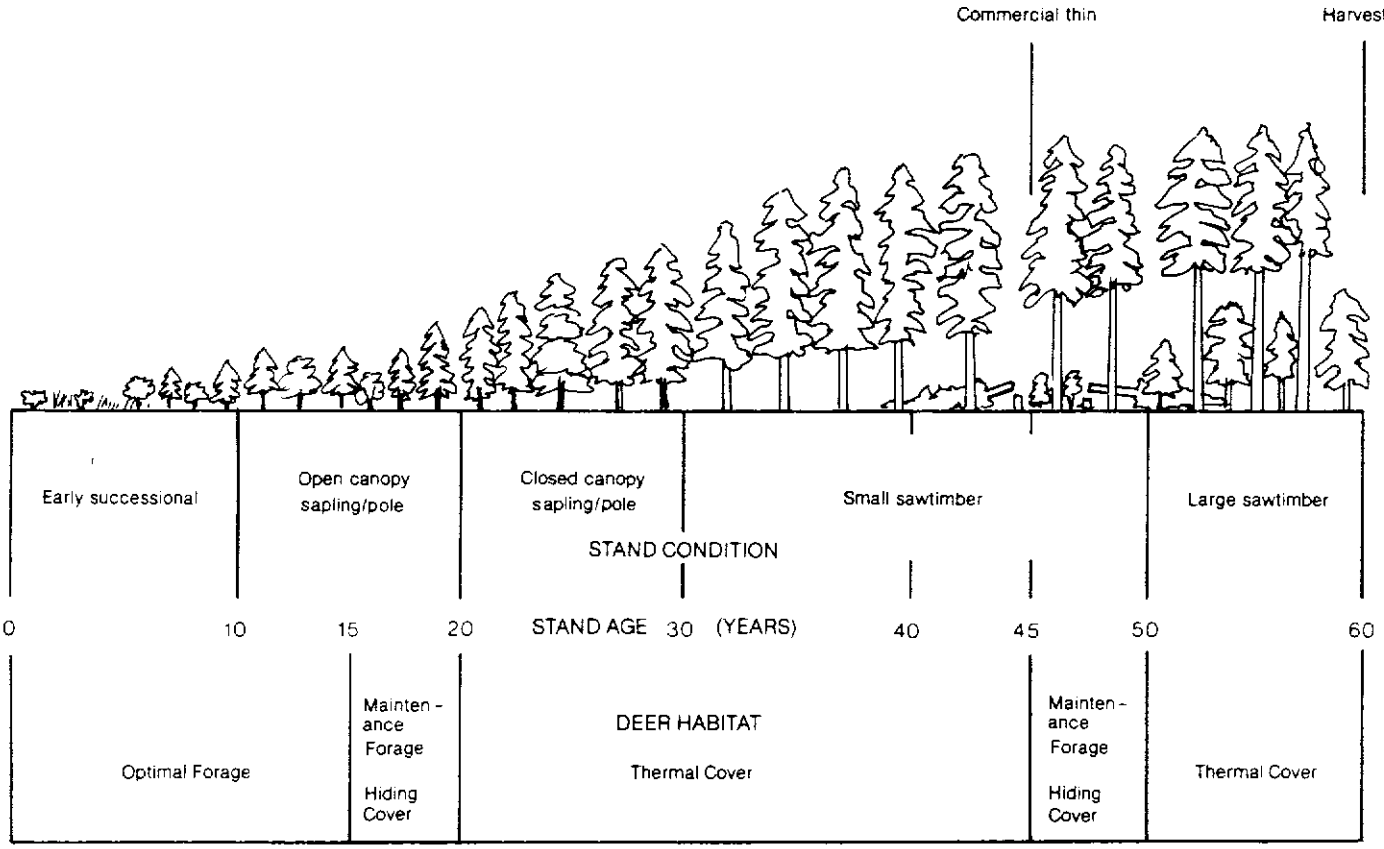
2.1.1 60-year Rotation Coniferous Forest

Approximately 1,290 acres of second growth coniferous forest (mostly small sawtimber) in the Lake Chaplain Tract will be managed on a 60-year rotation to optimize the availability of forage and the interspersion of

forage and cover for deer, and to increase the amount of large sawtimber coniferous forest for late-successional wildlife species (Figure 2.2). The availability of deer forage will be increased by maintaining a constant acreage in the early-successional stand condition and increasing the production of grasses and shrubs on those acres. This will require regular harvesting to replace stands that develop into small sawtimber. The interspersion of forage and cover will be optimized by limiting the width of harvest units to 1,200 feet (deer use decreases significantly at distances greater than 600 feet from cover; Witmer et al., 1985) and maintaining forest cover around all harvest units until they are at least 15 years old. Late-successional characteristics will be enhanced by providing large snags, logs and green tree clumps and by thinning to promote the growth of overstory trees late in the rotation.

All lands to be managed on the 60-year rotation have been divided into cutting units of 3 to 26 acres (26 acres is the area of a circle with a radius of 600 feet). Each unit has a scheduled harvest date, with harvests beginning in 1990. Harvesting will be done on a sustained-area basis, so an average of 1/60 of the total area will be harvested in any year. Units will be grouped into 5-year periods for efficiency of management, with approximately 1/12 of the area scheduled for harvest in each 5-year period. Adjustments may be made to the schedule if market or site-specific conditions warrant, but no harvest unit will be cut more than 10 years before or after its scheduled harvest date. Schedule changes will not compromise the overall objectives of the wildlife habitat management plan. Harvest units will be interspersed to minimize the number of adjacent units cleared within 15 years of each other. This will provide forage areas (0 to 15 years after harvest) adjacent to hiding and thermal cover (15 years plus) for the benefit of edge-dwelling wildlife species.

Each unit will be visited by a forester and a biologist one to two years prior to the scheduled harvest date. The harvest will be planned, roads will be designated and the timber will be cruised. Buffer zones (Section 2.2), snags and green-tree clumps (Section 2.3) will be designated



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON
WILDLIFE HABITAT MANAGEMENT PLAN

Figure 2.2 Successional model for coniferous forest wildlife management lands under the proposed 60-year rotation for wildlife.

accordingly by the wildlife biologist in cooperation with the forester. The timber harvest will be jointly supervised by the forester and biologist to ensure that wildlife objectives are met. Logging slash will be treated the year of harvest to meet DNR requirements, minimize fire danger and allow deer movement within stands. The method of a slash disposal will be determined by the wildlife biologist after consultation with the forester. Wildlife considerations will take precedent over timber revenues during harvests.

Units will be seeded (Section 2.1.5) and re-planted within one year after harvesting. Douglas-fir seedlings will be planted at a density of 250 trees per acre. This is lower than the industry standard of 300 to 400, but it will minimize the need for pre-commercial thinning and leave greater growing space for grasses, forbs and shrubs (forage). Competing vegetation (largely alder and maple) will not be controlled unless it threatens to seriously retard the growth of coniferous trees. Maple stumps will be allowed to re-sprout and alder will be allowed to invade to produce an overstory with 5 to 10 percent hardwood trees. Cottonwood and cedar may also be planted with the Douglas-fir if site conditions are appropriate.

Units will be visited annually for 5 years and again at 10 years after planting to check tree density. Stocking adjustment (i.e., pre-commercial thinning or re-planting) will be conducted if the density is significantly greater or less than 190 trees per acre. Pre-commercial thinning should not be necessary on most stands, thereby avoiding the accumulation of slash and the problems it creates for big game movement.

Units will be fertilized, at the option of the District and City, beginning 1 to 2 years after planting. Fertilization may continue at 5-year intervals until stand age of 55 years. The first two or three fertilizer applications will enhance the growth of young trees as well as grasses and shrubs. Later applications primarily will affect tree growth and will hasten the development of the large sawtimber stand condition. The decision whether or not to fertilize will be based on the effects on stand vegetation as well as the economics of fertilizer. Fertilization will not be done

unless it furthers the goals of the management plan (i.e., increased forage production and larger tree size) and it is cost effective (i.e., the cost of application is recovered through increased timber yield at the time of harvest). There will be no fertilization on stands within the Lake Chaplain watershed. The rate of fertilization will be at least the equivalent of 200 pounds of nitrogen per acre, and will be determined on a site-specific basis. (Note: benefits of the plan projected in the HEP analysis did not include the use of fertilizer).

Coniferous forest will be thinned commercially 40 to 45 years after planting. The overstory will be thinned to approximately 60 percent canopy closure (canopy closure will be 100% prior to thinning in most harvest units). Thinning will allow sunlight to reach the understory for forage development and increase the growth rate of the remaining trees to produce large sawtimber. Units will then be allowed to grow until they are 60 to 65 years old, when they will be harvested again.

2.1.2 Old-growth Coniferous Forest

Existing old-growth stands in the Lake Chaplain and Williamson Creek Tracts will be preserved and managed with minimal intervention. Overstory trees will be killed only when necessary to maintain target densities of snags (Section 2.3) at the Lake Chaplain Tract.

Several stands of small sawtimber, large sawtimber and mixed forest adjacent to existing old-growth stands will be included with the older stands into old-growth management areas. The younger stands will serve initially as buffer zones between the old-growth and more intensively managed forest. The young buffer stands will not be harvested, and eventually they will develop late-successional characteristics such as large overstory trees, large snags and logs and multi-layered overstories. This may require thinning and patch clearings (less than 1 acre) in those stands that are accessible with logging equipment. In general however, management of old-growth areas will consist of protection from harvest and minimal manipulation.

2.1.3 Permanent Mixed Forest and Permanent Deciduous Forest

Two hundred fifty-seven acres of forest in the Lake Chaplain Tract, 80 acres in the Lost Lake Tract, 17 acres in the Project Facility Lands Tract and 20 acres of the Williamson Creek Tract will be preserved as permanent mixed forest with no clearcutting. An additional 52 acres of deciduous forest and 17 acres of riparian forest at Lake Chaplain, 4 acres of deciduous forest and 50 acres of young riparian forest at Spada Lake and 35 acres of mature riparian forest at Williamson Creek will similarly be preserved through 2060. Approximately 33 acres of mixed forest that occur in small scattered stands will be incorporated into coniferous forest units for practical reasons, but they will be protected during harvest if possible. The ability to preserve the smaller stands depends on site-specific limitations of harvesting equipment and the potential for blowdown in such small stands.

Some units are mixed or hardwood forest because of moist soils or other edaphic conditions (e.g., riparian) that preclude conifers from becoming dominant, and they will remain as mixed or deciduous forest with little intervention. Other units are dominated by alder or a mixture of conifers and alder simply because they were not replanted with conifers after harvest. Their present condition is only temporary and they will eventually become coniferous stands if left alone.

2.1.4 60-Year Rotation Mixed Forest

Approximately 96 acres of mixed forest in the Lost Lake Tract will be managed on a 60-year rotation to provide optimal mixed forest habitat for early- and mid-successional wildlife species. The basic management prescription will be similar to that for second growth coniferous forest at Lake Chaplain, with the following exceptions:

a) Stands will be replanted with a mixture of species to ensure a stocking composition of at least 30 percent deciduous trees (preferably cottonwood and bigleaf maple) at stand age of approximately 45 years;

b) Stocking adjustments will be performed on a spacing basis, with multiple tree species being left, rather than selection for a single species such as Douglas-fir; and

c) Maximum size of cutting units will be limited to 10 acres in order to increase edge and enhance habitat for ruffed grouse and black-tailed deer.

2.1.5 Understory Management

Much of the second growth forest on the management lands is characterized by a poorly developed understory. Shrub production is low in most small and large sawtimber coniferous stands because too little light reaches the understory. The overstory management program will open the forest canopy during commercial thinning and remove it at final harvest. The growing space made available through overstory removal 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.

Forage production will be increased by protecting desirable forage species during harvest, re-planting trees at a lower than normal density (250 trees per acre) and seeding units with grasses and forbs. A tentative list of species is presented in Table 2.1. Fertilization may occur at a rate of 200 pounds of nitrogen per acre (except in the Lake Chaplain watershed) beginning 1 to 2 years after seeding.

Studies conducted in an Oregon coast range Douglas-fir forest by Witler (1975) showed an increase in herbaceous cover and shrub biomass in stands thinned to approximately 70 percent canopy closure. Forage production will be increased on management lands by commercially thinning to approximately 60 percent canopy closure and re-seeding with palatable grasses and forbs following thinning.

Table 2.1 Tentative list of plant species for forage enhancement of forested lands.

Common Name	Scientific Name
GRASSES	
Perennial Ryegrass[1]	Lolium perenne
Creeping Red Fescue[1]	Festuca rubra
Alta Tall Fescue[1]	Festuca arundinaceae
Reedgrass[2,3]	Calamagrostis canadensis
Dwarf Orchard-grass[1]	Dactylis glomerata
Bulrush[2]	Scirpus microcarpus
Mannagrass[3]	Glyceria spp.
Sedge[2]	Carex spp.
Rush[2]	Juncus spp.
FORBS	
Agoseris[4]	Agoseris heterophylla
Pearly-everlasting[4]	Anaphalis margaritacea
Clover[1,4]	Trifolium spp.
Birdsfoot trefoil[4]	Lotus corniculatus
Plantain[4]	Plantago spp.
Yarrow[4]	Achillea lanulosa
Speedwell[2]	Veronica spp.
Valerian[2]	Valeriana spp.
False Solomon's Seal[2]	Smilacina spp.
Prunella[1]	Prunella vulgaris
Cats-ear[5]	Hypochaeris radicata
Fireweed[5]	Epilobium angustifolium
Willow-weed[2]	Epilobium watsonii
Fleabane[5]	Erigeron spp.
Hawksbeard[5]	Crepis spp.

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

2.2 WETLAND AND STREAMSIDE BUFFER ZONES

Riparian zones support a wide variety of plant and animal life and therefore form an important part of forest communities. Riparian vegetation stabilizes streamside soils and provides deciduous litter that is a primary source of nutrients to the aquatic system (Franklin et al., 1981). The vegetation is typically more diverse and includes 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 cycle.

2.2.1 Wetland Buffer Zones

Buffer zones will be established around all wetlands and maintained through 2060. Zones will be 500 feet wide around Lost Lake and 200 feet around all other wetlands. There will be no overstory harvest in the buffer zones unless small patch cutting (less than 1 acre) is done to promote understory development (Section 2.1.5). Snag densities will be maintained at target levels (Section 2.3).

2.2.2 Streamside Buffer Zones

Buffer zones will be maintained along all streams and rivers on the management lands through 2060. Buffer zones will be at least 200 feet wide along either side of the Sultan River (a Type 1 stream as defined by the DNR stream classification system), 100 feet wide along Type 2 and Type 3 streams (i.e., Chaplain Creek) and 50 feet wide along Type 4 and Type 5 streams. Buffer zones may be wider on steep and/or unstable soils or between roads and streams where a larger zone is needed to adequately protect the stream. No overstory harvesting will be conducted in buffer zones. They will be visited annually through 2060 to monitor soil and vegetation conditions and to ensure effectiveness of stream protection. Snag densities will be maintained at target levels by creating snags.

2.3 SNAG MANAGEMENT

Snags, and the cavities created in them, are important habitat components for many species of terrestrial wildlife. Snags are used extensively for a number of activities, including nesting, hiding, foraging and food storage. Cavity nesting birds can represent 30 to 45 percent of the total bird population in forested areas (Raphael and White 1984), and the absence of suitable snags can be a major factor limiting their populations.

The number and size of snags present under natural conditions can vary greatly depending on the age and history of the stand. Cline et al., (1980) found densities to range from 79.3 snags per acre in 35-year-old stands to 7.3 snags per acre in stands of 200 years or older. Average snag size ranged from 5.1 inches in the young stands to 28.3 inches in the older stands. Snag longevity also varies with the size and species of the snag. Large Douglas-fir snags can last up to 90 years, but they receive the majority of their use during the first 50 years. Small hemlock and alder snags may remain standing 5 years or less. Snags turn from hard to soft over many years as the decay process softens the wood. Both types of snags are important to wildlife and serve specific functions. Hard snags are used for nesting and foraging by woodpeckers, while soft snags are important for nesting by less capable excavators like chickadees. The decay process has been described in detail by Cline et al., (1980), who identified five sequential stages of decay.

Snags are usually eliminated in managed forests to maximize the production of wood fiber and improve safety during logging and fire suppression. Pre-commercial and commercial thinning typically eliminate all snags greater than 15 inches DBH in managed stands (Neitro et al., 1985).

Several assumptions are necessary to determine the number of snags needed for snag-dependent wildlife in managed forests. They have been discussed by Neitro et al., (1985), and include:

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 2.2). Snags are frequently used by different individuals of the same or different species in subsequent years, but they are rarely shared during the same year.

A total of 307 snags per 100 acres, ranging in DBH from 11 inches to 25 inches, will 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 2.3).

Table 2.2. Snag requirements of primary cavity nesters common to the Jackson Project wildlife management lands (from Neitro et al., 1985).

Species	Snags/100 ac.	Hard	Soft	Minimum Size DBH(in)	Minimum Size Height(ft)
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				

Table 2.3. Snag requirements of secondary cavity nesters common to the Jackson Project wildlife management lands (from Neitro et al., 1985)

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

Snags will be created and monitored on management lands to ensure that the snag requirements of species in Tables 2.2 and 2.3 are met. The target density will be 15 snags per 5 acres of forest or an average of three per acre. These may be in clumps or dispersed evenly throughout the stand, depending on the distribution of existing snags and safety restrictions imposed during logging operations. Existing snag densities will be determined on a stand by stand basis during the first eight years of the management plan, and new snags will be created, as needed, by topping live trees (Bull and Partridge 1986). Existing snags will be left during overstory harvest whenever possible in keeping with the safety guidelines established by the U.S. Forest Service (USFS 1986) and approved by the WDW, DNR and WDLI.

New snags will be created to achieve, at a minimum, the sizes and densities of snags shown in Table 2.2. Smaller snags will be substituted if trees of the appropriate size are not available. Each stand should have snags from a variety of decay stages, as defined by Cline et al. (1980). If a stand does not have any existing snags or snags of the more advanced decay stages (3, 4 and 5), the new snags should come initially from species with variable decay rates. Douglas-fir and western red cedar decay slowly, while

hemlock, alder and true firs decay rapidly. A mixture of one-third cedar, one-third comprised of other conifers and one-third alder, maple or cottonwood will produce a range of decay stages within 5 to 15 years. Order of preference for conifers should be Douglas-fir first, followed by western hemlock and true firs.

The average life span of a snag (from death of the tree until the snag falls) is considerably less than 60 years, so live trees will be needed to replace initial snags on all lands managed under the 60-year rotation. Clumps of green trees will be protected during overstory harvest and maintained to serve as snags later in the rotation or in the next rotation (Raphael and White 1984). One-fourth acre of trees will be protected as a green tree clump for every 5 acres of forest harvested. Clumps will be located away from logging cable corridors and skid roads and adjacent to streamside buffer zones or unit boundaries whenever possible to avoid logging damage and blowdown. Trees with defects or poor form will be selected for green tree clumps to minimize costs, but they must be large, healthy trees capable of living and growing at least 50 years. If clumps contain existing snags, these may be used to meet immediate needs as well.

Man-made snags and green tree clumps will be located at least 200 feet from roads where public access is allowed, because new snags are frequently sought by firewood cutters. Locating snags down slope from roads will also discourage firewood cutting. Skid trails may not be located within the falling distance (height) of snags. Safety concerns for personnel managing and monitoring the snag program will take precedence when making decisions on snag location.

Snags will be created as needed concurrent with initial overstory harvest in all units scheduled to be harvested or thinned through 2010. In stands that will be harvested after 2010, as well as stands that will never be harvested, snag creation will begin in 1988. Snags will not be created in existing stands until the stands are at least 40 years old. All snag management activities will be in compliance with the regulations and requirements of WDLI.

2.4 DEAD AND DOWN WOODY MATERIAL MANAGEMENT

Dead and down woody material 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 ruffed grouse (Bartels et al., 1985). The size and amount of dead and down material 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 that 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 dead and down material. 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.

Dead and down material will be provided at the time of harvest on the forested management lands. A variety of decay classes will be left in sufficient volume to meet the needs of most wildlife species, without inhibiting the movement of larger species or interfering with forest management activities. The recommended numbers and sizes of logs are estimates based on the habitat requirements of the HEP evaluation species, data from natural stands, information on dead and down material found on management lands during the timber cruise and HEP field work, and projections of tree sizes for management lands under the proposed plan. Future adjustments should be made to this prescription as more detailed information becomes available.

Logs of decay classes 3, 4 and 5 (Bartels et al., 1985) will be left during harvest operations. Logs with unique habitat value (i.e, large diameter logs or logs with signs of heavy wildlife use) will be marked prior to harvest and protected during felling and skidding operations. Six to 10 logs from decay class 1 or 2 will also be left during harvest. Logs with a minimum diameter of 24 inches and minimum length of 20 feet are preferred. Douglas-fir will be the preferred species, with western red cedar as an alternate.

New logs will be spread throughout harvest units when feasible. Slash disposal, if conducted, will be accomplished by windrowing or piling and burning fine slash to avoid burning large logs. If broadcast burning is necessary, it will be done in the spring when heavy fuels (i.e., logs) will not burn. Old-growth cedar and Douglas-fir stumps presently existing in second growth stands will be protected. If logs are not available, slash piles may be substituted within the confines of DNR slash disposal requirements.

2.5 RIGHT-OF-WAY MANAGEMENT

Permanent meadows and grasslands are rare in western Washington where natural succession favors dense coniferous forest (Section 2.1). 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 stable communities of shrubs and grasses that provide habitat for birds and mammals and forage for deer.

