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April 30, 1998

PUD 20501

Ms. Lois D. Cashell, Secretary  
Federal Energy Regulatory Commission  
888 1<sup>st</sup> Street NE  
Washington, D.C. 20426

Dear Ms. Cashell:

RE: Henry M. Jackson Project – FERC No. 2157  
Project License Article 53 – Annual Report  
Wildlife Habitat Management Program

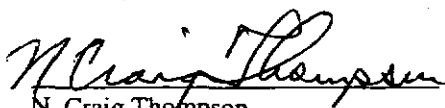
The 1997 Annual Report for the Jackson Project Wildlife Habitat Management Program is enclosed. This report fulfills the requirement of the "Order Approving with Modification Revised Wildlife Habitat Management Plan" (issued May 19, 1989, revised June 27, 1990), which stated "The Licensees shall file with the Commission their annual reports on Phase I." The Commission extended the deadline to file this annual report to April 30<sup>th</sup> of each year.


This annual report describes activities conducted during 1997, and activities planned for 1998. A comparison of all activities completed since implementation of the program began in 1989 with activities planned this period is also included. The activities, procedures and schedules described in this report are based on the Wildlife Habitat Management Plan submitted to the Federal Energy Regulatory Commission on May 25, 1988.

The draft annual report was submitted to the U.S. Fish and Wildlife Service (USFWS), the Washington Department of Wildlife (WDW), and the Tulalip Tribes for comment. The Washington Department of Natural Resources was also sent a copy. A meeting was held with agency representatives on March 17, 1998, to request comments and discussion on progress to date and planned activities for 1998. An attendance list and meeting minutes are attached to the Annual Report. No additional comments have been received from the agencies since the March 17, 1998 meeting. If comments are received after this submittal from the agencies, they will be forwarded promptly to the Commission.

Please call Bernice Tannenbaum (425) 304-1746, if you have any questions on the 1997 Annual Report.

Sincerely,

  
N. Craig Thompson  
Assistant General Manager  
Water Resources

  
Clair Olivers  
Director of Public Works  
City of Everett

Enclosures  
BRT/ldm

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G. Ging, U.S. Fish and Wildlife Service  
A. McGuire, Washington Department of Natural Resources  
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R. Young, Tulalip Tribes  
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D. Farwell, City of Everett  
M. Schutt – E2

**1997 ANNUAL PROGRESS REPORT**

**WILDLIFE HABITAT MANAGEMENT PROGRAM**

**for the**

**HENRY M. JACKSON HYDROELECTRIC PROJECT**

**FEDERAL ENERGY REGULATORY COMMISSION  
Project Number 2157 – License Article 53**

**Submitted by**

**PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY**

**And**

**THE CITY OF EVERETT, WASHINGTON**

**April, 1998**

**1997 ANNUAL PROGRESS REPORT  
WILDLIFE HABITAT MANAGEMENT PLAN**

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## **LIST OF ATTACHMENTS**

- ATTACHMENT 1. BALD EAGLE NEST SITE MANAGEMENT PLAN**
- ATTACHMENT 2. FERC ORDER APPROVING SPADA LAKE SUPPLEMENTAL PLAN**
- ATTACHMENT 3. AGENCY TOUR OF WHMP SITES – DISCUSSION NOTES**
- ATTACHMENT 4. VEGETATION MONITORING PLAN – CHAPLAIN FOREST FERTILIZATION PROJECT**
- ATTACHMENT 5. AGENCY CONSULTATION – ANNUAL MEETING MINUTES AND CORRESPONDENCE**

**1997 ANNUAL PROGRESS REPORT  
WILDLIFE HABITAT MANAGEMENT PLAN**

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**1.0 SUMMARY**

**1.1 MAJOR TASKS ACCOMPLISHED DURING 1997:**

- Tiki Sale layout completed – offered for sale (Lake Chaplain Tract)
- Monitored stocking levels in one 1991 final harvest unit (Lake Chaplain Tract)
- Monitoring of biosolids application sites (Lake Chaplain Tract)
- Preliminary layout of two 1998 final harvest units at Lake Chaplain Tract
- Secured right-of-way (ROW) easement over DNR property for forest management activities at Lake Chaplain Tract
- GPS data collection at Lake Chaplain Tract
- Bald Eagle Nest Site Management Plan at Lake Chaplain Tract
- Snag inventory and creation at Lake Chaplain Tract
- Monitoring of buffer zones and green tree areas in harvested units at Lake Chaplain Tract
- Deer forage monitoring at Lake Chaplain Tract
- Seeding of the power pipeline ROW
- Planting of shrubs on power pipeline and powerhouse site
- Continued established monitoring programs for revegetation sites and nest structures
- Monitoring of test plantings in the Spada Lake drawdown zone
- WHMP Supplement for Spada Lake Tract approved by the FERC
- Met with DNR to discuss future options for maintenance of North Shore Road on Spada Lake Tract

A cumulative summary of tasks accomplished since the initiation of the Wildlife Habitat Management Plan (WHMP) in 1989 is presented in this report.

**1.2 TASKS SCHEDULED FOR 1998:**

- Re-offer Tiki sale during spring 1998
- Complete layout of two Line Tree sale harvest units, and offer for sale in fall 1998
- Begin layout of 1999 timber sale
- Biosolids application at Lake Chaplain Tract
- Monitoring of Lake Chaplain biosolids application sites
- Vegetation management in 1991-2 final harvest unit
- Continue monitoring stocking levels in 1991 final harvest units
- Vegetation management along western edge of Chaplain Marsh
- GPS data collection at Lake Chaplain Tract and Lost Lake Tract
- Evaluate feasibility of logging on Spada Lake Tract
- Field reconnaissance work on upcoming harvest units on Lost Lake Tract
- Continue snag management program on Lake Chaplain and Lost Lake Tracts
- Continue monitoring of nest structures

- Continue deer forage monitoring
- Continue coarse woody debris management program at Lake Chaplain Tract
- Monitor buffer zones and green tree areas in harvested units at Lake Chaplain Tract
- Continue seeding of pipeline ROW as needed
- Monitor vegetation coverage on pipeline ROW

Problems or changes needed during implementation of the WHMP are discussed in this report, and updated schedules are presented. A draft of this report was submitted for comments to the U.S. Fish and Wildlife Service (USFWS), the Washington Department of Fish and Wildlife (WDW), and the Tulalip Tribes. The Washington Department of Natural Resources (DNR) was also consulted.

## 2.0 INTRODUCTION

The 1997 Annual Progress Report on the Wildlife Habitat Management Plan for the Henry M. Jackson Hydroelectric Project is submitted in response to the Federal Energy Regulatory Commission (FERC) Order Approving With Modification Revised Wildlife Habitat Management Plan (issued May 19, 1989). Public Utility District No. 1 of Snohomish County (District) and the City of Everett (City) are co-licensees in the Project. The WHMP project area and management tracts are shown in Figure 1.

This annual report describes activities conducted during calendar year 1997 and summarizes activities completed since the management program was initiated in 1988. Activities anticipated for the calendar year 1998 are described. Activities, procedures and schedules described in this report are based on the WHMP submitted to the FERC on May 25, 1988, in accordance with Project License Article 53 and subsequent related orders from the Commission.

## 3.0 WORK COMPLETED DURING 1997

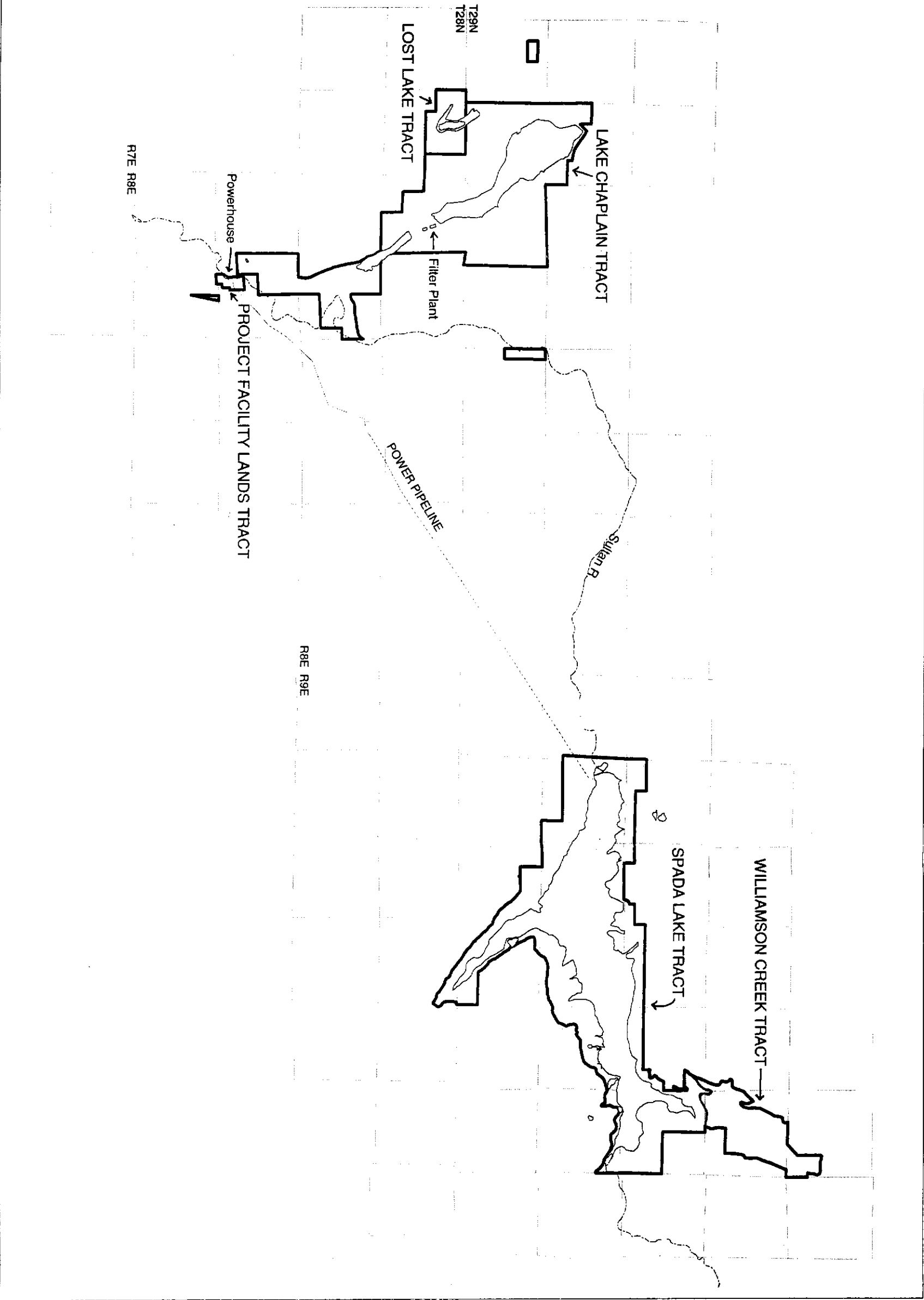
### 3.1 FOREST VEGETATION MANAGEMENT

#### 3.1.1 Timber Harvest

Layout of the two units of the Tiki timber sale as described in the 1996 Annual Report (Section 3.1.2) was completed in 1997 (Figure 2). The layout includes marking the units with boundary tags, selecting and marking trees for coarse woody debris (CWD) and snags, and delineation and inventory of the green tree areas (GTA) for each unit. A stream buffer zone was delineated in one unit. Logging systems, slash management and reforestation specifications were also prepared for these units. The units were offered for sale in November 1997, but no bids were received due to uncertain timber market conditions at that time. This sale will be re-offered in the spring of 1998. Road construction and harvest will take place in 1998 or 1999.

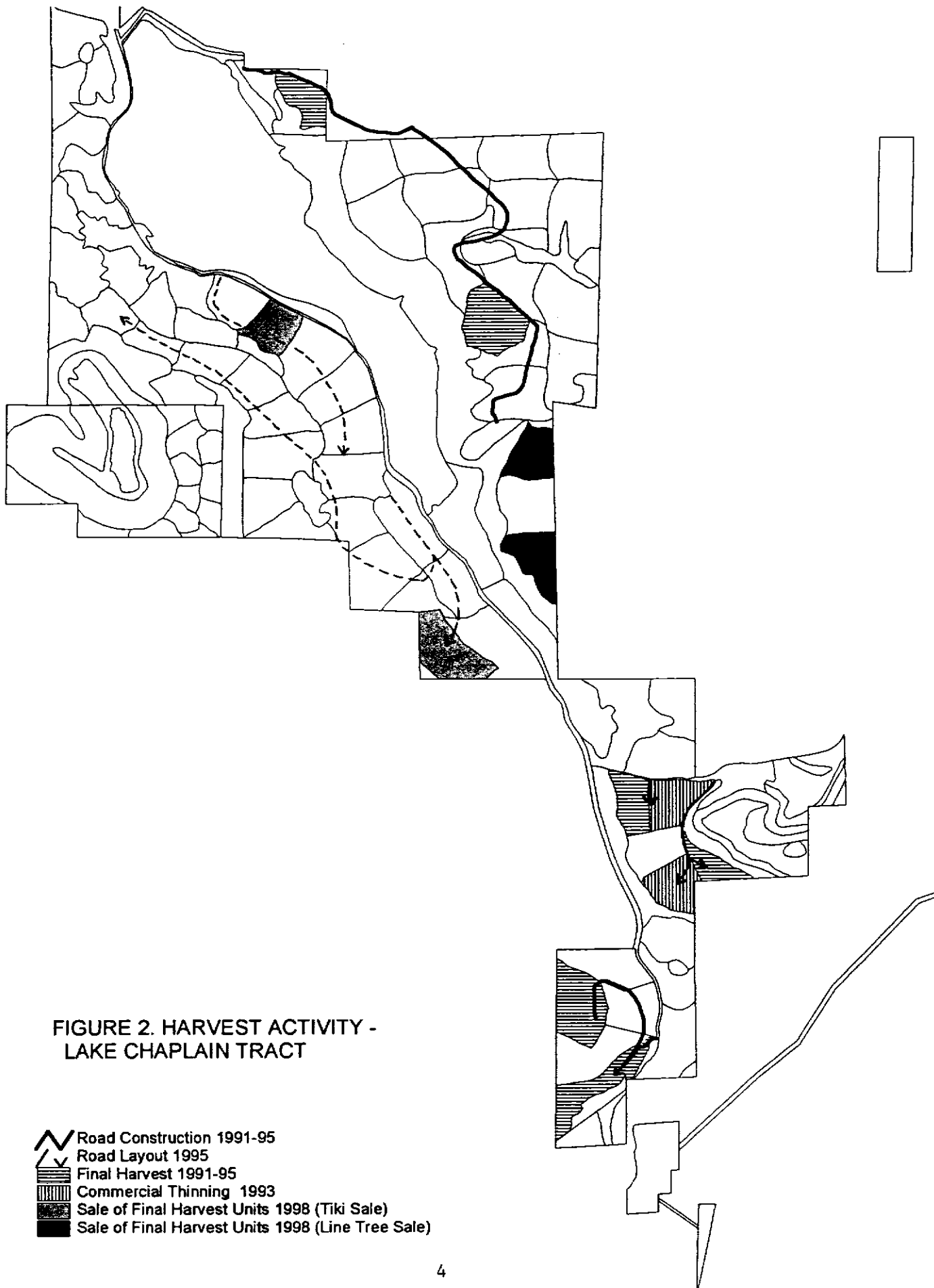
Management Unit 3-1 on the east side of the Lake Chaplain Tract was flagged, and layout of two final harvest units within this Management Unit was started (Figure 2). One unit was scheduled in the WHMP for final harvest in 1990, and the other in 2000. Harvest of these units will take place in 1999 or 2000.





HENRY M. JACKSON PROJECT  
WILDLIFE HABITAT MANAGEMENT PLAN  
FIGURE 1. MANAGEMENT TRACTS





### 3.1.2 Road System

Two right-of-way easements were secured from the Department of Natural Resources (DNR) to construct roads across DNR property adjacent to the Lake Chaplain Tract. One easement includes a section of the access road for the west side of the Lake Chaplain Tract that will serve future harvest units, and the other will provide access to units on the east side of the Lake Chaplain Tract (Figure 2).

### 3.1.3 Harvest Unit Monitoring

Stocking levels of tree species in the 1991-2 final harvest unit were monitored in 1997 to determine whether the hardwood component of the stand was close to the desired level stated in the WHMP (5-10 percent), and to see whether adequate conifers were present. Hardwoods sampled included cherry, red alder, cascara, willow and bigleaf maple. Sampling was done on twelve 1/100<sup>th</sup> acre plots. Overall, conifer stocking is excessive, with over 1400 trees per acre. Hardwood stocking is adequate, with the larger species (cherry, red alder and bigleaf maple) comprising about 309 trees per acre, or five percent, of all trees (Table 1). Distribution of each species over the stand is uneven, especially the hardwood species. Future vegetation management prescriptions, such as hardwood control or precommercial thinning, must take this variation into consideration. The discussion in Section 5.1.1 describes how the unit will be managed to maintain the hardwood stocking in the future, and reduce the total number of trees.

Conifer survival plots were checked on the Diversion Sale (1995) units. Survival is approximately 90 percent and there has been some natural in-seeding (natural recruitment) of conifers. However, in-seeding in these units does not seem to be as great as experienced in the units of the Chaplain Sale (1991).

A walk-through check was done on the Horseshoe Sale (1993) final harvest unit. Survival of planted Douglas fir is good, and there is a moderate amount of in-seeding. Survival of planted red cedar is low, and many of the surviving cedar have been severely browsed.

### 3.1.4 Survey Work and Mapping Improvements

The DNR conducted survey work in the vicinity of the Lost Lake Tract to properly locate section corners and establish property lines with the District. They have completed their field measurements but have not monumented the corners or blazed trees on the property line yet. The City has begun using GPS technology to determine the coordinates of a number of points on the Lake Chaplain Tract, including positions on roads and the north and south dams. These coordinates will be entered into the traverses of harvest units and access roads to improve the accuracy of mapping of the Tract.

### 3.1.5 Lost Lake Monitoring

Photo documentation stations in the precommercially-thinned unit at Lost Lake were revisited in October 1997, more than six years after the thinning was completed (July 1991). Sections with an alder canopy are quite passable, with an understory of ferns and salmonberry. Former hemlock thickets have become reasonably passable, as many of the branches have fallen off the cut stems.

**Table 1. Stocking Levels, by Species, of Unit 1991-2**

Plot #	Conifers			Hardwoods			Total
	Douglas fir	Western hemlock	Western red cedar	Cherry	Red alder	Bigleaf Maple	
1	12	11	1	1			25
2	17		1	1	11		30
3	12						12
4	8	1					9
5	16						16
6	6	2					8
7	19						19
8	10			4			14
9	1	50*					51
10	1	1		10			12
11						6	6
12	3			4			7
Total	105	65	2	20	11	6	209
Trees/ac.	875 (50.2%)	542 (31.1%)	17 (<1%)	167 (9.6%)	92 (5.3%)	50 (2.8%)	1743

\*Estimated (too numerous to count)

### 3.1.6 Spada Lake Monitoring

Photo documentation stations were set up in the units that were precommercially thinned in 1996, and the stand was monitored in July and September 1997.

## 3.2 SNAG MANAGEMENT

### 3.2.1 Snag Inventory/Monitoring Procedures

We reported in the 1996 Annual Report that a revised snag inventory and monitoring procedure had been developed and was under review by the co-licensees. The inventory procedure was field-tested by doing a complete inventory of all snags on a unit, and then sampling snag density on this same unit. The procedure was finalized and used in inventories conducted in 1997 on Lake Chaplain Tract units that will not be harvested for twenty years or more, and some permanent mixed forest units (see Section 3.2.2). The procedure was also used in the set-up of the two harvest units of the Tiki Sale. Existing snag density, size and decay class were sampled, and a set of live trees was selected and marked for snag creation after harvest has been completed.

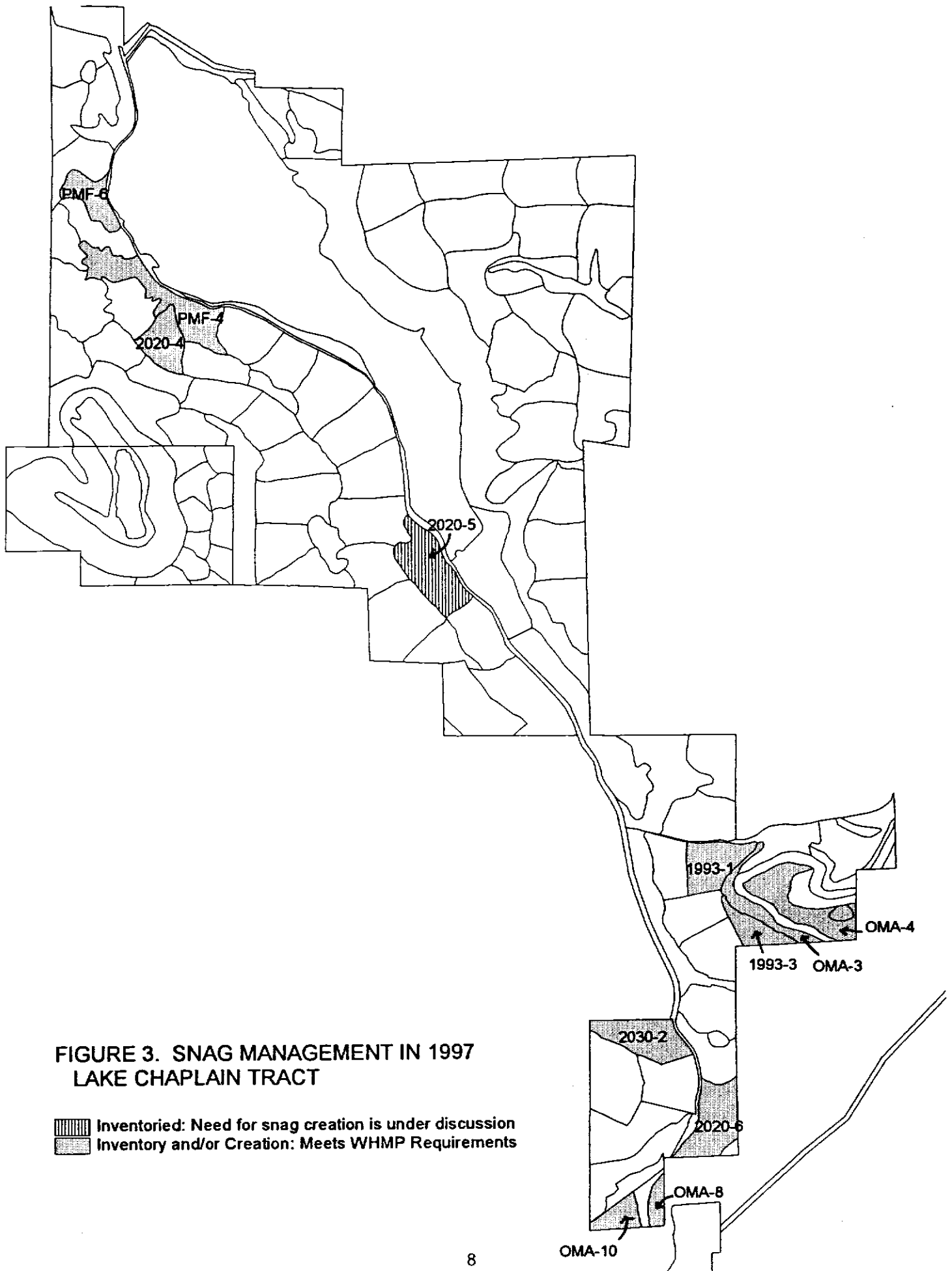
As described in the 1996 Annual Report, ½ acre rectangular plots are used, and the minimum coverage during inventories will be 10 percent. Also, to account for trees found during inventories which are likely to die within the next year, we have added a "Class 0" to our current system of snag decay classes. This will allow us to capture those trees which will likely be added to the snag pool in the near future, and avoid creating snags unnecessarily.

