SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT NO. 1

EVERETT

Providers of quality water, power and service at a competitive price that customers value.

May 1, 1997
PUD 20429

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 1st 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 1996 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 30th of each year.

This annual report describes activities conducted during 1996, and activities planned for 1997. A comparison of all activities completed since implementation of the program began in 1989 with activities planned during 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 27, 1997, to request comments and discussion on progress to date and planned activities for 1997. An attendance list and meeting minutes are attached to the Annual Report. No additional comments have been received from the agencies since the March 27, 1997 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 1996 Annual Report.

Sincerely,

N. Craig Thompson
Assistant General Manager
Water Resources

Clair Olivers
Director of Public Works
City of Everett

Enclosures
BRT:dkw
cc: G. Engman, Washington Department of Wildlife
G. Ging, U.S. Fish and Wildlife Service
A. McGuire, Washington Department of Natural Resources
R. Young, Tulalip Tribes
H. Hall, FERC, Portland
J. Jones, Bell and Ingram
D. Farwell, City of Everett
bcc: B. Meaker – E2
K. Bedrossian – E2
B. Tannenbaum – E2
R. Metzgar, City of Everett
M. Schutt – E2

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1996 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, 1997

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1.0 SUMMARY

1.1 MAJOR TASKS ACCOMPLISHED DURING 1996:

- Layout of road system on west side of Lake Chaplain.
- Layout of 2 harvest units - Tiki sale.
- Snag creation and inventory at Lake Chaplain.
- Coarse woody debris management program at Lake Chaplain.
- Diversion Sale units planted.
- Biosolids application at Lake Chaplain.
- Monitoring of test plantings in the Spada Lake drawdown zone.
- Seeding of the entire power pipeline right-of-way.
- Precommercial thinning at Spada Lake.
- Relocate floating platforms from Lake Chaplain to Spada Lake.
- New duck nest boxes installed at Spada Lake and Lost Lake.
- Incorporated contract foresters' report information into Spada Lake Tract Supplement to the WHMP, and prepared final draft in consultation with the resource agencies.

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 1997:

- Complete setup and sale of two (2) Lake Chaplain harvest units (Tiki Sale).
- Complete layout of two (2) units at Lake Chaplain to be sold in 1998.
- Continue snag management program on Lake Chaplain, Spada Lake and Lost Lake Tracts.
- Continue coarse woody debris management program at Lake Chaplain.
- Planting of shrubs in selected locations on the power pipeline.
- Submit final Spada Lake Tract Supplement to the FERC.
- Continue monitoring activities at nest structures.
- Continue deer forage monitoring.
- Conduct monitoring of Lake Chaplain biosolids application sites.
- Monitor stocking levels of Lake Chaplain plantations.
- Precommercial thinning at Spada Lake Tract.
- Install new duck nest boxes at Spada Lake, if appropriate sites are found.

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.

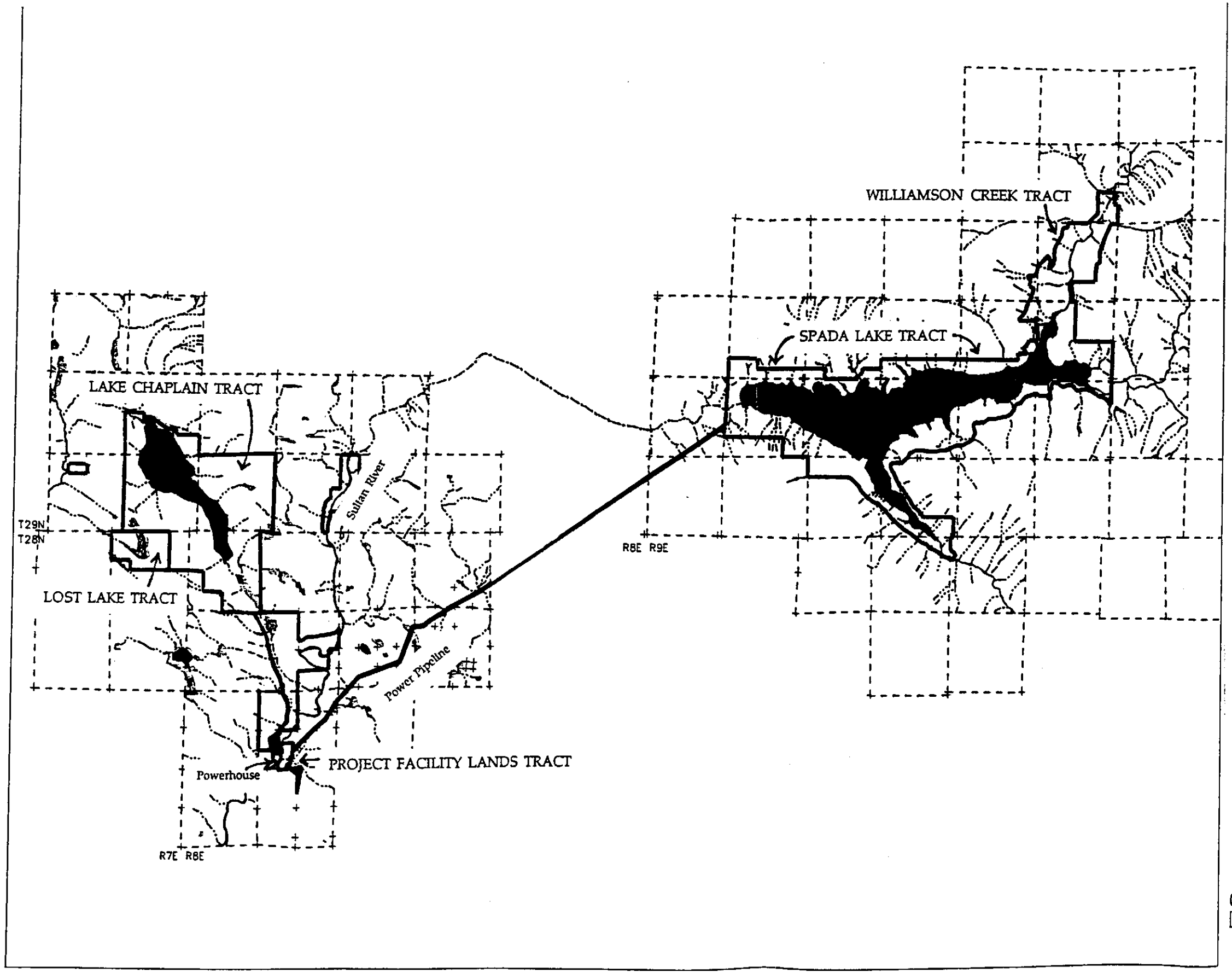
2.0 INTRODUCTION

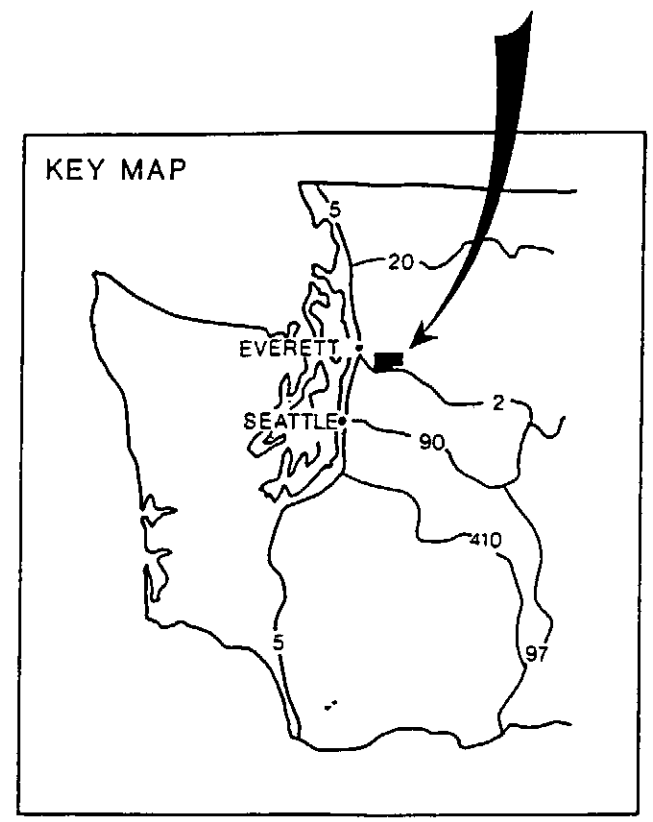
The 1996 Annual Progress Report on the Wildlife Habitat Management Plan for the Henry M. Jackson Hydroelectric Project (Figure 1) is submitted in response to the Federal Energy Regulatory Commission (FERC) Order Approving With Modification Revised Wildlife Habitat Management Plan (issued May 19, 1989). 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 1996 and summarizes activities completed since the management program was initiated in 1988. Activities anticipated for the calendar year 1997 are described. Activities, procedures and schedules described in this report are based on the (WHMP) submitted to FERC on May 25, 1988, in accordance with Project License Article 53 and subsequent related orders from the Commission.

HENRY M. JACKSON PROJECT
WILDLIFE HABITAT MANEGEMENT PLAN

FIGURE 1. MANAGEMENT TRACT LOCATION





North

0 5000 10000 15000 20000 FEET

3.0 WORK COMPLETED DURING 1996

3.1 FOREST VEGETATION MANAGEMENT

3.1.1 Timber Harvest - 1995 Units (Diversion Sale)

The two (2) units of the 1995 Diversion Sale, shown in Figure 2, were replanted in 1996. One (1) unit was planted with 300 stems per acre of Douglas fir. The other unit was planted with 300 stems per acre as well, but a mixture of Douglas fir and western red cedar was planted in wetter areas of the stand, and pure Douglas fir was planted in the remainder. A total of 1000 western red cedar saplings went into this unit.

3.1.2 Harvest Unit Setup

The upcoming Tiki Sale was described in the 1995 Annual Report as having four (4) units located on the west side of the Lake Chaplain Tract, and one (1) on the east side. Four (4) of these units were scheduled in the WHMP for harvest in 1995 and one (1) was scheduled in the WHMP for 1990. Two (2) of these units were laid out and marked with boundary tags during 1995, including the delineation of green tree areas (GTA) in both units and a stream buffer zone in one (1) unit. The harvest plan described in the 1995 Annual Report indicated that we would complete layout and sale of all five (5) units during 1996. However, because the timber market was unfavorable during 1996, these units were not sold. The two (2) units that were laid out in 1995 will be sold in 1997. Layout of a third unit, scheduled for harvest in the WHMP in 1990, was started during 1996, and the GTA was roughly identified. This unit will be included in a future sale along with other three units that were originally (in 1995) planned for the Tiki sale. Units that are currently planned for sale during 1998-2000 are shown in Figure 2, but plans for these units are subject to change.

3.1.3 Road System Layout

The road system layout to serve future harvest units on the west side of Lake Chaplain was refined in 1996, and portions that are required to serve the upcoming Tiki Sale were finalized (Figure 2). Future sale units will be accessed by extending this road system. A right-of-way application was submitted to the DNR for two (2) sections of the road.

3.1.4 Lost Lake Monitoring

Photo documentation stations in the precommercially-thinned unit at Lost Lake were re-visited in November 1996, more than five (5) years after the thinning was completed (July 1991). The slash resulting from the thinning remains thick in hemlock thickets, although almost all small branches have dropped. All of the large alders that were girdled during the thinning operation have fallen to the ground, and some are host to shelf fungi. A dense shrub layer dominated by salmonberry and salal has developed in trails that were cleared during the thinning, and in areas that were formerly dominated by an alder canopy. There was evidence of deer-browse on salmonberry twigs.

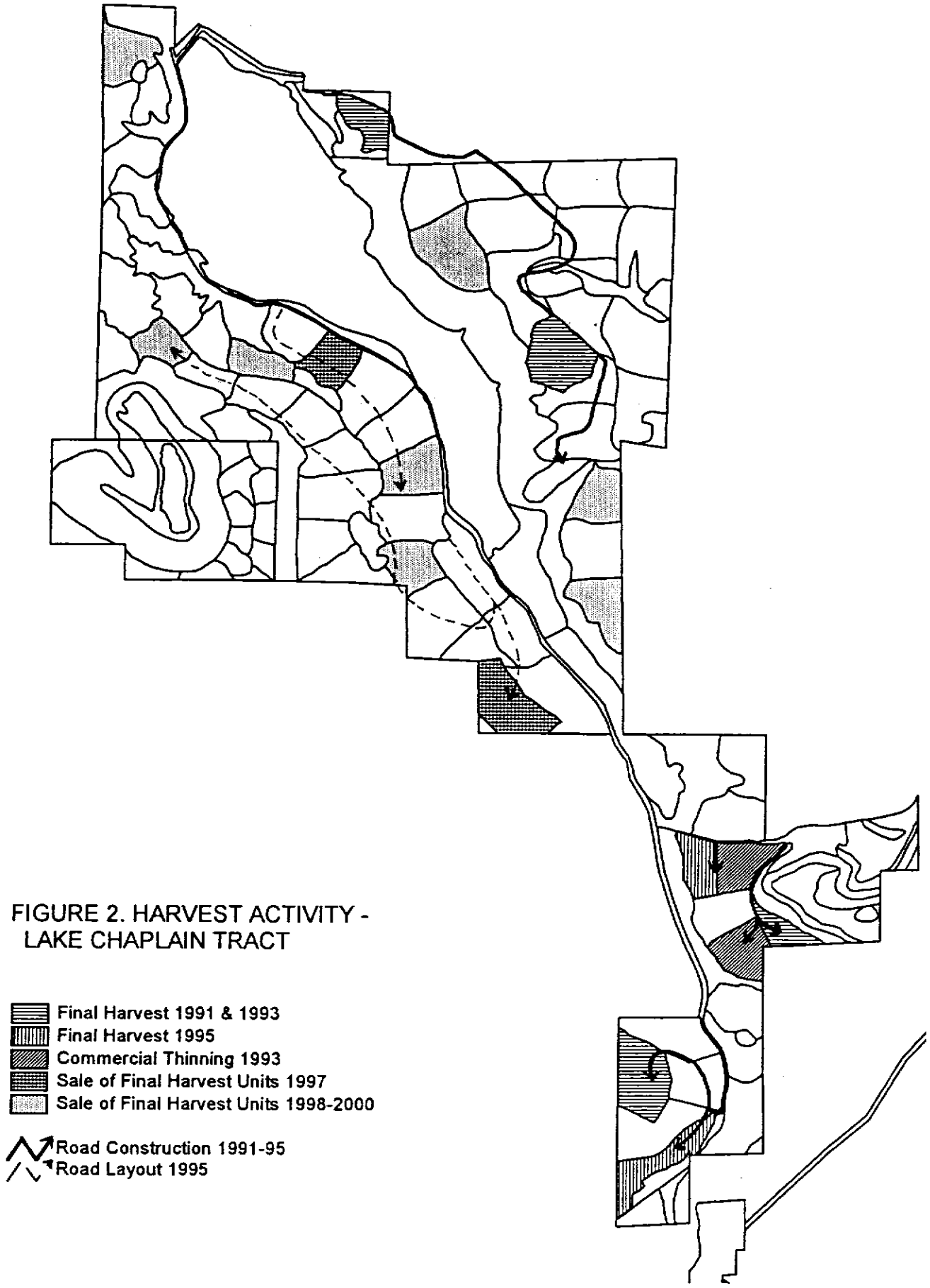


FIGURE 2. HARVEST ACTIVITY -
LAKE CHAPLAIN TRACT

3.1.5 Spada Lake Precommercial Thinning

Portions of three (3) second growth stands at Spada Lake were precommercially thinned in September 1996 (Figure 3). These stands ranged in age from approximately 14 years to 30 years and were overstocked with conifers and red alder pockets. Prior to thinning, the average density of trees in the younger stand was approximately 2000 stems per acre and approximately 800 stems per acre in the older stands. The younger stand had a dense understory dominated by huckleberry, and it was a priority to preserve this shrub layer by means of reducing the conifer canopy. Also, western red cedar and cottonwood were present on the stand, but scarce, and it was decided to favor these species in the thinning prescription. According to information provided by the forestry consultants who contributed to development of the Spada Supplemental Plan, western red cedar was an important component of the old growth stands that formerly existed on the Spada Lake Tract, but it is currently scarce.