Rights-of-way management will emphasize three main factors: a) increased production of grasses, forbs and shrubs for forage, b) placement of trees, shrubs and brush piles for cover and habitat diversity and c) limiting human use, particularly off-road vehicle use on the power pipeline right-of-way. A tentative list of species for planting on rights-of-way is presented in Table 2.4. Changes in the list may occur after additional on-site evaluation by contract horticulturists and District biologists.

Rights-of-way will be seeded with grasses and forbs and fertilized (except in areas of water quality concern). The rate, frequency and composition of fertilizer will be determined by a contract horticulturist. Shrubs will be planted or seeded onto rights-of-way to provide forage and screening. Brush piles (up to 20 feet in diameter and 8 feet tall) will be placed on the power pipeline right-of-way to provide habitat for small mammals and birds, inhibit off-road vehicle use and provide hiding cover for deer.

Trees will be planted on the Lake Chaplain pipeline to provide visual screening between the road and the wetland. Trees also will be planted for cover and mast on all but the powerline right-of-way. No trees will be planted within 15 feet of the centerline of the power pipeline.

Table 2.4. Tentative list of plant species for wildlife habitat enhancement on rights-of-way.

Common Name	Scientific Name
Perennial ryegrass	Holium perenne
Annual ryegrass	Holium multiflorum
Alta tall fescue	Festuca arundinaceae
Creeping red fescue	Festuca rubra
Chewings fescue	Festuca rubra var. commitata
Redtop bentgrass	Agrostis alba
Dwarf orchard-grass	Dactylis glomerata
Plantain	Plantago spp.
Clover	Trifolium spp.
Fireweed	Epilobium angustifolium
Willow-weed	Epilobium watsonii
Trailing blackberry	Rubus ursinus
Evergreen blackberry	Rubus laciniatus
Himilayan blackberry	Rubus discolor
Elderberry	Sambucus spp.
Huckleberry	Vaccinium spp.
Thimbleberry	Rubus parviflorus
Rose	Rosa spp.
Salmonberry	Rubus spectabilis
Snowberry	Symphoricarpos albus
Serviceberry	Amelanchier alnifolia
Vine maple	Acer circinatum
Ocean spray	Holodiscus discolor
Willow	Salix spp.
Cottonwood	Populus spp.
Dogwood	Cornus spp.
Cherry	Prunus spp.
Bigleaf maple	Acer macrophyllum
Apple	Pyrus spp.
Hazelnut	Corylus cornuta
Red alder	Alnus rubra
Douglas-fir	Pseudotsuga menziesii
Western red cedar	Thuja plicata

2.6 ARTIFICIAL NESTING ISLANDS

Nesting islands offer waterfowl a predator-reduced environment. Nests are often found on islands at densities greater than found on mainland areas (Bent 1923, Giroux 1981). Artificial nesting islands have proven to be an economical and successful method of improving waterfowl nesting habitat (Young 1971).

Artificial nesting islands will be placed on Lost Lake to improve breeding habitat for waterfowl. They will be floating islands made of logs according to methods described by Young (1971). They will measure 6 x 8 feet and will each contain one nest box measuring 18 x 18 x 6 inches deep. They will be anchored with cable or chain to stumps or concrete blocks. Boxes will be filled with leaf litter and screened with brush, and the entire island will be covered with evergreen boughs to reduce avian predation. Brush screens and evergreen boughs will be replaced annually.

Islands will be monitored for at least three years to determine use (Young 1971). Islands that are not used after three years will be moved to other locations and monitored again.

2.7 WATERFOWL NEST BOXES

Numerous studies have demonstrated the value of nesting boxes in enhancing wood duck populations. Bellrose (1976) provides an extensive summary of research on wood duck use of nest boxes. Additional species utilize boxes designed for wood ducks. Both common and hooded mergansers are known to nest in wood duck boxes in the Sultan Basin. Chaplain Creek Marsh and the wetlands east of Lake Chaplain have several nest boxes placed by Mr. Dave Mundell, a Snohomish, Washington resident. Mr. Mundell maintains these boxes each year and has had wood duck nesting success in the past (Mundell 1986).

Two wood nest boxes of the type designed by Bellrose (1976) will be placed at Lost Lake. Boxes will be made of rough-cut cedar and attached 12 to 20 feet up 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.

2.8 OSPREY NEST STRUCTURES

Osprey commonly nest adjacent to lakes, rivers and reservoirs in western Washington (Henny 1983). They select trees, snags or artificial structures that have broad, flat tops for nesting. Broken tree tops are often used as nest sites (Garber 1972). Osprey will also readily nest on artificial platforms, pilings, power poles and other structures (Bohms 1985, Westall 1983). Additional large trees or snags are needed near the nest to provide perches with an unobstructed view of the nest.

Osprey may utilize nesting structures that vary in width from 1 to 7 feet. Increased production has been noted with larger, more stable nest structures (Garber 1972). Use of artificial nest structures may decrease egg mortality, resulting in higher overall production rates (Westall 1983). Human disturbance has resulted in lower reproductive success and nest failure (Garber 1972, Levenson and Koplin 1984) and should be considered when planning enhancement measures.

One osprey nest sites will be created at Lost Lake and two at Spada Lake by topping live trees or erecting poles where trees are not available. Trees will be solid and will have a DBH of at least 36 inches. They will be topped at least 20 feet above the ground (or water surface for submerged trees) and have flat tops at least 1 foot in diameter. Tree selection will be based on height above the forest canopy (at least 5 feet), distance from human disturbance, proximity to water and availability of perch trees of an equal or greater height. Artificial platforms will be made from wooden or steel poles if suitable trees or snags cannot be found (Walters, pers. comm., 10 October 1986).

3.0 MANAGEMENT TRACT DESCRIPTIONS AND PRESCRIPTIONS

3.1 LAKE CHAPLAIN TRACT

3.1.1 Existing Habitat Conditions

The Lake Chaplain Tract, which is located 6 miles north of the town of Sultan, Washington, consists of a 441-acre reservoir and 2,216 acres in and adjacent to the City of Everett's Lake Chaplain Watershed (Figure 3.1). The entire tract is owned by the City.

Elevation within the Lake Chaplain Tract ranges from 400 feet to 1,200 feet MSL. The terrain is mostly gentle to moderately steep (slopes up to 30%) with locally steeper slopes (up to 100% and greater) along the Sultan River and around Lake Chaplain and Chaplain Creek. Soils are mainly of the Tokul series, which are moderately deep and well drained. These are productive forest soils but difficult to work in wet weather due to rutting and compaction.

The 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 red cedar (Thuja plicata). Scattered throughout the coniferous 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.

The existing vegetation on the Lake Chaplain Tract is predominantly second growth coniferous forest; with lesser amounts of old-growth forest, mixed forest, deciduous forest, wetland and permanent shrub/brush (Figure 3.2). The filtration plant site, including the adjacent grass field, was not incorporated into this management plan. Most of the tract was logged between 40 and 70 years ago and left to regenerate naturally, resulting in a series of even-aged stands of hemlock, Douglas-fir, cedar, maple and alder.

LAKE CHAPLAIN TRACT

LAKE CHAPLAIN

LOST LAKE TRACT

TUNNEL PORTAL

PIPELINE RIGHT-OF-WAY

POWERHOUSE SITE

TRANSMISSION LINE RIGHT-OF-WAY

WEDGE SHAPED PARCEL

PROJECT FACILITY LANDS TRACT

WOODS LAKE

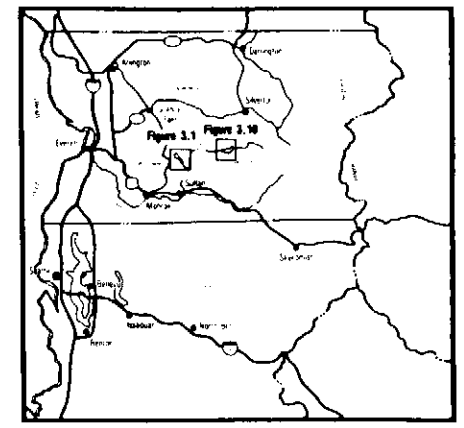
LAKE BROWNSWORTH

LAP LAKE

MARSH CR.

CHAPLAIN CREEK

SMITH CR.



VICINITY MAP

LEGEND

- All Weather Road
- Dirt Road or Unmaintained Gravel Road
- Tract Boundary
- (35) Section Number

NORTH

0 1000 2000 3000

SCALE IN FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

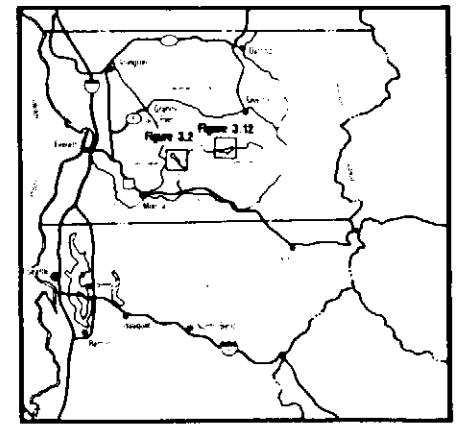
WILDLIFE HABITAT MANAGEMENT PLAN

FIGURE 3.1 Management Lands Location Map: Lake Chaplain, Lost Lake and Project Facility Lands Tracts

LAKE CHAPLAIN TRACT

LOST LAKE TRACT

PROJECT FACILITY LANDS TRACT



VICINITY MAP

LEGEND

- All-Weather Road
- Dirt Road or Unmaintained Gravel Road
- (8) Section Number

COVER TYPES

- ES Early Successional Forest
- OS Open-Canopy Sapling Pole Coniferous Forest
- CS Closed-Canopy Sapling Pole Coniferous Forest
- SS Small Sawtimber Coniferous Forest
- LS Large Sawtimber Coniferous Forest
- OG Old-growth Coniferous Forest
- MF Mixed Deciduous/Coniferous Forest
- DF Deciduous Forest
- RF Riparian Forest
- SB Mixed Shrub/Brush
- GM Grass/Meadow
- WL Wetland
- OW Open Water
- NV Non-Vegetated
- SL Slides
- RW Right-Of-Way

NORTH

0 1000 2000 3000

SCALE IN FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

FIGURE 3.2 Management Lands Cover Type Map;
Lake Chaplain, Lost Lake and Project Facility Lands Tracts

Most of the coniferous forest stands fall into the small sawtimber stand condition, with canopy closure generally greater than 70 percent, and trees with an average diameter at breast height (DBH) between 10 and 20 inches and height of 75 to 125 feet. Understory vegetation is generally sparse, consisting of sword fern (Polystichum munitum), vine maple (Acer circinatum), salal (Gaultheria shallon), snowberry (Symphoricarpos albus), huckleberry (Vaccinium spp.), Oregon grape (Berberis nervosa) and others. (Detailed descriptions of all vegetation cover types are in Appendix A.)

Approximately 55 acres along the east shore of Lake Chaplain have never been harvested and now support the only old-growth forest in the tract. The species composition of old-growth stands is the same as younger coniferous forest, but individual trees are much larger (up to 66 inches DBH), the overstories are multi-aged and multi-layered and the understories are more developed. Parts of the stands have been selectively logged in the past, but they retain their old-growth character.

A number of small wetlands occur throughout the tract, and a 48-acre wetland complex exists south of Lake Chaplain along Chaplain Creek. The smaller wetlands support two or more wetland cover types (Cowardin et al., 1979) within each, including palustrine open water and persistent emergent, with lesser areas of scrub-shrub and forested wetland surrounding them. The larger Chaplain Creek wetland contains these wetland types as well as non-persistent emergent wetland. Diversity is quite high in the Chaplain Creek wetland due to the high interspersion of cover types and a stable water level. The total acreage of wetlands in the Lake Chaplain Tract is approximately 79 acres.

The Lake Chaplain Tract is surrounded by timberland owned by the USFS, DNR and various private timber companies. Most of it is in various stages of second growth, ranging from recent clearcuts to small sawtimber.

3.1.2 Existing Habitat Value

The current wildlife habitat values of the tract were assessed in the baseline HEP conducted for the plan (Section 6.0). The small sawtimber stand condition has low to moderate value for most wildlife species because of its low structural diversity and low production of palatable forage. Early- and mid-successional species such as deer and grouse find little edge and food in this cover type, although hiding and escape cover are generally good. Late-successional species like the pileated woodpecker and pine marten will make use of the small sawtimber, but the lack of large dead material (snags and logs) limits nesting sites and food supply. The small sawtimber contains some large old-growth cedar stumps that are in advanced stages of decay. Douglas squirrel, the species most commonly associated with small sawtimber, is somewhat limited in this tract by the low percentage of cone-bearing Douglas-fir trees.

Large sawtimber and old-growth are of greater value to most evaluation species because of their greater structural diversity, but they make up a small percentage of the overall tract. All wetlands in the tract have high habitat value because of their complexity and stable water levels. The less prevalent cover types in the tract, such as deciduous forest and mixed forest, are valuable for wildlife because they provide diversity within extensive coniferous stands. They also provide a distinct shrub layer composed of a variety of plant species used by several wildlife species, including black-tailed deer, ruffed grouse and black-capped chickadee.

The City has prepared a timber harvest plan for the tract that would be implemented if the lands were not used for wildlife habitat enhancement (Newman 1983). The plan calls for clearcut harvest and re-planting of all commercial lands within the tract by the year 2030. The result would be an initial pulse of early-successional habitat that would develop eventually into small sawtimber and be cut again in 40 to 45 years. Interspersion would be low because of the large clearcut size and narrow distribution of age classes. Certain cover types, including old-growth, large sawtimber and

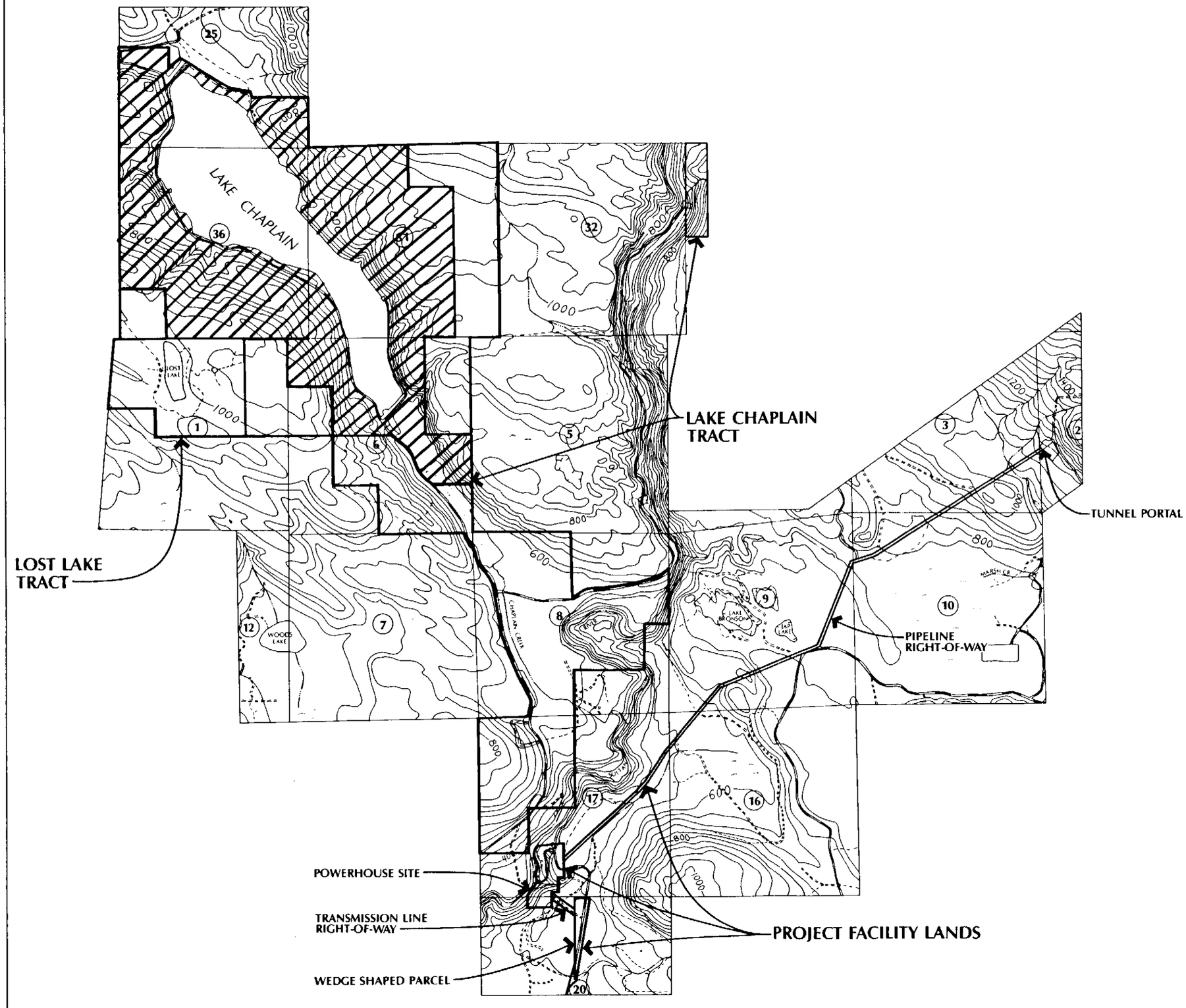
deciduous forest, would be lost entirely. The Newman timber harvest plan served as the basis for predicting future habitat conditions without habitat enhancement.

3.1.3 Management Constraints

Portions of the Lake Chaplain Tract lie within a municipal watershed. The City restricts public access to the watershed. Fishing is prohibited in Lake Chaplain and overnight camping is prohibited on all City lands. Vehicle access is allowed on the Lake Chaplain Road, as far as the filtration plant at the south end of the lake. Hunting is prohibited on all lands that drain into the lake, but will be allowed on other City lands in the tract (Figure 3.3). Management constraints for lands within the hydrographic boundary of the watershed include: a) prohibit the use of fertilizer and herbicides, b) do not encourage the presence of waterfowl or beaver, c) limit human use and d) restrict forest practices that could potentially degrade water quality.

Management activities in the watershed will be subject to local, state and federal standards for the protection of municipal water supplies (Appendix G). Certain precautions must be taken to protect water quality during forest management activities, but none of the regulations identified in Appendix G will preclude management of the tract for wildlife habitat. The Washington Department of Social and Health Services has approved the management plan (Appendix E).

The shoreline of Lake Chaplain is protected under the Washington State Shoreline Management Act. The shoreline is under the jurisdiction of the City of Everett, which manages it according to the policies and procedures of the Snohomish County Shoreline Management Master Program (Snohomish County Planning Department 1974). All activities within 200 feet landward of the high water mark are regulated under the Master Program. The Master Program does not prohibit any activities proposed in this plan, but it may require regulatory approval for some. These are identified in Appendix C.



LEGEND

Public access, including hunting, prohibited in this area

NORTH

0 1000 2000 3000
SCALE IN FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.3 Restricted area of the Lake Chaplain Tract.

In particular, the Program restricts clearcutting on lands within 50 feet of Lake Chaplain and on slopes greater than 30 percent within 200 feet of the lake.

3.1.4 Habitat Management Objectives

a) Maintain existing water quality, particularly within the Lake Chaplain Watershed;

b) Retain all existing old-growth stands;

c) Manage forested areas directly adjacent to existing old-growth stands in permanent forested cover to increase the overall habitat available to late-successional wildlife species;

d) Protect existing wetlands and establish 200-foot buffer zones around them. Manage the buffer zones for the benefit of wetland species (Note: do not promote beaver or waterfowl use of Lake Chaplain or wetlands that drain into Lake Chaplain);

e) Create buffer zones along all streams within the tract. Manage the buffer zones as mature second growth coniferous forest or mature deciduous/mixed forest as individual site conditions permit;

f) Retain riparian forest along the Sultan River;

g) Retain existing mixed forest and deciduous forest and manage without overstory harvest to benefit black-tailed deer, ruffed grouse and black-capped chickadee;

h) Manage all remaining forested lands to produce a mixture of early-, mid- and late-successional habitats. Improve wildlife habitat values within all successional stages;

i) Limit human activity in and near the existing old-growth stands during the spring and early summer to protect nesting ospreys; and

j) Create snags in forested stands to meet the needs of cavity nesting species.