The snag monitoring procedures consist of sampling units at 10-year intervals to check for snag density, and sampling a subset of created snags every three years to study the process of decay and use by wildlife species over time.

### 3.2.2 Snag Inventory and Creation

In 1997, snag inventories were conducted on 11 units (200 acres) on the Lake Chaplain Tract, eight of which required creation of additional snags (Figure 3). The other three units had sufficient natural snags in all size classes such that no additional creation was necessary. A total of 202 snags were created on these eight units (152 acres). These units will not be harvested for at least 20 years, or were designated in the WHMP as permanent forested stands. Table 2 shows summary information for units where snag management occurred this year. Again this year, snags were created by topping live trees and leaving a few branch stubs. Also, these snags were tagged, painted, and their location mapped for future monitoring, as has been done with all snags created to date.

One of the eight units (2020-5) which is deficient in snags is currently under discussion regarding how best to meet the intentions of the WHMP regarding snag requirements. An inventory of the unit showed that it had far more than the required number of snags in the 11-15" size class (8.0/acre), and adequate numbers in the 17-25" class (0.5/acre). However, as often occurs in second-growth forest stands, there was a deficiency of snags in the 15-17" (0.5/acre) and 25"+ size (0/acre) classes, and almost all of the existing snags were hemlocks which do not last as long as Douglas fir or red cedar snags. A total of 36 snags (1.9/acre) would be required from the 15-17" size class and one (0.05/acre) from



**Table 2. Summary of Snag Management Through 1997**

UNIT	ACRE- AGE	# CREA- TED	AVG DBH (in.)	AVG HT (ft.)	# PER ACRE	NOTES
2020-4	15.3	36	17.0	49.3	4.4	√ Includes only created snags
2020-5	19.1	0	13.8	67.1	9.0	Evaluating need for additional creation
2020-6	12.0	26	17.7	50.5	6.3	√ Includes only created snags
2030-2	22.1	60	17.0	50.3	3.1	√ Includes natural and created snags
HORS1-93	20.0	0	14.5	89.0	11.5	√ Includes natural snags only
HORS3-93	13.7	43	16.0	33.8	3.1	√ Includes natural and created snags
Horseshoe OMA (OMA #3)	11.8	27	16.2	63.6	6.3	√ Includes natural and created snags
PMF #4	31.8	54	16.5	46.2	4.9	√ Includes only created snags
PMF #6	13.3	0	23.9	64.3	6.0	√ Includes natural snags only
Stand 4-7 (OMA's #8 & 10)	14.0	11	18.8	55.0	17.9	√ Includes natural and created snags
Stand 5-11 (OMA #4)	26.5	22	16.1	54.5	6.7	√ Includes natural and created snags
2015-1	12.2	15	16.1	66.5	4.5	√ Includes natural and created snags
2015-3	18.0	13	16.9	48.4	7.4	√ Includes natural and created snags
2015-4	18.8	0	20.6	46.1	4.7	√ Includes natural snags only
2015-5	17.7	26	16.0	44.1	5.4	√ Includes natural and created snags
2015-6	19.0	45	17.5	55.4	4.0	√ Includes natural and created snags
2035-3	18.5	30	18.0	55.0	4.9	√ Includes natural and created snags
CHAP1-91	26.0	70	16.6	33.5	3.1	√ Includes natural and created snags
CHAP2-91	15.0	46	16.1	27.4	3.1	√ Includes only created snags
CHAP3-91	24.0	66	18.0	31.0	3.6	√ Includes natural and created snags
Chaplain Crk. Buffer	8.7	23	16.6	46.6	4.5	√ Includes natural and created snags
Chaplain Crk. PMF (PMF #11)	12.0	25	16.8	43.7	4.3	√ Includes natural and created snags
DIVR1-95	15.6	41	16.8	50.3	3.1	√ Includes natural and created snags
DIVR2-95	19.7	61	18.3	47.9	3.1	√ Includes natural and created snags
HORS2-93	18.0	23	16.9	55.2	4.6	√ Includes natural and created snags
Horseshoe PMF (PMF #17)	14.7	35	17.0	58.1	4.4	√ Includes natural and created snags
Buffer Zone #1	2.7	20	17.0	40 <sup>3/</sup>	2 <sup>2/</sup>	
Buffer Zone #2	3.8	10	15.7	40 <sup>3/</sup>	2 <sup>2/</sup>	
Chap. Marsh PMF (PMF #10)	33.1	10	16.8	38.5	2 <sup>2/</sup>	
East Side OMA (OMA #1)	173.6	12	17.3	40 <sup>3/</sup>	2 <sup>2/</sup>	
Lost Lake - City (PMF #9)	46.0	36	16.9	52.4	2 <sup>2/</sup>	
Lost Lake Tract	112.0	43	16.9	49.5	1 <sup>1/</sup>	
Stand 1-3 <sup>4/</sup>	13.8	6	21.5	55.0	2 <sup>2/</sup>	
Stand 2-1 (PMF #7)	8.9	4	19.5	48.8	2 <sup>2/</sup>	
Stand 2-2 <sup>4/</sup>	30.7	12	19.0	47.9	2 <sup>2/</sup>	
Stand 3-1	141.1	10	19.5	51.1	2 <sup>2/</sup>	
<b>TOTALS</b>	<b>457</b>	<b>798</b>	Totals for those units which meets WHMP requirements (25 units).			
	<b>1023</b>	<b>961</b>	Totals for all units having snag management activity to date (36 units).			

**BOLD** denotes those units where snag management activity occurred in 1997

√ Meets WHMP requirements for size class distribution and number per acre

1/ Incomplete inventories have been done, and some snags have been created, but the target densities have not yet been met.

2/ No inventories have been done in these units.

3/ Estimated heights.

4/ Remainder of stand, exclusive of already delineated units.

the 25"+ class to achieve the desired size distribution of snag trees, and ideally most should come from Douglas fir or cedars. In view of the scarcity of Douglas fir and red cedar in the 15-17" size class, however, no snags were created on this unit, and the possibility of creating fewer larger snags from these species is under consideration. Because so many hemlock snags in the 11-15" size class are already present naturally, the value in creating many more that are not much larger is questionable. The trade-off under consideration by the co-licensees, creating a smaller number of larger snags, would increase the average snag diameter for the entire unit, and provide relatively larger, longer lasting habitat trees that are not currently present in the unit.

### 3.3 COARSE WOODY DEBRIS MANAGEMENT

The revised CWD inventory and monitoring procedures discussed in the 1996 Annual Report were field tested as described for snags in Section 3.2.1. The procedures were finalized and used in the setup of the two Tiki Sale harvest units on the Lake Chaplain Tract. Existing CWD density, size and decay class were sampled, and a set of live trees was selected and marked for CWD creation after harvest has been completed. Additionally, a small set of existing logs in decay classes 3-4 was marked in each unit to identify whether harvest operations represent a problem for retention of preharvest CWD. Their locations were mapped to facilitate finding them after harvest.

### 3.4 REVEGETATION

Activities in 1997 consisted of monitoring previously-revegetated sites, seeding the right of way, and planting additional shrubs on the power pipeline right-of-way and the powerhouse site. Details of the original plantings are described in earlier annual reports, and summarized in Section 4.

#### 3.4.1 Spada Lake Drawdown Zone

Wetland emergent species were planted from 1430 ft. to 1445 ft. in 1994. At that time there was very little vegetation present in this zone at the two planting sites. The test plantings at the North Fork site were monitored in April and September 1997. Plantings at the North Fork site were damaged by wave action and debris movement during periods of high water. All planted species were affected by this physical damage. As a result, most of the plantings did not survive, with the exceptions of three rows of sedges (Carex obnupta and C. rostrata) and one row of Sparganium. Among the planted species, the sedges did best between 1438-1441 ft. elevation.

Volunteers of a number of other wetland emergent species have established on the North Fork site. Below 1438 ft. one volunteer species, tentatively identified as tapegrass (Vallisneria americana), has become established. Above 1438 ft we have identified yellow marshcress (Rorippa islandica), spike-primrose (Epilobium possibly densiflorum), smartweed (Polygonum sp.), sedges (Carex stipata and C. obnupta), soft rush (Juncus effusus), creeping spearwort (Ranunculus flammula), spike-rush (Eleocharis sp.) and cattail (Typha latifolia).



By far the most abundant species on the site was small-fruited bulrush (Scirpus microcarpus), a species that we planted in 1994 (Figure 4). However, most of the plants currently on the site are volunteers and not our plantings. These plants were misidentified as woolly bulrush (S. cyperinus) in the 1996 Annual Report.

Plantings at Williamson Creek were monitored in September 1997. Survival of plantings at the Williamson Creek site was much better than at the North Fork site because they are less subject to damage by wave action and floating debris. The sedges survived in greater numbers than other species between 1437-1441 ft. elevation, similar to the North Fork site. About 80 percent of the planted slough sedge (C. obnupta) at Williamson Creek have survived. Volunteers of this species are present on the site in the same elevation range. Some planted hardstem bulrush (Scirpus acutus) also survived, but volunteer small-fruited bulrush is the dominant species, similar to the North Fork site.

The co-licensees met with representatives of the US Fish and Wildlife Service and Washington Department of Wildlife on the sites in September 1997, and discussed the future of the shoreline revegetation program. The discussion is summarized in Attachment 3.

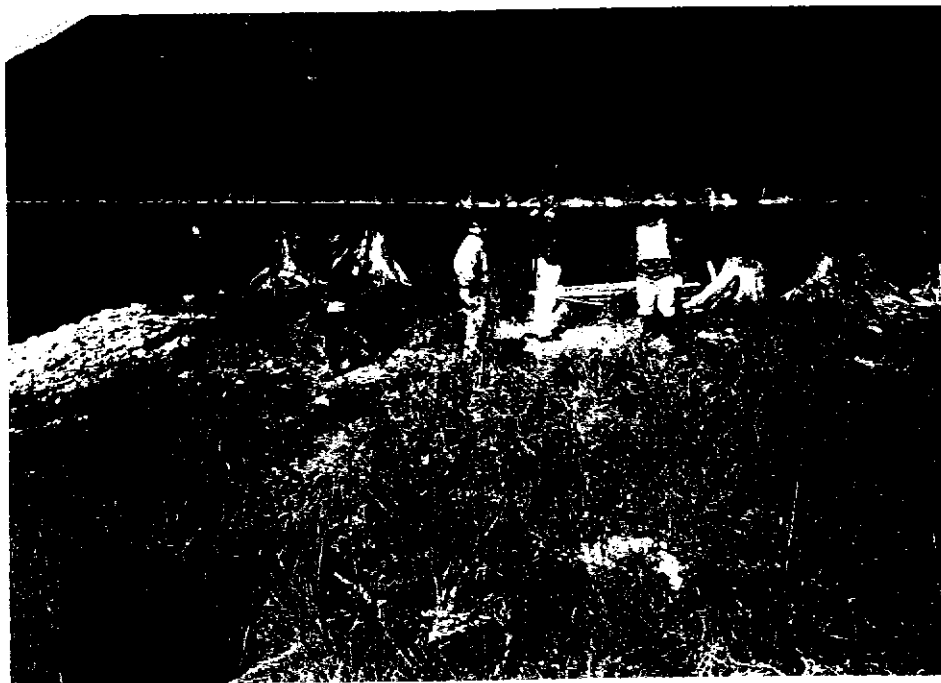
#### 3.4.2 Power Pipeline Right-of-Way

The small, patchy areas of the power pipeline right-of-way (ROW) where vegetation had not successfully become established were seeded again with a mixture of grasses and forbs. Photo-documentation of the ROW was also conducted again this year to document the effects of management practices. The thirty foot portion over the center of the pipeline was mowed by powerhouse staff in June to keep the invading trees down. This precluded any quantitative monitoring of the vegetation that would have been done during the summer. In 1998, mowing will not occur until after vegetation plots are monitored and photo-documentation has been completed.

Construction was started on the pipeline access road and stream crossing. The road work will allow closer inspection of the pipeline in the event of an emergency, as well as reduce erosion on several steep portions of the ROW. The culvert placement will stop off-road vehicle use of a stream crossing, and allow more expeditious pipeline inspections. Both projects are expected to be completed during 1998.

Shrubs and small trees were planted in selected areas on the ROW this year. Species included 6 red-osier dogwood, 7 swamp rose and 6 serviceberry. Most were planted near stump piles which had been placed on the right-of-way several years ago, to afford them some degree of protection from mowing. If these plantings are successful, more may be planted in the future.

FIGURE 4. Spada Lake drawdown zone, North Fork revegetation site. September 1997.  
Small-fruited bulrush is the most abundant species in the planted area.



Williamson Creek revegetation site. September 1997.  
Planted and volunteer slough sedge growing between 1438 ft and 1441 ft elevation.



#### 3.4.3 Chaplain Marsh

Shrubs were planted along the western edge of Chaplain Marsh in 1993 to create a vegetative screen between the Lake Chaplain road and the marsh, and to provide a food source for fruit- and seed-eating birds. Species planted included red-osier dogwood, English holly, huckleberry, serviceberry, Nootka rose, red-flowering currant, and western red cedar. The plantings were monitored at various times during the summer/fall of 1997 (with photo documentation in October 1997), by walking along the edge and looking for gaps or dead shrubs. Mortality of planted shrubs has been very low. Holly and red-osier dogwood plantings have shown the greatest increase in height and bushiness. Average height of these shrubs was about 8 ft. Western red cedars averaged 6 ft in height. Hawthorn shrubs that were planted in the mid-1980's as part of earlier mitigation for the construction of the filter plant have also grown to an average of 8 ft tall. The goals of the plantings (to provide a vegetative screen between the road and the marsh) have been achieved, but some management of other vegetation on this site will be necessary to maintain the screen. Other shrub and tree species, especially red alder, salmonberry and willow, are growing well on this site and have overtopped the smaller shrub species (e.g. huckleberry) that were planted there. Therefore, we plan to manually remove the red alders, and prune willows and salmonberry in the planted area during 1998. The small number of red alder trees that are greater than 25 ft tall will be retained, as they do not seem to be shading the plantings excessively.

#### 3.4.4 Powerhouse Site

Ten mast/fruit tree groups and ten shrub/tree groups were established near the Powerhouse in 1993 and 1994. Species included Oregon ash, western crabapple, black hawthorn, red-flowering currant, serviceberry, Nootka rose, and red huckleberry. Five cascara, eight crabapple and one serviceberry were added in the shrub/tree groups in April 1997. The plantings were monitored in early September 1997 (Table 3).

Most of the tree species (crabapple, ash and hawthorn) showed satisfactory growth on the site. The cascara planted during the spring did not show much growth during the first season, as expected. Among the shrubs that we have tried on this site, only Nootka rose has done well. Some volunteer species, including spirea and thimbleberry, are performing better and these will be retained wherever they begin growing. Red alder saplings and Himalayan blackberry have appeared within and around some of the planted areas, and these will be manually removed during 1998.

**Table 3. Condition of Tree and Shrub Groups at Powerhouse**

Species	No. Planted	No. Remaining	Condition of Surviving Plants	No. of Volunteers
Crabapple	47	47	E: 5, G:21, F:12	-
Oregon Ash	15	15	E:5, G:3, F:7	-
Black Hawthorn	26	20	G:3, F:17	-
Red flowering currant	33	2	F:2	-
Serviceberry	53	27	G:1, F:27	9
Nootka rose	32	32	E:2, G:16, F:14	16
Red huckleberry	43	19	G:5, F:14	1
Cascara	5	5	F:5	-
Spirea	-	-		10+
Thimbleberry	-	-		Present; not counted
Salmonberry	-	-		Present; not counted

E - excellent, G - good, F - fair

#### 3.4.5 North End Lake Chaplain

Douglas fir and western red cedar seedlings were planted in 1992 at the north end of Lake Chaplain to provide a visual screen between the lake and the adjacent road (Figure 5). The trees were monitored in February 1997. There has been no change in this area since the 1996 Annual Report, except that the trees have become taller. As reported in 1996, the Douglas fir trees are generally in excellent condition, with very little mortality since planting. Average height is over ten feet. Approximately 60 percent of the western red cedar trees have died since planting, and the remainder are in fair to good condition. Average height of red cedars is about six feet.

FIGURE 5. North End of Lake Chaplain. February 1997. Planted row of Douglas fir and western red cedar viewed from lakeshore toward access road.



View of planted Douglas fir trees from south to north. February 1997.



### 3.5 NEST STRUCTURES

#### 3.5.1 Floating Nest Platforms

District staff monitored the two platforms at Lost Lake at least twice per month from late March to the end of July for periods of at least 30 minutes. Jean Cross performed additional monitoring of the platforms and observed waterfowl on the lake. The platforms at Spada Lake were not checked until May because of access problems. It was discovered that both platforms at Spada Lake had moved from their anchored positions and were not functional. There was no observed use by wildlife of any of the platforms. Hooded mergansers, wood ducks, bufflehead and otters were observed using Lost Lake. Ring-necked ducks, northern shovelers, harlequin ducks, common loons, mallards, common mergansers, Canada geese, and otters were observed using Spada Lake.

#### 3.5.2 Nest Boxes

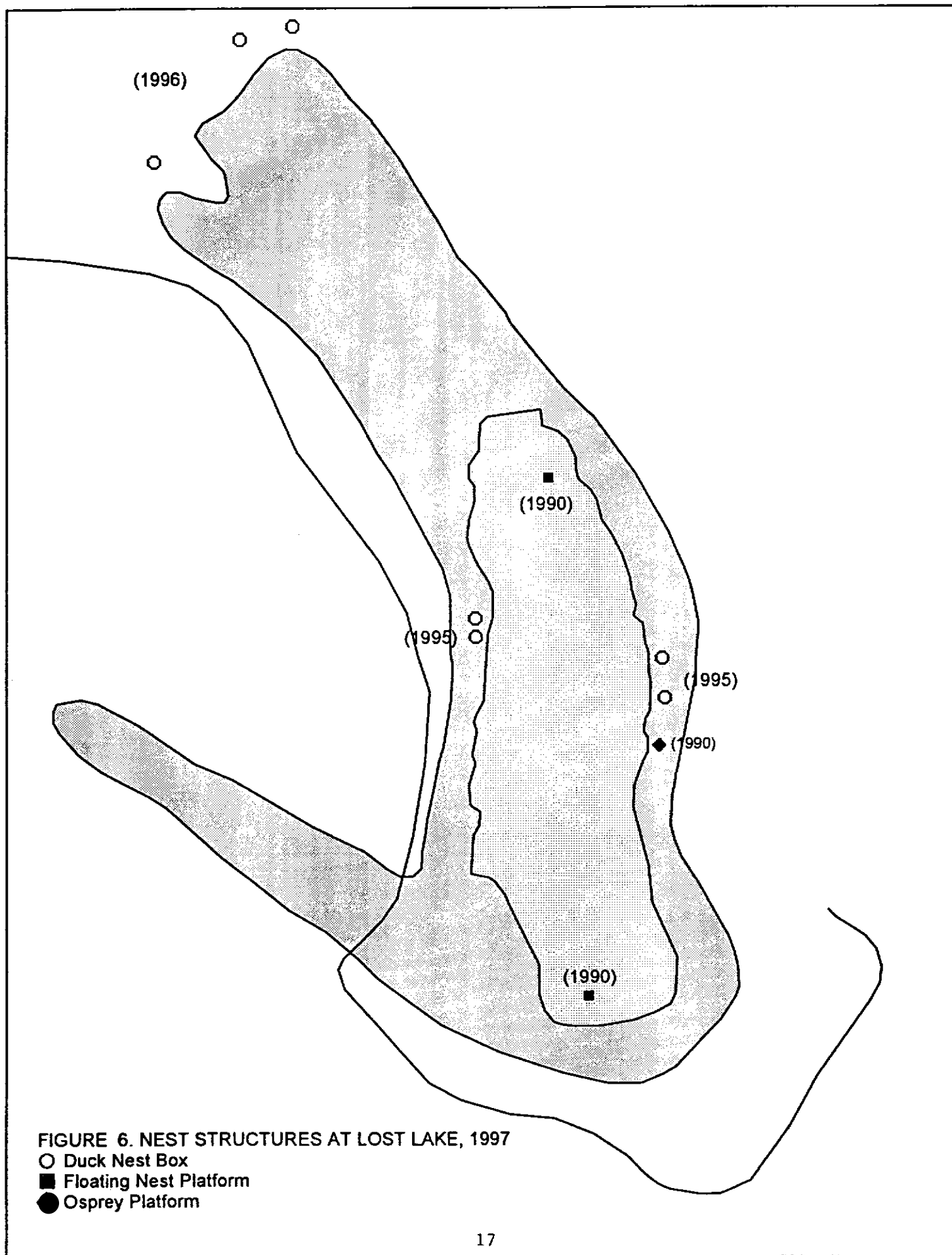
The seven nest boxes at Lost Lake (Figure 6) and the six boxes at Chaplain Marsh (Figure 7) were maintained and monitored by District staff in March and July of 1997. The three boxes installed on Williamson Creek within the Spada Lake Tract at the end of the season in 1996 were not monitored because of access problems. Production was estimated by examining eggshell remains in the boxes.