The thinning prescription called for retaining an average of 225 dominant and co-dominant trees per acre, with the order of preference as follows: (most preferred) western red cedar, big-leaf maple and cottonwood, other conifers, and alder (least preferred). All existing snag trees and shrubs were retained, and one-hundred foot buffer zones were established adjacent to the main access road, and the shoreline of Spada Lake. The thinning, especially in the denser younger stand, resulted in a large quantity of woody debris that may impede wildlife movement for five (5) to ten years. However, long-term improvements in wildlife habitat quality are expected from the thinning.

3.2 SNAG MANAGEMENT

Snag trees were created in 1996 on five (5) units within the Lake Chaplain Tract (Figure 4). A total of 104 snags were created based on inventories conducted during 1995. These units comply with the WHMP targets for snag tree density and size class distribution. A summary of the snag component of each of these units, as well as other units, on which snags have been created, is presented in Table 1. Snags were created, as in previous years, by topping live trees and leaving a few branch stubs. Created snags were mapped for future monitoring, and marked with numbered metal tags and a painted stripe 4 feet above the ground.

A revised snag inventory and monitoring procedure has been developed with the assistance of a forestry consultant, and is now under review by the co-licensees. The procedures retain the WHMP's objectives of providing snag trees of various decay classes and size classes, monitoring their persistence and use by wildlife over time, and supplementing with additional snags to maintain the required density and size distribution over time. Details of the sampling procedure were modified in the draft procedure, however, based on the consultant's recommendations. The number of sample plots described in the WHMP (p. 4- 2) has been reduced, while the sample plot size has been increased. More frequent monitoring of specific snag trees, including created snags and naturally-occurring snags, will be performed. The procedure also presents appropriate statistical tests for evaluating differences in persistence and wildlife use in snags of different sizes and species, and among forested stands and harvested stands.

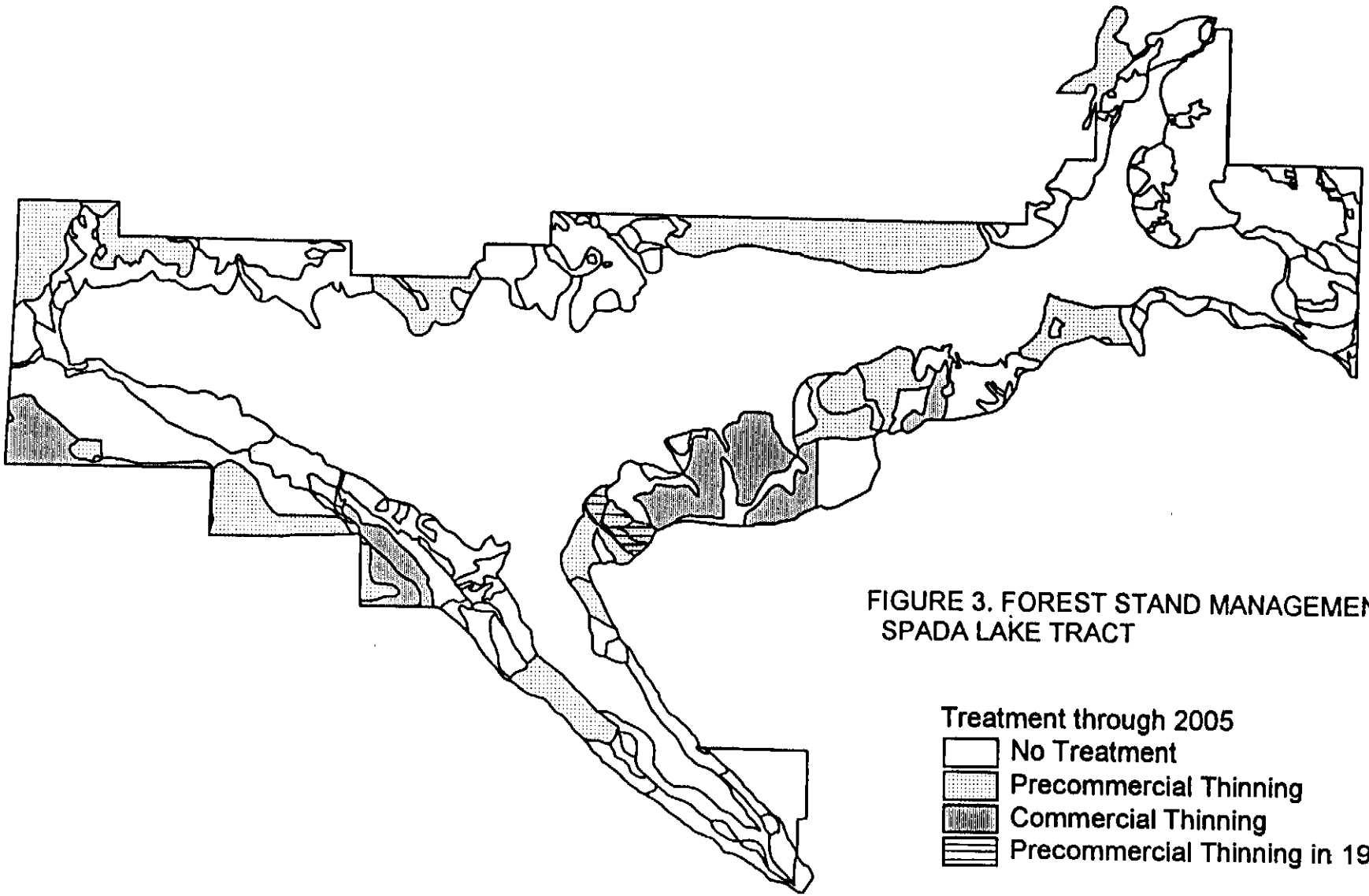


FIGURE 3. FOREST STAND MANAGEMENT
SPADA LAKE TRACT

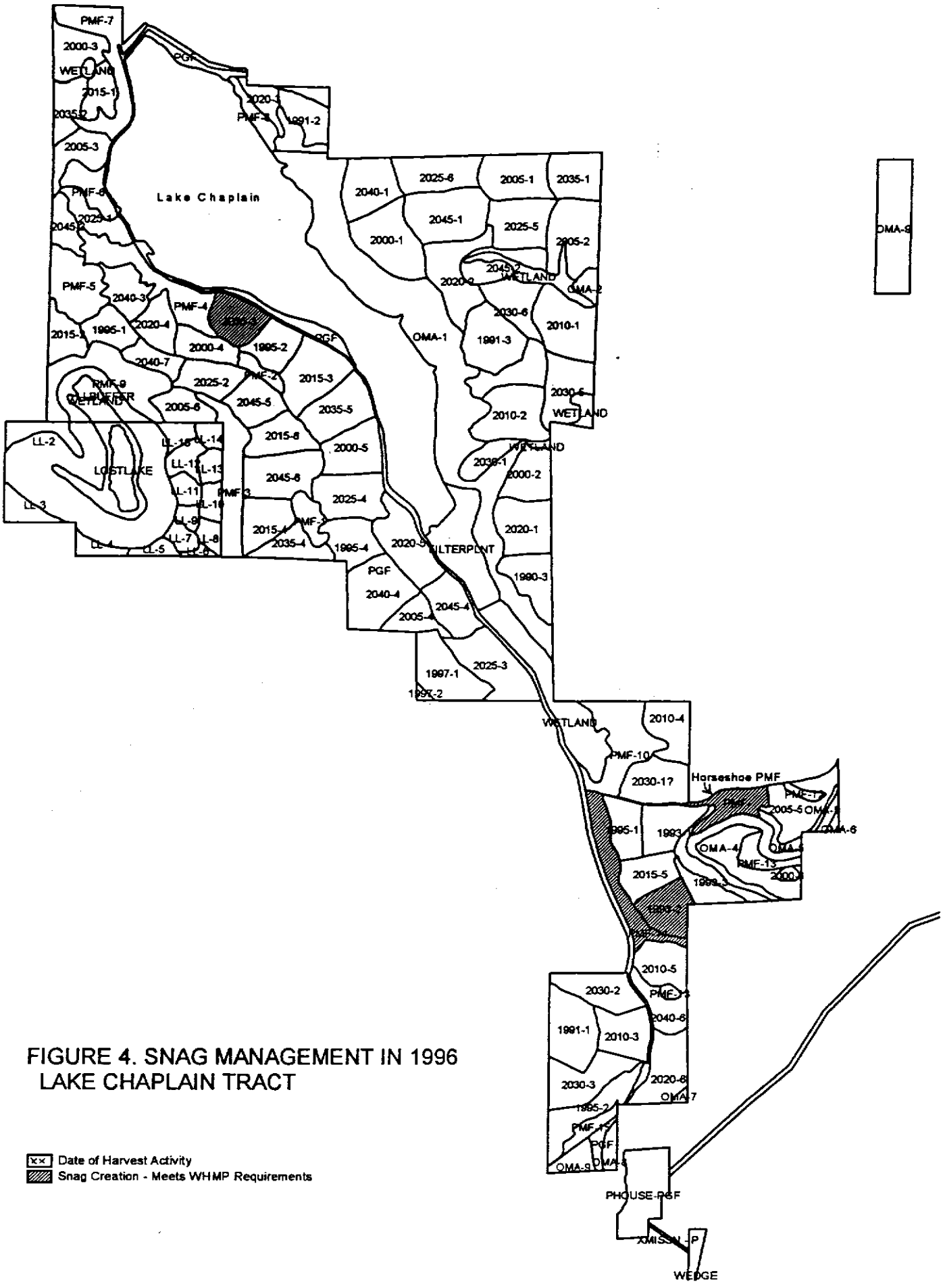


FIGURE 4. SNAG MANAGEMENT IN 1996
LAKE CHAPLAIN TRACT

XX Date of Harvest Activity
Snag Creation - Meets WHMP Requirements

Table 1. Summary of Snag Management Through 1996

UNIT	ACREAGE	# CREA-TED	AVG DBH (in.)	AVG HEIGHT (ft.)	#/ACRE	NOTES
1992-2CT	**18.0**	**23**	**16.9**	**55.2**	**4.6**	**√ Includes natural and created snags**
Horseshoe PMF	**14.7**	**35**	**17.0**	**58.1**	**4.4**	**√ 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	**12.0**	**25**	**16.8**	**43.7**	**4.3**	**√ Includes natural and created snags**
2035-3	**18.5**	**30**	**18.0**	**55.0**	**4.9**	**√ Includes natural and created snags**
1991-1	26.0	70	16.6	33.5	3.1	√ Includes natural and created snags
1991-2	15.0	46	16.1	27.4	3.1	√ Includes only created snags
1991-3	24.0	66	18.0	31.0	3.6	√ Includes natural and created snags
1992-3	13.7	42	15.7	31.7	3.1	√ Includes only created snags
1993-1	15.6	41	16.8	50.3	3.1	√ Includes natural and created snags
1993-2	19.7	61	18.3	47.9	3.1	√ 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
Lost Lake Tract	112.0	43	16.9	49.5	1/	39 created
Lost Lake (City)	46.0	36	16.9	52.4	2/	38 created
Horseshoe OMA	16.7	25	17.1	54.0	1/	25 created
East side OMA	173.6	12	17.3	40 3/	2/	12 created
Stand 1-3 4/	13.8	6	21.5	55.0	2/	6 created
Div. Dam Rd. PMF	33.1	10	16.8	38.5	2/	10 created
Buffer Zone # 1	2.7	20	17.0	40 3/	2/	20 created
Buffer Zone # 2	3.8	10	15.7	40 3/	2/	10 created
Stand 2-1	8.9	4	19.5	48.8	2/	4 created
Stand 2-2 4/	30.7	12	19.0	47.9	2/	12 created
Stand 3-1	141.1	10	19.5	51.1	2/	10 created
Stand 4-5 4/	76.1	6	22.5	61.0	2/	6 created
Stand 4-7	14.0	11	18.8	55.0	2/	11 created
TOTALS	**272**	**561**	**Totals for those units which meets WHMP requirements**			
	944	**766**	**Totals for all units which have had snag management activity to date.**			

BOLD denotes those units where snag management activity occurred in 1996.

√ 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.