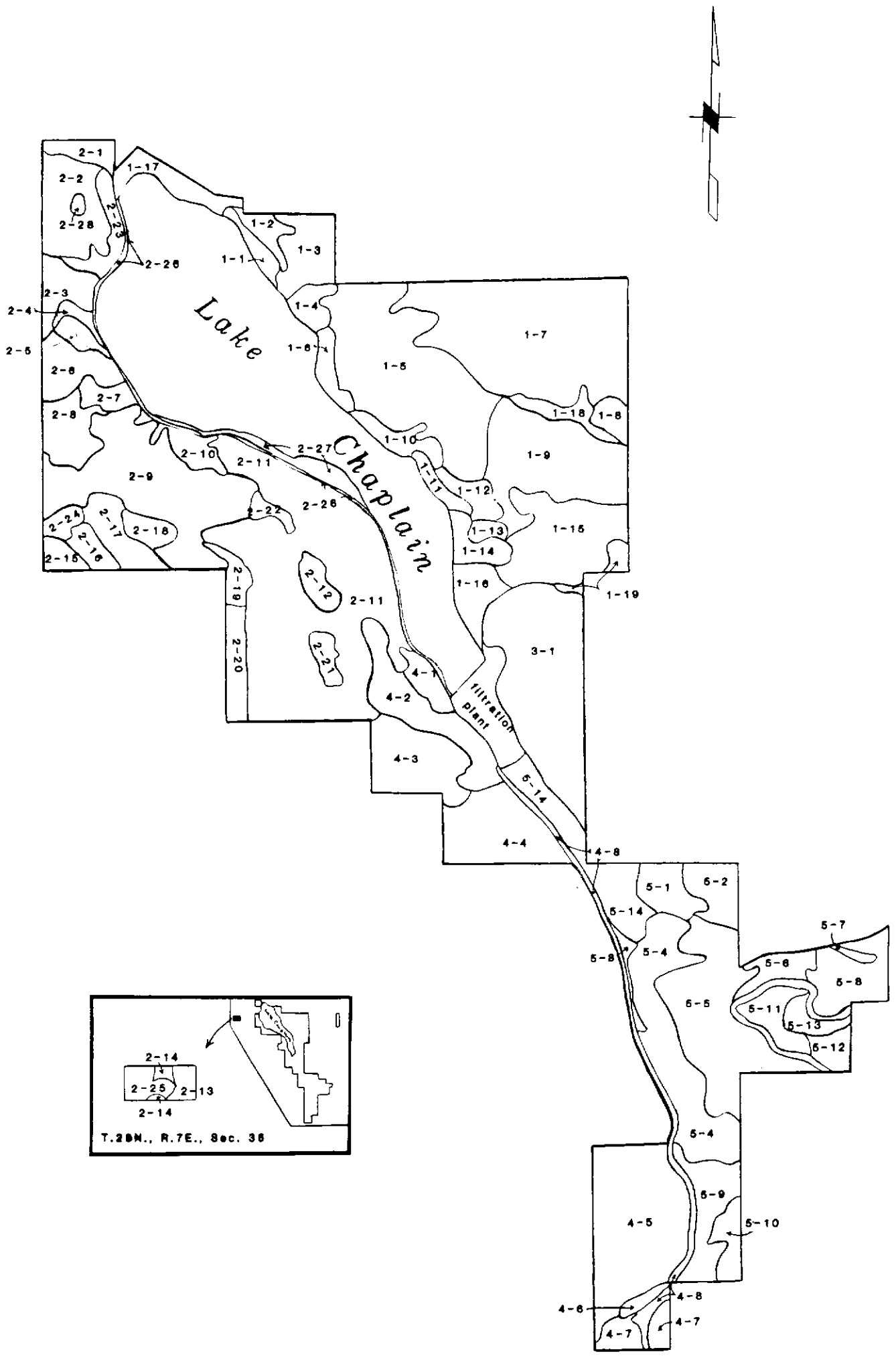
3.1.5 Habitat Management

The Lake Chaplain Tract was divided into six management units containing a total of 70 stands (Figure 3.4). Management Units 1 and 2 drain into Lake Chaplain, which is part of the City's municipal watershed. They are distinguished from the other units primarily by the water quality constraints associated with the watershed (See Appendix G). Management Units 3, 4 and 5 are south of the lake and outside the watershed. Unit 6 is a 36-acre parcel encompassing the City's diversion dam on the Sultan River, east of Lake Chaplain. Management of the tract will involve five major habitat systems: 1) old-growth forest, 2) mixed forest, 3) 60-year rotation coniferous forest, 4) wetlands and 5) buffer zones.

3.1.5.1 Old-Growth Forest

Six old-growth management areas will be established, totaling approximately 294 acres. They will be comprised of existing stands of old-growth, large sawtimber and small sawtimber. They will be managed for the benefit of late-successional wildlife species such as the pine marten, pileated woodpecker and Douglas squirrel and will also provide good habitat for black-tailed deer, with an interspersion of forage and thermal cover.

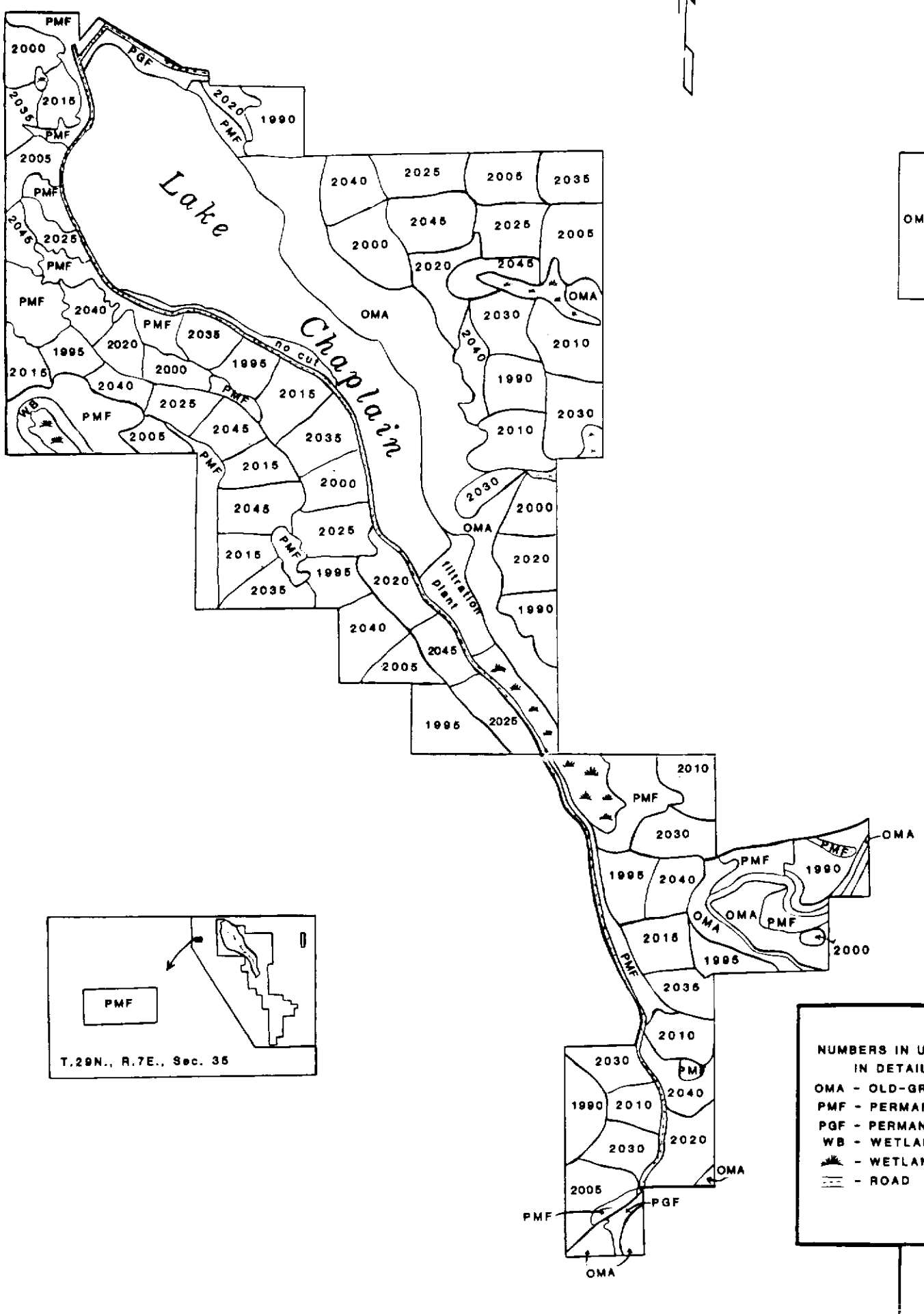
The largest old-growth management area will consist of 180 acres located along the east side of Lake Chaplain in Management Units 1 and 3 (Figure 3.5). It will include four existing old-growth stands (1-4, 1-6,, 1-10 and 1-12), a deciduous stand (1-14) and small sawtimber in stands 1-11, 1-13, 1-16 and parts of 1-5 and 3-1. The existing old-growth stands will be monitored for snag densities and adjustments will be made, if needed, by creating snags. Snags will also be created, as needed, in the younger



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

FIGURE 3.4 Management Stands of the Lake Chaplain Tract



LEGEND

NUMBERS IN UNITS REFER TO YEAR OF HARVEST AS STATED IN DETAILED MANAGEMENT PRESCRIPTIONS

OMA - OLD-GROWTH MANAGEMENT AREA WITH NO CUTTING

PMF - PERMANENT MIXED FOREST WITH NO CUTTING

PGF - PERMANENT GRASS/FORB AREA

WB - WETLAND BUFFER

- WETLAND

- ROAD

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

FIGURE 3.5 Cutting Units and Harvest Schedule for the Lake Chaplain Tract

stands. The deciduous stand (1-14) will be maintained as mature deciduous forest to add diversity to the old-growth area. None of the 180 acres will be harvested during the life of the plan.

The second old-growth management area is Stand 1-8; 10 acres of large sawtimber located east of a wetland in Management Unit 1. The close proximity of this stand to the stable wetland will give it value to both wetland and late-successional wildlife species.

The third old-growth management area will be made up of 46 acres along the Sultan River in Stands 5-5, 5-8, 5-11, and 5-12. Stand 5-11 will be thinned in 2000 to promote diameter growth of the dominant trees. The portions of the other stands dedicated to old-growth management will not be manipulated, except to maintain adequate snag densities.

The fourth old-growth management area will consist of 8 acres in Stand 5-10, a single stand of small sawtimber situated along the Sultan River. As with most other small sawtimber stands targeted for late-successional wildlife habitat, the stand will receive a minimum of manipulation while it is allowed to mature. Snag densities will be maintained at appropriate levels.

A fifth old-growth management area will be established in Management Unit 6. The 36 acres of small sawtimber, large sawtimber and mixed forest will be preserved as late-successional riparian forest along the Sultan River. There will be no timber harvesting in the unit, but snag densities will be monitored and supplemented, if needed.

The final old-growth management area will be the entire 14 acres in Stand 4-7. This small sawtimber stand will be protected for forest cover adjacent to the Lake Chaplain pipeline right-of-way.

3.1.5.2 Permanent Mixed Forest

All or part of 27 stands, comprising 268 acres, will be retained as mixed and/or deciduous forest for the life of this plan. The stands are 1-1, 2-1, 2-4, 2-5, 2-7, 2-8, 2-10, 2-13, 2-14, 2-15, 2-17, 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, 2-24, 2-25, 4-6, 5-1, 5-3, 5-4, 5-6, 5-7, 5-9 and 5-13. Conifers will be removed as commercial timber when this can be accomplished without interfering with the mixed forest objectives of the stands. Snag densities will be maintained at target levels.

3.1.5.3 60-year Rotation Coniferous Forest

Approximately 1,360 acres of the Lake Chaplain Tract will be managed on the 60-year rotation described in Section 2.1.1. The stands (Figure 3.4) will be divided into cutting units of 26 acres or less and harvested according to the schedule shown in Figure 3.5. Approximately 70 acres of this total will be set aside as green tree clumps as described in Section 2.3.

3.1.5.4 Wetlands

Approximately 79 acres of existing wetlands in the Lake Chaplain Tract will be protected and enhanced. The two small wetlands in Management Unit 1 and the Chaplain Creek wetland in Unit 5 will be retained in their existing condition. Forested buffer zones 200 feet wide will be established around them and enhanced for wetland species by creating snags.

3.1.5.5 Buffer Zones

Approximately 106 acres of coniferous and mixed forest throughout the tract will be retained in forested cover as wetland and riparian buffer zones in accordance with Section 2.2. Of the remaining 120 terrestrial acres in the tract, 64 acres will be converted to road, 34 acres will be managed as permanent grass/meadow and 22 acres will remain in shrub/brush.

3.1.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Lake Chaplain 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. Harvest acreages in the following prescriptions do not include areas protected as green tree clumps and buffers.

Stand 1-1

Area: 13.3 acres **Date of Origin**: 1945 **Site Index**: 138

Cover Types: Deciduous and Mixed Forest

Constraints:
- Entirely within Lake Chaplain Watershed
- Most of unit within 200 feet of Lake Chaplain
- An old gravel pit and adjacent disturbed area bordering Stands 1-1 and 1-2 will be used as a disposal site for solids from the filtration plant. Solids will be disced into the soil and hydroseeded

Special/Unique Features: Lake Chaplain Shoreline

Access: Excellent; existing road through unit

Management Guidelines:

- Retain as permanent deciduous and mixed forest to provide forage for deer and deciduous habitat for black-capped chickadee
- Provide snags for chickadee and small woodpeckers
- Retain selected large conifers in the overstory as future osprey roosts and/or nest sites

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-2

Area: 9 acres **Date of Origin:** 1945 **Site Index:** 138

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Entirely within Lake Chaplain Watershed
- Small portion within 200 feet of Lake Chaplain
- Small drainage at north end of stand

Special/Unique Features: None

Access: Good; level site, adjacent to existing road

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Manage portion within 200 feet of Lake Chaplain in conjunction with Stand 1-1
- Provide snags for primary cavity excavators
- Provide dead and down woody material after harvest
- Maintain a 50-foot buffer zone on each side of the drainage

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- No new activity

1996 - 2000
- Commercially thin 6.7 acres scheduled for harvest in 2020

2001 - 2015
- No new activity

2016 - 2020
- Harvest 6.7 acres as one cutting unit

2021 - 2025
- No new activity

2026 - 2030
- Stocking adjustment of 6.7 acres harvested in 2020

2031 - 2060
- No activity except snag monitoring and maintenance

Stand 1-3

Area: 28.8 acres **Date of Origin:** 1925 **Site Index:** 138

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Entirely within Lake Chaplain Watershed
- Partially within 200 feet of Lake Chaplain
- Small drainage at north end

Special/Unique Features: Lake Chaplain Shoreline

Access: Good; level site, adjacent to existing road

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Manage portion within 200 feet of Lake Chaplain in conjunction with Stand 1-1
- Include cedar in green tree clumps where possible
- Retain old-growth cedar stumps during harvest
- Maintain a 50-foot buffer zone on each side of the drainage
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Harvest 24.5 acres as one cutting unit, treat slash and plant
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- No new activity

1996 - 2000
- Conduct stocking adjustment on 24.5 acres harvested in 1990

2001 - 2030
- No new activity

2031 - 2035
- Conduct commercial thin on 24.5 acres harvested in 1990

2036 - 2045
- No new activity

2046 - 2050
- Harvest 24.5 acres previously harvested in 1990, treat slash and plant

2051 - 2060
- No activity except snag monitoring and maintenance

Stands 1-4, 1-6, 1-10, 1-12

Area: 1-4 = 17.7 acres **Date of Origin:** 1850 **Site Index:** 94-138
1-6 = 13 acres
1-10 = 13 acres
1-12 = 10.9 acres

Cover Type: Old-Growth Coniferous Forest

Constraints:
- All or part of each stand within 200 feet of Lake Chaplain
- Multiple small drainages
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Old-growth, lakeshore, osprey nest

Access: Poor - Fair; moderate slopes, distant from existing road

Management Guidelines:

- Retain and protect as old-growth forest for late-successional wildlife species
- Protect existing osprey nest site. Consider potential for new nest sites when developing snags

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-5

Area: 138.7 acres **Date of Origin:** 1945 **Site Index:** 132

Cover Types: Small Sawtimber Coniferous and Mixed Forest

Constraints:
- Several small drainages with unstable soils
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Borders old-growth forest

Access: Fair; level site, distant from existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Include steep, western portion of stand within 400 feet of old-growth stands as part of old-growth management area (46 acres)
- Protect old-growth cedar stumps during thinning and harvest
- Maintain a 50-foot buffer zone on each side of the drainages
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2000
- Harvest 22.8 acres as one cutting unit, treat slash and plant
- Commercially thin 19.9 acres scheduled for harvest in 2020 and 21.8 acres scheduled for harvest in 2040

2001 - 2005
- No new activity

2006 - 2010
- Stocking adjustment of 22.8 acres harvested in 2000

2011 - 2015
- No new activity

2016 - 2020
- Harvest 19.9 acres with part of Stand 1-7, treat slash and plant
- Commercially thin 2.8 acres scheduled for harvest in 2040

2021 - 2025
- Harvest 2.8 acres with part of Stand 1-7, treat slash and plant
- Commercially thin 8.3 acres scheduled for harvest in 2045 and 1.9 acres also scheduled for harvest in 2045

2026 - 2030
- Stocking adjustment of 19.9 acres harvested in 2020

2031 - 2035
- Stocking adjustment of 2.8 acres harvested in 2025

2036 - 2040
- Harvest 21.8 acres with part of Stand 1-7, treat slash and plant
- Harvest 2.8 acres with part of Stand 1-9, treat slash and plant

2041 - 2045
- Harvest 8.3 acres with part of Stand 1-7 and stand 1-9, treat slash and plant
- Harvest 1.9 acres with parts of Stand 1-7 and Stand 1-9, treat slash and plant
- Commercially thin 22.8 acres harvested in 2000

2046 - 2050
- Stocking adjustment of 21.8 acres harvested in 2040

2051 - 2055
- Stocking adjustment of 10.2 acres harvested in 2045

2056 - 2060
- Harvest 22.8 acres previously harvested in 2000, treat slash and plant

Stand 1-7

Area: 173 acres **Date of Origin:** 1945 **Site Index:** 137

Cover Types: Small Sawtimber Coniferous and Mixed Forest

Constraints:
- Several small drainages
- Partially within Lake Chaplain Watershed

Special/Unique Features: Wetland on southern boundary; small stream on eastern boundary

Access: Fair; level site, distant from existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 200-foot buffer zone adjacent to the wetland
- Maintain 50-foot buffer zones on each side of the drainages
- Protect old-growth cedar stumps during harvest
- Designate green tree clumps adjacent to drainage and wetland buffer zones where possible

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2000
- Commercially thin 2.8 acres scheduled for harvest in 2020

2001 - 2005
- Harvest 38.8 acres as two equal sized cutting units
- Commercially thin 21.8 acres scheduled for harvest in 2025
- Commercially thin 22.8 acres scheduled for harvest in 2035

2006 - 2015
- No new activity

2016 - 2020
- Harvest 2.8 acres with part of Stand 1-5, treat slash and plant
- Commercially thin 1.9 acres scheduled for harvest in 2040
- Stocking adjustment of 38.8 acres harvested in 2005 as two cutting units

2021 - 2025
- Harvest 21.8 acres as one cutting unit, treat slash and plant
- Harvest 20.9 acres with part of Stand 1-5, treat slash and plant
- Commercially thin 36 acres scheduled for harvest in 2045

2026 - 2030
- Stocking adjustment of 2.8 acres harvested in 2020

2031 - 2035
- Harvest 22.8 acres as one cutting unit, treat slash and plant
- Stocking adjustment of 42.7 acres harvested in 2025

2036 - 2040
- Harvest 1.9 acres with part of Stand 1-5, treat slash and plant

2041 - 2045
- Stocking adjustment of 22.8 acres harvested in 2035
- Harvest 16.1 acres with part of Stand 1-5, treat slash and plant
- Harvest 19.9 acres with parts of Stand 1-5 and Stand 1-9, treat slash and plant

2046 - 2050
- Commercially thin 38.8 acres harvested in 2005 as two cutting units
- Stocking adjustment of 1.9 acres harvested in 2040

2051 - 2055
- Stocking adjustment of 36 acres harvested in 2045 as two cutting units

2056 - 2060
- No activity except snag monitoring and maintenance

Stand 1-8

Area: 9.9 acres **Date of Origin:** 1850-1940 **Site Index:** 133

Cover Type: Large Sawtimber Coniferous Forest

Constraints:
- Poorly drained soils
- Partially within Lake Chaplain Watershed

Special/Unique Features: Flooded forest adjacent to wetland

Access: Fair; level site, distant from existing road system

Management Guidelines:

- Retain existing stand as part of wetland/old-growth management area and manage for late-successional wildlife species

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-9

Area: 92.9 acres **Date of Origin**: 1925 **Site Index**: 118

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Small drainage in southwest corner
- Partially within Lake Chaplain Watershed

Special/Unique Features: Wetland along north border

Access: Fair; level site, distant from existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 200-foot buffer zone adjacent to the wetland
- Maintain 50-foot buffer zones on each side of the drainages
- Designate green tree clumps adjacent to 200-foot buffer zone where possible
- Protect old-growth cedar stumps during harvest

Schedule:

1988 - 1990
- Harvest 8.7 acres with part of Stand 1-15, treat slash and plant
- Commercially thin 22.7 acres scheduled for harvest in 2010
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- No new activity

1996 - 2000
- Stocking adjustment of 8.7 acres harvested in 1990

2001 - 2005
- No new activity

2006 - 2010
- Harvest 22.7 acres as one cutting unit, treat slash and plant
- Commercially thin 26.2 acres scheduled for harvest in 2030

2011 - 2015
- No new activity

2016 - 2020
- Stocking adjustment of 22.7 acres harvested in 2010
- Commercially thin 18.3 acres scheduled for harvest in 2040

2021 - 2025
- Commercially thin 1.8 acres scheduled for harvest in 2045

2026 - 2030
- Harvest 26.2 acres as one cutting unit, treat slash and plant

2031 - 2035
- Commercially thin 8.7 acres harvested in 1990

2036 - 2040
- Harvest 18.3 acres with part of Stand 1-5, treat slash and plant
- Stocking adjustment of 26.2 acres harvested in 2030

2041 - 2045
- Harvest 1.8 acres with parts of Stands 1-5 and 1-7, treat slash and plant

2046 - 2050
- Stocking adjustment of 18.3 acres harvested in 2040
- Harvest 8.7 acres initially harvested in 1990, treat slash and plant

2051 - 2055
- Commercially thin 22.7 acres previously harvested in 2010

2056 - 2060
- No activity except snag monitoring and maintenance

Stand 1-11

Area: 6.6 acres **Date of Origin:** 1941 **Site Index:** 122

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Within 200 feet of Lake Chaplain
- Steep slopes
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Lakeshore; borders on watershed; old-growth forest