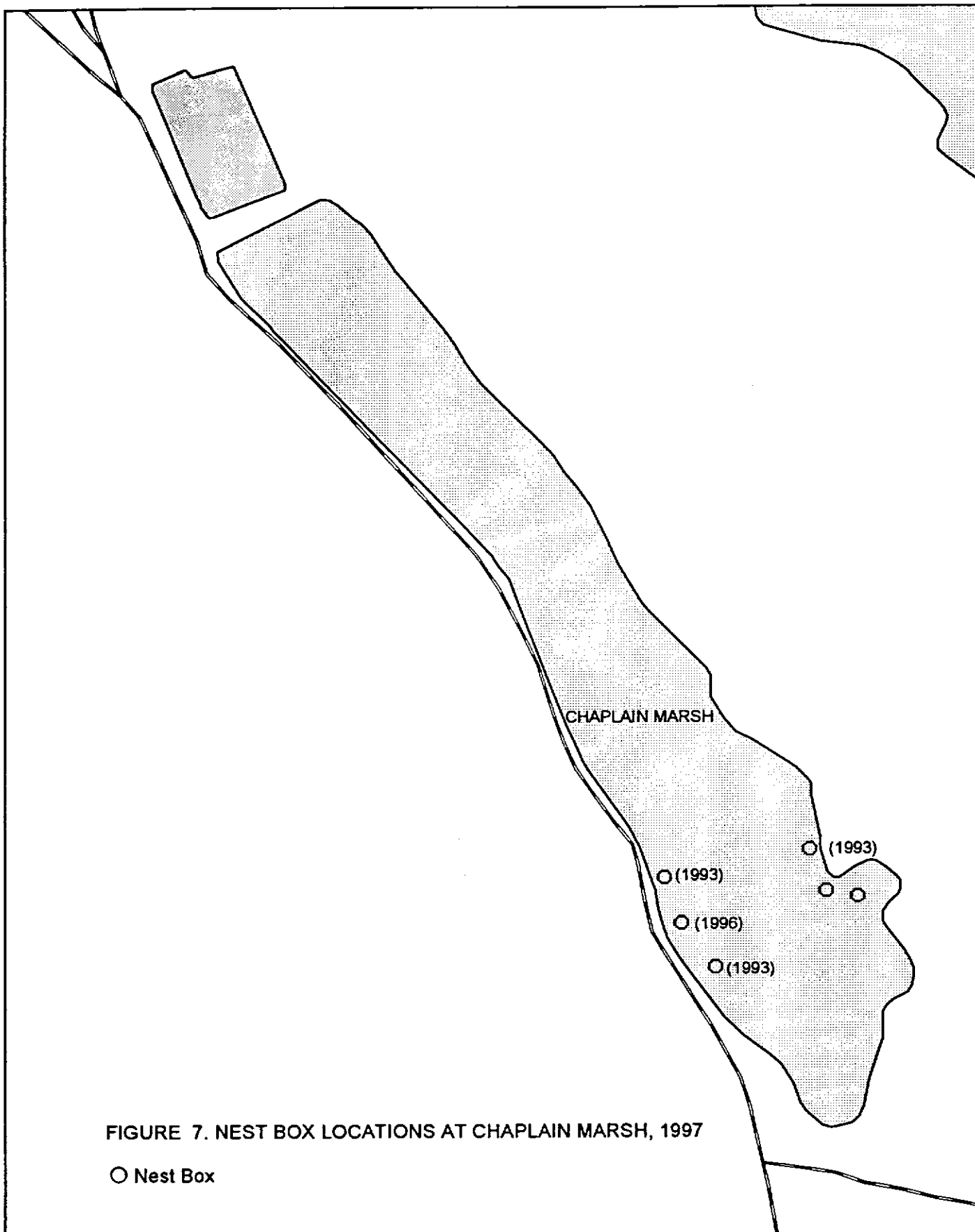
Nesting results are summarized in Table 4. Wood ducks and hooded mergansers used the boxes at Lost Lake. Wood ducks, hooded mergansers, and buffleheads used the nest boxes at Chaplain Marsh. A nest box was considered successful if the contents of the box showed that at least one duckling had successfully fledged from the nest box (egg membrane present, no presence of duckling remains). In 1997, eight of 13 boxes were used successfully with a total of 51 ducklings successfully fledged from the nest boxes.

**Table 4. Use of Nest Boxes at Lost Lake and Chaplain Marsh.**

Site	Number of Boxes	Number of Boxes with Duck Eggs	Number of Successful Boxes	Number of Eggs Hatched by Species*	Number of Boxes Used by Other Species
Lost Lake	7	4	4	14 HM 6 WD	1 (honey bees)
Chaplain Marsh	6	4	4	7HM 7 WD 17 BH	0
Totals	13	8	8	21 HM 13 WD 17 BH	1

\* HM = hooded merganser, WD = wood duck, BH = bufflehead







### 3.5.3 Osprey Nest Platforms

District staff and Jean Cross monitored the osprey nest platform at Lost Lake from the opposite side of the lake during spring and summer 1997. A pair of ospreys occupied the platform from April through August 1997, but it does not appear that they successfully reared young.

No osprey activity was observed on the two nesting platforms at Spada Lake. Ospreys were observed on the nest west of Culmbach dam above the Sultan River gorge. The nest appeared to be partially collapsed in early July and the ospreys were observed rebuilding. Nesting was observed through the end of July, but it was not determined if the pair produced offspring.

### 3.5.4 Bald Eagle Nesting

A pair of bald eagles nested on the Lake Chaplain Tract. Two chicks were observed on the nest and at least one was successfully fledged and observed at Spada Lake and Lake Chaplain during the fall and winter. The City and the Washington Department of Fish and Wildlife developed a Bald Eagle Nest Site Management Plan for the site (Attachment 1).

## 3.6 WHMP SUPPLEMENT FOR SPADA LAKE TRACT

The co-licensees submitted the Spada Supplement to the FERC in January 1997. The FERC accepted the plan in an order issued April 18, 1997 (Attachment 2)

## 3.7 MONITORING OF BIOSOLIDS APPLICATION SITES

The 1996 Annual Report described application of biosolids to two commercially-thinned units on the Lake Chaplain Tract. Vegetation monitoring was conducted in 1997 in accordance with the vegetation monitoring plan for this project (Attachment 4). Sample plots were established in treatment units 2040-5 and 2035-6. Control plots were established southwest of unit 2040-5. Understory cover and height were measured in June and late August/September of 1997, following application in August/September 1996. Total percent cover increased in the treated plots but decreased slightly in the control plots. Much of the increase in percent cover is attributable to increases in bracken fern and salal percent cover (Figure 8).

## 3.8 DEER FORAGE MONITORING

### 3.8.1 Monitoring Procedures

The 1996 Annual Report described the ongoing development of sampling procedures for deer forage availability on harvest units, and stated that an alternative method recommended by our consulting statistician would be tested in 1997. The alternative method was refined in 1997, field tested, and adopted for use in the future. This method utilizes ten parallel transects that are evenly spaced perpendicular to a baseline extending across the unit. Ten 50 x 50 cm sample quadrats are randomly located on each transect. All plants encountered in a quadrat are recorded as being "present", and the frequency of occurrence

FIGURE 8a. Biosolids Application Project. Understory Vegetation Monitoring Results in June 1997.

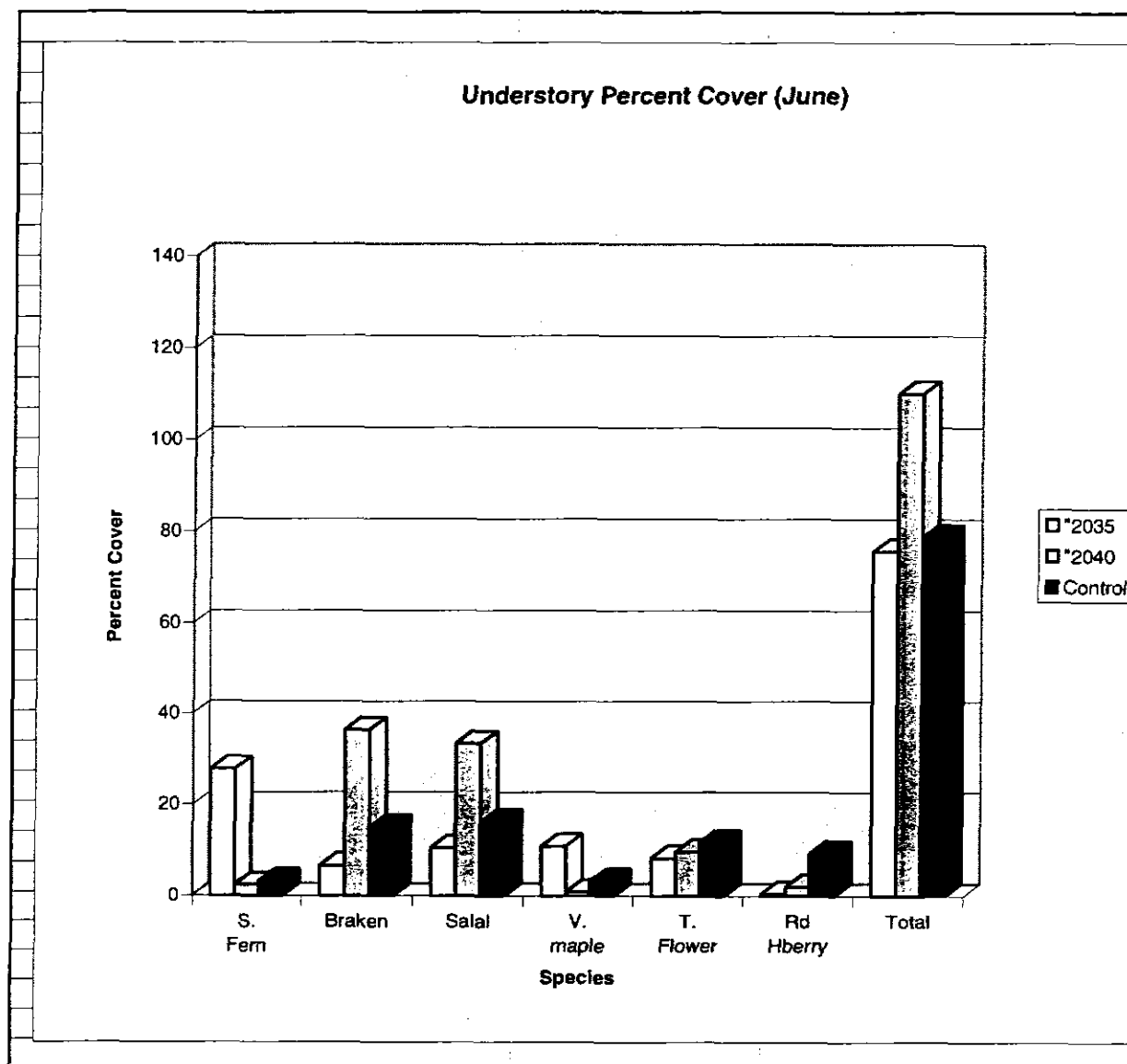
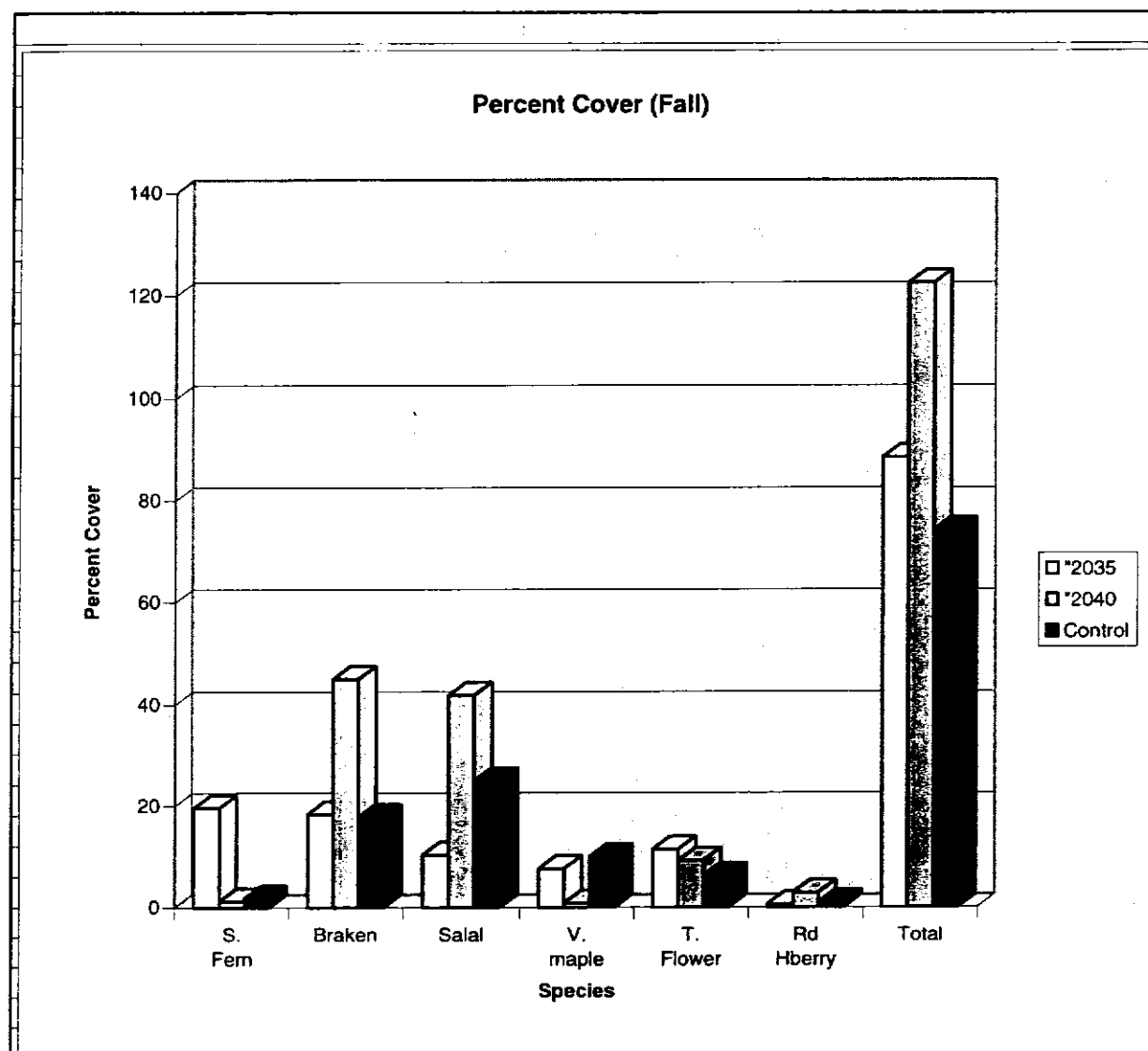


FIGURE 8b. Biosolids Application Project. Understory Vegetation Monitoring Results in Fall 1997.



of each species is calculated. Measurements are made on selected harvest units and adjacent unharvested forest stands of the same original timber type. The results will be used to test for changes in frequency of occurrence of different species over time within a unit, and to compare the frequency of occurrence of plants in harvested stands with adjacent unharvested stands. These comparisons will assist in quantifying the changes in availability of forage plants as a result of timber harvest and subsequent forest regeneration. We will be sampling a subset of harvest units, as specified in the WHMP, and adjacent unharvested control units.

Forage utilization by wildlife is not sampled under the monitoring procedure, as discussed in the 1996 Annual Report, but notes are taken on signs of browsing while sampling for forage species availability.

### 3.8.2 Monitoring Results

Deer forage availability was sampled on the two harvested units that have been previously studied: one unit of the Chaplain Sale, harvested in 1991, and one unit of the diversion Sale, harvested in 1995. In addition, one unharvested unit adjacent to each of the harvest units was sampled. Results are presented in Figure 9. The 1991 harvest unit had greater frequency of bracken fern, Rubus species and fireweed than its forested control unit. Fireweed is a very desirable species for deer forage, and evidence of browsing on fireweed was noted on several sampling transects. Sapling trees, which consisted primarily of Douglas fir, but also included hardwoods such as cherry and willow, had high frequency of occurrence on the clearcut and were rare in the control unit. The 1995 harvest unit had very high occurrence of fireweed and various forbs, in comparison with its forested control. The control unit had a lot of salal present, but the clearcut did not. Sapling trees were not frequently encountered on sample quadrats in the clearcut, because only one year had elapsed since the unit was planted.

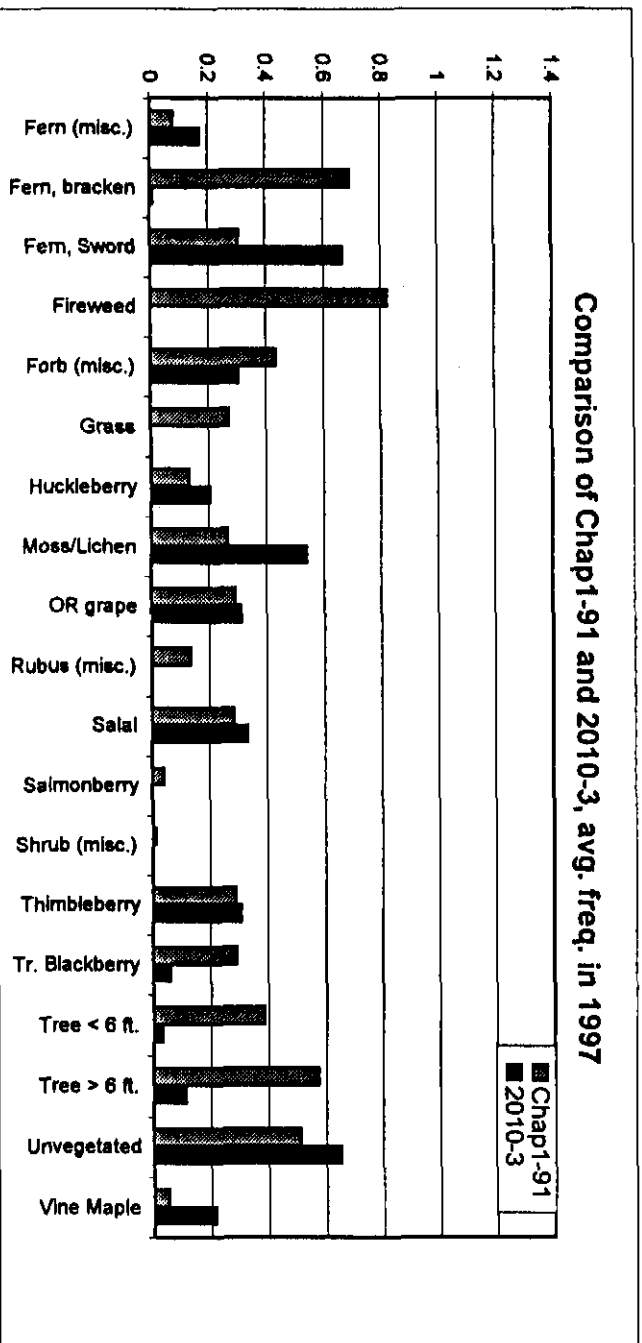
## 3.9 AGENCY TOUR OF WHMP SITES

Representatives of the USFWS and WDFW toured Lake Chaplain, Spada Lake, Lost Lake and pipeline ROW with the co-licensees' technical staff on September 23, 1997. *The tour emphasized ROW management, the revegetation sites in the Spada Lake drawdown zone, biosolids application sites, and forage monitoring in the harvest units.* Notes on the discussions are summarized in Attachment 3.

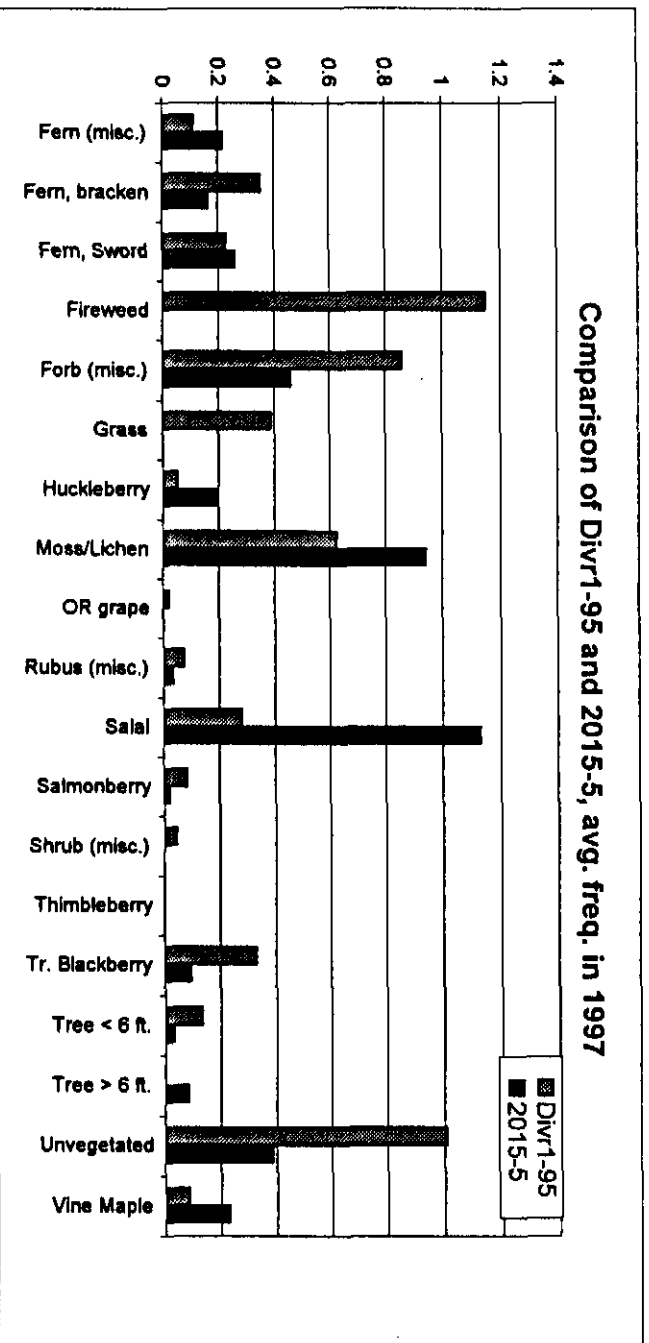
## 4.0 CUMULATIVE SUMMARY

A summary of all activities completed under the WHMP, from the earliest implementation in 1988 through the end of December 1997, is presented in this section. Table 5 lists milestones of WHMP implementation to date, with a reference to the location in past annual reports of discussions of each activity. This table is included in this Annual Report as a method of cross-referencing reports of past activities without repeating the complete details of information presented in previous reports. For complete discussion of a particular subject, the reader should refer to the referenced annual reports.