3.3 COARSE WOODY DEBRIS MANAGEMENT

We reported the procedure for Coarse Woody Debris (CWD) management on harvest units at the annual meeting with the agencies in March 1995. The procedure primarily addresses providing adequate supplies of decay Class 1 and 2 logs. Details of the procedure were described in the 1994 Annual Report. The procedure was implemented on the Diversion Sale at Lake Chaplain in 1995, (shown in Figure 2), and results were reported in the 1995 Annual Report. A cumulative summary of CWD management is presented in Section 4.3. In 1996, we marked created CWD logs in the two (2) units of the 1995 Diversion Sale at Lake Chaplain for long-term monitoring.

The 1995 Annual Report discussed problems encountered with the previously used CWD sampling method. During 1996, sampling design for inventory and long-term monitoring was revised with the assistance of consulting foresters. The revised method is similar to the method under review for snag inventory and monitoring, as described in Section 3.2. Additionally, it calls for marking and mapping the locations of a small set of existing logs that have particular interest, such as large size or evidence of wildlife use, prior to harvest, for monitoring immediately after harvest. The objective of this sample is to identify whether harvest is causing a significant loss or damage to preharvest CWD. The revised sampling/monitoring method is currently under review. As in the snag sampling/monitoring method, described in Section 3.2, the sampling method will include appropriate statistical tests to evaluate persistence and wildlife use of CWD.

The revised methods will be field tested on two (2) units of the Tiki Sale at Lake Chaplain which are scheduled for sale in 1997. The methods will include marking a set of existing pre-harvest logs for monitoring during harvest to determine whether harvest operations represent a problem for CWD retention as discussed at the agency meeting in March 1996.

3.4 REVEGETATION

Activities in 1996 consisted primarily of monitoring previously-revegetated sites. Details of the original plantings are described in earlier annual reports, and summarized in Section 4.

3.4.1 Spada Lake Drawdown Zone

The initial plantings in 1994 included nursery-grown plugs and root divisions of five (5) wetland emergent species, (Scirpus acutus, Scirpus microcarpus, Sparganium, Carex obnupta, Carex rostrata, and seed of a sixth species (Scirpus cyperinus). Plantings were done between 1430 ft. and 1445 ft. elevation at two (2) sites, the Williamson Creek arm of Spada Lake and the North Fork Sultan River arm. The test plantings at the North Fork site were monitored in October 1996. Plantings at Williamson Creek were not monitored in 1996. Results of monitoring plugs and divisions since planting are shown in Table 2. Plantings were damaged by wave action and debris movement during high water at the North Fork site. Scirpus cyperinus plants have established at this site as well, but mostly in areas that were not seeded by us and other wetland emergent species, including C. obnupta and cattails, have established on the site by in-seeding.

Table 2. Condition of Spada Lake Drawdown Zone Plantings

Site		Species				
North Fork	**No. of plants, all species**	***Carex rostrata***	***Carex obnupta***	***Sparganium***	***Scirpus acutus***	***S. microcarpus***
Oct. 1994	501 (20)	111 (5)[1]	103 (4)	81 (3)	96 (3)	110 (5)
Oct. 1996	300 (17)	85 (5)[2]	91 (4)[2]	6 (1)	80 (3)	38 (4)
% surviving	60	77	88	7	83	35

3.4.2 Power Pipeline Right-of-Way

Portions of the ROW which have not yet been successfully revegetated were seeded with a grass/forb mix again during 1996. Most of these areas are on the upper portion of the ROW closest to the tunnel portal. Alders and other invasive trees were mowed from the pipeline this year as well.

Planning and preliminary reconstruction began on the access road immediately adjacent to the pipeline, from Marsh Creek to the Tunnel Portal. We have previously attempted to revegetate this old gravel road with a grass/forb seed mix. With the reconstruction, a narrow (± 20 ft.) strip will be restored as a permanent gravel access road. The construction is expected to be completed by the end of Fall 1997. The purpose of the access roads is to facilitate inspection of the pipeline by Jackson Project staff. The roads are gated at their junction with the Sultan Basin Road in the vicinity of Marsh Creek, and are not open to vehicular use by the public.

3.4.3 Chaplain Marsh

Shrubs were planted in 1993 along the western edge of Chaplain Marsh to create a vegetative screen between Chaplain Road and the marsh. The plantings were monitored in November 1996. Mortality at this site has been negligible since the shrubs were originally planted, and growth of most species, especially holly and red-osier dogwood, was good. Many additional shrubs have grown in this border including red alder, willows, hawthorn, salmonberry, trailing and evergreen blackberry, plus forbs and grasses. The vegetation "screen" between the road and the marsh is at least 6 feet high, and is currently a continuous band that is 2 to 3 times broader and much denser than prior to planting.

[1] Number of plants (number of rows)
[2] Number of plants increased in some rows.

3.4.4 Powerhouse Site

Shrub and tree plantings at the powerhouse site, also done in February 1993, included Oregon ash, western crabapple, black hawthorn, red-flowering currant, serviceberry, Nootka rose, and red huckleberry. The original plantings consisted of ten tree groups that included 5 trees each, and ten shrub/tree groups that included three (3) trees and 13 shrubs each. Thirty-three more shrubs were added to the shrub/tree groups in September 1994 to replace some that had died. The plantings were monitored in April 1996 (Table 3).

Most of the tree species (crabapple, ash and hawthorn) showed satisfactory growth on this site, with little mortality. Among the shrubs, only Nootka rose did very well in the 3 years following planting, although about half of the huckleberries and serviceberries still survived. Three (3) of the planted species, most notably Nootka rose, propagated on site, and volunteer spirea, salmonberry and thimbleberry have also turned up among the plantings.

Table 3. Condition of Tree and Shrub Groups at Powerhouse

Species	**No. planted**	**No. Dead**	**Condition of Surviving Plants**	**No. of Volunteers[1]**
Crabapple	39	0	18excellent, 18 good, 2 fair, 1 poor	-
Oregon Ash	15	2	13 fair	-
Black Hawthorn	26	4	3 excellent, 14 good, 5 fair,	-
Red Flowering Currant	33	29	1 good, 1 fair, 2 poor	-
Serviceberry	52	19	6 good, 14 fair, 3 poor	9
Nootka Rose	32	0	3 excellent, 5 good, 16 fair	16
Huckleberry	43	24	3 good, 10 fair, 6 poor,	1
Spirea	0			6+
Thimbleberry	0			6
Salmonberry	0			1

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. The seedlings were monitored in November 1996. Twenty-seven (60 percent) of the original 45 western red cedar have died since they were planted, possibly because they were planted in very wet sites. The remainder are in fair to good condition, and average about 5 feet in height. One hundred fifty-four Douglas fir seedlings were planted in drier areas, with only eight percent mortality (12 trees) since planting. All of the surviving Douglas fir are in excellent condition, and average about 10 feet in height.

[1] These shrubs were not planted by us, but are growing within the planted shrub/tree groups.

3.5 NEST STRUCTURES

3.5.1 Floating Nest Platforms

The platforms at Lost Lake were monitored by District Staff at least twice per month from April to the end of July for periods of at least 15 minutes. The two (2) platforms that had been in Lake Chaplain since 1990 were moved in February 1996 to Spada Lake (see Figure 5 for location). These platforms were monitored twice per month from March through June. Additional monitoring was performed by Jean Cross, on a weekly basis. There was no observed use by wildlife of any of the platforms. Lost Lake was used by beaver, otter, great blue herons, mallard, bufflehead, wood duck, hooded merganser, and pied-billed grebes. Shovelers, ring-necked ducks, common goldeneye, common mergansers and common loons were observed at Spada Lake.

3.5.2 Nest Boxes

All nest boxes were monitored by District staff. Production was estimated by examining eggshell remains in the boxes and observations of newly-hatched broods near the nest. Wood duck and hooded mergansers used the nest boxes at Lost Lake and Chaplain Marsh. Nesting results are summarized in Table 4.

The duck species using the nest box at Lost Lake was not verified although we believe they were hooded mergansers, because this species is often observed at Lost Lake and the egg measurements are within the range for this species. All of the boxes at Chaplain Marsh were used by wood ducks, and three (3) of them had one (1) or two (2) additional eggs that were probably laid by other duck species.

Three (3) nest boxes at the north end of Chaplain Marsh which were attracting starlings, were moved to the north end of Lost Lake (See Figures 6 and 7, for locations). The two (2) original boxes installed at Lost Lake in 1990 were removed at the end of the nesting season because the trees they were on had died and were unstable. Three (3) new nest boxes were installed on Williamson Creek within the Spada Lake Tract at the end of the season (Figure 5).

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

Site	# Boxes	# Boxes with Clutches of Duck Eggs	# Successful Boxes (No. Eggs Hatched)	# Boxes Used by Other Species
Lost Lake	9	1	1 (7)	0
Chaplain Marsh	6	6	4 (30)	0
Totals	15	7	5 (37)	

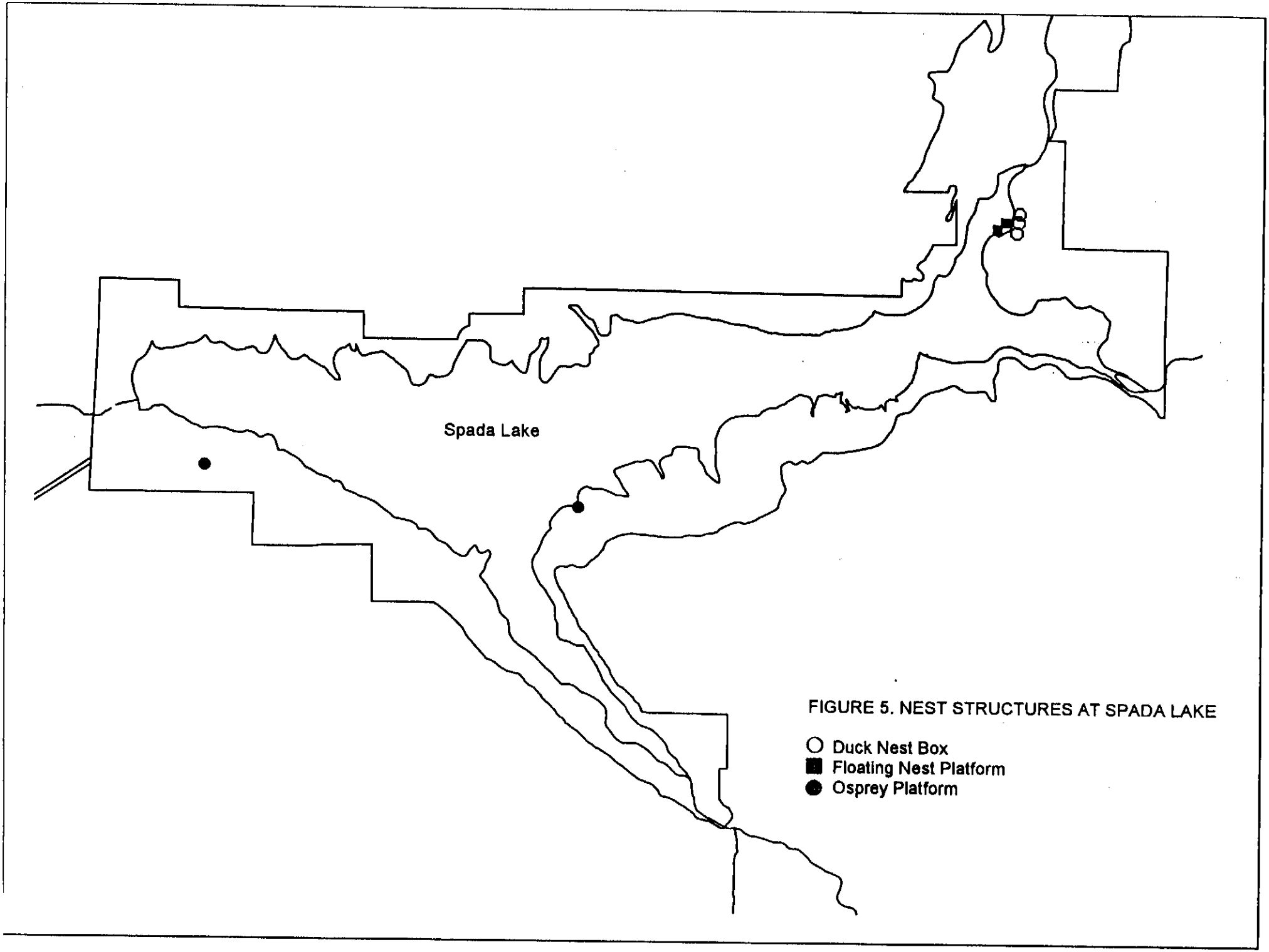


FIGURE 5. NEST STRUCTURES AT SPADA LAKE

3.5.3 Osprey Nest Platforms

The osprey nest platform at Lost Lake was monitored by District staff and Jean Cross from the opposite side of the lake during Spring-Summer 1996. The platform was occupied in 1996 by a pair of osprey, but they did not successfully rear any young. The adults were seen at the nest platform, and appeared to be brooding through most of July. By the end of July, reproduction attempts had failed. One (1) osprey was observed at Lost Lake as late as 4 September 1996.

No osprey activity was observed on the two (2) nesting platforms at Spada Lake (see Figure 5 for locations). There are very few sticks left on the platform located east of the South Fork arm. A new osprey nest was observed approximately one (1) mile west of Culmback Dam above the Sultan River gorge. It appears that this pair successfully reared one (1) young through fledging.

3.6 WHMP SUPPLEMENT FOR SPADA LAKE TRACT

The District incorporated appropriate information from the forestry consultants' report (received in late 1995) into the draft Spada Supplement. The draft supplement was presented to the agencies during the annual meeting in March 1996. Detailed stand prescriptions were further examined for feasibility and to determine more accurate acreage estimates included in treatment. A schedule and cost estimates were developed. Various drafts of the plan were reviewed by the District, City, and resource agencies. Comments were incorporated into the plan and figures were finalized. The final plan was submitted to the FERC in January 1997.