Access: Poor; moderate to steep slopes, distant from existing road system

Management Guidelines:

- Manage as part of the old-growth management area
- Maintain large conifers for future osprey roosts and nests
- Create snags in the largest size class available to provide habitat for cavity nesting waterfowl

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-13

Area: 3.6 acres **Date of Origin:** 1860 **Site Index:** 95

Cover Type: Large Sawtimber Coniferous Forest

Constraints: *Entirely within Lake Chaplain Watershed*

Special/Unique Features: Large trees

Access: Fair; variable terrain, distant from road system

Management Guidelines:

- Manage as part of old-growth management area
- Retain conifers in the largest size class for future osprey roosts and nests

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-14

Area: 10.4 acres **Date of Origin:** 1930 **Site Index:** 98

Cover Types: Deciduous and Mixed Forest

Constraints:
- Steep, poorly drained, unstable soils
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Small wetland complex in center of stand

Access: Poor; steep, unstable terrain, close to existing road

Management Guidelines:

- Include as part of old-growth management area but manage as deciduous and mixed forest
- Provide snags for chickadee and small woodpeckers

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-15

Area: 66 acres **Date of Origin**: 1915 **Site Index**: 135

Cover Type: Small Sawtimber Coniferous Forest

Constraints: Partially within Lake Chaplain Watershed

Special/Unique Features: Wetland in southeast corner

Access: Fair; level site, distant from existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 200-foot buffer zone around wetland
- Maintain 50-foot buffer zones on each side of drainages
- Protect old-growth cedar stumps during timber harvest
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Harvest 12.1 acres with part of Stand 1-9, treat slash and plant
- Initiate snag management and monitoring program and continue through 2060
- Commercially thin 21.8 acres scheduled for harvest in 2010

1991 - 1995
- No new activity

1996 - 2000
- Stocking adjustment of 12.1 acres harvested in 1990

2001 - 2005
- No new activity

2006 - 2010
- Harvest 21.8 acres as one cutting unit, treat slash and plant
- Commercially thin 20.9 acres scheduled for harvest in 2030

2011 - 2015
- No new activity

2016 - 2020
- Stocking adjustment of 21.8 acres harvested in 2010

2021 - 2025
- No new activity

2026 - 2030
- Harvest 20.9 acres with part of Stand 1-9, treat slash and plant

2031 - 2035
- Commercially thin 12.1 acres harvested in 1990

2036 - 2040
- Stocking adjustment of 20.9 acres harvested in 2030

2041 - 2045
- No new activity

2046 - 2050
- Harvest 12.1 acres previously harvested in 1990 with part of Stand 1-9, treat slash and plant

2051 - 2055
- Commercially thin 21.8 acres harvested in 2010

2056 - 2060
- No activity except snag monitoring and maintenance

Stand 1-16

Area: 13.5 acres **Date of Origin:** 1925 **Site Index:** 100

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Very steep
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Lakeshore

Access: Poor; extremely steep terrain, close to existing road system

Management Guidelines:

- Manage as part of old-growth management area
- Maintain conifers of the largest size class for future osprey roosts and nests

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 1-17

Area: 10.7 acres **Date of Origin:** N/A **Site Index:** 122

Cover Type: Mixed Shrub/Brush and Grass Meadow

Constraints:
- Partially within 200 feet of Lake Chaplain
- Partially within Lake Chaplain Watershed

Special/Unique Features: Lakeshore

Access: Excellent; level site, bordering on road

Management Guidelines:

- Manage as mixed shrub/brush and grass meadow for early-successional stage species and to provide habitat diversity
- Plant Douglas-fir along the road east of the dam to provide visual screening

Schedule:

1988 - 1990
- Plant trees along roadside

1991 - 2060
- Monitor plantings. Conduct additional plantings if necessary

Stand 1-18

Area: 11.4 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Wetland

Constraints: Within Lake Chaplain Watershed

Special/Unique Features: Wetland complex

Access: Fair; level site, distant from existing road

Management Guidelines:

- Preserve and protect existing wetland character
- Provide snags, where needed, in flooded forest fringe of wetland

Schedule:

1988 - 2060

- Monitor and maintain snags in the flooded forest fringe, create new snags where needed

Stand 1-19

Area: 7.4 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Wetland

Constraints: None

Special/Unique Features: Wetland complex

Access: Fair; level site, distant from existing road system

Management Guidelines:

- Preserve and protect existing wetland character
- Protect and maintain existing snags

Schedule:

1988 - 2060

- Monitor and maintain snag densities in the flooded forest fringe, creating new snags where needed

Stand 2-1

Area: 8.9 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Mixed Forest

Constraints: - Partially within 200 feet of Lake Chaplain, but not within Lake Chaplain drainage

Special/Unique Features: Stream and small pond; flooded forest; lakeshore

Access: Excellent; level site, adjacent to existing road system

Management Guidelines:

- Retain as permanent mixed forest for habitat diversity and edge benefit
- Retain large conifers as future osprey roosts and nests
- Provide snags for chickadees and smaller woodpeckers

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 2-2

Area: 43 acres **Date of Origin:** 1933 **Site Index:** 129

Cover Types: *Small Sawtimber Coniferous Forest, Mixed Forest and Grass/Meadow*

Constraints:
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Small wetland in center of stand

Access: Good; level to moderate terrain adjacent to existing road

Management Guidelines:

- Manage as a 60-year rotation coniferous forest
- Maintain a 200-foot buffer zone surrounding wetland and flooded forest
- Designate green tree clumps adjacent to wetland buffer zones where possible
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1995
- *Initiate snag management and monitoring program and continue through 2060*

1996 - 2000
- Harvest 12.5 acres as one cutting unit, treat slash and plant

2001 - 2005
- No new activity

2006 - 2010
- Stocking adjustment of 12.5 acres harvested in 2000

2011 - 2015
- Harvest 12.3 acres as one cutting unit, treat slash and plant

2016 - 2020
- No new activity

2021 - 2025
- Stocking adjustment of 12.3 acres harvested in 2015

2026 - 2030
- *No new activity*

2031 - 2035
- Harvest 5.1 acres with part of Stand 2-3, treat slash and plant

2036 - 2040
- No new activity

2041 - 2045
- Commercially thin 12.5 acres harvested in 2000
- Stocking adjustment of 5.1 acres harvested in 2035

2046 - 2055
- No new activity

2056 - 2060
- Harvest 12.5 acres previously harvested in 2000, treat slash and plant
- Commercially thin 12.3 acres previously harvested in 2015

Stand 2-3

Area: 23.5 acres **Date of Origin:** 1925 **Site Index:** 131-133

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Entirely within Lake Chaplain Watershed
- Partially within 200 feet of Lake Chaplain
- Small drainage
- Unstable drainage area

Special/Unique Features: Lakeshore

Access: Excellent; level to moderate terrain adjacent to existing road

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 50-foot buffer zone on each side of the drainage
- Designate green tree clumps adjacent to riparian buffer zones where possible

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2000
- No new activity

2001 - 2005
- Harvest 16.2 acres as one cutting unit, treat slash and plant

2006 - 2010
- No new activity

2011 - 2015
- Stocking adjustment of 16.2 acres harvested in 2005

2016 - 2030
- No new activity

2031 - 2035
- Harvest 5.1 acres with part of Stand 2-2, treat slash and plant

2036 - 2040
- No new activity

2041 - 2045
- Stocking adjustment of 5.1 acres harvested in 2035

2046 - 2050

- Commercially thin 16.2 acres harvested in 2005

2051 - 2060

- No activity except snag monitoring and maintenance

Stands 2-4, 2-5, 2-7, 2-8, 2-10, 2-21, 2-22, 2-23

Area: 2-4 = 5.6 acres **Date of Origin:** 1914-1933 **Site Index:** 122-144
2-5 = 7.0 acres
2-7 = 15.3 acres
2-8 = 34.1 acres
2-10 = 13.9 acres
2-21 = 7.3 acres
2-22 = 7.4 acres
2-23 = 11.4 acres

Cover Type: Mixed Forest

Constraints:
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed
- Small drainages

Special/Unique Features: Seeps, small springs, lakeshore

Access: Good - Fair; mostly moderate terrain, adjacent to existing road system

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stands 2-6

Area: 26.2 acres **Date of Origin:** 1922 **Site Index:** 146

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed
- Small drainage

Special/Unique Features: Several seeps

Access: Good; mostly moderate terrain, adjacent to existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 50-foot buffer zone along each side of drainage
- Designate green tree clumps adjacent to buffer zones where possible
- Do not harvest timber or operate heavy equipment on saturated soils
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2000
- No new activity

2001 - 2005
- Commercially thin 10.4 acres scheduled for harvest in 2045

2006 - 2020
- No new activity

2021 - 2025
- Harvest 10.6 acres as one cutting unit, treat slash and plant

2026 - 2030
- No new activity

2031 - 2035
- Stocking adjustment of 10.6 acres harvested in 2025

2036 - 2040
- No new activity

2041 - 2045
- Harvest 10.4 acres as one cutting unit, treat slash and plant

2046 - 2050
- No new activity

2051 - 2055
- Stocking adjustment of 10.4 acres harvested in 2045

2056 - 2060
- No activity except snag monitoring and maintenance

Stand 2-9

Area: 135.4 acres **Date of Origin:** 1926 **Site Index:** 140

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed
- Several drainages

Special/Unique Features: Lakeshore

Access: Fair; moderate to steep terrain, near existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 50-foot buffer zone along each side of the drainages
- Designate green tree clumps adjacent to drainage buffer zones where possible
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- Harvest 15.1 acres as one cutting unit, treat slash and plant
- Commercially thin 10.9 acres scheduled for harvest in 2015

1996 - 2000
- Harvest 15.1 acres as one cutting unit, treat slash and plant

2001 - 2005
- Harvest 13.3 acres as one cutting unit, treat slash and plant
- Stocking adjustment of 15.1 acres harvested in 1995

2006 - 2010
- Stocking adjustment of 15.1 acres harvested in 2000

2011 - 2015
- Harvest 10.9 acres as one cutting unit, treat slash and plant
- Stocking adjustment of 13.3 acres harvested in 2005

2016 - 2020
- Harvest 15.3 acres as one cutting unit, treat slash and plant
- Commercially thin 10 acres of 14.9-acre unit scheduled for harvest in 2040

2021 - 2025
- Harvest 10.8 acres with part of Stand 2-11, treat slash and plant
- Stocking adjustment of 10.9 acres harvested in 2015

2026 - 2030
- Stocking adjustment of 15.3 acres harvested in 2020

2031 - 2035
- Stocking adjustment of 10.8 acres harvested in 2025

2036 - 2040
- Commercially thin 15.1 acres harvested in 1995
- Harvest 15.1 acres as one cutting unit, treat slash and plant
- Harvest 14.9 acres as one cutting unit, treat slash and plant

2041 - 2045
- Commercially thin 15.1 acres harvested in 2000

2046 - 2050
- Commercially thin 13.3 acres harvested in 2005
- Stocking adjustment of 30 acres harvested in 2040

2051 - 2055
- Harvest 15.1 acres previously harvested in 1995, treat slash and plant

2056 - 2060
- Harvest 15.1 acres previously harvested in 2000, treat slash and plant
- Commercially thin 10.9 acres harvested in 2015

Stands 2-11, 2-12

Area: 2-11 = 220.7 acres **Date of Origin:** 1923-1930 **Site Index:** 122-144
2-12 = 12.1 acres

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Partially within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed
- Small drainages

Special/Unique Features: Several seeps

Access: Fair; moderate to steep slopes, near existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 50-foot buffer zone on each side of the drainages
- Designate green tree clumps to include seeps if possible
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- Harvest 14.8 acres in Stand 2-11 as one cutting unit, treat slash and plant
- Harvest 13.1 acres in Stand 2-11 with part of Stand 4-2, treat slash and plant

1996 - 2000
- Harvest 16.4 acres in Stand 2-11 as one cutting unit, treat slash and plant

2001 - 2005
- Stocking adjustment of 27.9 acres harvested in 1995

2006 - 2010
- Stocking adjustment of 16.4 acres harvested in 2000

2011 - 2015
- Harvest 16.4 acres and 18 acres in Stand 2-11 as separate cutting units, treat slash and plant
- Harvest 14.9 acres in Stand 2-11 and 5.7 acres in Stand 2-12 as one cutting unit, treat slash and plant
- Commercially thin 15.6-acre unit scheduled for harvest in 2035

2016 - 2020
- No new activity

2021 - 2025
- Commercially thin 15.2-acre unit, 5.7-acre unit and 10 acres of the 14.3-acre unit all scheduled for harvest in 2045
- Harvest 14.3 acres in Stand 2-11 with part of Stand 4-2, treat slash and plant
- Harvest 4.6 acres in Stand 2-11 with part of Stand 2-9, treat slash and plant
- Stocking adjustment of 55 acres harvested in 2015

2026 - 2030
- No new activity

2031 - 2035
- Harvest 14.3 acres, 18.5 acres and 15.6 acres in Stand 2-11 as three cutting units, treat slash and plant
- Stocking adjustment of 18.9 acres harvested in 2025

2036 - 2040
- Commercially thin 14.8-acre and 13.1-acre cutting units harvested in 1995

2041 - 2045
- Commercially thin 16.4-acre cutting unit harvested in 2000
- Harvest 14.3 acres in Stand 2-11, treat slash and plant
- Harvest 15.2 acres of Stand 2-11 and 5.7 acres of Stand 2-12 as one cutting unit, treat slash and plant
- Stocking adjustment of 48.4 acres harvested in 2035

2046 - 2050
- No new activity

2051 - 2055
- Harvest 14.8-acre and 13.1-acre cutting units previously harvested in 1995
- Stocking adjustment of 35.2 acres harvested in 2045

2056 - 2060
- Commercially thin 55 acres harvested in 2015
- Harvest 16.4-acre cutting unit previously harvested in 2000

Stand 2-13

Area: 6.5 acres **Date of Origin:** 1924 **Site Index:** 120

Cover Type: Small Sawtimber Coniferous Forest

Constraints: None

Special/Unique Features: Isolated stand adjacent to tunnel portal

Access: Excellent; level site, adjacent to existing road

Management Guidelines:

- Maintain as permanent mixed forest and manage with Stands 2-14 and 2-25

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060
- Commercially thin entire 6.5 acres

1991 - 2060
- No activity except snag monitoring and maintenance

Stand 2-14

Area: 2.3 acres **Date of Origin:** 1923 **Site Index:** 119

Cover Type: Mixed Forest

Constraints: None

Special/Unique Features: *Small isolated stand adjacent to tunnel portal*

Access: Excellent; level site, adjacent to existing road

Management Guidelines:

- Retain as permanent mixed forest
- Maintain large conifers presently in stand

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 2-16

Area: 8.6 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Wetland

Constraints: - Partially within Lake Chaplain Watershed

Special/Unique Features: Wetland

Access: Excellent; level terrain, adjacent to existing road system

Management Guidelines:

- Manage in association with Lost Lake for waterfowl and other wetland species

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stands 2-15, 2-17, 2-18, 2-24

Area: 2-15 = 9.5 acres **Date of Origin:** 1933-1945 **Site Index:** 122-130
2-17 = 19.7 acres
2-18 = 8.9 acres
2-24 = 7.5 acres

Cover Types: Mixed Forest, Deciduous Forest and Small Sawtimber Coniferous Forest

Constraints: - Partially within Lake Chaplain Watershed

Special/Unique Features: Partially adjacent to wetlands

Access: Good; level terrain, near existing roadway

Management Guidelines:

- Maintain in permanent mixed forest as part of the 500-foot buffer zone around the wetland north of Lost Lake. Within this buffer zone:

  1) no overstory harvest within 200 feet of the wetland,
  2) no overstory harvest greater than 1 acre,
  3) no more than 5 acres harvested every 10 years,
  4) retain existing mixed forest and
  5) create snags where needed

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stands 2-19, 2-20

Area: 2-19 = 8.1 acres
2-20 = 12.0 acres

Date of Origin: 1970

Site Index: 126

Cover Types: Pole Stage Coniferous Forest and Mixed Shrub/Brush

Constraints: None

Special/Unique Features: None

Access: Fair; level site, less than 1/2 mile from existing road system

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee

Schedule:

1988 - 2015
- No activity

2016 - 2020
- Initiate snag management and monitoring program and continue through 2060

2021 - 2060
- No activity except snag monitoring and maintenance

Stand 2-25

Area: 11.2 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Mixed Shrub/Brush

Constraints: None

Special/Unique Features: Isolated stand adjacent to tunnel portal

Access: Excellent; road adjacent to stand

Management Guidelines:

- Allow to develop into mixed forest and retain through 2060

Schedule:

1988 - 2020
- No activity

2021 - 2025
- Initiate snag management and monitoring program and continue through 2060

2026 - 2060
- No activity except snag monitoring and maintenance

Stand 2-26

Area: 24.7 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Grass/Meadow

Constraints:
- Within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed
- Approximately 2 acres adjacent to Stand 2-27 will be used as a drying bed for solids from the filtration plant

Special/Unique Features: Lakeshore

Access: Excellent; level terrain, adjacent to existing road

Management Guidelines:

- Maintain as grass/meadow for early-successional stage species such as black-tailed deer
- Establish grasses and evergreen forb species palatable to deer

Schedule:

1988 - 1990
- Seed grasses and evergreen forb species

1991 - 2060
- Monitor grass species composition and maintain favorable mix for deer through additional seedings (if needed)

Stand 2-27

Area: 6.8 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Closed Sapling/Pole Coniferous Forest

Constraints:
- Within 200 feet of Lake Chaplain
- Entirely within Lake Chaplain Watershed

Special/Unique Features: Lakeshore

Access: Excellent; level terrain, adjacent to existing road

Management Guidelines:

- Maintain as coniferous forest riparian buffer zone to provide visual screening between the road and Lake Chaplain

Schedule:

1988 - 2010
- No activity

2011 - 2015
- Initiate snag management and monitoring program and continue through 2060

2016 - 2060
- No activity except snag monitoring and maintenance

Stand 2-28

Area: 3 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Wetland

Constraints: None

Special/Unique Features: Wetland

Access: Poor; distant from existing road system

Management Guidelines:

- Retain and protect existing wetland characteristics
- Maintain a 200-foot buffer zone surrounding the wetland

Schedule:

1988 - 2060

- Monitor wetland condition

Stand 3-1

Area: 141.1 acres **Date of Origin:** 1925 **Site Index:** 133

Cover Types: Small Sawtimber Coniferous and Mixed Forest

Constraints:
- Large drainage
- Steep slopes

Special/Unique Features: Wetland, stream drainage

Access: Fair - Poor; moderate to steep terrain, distant from existing road system

Management Guidelines:

- Manage steep inaccessible areas along drainage and Chaplain Creek marsh as old-growth management area
- Manage remainder of area (approximately 90 acres) as 60-year rotation coniferous forest
- Maintain a 200-foot buffer zone along the wetland in the northeast corner of the stand and a 50-foot buffer zone along each side of the drainage
- Designate green tree clumps adjacent to wetland and drainage buffer zones where possible
- Retain pockets of mixed forest during harvest if practicable

Schedule:

1988 - 1990
- Harvest 23.3 acres as one cutting unit, treat slash and plant
- Initiate snag management and monitoring program and continue through 2060
- Commercially thin 23.3 acres scheduled for harvest in 2020

1991 - 1995
- No new activity

1996 - 2000
- Stocking adjustment of 23.3 acres harvested in 1990
- Harvest 23.3 acres as one cutting unit, treat slash and plant
- Commercially thin 14.7 acres scheduled for harvest in 2030

2001 - 2005
- No new activity

2006 - 2010
- Stocking adjustment of 23.3 acres harvested in 2000

2011 - 2015
- No new activity

2016 - 2020
- Harvest 23.3 acres as one cutting unit, treat slash and plant

2021 - 2025
- No new activity

2026 - 2030
- Stocking adjustment of 23.3 acres harvested in 2020
- Harvest 14.7 acres as one cutting unit, treat slash and plant

2031 - 2035
- Commercially thin 23.3 acres harvested in 1990

2036 - 2040
- Stocking adjustment of 14.7 acres harvested in 2030

2041 - 2045
- Commercially thin 23.3 acres harvested in 2000

2046 - 2050
- Harvest 23.3 acres previously harvested in 1990, treat slash and plant

2051 - 2055
- No new activity

2056 - 2060
- Harvest 23.3 acres previously harvested in 2000, treat slash and plant
- Stocking adjustment of 23.3 acres harvested in 2050

Stands 4-1, 4-2, 4-3

Area: 4-1 = 12.3 acres **Date of Origin:** 1923-1924 **Site Index:** 119-128
4-2 = 45.2 acres
4-3 = 46.3 acres

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Unstable soils
- Slopes to 65 percent
- Several drainages

Special/Unique Features: None

Access: Good; moderate to steep slopes, adjacent to existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 50-foot buffer zone on each side of drainages and unstable areas
- Designate green tree clumps adjacent to drainage buffer zones and unstable areas where possible
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- Harvest 3.8 acres in Stand 4-3 with part of Stand 4-4, treat slash and plant
- Harvest 6 acres in Stand 4-2 with part of Stand 2-11

1996 - 2000
- No new activity

2001 - 2005
- Stocking adjustment of 9.8 acres harvested in 1995
- Harvest 16.4 acres in Stand 4-3 and 1.2 acres in Stand 4-2 as one cutting unit, treat slash and plant