Figure 9. Availability of Major Forage Species on Two Lake Chaplain Harvest Units and Unharvested Control Units



a) Chaplain Sale Unit, harvested in 1991, and Control Unit 2010-3



b) Diversion Sale unit, harvested in 1995, and Control Unit 2015-5

**TABLE 5. WHMP IMPLEMENTATION MILESTONES**

General Activity Category	Management Tract	Milestone	Annual Report Reference – (Section/page #)
Timber Harvest	Lake Chaplain	Chaplain Sale	1991 (3.3.1, p.6), 1992 (3.2.1, p.4)
	Lake Chaplain	Horseshoe Sale	1992 (3.2.2, p.6), 1993 (3.1.1, p.6)
	Lake Chaplain	Diversion Sale	1995 (3.1.1, p.6)
	Lake Chaplain	Tiki Sale	1997 (3.1.1, p.2)
	Lake Chaplain	Line Tree Sale	1997 (3.1.1, p.2)
	Lake Chaplain	Salvage Sale	1993 (3.1.2, p.6)
Reforestation	Lake Chaplain	Chaplain Sale	1992 (3.2.1, p.4)
	Lake Chaplain	Horseshoe Sale	1993 (3.1.1, p.6), 1994 (3.1.3, p.5)
	Lake Chaplain	Diversion Sale	1996 (3.1.1, p.4)
Roads	Lake Chaplain	S1000 (Chaplain Sale)	1991 (3.3.1, p.6)
	Lake Chaplain	C1300 (Chaplain Sale)	1991 (3.3.1, p.6)
	Lake Chaplain	C1900 (Tiki Sale)	1997 (3.1.2, p.5)
	Lake Chaplain	SP1500 (Tiki Sale)	1997 (3.1.2, p.5)
	Lake Chaplain	SP1000 (Tiki Sale)	1997 (3.1.2, p.5)
	Lake Chaplain	SP1300 (Tiki Sale)	1997 (3.1.2, p.5)
	Spada Lake	North Shore Road	1997 (4.3, p.28)
Forest Vegetation Management	Lake Chaplain	Chaplain Sale	1997 (3.1.3, p.5)
	Lost Lake	Precommercial Thinning	1991 (3.3.2, p.9)
	Spada Lake	Precommercial Thinning	1996 (3.1.5, p.6)
Buffer Zone Management			
GTA Management	Lake Chaplain	Chaplain Sale Unit 1	1994 (3.1.3, p.5)
Snag Management	Lake Chaplain	Implementation Decisions	1990 (3.3, p.6), 1993 (3.2, p.8), 1996 (3.2, p.6)
	Lake Chaplain	Snag Inventory Results	1991 (3.4, p.9), 1992 (3.3, p.6), 1995 (3.2, p.7), 1997 (3.2.2, p.7)
	Lake Chaplain	Snag Creation	1990 (3.3, p.6), 1991 (3.4, p.12), 1992 (3.3, p.6), 1993 (3.2, p.8), 1994 (3.2, p.6), 1995 (3.2, p.7), 1996 (3.2, p.6), 1997 (3.2.2, p.7)
CWD Management	Lake Chaplain	Implementation Decisions	1991 (3.10.2, p. 27), 1992 (3.9.2, p.12), 1993 (4.5, p.22), 1994 (3.6.6, p.10), 1995 (3.3.2, p.11), 1995 (Appendix A-Exhibits 1-3), 1996 (3.3, p.10)
	Lake Chaplain	CWD Inventory Results	1991 (3.10.2, p.27), 1993 (3.7.2, p.14), 1995 (Appendix A-Exhibit 4)
	Lake Chaplain	CWD Creation	1994 (4.7.6, p.18), 1995 (3.3.1, p.7), 1995 (Appendix A-Exhibit 4)
Revegetation	Spada Lake	Drawdown Zone Test Plantings	1994 (3.3.1, p.6), 1995 (3.4.1, p.12), 1996 (3.4.1, p.10), 1997 (Fig.4)
	Pipeline ROW	Revegetation Design	1991 (3.5, p.19)
	Pipeline ROW	Seeding	1992 (3.4, p.10), 1993 (3.3, p.11), 1994 (3.3.2, p.7), 1996 (3.4.2, p.11), 1997 (3.4.2, p.11)
	Pipeline ROW	Plant shrubs and trees	1997 (3.4.2, p.11)
	Pipeline ROW	Place tree root wads	1989 (3.3, p.3), 1995 (3.4.2, p.13)

	Lake Chaplain	Revegetation Design	1991 (3.5, p.19)
	Lake Chaplain	Plantings at north end of lake	1992 (3.4, p.10)
	Lake Chaplain	Plantings along Chaplain Marsh	1993 (3.3, p.11)
	Powerhouse	Revegetation Design	1991 (3.5, p.19)
	Powerhouse	Plant shrubs and trees	1993 (3.3, p.11)
Nest Structures	Lost Lake	Floating platforms	1991 (3.6, p.20), 1992 (3.5, p.10), 1993 (3.4, p.11)
	Lost Lake	Duck nest boxes	1990 (3.7, p.8), 1995 (3.5.2, p.16), 1996 (3.5.2, p.13)
	Lost Lake	Osprey Platform	1990 (3.8, p.8)
	Lake Chaplain	Floating platforms	1991 (3.6, p.20), 1992 (3.5, p.10), 1993 (3.4, p.11), 1994 (3.4, p.7)
	Lake Chaplain	Duck Nest Boxes	1993 (3.5, p.11), 1995 (3.5.2, p.16), 1996 (3.5.2, p.13), 1997 (3.5.1, p.16)
	Spada Lake	Floating Platforms	1996 (3.5.1, p.13), 1997 (3.5.1, p.16)
	Spada Lake	Duck Nest Boxes	1996 (3.5.2, p.13)
	Spada Lake	Osprey Platforms	1992 (3.7, p.11)
Biosolids Application	Lake Chaplain	Biosolids Application	1996 (3.8, p.18)
	Lake Chaplain	Monitoring	1996 (3.8, p.18), 1997 (3.7, p.19)
Deer Forage Monitoring	Lake Chaplain	Implementation Decisions & Methods	1991 (3.10.1, p.21), 1996 (3.9, p.18) 1997 (3.8.1, p.19)
		Forage Availability Results	1991 (3.10.1, p.22), 1996 (3.9, p.18) 1997 (3.8.2, p.22)
		Utilization Results	1991 (3.10.1, p.22)
Land Acquisition	Lost Lake		1989 (3.1, p.2)
	Lake Chaplain		1991 (3.1, p.3)
	Spada Lake		1990 (3.1, p.2)
	Williamson Creek		1991 (3.1, p.3)
Management Plans & Land Use Decisions	Lake Chaplain	Chaplain Property Comprehensive Plan	1995 (3.7, p.17)
	Lake Chaplain	Shoreline Zone development permit	1995 (3.7, p.17)
	Lake Chaplain	Zoning Code change	1996 (3.7, p.15)
	Lake Chaplain	Bald Eagle Nest Site Management Plan	1997 (Attachment 1)
	Lost Lake	Concrete Ford Installation	1991 (3.2, p.3)
	Spada Lake	Supplemental Plan	1997 (Attachment 2)
ROW Management	Power Pipeline	Gate to restrict public access	1994 (3.3.2, p.7)
	Power Pipeline	Access Road	1996 (3.4.2, p.11), 1997 (3.4.2, p.11)
Special Agency Consultation	All management tracts	Agency tour of WHMP Sites	1997 (3.9, p.22)

## **4.1 FOREST VEGETATION MANAGEMENT AT LAKE CHAPLAIN TRACT**

### **4.1.1 Road System Layout and Construction**

The main road system for the northeast side of the Tract and the area south of the Diversion Dam Road has been constructed, as shown in Figure 2. Additional spur roads will be constructed to serve individual harvest units in the future. Right of way has been secured from DNR to access additional stands on the east side of Chaplain Marsh and the filter plant. The necessary spur roads will be constructed with future timber sales. The main road system for the west side of Lake Chaplain has been laid out, and necessary right of way over a short distance on adjacent DNR property has been obtained. These roads will be constructed as part of the Tiki Timber Sale, in 1998 or 1999.

### **4.1.2 Timber Harvest**

Harvest activity was summarized in the 1996 Annual Report (Sections 4.1.2 and 4.1.3), and there are no changes to report from 1997. Harvest activity to date is depicted in Figure 10. As described in Section 3.1.1, the Tiki Sale was marketed in 1997; it is expected that the units will be sold early in 1998. Setup work was started in 1997 on the Line Tree Sale, which is expected to be sold in 1998 and harvested in 1999 (Figure 10).

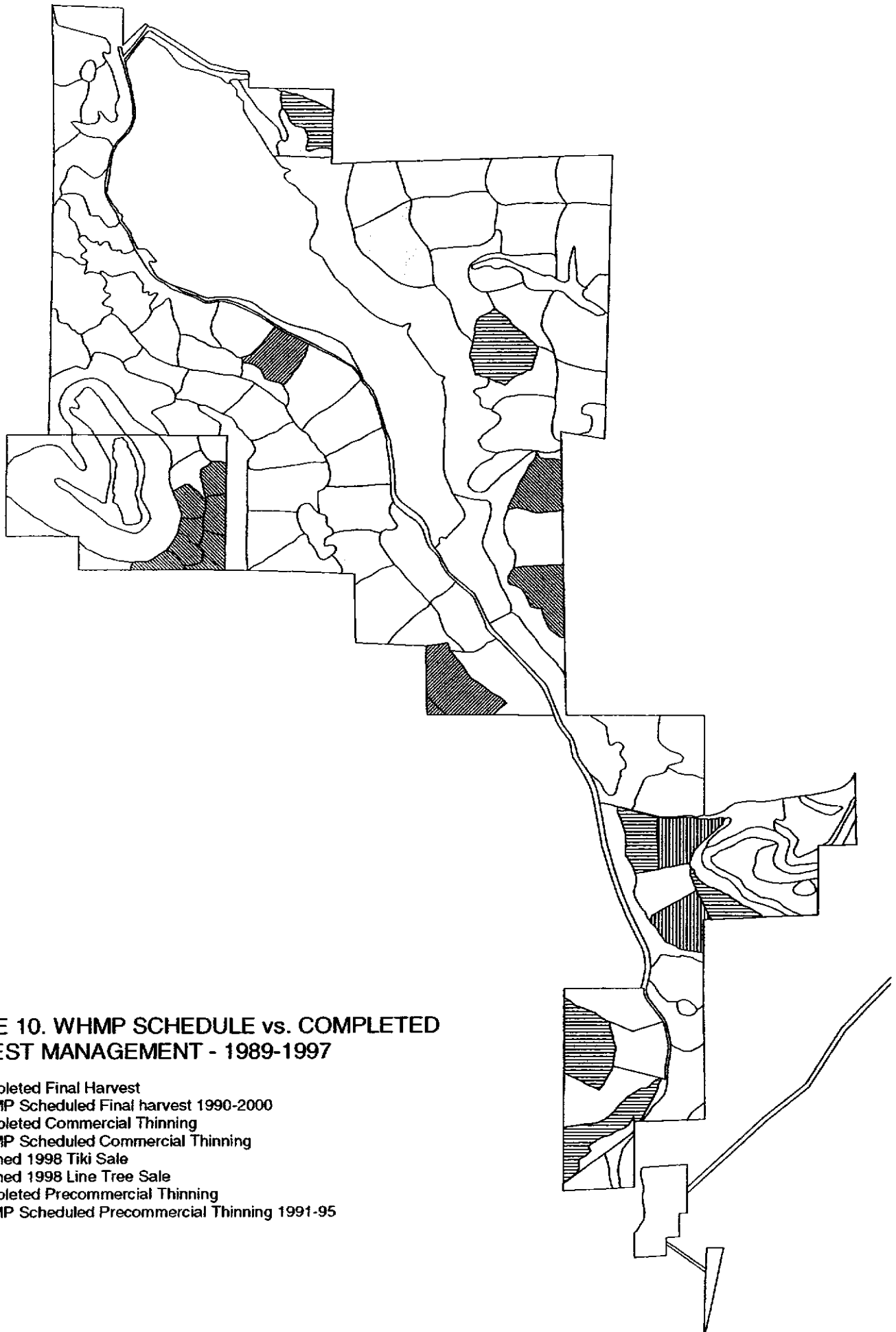
### **4.1.3 Management of Roads and Post-harvest Units (Lake Chaplain)**

Management activities were described in the 1996 Annual Report (Section 4.1.4). All final harvest units have been seeded with a grass/forb mix on bare areas, and replanted with Douglas fir and red cedar seedlings. Road ROW's have also been seeded, and access roads outside the closed watershed have been gated to prevent vehicular access by the public. A small timber salvage sale was held following a major storm in January 1993. Monitoring of stocking levels in post-harvest units was started in 1997. Results in one unit showed adequate overall density, although distribution of hardwood species is clumped.

## **4.2 FOREST VEGETATION MANAGEMENT AT LOST LAKE TRACT**

As described in the 1996 Annual Report, the stand that was precommercially thinned in 1991 has been monitored annually with photo documentation. The slash has begun to decompose, and access through the stand has gradually improved over time. The shrub layer, especially salmonberry, has responded to the reduction in the tree canopy, and signs of deer browsing have been observed.





**FIGURE 10. WHMP SCHEDULE vs. COMPLETED  
FOREST MANAGEMENT - 1989-1997**

#### **4.3 FOREST VEGETATION MANAGEMENT AT SPADA LAKE TRACT**

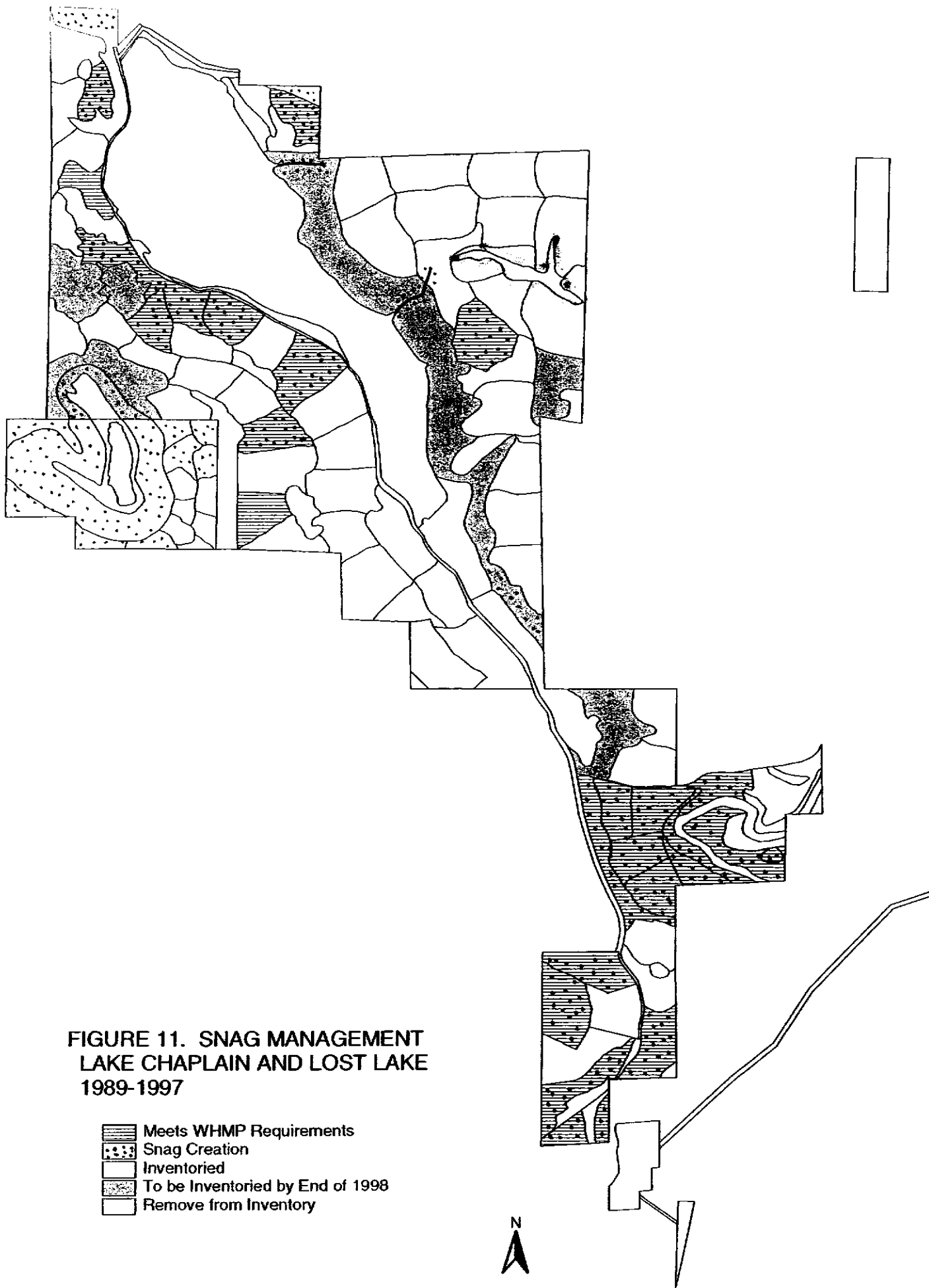
Three young second growth stands (totaling about 30 acres) on the south shore of Spada Lake were precommercially thinned in September 1996. The thinning prescription was described in the 1996 Annual Report (Section 3.1.5). The Spada Supplement, approved by the FERC in 1997, calls for additional precommercial thinning on the Tract during the period 1996-2000. There is uncertainty over future access to the north shore of the Lake because the DNR announced in 1997 that it was planning to abandon the North Shore Road in the vicinity of Recreation Site 8. The District does not at this time plan to assume the responsibility for repairs and maintenance of the road, which is inaccessible past Recreation Site 8 due to a massive landslide in 1997. Therefore, the most promising option for future commercial harvest north of the lake is helicopter logging. Some information was obtained from a contractor who does helicopter logging, but additional consideration will be necessary to advance the plan. Until decisions regarding the feasibility of future commercial thinning can be made, it will be difficult to prescribe precommercial thinning specifications for these stands. Therefore, the emphasis in 1998 will be on managing stands for which future access is more certain.

#### **4.4 SNAG MANAGEMENT**

Snag management activity from the beginning of implementation in 1989 through 1997 is shown in Figure 11. Snag inventory/creation has been completed on all units which have been harvested or thinned, as well as all units scheduled for harvest by 2020 (except 2020-5, see Section 3.2, and those scheduled for commercial thinning within 20 years, see Section 5.2). Two units depicted in blue in Figure 11 were originally selected for inventory by the end of 1998, as described in the 1995 Annual Report. However, as these units are now expected to be commercially thinned in the next few years, snag inventory and creation will be done following commercial thinning.

As Table 2 shows, to date, 961 snags have been created on 1,023 acres on the Lake Chaplain and Lost Lake Tracts. A total of 457 acres (25 units) has been verified as meeting the WHMP's minimum requirements of 3.07 snags per acre as well as the required size class distribution for snags.

In 1996 the inventory/monitoring methods for snags were revised. Methods were field tested and finalized in 1997. These methods were implemented on the Tiki Sale units, and other units of the Lake Chaplain Tract, as reported in Section 3.2.1.



## **4.5 COARSE WOODY DEBRIS MANAGEMENT**

The 1995 Annual Report describes the first inventories of CWD on the Lake Chaplain Tract, and the subsequent development of the CWD management procedure to ensure compliance with WHMP targets. The procedure was implemented on the Diversion Sale, which was harvested in 1995. The 1995 and 1996 Annual Reports describe more fully the earlier inventories and consultations with the agencies regarding standards for compliance. In 1996, the inventory/monitoring methods were revised following a consultant's review of the procedures, as described in the 1996 Annual report. The methods were finalized in 1997, field tested, and implemented on the units of the Tiki Sale, as reported in Section 3.3 of the present Annual Report.

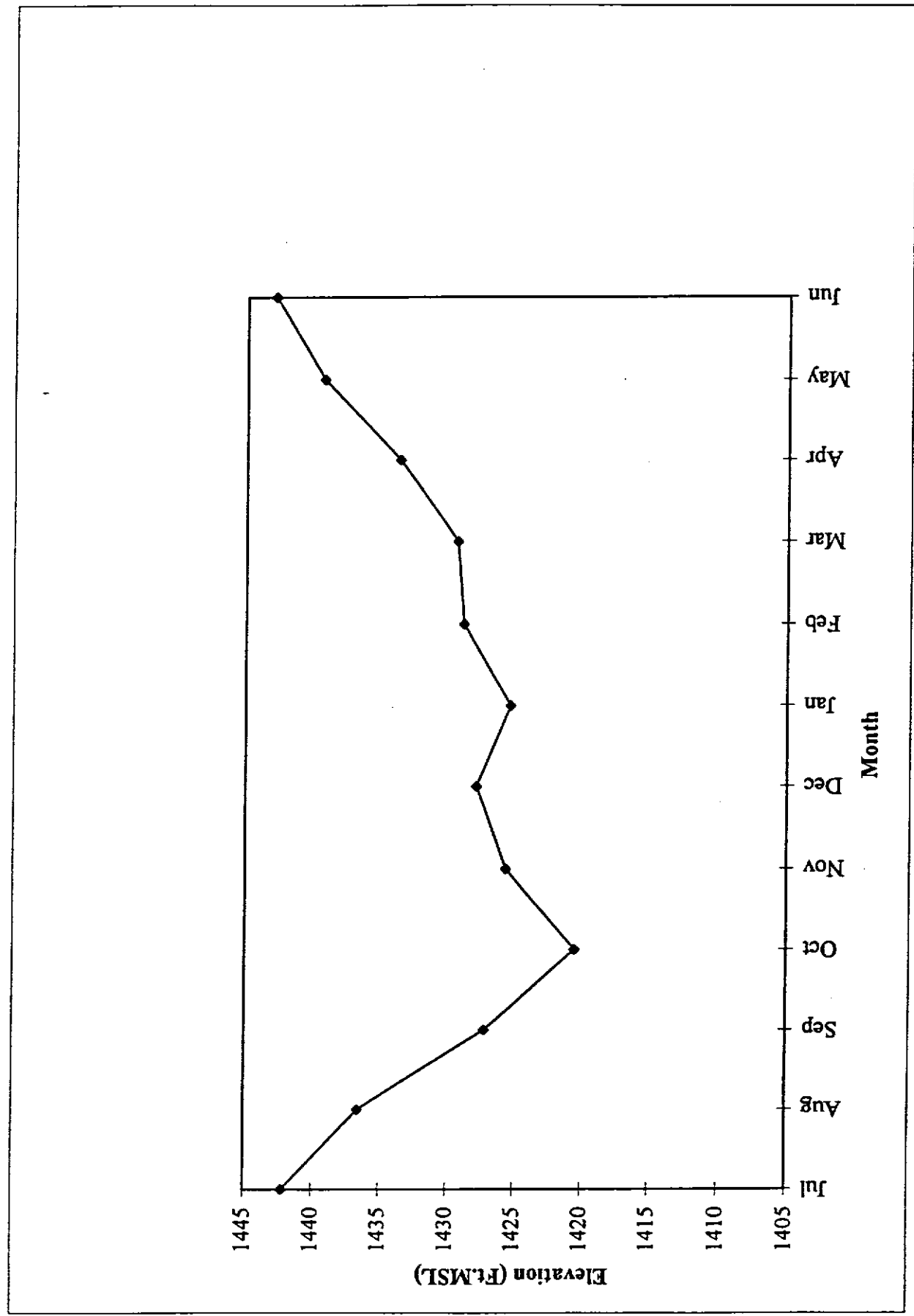
## **4.6 REVEGETATION**

### **4.6.1 Spada Lake Drawdown Zone**

Test plots of five wetland emergent species were planted at two sites in October/November 1994 and monitored each following year. Two sedge species survived during the first growing seasons at Williamson Creek, but most plantings at the North Fork site were damaged by wave action and floating debris. To date, natural recruitment of wetland species, especially small-fruited bulrush, has been far more successful in covering the ground than the test plantings.