3.7 LAND USE ACTIONS AT LAKE CHAPLAIN TRACT

The City of Everett Planning Department proposed changing the City's Zoning Code designation for its Chaplain Tract, which encompasses the WHMP's Lake Chaplain Tract and adjacent forest lands acquired by the City during the past few years. Currently classified as Suburban Residential, the Chaplain Tract will be rezoned as Watershed - Resource Management. The Watershed - Resource Management (WRM) Zone is a designation specifically created for the Chaplain Tract that recognizes its unique role in maintaining the City's water supply management system. Urban development is specifically discouraged in the WRM Zone. Permitted uses in the WRM Zone include:

1. Public water supply management
2. Hydro-electric power generation
3. Forestry management
4. Biosolids application
5. Public recreation, where allowed
6. Wildlife habitat management
7. Uses incidental to the above listed uses

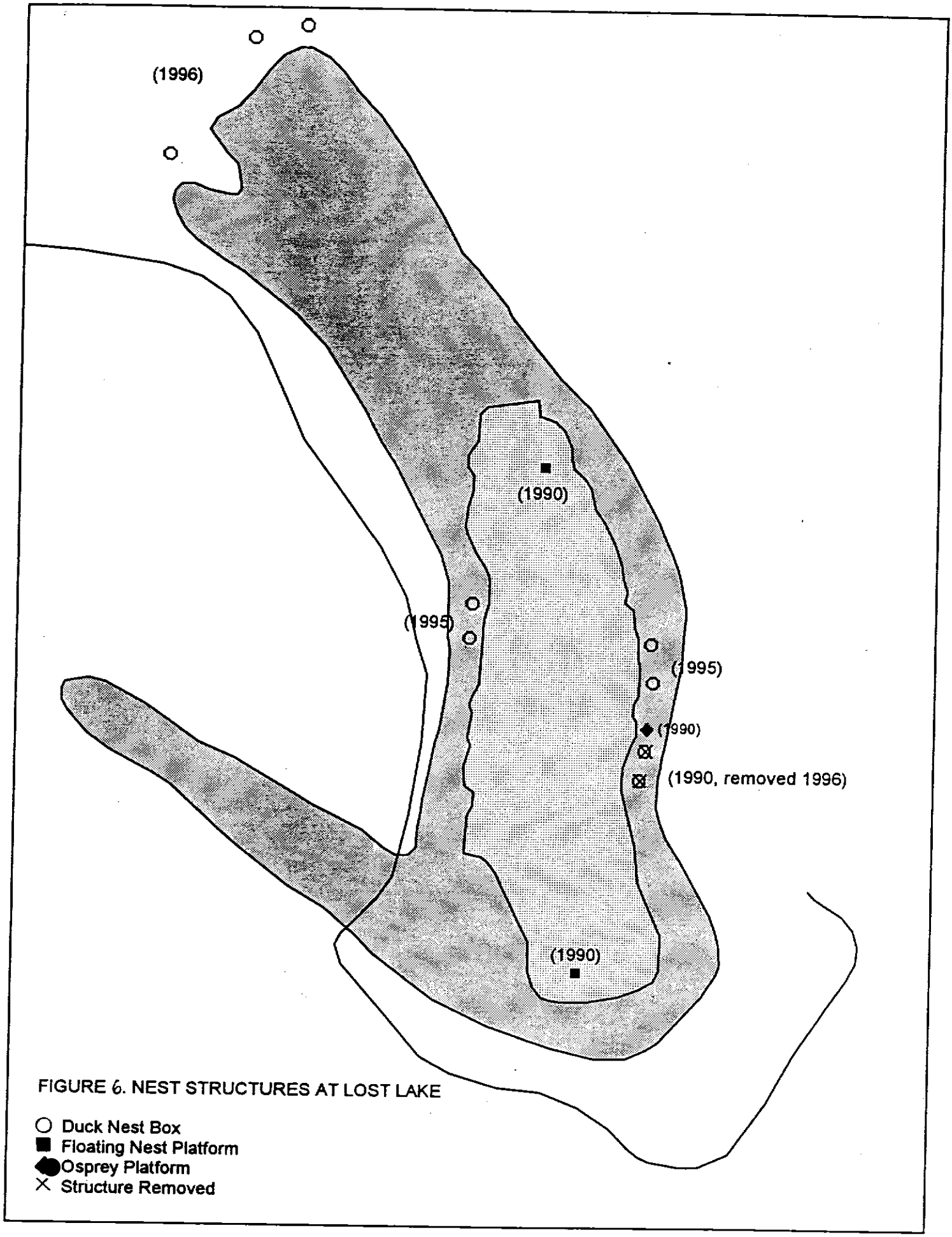


FIGURE 6. NEST STRUCTURES AT LOST LAKE

- ○ Duck Nest Box
- ■ Floating Nest Platform
- ◆ Osprey Platform
- × Structure Removed

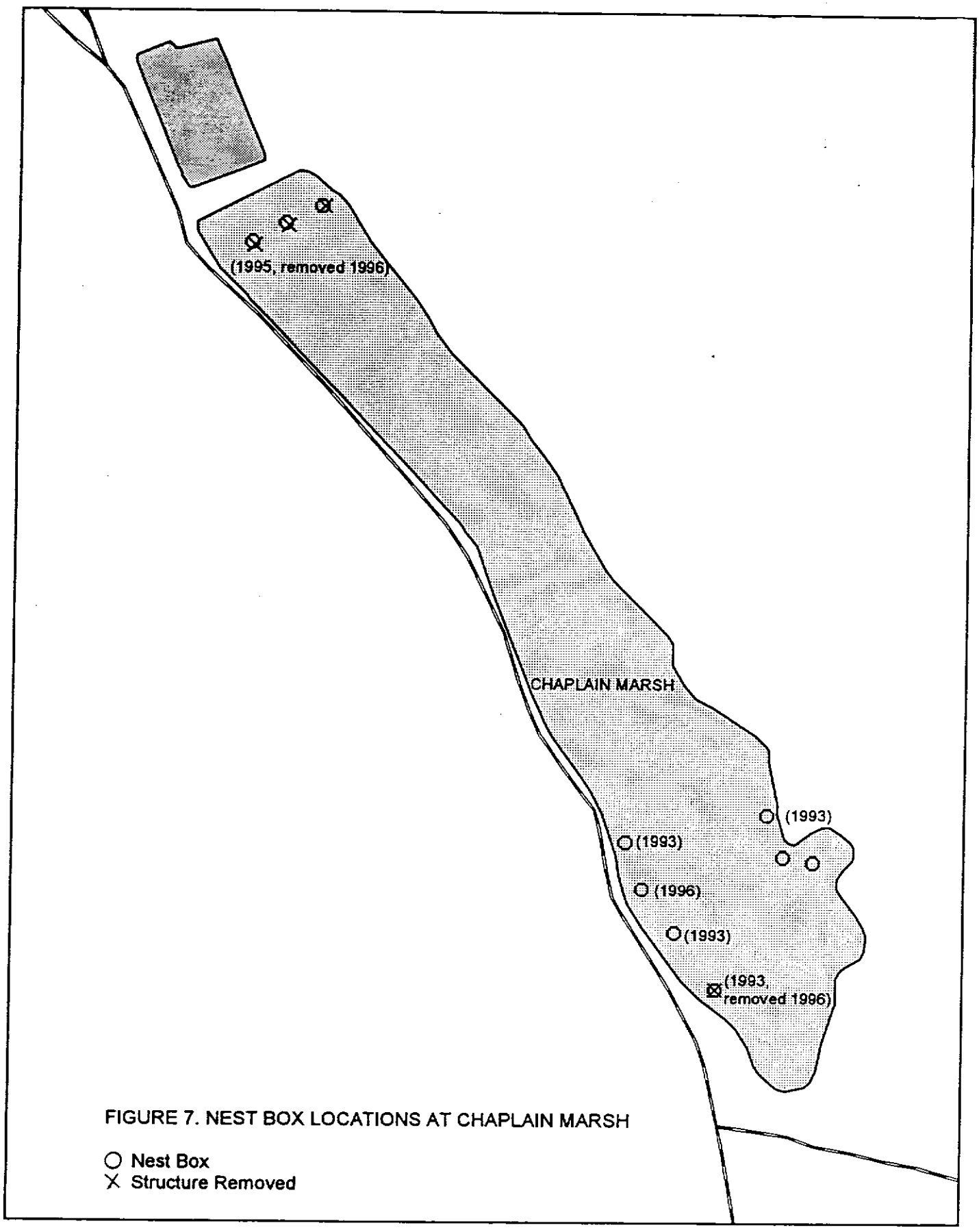


FIGURE 7. NEST BOX LOCATIONS AT CHAPLAIN MARSH

○ Nest Box
X Structure Removed

3.8 BIOSOLIDS APPLICATION AT LAKE CHAPLAIN TRACT

The City of Everett applied biosolids to units 1993-1 and 1993-2 in the Lake Chaplain Tract in August and September of 1996. Stands 1993-1 and 1993-2 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. (See Figure 2 for the locations of these units.) 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.

Two (2) water quality monitoring sites were established on Chaplain Creek. Creek waters were sampled in August and will be sampled monthly for two (2) years. Parameters examined were nitrates, phosphorus, fecal coliform, ammonia, and chloride. Results of the monitoring are in Table 5.

3.9 DEER FORAGE MONITORING

Deer forage availability was sampled on one (1) unit of the Chaplain Sale, harvested in 1991, and one (1) unit of the Diversion Sale, harvested in 1995, using methods described in the WHMP (p. 4-12 to 4-13). In practice, the sampling procedure proved to be very time-consuming, and the actual sampling effort was less than the WHMP's prescription. The WHMP called for sampling fifteen 100 m. transects, whereas only 10 transects were sampled in the 1991 unit and 7 in the 1995 unit. Results of the sampling are summarized in Table 6. The older stand, harvested in 1991, had an understory dominated by fern species, which are fairly unpalatable to deer, and fireweed, which is palatable. Most of the stand had a shrub or forb layer. The more recent clearcut, (in its first growing season since harvest), had less fern, a large population of fireweed, and substantial areas with no shrub or forb cover.

Forage utilization by wildlife was not sampled. In consultation with USFWS, WDFW and the Tribes' representatives, it was decided that utilization will not be sampled. Sampling was very time consuming and results were highly subjective. In the future, notes regarding evidence of browsing will be taken while sampling for availability. Instead of sampling for utilization, baseline sampling prior to harvest and sampling in an unharvested second growth forest stand for availability will be conducted.

The District prepared a draft sampling procedure, based on the WHMP method, and submitted it to a consulting statistician for review. The consultant concluded that the WHMP method, using ten 100 m. transects rather than 15, was satisfactory for characterizing vegetation on units at any given point in time, and for detecting a 50 percent change in understory species composition over time. An alternative, less time-consuming, method was recommended that may deliver the same reliability in detecting changes. This method will be tested in 1997, and the revised procedure will be reviewed. The consultant's recommendations included appropriate statistical tests for deer forage data.

Table 5. Lake Chaplain Tract Biosolids Application
Water Quality Monitoring Results

Sample Date		8/27/96	9/19/96	10/29/96	11/21/96	12/10/96	1/27/97
Analyte/Sample Site	Units	Results					
Ammonia (NH3)							
Upstream (CHAPCR08)	mg/L	0.020	0.005	<0.003	<0.003	<0.004	0.011
Downstream (CHAPCR38)		0.008	<0.005	<0.003	<0.003	0.005	0.011
Nitrate (NO3)							
Upstream (CHAPCR08)	mg/L	not sampled	<0.002	0.197	0.073	0.201	0.233
Downstream (CHAPCR38)		not sampled	<0.002	0.315	0.125	0.286	0.194
Total Phosphorus							
Upstream (CHAPCR08)	mg/L	0.010	<0.005	0.006	0.005	<0.005	<0.005
Downstream (CHAPCR38)		0.009	<0.005	0.006	0.005	<0.005	<0.005
Chloride							
Upstream (CHAPCR08)	mg/L	2.2	2.5	1.5	1.4	1.7	1.5
Downstream (CHAPCR38)		2.1	2.2	1.7	1.8	1.7	1.4
Fecal Coliforms							
Upstream (CHAPCR08)	CFU/100mL	11	7	<2	2	5	<2
Downstream (CHAPCR38)		16	27	8	2	11	<2
pH							
Upstream (CHAPCR08)	s.u.	6.8	6.8	6.5	6.5	6.4	6.6
Downstream (CHAPCR38)		7.1	7.1	6.6	6.6	6.6	6.6

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Table 6. Summary of Deer Forage Monitoring in Two Lake Chaplain Harvest Units

Percent Cover[1] of Shrub, Forb, and Tree Species < 6' Tall

Species	Unit 1991-1	Unit 1995-1
Fern species	31	11
Fireweed	16	31
Salal	8	3
Huckleberry	4	<1
Thimbleberry	4	-
Other Rubus species	6	1
Oregon Grape	6	-
Aster species	-	8
Grass species	<1	3
Forb species	<1	2
Other Species	21.5	5
Total Understory Vegetation Cover	96.5	63.9
Unvegetated[2]	7	42

No. of Trees >6' tall encountered on transects

	121	0

[1] Percent cover = sum of the lengths of transects covered by each species divided by the total length of the transects.
[2] Includes bare ground, slash piles, coarse woody debris, roads, and skid trails.

4.0 CUMULATIVE SUMMARY

A summary of all activities completed under the WHMP, from the earliest implementation in 1988 through the end of December 1998, is presented here.

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 Lake Chaplain and the area south of the Diversion Dam Road has been constructed, as shown in Figure 2. Some spur roads will be constructed to serve individual harvest units in the future, but the major construction in these areas has been completed. We require that openings be left in the slash along rights-of-way at 100 foot intervals to allow wildlife to easily pass through. Deer have been observed using these breaks, and we will continue using this practice in future road construction.

The main road system for the west side of Lake Chaplain has been laid out, and construction is expected to follow as part of the next timber sale.

4.1.2 Final Harvest

Five (5) units were scheduled in the WHMP for final harvest from 1990-1995, and five (5) units were scheduled from 1995-2000 (Figure 8). Three (3) of the units in the first group have been harvested. Harvest of a fourth 1990 unit was been delayed pending road construction, and will be included in a future sale. Harvest of the remaining 1990 unit was deferred because it contained many snags and other habitat characteristics which we are trying to preserve and promote. Another unit was substituted for the 1990 unit in the Diversion sale, which also included one unit scheduled in the WHMP for harvest in 1995. The Diversion sale was harvested in 1995. This substitution will not compromise the WHMP requirement for a 15-year green-up period between the harvest of adjacent units. One (1) 1995 unit was harvested in 1993 as part of the Horseshoe Sale. Two (2) other 1995 units will be included in the Tiki Sale, which is scheduled for sale in 1997. Thus six (6) units have had final harvests and two (2) are expected to be sold in the next year, compared to the target of five (5) for 1990-1995 in the WHMP schedule, and five (5) for 1995-2000. The WHMP provides flexibility in scheduling final harvest - actual harvest may occur within ten years before or after the target year. Therefore, accomplishments to date are within the acceptable range.