2006 - 2010
- No new activity

2011 - 2015
- Stocking adjustment of 17.6 acres harvested in 2005

2016 - 2020
- Harvest 10.7 acres in Stand 4-1 and 8.4 acres in Stand 4-2 as one cutting unit, treat slash and plant

2021 - 2025
- Harvest 6 acres in Stand 4-2 with part of Stand 2-11, treat slash and plant

2026 - 2030
- Stocking adjustment of 19.1 acres harvested in 2020

2031 - 2035
- Stocking adjustment of 6 acres harvested in 2025

2036 - 2040
- Harvest 17.6 acres from Stand 4-3 and 4.3 acres from Stand 4-2 as one cutting unit, treat slash and plant
- Commercially thin 9.8 acres harvested in 1995

2041 - 2045
- Harvest 14.2 acres in Stand 4-2 and 3.5 acres in Stand 4-3 as one cutting unit, treat slash and plant

2046 - 2050
- Stocking adjustment of 21.9 acres harvested in 2040
- Commercially thin 17.6 acres harvested in 2005

2051 - 2055
- Stocking adjustment of 17.7 acres harvested in 2045
- Harvest 9.8 acres previously harvested in 1995, treat slash and plant

2056 - 2060
- No activity except snag monitoring and maintenance

Stand 4-4

Area: 52.1 acres **Date of Origin:** 1922 **Site Index:** 130

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Several drainages and unstable areas
- Slopes to 60 percent

Special/Unique Features: Chaplain Creek

Access: Fair; moderate to steep terrain, near existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Maintain a 50-foot buffer zone along each side of drainages and unstable areas
- Designate green tree clumps adjacent to drainage buffer zones and unstable areas where possible

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- Harvest 19 acres with part of Stand 4-3, treat slash and plant

1996 - 2000
- No new activity

2001 - 2005
- Stocking adjustment of 19 acres harvested in 1995

2006 - 2020
- No new activity

2021 - 2025
- Harvest 25.7 acres as one cutting unit, treat slash and plant

2026 - 2030
- No new activity

2031 - 2035
- Stocking adjustment of 25.7 acres harvested in 2025

2036 - 2040
- Commercially thin 19 acres harvested in 1995

2041 - 2050

- No new activity

2051 - 2055

- Harvest 19 acres previously harvested in 1995 with part of Stand 4-3, treat slash and plant

2056 - 2060

- No activity except snag monitoring and maintenance

Stand 4-5

Area: 121.8 acres **Date of Origin**: 1923 **Site Index**: 122

Cover Type: Small Sawtimber Coniferous Forest

Constraints: Small drainage

Special/Unique Features: None

Access: Good - Excellent; moderate terrain, adjacent to existing road system

Management Guidelines:

- Manage as 60-year rotation coniferous forest
- Harvest cutting units away from the Lake Chaplain Road first and leave units along the road as screening until first harvest has regenerated
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060
- Commercially thin 20.9 acres scheduled for harvest in 2030
- Harvest 22.8 acres as one cutting unit, treat slash and plant

1991 - 1995
- No new activity

1996 - 2000
- Stocking adjustment of 22.8 acres harvested in 1990

2001 - 2005
- Commercially thin 21.5 acres scheduled for harvest in 2030
- Harvest 18 acres as one cutting unit, treat slash and plant

2006 - 2010
- Harvest 22.8 acres as one cutting unit, treat slash and plant

2011 - 2015
- Stocking adjustment of 18 acres harvested in 2005

2016 - 2020
- Stocking adjustment of 22.8 acres harvested in 2010

2021 - 2025
- No new activity

2026 - 2030
- Harvest 42.4 acres as two cutting units (21.5 acres and 20.9 acres), treat slash and plant

2031 - 2035
- Commercially thin 22.8 acres harvested in 1990

2036 - 2040
- Stocking adjustment of 42.4 acres harvested in 2030 as two cutting units

2041 - 2045
- No new activity

2046 - 2050
- Commercially thin 18 acres harvested in 2005
- Harvest 22.8 acres previously cut in 1990 as one cutting unit, treat slash and plant

2051 - 2055
- Commercially thin 22.8 acres harvested in 2010

2056 - 2060
- Stocking adjustment of 22.8 acres harvested in 2050

Stand 4-6

Area: 4.8 acres **Date of Origin**: 1923 **Site Index**: 137

Cover Type: Mixed Forest

Constraints: None

Special/Unique Features: None

Access: Excellent; adjacent to existing road system

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 4-7

Area: 14 acres **Date of Origin:** 1925 **Site Index:** 134

Cover Type: Small Sawtimber Coniferous Forest

Constraints: None

Special/Unique Features: Lake Chaplain pipeline

Access: Good - Excellent; moderate terrain, adjacent to existing road system

Management Guidelines:

- Maintain as permanent coniferous forest and manage as an old-growth management area to provide cover and edge adjacent to the pipeline right-of-way

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 4-8 **(Lake Chaplain Pipeline Right-of-Way)**

Area: 9 acres **Date of Origin:** 1982 **Site Index:** N/A

Cover Types: Mixed Shrub/Brush and Grass/Meadow

Constraints:
- Do not plant deep-rooted vegetation over the pipeline (15 feet either side of center-line)
- Do not fertilize near Chaplain Creek and Marsh

Special/Unique Features: Chaplain Creek, wetland, Sultan River

Access: Excellent; level sites, adjacent to road

Management Guidelines:

- Seed preferred grasses and forbs for black-tailed deer
- Convert the area between the road and wetland to mixed forest and mixed shrub/brush to provide visual screening and to establish native riparian vegetation along the wetland edge
- Monitor and maintain plantings

Schedule:

1988 - 1990
- Plant western red cedar, hemlock, willow and fast-growing black cottonwood between the road and the wetland

1991 - 2060
- Monitor planting success and replant as necessary

Stand 5-1

Area: 22.1 acres **Date of Origin**: 1923 **Site Index**: 130

Cover Type: Mixed Forest

Constraints: Wetland (flooded forest)

Special/Unique Features: Adjacent to Chaplain Creek marsh

Access: Good; gentle terrain, adjacent to existing road system

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse, black-capped chickadee and wetland species

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 5-2

Area: 18.8 acres **Date of Origin**: 1923 **Site Index**: 98

Cover Type: Small Sawtimber Coniferous Forest

Constraints: None

Special/Unique Features: None

Access: Fair; moderate to steep terrain, near existing road system

Management Guidelines:

- Manage 1 acre isolated from rest of stand as permanent mixed forest with Stand 5-1
- Manage as 60-year rotation coniferous forest
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2005
- No new activity

2006 - 2010
- Harvest 16.9 acres as one cutting unit, treat slash and plant

2011 - 2015
- No new activity

2016 - 2020
- Stocking adjustment of 16.9 acres harvested in 2010

2021 - 2050
- No new activity

2051 - 2055
- Commercially thin 16.9 acres harvested in 2010

2056 - 2060
- No activity except snag monitoring and maintenance

Stand 5-3

Area: 7.3 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Types: Mixed Forest and Mature Riparian Forest

Constraints: Within 100 feet of Chaplain Creek

Special/Unique Features: Chaplain Creek

Access: Excellent; level terrain, adjacent to existing road system

Management Guidelines:

- Retain as permanent mixed forest to provide visual screening between the road and Chaplain Creek

Schedule:

1990 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stands 5-4, 5-5

Area: 5-4 = 74.5 acres **Date of Origin:** 1925 **Site Index:** 129-136
5-5 = 87.5 acres

Cover Types: Small Sawtimber Coniferous Forest and Mixed Forest

Constraints:
- Partially within 100 feet of Chaplain Creek
- Partially within 200 feet of Sultan River
- Slopes to 90 percent

Special/Unique Features: Sultan River, Chaplain Creek, Chaplain Creek marsh

Access: Poor - Excellent; level to steep terrain, adjacent to existing road systems

Management Guidelines:

- Protect steep areas adjacent to Sultan River and manage as old-growth management area
- Maintain a 100-foot buffer zone on each side of Chaplain Creek and a 200-foot buffer zone adjacent to the wetland
- Manage remaining land as 60-year rotation coniferous forest
- Designate green tree clumps adjacent to Chaplain Creek and wetland buffer zones where possible
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- Harvest 13.3 acres of Stand 5-4 and 2.8 acres of Stand 5-5 as one cutting unit, treat slash and plant
- Harvest 9.5 acres of Stand 5-5 as one cutting unit, treat slash and plant

1996 - 2000
- No new activity

2001 - 2005
- Stocking adjustment of 25.6 acres harvested in 1995

2006 - 2010
- Harvest 16.1 acres of Stand 5-4 with part of Stand 5-9, treat slash and plant

2011 - 2015
- Harvest 7.6 acres of Stand 5-4 and 12.3 acres of Stand 5-5 as one cutting unit, treat slash and plant
- Commercially thin 18.9 acres scheduled for harvest in 2035

2016 - 2020
- Stocking adjustment of 16.1 acres harvested in 2010

2021 - 2025
- Stocking adjustment of 19.9 acres harvested in 2015

2026 - 2030
- Harvest 5.2 acres of Stand 5-4 and 16.6 acres of Stand 5-5 as one cutting unit, treat slash and plant

2031 - 2035
- Harvest 10.4 acres of Stand 5-4 and 8.5 acres of Stand 5-5 as one cutting unit, treat slash and plant

2036 - 2040
- Stocking adjustment of 21.8 acres harvested in 2030
- Commercially thin 25.6 acres harvested in 1995
- Harvest 19 acres of Stand 5-5 as one cutting unit, treat slash and plant

2041 - 2045
- Stocking adjustment of 18.9 acres harvested in 2035

2046 - 2050
- Stocking adjustment of 19 acres harvested in 2040

2051 - 2055
- Commercially thin 16.1 acres harvested in 2010
- Harvest 25.6 acres previously harvested in 1995 as two cutting units, treat slash and plant

2056 - 2060
- Commercially thin 19.9 acres harvested in 2015

Stand 5-6

Area: 11.5 acres **Date of Origin**: 1924 **Site Index**: 135

Cover Type: Mixed Forest

Constraints:
- Partially within 200 feet of the Sultan River
- Slopes to 90 percent

Special/Unique Features: Sultan River

Access: Excellent - Poor; level to steep terrain, adjacent to existing road systems

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 5-7

Area: 2.1 acres **Date of Origin**: N/A **Site Index**: N/A

Cover Type: Mixed Forest

Constraints: None

Special/Unique Features: None

Access: Fair; level terrain, adjacent to overgrown road system

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee

Schedule:

1988 - 2000
- No activity

2001 - 2005
- Initiate snag management and monitoring program and continue through 2060

2006 - 2060
- No activity except snag monitoring and maintenance

Stand 5-8

Area: 39 acres **Date of Origin:** 1930 **Site Index:** 138

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Partially within 200 feet of Sultan River
- Slopes to 90 percent

Special/Unique Features: Sultan River

Access: Poor - Excellent; level to steep terrain, adjacent to existing road system

Management Guidelines:

- Protect steep areas adjacent to Sultan River and manage as old-growth management area
- Manage remaining land as 60-year rotation coniferous forest
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1990
- Harvest 24.2 acres as one cutting unit, treat slash and plant
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- No new activity

1996 - 2000
- Stocking adjustment of 24.2 acres harvested in 1990

2001 - 2030
- No new activity

2031 - 2035
- Commercially thin 24.2 acres harvested in 1990

2036 - 2045
- No new activity

2046 - 2050
- Harvest 24.2 acres previously harvested in 1990

2051 - 2055
- No new activity

2056 - 2060
- Stocking adjustment of 24.2 acres harvested in 2050

Stands 5-9, 5-10

Area: 5-9 = 24.6 acres **Date of Origin**: 1923-1925 **Site Index**: 124-135
5-10 = 10.1 acres

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Partially within 200 feet of the Sultan River
- Small drainage

Special/Unique Features: Sultan River, small pond (gravel pit)

Access: Fair - Excellent; moderate to steep terrain, adjacent to existing road system

Management Guidelines:

- Manage as a 60-year rotation coniferous forest
- Protect a 100-foot buffer zone around the gravel pit and a 50-foot buffer zone on each side of the drainage
- Designate green tree clumps adjacent to drainage and wetland buffer zones if possible
- Manage 8 acres in Stand 5-10 along the Sultan River as an old-growth management area
- Retain pockets of mixed forest during harvest, if practicable

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2005
- No new activity

2006 - 2010
- Harvest 1.9 acres in Stand 5-9 with part of Stand 5-4, treat slash and plant

2011 - 2015
- No new activity

2016 - 2020
- Harvest 10 acres in Stand 5-9 and 2 acres in Stand 5-10 as one cutting unit, treat slash and plant
- Stocking adjustment of 1.9 acres harvested in 2010

2021 - 2025
- No new activity

2026 - 2030
- Stocking adjustment of 12 acres harvested in 2020

2031 - 2035
- No new activity

2036 - 2040
- Harvest 9.5 acres in Stand 5-9 as one cutting unit, treat slash and plant

2041 - 2045
- No new activity

2046 - 2050
- Stocking adjustment of 9.5 acres harvested in 2040

2051 - 2055
- Commercially thin 1.9 acres harvested in 2010

2056 - 2060
- No activity except snag monitoring and maintenance

Stands 5-11, 5-12

Area: 5-11 = 15.5 acres **Date of Origin:** 1909 **Site Index:** 116-126
5-12 = 11.0 acres

Cover Type: Small Sawtimber Coniferous Forest

Constraints:
- Partially within 200 feet of the Sultan River
- Unstable areas adjacent to river

Special/Unique Features: Sultan River

Access: Fair; moderate to steep terrain, near existing road system

Management Guidelines:

- Harvest part of Stand 5-12 one time in 2000
- Manage remainder of Stands 5-11 and 5-12 as late-successional forest in an old-growth management area

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 1995
- No new activity

1996 - 2000
- Commercially thin 12 acres in Stand 5-11 outside shoreline of Sultan River
- Harvest 3 acres in Stand 5-12 as one cutting unit, treat slash and plant

2001 - 2005
- No new activity

2006 - 2010
- Stocking adjustment of 3-acre cutting unit harvested in 2000

2011 - 2060
- No activity except snag monitoring and maintenance

Stand 5-13

Area: 8.3 acres **Date of Origin**: 1909 **Site Index**: 122

Cover Type: Mixed Forest

Constraints:
- Partially within 200 feet of the Sultan River
- Unstable areas adjacent to river

Special/Unique Features: Sultan River

Access: Fair; moderate to steep terrain, near existing road system

Management Guidelines:

- Retain as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 5-14 (Chaplain Creek Marsh)

Area: 48 acres **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Wetland

Constraints: Culvert under Diversion Dam Road must remain open

Special/Unique Features: Flat, level terrain; flooded forest

Access: Good; flat terrain, near existing road

Management Guidelines:

- Preserve and protect existing wetland

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stands 6-1, 6-2, 6-3

Area: 6-1 = 10.3 acres
6-2 = 10.7 acres
6-3 = 15.3 acres

Date of Origin: 1925 **Site Index:** 131

Cover Types: Small Sawtimber Coniferous and Mixed Forest

Constraints:
- Partially within 200 feet of the Sultan River
- Steep slopes

Special/Unique Features: Two drainages

Access: Very Poor; moderate to steep terrain, distant from existing road system

Management Guidelines:

- Manage as old-growth management area

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060

1991 - 2060
- No activity except snag monitoring and maintenance

3.2 LOST LAKE TRACT

3.2.1 Existing Habitat Conditions

The Lost Lake Tract consists of 29 acres of lake and wetland and 176 acres of young second growth forest (Figure 3.1). It is located approximately 1 mile west of Lake Chaplain. The tract was proposed for subdivision into 20-acre suburban residential lots by the previous owner. The District has acquired the tract and intends to manage it for wildlife habitat.

Physiographically, the tract is an extension of the Lake Chaplain Tract. Topography, soils and native vegetation of the two tracts are virtually identical, and the discussion in Section 3.1.1 is applicable here. All upland sites have been logged at least once in the past 100 years and left to regenerate naturally. They are now dominated by mixed second growth stands of hemlock, red alder, Douglas-fir, cedar, bigleaf maple and black cottonwood (Figure 3.2).

The wetland complex consists of 14 acres of open water (Lost Lake) surrounded by 14 acres of associated 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. Beaver activity has raised the water level of the lake approximately 3 feet, expanding the wetland area into the surrounding forest. Human disturbance of the wetland area is minimal because the City limits vehicle access to the site. A smaller (1 acre) wetland surrounded by mixed forest exists in the southwest corner of the tract.

3.2.2 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 available, and the high diversity of overstory tree

species. Recently harvested areas provide good forage for deer and ruffed grouse, but they are too large to allow optimal utilization and their quality is decreasing as the 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 pine marten are presently limited in mixed forest and small sawtimber due to the absence of snags, large diameter logs and large diameter trees. The Douglas squirrel is limited by the low percentage of Douglas-fir in the overstory.

The wetland complex has high habitat value because of its diversity of wetland types. It is good to excellent habitat for most of the HEP evaluation species. The lake was stocked with trout from 1964 through 1979 and maintains a fish population that could provide a food source for species such as the osprey and merganser. The ratio of open water and emergent vegetation is favorable for mallard nesting, and the abundance of young deciduous trees in the surrounding uplands provides an excellent food source for beaver.

3.2.3 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 under 20 acres. Forest practice regulations and general zoning would apply to the property, but they would not restrict any potential management activities proposed in this plan. Snohomish County is presently developing a county wetland protection ordinance, which could include Lost Lake. The County should therefore be consulted prior to any alteration of the wetland.

The City estimates that less than 10 percent of Lost Lake drains into the Lake Chaplain watershed, even under flood conditions. Water quality is therefore a minor concern that should not interfere with management or human use of the tract.

3.2.4 Habitat Management Objectives

a) Purchase the tract and protect if from residential development through 2060;

b) Enhance the wetland by designating a forested buffer zone around it and providing nesting islands, snags, waterfowl nest boxes and osprey nesting structures;

c) Manage forested lands outside the buffer zone as 60-year rotation mixed forest to optimize habitat for black-tailed deer, ruffed grouse and black-capped chickadee; and

d) Implement the snag management program on forested lands.

3.2.5 Habitat Management

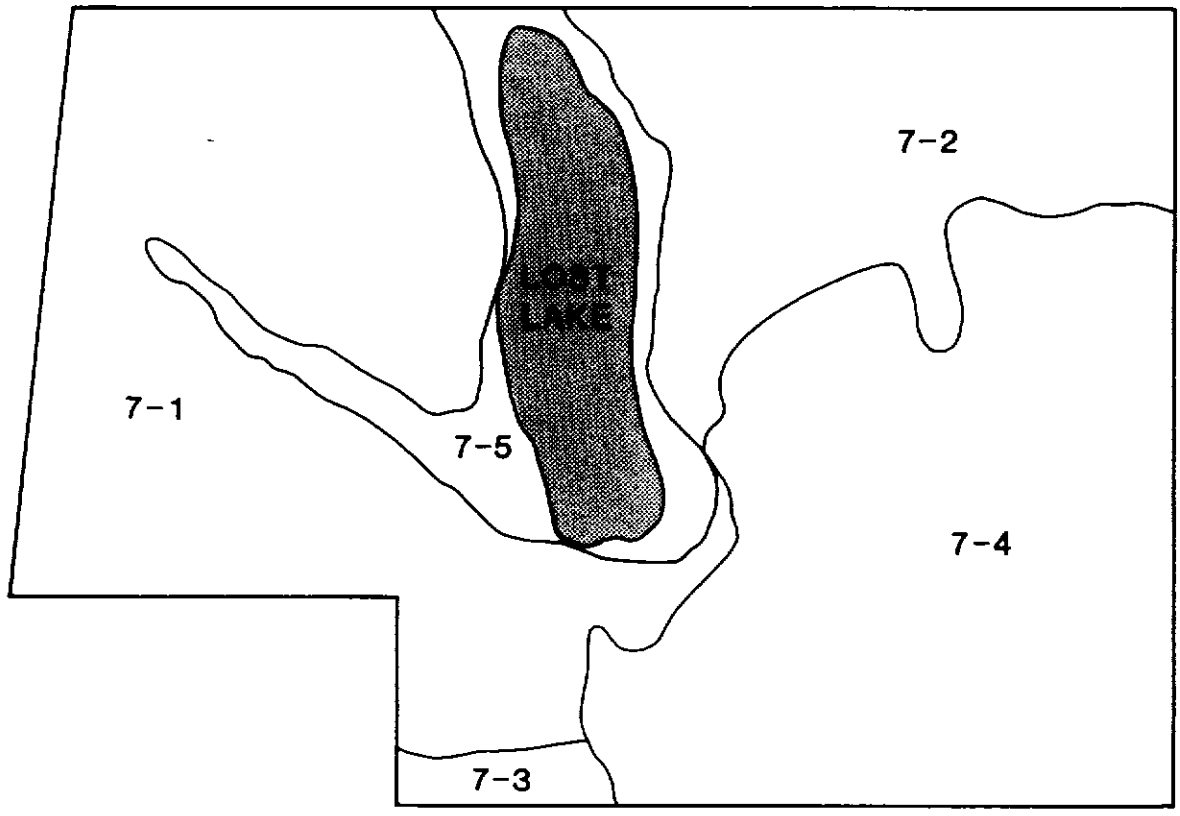
The Lost Lake Tract is a single management unit divided into five stands based on vegetation cover (Figure 3.6). Management of the tract will involve three major habitat systems: 1) lake/wetland, 2) wetland buffer zone and 3) 60-year rotation mixed forest. These elements are described in the following sections.