Elevation and fluctuations in the water level of the reservoir are key factors that determine whether a wetland species can become established and how far down the drawdown zone it will grow. The band between 1438 ft and 1441 ft was the most successful for species we introduced on the site and volunteer species. Only one wetland species has become established below the 1437 ft elevation, and it covers a fairly small area at present. This elevation appears to be the limit for emergent species, below which the period of inundation during the growing season (see Figure 12) is too prolonged, even where wave scour is not a problem. Submergent and floating species, such as duckweed or pondweed, are not establishing at lower elevations in the drawdown zone, possibly because they also cannot tolerate the water level fluctuations and scour. Vegetation of the drawdown zone will continue to be limited by the magnitude of water level fluctuations. The lower limit of the vegetated zone is expected to change somewhat from year to year, but the lower drawdown zone is likely to remain unvegetated over time.

Figure 12. Spada Lake Mean Monthly Elevations, 1991-1995



#### 4.6.2 Power Pipeline Right-of-Way

The pipeline ROW has been seeded annually, all or in part, since 1990. Only those areas where vegetation is still sparse are seeded. Most of the ROW has been successfully revegetated, but some areas are likely to remain somewhat bare due to extremely sandy or rocky soil. Some shrubs and trees have been planted, primarily as test plantings to evaluate the potential for creating small shrub or mast-tree clumps on the right-of-way.

Work on rebuilding a portion of the access road and replacing a washed out culvert has begun, and will continue in the coming year.

#### 4.6.3 North End of Lake Chaplain and Chaplain Marsh

The required plantings at the north end of Lake Chaplain were monitored twice annually from the time of planting in 1992 through 1995, and once in 1996 and 1997. Survival of western red cedar at the north end of the lake is currently about 50 percent. Alders are growing where red cedar were planted (generally the wetter areas), and they provide some screening between the lake and the road during the summer. Douglas fir saplings have had excellent growth, with overall survival over 90 percent.

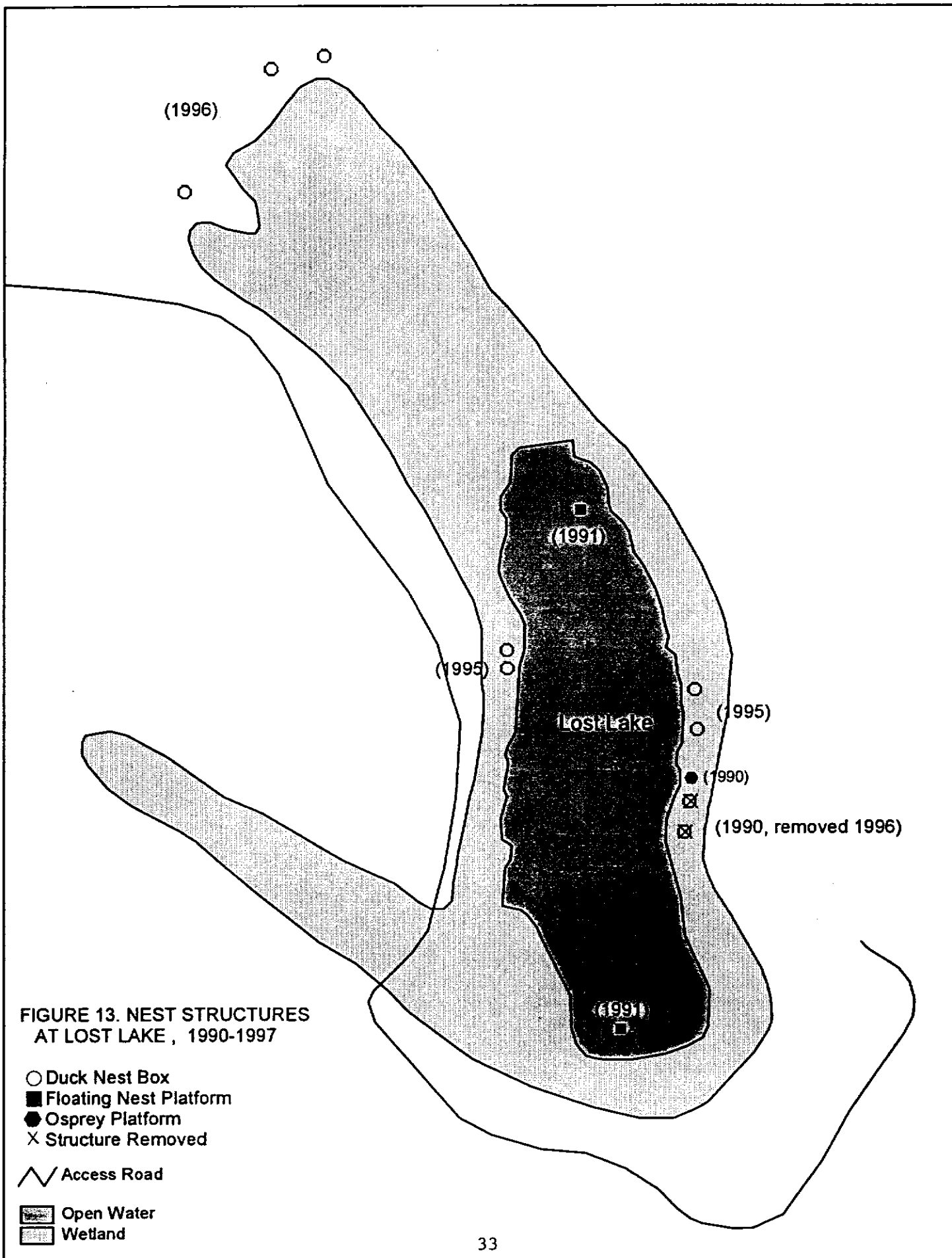
The required plantings adjacent to Chaplain Marsh were monitored twice annually from the time of planting in 1993 through 1995, and once in 1996 and 1997. Survival of shrubs has been close to 100 percent with generally good growth. However, alders and a few other shrub species have overtopped the planted shrubs in the past year, and must be managed to help maintain the plantings.

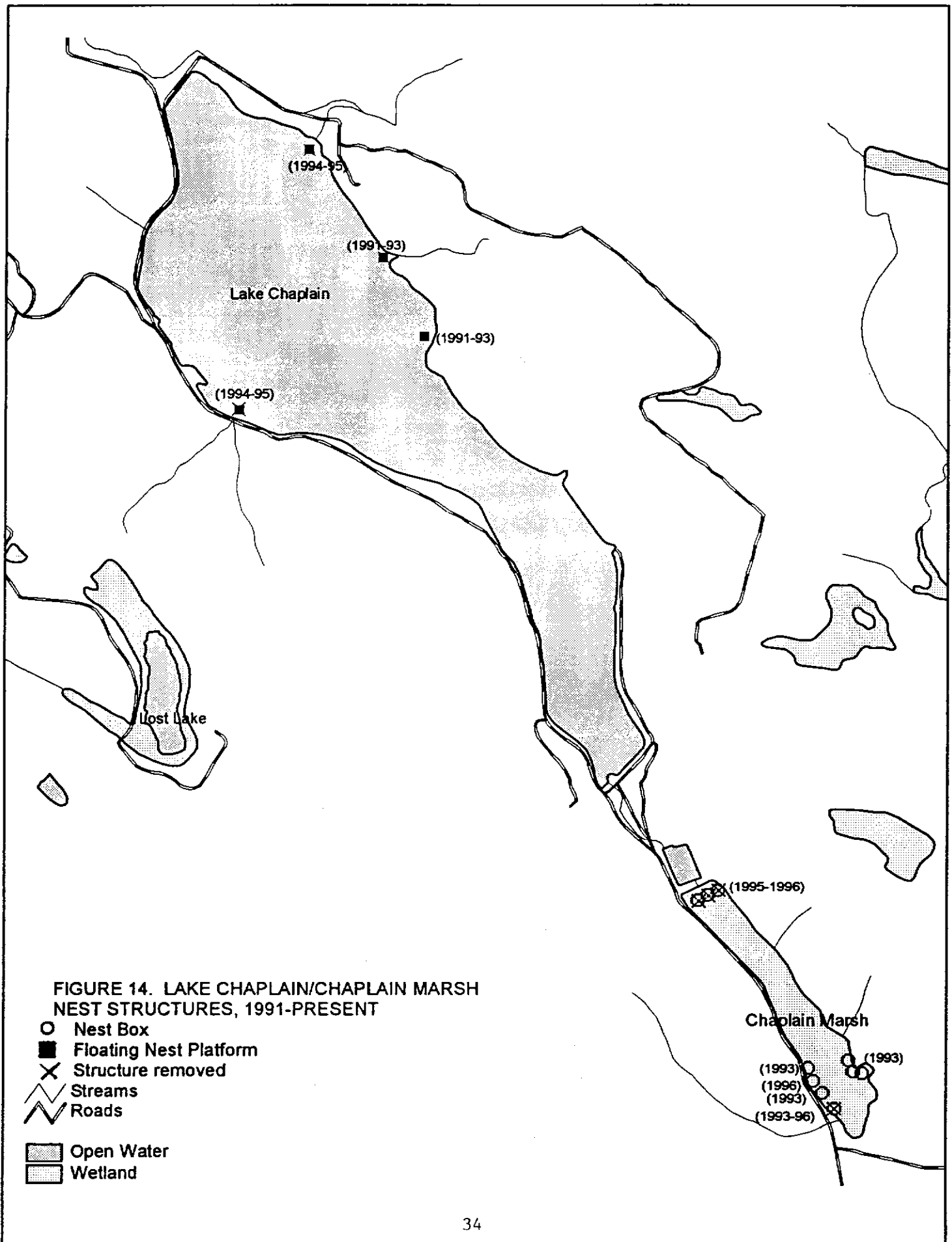
#### 4.6.4 Powerhouse Site

Shrub and tree plantings were monitored at least twice each growing season between planting (in 1993) and 1995, and once in 1996 and 1997. In 1997, we planted a small number of cascara saplings to test whether this species is suitable for the site. Survival of the tree species has been greater than 90 percent, and growth has been variable: crabapples have grown more than ash and hawthorn (Table 3). Most of the shrubs, with the exception of Nootka rose, have not done very well.

### 4.7 NEST STRUCTURES

All of the nest structures that were required by the WHMP have been installed and monitored annually thereafter (see Figures 13, 14 and 15 for all nest structure locations). In 1990, two floating nest platforms were placed in Lost Lake. The required two duck nest boxes were installed at Lost Lake in 1990. One osprey platform was installed at Lost Lake in 1990 and 2 at Spada Lake in 1992.







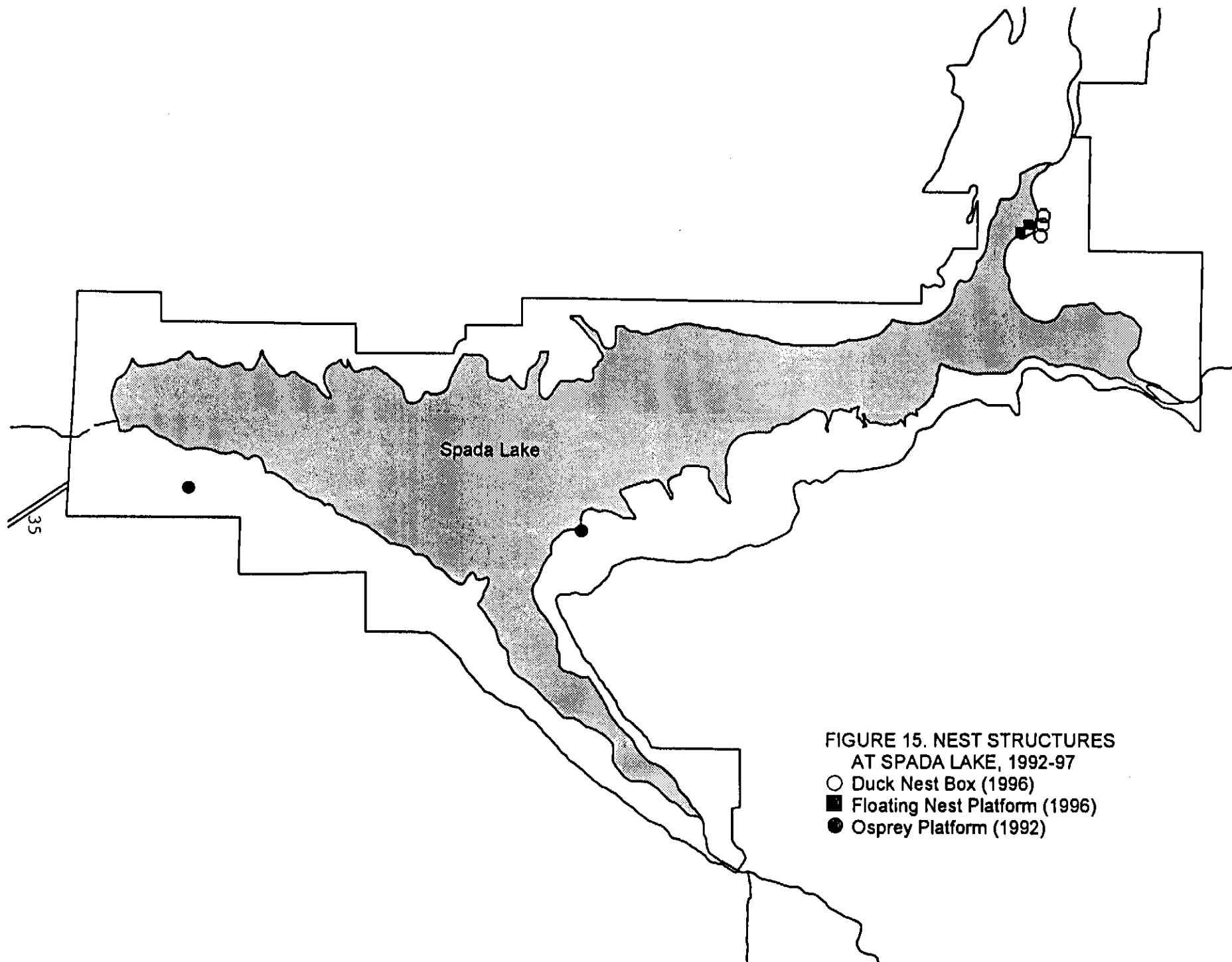


FIGURE 15. NEST STRUCTURES  
AT SPADA LAKE, 1992-97

- Duck Nest Box (1996)
- Floating Nest Platform (1996)
- Osprey Platform (1992)

In addition to the required nest structures, we placed two floating platforms (one of these in place of the third platform required at Lost Lake), in Lake Chaplain in 1990 in hopes of recruiting loons. In February 1996 the floating platforms at Lake Chaplain were moved to Spada Lake. They were destroyed in late 1996 or early 1997 by unknown causes. We placed six nest boxes in Chaplain Marsh in 1993. In 1995 we placed four additional nest boxes at Lost Lake and three more at the north end of Chaplain Marsh.

In 1996 we removed the three boxes from the north end of Chaplain Marsh because only starlings were using them. They were installed at Lost Lake in 1996. Three new nest boxes were put up at Williamson Creek in the Spada Lake Tract in summer 1996.

The nest structures, with the exception of Williamson Creek, have been monitored every year since installation. Ducks have used about half of the boxes each year (61% in 1997). The osprey platform at Lost Lake produced one fledgling in 1994 and one in 1995. Nesting was attempted in 1996 and 1997, but did not appear to be successful. A nest was partially constructed at the platform near the South Fork at Spada Lake during 1994 and in 1995 osprey completed a nest and were observed setting prior to nest abandonment in June. Nesting has not been observed on the platforms at Spada Lake since then. A new nest has been actively used in 1996 and 1997, downstream of Culmback Dam. The floating platforms have been used for resting and feeding by waterfowl and otters, but no breeding attempts have been noted.

#### **4.8 BIOSOLIDS APPLICATION**

The City of Everett applied biosolids to stands 2035-6 and 2040-5 in the Lake Chaplain Tract in August and September of 1996 (Figure 16). Stands 2035-6 and 2040-5 are composed primarily of second growth Douglas fir and western hemlock. These stands were commercially thinned in 1993 with the intention of increasing understory forage production and providing more growing space for co-dominant and dominant trees. The City applied 12.5 dry tons of biosolids per acre to 36 acres. The material was applied in semi-solid form using a side discharge spreader. The ultimate intention was to apply roughly twice this amount of biosolids, based on measured nitrogen requirements of the soils on these sites, but it was decided to apply one half this amount at one time. Based on the positive response of the understory, finishing the prescribed biosolids applications in stands 2035-6 and 2040-5 is planned for Spring or early summer of 1998. Other possible biosolids fertilization projects in 1998 could include stand 1993-3.

Two water quality monitoring sites were established on Chaplain Creek. Creek waters were sampled in August 1996 and will be sampled monthly for two years following application. Parameters examined were nitrates, phosphorus, fecal coliform, ammonia, and chloride. Results of the monitoring are in Table 5. Water quality monitoring has indicated no biosolids effect on the water quality parameters measured.

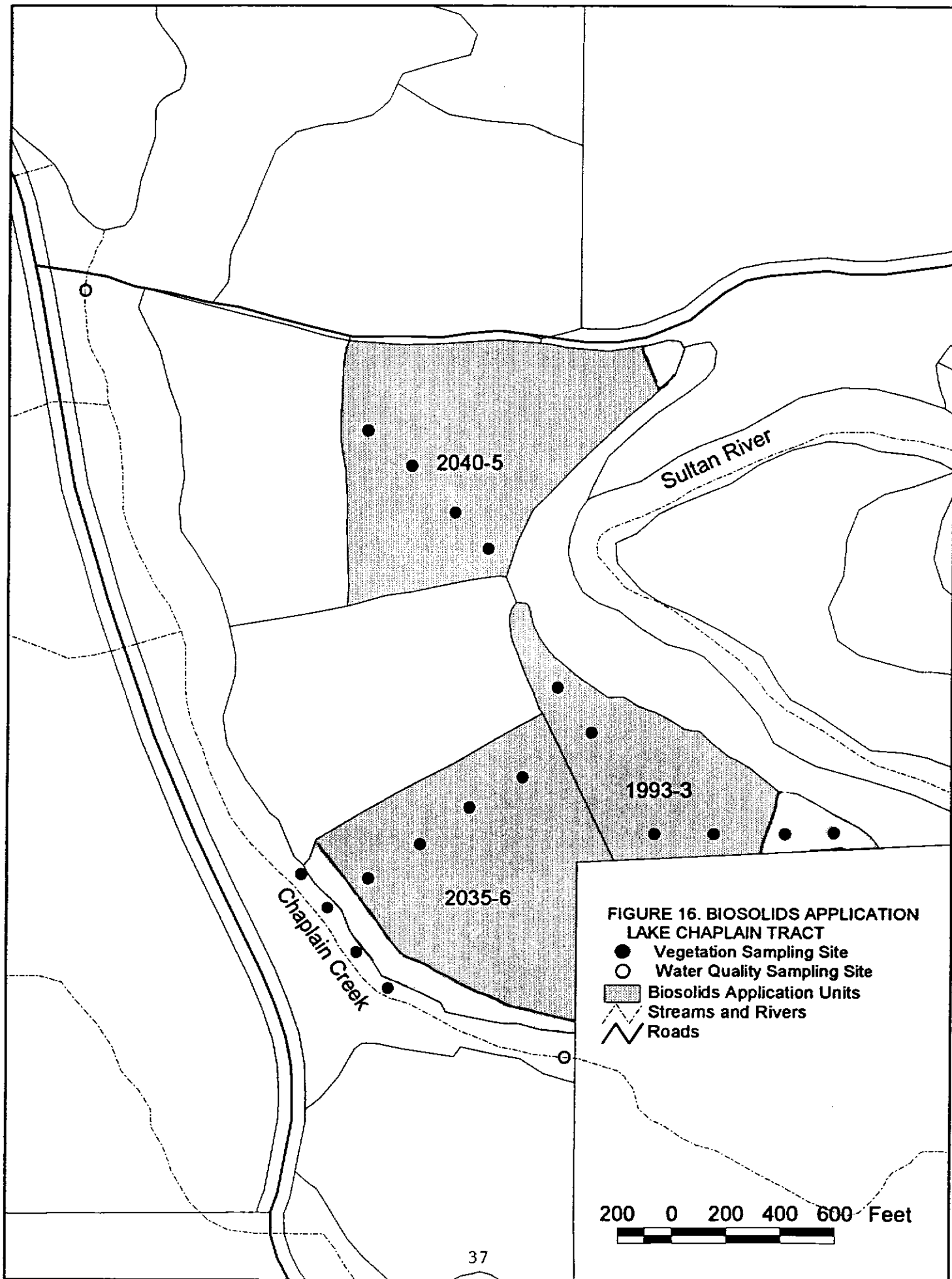


TABLE 6. Biosolids Application Project. Chaplain Creek Water Quality Monitoring Results