4.1.3 Commercial Thinning

Two (2) units (36 acres) were commercially thinned in 1993 (Figure 8). These units were not specified in the WHMP schedule, but were thinned because it appeared that the understory vegetation would respond favorably, and because the thinning operation was feasible with little impact to the stand or soils.

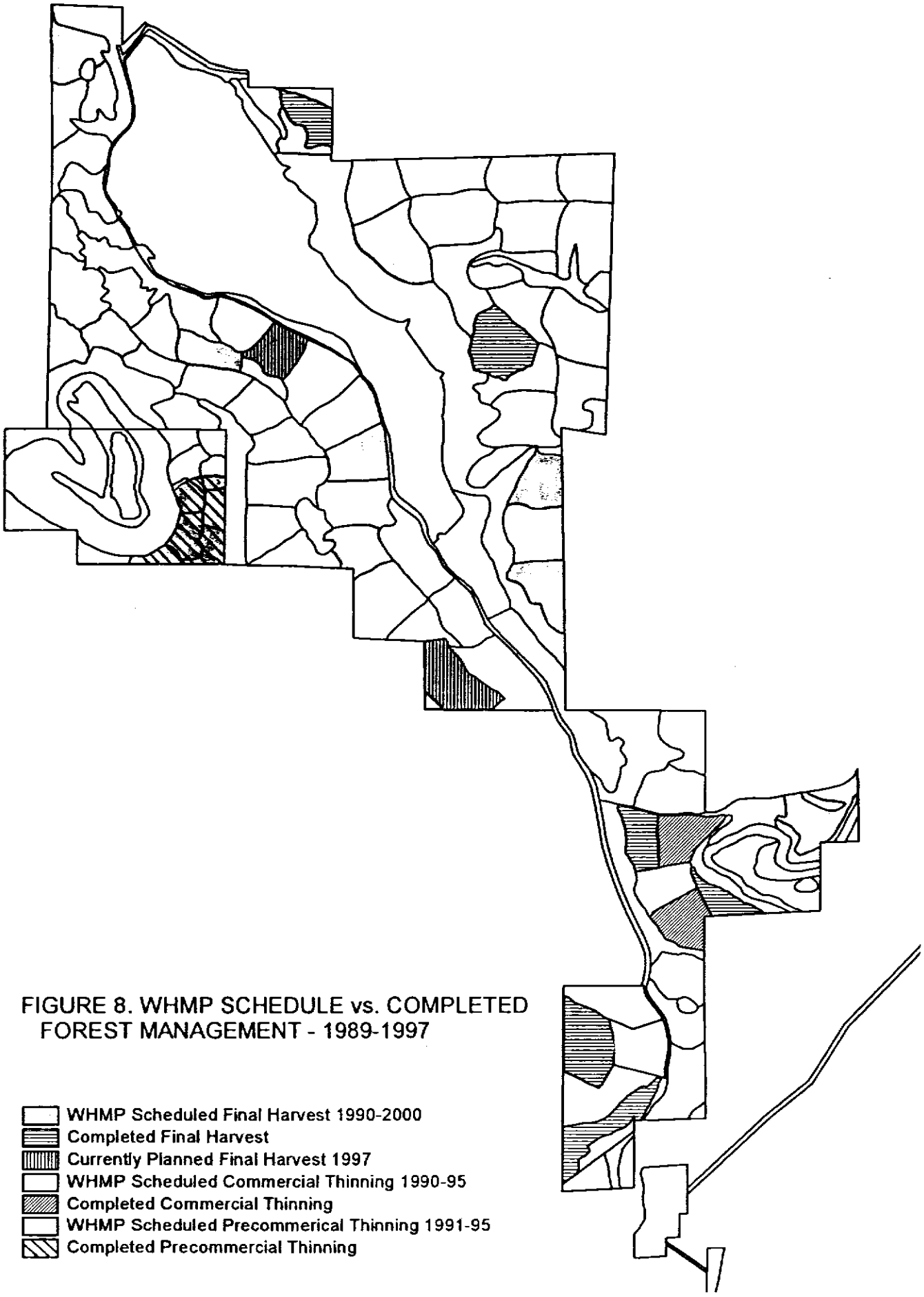


FIGURE 8. WHMP SCHEDULE vs. COMPLETED FOREST MANAGEMENT - 1989-1997

five (5) other units (totaling approximately 106 acres) that were scheduled for thinning in the WHMP through 1994 (Figure 8) have been deferred until roads are constructed to nearby final harvest units (Figure 2). It is likely that some of these units may not be thinned due to unsuitable site conditions, such as soil, timber type, or slope. Scheduled units that are suitable will be thinned as the major road system reaches completion, and other unscheduled units will be evaluated as possible candidates for thinning. Criteria for thinning will include wildlife habitat benefits and operational feasibility.

4.1.4 Management of Roads and Post-Harvest Units

All final harvest units have been seeded with a grass/forb mix after harvest, and replanted with fir and cedar seedlings. Cottonwood cuttings were planted in moist areas of two (2) of the final harvest units. The rights-of-way of new access roads and spur roads were also seeded with a grass/forb mix. Access roads have been gated to prevent their use by the public, and a spur road in one (1) of the Diversion Sale (1995) units was abandoned.

In addition to harvest of scheduled units, described in Section 4.1.1, some trees adjacent to the three (3) Chaplain Sale (1991) units were salvaged after being blown down by a major storm in January 1993. The affected areas were replanted with Douglas fir seedlings after harvest, and were added to the adjacent unit for future management. The green tree area of one (1) unit was reduced by the same storm, but the downed trees were not salvaged to avoid damaging surviving trees. The affected area was replanted with Douglas fir seedlings, and will remain part of the GTA.

4.2 FOREST VEGETATION MANAGEMENT AT LOST LAKE TRACT

Precommercial thinning of approximately 46 acres at Lost Lake was completed as scheduled in 1991 (Figure 8), and photo documentation stations were established to monitor the results annually. As of November 1996, hemlock thickets that were thinned had significant amounts of slash remaining on the ground that may limit their use by anything other than small birds and mammals. Alder pockets and trails that were cut through the unit had shrub layers consisting primarily of salmonberry, which were not present prior to thinning. Salmonberry was lightly browsed at three (3) out of five (5) of the monitoring stations.

4.3 FOREST VEGETATION MANAGEMENT AT SPADA LAKE TRACT

Three (3) young second growth stands (totaling about 30 ac.) on the south shore of Spada Lake were precommercially thinned in September 1996, following a prescription that is described in Section 3.1.5 (Figure 3).

4.4 SNAG MANAGEMENT

Earlier Annual Reports, particularly the 1994 and 1995 Annual Reports discussed the problems that have slowed progress on performing inventories and snag creation as scheduled in the WHMP. These reports described our priorities in snag management. In the 1994 Annual Report, areas that would be targeted for snag management over the next four (4) years (through 1998) were identified. As shown in Figure 9, we have made good progress toward meeting this goal. Snag inventory/creation has been completed in all of the units that have had final harvest, plus all of the units scheduled for final harvest in 2015, except for one (1) unit that may be commercially thinned. Additional units, including buffer zones, permanent mixed forest and old growth management areas have been inventoried and snag trees have been created (Table 1). A total of 766 snags have been created since implementation of the WHMP began in 1989. A total of 272 acres has now been verified as meeting the WHMP requirements of 3.07 snags per acre as well as the target size distribution for snags.

Since implementation began, we have continued to refine our inventory and snag creation procedures. A draft inventory/monitoring method, described in Section 3.2, is under review that will ensure accurate and consistent collection of data.

4.5 COARSE WOODY DEBRIS MANAGEMENT

The 1995 Annual Report describes results of previous pre- and post-harvest CWD inventories on final harvest units of the Chaplain (1991) and Horseshoe (1992) Sales. This report also described the development of the CWD management procedure during 1995, which ensures compliance with the WHMP targets for CWD density and size at the time of harvest.

The CWD procedure was implemented on the two (2) units of the Diversion Sale at Lake Chaplain, which was harvested in 1995. Pre-harvest CWD inventories were sampled using the circular plot method (see Appendix A of the 1995 Annual Report), but no post-harvest sampling was done. Instead, as prescribed in the CWD procedure, (and discussed in detail in the 1995 Annual Report), a complete post-harvest inventory of all of the designated created CWD trees was done to ensure compliance. Created CWD on the Diversion Sale Units was marked and mapped in 1996 for long-term monitoring. Agency representatives approved the CWD procedure for supplementing class 1 and 2 logs on harvest units (See Annual Meeting Notes p. 11, and letter dated April 22, 1996 from the Tribes, in Appendix A of the 1995 Annual Report), but had a further request regarding logs in existence prior to harvest. Agency representatives requested that the co-licensees investigate the potential impacts of timber harvest on existing CWD, especially in the decay classes 3, 4 and 5, and develop a quantitative monitoring procedure that involved re-visiting the same sample plot and/or logs.

In 1996, a draft inventory/monitoring method was developed (which is currently under review), that includes marking specific logs of decay classes 3, 4 and 5 and monitoring their condition immediately following harvest. The draft method also will change some details of previously-used sampling designs for estimating CWD density, as described in Section 3.3

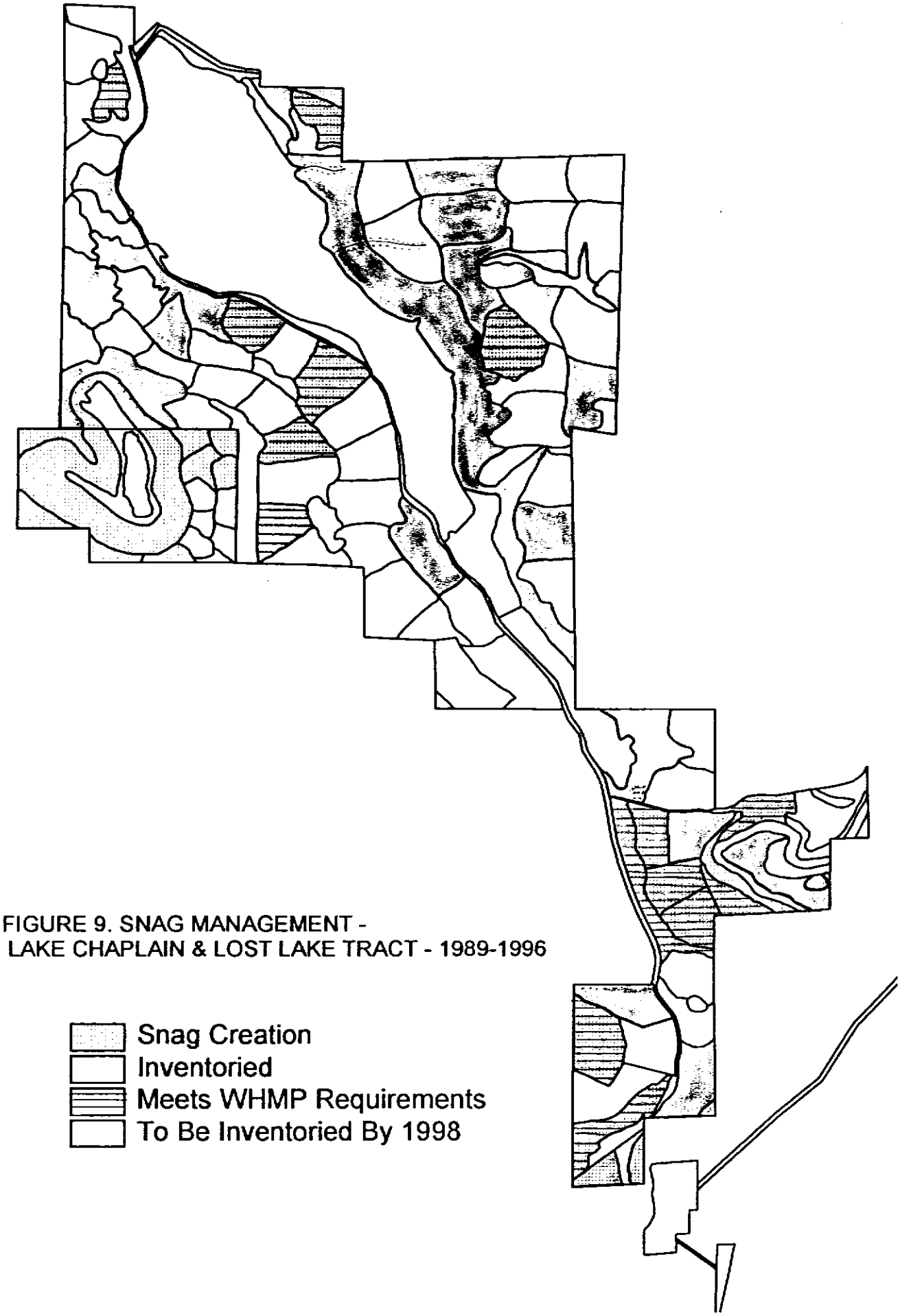


FIGURE 9. SNAG MANAGEMENT -
LAKE CHAPLAIN & LOST LAKE TRACT - 1989-1996

4.6 REVEGETATION

Tree/shrub plantings at the north end of Lake Chaplain (Stand 1-17), Chaplain Marsh (Stand 4-8), and the powerhouse (Stand 8-4) have been completed as described in consultant reports attached to the 1991 Annual Report. The plantings are consistent with the objectives of the WHMP, to provide screening between the Lake Chaplain Road and the lake and marsh, and to provide forage and shelter at all three (3) sites.

4.6.1 North End of Lake Chaplain and West Side of Chaplain Marsh

The required plantings at the north end of the lake, and adjacent to Chaplain Marsh were monitoring twice annually between planting (in 1992 and 1993, respectively) and 1995, and once in 1996. Survival of shrubs adjacent to the marsh has been close to 100 percent with generally good growth. Douglas fir saplings at the north end of the lake have also had very good growth, with overall survival over 90 percent.

4.6.2 Powerhouse

Shrub and tree plantings were monitored at least twice each growing season between planting in 1993 and 1995, and once in 1996. Survival of tree species has been greater than 90 percent, and growth has been variable: crabapples have had fair to excellent growth, and Oregon ash and hawthorn have had poor to good growth (Table 3). Most of the shrubs, with the exception of Nootka rose, have not done very well most likely due to poor soil on the site.