3.2.5.1 Lake/Wetland Management

The 28-acre lake/wetland complex and the one-acre wetland will be retained for the life of this management plan. Three floating nesting islands for waterfowl will be placed on the lake. One artificial osprey nesting platform will be erected in or adjacent to the lake/wetland complex.

3.2.5.2 Wetland Buffer Zone Management

Approximately 80 acres of second growth forest will be maintained as a 500-foot wide permanent buffer zone surrounding the lake/wetland complex (Figure 3.7). The buffer will be managed in two sections. The area within



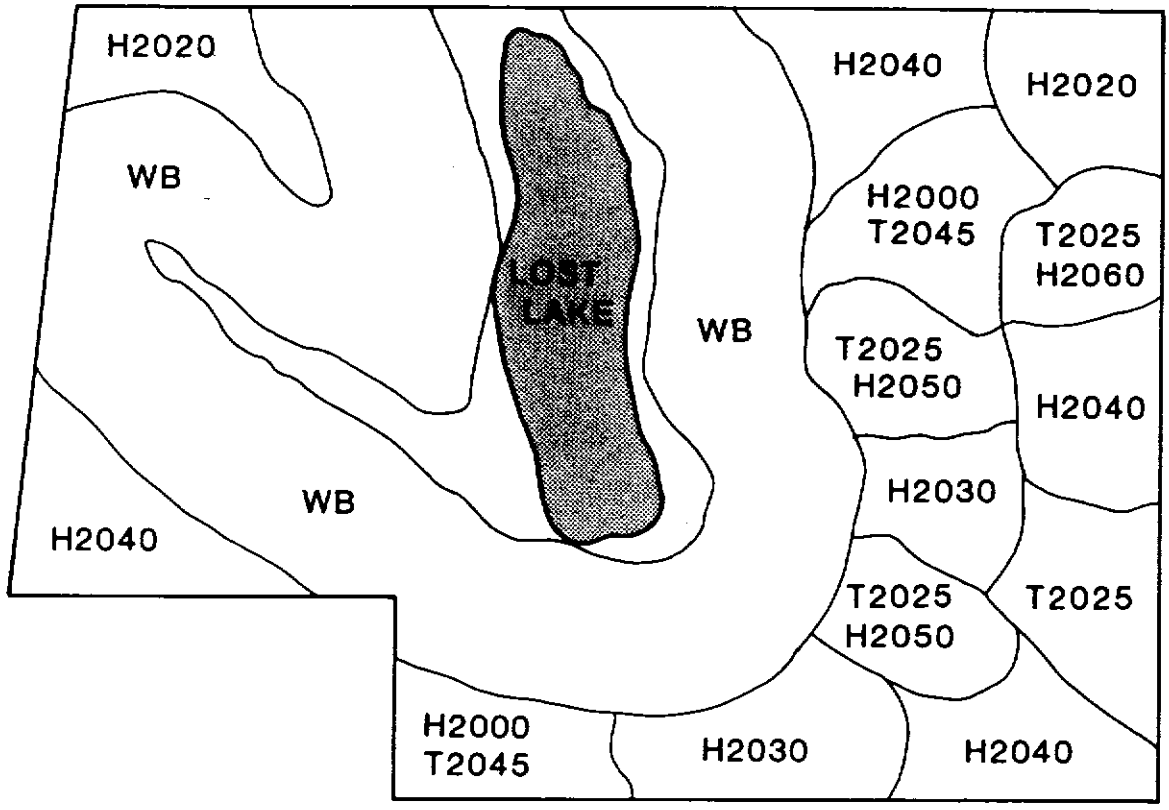
NORTH

0 500 1000 1500 FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.6 Management stands of the Lost Lake Tract



LEGEND

T2000 - Year of Commercial Thin
H2000 - Year of Harvest
WB - Wetland Buffer

NORTH

0 500 1000 1500 FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.7 Cutting units and harvest schedule for the Lost Lake Tract

200 feet of the lake/wetland will be managed as stable, mixed forest with special emphasis on late-successional characteristics. The establishment and maintenance of the buffer zone will follow the procedures outlined in Section 2.2. No overstory harvest will occur within this area. Snags will be maintained at target densities with emphasis on providing suitable snags as osprey perch sites. Waterfowl nesting boxes will be erected in trees directly adjacent to the lake/wetland.

The area between 200 and 500 feet from the lake/wetland will be managed as permanent mixed forest to emphasize habitat for black-tailed deer, ruffed grouse and black-capped chickadee. Selected cuttings of not more than 1 acre each will be used to enhance the mixed forest habitat quality by creating small patches of young black cottonwood, bigleaf maple and alder trees in the older mixed forest stand. Cutting will be limited to a maximum of 5 acres every 10 years. Snag management will also be implemented within this area.

3.2.5.3 60-Year Rotation Mixed Forest Management

Ninety-six acres of forested land outside the wetland buffer zone will be managed on the 60-year mixed forest harvest rotation described in Section 2.1.4. Harvest units are smaller and the interval between harvests on adjacent units is less than in the standard 60-year harvest rotation to improve habitat interspersion for grouse. A map showing the proposed cutting units and cutting dates is provided as Figure 3.7. The map will serve as the basic reference for the life of this plan.

3.2.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Lost Lake 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. Harvest acreages in the following prescriptions do not include areas protected as green tree clumps and buffers.

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

Area: 7-1 = 71.0 acres **Date of Origin:** 1934-1938 **Site Index:** 126
7-2 = 37.0 acres
7-3 = 4.0 acres

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

Constraints: None

Special/Unique Features: Adjacent to Lost Lake, wetland

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

Management Guidelines:

- Establish a 500-foot buffer zone around Lost Lake and adjacent wetland (69 acres). Within this zone:

  1) no cutting within 200 feet of the lake or wetland,
  2) no cuttings greater than 1 acre,
  3) no more cutting than 5 acres every 10 years and
  4) maintain existing mixed forest and create snags where needed

- Manage remaining area (37 acres) as 60-year rotation mixed forest
- Harvest with a maximum cutting unit size of approximately 8 acres for multiple cover type species such as ruffed grouse and black-tailed deer
- Promote mixed forest in the next rotation by leaving mature cottonwood and maple as seed sources (prune if necessary to prevent blowdown)
- Green tree clumps will be left in Stand 7-2 only
- Maintain a 200-foot buffer zone adjacent to the 1-acre wetland in Stand 7-1

Schedule:

1988 - 1990
- Initiate snag management and monitoring program and continue through 2060
- Install two waterfowl nest boxes; maintain and monitor through 2060 as use warrants
- Install one osprey nest platform; maintain and monitor through 2060 as use warrants

1991 - 1995
- No new activity

1996 - 2000
- Harvest 4 acres in Stand 7-3 and 2 acres of Stand 7-1 as one unit, treat slash and plant
- Harvest 7.6 acres in Stand 7-2 as one unit, treat slash and plant

2001 - 2005
- No new activity

2006 - 2010
- Stocking adjustment of 13.6 acres harvested in 2000

2011 - 2015
- No new activity

2016 - 2020
- Harvest 6 acres in Stand 7-1 and 6.7 acres in Stand 7-2 as two cutting units, treat slash and plant

2021 - 2025
- No new activity

2026 - 2030
- Stocking adjustment of 12.7 acres harvested in 2020

2031 - 2035
- No new activity

2036 - 2040
- Harvest 8 acres in Stand 7-1 and 6.7 acres in Stand 7-2 as separate units, treat slash and plant

2041 - 2045
- Commercially thin 13.6 acres harvested in 2000

2046 - 2050
- Stocking adjustment of 14.7 acres harvested in 2040

2051 - 2055

- No new activity

2056 - 2060

- Harvest 4 acres in Stand 7-3 previously harvested in 2000, treat slash and plant

Stand 7-4

Area: 65 acres **Date of Origin**: 1970 **Site Index**: 126

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

Constraints: Small drainage

Special/Unique Features: None

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

Management Guidelines:

- Establish a 500-foot buffer zone around Lost Lake and adjacent wetland (11 acres). Within this zone:

  1) no cutting within 200 feet of the lake or wetland,
  2) no cuttings greater than 1 acre,
  3) no more cutting than 5 acres every 10 years and
  4) maintain existing mixed forest and create snags where needed

- Manage remaining acreage as 60-year rotation mixed forest
- Harvest with a maximum cutting unit size of approximately 8 acres to maximize habitat diversity for multiple cover type species such as ruffed grouse and black-tailed deer
- Thin pre-commercially in 1990 to improve deer habitat
- Divide stand into 8 units; commercially thin half of the units in 2025; do not thin the remaining units prior to harvest
- Leave one cutting unit (7 acres) unharvested

Schedule:

1988 - 1995
- Pre-commercially thin 54 acres (all forest land outside buffer zone)

1996 - 2015
- No new activity

2016 - 2020
- Initiate snag management and monitoring program and continue through 2060

2021 - 2025
- Commercially thin 23.8 acres in four units

2026 - 2030
- Harvest 14.2 acres as two equal cutting units, treat slash and plant

2031 - 2035
- No new activity

2036 - 2040
- Harvest 13.3 acres as two cutting units (7.6 acres and 5.7 acres), treat slash and plant
- Stocking adjustment of 14.2 acres harvested in 2030

2041 - 2045
- No new activity

2046 - 2050
- Harvest 12.4 acres as two cutting units (6.7 acres and 5.7 acres), treat slash and plant
- Stocking adjustment of 13.3 acres harvested in 2040

2051 - 2055
- No new activity

2056 - 2060
- Stocking adjustment of 12.4 acres harvested in 2050
- Harvest 4.8 acres as one unit, treat slash and plant

Stand 7-5 **(Lost Lake and adjacent wetland)**

Area: 28 acres **Date of Origin**: N/A **Site Index**: N/A

Cover Type: Lake and Wetland

Constraints: None

Special/Unique Features: Lake/wetland complex

Access: Good; gravel road to site

Management Guidelines:

- Preserve and protect existing wetland
- Improve value as wetland habitat by adding nesting structures for waterfowl and osprey

Schedule:

1988 - 1990
- Acquire property
- Install three artificial nesting islands

1991 - 2060
- Maintain and monitor artificial nesting islands through 2060 if use warrants

3.3 PROJECT FACILITY LANDS TRACT

3.3.1 Existing Habitat Conditions

Approximately 79 acres of Project facility lands downstream of Spada Lake are available for management and enhancement as wildlife habitat. They include the pipeline right-of-way between the tunnel and the powerhouse (40 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 3.1). These lands are owned and/or controlled by the District.

The permanent 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. It is sparsely vegetated with young red alder and other pioneering species. During construction, a 200-foot wide right-of-way was cleared, 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 young Douglas-fir trees. The lands outside the 200-foot right-of-way are predominantly second growth commercial timberland, much of which is scheduled for harvest within the next 10 years. The right-of-way also crosses Marsh Creek and its associated wetland for a distance of approximately 500 feet.

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. A riparian strip along the Sultan river supports young hardwood trees and shrubs that regenerated naturally after construction. At the top of the slope above the powerhouse there is approximately 1 acre of pole stage Douglas-fir. The powerhouse access road goes through the site.

The transmission line right-of-way extends 800 feet cross-country from the powerhouse to the powerhouse access road. This 50-foot swath is maintained in low-growing vegetation, but is otherwise 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 less than 10 years ago. Part of the site (less than 2 acres) was logged and replanted in 1960 and now contains a well-stocked stand of pole size Douglas-fir.

3.3.2 Existing Habitat Value

The pipeline right-of-way is sparsely vegetated and provides minimal forage or hiding cover. The powerhouse site provides habitat for species using early-successional cover types, but lacks hiding cover. The transmission line right-of-way and most of the wedge-shaped parcel currently provide habitat for species requiring early-successional vegetation. All four sites have potential because of the edge they provide, but their lack of forage and/or hiding cover results in low habitat quality.

3.3.3 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 should be planted directly above the pipeline (30-foot wide strip centered over the pipeline). Vehicle access to service points must also be maintained.

The pipeline right-of-way passes through the Town of Sultan's watershed. No fertilizer or herbicides should be applied to the right-of-way within the watershed.

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 which 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. No fertilizer or herbicides should be applied within 100 feet of the Sultan River or Cascade Creek.

3.3.4 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 and

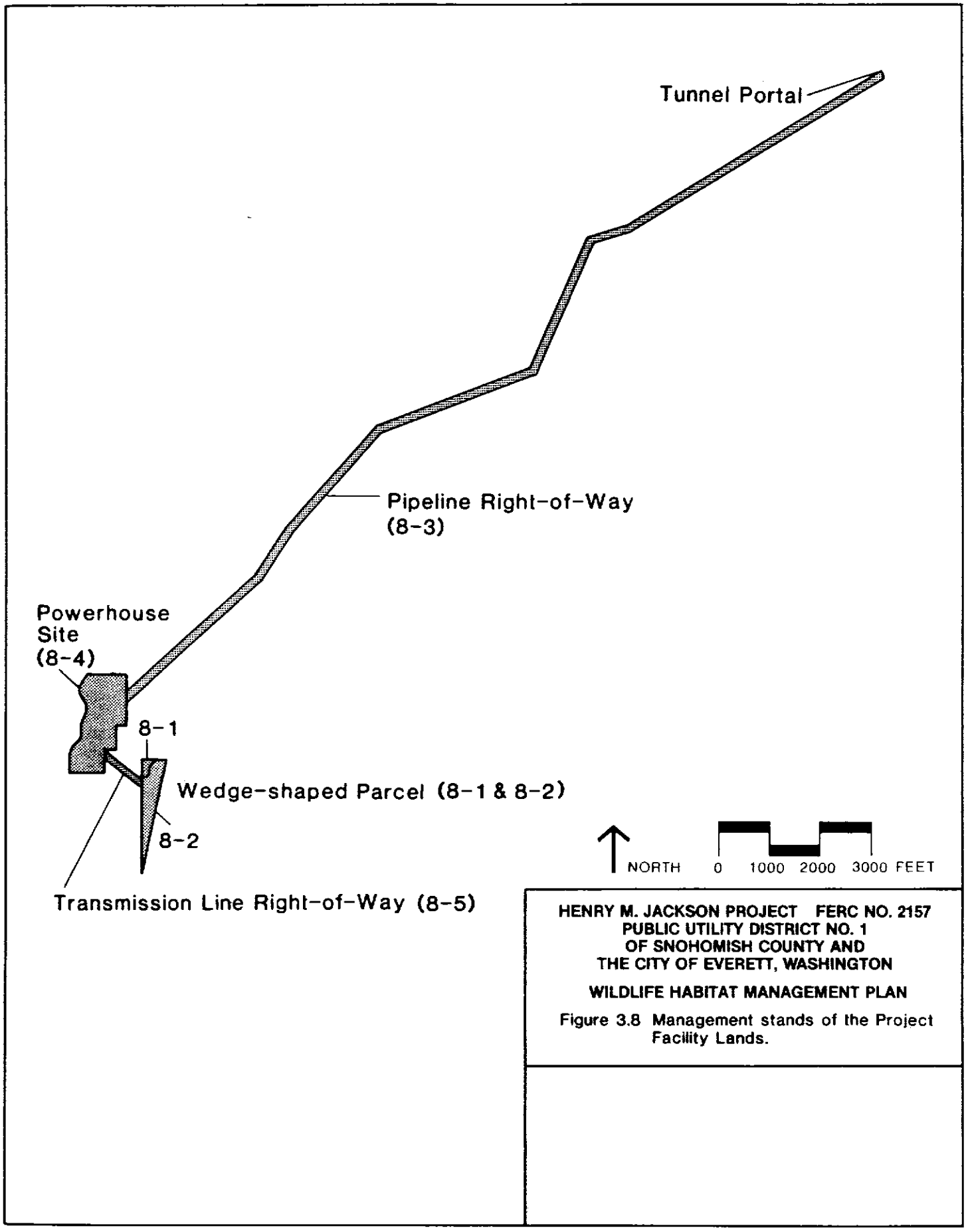
b) Preserve existing forested stands and create snags to facilitate development of late-successional habitat.

3.3.5 Habitat Management

The Project Facility Lands consist of 5 stands (Figure 3.8). They will all be managed to enhance habitat for early-successional and mixed forest wildlife species as described in Section 2.5. Special emphasis is given to management for black-tailed deer and ruffed grouse.

3.3.5.1 Wedge-shaped Parcel

The two small stands of coniferous and mixed forest will be retained in forested cover with no harvest through 2060 to provide permanent cover. The snag management program will be implemented when trees become large enough to meet the needs of cavity nesters.



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.8 Management stands of the Project Facility Lands.

3.3.5.2 Pipeline Right-of-Way

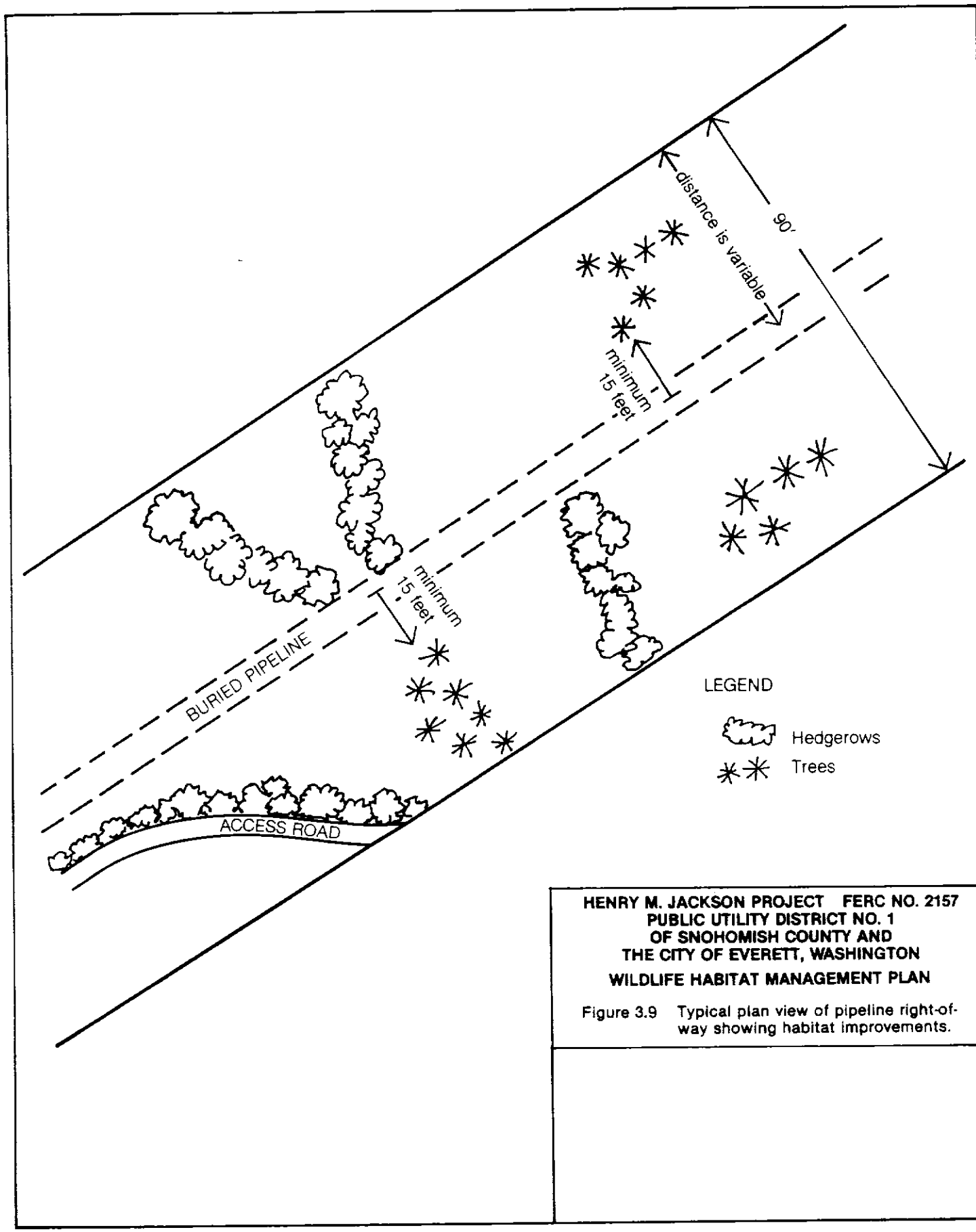
The pipeline right-of-way will be seeded with a mixture of grasses and forbs suited to the site. Hedgerows and clumps of shrubs and trees will be planted at a maximum spacing of 600 feet (Figure 3.9). In addition, brush piles will be placed at several locations along the right-of-way and planted with trailing blackberry. The brush piles will be placed in strategic locations to control off-road vehicle use.

3.3.5.3 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 will 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 coniferous and riparian forest, with minimal intervention. Large trees will be retained along the river to serve as perches for osprey and bald eagles that occasionally use the area.

3.3.5.4 Transmission Line Right-of-Way

The transmission line right-of-way will be managed permanently in low-growing vegetation. Trees will be removed manually when they exceed a height of 10 feet. The site will be fertilized approximately every 5 years to promote vigorous growth of grasses and shrubs and discourage hardwood trees.



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.9 Typical plan view of pipeline right-of-way showing habitat improvements.

3.3.6 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.