		Pre-application				Post-application				
Sample Date		8/27/96	9/19/96	10/29/96	11/12/96	12/10/96	1/27/97	2/12/97	3/26/97	4/9/97
Analyte/Sample Site	Units	Results								
<b>Ammonia (NH3)</b>										
Upstream (CHAPCR08)	mg/L	0.020	0.005	<0.003	<0.003	0.004	0.011	0.028	0.028	0.057
Downstream(CHAPCR38)		0.008	<0.005	<0.003	<0.003	0.005	0.011	0.017	0.016	0.022
<b>Nitrate (NO3)</b>										
Upstream (CHAPCR08)	mg/L	not sampled	<0.002	0.197	0.073	0.201	0.233	0.108	0.036	0.022
Downstream(CHAPCR38)		not sampled	<0.002	0.315	0.125	0.286	0.194	0.152	0.083	0.044
<b>Total Phosphate</b>										
Upstream (CHAPCR08)	mg/L	0.010	<0.005	0.006	0.005	<0.005	<0.005	0.007	0.007	0.016
Downstream(CHAPCR38)		0.009	<0.005	0.006	0.005	<0.005	<0.005	0.007	0.007	0.014
<b>Chloride</b>										
Upstream (CHAPCR08)	mg/L	2.2	2.5	1.5	1.4	1.7	1.5	1.6	1.3	1.6
Downstream(CHAPCR38)		2.1	2.2	1.7	1.8	1.7	1.4	1.7	1.4	1.6
<b>Fecal Coliforms</b>										
Upstream (CHAPCR08)	CFU/100mL	11	7	<2	2	5	<2	4	<2	4
Downstream(CHAPCR38)		16	27	8	2	11	<2	<2	<2	3
<b>pH</b>										
Upstream (CHAPCR08)	s.u.	6.8	6.8	6.5	6.5	6.4	6.6	6.6	6.5	6.6
Downstream(CHAPCR38)		7.1	7.1	6.6	6.6	6.6	6.6	6.8	6.7	6.8

Sample Date		4/9/97	5/14/97	6/5/97	7/29/97	8/20/97	9/22/97	10/7/97	11/4/97
Analyte/Sample Site	Units								
<b>Ammonia (NH<sub>3</sub>)</b>									
Upstream (CHAPCR08)	mg/L	0.057	0.009	0.014	0.037	0.039	0.048	0.016	0.032
Downstream(CHAPCR38)		0.022	0.011	0.022	0.028	0.038	0.053	0.012	0.034
<b>Nitrate (NO<sub>3</sub>)</b>									
Upstream (CHAPCR08)	mg/L	0.022	0.012	0.033	0.007	0.012	0.042	0.206	0.222
Downstream(CHAPCR38)		0.044	0.032	0.079	0.024	0.035	0.083	0.284	0.282
<b>Total Phosphate</b>									
Upstream (CHAPCR08)	mg/L	0.016	0.017	0.019	0.019	0.029	<0.016	<0.016	<0.016
Downstream(CHAPCR38)		0.014	0.021	0.023	<0.016	0.026	<0.016	<0.016	0.018
<b>Chloride</b>									
Upstream (CHAPCR08)	mg/L	1.6	1.4	1.5	1.6	2.7	2.2	1.8	2.1
Downstream(CHAPCR38)		1.6	1.5	1.5	1.5	2.1	2.3	2.0	1.9
<b>Fecal Coliforms</b>									
Upstream (CHAPCR08)	CFU/100mL	4	<2	52	8	9	4	6	<2
Downstream(CHAPCR38)		3	42	24	4	7	12	20	<2
<b>pH</b>									
Upstream (CHAPCR08)	s.u.	6.6	6.5	not sampled	6.6	6.6	6.4	6.6	6.6
Downstream(CHAPCR38)		6.8	6.6	not sampled	7.0	7.1	6.8	6.6	6.6

#### **4.9 DEER FORAGE MONITORING**

A revised sampling procedure was finalized in 1997, after several other procedures proved unsatisfactory in previous years. The procedure was used on two final harvest units on the Lake Chaplain Tract and results were compared to forage availability on forested control units.

#### **4.10 LAND ACQUISITION**

In 1988 the District purchased the 205 acre Lost Lake Tract as part of the WHMP requirement. The District/USFS/DNR land exchange was completed in 1991. The District acquired 2,295 acres of upland and wetland habitat at Spada Lake and Williamson Creek. This included the entire Williamson Creek Tract identified in the WHMP. With the exception of existing recreation sites and areas used for hydroelectric operations, the land in the Spada Lake Tract has been incorporated into the wildlife habitat management program as prescribed by the WHMP and the Spada Lake Tract Supplemental Plan. The Supplemental Plan was submitted to the FERC in January 1997 and will guide future forest vegetation management.

The City/DNR land exchange was completed in late 1991. All of the land specified in the WHMP in the Lake Chaplain Tract was acquired by the City and dedicated to management under the WHMP.

### **5.0 WORK PLANNED FOR 1998**

#### **5.1 FOREST VEGETATION MANAGEMENT**

##### **5.1.1 Lake Chaplain Tract**

The Tiki Sale will be re-offered early in 1997. Road construction and harvest may begin in 1998. Layout of two units of the Line Tree Sale located east of Chaplain Marsh will be completed including allocating trees for created snags, CWD, GTA's, and marking any buffer zones that may be needed (Figure 2). These units will be sold during 1998 and harvest and road construction may take place in 1999. Road construction work that will be done in conjunction with this sale will provide access to one future harvest unit located between the two Line Tree Sale units.

We are currently considering management of one Chaplain Sale (1991-2) unit to accomplish several objectives: 1) Reduce the density of stems in one alder thicket, interplanting with western red cedar and cottonwood. Approximately 25 cottonwood cuttings/acre and 25 red cedar seedlings/acre will be planted, and the ultimate spacing of stems of all tree species will be about 18-20 ft. 3) Reduce the number of bigleaf maple stems to avoid dense maple thickets. Maple in the Lake Chaplain harvest units regenerates primarily from stump sprouts, forming dense thickets of numerous stems rather than a single stem. Since it is a desirable species, we will selectively remove all but the largest 4-5 stems on a clump to promote growth into the canopy.

Precommercial thinning in the future will provide an additional opportunity to manage and maintain the hardwood component of the stand. The thinning prescription will favor the retention of hardwoods.

We will complete work on GTA management procedures in 1998, and draft management plans for existing GTA's.

#### 5.1.2 Spada Lake Tract

We will evaluate the need for precommercial thinning on South Fork and South Shore units that were identified for possible management in the Spada Supplement. If the canopy in a unit is close to closure, it will probably be thinned promptly; if not, action will be deferred. We will investigate the feasibility of helicopter logging for units that were identified in the Spada Supplement for commercial thinning.

#### 5.1.3 Lost Lake Tract

Field reconnaissance will begin in 1998 for the units that were scheduled for harvest in the WHMP in 2000. The wildlife benefits of harvesting as scheduled in the WHMP will be examined in light of the timber harvesting adjacent to the Lost Lake Tract in recent years.

### 5.2 SNAG MANAGEMENT

During the upcoming year, the first priority for snag inventory and creation will be those areas shown in Figure 11 as "to be inventoried by the end of 1998." The units shown on Table 1 as having incomplete inventories or no inventories at all will be the second priority. Long-term monitoring of a selected subset of snags will begin this year, as described in the 1996 Annual Report. This monitoring, which is more frequent than that required by the WHMP, will provide us with additional information which we will use to adjust our snag management program, if necessary.

Several units which were shown in the 1996 Annual Report as "to be inventoried by 1998" are currently scheduled for commercial thinning within the next few years, and therefore will not be inventoried until after harvest. These units are 2020-1, 2020-2, 2020-3, 2025-6, and 2045-1.

Long term monitoring of created snag trees will be done in 1998 following the procedures that were finalized in 1997. For this monitoring, subsets of snag trees will be tracked that represent the different species, size classes, position within stands (edge of clearcut, interior of clearcut, or interior of forested stand), and time since the snag was created. The effects of these variables on the type of use by wildlife species, and the physical changes in the snags themselves will be reported in the future.

### **5.3 COARSE WOODY DEBRIS MANAGEMENT**

The CWD inventory/monitoring procedures that were finalized in 1997 will be used in the setup of the Line Tree Sale on the Lake Chaplain Tract in 1998. If the Tiki Sale is harvested in 1998, marked CWD in decay classes 3-4 will be revisited after harvest to determine whether the harvest operation had any effect on them. If the foliage from felled trees is too dense immediately after harvest to find the marked logs, however, we may wait until the following year to look for them.

### **5.4 REVEGETATION**

#### **5.4.1 Spada Lake Drawdown Zone**

Survival of wetland plantings and natural recruitment of vegetation will be monitored on the two shoreline revegetation sites in 1998.

#### **5.4.2 Power Pipeline Right-of-Way**

Quantitative measurements of vegetation cover on the ROW will be done in 1998 to help determine the percent of grass/forb cover that exists, and what species would be best suited for seeding of problem areas on the right-of-way. The condition and percent survival of the shrubs and trees that were planted in 1997 will also be evaluated to determine the need for additional plantings.

Thinning of the buffer strip between the access road and the pipeline will begin this year. This will reduce competition among the remaining trees, and allow them to develop into perch trees and also increase production of the shrub layer underneath.

#### **5.4.3 Chaplain Marsh, North End of Lake Chaplain, and Powerhouse Site**

Monitoring will be conducted as in previous years. Plans for removing alders and pruning tall willows and salmonberry among the plantings on the edge of Chaplain Marsh were described in Section 3.4.3. Alders and blackberry vines that are encroaching on plantings at the powerhouse site will be removed as well.

### **5.5 NEST STRUCTURES**

Two floating nest platforms will be replaced at Spada Lake. These platforms and the two at Lost Lake will be monitored from March through June. Visits will be more frequent and observation time may be longer if it is determined that the platforms are being used for nesting. At the end of the nesting season the platforms will be visited to look for signs of use by wildlife.

Nest boxes will be cleaned and repaired in February and checked for nesting success in June. Osprey platforms will be monitored from April through September depending on use.



## **5.6 DEER FORAGE MONITORING**

Two final harvest units and two adjacent control units will be sampled in 1998, using the procedure developed in 1997.

## **5.7 BIOSOLIDS APPLICATION AT LAKE CHAPLAIN**

Biosolids application on units 2035-6 and 2040-5 will be completed prior to July 1, and application may be made on unit 1993-3 (Figure 16). Understory vegetation will be measured following application on units 2035-6 and 2040-5 per the procedures in Attachment 4. Measurements will be done in the units at the end of the growing seasons. Pre-application and post-application monitoring will be done on 1993-3, if the decision is made to apply biosolids, using the same procedure. Water quality monitoring for units 2035-6 and 2040-5 will continue at the established stations in Chaplain Creek through June 1999.

## 6.0 SCHEDULE OF ACTIVITIES FOR 1998

MAJOR ACTIVITIES	LOCATION	QUANTITY
Final Harvest		
Timber sale	Tiki Sale; see Fig.2	2 units (approx. 45 ac.)
Complete layout and sale	Line Tree Sale, see Fig. 2	2 units (acreage TBD)
Field Reconnaissance	Lost Lake Tract	2 scheduled FH units (acreage TBD)
Snag Creation	Tiki Sale units, if harvested in 1998, plus other units TBD	TBD
Snag Inventory	Areas shown in Fig. 11	TBD
Revegetation		
Grass seeding/fertilizer	Pipeline ROW	As needed to improve bare spots
Monitoring		
Revegetation Site Monitoring/Maintenance	West side, Chaplain Marsh North end, L.Chaplain Powerhouse site Spada L. drawdown zone Pipeline ROW	Monitoring of all planted/seeded areas. Maintenance as needed: Weeding, brush thinning, etc.
Deer Forage	Lake Chaplain Tract	2 FH units and 2 unharvested reference units
Coarse Woody Debris	Tiki Sale units (if harvested in 1998)	2 units (35 ac.)
Created Snag Trees	TBD	TBD
Nesting Structures	Lost Lake, Spada Lake, and Chaplain Marsh	Monitor all structures and install nest boxes at Spada L.
Biosolids Application		
Complete applications	Units 2035-6 and 2040-5	2 units
New application (potential)	Unit 1993-3	1 unit
Understory monitoring	Units 2035-6, 2040-5, 1993-3	3 units
Water quality monitoring	Chaplain Creek	2 stations
GTA and BZ Management	All established units	Monitor and develop long-term management plans

**ATTACHMENT 1**

**BALD EAGLE NEST SITE MANAGEMENT PLAN**



STATE OF WASHINGTON

## DEPARTMENT OF FISH AND WILDLIFE

16018 Mill Creek Boulevard • Mill Creek, Washington 98012 • (206) 775-1311 FAX (206) 338-1066

House Route

Mike  
~~Kear~~

Bennice

## BALD EAGLE NEST SITE MANAGEMENT PLAN

RCW 77.12.655

WAC 232-12-292

## EAGLE NEST SITE: Lake Chaplain

Applicant	Site Location	Pending
Don Farwell	SEC 31	Current and Future Forest
City of Everett Public Works	T29N, R8E	Practices within Lake Chaplain
3200 Cedar Street		Watershed.
Everett, WA 98201		

BACKGROUND/JUSTIFICATION

An on site meeting with Don Farwell took place April 11, 1997 to discuss management issues surrounding a recently documented nest on the east side of Lake Chaplain. The purpose of this plan is to integrate a specific bald eagle management plan into an existing wildlife habitat management plan (WHMP) and will apply to present and any future nests located within the watershed. The nest is located in a broken topped douglas fir approximately 30 feet from the water in an area designated as an old-growth management area (OMA). This area will be used as a general no cut buffer (Figure 1), with the exception of possible 1 acre clearings as specified in the WHMP. Harvest units average 26 acres in size and the majority are managed on 60 year rotations. A 400 foot buffer or to the crest of the bench on the slope from the eastern most edge of the old-growth strip, located within the OMA boundary, is standard practice for any harvest units in the vicinity of the OMA. The nest can be observed from the west side of the lake in the area of some drying beds. The main goal of the Washington Department of Fish and Wildlife is preserving present and potential nest and perch trees long term.

FACTORS CONSIDERED

- 1) The original landowner goals were considered through a site visit with Don Farwell, the forester for the City of Everett on April 11, 1997.
- 2) Bald eagle habitat use was considered by analysis of territory integrity through time, current surrounding habitat conditions, current status of the bald eagle population and scientific literature concerning bald eagle habitat protection.

CONDITIONS

- 1) No harvest activity within 800 feet of an active bald eagle nest from February 1 to August 15 of any given calendar year (Figure 1).

- 2) No harvest activity within the OMA adjacent to the nest along the east side of Lake Chaplain (i.e. 1 acre clearings) without prior notification (FPA) of the Washington Department of Fish and Wildlife.

### DURATION OF PROTECTION

This Plan applies to the landowner who signs the Plan. If the ownership changes, the new owner must sign the Plan or request a new one to reflect a change in land use. Since eagles return to the same traditional use areas each year, the conditions of this Plan shall apply indefinitely, unless a breeding territory has been unoccupied for 5 consecutive years. If an eagle does not occupy a breeding territory and show signs of incubating eggs by May 1 of any year, then the construction timing restrictions do not apply. Surveys shall be done by a qualified wildlife biologist to make these determinations. If the department does the survey, they will notify the landowner when a nest is unoccupied. Please contact WDFW if the eagles change the location of their nest. Do not assume that the conditions of this Plan no longer apply.

### REVIEW AND AMENDMENT

This Plan will be subject to the following review and amendment procedures. The Plan may be reviewed periodically by the Department and the landowner to determine whether: 1) the Plan requires amendment in response to changing eagle and landowner circumstances; or, 2) the terms of the Plan comply with applicable laws and regulations; or, 3) the parties to the Plan are complying with its terms.

### APPEAL PROCEDURE

In addition to the provisions of WAC 232-12-292 (7.1)-(7.3), the landowner may request a formal appeal of WDFW actions according to the Administrative Procedures Act, Chapter 34.05 RCW, and the Model Rules of Procedure, Chapter 10.08 WAC. Such a request shall be filed with the Department within 20 days of receipt of the contested WDFW decision. The appeal request shall clearly state the relief sought and the grounds for the appeal.

### COMPLIANCE

Failure to comply with this Plan constitutes a misdemeanor as set forth in RCW 77.21.010. This Plan applies only to the proposed land use listed above. Any other proposals may be subject to a different set of conditions. It is the landowner's responsibility to notify the Department of any new proposed land use activities within the conditions set forth in this plan.

City of Everett Public Works- Lake Chaplain Bald Eagle Management Plan, page 3.

If the Plan is acceptable, sign and return for WDFW signature.

Don Farwell 4/29/97  
Landowners or Agent Signatures (Date)

Don Farwell  
Landowners or Agent Names (Print)

3200 Cedar St.  
Address

Everett Wa 98201  
City, State, Zip

W. L. [Signature] 5-5-97  
Regional Director (Date)

[Signature] 4/29/97  
Steve Negri (Date)  
Wildlife Biologist

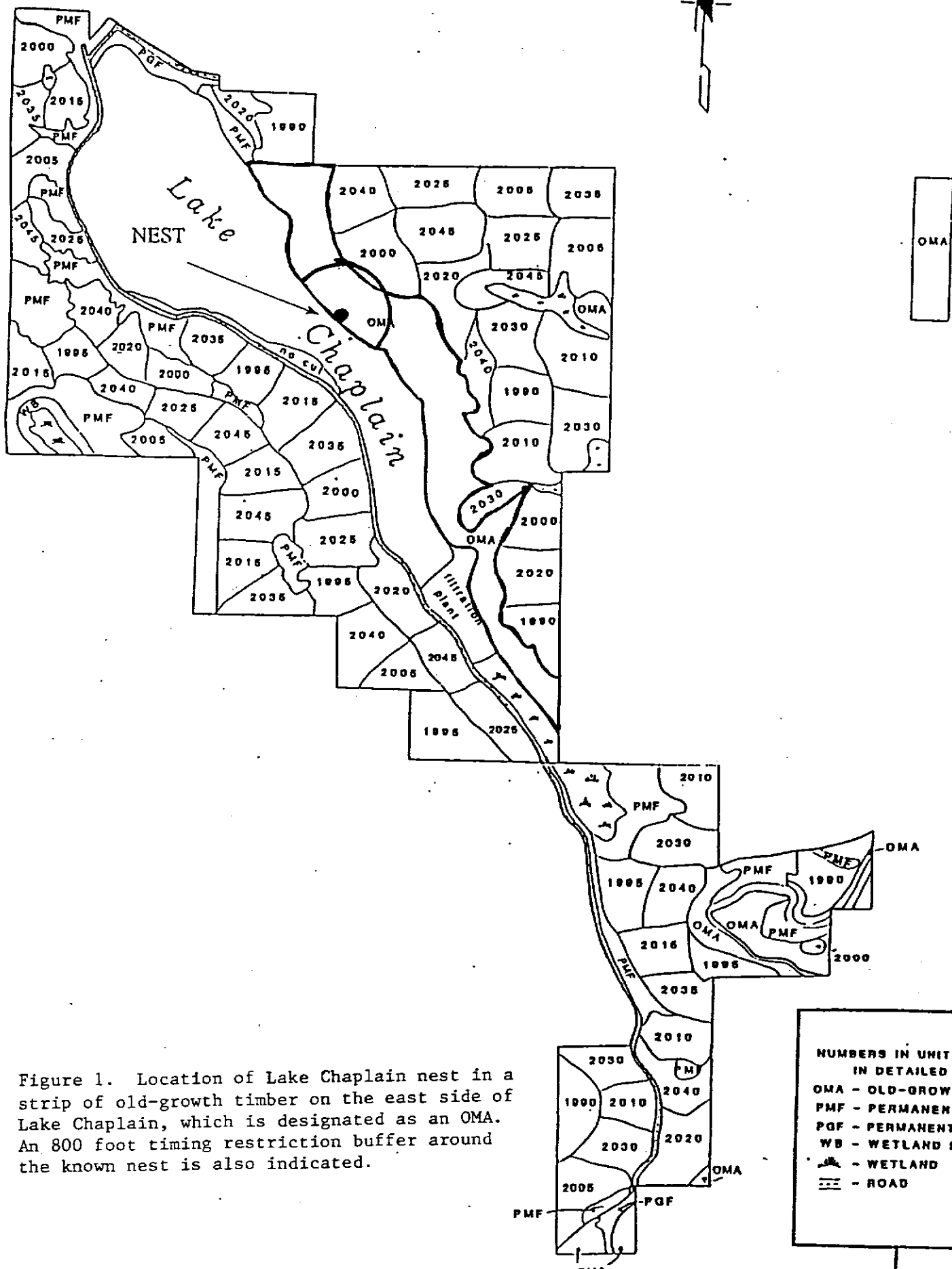


Figure 1. Location of Lake Chaplain nest in a strip of old-growth timber on the east side of Lake Chaplain, which is designated as an OMA. An 800 foot timing restriction buffer around the known nest is also indicated.

**ATTACHMENT 2**

**FERC ORDER APPROVING SPADA LAKE SUPPLEMENTAL PLAN**



UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

PUD No. 1 of Snohomish County ) Project No. 2157-122  
City of Everett )

ORDER APPROVING WILDLIFE HABITAT MANAGEMENT PLAN SUPPLEMENT  
FOR THE SPADA LAKE TRACT  
( Issued April 18, 1997 )

On February 3, 1997, PUD No. 1 of Snohomish County and the City of Everett (licensees) filed a wildlife habitat management plan supplement for the Spada Lake Tract for the Henry M. Jackson Project. The plan was filed to supplement the wildlife habitat management plan which was approved by Order Approving With Modification Revised Wildlife Habitat Management Plan (WHMP), issued May 19, 1989. The Henry M. Jackson Project is located on the Sultan River in Snohomish County, Washington.

The licensees and the U.S. Forest Service (FS) completed a land exchange on February 28, 1991. The licensees obtained approximately 3,467 acres of land from the FS beneath and adjacent to Spada Lake. Approximately 1,549 of these acres were required to be incorporated into the WHMP (all lands above elevation 1,460). In addition, 197 acres from the Washington Department of Natural Resources (WDNR) are also incorporated into this supplemental plan.