4.6.3 Power Pipeline Right-Of-Way

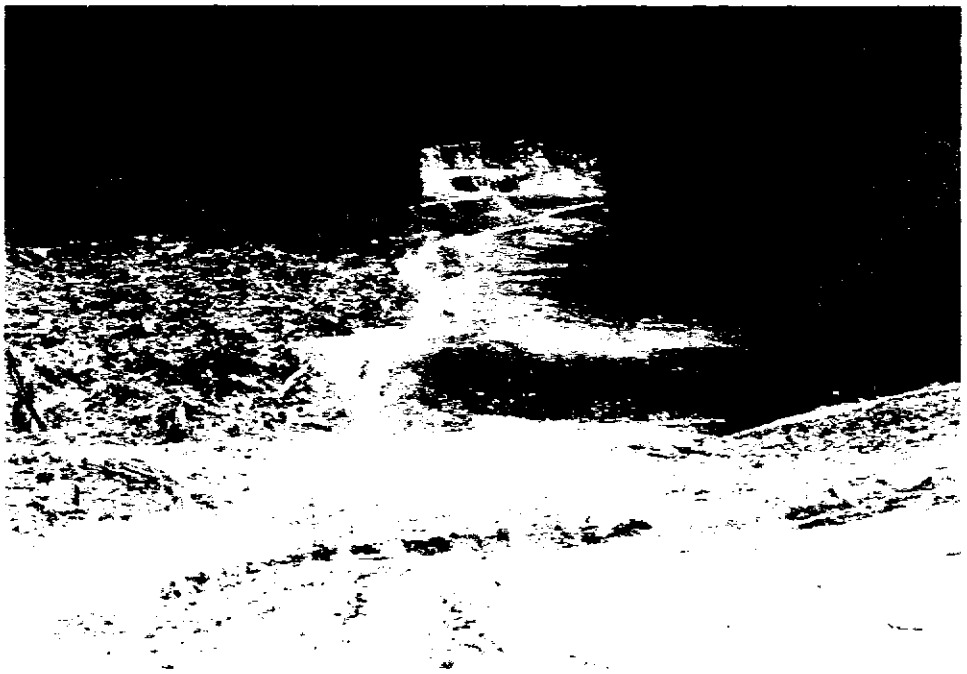
As described in previous annual reports, the pipeline ROW from the Marsh Creek gate to the Powerhouse has been seeded annually since 1990. On this portion of the ROW, those areas where revegetation has not been successful are re-seeded annually. Fertilizer has been applied where permitted, outside of the City of Sultan's watershed. Results of seeding and fertilizing the pipeline right-of-way have been qualitatively evaluated each year. It will still be necessary to mow alders every few years. Some shrubs (mostly salal) are coming in and will be protected from mowing in the future. Small piles of tree stumps have been placed at intervals on the right-of-way to encourage wildlife use and shrub growth (Figure 10a).

North of the Marsh Creek gate, the ROW has been seeded since 1994 and has a good grass layer in most areas. Sparse growth prior to 1994 made it unnecessary to sample percent grass/forb ground cover, but there was improved coverage in 1995 (Figure 10b). Re-construction of a portion of the access road along the pipeline between the tunnel portal and Marsh Creek has been initiated.

Trees and shrubs have not yet been planted on the power pipeline right-of-way, based on the consultant's recommendation in 1991 that a sod layer should be developed first to help improve the soil. Other improvements, such as gates over access roads, boulders and ecology blocks, have reduced the damage caused by off-road vehicle traffic and garbage dumping on the upper portion of the pipeline north of the Marsh Creek gate. Figure 10c shows improvements to Marsh Creek.

FIGURE 10a. View of Pipeline Right of Way near Manhole P13. Photo taken in 1995.

FIGURE 10b. Pipeline Right of Way looking NE from Manhole P3. Upper photo taken in 1987; lower photo taken in 1996



4.6.4 Spada Lake Drawdown Zone

Test plots of five (5) wetland emergent species were planted at two (2) sites in October/November 1994 and monitored in 1995 and 1996. Several species, including two (2) sedge species, survived well during the first growing seasons at Williamson Creek. Wave action damaged many of the plantings at the North Fork site.

4.7 NEST STRUCTURES

All of the nest structures that were required by the WHMP have been installed and monitored annually thereafter. In 1990, two (2) floating nest platforms were placed in Lost Lake. The required two (2) duck nest boxes were installed at Lost Lake in 1990. One (1) osprey platform was installed at Lost Lake in 1990, and two (2) at Spada Lake in 1992. In addition to the required nest structures, we placed two (2) floating platforms, (one (1) of these in place of the third platform required at Lost Lake), in Lake Chaplain in 1990 in hopes of recruiting loons. We placed six (6) nest boxes in Chaplain Marsh in 1993. In 1995 we placed four (4) additional nest boxes at Lost Lake and three (3) more at the north end of Chaplain Marsh. In 1996 we removed the three (3) boxes from the north end of Chaplain Marsh because only starlings were using them. They were installed at Lost Lake in 1996 (see Figures 6 and 7). Three (3) new nest boxes were put up at Williamson Creek in the Spada Lake Tract in summer 1996 (Figure 5).

The nest structures have been monitored every year since installation. About half of the duck nest boxes have been used by wood ducks and/or hooded mergansers each year. The osprey platform at Lost Lake produced one (1) fledgling in 1994 and one (1) in 1995. Nesting was attempted in 1996, but the nest was abandoned in July. 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. The floating platforms have been used for resting and feeding by waterfowl and otters, but no breeding attempts have been noted.

4.8 DEER FORAGE MONITORING

The 1991 and 1995 Annual Reports described several changes from the WHMP's methods. As discussed in the 1991 Annual Report, the objective of monitoring deer forage was changed from a comparison of WHMP harvest methods with typical industrial forest management to a comparison of Lake Chaplain units before and after harvest. Also, we experimented with two (2) methods for estimating forage availability and a method for estimating deer utilization of harvest units, as described in previous annual reports. In 1996 it was decided, with agency consent, to eliminate estimates of forage utilization, and to concentrate on comparing forage availability on post-harvest units with the pre-harvest condition and other unharvested second growth stands.

4.9 LAND EXCHANGE

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. 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.

FIGURE 10c. Improvements to Pipeline Right of Way Crossing at Marsh Creek. Upper photo taken in 1988; lower photo taken in 1996.

5.0 WORK PLANNED FOR 1997

5.1 FOREST VEGETATION MANAGEMENT

5.1.1 Lake Chaplain Harvest Units

Layout of two (2) units of the Tiki Sale on the west side of Lake Chaplain will be completed, including allocating trees for created snags and CWD. These units will be sold during 1997, and harvest may take place in 1997 or 1998. Final road layout work will be done on the west side of the lake to provide access to these, and other future harvest units. The roads may be built in 1997 or 1998, as part of the Tiki Sale contract. Layout of 1998 harvest units, consisting of two (2) units scheduled in the WHMP for 1995, will be completed, but they are not expected to be sold during 1997. (Figure 2) Additional units shown in Figure 2 as currently planned for sale in 1998-2000 are subject to change.

5.1.2 Lake Chaplain Plantation Monitoring

During 1997, plots will probably be put in the Chaplain Sale units (harvested in 1991) to check whether hardwood density is sufficient. Stocking levels for Douglas fir appear to be high, with average annual growth of about three (3) feet. Some of the western red cedar seedlings have been browsed by deer, but the remainder appear to be growing well.

5.1.3 Buffer Zone and Green Tree Area Management

Buffer zones (BZ's) and green tree areas (GTA's) that have been established as part of past timber sale layout on the Lake Chaplain Tract will be monitored during 1997. We also plan to develop management plans for GTA's, which may involve snag creation, light thinning, and underplanting. The management objective for GTA's is to preserve trees for future snag creation needs of the associated harvest unit. In some cases a light thinning, interplanting, or other measures may improve growth rates of the trees that are retained in the GTA, as well as other habitat values. The feasibility of making such improvements on established GTA's will be explored during 1997.

5.1.4 Spada Lake Precommercial Thinning

We will investigate the benefits of additional precommercial thinning on young second growth stands on the Spada Lake Tract that were identified in the Spada Lake Tract Supplemental Plan. If prompt action is most beneficial to wildlife, we will thin the stands in 1997; otherwise, thinning may be deferred.

5.2 SNAG MANAGEMENT

Inventory efforts will continue during 1997 to ensure that those units shown on Table 1 as having incomplete inventories or no inventory at all, as well as those shown in Figure 9 as requiring action by 1998, will be inventoried by the end of 1998. Additionally, units scheduled for harvest in the year 2020 will be added to our inventory priority list so that necessary snag creation can be completed by the year 2000. We will begin long-term monitoring of a subset of the snags, revisiting them every three (3) years.

This monitoring, which is more frequent than that required by the WHMP, will provide us with additional information on decay rates and wildlife use of different snag species and sizes, which we may use to adjust our snag management program. The details of the sampling/long-term monitoring method will be finalized.

5.3 COARSE WOODY DEBRIS MANAGEMENT

In 1997 we will follow the CWD Procedure (see 1995 Annual Report, Appendix A) in completing the setup of the upcoming Tiki Sale. An appropriate number of existing snags and green trees will be designated for CWD on these units. The procedure for evaluating the impacts of harvest on pre-harvest logs in decay classes 3, 4 and 5 will be implemented in this sale. The details of the sampling/ long-term monitoring method will be finalized, and logs on the Tiki Sale units will be marked for long-term monitoring.

5.4 REVEGETATION

The areas that were previously planted (powerhouse site, Chaplain Marsh, north end of Lake Chaplain, Spada Lake drawdown zone, and pipeline right-of-way) will be monitored. Seeding and possible fertilization of the ROW will be done again this year in those areas where it is needed. Thinning of the buffer strip between the access road and the pipeline will likely begin this year as well, as time permits. The reconstruction of the portion of the access road along the pipeline from Marsh Creek to the tunnel portal will also be completed this year.

We will begin quantitative monitoring of the vegetation cover on the pipeline ROW in 1997 to document changes over time. Results will be used to adjust the seeding and fertilizing program if necessary.

5.5 NEST STRUCTURES

Floating nest platforms in Lost Lake and Spada Lake (depending on accessibility) will be monitored from March at least through the end of June. If there is any use of the platforms, monitoring will continue through the entire breeding season.

Nest boxes and platforms and any new osprey nests at any of the lakes will be monitored following the procedure in the 1991 Annual Report.

5.6 DEER FORAGE MONITORING

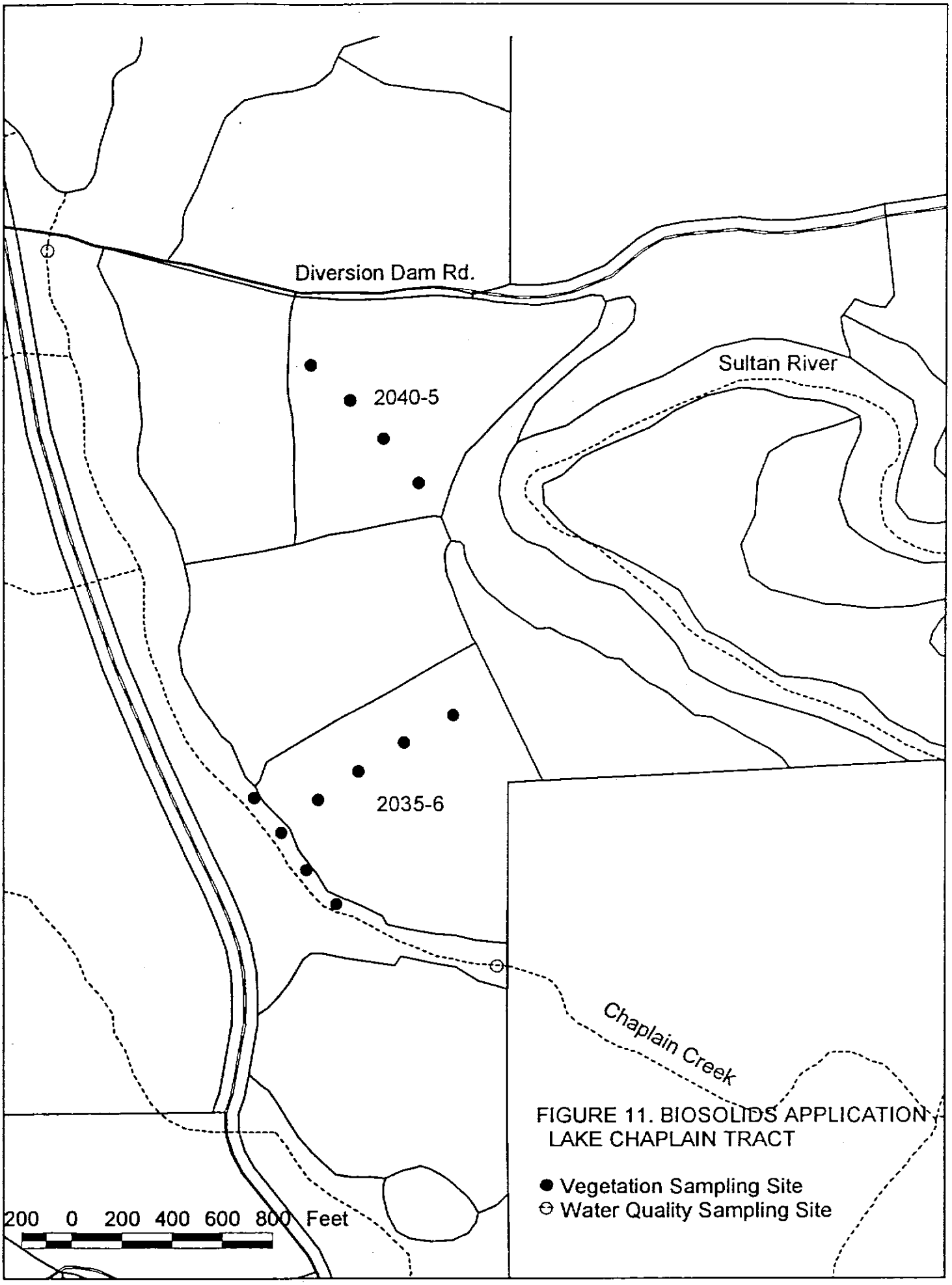
In 1997 we will test the alternate sampling method recommended by the consultant in 1996, compare the results with those obtained with the WHMP method in 1996, and decide which will be used in the future. The details of the procedure will be finalized in 1997.