Stand 8-1 (Wedge-shaped Parcel)

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

Cover Types: Closed Canopy Sapling/Pole Coniferous Forest

Constraints: Adjacent to transmission line right-of-way

Special/Unique Features: Small, isolated stand

Access: Excellent; level site, near existing road system

Management Guidelines:

- Maintain as cover to provide habitat diversity to the surrounding stands

Schedule:

1988 - 2010
- No activity

2011 - 2015
- Initiate snag management and monitoring program and continue through 2060

2016 - 2060
- No activity except snag monitoring and maintenance

Stand 8-2 **(Wedge-shaped Parcel)**

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

Cover Type: Mixed Shrub/Brush

Constraints: Transmission line right-of-way and access road

Special/Unique Features: Small, isolated stand

Access: Excellent; level site, adjacent to existing road

Management Guidelines:

- Retain as permanent mixed forest

Schedule:

1988 - 2015
- No activity

2016 - 2020
- Initiate snag management and monitoring program and continue through 2060

2021 - 2060
- No activity except snag monitoring and maintenance

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

Area: 40 acres **Date of Origin:** 1982 **Site Index:** N/A

Cover Type: Grass/Meadow

Constraints:
- No trees or large shrubs within 15 feet of the center of the pipeline
- Maintain vehicular access to service points
- Do not obstruct microwave pathway
- Apply no fertilizer within the Town of Sultan's watershed
- Do not apply fertilizer directly to surface water or allow it to drift into surface water during application
- Do not apply fertilizer during periods of heavy precipitation

Special/Unique Features: Linear nature

Access: Excellent; permanent access road maintained

Management Guidelines:

- Manage as permanent grass/meadow or shrub/brush with scattered trees to maximize habitat value for early-successional stage species
- Seed with locally adapted grasses and forbs and fertilize to compensate for poor soils (except adjacent to the town of Sultan watershed and Marsh Creek)
- Plant hedgerows and/or clumps of shrubs and trees with a minimum spacing of 600 feet. See Table 2.3 for appropriate species

Schedule:

1988 - 1990
- Seed, fertilize and plant with shrubs and trees

1991 - 2060
- Fertilize, as needed, to maintain plant productivity

Stand 8-4 (Powerhouse Site)

Area: 27 acres **Date of Origin:** 1960-1982 **Site Index:** N/A

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

Constraints:
- Steep slope with highly erodible soil, no heavy equipment
- Daily human activity
- Partially within 200 feet of the Sultan River
- Safety restrictions for powerhouse and access road (do not obstruct vision or shade road)
- Do not apply fertilizer within 100 feet of Cascade Creek or the Sultan River and do not allow fertilizer to enter surface water during application
- Do not apply fertilizer during periods of heavy precipitation

Special/Unique Features: None

Access: Excellent; permanent all-weather road

Management Guidelines:

- Manage as permanent grass/shrub with small pockets of cover to maximize habitat value for early-successional stage species
- Fertilize existing grasses to maintain productivity
- Seed desirable forbs such as clover and trefoil
- Plant hedgerows and/or clumps of shrubs and trees to provide hiding cover and food supply (Table 2.3)
- Plant fruit and mast trees as food and nest sites
- Retain existing coniferous and mixed forest stands to provide habitat diversity to the surrounding area

Schedule:

1988 - 1990
- Fertilize and plant shrubs and trees

1991 - 2010
- No new activity

2011 - 2015
- Initiate snag management program in forested areas and continue through 2060

2016 - 2060
- Fertilize as needed to maintain productivity

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

Area: 1 acre **Date of Origin:** N/A **Site Index:** N/A

Cover Type: Mixed Shrub/Brush

Constraints:
- Maintain low-growing vegetation beneath power lines
- Do not allow fertilizer to enter surface water during application and do not fertilize within 100 feet of surface water
- Do not fertilize during periods of heavy precipitation

Special/Unique Features: Long, narrow shape

Access: Good; level site, near existing road

Management Guidelines:

- Maintain as mixed shrub and brush to maximize its value as edge and for early-successional stage species such as black-tailed deer and ruffed grouse
- Seed with grasses and forbs and fertilize to provide complete ground cover

Schedule:

1988 - 2060
- Manually control tall growing vegetation
- Release forage species preferred by black-tailed deer
- Seed with grasses and forbs and fertilize

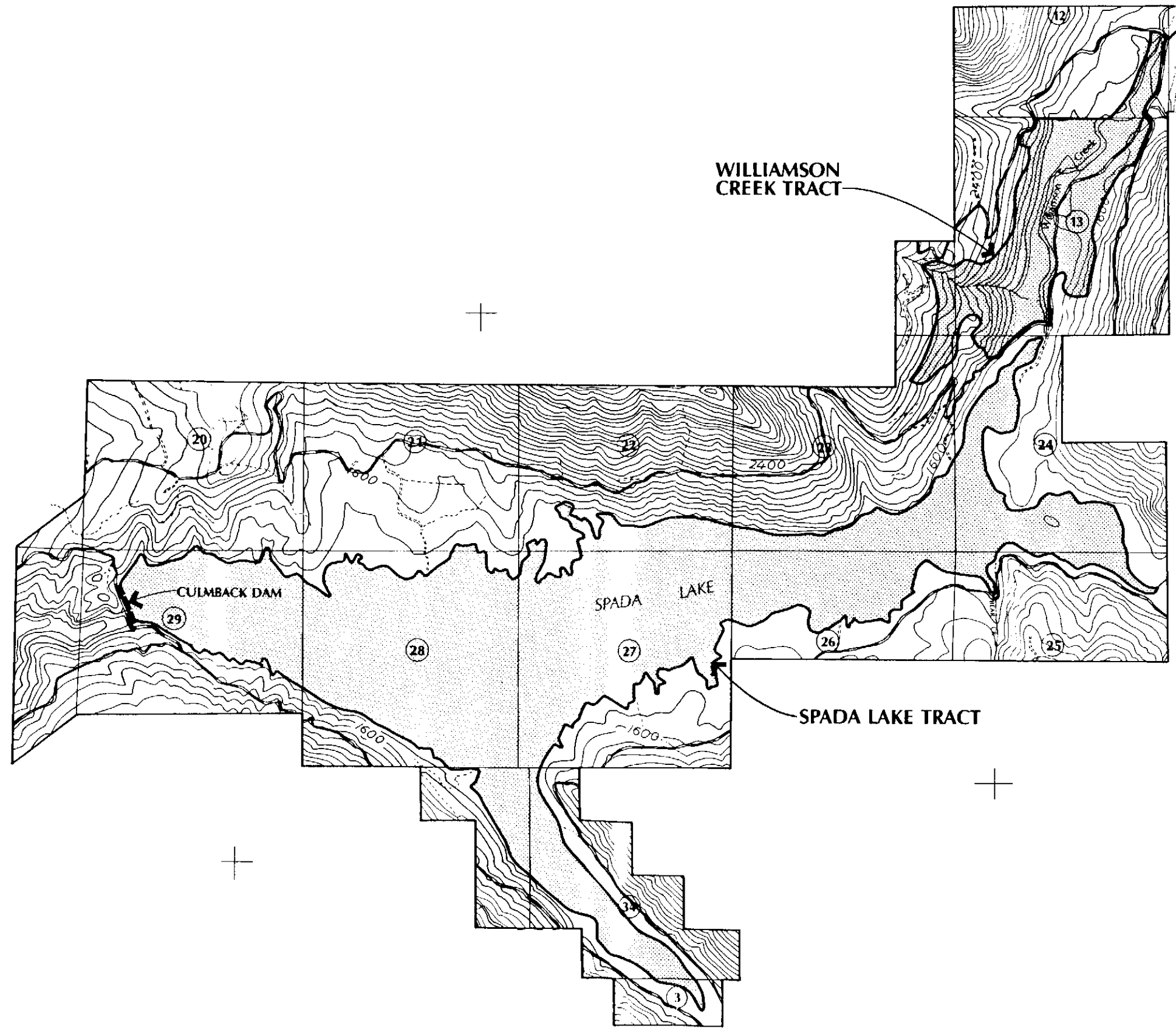
3.4 SPADA LAKE TRACT

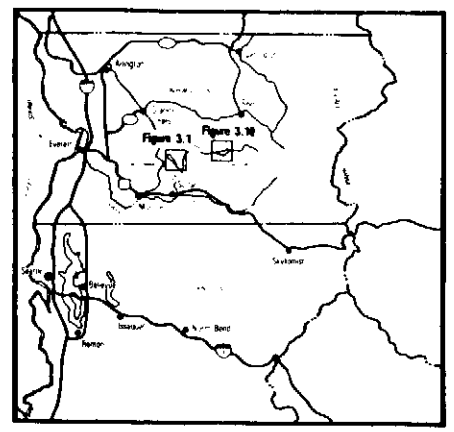
3.4.1 Existing Habitat Conditions

The Spada Lake Tract consists of the reservoir, shoreline and upper drawdown zone of Spada Lake (Figure 3.10). It also will include at least 700 acres of forest and wetland near Spada Lake when they are acquired by the co-licensees. The current (1987) Project boundary around Spada Lake is at elevation 1,460 feet MSL. The normal maximum pool elevation of the lake is 1,450 feet MSL. Between these two elevations lie 68 acres of small sawtimber coniferous forest, mixed forest, deciduous forest and early-successional forest (Figure 3.11). Between elevation 1,450 feet and the preferred maximum operating pool at 1,445 feet lie an additional 48 acres of deciduous riparian forest that are occasionally inundated. Below elevation 1,445 feet, the reservoir bottom is mostly unvegetated, except for scattered alder, cottonwood and snags between 1,445 and 1,440 feet, and sparse sedges, rushes and grasses as low as 1,435 feet.

Spada Lake lies in the Abies amabalis Zone of the northern Cascades physiographic province (Franklin and Dyrness 1973), where the native vegetation is dense forests of Pacific silver fir (Abies amabalis), western hemlock, Douglas-fir, western red cedar, red alder, bigleaf maple and black cottonwood. In terms of structure and species composition, this is similar to the Tsuga heterophylla Zone described for the Lake Chaplain Tract. The primary difference between the zones is elevation, which results in greater annual precipitation and more persistent snowpack in the higher Abies amabalis Zone.

The Spada Lake Basin, including what is now the shoreline, was logged between 1950 and 1965. It is now dominated by 20 to 35 year old stands of pure conifer, mixed forest and hardwood forest (Figure 3.12). All stands are the result of natural regeneration and they have not been thinned. They are dense, even-aged stands with complete canopy closure and little or no understory.





VICINITY MAP

LEGEND

- All-Weather Road
- Dirt Road or Unmaintained Gravel Road
- Tract Boundary
- (35) Section Number

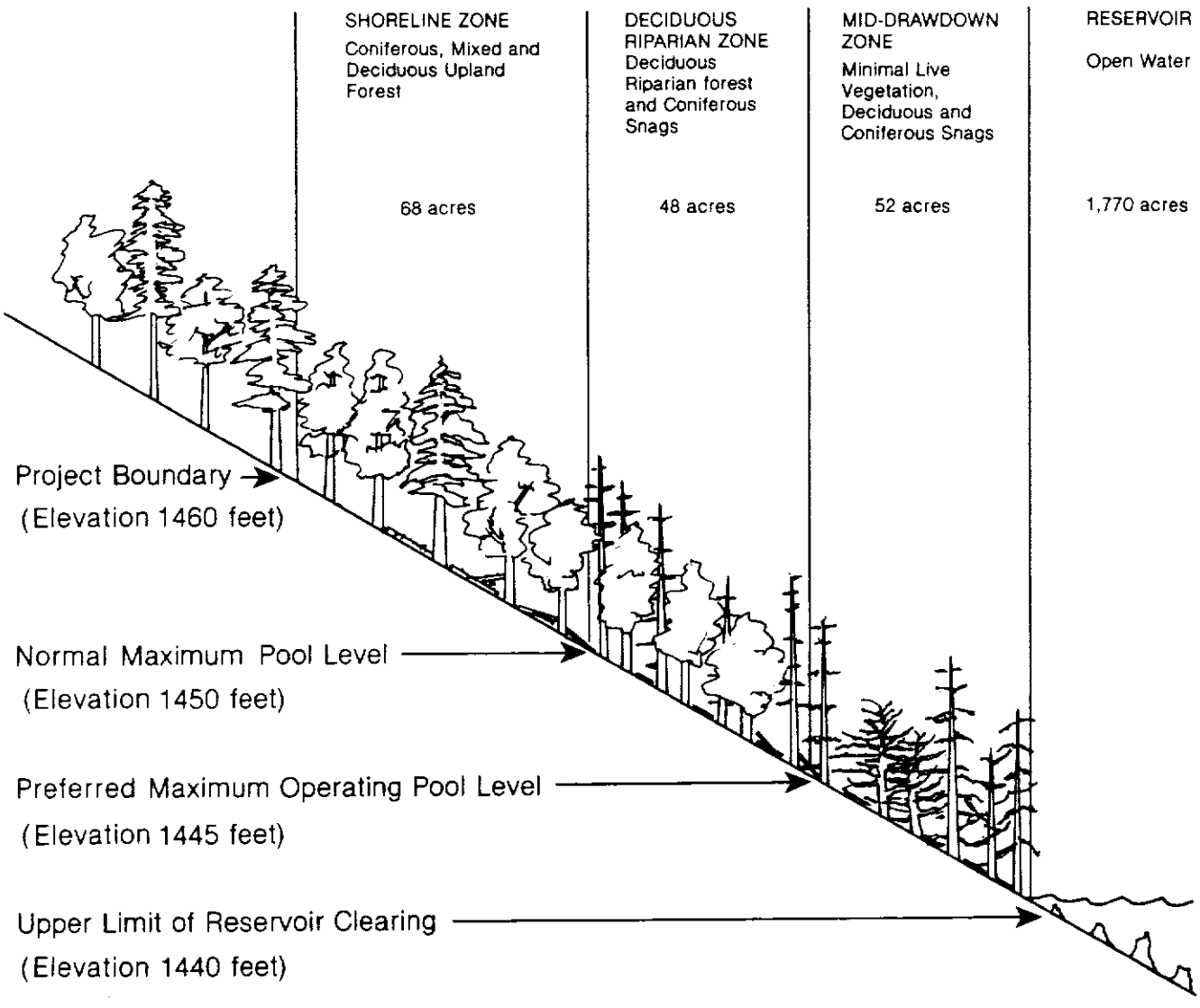
NORTH

0 1000 2000 3000
SCALE IN FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

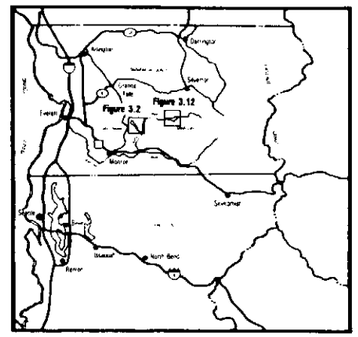
FIGURE 3.10 Management Lands Location Map; Spada Lake and Williamson Creek Tracts.



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.11 Cross sectional profile of Spada Lake shoreline and upper drawdown zone.



VICINITY MAP

LEGEND

COVER TYPES

- ES Early Successional Forest
- OS Open-Canopy Sapling/Pole Coniferous Forest
- CS Closed-Canopy Sapling/Pole Coniferous Forest
- SS Small Sawtimber Coniferous Forest
- LS Large Sawtimber Coniferous Forest
- OG Old-growth Coniferous Forest
- MF Mixed Deciduous/Coniferous Forest
- DF Deciduous Forest
- RF Riparian Forest
- SB Mixed Shrub/Brush
- GM Grass/Meadow
- WL Wetland
- OW Open Water
- NV Non-Vegetated
- SL Slides
- All-Weather Road
- Dirt Road or Unmaintained Gravel Road
- (7) Section Number

NORTH

0 1000 2000 3000
SCALE IN FEET

HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY
AND THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

FIGURE 3.12 Management Lands Cover Type Map: Spada Lake and Williamson Creek Tracts

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.

Prior to Stage II reservoir clearing, the upper 10 feet of the drawdown zone (1,450 to 1,440 feet MSL) supported vegetation similar to the shoreline. This zone was left vegetated at the time of clearing in an effort to create a forested riparian community at the lake edge. Most trees in the lower 5 feet of the zone (1,445 to 1,440 feet MSL) died when the reservoir was raised and the area is now covered with a stand of small snags. The flood-tolerant trees in the upper 5 feet of this zone survived and the area is dominated by stands of alder and black cottonwood. The zone also contains a high number of snags from the conifers that existed prior to flooding.

The target reservoir elevation in the spring is 1,445 feet MSL. The water surface is gradually lowered during the summer to provide municipal water supply for the City and minimum instream flows for the fishery in the lower 9.5 miles of the Sultan River. Normally, as much water will be stored as possible through the summer. After the close of the resident fishing season on Labor Day, reservoir drawdown commences, if necessary, to reach a pool elevation of 1,430 feet MSL by November 1. Usually maximum water change will be 25 feet. This is an unnatural water regime for freshwater systems in the Pacific Northwest and the local flora offers few 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).

3.4.2 Existing Habitat Value

Wildlife use of the shoreline (above 1,450 feet MSL) is limited by the dense overstory and poorly developed understory typical of closed canopy coniferous forest. In the deciduous riparian zone (1,450 to 1,445 feet MSL), big game use is restricted in localized areas by the accumulation of logging debris on gentler slopes. All areas below 1,445 feet receive limited wildlife use due to the general lack of live vegetation (overstory and understory). Small mammals and birds may find cover in all zones above 1,445 MSL, but food is in short supply. Cavity nesting birds have made little use of the area because of the small size and early stages of decay of most snags.

3.4.3 Management Constraints

According to Snohomish County, the Spada Lake shoreline is a Shoreline of State-wide Significance and a Conservancy Shoreline under the Snohomish County Shoreline Management Master Program. Shoreline development is restricted under the Program, and forest harvest is limited to partial cuts of no more than 30 percent of the merchantable volume in any 10 year period. The USFS does not agree that Spada Lake is included in the County's Master Program because it is on federal land. This disagreement does not affect management proposed in this plan and would be inconsequential upon USFS exchange out of the basin. The shoreline is covered by the City municipal watershed protection policies and subject to all water quality constraints associated with them (Appendix G).

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 will have to conform to the established water level regime.

3.4.4 Habitat Management Objectives

a) Manage the Spada Lake shoreline (elevation 1,450 to 1,460 feet MSL) as a permanent forested buffer zone to promote late-successional habitat features such as large trees, large snags and multi-layered overstories;

b) Investigate the use of riparian, wetland and aquatic plants for re-vegetating the drawdown zone of Spada Lake and conduct field tests of potentially suitable species. Vegetation cover would stabilize the shoreline, reduce erosion, provide fish and wildlife habitat and enhance the aesthetics of the reservoir;

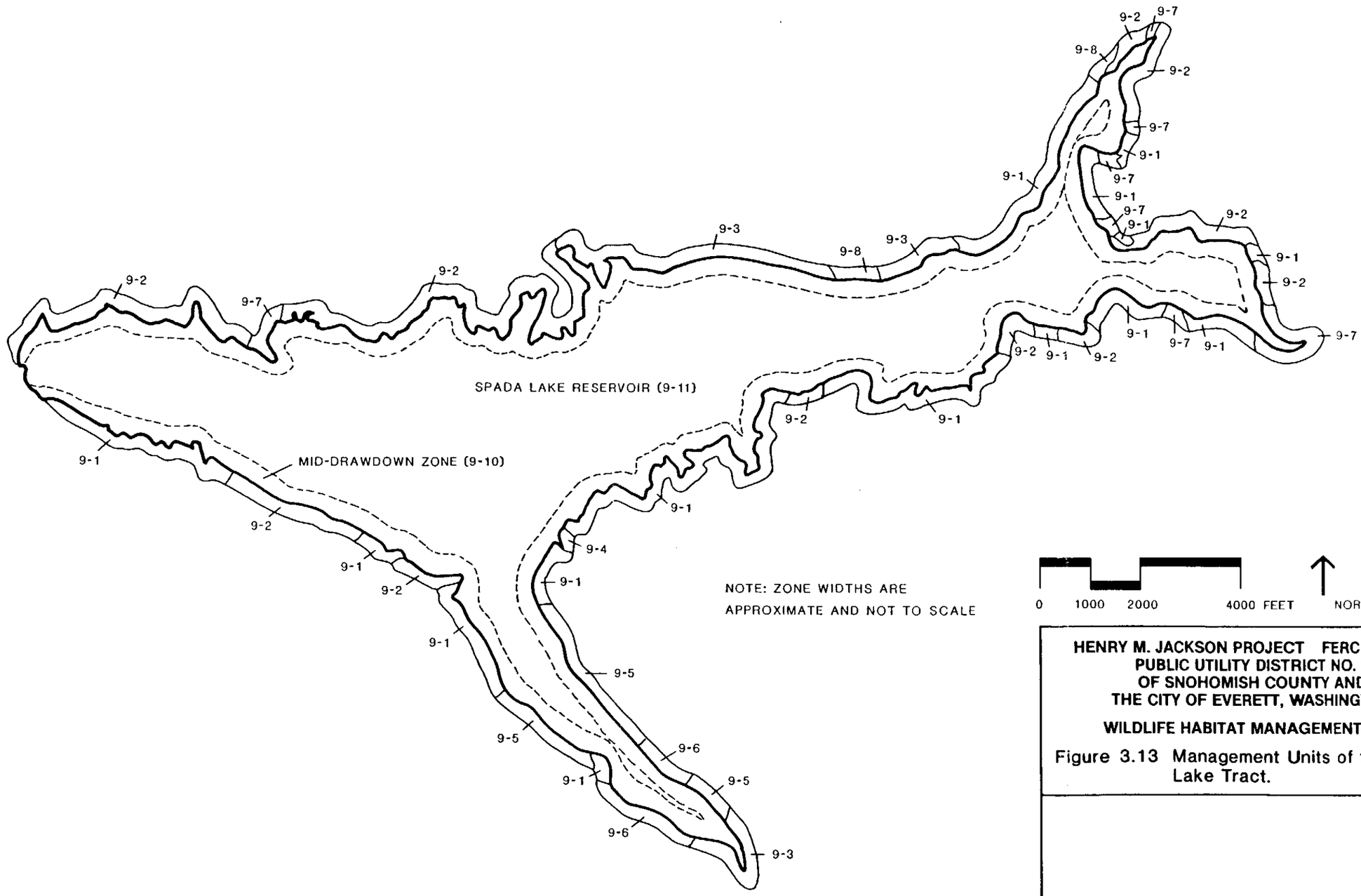
c) Create two nesting platforms in or near Spada Lake to encourage osprey use of the reservoir; and

d) Include in the management plan at least 700 acres of land near Spada Lake if and when they are acquired by the co-licensees. Manage these lands with emphasis for black-tailed deer.