The goals of the supplemental WHMP are to preserve water quality, preserve and enhance old growth, riparian, and wetland habitats, manage second growth forest primarily, and to consider aesthetics in planning and implementation of the supplemental plan. The supplemental plan describes the management area and the various habitats and vegetation cover types located within that area. Habitat management objectives, enhancement methods, and management prescriptions were outlined for a 10-year period. This supplemental plan is an evolving plan and will be updated every 10 years. The results of monitoring and any changes to the supplemental plan will be filed with the reports required by the May 1989 WHMP.

The supplemental plan was prepared in cooperation with the U.S. Fish and Wildlife Service (FWS), the Washington Department of Fish and Wildlife (WDFW), the WDNR, and the Tulalip Indian Tribes. Comments were received on the plan from the WDNR, the Tribes, and the FWS in letters dated April 15, 22, and 30, 1996, respectively. The agencies' comments were adequately addressed in the supplemental plan.

The licensee's wildlife habitat management plan supplement for the Spada Lake Tract supports the requirements of the approved WHMP and should provide adequate habitat management for the new lands added to the project; this plan should be approved.

DC-A-5

Project No. 2157-122

-2-

The Director orders:

(A) The wildlife habitat management plan supplement for the Spada Lake Tract, filed on February 3, 1997, is approved.

(B) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 CFR §385.713.

*Kevin P. Hadden*

Kevin P. Hadden  
Acting Director  
Office of Hydropower Licensing

JACKSON PROJECT		
4-25-97		
	Orig.	Copy
C. Thompson		
B. Meaker		
K. Bedrosian		X
A. Tanenbaum		X
D. Milos		
N. Johnson		
M. Schuh		
M. Schull		X
B. Maxwell		
PNP 28-14-14	X	
PUD 22-128		X

**ATTACHMENT 3**

**AGENCY TOUR OF WHMP SITES – DISCUSSION NOTES**



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## Memorandum

**To:** Bruce Meaker, Mike Schutt, Karen Bedrossian, Don Farwell  
**CC:** Dan Thompson  
**From:** Bernice Tannenbaum  
**Date:** 10/21/97  
**Re:** Notes on Agency Tour of WHMP Sites

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Meeting Date: 9/23/97

In attendance: Bruce Meaker, Bernice Tannenbaum, Karen Bedrossian, Mike Schutt – PUD  
Don Farwell, Dan Thompson, Roy Metzgar, Kathie Joyner – City of Everett  
Gwill Ging – U.S. Fish and Wildlife Service  
Gary Engman – Washington Dept. of Fish and Wildlife

The group visited selected sites involved in implementation of the WHMP. The following notes are intended to document comments and observations of the agency representatives:

1. Pipeline ROW – The group looked at two sites on the ROW. Gwill commented on the benefits of gating access roads to the pipeline. He asked what the intended "look" of vegetation on the ROW would be. The District biologists responded that more shrubs are desired to break up the line of sight down the ROW, and that the root wads were placed there to contribute to shrub development. Management of the row of small trees between the ROW and access road was described.
2. Spada Lake Drawdown Zone Test Plantings – The agency representatives viewed test plantings in the Williamson Creek and North Fork areas. The water level was approximately 1440 ft on this date, and most of the areas planted in 1994 were submerged. Some plantings were visible under water and on shore, however. We discussed natural vegetation vs. planting. Bernice said that natural recruitment of wetland species, especially small-fruited bulrush, was far more successful in covering the ground than the test plantings. She added that planting could be useful if one wanted to introduce species that weren't naturally seeding in. Gwill said he wasn't ready to call the experiment a failure since it takes time for planted vegetation to become established. He wants monitoring to continue. We should use the result to decide

what, if anything, to do in the future. Karen pointed out that the WHMP called for monitoring test plantings over a ten year period. Success was to be judged on survival after two years and ability to reproduce. Efforts were to be discontinued if not successful. Gwill and Gary asked what we would offer instead of the shoreline revegetation project. Karen said she did not think another program needs to be offered, and that the time would be better spent on more productive tasks already required by the WHMP. We agreed to discuss future actions at the time of the next annual meeting.

3. Precommercial Thinning at Spada Lake. The group viewed the stand thinned in 1996. Gwill asked how long it would take for slash to decompose sufficiently to allow easy access into the stand. Bernice said that within about eight years it should be easily accessible, based on some similar stands thinned by DNR near Site 8.
4. Biosolids Application Sites. Dan showed the two treatment units (2035 and 2040 final harvest) and the control for the 2040 stand. The group noted the response of elderberry, fern and twinflower in particular, on the treatment stands. Dan presented graphs of understory data collected in June 1997, and said that in spite of the observed response on treated stands, the difference between treated and untreated sites was not statistically significantly different. Gwill requested the September data sets when they become available.
5. Deer Forage Monitoring on clearcuts. The group visited unit 1995-1 and 1991-1. Bernice showed graphs comparing understory vegetation on each clearcut stand with an adjacent forested control unit. Don discussed the need for precommercial thinning on clearcuts. There are excessive conifers on the 1991 units. If they are thinned too early, more conifer seedlings will grow, requiring another PCT. If we wait too long, the understory layer will decline due to shading by the young trees. Gwill stated that he'd prefer to thin sooner rather than later to promote understory maintenance. Don said that the thinning prescription would depend on whether more than one commercial thinning entry would be allowed. He said that multiple entries would assist in maintaining understory through the rotation. Gwill and Gary said they could accept multiple entries into stands, even if thermal cover was reduced, if there are surrounding WHMP stands that provide thermal cover. They would first want a plan or proposal with the details.
6. Chaplain Marsh – The group drove by Chaplain Marsh without stopping. Bernice mentioned that we will be removing small alders and topping some of the willows that are starting to shade out the shrubs that we have planted along the marsh.
7. Lost Lake. Gary and Gwill half-seriously recommended removing the bullfrog population.
8. Gwill suggested putting flashing on tree trunks supporting duck nest boxes to reduce predation. Karen and Mike said we hadn't had much evidence of predation at any of our sites. Don heard that flashing on nest box trees in eastern Washington actually killed the trees by overheating them. Bernice suggested calling nest box expert Paul Fielder for guidance.

**ATTACHMENT 4**  
**VEGETATION MONITORING PLAN**  
**CHAPLAIN FOREST FERTILIZATION PROJECT**

ATTACHMENT 4  
VEGETATION MONITORING PLAN  
CHAPLAIN FOREST FERTILIZATION PROJECT

1. 12 permanent, nested plots will be located.

Four plots will be located in stand 2035-6. Four plots will be located in stand 2040-5 and four plots will be located outside the application area between stand 2040-5 and Chaplain Creek. No plots will be located within 50 feet of the riparian zone. Plots will be located systematically in order to facilitate geographic representation of the site and the buffers exclusive of the riparian areas.

Plot centers will be marked with ¼ in. rebar stakes. Reference trees will be located on the nearest road. Posters will be placed on reference trees noting the distance and bearing to the associated road. Data will be collected prior to fertilization and once every year for two years after fertilization. Data will be collected between July 15 and September 15.

2. Plots will consist of two 0.025 ac. Understory vegetation plot and one 0.1 ac. overstory plot.

2.1 Plot Data

- Plot #
- Stand #
- Estimated % canopy cover
- # of trees
- Crown Competition Factor (CCF)
- Photo documentation point

2.2 Understory Data

- Species
- % cover
- Height

2.3 Tree Data

- Diameter at breast height (all trees)
- Height (4 trees per plot. Two dominant or codominants and two intermediate or suppressed).
- Crown class (all trees): Dominant, codominant, intermediate, suppressed, dead
- Species

**ATTACHMENT 5**

**AGENCY CONSULTATION**

**ANNUAL MEETING MINUTES AND CORRESPONDENCE**



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February 23, 1998  
PUD 20484

Mr. Gary Engman  
Washington Department of Wildlife  
Region 4  
16018 Mill Creek Boulevard  
Mill Creek, WA 98012

Mr. Gwill Ging  
U.S. Fish & Wildlife Service  
510 Desmond Dr SE Suite 102  
Lacey, WA 98503

Mr. Al McGuire  
Department of Natural Resources  
919 Township Street  
Sedro Woolley, WA 98282

Mr. Richard Young  
Tulalip Tribes, Inc.  
6700 Totem Beach Road  
Marysville, WA 98270

Gentlemen:

RE: Jackson Hydroelectric Project – FERC #2157  
Wildlife Habitat Management Plan

Annual Report

A copy of the 1997 draft Annual Report on the Jackson Project Wildlife Habitat Management Program is enclosed for your review. We request your attendance at the annual agency review of activities. The meeting has been scheduled for 10 a.m. on March 17, 1998, at the City of Everett Filtration Plant, Everett, Washington. The filtration plant phone number is (425) 257-8200. We expect that the presentation and discussion will last approximately three hours. Lunch will be provided.

A draft agenda is also attached. Please review it and let us know if you would like to include additional topics, visits to field sites, or if you have special concerns that you would like to have addressed in the presentations.

If you are unable to attend the meeting please contact Bernice Tannenbaum at (425) 304-1746 or Karen Bedrossian at (425) 304-1774.

Sincerely,

A handwritten signature in black ink, appearing to read "Bruce", is positioned above the printed name of the sender.

Bruce F. Meaker  
Regulatory Affairs Manager

Enclosures  
BT/ldm

cc: Dan Thompson, City of Everett  
Don Farwell, City of Everett  
Dan Lowell, City of Everett  
Roy Metzgar, City of Everett

bcc: Karen Bedrossian  
Bruce Meaker  
Mike Schutt  
Bernice Tannenbaum

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## **Wildlife Habitat Management Plan**

Annual Meeting Agenda  
March 17, 1998  
City of Everett Filtration Plant  
10:00 AM

1. Introductions
2. Progress and Work Planned on WHMP Implementation
  - Forest Vegetation Management
  - Snag Management
  - Coarse Woody Debris Management
  - Revegetation (including plantings in drawdown zone)
  - Nest Structures
  - Management Activities on Spada Lake Tract
  - Deer Forage Monitoring
  - Biosolids Application at Lake Chaplain Tract
3. Problems or Concerns
4. DNR Road Status in the Basin
5. Future Reports/Meetings
6. Summary

\*Lunch will be provided

\*Please let us know if you would like other items included on the agenda or field visit.

WHLMP Annual Agency Meeting  
Attendance List - March 17, 1998

<u>Name</u>	<u>Organization</u>	<u>Phone #</u>
Don Farwell	City	257-8204
Dan Thompson	"	" 8860
Gary Engman	WOFW	425-775-1311
Brude Meaker	PUD	425-304-1722
Gwill Gink	USFWS	360-753-6041
MIKE SCHULT	PUD	304-1712
Roy G. Metzgar	City	425/257-8884
Karen Bedrossian	PUD	(425) 304-1774
Louisa Mardon	PUD	(425) 304-1744
Bernice Tannenbaum	PUD	425-304-1746

## AGENCY COMMENTS ON THE ANNUAL REPORT

No written comments on the 1997 Annual Report were received from the reviewing agencies. Their verbal comments are documented in the Meeting Minutes in this Attachment. All of the participants at the annual meeting were given draft copies of the Meeting Minutes, and their comments and revisions were requested. The USFWS representative phoned the co-licensees to state that he found the Minutes satisfactory.

# **WILDLIFE HABITAT MANAGEMENT PLAN**

## **ANNUAL AGENCY MEETING MINUTES**

### **March 17, 1998**

#### **In Attendance:**

City - Don Farwell, Dan Thompson, Roy Metzgar

District - Bernice Tannenbaum, Bruce Meaker, Karen Bedrossian, Mike Schutt, Lonna Mardon

USFWS - Gwill Ging

WDFW - Gary Engman

#### **Summary of Major Decisions**

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##### **Snag Management**

The City and District discussed snag inventory data on harvest unit 2020-5 on the Chaplain Tract, in which the existing inventory of small hemlock snags is unusually high, and the 15-17 inch size class is poorly represented. They proposed creating a reduced number of snags in the 18+ inch category. **Decision:** The City and District will provide the agencies with a proposal on the trade-off between small and larger trees. They will explain the process used to arrive at this proposal. A monetary basis for the trade-off is acceptable to the agencies, provided they're satisfied with the number of trees being offered. The proposal may be submitted as a letter after the 1997 Annual Report has been completed.

##### **Spada Lake Drawdown Zone**

The District recommended not expending more effort on additional plantings in the drawdown zone. The agencies were not convinced that planting is not beneficial. **Decision:** The District will continue monitoring the test plantings with photodocumentation, examine other potential revegetation sites along the shoreline, and review what's happening elsewhere in Oregon and Washington.

##### **Floating Platforms**

The floating platforms have not been used for breeding by waterfowl so far. It has been difficult to find a secure place to anchor platforms in Spada Lake. **Decision:** The District will re-install one platform at a safer site in Williamson Creek and observe for a few years.

##### **Biosolids**

The City would like to apply biosolids to 2 or 3 sites on the Chaplain Tract during the summer 1998. The agencies were concerned over potential impacts to breeding birds. **Decision:** Applications will be made after July 1. Figure 8 and Table 5 of the Annual Report will be clarified. In the future, data on presence of understory species that are valuable to wildlife will be reported, even for species that are not dominant in the sample plots. The District will provide the City with a list of plant species that should be reported.

##### **Future Reports and Meetings**

Participants discussed whether annual meetings should be held in the future. **Decision:** The District will make preliminary arrangements each year for a meeting, and the agencies will decide at that time whether it is warranted, based on outstanding issues or discussions.

## Meeting Minutes

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### 1. Introductions

### 2. Progress and Work Planned on WHMP Implementation

- **Forest Vegetation Management**

[Don briefly reviewed past timber sales. Last year he did a detailed reprod. survey of unit 2 of the Chaplain Sale because he was concerned about the hardwood component of the stand.] We will be able to meet our target of 5 to 10% hardwood composition for the future. The other units of the Chaplain Sale appear to be good. We're running around 2000 stems per acre because we've had heavy in-seeding of conifers plus light in-seeding of hardwoods in these units.

Unit 2 has a small wet draw with thick alder. We planted some cedar in there and they did not survive. There are about 10 or 12 big maple clumps there too. We removed some of the maple stems, leaving about 5 dominant stems per clump, hoping that they would not resprout. We underplanted with cottonwood and cedar this spring. This summer after the alder leaf out we're going to heavily thin the alder. The objective is to get a mix of some cottonwoods, cedar, alder and maple instead of just a pure alder thicket.

In the Horseshoe Sale units the natural seed-in has been light in the clearcut. Most of the cedar that we planted out there have been pretty well browsed, and there's a low hardwood component out there, but after precommercial thinning it appears we will be able to reach the 5 to 10% hardwood component.

The Diversion timber sale was planted in 1996. Natural in-seeding has been pretty low. If we don't get much more in-seeding this year we won't need a pre commercial thinning 10 to 15 years from now.

We called for bids last year for the Tiki Sale but didn't get any due to market conditions. We have re-offered it and we'll be getting bids on the 16th of April. The next sale to be offered is the Line Tree Sale. The two units will be sold this fall and harvested next year. The next sale, called the Lost Sale, will be sold in 1999.

**Gwill** - How wide is the buffer in the lower Tiki unit?

**Don** - 50 feet on either side of the stream. The stream is running 8 to 10 feet wide. I think it's a type 4 stream. The new DNR forest practice rules call for it be treated as a class 3 stream, which gives it a 50 foot buffer - the same as prescribed by the WHMP.

**Bernice** – The WHMP calls for final harvest in a couple small units at Lost Lake in the year 2000. This summer we will start looking at the units in the field and see what the opportunities and the problems might be in harvesting them. They're rather small (6 acres and 4 acres). One issue involves access. No matter how we do it there will be some road reconstruction or some new construction to access these two small units.

**Gwill** – In both of those units, would road construction drain toward Lost Lake?

**Bernice**– Yes. Access from the south is a possibility. DNR has been working to establish property boundaries in this area, and if they harvest it, they would build a road to access it. On the Lost Lake Tract, after the harvest scheduled in the year 2000, there are no other timber harvests scheduled until 2020. We may have to do a lot of new road construction, with a substantial investment, in order to pick up two small units. Another issue is the extensive harvest activity in the vicinity since 1990. Questions arise about the timing and adjacency of harvest units.

- **Snag Management**

**Mike** presented the snag management program. This past year we finalized our standard operating procedures for snag management, which includes how and where we create snags as well as how we inventory and monitor them. In addition to the standard Cline five decay class method that the WHMP uses, we added another class to try to capture trees that are on the way out that we expect will die within the next year or so. The intention is to avoid going out and creating additional snags when mother nature was probably going to provide those to us in the near future. So we add those into our tally as well and hope that they'll die in the next year or two.

Snag inventory and creation in 1997: Figure 11 in the report was summarized. The inventory on one unit (2020-5) showed that we had 9 snags per acre but 8 of the 9 were from 11 to 15 inches size class which is far more than we need from that class. Most of these were hemlocks. We were deficient by 2 snags per acre in the 15 to 17 size class. We would be required to create 36 snags total from that size class, but live trees in the 15 to 17 inch class are scarce out there and mostly hemlock, and we would like to pick up other species. We are considering our options. We may create fewer, larger Douglas fir snags - something on the order of 18 snags that are closer to 18 or 19 inches. That's based on trying to come up with something that's similar in dollar value to the 36 snags that we would have created of the smaller size class. We'll reach a decision this year and during the next snag contract we'll remedy the situation.

**Gwill** - If you go with fewer larger size snags how does that equate (to more smaller trees)?

**Mike** - In terms of dollars, we're looking at 36 hemlock snags averaging 16 inches being equivalent to about 18 fir snags averaging 18 inches.

**Gwill** – Off the cuff that seems like a favorable approach. When do you think you'll come back with a proposal?

**Mike** - I would guess if that's something you want to see in the final report we'll certainly do it, but otherwise I guess we'll probably put it off till after the report. The inventory was done back in July or August and dealing with that one unit was starting to bog us down, so we decided to put it on the shelf for the time being.

**Don** - Basically we are looking at the volume of fiber that you have standing out there. Do you want it on a big tree or 2 small trees or any combination thereof. Maybe for wildlife the larger they are, the more use they will get, and the longer they will last.

**Mike** - The 16-inch trees that we're technically required (by the WHMP standards) to provide are mostly hemlock on this stand.

**Gwill** - Are there conifers presently of sufficient size to get that larger snag?

**Mike** - Yes.

**Gary**- It seems to me you're headed in the right direction. I would like to see a proposal.

**Don** – [Difficulties in preparing a proposal when there is an infinite number of possibilities]

**Gwill** - The approach is trading off hemlock for Douglas fir to ensure larger snags. Gary, are you looking for specifics?

**Gary** – No, just a general approach.

**Mike** - What we have right now are 8 snags per acre that average 13.4 inches. We need about 2 ½ snags per acre total from the 15 to 17 inch class, of which we have around a half snag per acre. So we need about 2 snags/acres from that size class. We would actually be creating snags in the next larger size class if we create some at 18-19 inches.

**Don** – The stand is going through a natural thinning process. Suppressed trees are dying that are about an inch too small.

**Bernice** – There is no problem finding 18 or 19 inch trees in the stand. I don't think it should be too hard without going out there to commit to selecting an appropriate number. Do you want to go with volume equivalency or value equivalency?

**Gary** – What were the criteria you mentioned about determining equivalency?

**Bernice** - We could go with dollar value based on what the market is offering these days, or volume.

**Gary** – That's biologically irrelevant.

**Don** – The way the WHMP is written, we're supposed to be creating snags in multiple decay classes. If you can't, you select the species that will get you into these decay classes. So, given what you have out there, to fill the decay class needs and the diameter needs, you'd be selecting hemlock.

**Gwill** - They decay faster?

**Don** - They decay faster and they're the right size to fit in the pigeon holes that were artificially made. If you go to Douglas fir you're going to be jumping in value because of the diameter, so to try and keep the scale somewhat balanced, we thought of using the value as a measure because the bigger snags will last a lot longer.

**Gwill** – When is the unit proposed for harvest?

**Mike** – In 2020. It isn't scheduled for commercial thinning before then either.

**Gwill** – There really isn't a pressing need to make a decision.

**Mike** – There is, because we're not allowed to create snags within 20 years of a scheduled harvest. We need to make snags by 2000.

**Bernice** – And also we've got this existing inventory which guides us toward what our needs are. If you let it go too long then the inventory of the existing snags will change. They will fall over and there will be new trees dying. We have to make this decision on how we're going to determine the equivalent.

**Don** – We can do exactly what it (WHMP) says to do and make a bunch of hemlock snags.

**Bernice** – That's not strictly speaking exactly what it says. We shouldn't have 100 percent hemlock snags. Ideally it should be only 30 percent hemlock.

**Mike** – Realistically, we would find mostly hemlock (in the 15-17 inch size class).

**Don** – Yes, that's the distribution of species in the stand.

**Gwill** – I guess I'd like to think about this a little bit and then give you my decision.  
[See pp. 15-17 for the conclusion of the discussion.]



**Mike** – [The cumulative results of our snag management] The first priority for 1998 is the areas that we committed to in the 1995 Annual Report. What's left to do this year is a couple hundred more acres to inventory, and we'll do whatever snag creation is necessary. The second priority is to pick up all the other areas that have had snag creation in the past but never had any inventories at all or had incomplete inventories. In addition, this year we will start our voluntary 3 year long term monitoring process.

- **Coarse Woody Debris**

**Bernice** reviewed decisions and activities for CWD management in past years. Most recently we designated green trees and a couple of standing snags for coarse woody debris designation on the Tiki units. We will be doing this on the upcoming Line Tree Sale this year. We have already set up our logs on the Diversion Sale units. According to the monitoring schedule we will revisit them in 1998 to see how they have progressed.

**Gwill** - I think I read somewhere in your reports that you're also trying to mark a certain number of coarse woody debris, to see how they've survived after harvest.

**Bernice** - Yes, these are existing logs in decay class 3 -4, not the logs that we've created at the time of harvest. We've set those up on the Tiki sale. I picked about 10 and mapped their locations to find them after harvest. I took notes and pictures of them so we will know what they looked like before and after. The Tiki Sale may or may not be harvested by this time next year, so we're not certain we'll have results for you in our next annual report.