5.7 BIOSOLIDS APPLICATION AT LAKE CHAPLAIN

Vegetation monitoring will be conducted in accordance with the vegetation monitoring plan (Appendix A). Sample plots have been established in units 1993-1 and 1993-2. Check plots have been established southwest of unit 1993-2 (Figure 11).

5.8 WHMP SUPPLEMENT FOR SPADA LAKE TRACT

The supplement was submitted to the FERC in January, 1997 and we are waiting for approval.


Diversion Dam Rd.
Sultan River
2040-5
2035-6
Chaplain Creek
200 0 200 400 600 800 Feet
FIGURE 11. BIOSOLIDS APPLICATION
LAKE CHAPLAIN TRACT
Vegetation Sampling Site
Water Quality Sampling Site

6.0 SCHEDULE OF ACTIVITIES FOR 1997

Activities scheduled for 1997 are reported in Table 7.

Table 7. Habitat Management Activity Schedule for 1997

Major Activities	Location	Quantity
Final Harvest		
Complete layout and sale	Tiki Sale; see Figure 2	2 units (approx. 35 ac.)
Road Layout	West side of L. Chaplain, see Fig. 2	Approx. 6000 ft.
Snag Creation	TBD	TBD
Snag Inventory	Areas shown in Figure 9	TBD
Revegetation		
Grass seeding/fertilizer	Pipeline ROW	As needed to improve bare spots.
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.
Monitoring		
Deer Forage	Chaplain Sale and Horseshoe Sale units	2 FH units and 2 unharvested reference units.
Coarse Woody Debris	Tiki Sale units	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 Lake.
GTA and BZ Management	All established units	Monitor and develop long-term management plans.
Spada Lake Supplemental Plan	Spada Lake Tract	Final plan submitted to FERC in January 1997.

APPENDIX A

VEGETATION MONITORING PLAN
CHAPLAIN FOREST FERTILIZATION PROJECT

1. Twelve (12) permanent, nested plots will be located.

   Four (4) plots will be located in stand 1993-1. Four (4) plots will be located in stand 1993-2 and four (4) plots will be located outside the application area between stand 1993-2 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 (2) years after fertilization. Data will be collected between July 15 and September 15.

2. Plots will consist of two (2) 0.025 ac. Understory vegetation plot and one (1) 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 (2) dominant or codominants and two (2) intermediate or suppressed).
   Crown class (all trees): Dominant, codominant, intermediate, suppressed, dead
   Species

APPENDIX B

AGENCY CONSULTATION – ANNUAL MEETING MINUTES AND CORRESPONDENCE

No written comments were received by the wildlife agencies. USFWS and WDFW were contacted in April 25, 1997. Their representatives stated that they would not be submitting written comments. The Tribes' representative did not return the phone message.

Draft 2/25/97

Wildlife Habitat Management Plan

Annual Meeting Agenda
March 27, 1997
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
   - WHMP Supplement for Spada Lake Tract
   - Biosolids Application at Lake Chaplain Tract
   - Deer Forage Monitoring

3. Problems or Concerns

4. DNR Road Status in the Basin (tentative depending on DNR participation)

5. Future Reports/Meetings

6. Summary

7. Field Visit to Biosolids Application Sites

* Lunch will be provided.

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

3/27/97

WTMP Annual Agency Meeting

Sign in Sheet

Name	Organization	phone
Don Farwell	City	257-8204
Bernice Tannenbaum	PUD	304-1746
Karen Bedrossian	PUD	304 1774
Dan Thompson	City	257-8860
Kathie Geyner	City	257-8949
Bruce Meeker	PUD	304-1722
ALLEN McGUIRE	DNR	856-3500
NEPHI JOHNSON	PUD	347-5549
Diana K. Wogl	PUD	304-1704
GWILL GING	USFWS	360-753-6041
Gary Engman	WDFW	206-775-1311
Rod Metzgar	Everett	206/257-8884
Dan Lowell	" "	" "/257-8823

Wildlife Habitat Management Plan
Annual Joint Agency Meeting
of March 27, 1997

In attendance:
City - Don Farwell, Dan Thompson, Kathie Joyner, Roy Metzgar, and Dan Lowell
PUD - Bernice Tannenbaum, Karen Bedrossian, Bruce Meaker, Nephi Johnson, and Diana Woge
DNR - Al McGuire
USFWS - Gwill Ging
WDFW - Gary Engman

1. Introductions

Bernice opened the meeting and gave introductions.

2. Progress and Work Planned on WHMP Implementation

- Forest Vegetation Management

Don reviewed Figure 2 showing the units harvested in 1995 and replanted with fir and cedar seedlings in 1996. He also discussed the upcoming (spring 1997) sale of two (2) units. Road location will depend on whether right-of-way easements can be negotiated with DNR. If access is not over DNR land, access to these units will be provided by building a new road off the Lost Lake road and extending the road that was built for the Chaplain sale Unit 3 across Chaplain Creek.

Another project currently in progress is using GPS technology to get coordinates of the section corners on the boundaries of the Lake Chaplain Tract and other reference points within the Lake Chaplain Tract.

Gwill - You mentioned that you planned on a larger sale but the market conditions prevented that. If the market conditions change are you going to go back to the larger sale?
Don - No. Don went on to review the planned unit sales through the year 2000.
Gwill requested a map of the proposed unit "future" sales.
Bernice asked if the agencies wanted the proposed future sales map included in the final version of the 1996 annual report. (This map was not included in the draft annual report.)
Yes, the agencies would like to see the map included in the report.

(Bernice) The gist of this portion of the presentation is to demonstrate that by the year 2000, we will be completely on target with the schedule in the WHMP with the completion of these final harvests. Those units will have either been sold or harvested by that time.
Gary - What is the distinction between "planned" and "scheduled"?

Bernice - When the term scheduled is used it means it was written in or taken from the WHMP. Planned means our modifications. Bernice said these terms were not obvious when looking at the Figures.
Gary said he was misinterpreting it.
Bernice said we would need to correct that. Karen suggested changing the wording to "scheduled in the WHMP" or "currently planned".

Agencies agreed. Bernice recapped that we will include this information in a figure in the final report with language that explains that we are retaining the possibility of making changes.

(Don) The other work planned for this year is surveys in the 1991 harvest units. These surveys will be done to find out how many trees per acre are present and species composition. This is different from the vegetation surveys the District is currently doing.

Bernice reviewed pre-Commercial thinning activities in 1996 younger stands and annual monitoring of a 20+ year old stand at Lost Lake are currently being done. A slide presentation of the Lost Lake stand, thinned in 1991 was shown.

Some pre-commercial thinning was done last year at Spada Lake (Figure 3). Thirty (30) acres consisting of several age classes, some at 14 years post harvest and some at 30 years post harvest. Composition on these units was pretty much different but thinning was treated the same way. Both stands had too many conifers. The younger stand had a well-developed understory and is dominated by Huckleberry. Our objective here was to retain understory and promote it and provide for more diversity in the overstory. A 100-foot buffer zone was left along the lakeshore where no thinning was done to prevent woody debris from entering the water. Also, a 100-foot no cutting buffer zones along the South Shore road. A lot of bear damage is being noted in this area and elsewhere within the Spada Lake Tract. The bear are going for the larger conifer trees, firs and hemlocks. Bernice feels this may be an on going problem.

- Snag Management (Bernice)

We have been creating and inventorying snags at Lake Chaplain and Lost Lake since 1990. In 1996 we created 104 snags to be added to the total number of snags. Table 1 presents a summary of all snag creation and inventory activities since we began the program. Bernice stated that we are on target with the amended goals for the Wildlife Plan in terms of the densities and size distribution requirements.

Gwill - Snags created last year were marked with tags and painted. Have you gone back and tagged the snags created in previous years?
Bernice - We started to go back earlier this year and we will complete marking all snags this year. At the next meeting, we can hopefully begin making comparisons of wildlife use between the snag species.

Bernice showed slides showing snag tree use by several species. Bernice stated that snags have been created from four species; fir, cedar, hemlock and alder. Naturally occurring snags are included in the monitoring program. All species will be used in the monitoring program.

Gwill - Are any Alder trees being used by any animal species?

Bernice - No use has been seen on the Alders.

Gwill - Do you expect the alders snags to stay up?

Bernice - Maybe not, but use is expected. Data from created alder snags will be used in the comparison.

During the past year we have been working to improve the snag inventory and monitoring procedures. A consultant was hired to refine these methods. The main change from the method originally recommended in the WHMP, is the size of the sample plots. The WHMP calls for 10^{th} acre sample plots on units. The consultant has recommended using much larger plots; we therefore will be using ½ acre plots. In addition, we will be monitoring our created snag trees more frequently than the 10-year intervals described in the WHMP and using statistical tests to evaluate results.

Gwill - Who was the Consultant?

Bernice - Jim Marra, a Forester from the University of Washington. He is a specialist in soils and decay processes in forest stands, and is doing long-term monitoring of CWD on the Olympic Peninsula.

- Coarse Woody Debris

At the last few annual meetings, the joint agencies showed concern regarding the implementation of CWD on harvest units. During the 1996 meeting, the agencies concurred with the co-licensees' detailed new CWD management procedures. We implemented the CWD procedure on the two (2) units of the 1995 sale, and are currently using the procedure on the 1997 units. We will also mark existing CWD to evaluate its condition after harvest.

Gwill - What will the marking involve?

Bernice - We will be painting them, taking pictures, and including a verbal description of condition, etc.

Bruce - Does this mean all the CWD laying out there will be marked?

Bernice - No, the intention is to look at the more valuable pieces, especially larger, fairly rotten logs. Logs in decay classes of 3, 4, and 5 are the concern. These are logs that are left over from a previous rotation. It's our intention to preserve these.

Bruce - Will the 1 and 2 classes be preserved?

Bernice - Some of them will be left on the stand and some will go to market. We will have the required number of CWD logs in decay classes 1 and 2 on the stand. Whether it comes from an existing tree that has fallen over or a live tree that's been deliberately felled, the required number of class 1 and 2 logs will be on the stand after harvest.

Gwill - What part of the existing CWD on the ground will go to market? Are those primarily trees that blew-down in recent time?

Bernice – Most of the trees that fell down are smaller than 20". There are not very many trees greater than 16" lying on the ground. We don't know what proportion of these trees will go to market.

Don added that the total number of plots per unit has been reduced while the plot size has increased over the WHMP procedures.

Bernice - Fewer and larger plots were the recommendation of the UW Consultant.

- Revegetation (Including Plantings in Drawdown Zone)

Bernice reviewed Figure 5 showing test plots on the Spada Lake drawdown zone. In late 1994 we planted five (5) different wetland species at two different sites between elevations 1430 and 1445 in rows perpendicular to the shoreline. Two (2) of the sedge species and hardstem bulrush have survived reasonably well down to the 1435' elevation, but are not propagating. Slides were shown during this portion of the presentation.

North Fork Site: At this site we had a lot of scour due to wave action and a lot of debris that's knocked out the plants.

Gwill - Would a log boom reduce the woody debris?

Bernice - That's a possibility, but even with the large boom log at the west end of the lake, debris still gets through.

Nephi – It would be hard to anchor a log boom at this site.

Karen - That's not our biggest problem. It's the soil, extreme water fluctuation, exposure, and timing of highwater during the growing season.

Gwill – What are you finding relative to elevation?

Bernice – The next slides from the Williamson Creek site, illustrate this better.

Williamson Creek Site: At this site we did not have the debris movement or scour problems. Our rows of plants are visible in the slide, especially sedges. They're surviving but not doing particularly well. Nature took over with a mixture of grasses, including mannagrass. The grass grows as low as 1435-foot elevation. When we planted, there was only mud present on the site. The species we planted were present in the Basin.

Gwill - Of the species you planted at the site, did they already occur on site? How extensive is the natural in-seeding?

Bernice – Yes, they were there, and the spread of natural plantings has been greater than our plantings. We are now finding our plantings amidst the naturally seeded-in plants. We haven't measured the area covered by natural in-seeding. We will continue to monitor plants for a couple of years to determine whether our plantings are spreading, but so far nature has done more planting.

Gwill – I didn't see much additional growth on the previous slide.

Bernice – The previous slide was taken at the north Fork site, where naturally established plants would be subject to the same battering by waves and woody debris that damaged our plantings. But there is some natural growth at North Fork too.
Gwill - The water, shown in the slide, is that from the reservoir or ground?
Bernice - No, this area is in a little inlet.
Gwill - Do you have any examples of plants putting out rhizomes?
Bernice - No, however, we will be looking for that.

Power Pipeline Right-of-Way: We have been working to improve the vegetation on the ROW since 1991. We will continue to improve grass layer by seeding and fertilizing. However, we do have problems in certain areas due to gravel and poor soil. We'll continue improving the grass layer.

Lake Chaplain: In 1992 we planted seedlings of western red cedar and Douglas fir to create a vegetative screen between the road and the lake. Slides showing changes in the screen density were shown.

This same type of planting was done along the Chaplain Marsh area. We planted holly trees and other shrubs as well as western red cedar. All species are growing well on this site. This screen was planted in 1993.

Powerhouse: Plantings at the powerhouse site were done in 1993. The planting included shrub groups and tree groups. These plantings have not done as well because this site is drier and has poor soil.

Slides were shown of all vegetation sites.

Gwill - Are the other species at the Chaplain Marsh site doing well?
Bernice - Yes, it is a favorable site with good soil and very moist.

- Nest Structures - (Karen)

Slides of the floating nest structures were shown. Use of Lost Lake platforms (cropped vegetation) was noted.

During 1996 we moved the two (2) platforms that were at Lake Chaplain to Spada Lake. No nesting use has been observed at any of the floating platforms.

Three (3) nest boxes were put up this year at Williamson Creek. These were put in late in the year so there's been no use observed.

There has been no (successful) use on the osprey nests at Spada Lake. A nest was built on the South Fork platform, but it was abandoned in mid-season in 1994. A new osprey nest has been observed west of the dam. This is a natural site in a tree not on project lands.