3.4.5 Habitat Management

3.4.5.1 Shoreline (1,460 to 1,450 feet MSL)

The forested areas on the shoreline of Spada Lake (Stands 9-1 through 9-8) will be managed as permanent forest buffer zone (Figure 3.13). Big game trails will be cleared through the debris and slash left from reservoir clearing in those areas where it is too dense to allow movement by deer. Thinning to increase diameter growth of trees will be considered in conjunction with timber harvests on adjacent lands.



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.13 Management Units of the Spada Lake Tract.

3.4.5.2 Deciduous Riparian Zone (1,450 to 1,445 feet MSL)

This zone (Stand 9-9) will be managed as a permanent riparian buffer zone. Live trees and snags will be retained except for snags causing water quality or safety hazards.

3.4.5.3 Mid-Drawdown Zone (1,445 to 1,435 feet MSL)

Efforts will be made to re-vegetate the mid-drawdown zone (Stand 9-10), but this will depend on the availability of plant species suited to growing there. The first step in locating such species will be to identify flood-tolerant species and initiate field tests in the reservoir.

Most flood tolerance research has been conducted on woody species. Whitlow and Harris (1979) list the relative flood tolerances of woody plants in Oregon, Washington and Idaho based on U.S. Army Corps of Engineers (COE) research. Red-osier dogwood (Cornus stolonifera) and three willow species (Salix exigua, hookeriana and lasiandra) proved to be the most flood tolerant of all species studied. These species were able to survive prolonged flooding for more than one consecutive growing season. Walters et al., (1980) also rated woody riparian species for tolerance and response to flooding in the Pacific Northwest and Rocky Mountain regions. Alder (Alnus spp.), dogwood (Cornus spp.) and willow (Salix spp.) were listed as very tolerant to flooding. Very tolerant was defined as "trees which can withstand flooding for periods of two or more growing seasons. These species exhibit good adventitious root growth during this period". Results of this study are based on research on mature trees flooded for two to eight weeks during the growing season.

Greenhouse studies by Minore (1968) compared flood tolerance of six trees native to the Pacific Northwest. Winter flooding had little effect on all species except Douglas-fir. Western red cedar and lodgepole pine (Pinus contorta) were most tolerant to summer flooding, while red alder, Sitka spruce (Picea sitchensis) and western hemlock were less tolerant of summer flooding. Tolerance was associated with adventitious root formation.

Flood tolerance of alder was rated differently in each study, ranging from very tolerant to intolerant. Willow and dogwood species were consistently reported to be the most flood tolerant woody species. Black cottonwood was reported to be tolerant of deep flooding for one growing season, with significant mortality occurring if flooding is repeated the following year.

Research sponsored by the COE, USFS and various state game and fisheries agencies has shown that some woody species can survive in the drawdown zones (Whitlow and Harris 1979; Skeesick 1983; Martin, pers. comm., 5 December 1986; Holmsberg, pers. comm., 5 December 1986; Skeesick, pers. comm., 17 December 1986). Buttonbush (Cephalanthus occidentalis), wild lily, introduced willow species, bald cypress (Taxodium distidum) and ash (Fraxinus spp.) have survived in drawdown zones of California and Oregon reservoirs.

Experimental research on the flood tolerance of herbaceous species is very limited. Columbia sedge (Carex aperta) and slough sedge (Carex obnupta) have been successfully established in test plots in Oregon reservoirs (Skeesick 1983). Columbia sedge was easily established by plug transplants from local sources and was successful from the high pool level to minus 51 feet. Slough sedge was more difficult to establish (and only survived to minus 10 feet), but once established it spread much more rapidly than Columbia sedge (up to 8 inches per year). Seeding trials with Columbia sedge have not yet been successful. There has been limited success in establishing slough sedge from seed and the USFS is still attempting to break the dormancy of Columbia sedge seed. If they become available, these seeds could provide an inexpensive source for use in drawdown areas. Columbia sedge is not a common sedge and transplant plugs from wild areas are very expensive and difficult to get in quantity. Until the seed dormancy of Columbia sedge is broken, it will not be available for large area plantings. Slough sedge is common in shallow ponds and wet meadows in western Oregon and Washington and is more readily available for transplanting and seed sources.

It is recommended that the species identified in Table 3.1 be tested in the drawdown zone of Spada Lake, according to the following program.

a) Locate test plots in protected areas with gentle slopes to reduce the influence of wave and current action on the plantings and to test a broad range of flooding depths. The Williamson Creek arm and the North Fork Sultan River arm are recommended areas to establish test plots. These areas are protected and in general, have gentle slopes. Each arm has unvegetated areas with stumps but few snags to remove. Access to these areas is good;

b) Remove excess slash to provide suitable plots for testing. Burn the excess woody material on site;

c) Plant test species in rows oriented perpendicular to the reservoir shoreline. Space individual plants or plugs 2 to 5 feet apart (depending upon species and availability) to assess growth, spreading ability and tolerance of the 1,450 to 1,435-foot elevational zone (MSL). Use exclosures to prohibit animal foraging, especially by black-tailed deer. Consult contract horticulturist for optimal planting seasons for each test species (Table 3.1); and

d) Judge success by the following criteria: 1) survival after two years of inundation and 2) ability to reproduce. If several species are successful they can be ranked by net increase of ground cover. These measures can also aid in determining spacing for future plantings.

Rushes, sedges and grasses have become established naturally at a few locations within the drawdown zone, and propagation of these species elsewhere in the reservoir should be investigated.

Table 3.1 Species recommended for test planting in the Spada Lake drawdown zone.

Species	Plant Source	Planting Recommendations
Black cottonwood[1] (Normal and fast-growing varieties) (*Populus trichocarpa*)	SCS Mt. Vernon office WSU Extension Service, Puyallup office	cuttings and rooted stock/ spring planting
Oregon ash[2] (*Fraxinus latifolia*)	Brooks Tree Farm Forestfarm	rooted stock/ spring planting
Willow[2] (i.e., Pacific willow, Scoulers willow) (*Salix* spp.)	Newell Wholesale Nursery Syverson Seed Company	cuttings and rooted/stock spring or fall planting
Red-osier dogwood[2] (*Cornus stolonifera*)	available at most nurseries	rooted stock/ spring or fall planting
Hardhack spirea[1] (*Spiraea douglasii*)	Newell Wholesale Nursery Syverson Seed Company	rooted stock/ spring planting
Common cat-tail[3] (*Typha latifolia*)	Kester's Wild Game Food Nurseries, Inc. Syverson Seed Company	seed and rooted stock/ fall or spring planting
Mannagrass (*Glyceria* spp.)	Native Plant, Inc. Syverson Seed Company	seed/ spring planting
Sedges (*Carex* spp.)	Wave Beach Grass Nursery local wild source needed for seed and/or plug collection.	seed or plugs/ spring or fall planting

[1] Research reviewed by Whitlow and Harris (1979) indicated these species to be tolerant of deep flooding for one growing season, with significant mortality occurring if flooding is repeated the following year.

[2] Species tolerant of repeated years of flooding during the growing season (Whitlow and Harris 1979, Skeesick 1983).

[3] Limited research conducted on emergents.

3.4.5.4 Reservoir (below 1,435 feet MSL)

Two osprey nest sites will be created by removing the tops of large trees along the shoreline or erecting artificial towers.

3.4.5.5 Spada Lake Exchange Lands

District and City lands around Spada Lake will be managed for wildlife, if and when they are obtained from the USFS in a land exchange. Management emphasis will be for black-tailed deer, with due regard for other species. Management will be compatible with the Jackson Project Recreation Plan. These lands will be open to public access subject to water quality protection constraints. It is estimated that at least 700 acres will be obtained in the exchange. Detailed plans will be prepared in consultation with the resource agencies upon acquisition.

3.4.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Spada Lake 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.

Stands 9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 9-8

(Spada Lake Shoreline: elevation 1,450 to 1,460 feet MSL)

Area: 68 acres **Date of Origin:** 1925-1984 **Site Index:** N/A

Cover Types: Grass Meadow, Early-Successional, Closed-canopy Sapling/ Pole Coniferous Forest, Small Sawtimber Coniferous Forest, Riparian Forest and Mixed Forest

Constraints:
- Shoreline of State-wide Significance (according to Snohomish County)
- Municipal Watershed

Special/Unique Features: Shoreline

Access: Poor; lake access only except in limited locations

Management Guidelines:

- Retain as a permanent forested buffer zone around shoreline
- Clear trails through woody debris in areas where it is excessive and prohibits deer movement

Schedule:

1988 - 2005
- Complete clearings of big game trails

2006 - 2010
- Initiate snag management and monitoring program and continue through 2060

2011 - 2060
- No activity except snag monitoring and maintenance

Stand 9-9 **(Deciduous Riparian Zone: elevation 1,445 to 1,450 feet MSL)**

Area: 48 acres **Date of Origin:** 1962 **Site Index:** N/A

Cover Types: Riparian Forest and Deciduous Forest

Constraints:
- Municipal Watershed
- Shoreline of State-wide Significance (according to Snohomish County)

Special/Unique Features: Riparian fringe of reservoir

Access: Poor; primarily from lake

Management Guidelines:

- Retain as riparian buffer zone through 2060
- Clear trails through woody debris to facilitate deer movement

Schedule:

1988 - 1995
- Complete clearing of big game trails

1996 - 2060
- No activity

Stand 9-10 **(Mid-Drawdown Zone: elevation 1,435 to 1,445 feet MSL)**

Area: Unknown **Date of Origin**: 1984 **Site Index**: N/A

Cover Type: Unvegetated Reservoir

Constraints:
- Shoreline of State-wide Significance (according to Snohomish County)
- Municipal Watershed

Special/Unique Features: Drawdown zone

Access: Poor; lake access only except in limited locations

Management Guidelines:

- Locate test plots in protected areas with gentle slopes to reduce the influence of wave and current action
- Remove excess dead woody material to provide suitable plots for testing
- Plant test species to determine rates of survival and ability to reproduce

Schedule:

1988 - 1990
- Locate test sites and remove excess dead woody material
- Plant test species and monitor. If an unusually dry summer occurs after planting, replanting of emergent and wetland species may be necessary

1991 - 2000
- Continue plant testing based on water conditions and success of previous year's plantings. If unsuccessful, efforts will be discontinued

2001 - 2060
- No activity

Stand 9-11 (Spada Lake)

Area: 1822 acres **Date of Origin:** 1984 **Site Index:** N/A

Cover Type: Reservoir

Constraints:
- Municipal Watershed
- Shoreline of State-wide Significance (according to Snohomish County)

Special/Unique Features: Reservoir

Access: Fair; limited boat access points

Management Guidelines:

- Enhance reservoir habitat by creating two osprey nesting sites

Schedule:

1988 - 1990
- Create two osprey nesting platforms

1991 - 2060
- Monitor osprey nesting platforms to determine utilization.

3.5 WILLIAMSON CREEK TRACT

3.5.1 Existing Habitat Conditions

The Williamson Creek Tract consists of 344 acres located approximately 1/2 mile northeast of Spada Lake (Figure 3.10). It contains one of the last stands of low-elevation old-growth forest in the Sultan Basin. Most of the tract is presently owned by the DNR. Two small parcels (totaling less than 40 acres) are federal land administered by the USFS. Most of the tract, particularly the old-growth, was scheduled for harvest by the mid-1980's, but logging has been postponed at the request of the District for consideration as part of the wildlife habitat management plan.

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 3.4.1 for a more detailed description of this zone). The tract contains approximately 272 acres of old-growth, 13 acres of second growth coniferous forest, 18 acres of mixed forest, 35 acres of riparian forest, 2 acres of shrub/brush and 4 acres of wetland (Figure 3.12). Old-growth stands contain trees of two distinct age classes; 135 years and 250+ 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 large sawtimber or mixed forest that is about 75 years old.

The riparian forest is composed of alder, black cottonwood, western hemlock, Douglas-fir, Pacific silver fir and western red cedar. It is a young forest (approximately 45 years old) and generally lacking snags and logs. The riparian areas lie in narrow strips adjacent to Williamson Creek and receive some seasonal flooding. Two small wetlands occur east of Williamson Creek. Recently they have been expanded by beaver activity, and are presently composed of flooded young deciduous and coniferous trees and shrubs.

3.5.2 Existing Habitat Value

The old-growth forest at Williamson Creek has high value for late-successional species such as pileated woodpecker and pine marten that require large diameter trees, large snags and logs for food and nesting. Snag densities are higher than all other stands considered for management. The old-growth also provides good cover and forage for black-tailed deer and moderate habitat for Douglas squirrel. The second growth forest is relatively old and structurally diverse for second growth, and provides average to good habitat for most late-successional species.

The riparian forest along Williamson Creek has high habitat value for early- and mid-successional species like deer, grouse and chickadee, but low value for late-successional forest species such as pine marten, Douglas squirrel and pileated woodpecker. The overstory is mostly hardwoods (alder, maple and 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, merganser and wood duck.

3.5.3 Management Constraints

Williamson Creek is a Type 1 waterway, as designated by the DNR. Activities such as road construction, timber harvesting and chemical application are regulated within 100 feet of the high water mark. Forest management practices are permitted within this zone, but directional falling, uphill yarding and rehabilitation of disturbed areas are required. The use of tractors and skidders across the waterway are prohibited. The tract is covered by the City municipal watershed protection policies and subject to all water quality constraints associated with them (Appendix G). This includes a general moratorium on the use of pesticides.

3.5.4 Habitat Management Objectives

a) Obtain management control of the tract;

b) Retain all existing old-growth;

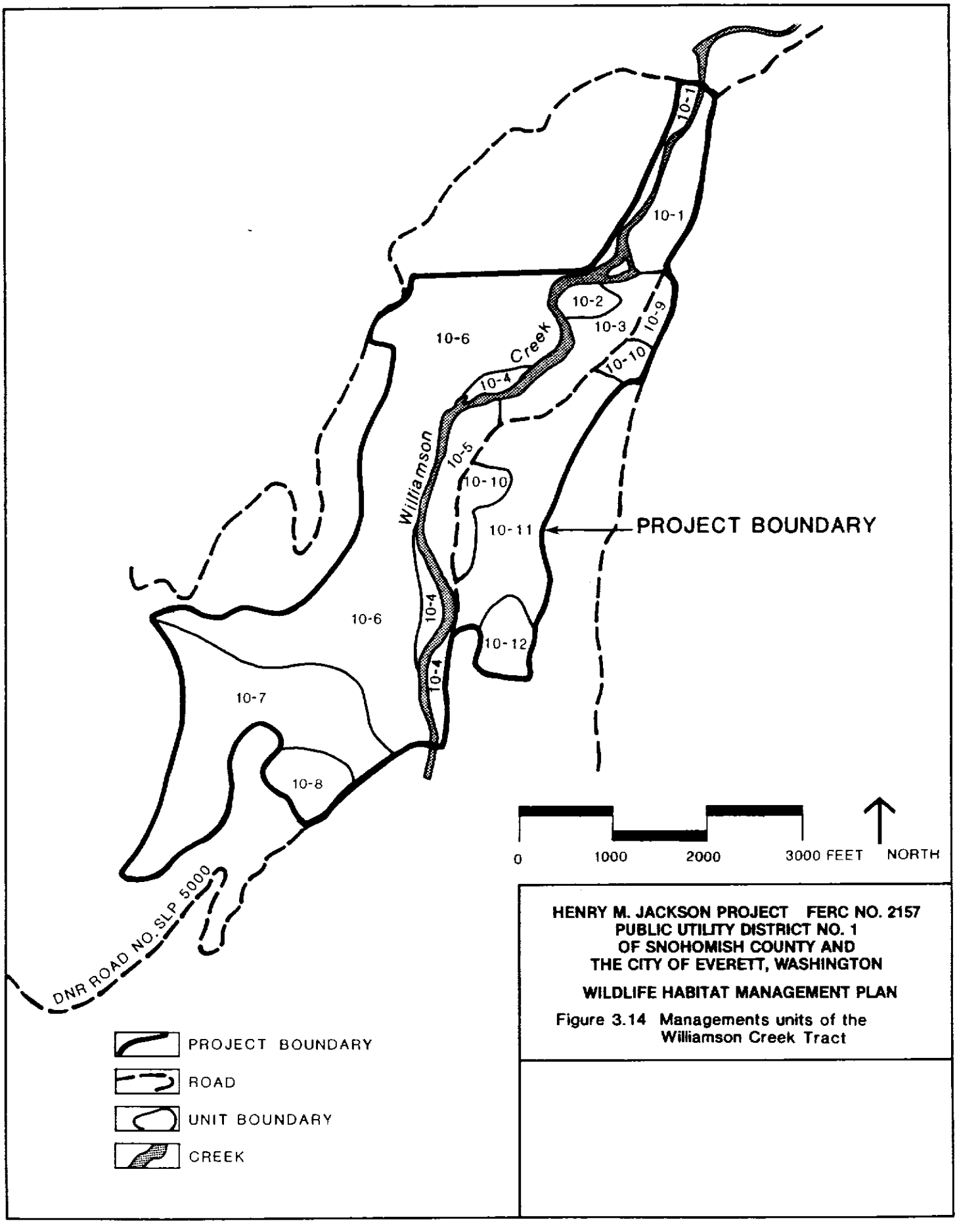
c) Retain riparian lands along Williamson Creek and enhance their value for late-successional wildlife species by creating snags;

d) Retain existing wetlands; and

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

3.5.5 Habitat Management

The Williamson Creek Tract is a single management unit with twelve stands (Figure 3.14). Management of the tract will be to preserve the old-growth forest from scheduled harvest and to retain adjacent stands including riparian forest and wetlands. Management activities in riparian forest and wetland will be limited to the creation of snags and logs for snag-dependent species such as black-capped chickadee, pileated woodpeckers, pine marten and Douglas-squirrel.



HENRY M. JACKSON PROJECT FERC NO. 2157
PUBLIC UTILITY DISTRICT NO. 1
OF SNOHOMISH COUNTY AND
THE CITY OF EVERETT, WASHINGTON

WILDLIFE HABITAT MANAGEMENT PLAN

Figure 3.14 Managements units of the Williamson Creek Tract

3.5.6 Detailed Prescriptions

The following prescriptions direct the management of all stands on the Williamson Creek 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.

Stand 10-1

Area: 29.7 acres **Date of Origin:** 1958 **Site Index:** 113

Cover Types: Small Sawtimber Coniferous Forest, Riparian Forest and Mixed Forest

Constraints: Partially within 100 feet of Williamson Creek

Special/Unique Features: Flooded forest

Access: Good; level terrain, near existing road

Management Guidelines:

- Maintain as riparian forest without harvesting through 2060

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

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

Date of Origin: pre-1850
Site Index: 108-127

Cover Type: Old-Growth Coniferous Forest

Constraints:
- Steep slopes
- Many drainages
- Partially within 100 feet of Williamson Creek

Special/Unique Features: Williamson Creek, old-growth trees

Access: Poor - Excellent; steep slopes in many areas, several stands adjacent to existing road system

Management Guidelines:

- Retain and manage as old-growth forest

Schedule:

1988 - 2060

- Visit all lands annually to obtain qualitative estimates of habitat integrity and wildlife values

Stand 10-3

Area: 12 acres **Date of Origin:** 1940 **Site Index:** 65

Cover Types: Mixed Forest, Deciduous Forest and Riparian Forest

Constraints: Partially within 100 feet of Williamson Creek

Special/Unique Features: Williamson Creek

Access: Excellent; level site, adjacent to existing road

Management Guidelines:

- Retain and manage for late-successional stage species
- Ensure adequate snags and dead and down woody material

Schedule:

1988 - 1990
- No activity

1991 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stands 10-4

Area: 11 acres **Date of Origin**: 1945 **Site Index**: 72

Cover Type: Riparian Forest

Constraints: Partially within 100 feet of Williamson Creek

Special/Unique Features: Williamson Creek

Access: Poor - Good; level site, part of stand adjacent to road and part isolated by creek

Management Guidelines:

- Retain as riparian forest through 2060
- Ensure adequate densities of snags

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 10-5

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

Cover Types: Large Sawtimber Coniferous Forest and Riparian Forest

Constraints: Partially within 100 feet of Williamson Creek

Special/Unique Features: Williamson Creek

Access: Excellent; level terrain, adjacent to existing road

Management Guidelines:

- Retain and manage for late-successional stage species
- Ensure adequate snags and dead and down woody material

Schedule:

1988 - 1995
- Initiate snag management and monitoring program and continue through 2060

1996 - 2060
- No activity except snag monitoring and maintenance

Stand 10-10

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

Cover Types: Wetland and Mixed Shrub/Brush

Constraints: None

Special/Unique Features: Wetland and Old-Growth Coniferous Forest

Access: Excellent; adjacent to existing road

Management Guidelines:

- Retain existing wetland character through 2060

Schedule:

1988 - 2060
- Monitor wetland condition