**Gwill** – Did you do this on the Line Tree Sale?

**Bernice** – Not yet, but we will do it.

- **Revegetation of Spada Lake Drawdown Zone**

**Bernice** – This group visited the test plantings in the Spada Lake drawdown zone in September. The photos from the visit in the Annual Report show that a lot of small-fruited bulrush has seeded in these sites. Of the plants that we put in, the sedges did best. Unfortunately the range of elevations in which they survived was rather narrow - between 1438 and 1441 foot elevation. We planted down to 1430 elevation, but below 1438 very little survived. At the North Fork site we have a lot of damage to our plantings due to debris floating around and wave action scouring out the ground. On that site we planted 20 rows of plants and only 4 of them remain at this point, all of which are sedges. At the Williamson Creek site the debris problem seemed to be a bit less severe and our plantings did better. We have 5 out of 16 original rows that survived. Again it was the sedges that did best. Slough sedge in particular seems to be well suited for this area. We've gotten to the point where it is very difficult to distinguish between what we planted and what has come in on its own. In our

discussion on site I concluded that natural recruitment on the sites was a lot more effective in covering the ground than our plantings were. The WHMP calls for monitoring annually for 10 years. It implies that if the experimental program was successful, it could be expanded, but I'm not going to recommend that at this time.

**Gary** - Were there any other locations within the reservoir drawdown zone where revegetation is occurring through natural recruitment? Could you find other areas to plant?

**Bernice** - Rec site 3 was actually planned as our original test site. There was just a mudflat there when we looked at it in 1990. Now there are several acres of bulrush occurring naturally. [A discussion of the exact location of the area followed.] Figure 12 in the Annual Report shows what we're up against in the reservoir. Below 1438 feet not much is growing, whether planted by us or not, because it is under water during the growing season.

**Gary** - There's two dimensions to what I asked. The horizontal picture needs explanation.

**Bernice** - A lot of the reservoir is very steep and we don't have mudflats on which you can expect plants to grow. There are places where you could get a thin band of vegetation growing if the wave scour and the debris permit.

**Karen** - The north shore is really steep. When we looked at where to do our plantings, site 3 was one, plus the two we actually used, because the slope was gentle. The only other possibility I can think of would be some more sites along the south shore between the South Fork arm and the North Fork. There is a lot of debris along there. The debris could be removed, but my suspicion is you'd end up with it back in another year or two.

**Gary** - I guess that answers my question. If that's the case, can we show it?

**Karen** - We could do that by taking photos of the areas.

**Gwill** - At this point I would like to see photodocumentation. I'm not willing at this time to conclude that additional planting wouldn't be of benefit. There may be information we don't have yet that may direct our course of action, but I don't want to rule out additional planting, or doing something different, if the monitoring shows it would be beneficial. At this time it looks like additional planting may be of limited value. I'd like to see review of successes elsewhere in Washington and Oregon that could be applicable.

**Karen** - So, you're proposing at this point just monitoring the existing plantings?

**Gwill** - Yes

**Roy** – The City is concerned over increasing organic material in the lake, which may in the future cause water quality problems in our treatment process. What has happened so far is not a problem, but down the line organics are a concern.

**Bernice** – Wetland vegetation in the drawdown zone is unlikely to create a problem because these plants will not spread very far in the reservoir.

- **Pipeline right-of-way**

**Bernice** – We visited several portions last September. It was mowed last June to keep the alders down, and some construction work started on an access road down the pipeline and a stream crossing in the vicinity of the tunnel portal. This work should be completed in 1998. We planted some shrubs on the lower portion of the pipeline right-of-way last year adjacent to the tree root wad piles that we had put out in the past. Some patches on the pipeline were reseeded with the grass-forb seed mix again this year. These are some of the stubborn patches where grass hadn't taken very well in the past years. In general, the right-of-way as you saw it last September was pretty grassy and has improved greatly over the condition when we started the project. In the coming year we'll be removing some of the small alders growing between the access road along the pipeline and the pipeline itself. The idea is to provide the hydro project operators with a good view of the pipeline from the access road.

- **Chaplain marsh**

**Bernice** - The shrub row that we planted in 1993 is generally doing very well. Alders, willows and salmonberries have started to overtop the shrubs that we put in. We want to control the alder in particular, so we'll be cutting them down and probably pruning back the salmonberries and willows this summer.

- **Powerhouse**

**Bernice** - Tree group plantings (crabapple, oregon ash, hawthorn) are all doing very well and starting to flower. Crabapples produced fruit as of last year. The shrub groups were planted on a worse site apparently, situated in the road switchback. Only one of the species in there - the native Nootka rose is doing well. We're getting a lot of volunteer spirea and thimbleberries, so the shrubs are coming in through propagation from our plantings and natural in seeding. We're not recommending additional plantings at this time. We planted more crabapples and cascara trees last year to see if they do any better. Basically we'll be maintaining these shrubs in the coming year and removing some blackberries that are crowding our plantings.

- **North end, Lake Chaplain**

**Bernice** - The photo in Figure 5 shows the planted visual screen from a point on the lakeshore looking toward the road. You can see we're beginning to get a bit of a screen there after planting the seedlings in 1992. Douglas fir is doing well, but the western red cedar, which was planted in a moist area, is not doing as well. We're expecting to go out this year and remove some alders to prevent them from shading the surviving cedars.

**Gary** – [Recommended showing the dates of plantings on the figures in the report.]

- **Nest Structures**

**Mike** – We finalized the standard operating procedures for management of our nest structures. Last year the floating platforms at Lost Lake got no use by waterfowl. On Spada Lake early in the spring or late in the previous winter the floating platforms were damaged or destroyed. One's completely gone, we don't know where it went, and the other one was found upside down along the shore over a half mile away. Both had come loose from their anchor so we don't know if they were vandalized or they just got blown out of the water in a storm. Next week we will replace the one that's gone completely and repair to whatever extent necessary the other one, and put them in a more protected area.

The nest box program at Lake Chaplain and Lost Lake Tract had eight of the 13 boxes used, producing 51 fledglings based on eggshell membrane counts. The osprey platform at Lost Lake was used last year, but no fledglings were observed. At Spada Lake the two osprey platforms were not used at all. We recently put 3 more nest boxes up at Spada Lake in the Williamson Creek area.

Last year a pair of bald eagles that built their nest in a tree along the shoreline of Lake Chaplain raised a chick. The City worked with Washington Department of Fish & Wildlife to develop a management plan for the nest site.

**Gwill** – Why aren't the floating platforms being used? Is a change warranted, or some other mitigation element? How valuable are the floating platforms?

**Mike** – For waterfowl I don't think they're very valuable. Muskrat and otters use them for feeding platforms. Lost Lake has adequate natural vegetation and structure up there for nesting waterfowl if they were there. We see cavity-nesting ducks there but not ground-nesting species. Last year there was a pair of Canada geese up there and I don't believe they nested there. At Spada Lake I don't think there's foraging or brooding habitat.

**Gwill** – If you were going to make changes what would you recommend?

**Bernice** – We're having better success with nest boxes. We've put out more than the required number of nest boxes and feel it has been worth the effort. I would be inclined to expend the effort in that direction.

**Karen** – We threw those (floating platforms) in at the end of WHMP planning to see what happened. We were looking at waterfowl in general, and then thought that loons might use them.

**Gary** - What is the cost of floating platforms?

**Mike** - Less than a couple hundred dollars each.

**Karen** - Installation costs at Spada Lake are higher, of course, as are monitoring costs. Leaving the platforms at Lost Lake is not much of an effort because we monitor them at the same time as we monitor the Lost Lake Osprey.

**Gary** - Go ahead and keep them at Lost Lake. What is Seattle Water Department doing with floating platforms?

**Bernice** – They had at least 3 successful platforms several years ago. They started off with loons that were attempting to nest on logs. The reservoir doesn't fluctuate as much as Spada Lake, but what they really have going for them is habitat. They have the overhanging trees and shrubs along the shoreline to provide a good kind of wetlands, and we don't have that.

**Gwill** – Are you proposing to replace the few that were at Spada Lake? Karen, you say you've already gone beyond the requirement on the nest boxes?

**Karen** – By far. The only requirement was two at Lost Lake. We've got 6 at Chaplain Marsh, 7 at Lost Lake, and 6 at Spada Lake.

**Gary** – Could we put some on Lake Chaplain again?

**Don** – We don't want to do that. We're afraid the increasing goose population will use the platforms.

**Gary** - When were they put in Spada Lake?

**Bernice** – 1996.

**Gary** – So you had one good year for the platforms on Spada Lake?

**Mike** – Unclear. Last May (1997), Murray discovered the platform that floated down to the South Shore. The road had blown out so we weren't able to monitor them.

**Gary** – I would like to see a few more years effort with one platform.

**Mike** – We looked for a better site, and there is one on Williamson Creek that we can try.

**Gwill** – In the bald eagle nest site plan, it said no activities from February within 800 feet of the nest. Are there any harvest units that would be affected?

**Don** – The (800 foot) circle (around the nest site) goes slightly into one 2000 harvest unit. We will put a timing restriction on this unit's harvest.

**Gwill** – Based on what you've seen with nest structures, are there any changes you would like to make or are you basically happy with the nesting success?

**Mike** – We're going to call Paul Fielder of Chelan County PUD about nest boxes. He coordinates the state data base for the duck nest boxes. We will talk to him about the number of nests that are either abandoned when there appears to be a full clutch, or where a partial clutch hatches. We'll see if he has any insight as to why this may be happening. I don't think nest dumping or predation is the problem, but we don't know if something could be happening to the nesting female or if the brooding habitat is a problem.

**Gwill** - In your table, it would be useful to report information on partially-hatched clutches.

**Mike** – We can update that in the final report.

- **Management Activities in the Spada Lake Tract**

**Bernice** – At the annual meeting last year, the DNR representative told us that they were considering abandoning the North Shore Road and wanted to explore other options with the District. During 1997 we evaluated several options in our discussions with the DNR. North Shore Road currently has 2 major slides on it. We also discussed road inactivation, or the possibility of the district securing a permanent easement with all the maintenance and repair obligations for the road. Another option was for the District to secure a management easement for a finite period of time which would be typically 5 to 10 years. That wasn't appealing because the majority of timber management activity, like hauling the trees out, would occur more than 10 years into the future. Abandonment is DNR's preference, and they would like the District to relinquish its easement.

**Gwill** – Since the road blew out, will it put particulate material into the lake?

**Don** – There is a flat area at the bottom of the section that failed. Most of the particulate matter is a sandy alluvial type of material from a glacial moraine. That type of particulate doesn't move.

**Gary** – Maybe true of this failure, but are there other time bombs out there?

**Gwill** – [Asked about abandonment criteria]

**Don** – According to forest practice rules, you don't have to remove the bridges if the bridges have been built to pass a 100 year flood. All the bridges beyond that point are built to pass a 100 year flood so the bridges do not have to be removed. You must take care of any potential mass wasting. Mass wasting into a Type 1 to 4 or 5 water is a bad thing. But if you have mass wasting that goes downhill and sits there, you get biodiversity.

**Gwill** – We don't want chronic inputs of sediment going into the adjacent wetlands, or high turbidity levels in Spada Lake that would affect downstream fisheries.

**Don** – I have reviewed any abandonment plans that the DNR has submitted to forest practice for the past 8 years to guarantee the City's concerns over water quality are met. If they submit a forest practice plan to abandon this road, I will participate.

**Bernice** – We have proposed to manage some of the forest lands along the north shore. Access could be by boat, and pre-commercial thinning is feasible. It would be possible to haul timber out by helicopter in a commercial thinning in the future. The timber we have right now probably isn't sufficient size, but it is an option for the future. For our management purposes, we can do without the North Shore Road. With regard to other portions of Spada Lake we'll be looking at some stands on the south shore for pre-commercial thinning. Next year we may start snag management, doing inventories and probably some snag creation on the Spada Lake Tract.

- **Deer Forage Monitoring**

**Bernice** – We developed procedures in 1997 in which we measure the frequency of occurrence of the plant species on our sample plots instead of the actual percent coverage. [Reviewed results of sampling in 1997] The main difference is fireweed, bracken fern, and small trees showing up only on the young stand. Our procedure calls for monitoring units prior to harvest, 2 years post-harvest and at 3 year intervals for 20 years after harvest. So according to this schedule we would pick 2 different units with their controls in 1998, and I'm proposing to look at the Tiki Sale units. We'll have the opportunity to get a base line measurement while the units are still forested and then assuming they're harvested this year we can come back in 2 years and get measurements on those units.

**Gwill** – Do the harvested units have higher density of trees?

**Bernice** - Very few trees turned up in our sample plots in the control units because they are forested stands, with very few small trees in the understory. In the harvested unit we pick up the trees that were planted and the natural in-seeding that occurred. There's few trees out there greater than 20 feet tall at this point. [There was a discussion of the sampling procedure.]

**Gwill** - What do you make of the data?

**Bernice** - Nothing astonishing. With clearcut you get an influx of fireweed and other annual plants that last for a few years and then are overshadowed as the trees start to grow. It appears to take a couple of years for some of the small woody plants like Rubus species and salal to come in if they weren't originally present on site. We'll see how long we continue to pick up things like fireweed and other herbaceous plants; and know at what point they drop out due to shading.

- **Biosolids Application at Lake Chaplain Tract**

**Dan** - [Reviewed application of biosolids to two commercially thinned units in Lake Chaplain Tract in August-September 1996. Proposed applying remainder to these units in June or July - total application 90 pounds/ac. nitrogen. Discussion of nitrate changes from the upstream and downstream water quality sample stations.]

**Dan** - We haven't got results on the overstory response to biosolids yet because we only have one growing season's worth of data and wouldn't expect to see anything at this point. We have understory data which shows a trend toward increasing cover of the treated areas but it's not statistically significant at this point. We're getting a change in relative abundance of the various species, with increases in salal and bracken fern. We have noticed much more elderberry than there used to be although it's not showing up in the data yet.

We're looking at doing an application on the Horseshoe Sale clearcut unit. We have the soil data collected but we haven't submitted the SEPA yet. If we do this, it will be in June-July, with about 90 pounds per acre of nitrogen.

**Gwill** - Will nesting birds be done by then?

**Gary** - July would be okay, but not June.

**Gwill** - What times of the year did you do the other 2 sites?

**Dan** - We did these in August-September.

**Bernice** - Are there any constraints, advantages to applying biosolids in July?



**Dan**- None that are directly related to biology at this site. I like to get out there in the summer time cause its dryer, but it's mostly to satisfy the delivery schedule.

**Gwill/Gary** – Apply no earlier than July 1.

**Gwill** – Can we expect that the nitrogen input would promote aquatic growth in streams or rivers?

**Dan** – The trigger for us is 10 milligrams per liter, which is the state water quality standard. Even that level is not likely to cause aquatic growth problems as much as drinking water quality problems. So when we're talking about .22 milligrams per liter we're not even up to 1 milligram per liter.

**Gwill** – So you're saying as long as its below 1 milligram per liter the contribution toward noxious growth isn't a problem?

**Dan** – No. I wouldn't expect to see contributions to aquatic plant growth if it was above 10 milligrams, but if I had 10 milligrams per liter of nitrogen I would be worried about it for other reasons. It does appear that the nitrate concentrations may be double or 50% higher down stream vs. upstream. Preapplication sampling was done on 8/26 and 9/19. We had already applied by 10/29 (sample date) but you wouldn't expect the nitrate to be have been able to migrate to the streams, and you can count that as pre-application as well. The magnitude of the numbers is the thing to key on. If you were really getting a biosolid effect you'd be seeing numbers from around 3 milligrams per liter and we're not over 1 at any point in time.

**Gwill** – I recall you saying you'll continue to monitor the two sites that you made the application on, but I didn't see any proposed monitoring for the new site.

**Dan** – There is no good place to monitor water quality - its possible to monitor the Sultan River but with a 200 foot buffer and the terrain in that particular area, the chance of seeing anything are pretty remote. You're looking at a large body of water here.

**Gwill** - Are there any drainage courses that go through the new application site?

**Don** - No.

**Roy** - The (nitrate) numbers are extremely low. To put it in perspective, the county groundwater study showed that you'll see the effects of septic tank seepage when you get to 2-3 milligrams. The background level is around 1 milligram of nitrates.

**Gwill** - On the new site are you proposing to apply the biosolids at double the rate you had on the other site?

**Dan** – We'll apply at an agronomic rate which will probably be approximately what the prescribed rate was on the other units.

**Gwill** - I would have preferred to have more data under our belt before having to face a site that's not getting water quality monitoring. Without measuring, who knows whether what you think is going to happen will actually occur?

**Dan** - We have considerable data from Pack Forest and Weyerhaeuser Tree Farm. This is not a brand new idea.

**Don** – The WHMP recommended nitrogen applications to stands at the rate of 200 pounds per acre.

**Gwill** – Was that for wildlife benefits or tree growth?

**Don** – It's a standard application rate in the industry.

**Gwill** – Do you have alternative parcels on which to apply biosolids from which you could do water quality monitoring?

**Dan** – We don't have the material to do any more than this small parcel.

**Don** – Right now, we have no other sites covered under the WHMP where I'd like to apply biosolids. This area would benefit the most. We selected this site because the soil analyses have been done—that's part of the front-end costs of doing this.

**Roy** – UW is monitoring biosolids applications at Pack Forest. They are getting at what you're asking about. [Roy gave Gwill a copy of collected abstracts from Puget Sound Research '98]

**Dan** offered to provide additional literature reviews of biosolids applications.

**Gwill** – [Would like to view the site before reaching a conclusion.]

**Gary** - Have you gone out and measured the setback from the river?

**Dan** – We haven't actually measured it.

**Gwill** – I would like to have the species names listed on Figure 8 showing understory vegetation response.

**Mike** – Would you also mark the pre-application dates on Table 5.

**Dan** – 8/27 and 9/19 were pre-application.

**Gwill** – In the vegetation plots, the difference between control and application sites didn't seem large.

**Dan** – Agreed. I didn't list every species found in every plot because the list was very long. I just listed the top five (in abundance).

**Gwill** – We'd also like to see those species which are valuable to wildlife but don't show up high enough in abundance to make your list of five, if there is a marked difference between control and application sites. The rationale for us to go along with biosolids application is the wildlife benefit.

**Don** – One of the reasons the WHMP calls for fertilization is to get to large saw timber as quickly as possible. The benefit for deer is a side benefit.

**Dan** – The documentation you want is easy enough; it's just a matter of identifying the species you want.

**Gwill** – I don't disagree that getting to large sawtimber was what we wanted to do, but while the WHMP was being developed we had serious concerns about biosolids application, like public entry, and the Tribes' concerns. Going along with biosolids as a means of fertilizing the stands was balanced by gaining the added benefit of deer browse.

**Bernice** – [Suggested using the list of preferred forage species in the WHMP]. We've grouped species together in the deer forage surveys. Perhaps you can do it the same way, unless a particular forb becomes very abundant due to biosolids application.

**Dan** – That would come out in the sampling.

### 3. Future Reports and Meetings

**Bernice** – With the present report we've completed the requirement for the implementation phase of the WHMP, based on the letter from the FERC dated September 27, 1997. They stated the next required report for their purposes would be due in 2000. After that reports will be submitted every 5 years. We will continue to write annual reports in the future and submit them to agency reviewers. The format we envision will be the same used so far: activities completed during preceding year, cumulative summary to date, planned activities for coming year. The cumulative section poses potential problems: rehashing past events year after year long after completion, or cutting discussion short and losing past decisions. We'll produce a list of major actions accomplished so far, cross-referencing the main discussions of these actions in each previous annual report.

Do we want to have annual meetings in the future?

**Gwill** – It's useful for me to have the opportunity to discuss future activities. Correspondence is too difficult to accomplish the discussion. Let's plan on setting them up, and if they're not needed, then don't have them.

**Bernice** – At these meetings would you want us to go over all of our activities?

**Gwill** – Let's have the opportunity, but if they're non-issues we don't need to discuss.

**Gary** – At every annual meeting so far we've had some useful discussion. Until it gets to the point where we have fail to have anything to discuss, then it's a useful thing to have. I want to keep the option.

**Bernice** – Then you should expect to receive next year's annual report, with an invitation to the meeting.

**Karen** – What's the next step for snags to resolve the issue with unit 2020-5. Will someone summarize what information will be necessary?

**Mike** – I think we should determine what a fair trade will consist of. We're probably shooting for 18 inch trees – but need to decide how many

**Don** -- How closely involved do the agencies want to be? If the biologists think it's a good deal, shouldn't we go ahead with it?

**Gwill** – We want to be part of the decision when it's more than just a routine small change. Making adjustments in snag diameter can't be done in isolation.

**Karen** – Just exactly what information do you want? Should we develop something and show it to you?

**Gwill** – Yes, give us a proposal like Mike suggested, such as 18 inch trees, or some number, and that the PUD and City coordinate the effort, and show us that you've gone through a process. Show us the process you've gone through to coordinate the effort.

**Gary** – If you make variances, the record is there to show what you're doing.

**Don** - I don't think we'll have time before this annual report goes out. [Also, didn't like committing first before selecting the trees.]

**Gary** - Think it through until you're reasonably certain of what you're actually able to do, then tell us. I can't just give you a blank check.

**Don** - If the concept is okay, then we can come up with a proposal, locate them in the field. The process won't change, and we'll send you the final proposal. But this will take time.

**Bernice** - One letter will suffice once we select the trees.

**Gwill** - Don, I hear you saying that you want to do this on a monetary equivalence basis.

**Don** - Roughly in the same ballpark is my preference.

**Gwill** - Given that, what I'd like to see is a proposal looking at (trade-off of) the larger size in hemlock and larger size in fir, because I don't know the dollar values of each. It may be that Gary and I would want more large hemlock and a fewer large Douglas fir.

**Don** - Could you give us that guidance now?

**Gwill** - How much more valuable per unit volume is Douglas fir vs. hemlock?

**Mike/Bernice** - We won't be able to find larger (18-19 inch) hemlock out there.

**Don** - We may need to include some larger firs. But we need to consider whether they'll be in a good location.

**Gwill** - If you find a deformed tree that's good for wildlife, then select it.

**Don** - Last time I checked, 4-saw Douglas fir was \$500, hemlock was \$320. Two-saw fir was \$690, hemlock was \$500. Stumpage value changes, but you can look at the spread in prices.

**Gwill** - I feel comfortable with the approach of trading hemlock for Douglas fir. But if you're talking about getting 1/3 the number of snags, then I don't agree.

**Bernice** - Unlikely that we'll get any more than half of the number of snags we'd ideally like to get.

The co-licensees and Gwill Ging then visited harvest unit 1993-3, which was proposed for biosolids application in 1998.