At Lost Lake we put in three (3) additional nest boxes at the north end, after removing them from Chaplain Marsh. The two (2) boxes initially put in, in 1990, were taken down at the end of the season because they were attached to unstable snags. There are currently seven (7) nest boxes at Lost Lake. At Chaplain Marsh, we removed the three (3) from the north end because they were just attracting starlings.

Monitoring Results are:
Total of 15 boxes up during 1996, seven (7) were used, and five (5) were successful with a total of 37 eggs hatched. These boxes were used by wood ducks and hooded mergansers.

Gwill requested that information on which species used the boxes be included in the annual report.

- WHMP Supplement for Spada Lake Tract (Karen)

Last year we presented a draft plan to the agencies, and then refined the program, and developed a schedule and cost estimate. Each of you should have received a final version. The final version went to the FERC in January and we are currently waiting for the their response. Our plan for this year is to look at possible pre-commercial thinning activities.

No comments or questions from the agencies at this time.

- Biosolids Application at Lake Chaplain Tract (Dan Thompson)

(Slide presentation during presentation)

Last August, 450 dry tons of biosolids were applied in the Horseshoe Bend area. This is 12 ½ dry tons per acre. This was half of the originally planned prescription due to application problems and aesthetic reasons. The objective of the project is to increase understory, tree growth, tree diameter, stratification, and protein content of the vegetation. The stand fertilized was an approximately 50 year old coniferous forest dominated by Douglas Fir and hemlock.

Dan reviewed Table 5 showing water quality monitoring results. Monitoring will include vegetation growth in the treated units and control plots. Height and diameter growth, by crown class, understory species composition and percent cover, and understory height will be measured and compared between the test unit sample plots and control plots. We have already seen a significant amount of grass growth in the skid trails.

Gwill - Will you reapply biosolids to the same site or is this a one time application?
Dan - That will depend on the results of the monitoring. If it seems to be doing a good job, that would be my recommendation.
Gwill - Do you have a sense of what levels the trace elements are at?

Dan - Yes, we monitor ten trace elements that would be a considered a concern from a health stand point. Based on the Federal 503 risk assessment for biosolids, we easily meet the criteria for being below the levels of concern.

Gwill - Explain the meaning of Class A biosolids.

Dan – It has to do with fecal coliforms, enteric viruses and helminth ova. We have never found significant levels of pathogens in the lagoon, but we can't call the biosolids Class A at this point for regulatory purposes.

A lengthy conversation followed regarding biosolids, including treatment technology, history, and monitoring standards.

Gwill – What specifically will you look at in monitoring the understory?

Dan – Species composition, percent cover and height on $1/100^{th}$ acre plots.

Gary – Will results be comparable to what was presented in Table 6 of the report?

Dan – Yes, future plans are to continue monitoring for three (3) to five (5) years.

- Deer Forage Monitoring (Bernice)

As reported in previous meetings, we have had to develop methods for the deer forage monitoring program. As described in the WHMP, there are two (2) different types of measurements to evaluate availability/preference by deer, and to document utilization. Problems have occurred with the different methods used, so last year we went back to the method described in the WHMP on two final harvest units. The results in Table 6 of the report were summarized. Cover by palatable species has increased over the unharvested condition in which most cover consisted of relatively unpalatable ferns.

During the past year we presented the sampling procedure to a statistician at Parametrix. They came up with a possible alternative for the procedure described in the WHMP. We are having problems with the WHMP method because it is extremely time consuming and labor intensive. We are planning to do something slightly different this summer that will be statistically reliable, but less time consuming.

Karen - We dropped the utilization portion of the study and replaced it with baseline sampling and sampling in unharvested second growth for forage availability.

Don - The cover is much higher due to the presence of other types of shrubs, plantation trees, etc. Bernice stated that the table in the report doesn't show plantation trees.

Karen – Obviously, as the stand ages, the plantation trees will over shadow the palatable forage.

Gary - Is there a way to represent that?

Bernice - We could. We have some data.

Gary - It would be helpful to see the contrast over time.

3. DNR Road Status in the Basin (Al McGuire)

Two separate road abandonment projects were discussed in last years meeting regarding the Pilchuck drainage area and the North Shore of Spada. The projects are almost completed.

The North Shore Road is being treated as an unnecessary road under the DNR's land management; however, the PUD does have an Administration easement for access but not for commercial products. The DNR's intentions are not to keep this road in the inventory in a managed state, which means abandonment, probably in 2-3 years.

Other Projects of Interest:

Conservation Area application for the North Fork drainage area was made to the state legislature. It was asked if the designation will restrict mining? Al actually said that access was the big issue because the mineral rights already belong to the DNR trusts. The Mine to Market road is the big issue.

DNR is completing a land survey and monumentation project around the Lost Lake tract. DNR knows that the south/east corner of the PUD property is incorrect. The boundary lines will be moving. Karen asked where. Al said he did not know where the boundaries would be after the survey. There is no doubt to an east/west error and some question regarding the north/south boundaries. This work will be done by the end of the summer.

Karen - Are you in contact with someone at the PUD as far as letting them know what's going on?

Al - When the monuments are done they will be recorded at the County Courthouse. Since there are no results, we really don't need any contact at this point. We'll probably monument in the next month, and finish documentation in a few months. Since we're doing work in the area, we'll be reviewing the boundaries of the wetland (west of Lost Lake) as well. Gary Herrick is regional land surveyor.

Bernice - How soon do you expect the sale of the stand south of Lost Lake?

Al - It's a 1999 fiscal year sale, so we're a year and a half away from sale date.

Gwill - Will the surveying results have an impact on the Lost Lake wildlife mitigation?

Don – We'll neither gain nor lose land. If the marsh to the southwest of Lost Lake is not in PUD ownership after the survey is completed, it'll still be there. We may discover we've been managing land that wasn't ours, but we won't lose acreage.

4. Problems or Concerns

Gwill - The jury is still out regarding the Biosolids application. This issue is new to him and he is not sure whether biomagnification issues will come up.
Dan - You couldn't measure the biomagnification at this time.
Gwill - It would be helpful if we could look at other studies or projects and request results from them, and wondered whether we might expect the same results. If so, we may request studies at this site. We can't state whether we want studies at this time. I just wanted to say that we're not satisfied at this time that that's all the monitoring we may need.
Dan - would the agencies like more data sent to them?
Gary and Gwill – Yes.

Al repeated that the road access in the Basin is up in the air and may impact the PUD's activities. Bernice said we have broad language in the supplemental plan to cover things such as inaccessibility.

Al stated that the DNR will lay out a commercial helicopter thinning project this summer, to be harvested this winter. It will block the P5000, as the road will be utilized as landing spot. There will be no access for about a year on this road.

5. Future Reports/Meetings

Bernice stated that having the meetings and field trips during this time of year is not showing the agencies the full effect of our efforts. There would be an advantage to meeting in the summer. Don reiterated that the agencies wanted continued meetings until they were comfortable and wondered how often they should be held. Gwill said there are things that are still being worked out and he will definitely want another meeting next year. Bruce asked if they wanted a meeting prior to the annual report or defer that to sometime during the summer or early fall. There was a discussion of the timing of the Annual Report. Gwill said there would be an advantage to seeing things during the summer and that he wants to see the reservoir drawdown zone plantings. Bruce asked if the agencies wanted to get together later this year for a field trip. It was decided to schedule a tour in September.

6. Field Visit to Biosolids Application Sites

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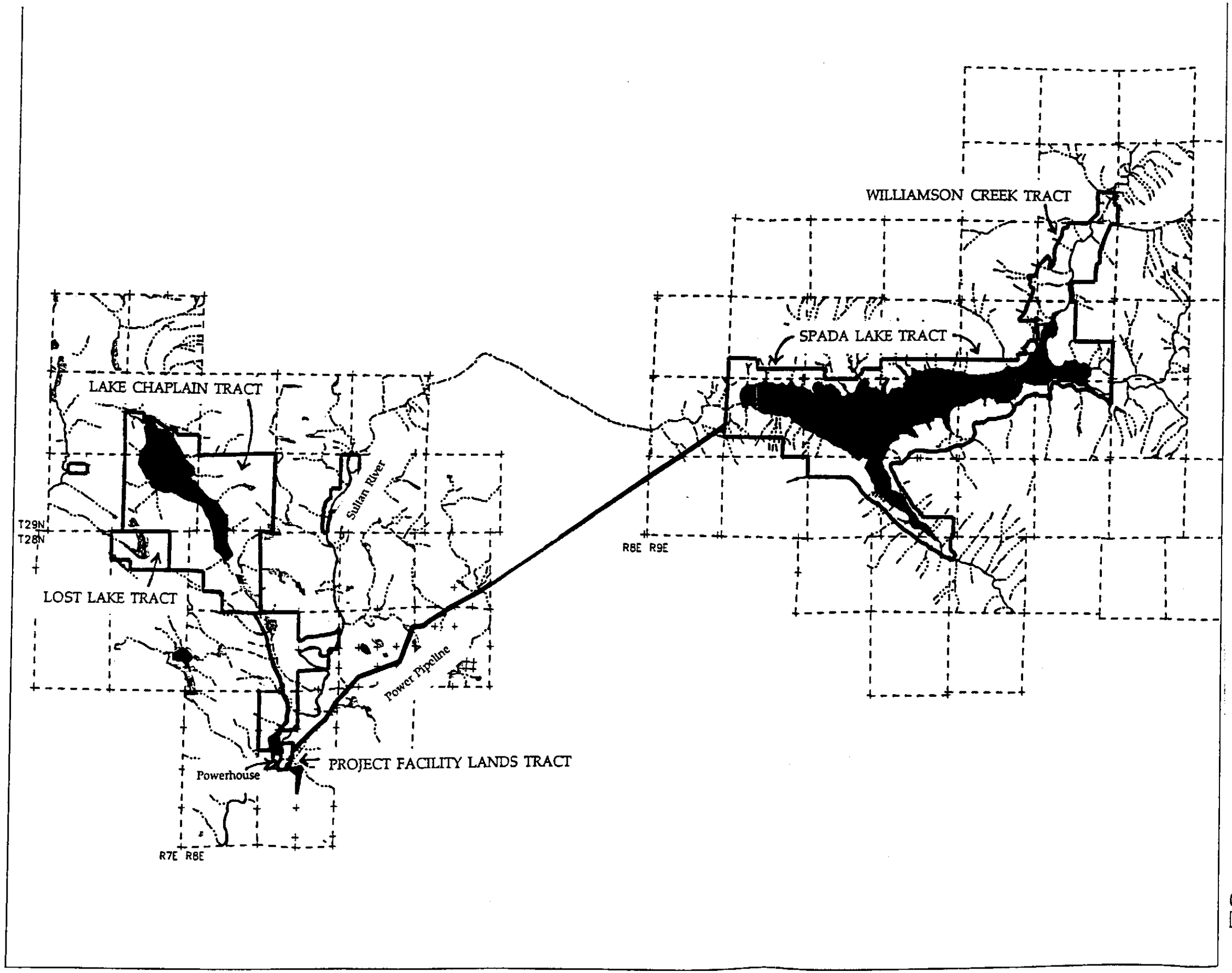
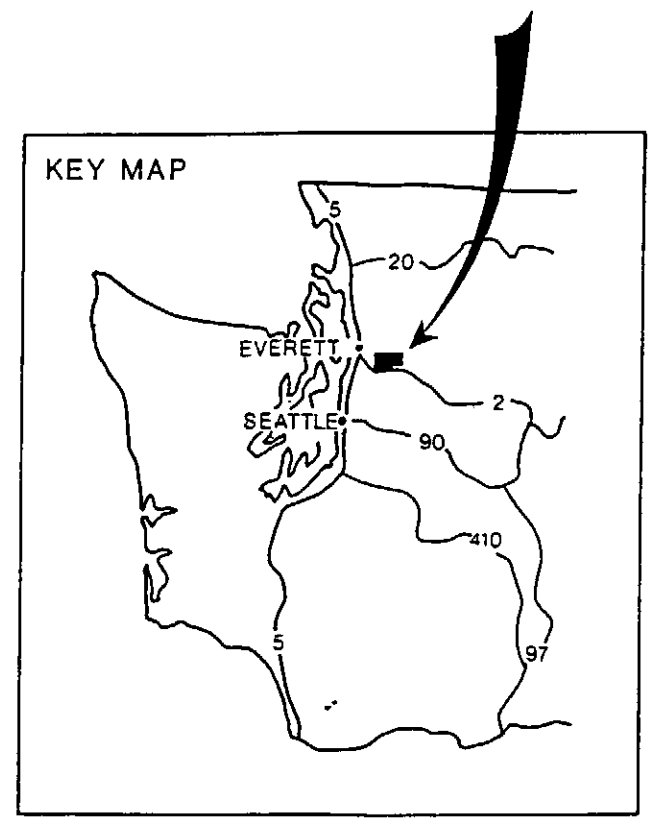
HENRY M. JACKSON PROJECT
WILDLIFE HABITAT MANEGEMENT PLAN

FIGURE 1. MANAGEMENT TRACT LOCATION





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PNP 28-14-15-4

SNOHOMISH COUNTY PUD
PUBLIC UTILITY DISTRICT NO. 1

2320 California Street • Everett, WA • 98201 • (206) 258-8211
Mailing Address: P.O. Box 1107 • Everett, WA • 98206-1107

March 17, 1997
PUD 20414

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
2625 Parkmont Lane SW
Olympia, WA 98502

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 1996 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 27, 1997, at the City of Everett Filtration Plant, Everett, Washington. The filtration plant phone number is 257-8200. We expect that the presentation, discussion, and visit of biosolids application sites near the filtration plant will last approximately four hours. Lunch will be provided.

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

Sincerely,

Bruce F. Meaker
Regulatory Affairs Manager

Enclosure
BT:dkw
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

Draft 2/25/97

Wildlife Habitat Management Plan

Annual Meeting Agenda
March 27, 1997
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
   - WHMP Supplement for Spada Lake Tract
   - Biosolids Application at Lake Chaplain Tract
   - Deer Forage Monitoring

3. Problems or Concerns

4. DNR Road Status in the Basin (tentative depending on DNR participation)

5. Future Reports/Meetings

6. Summary

7. Field Visit to Biosolids Application Sites

* Lunch will be provided.

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

Directions to the

City of Everett Water Filtration Plant

Phone 206-257-8200
Fax 206-257-8210

Note: Area code will change to 425 in April 1997

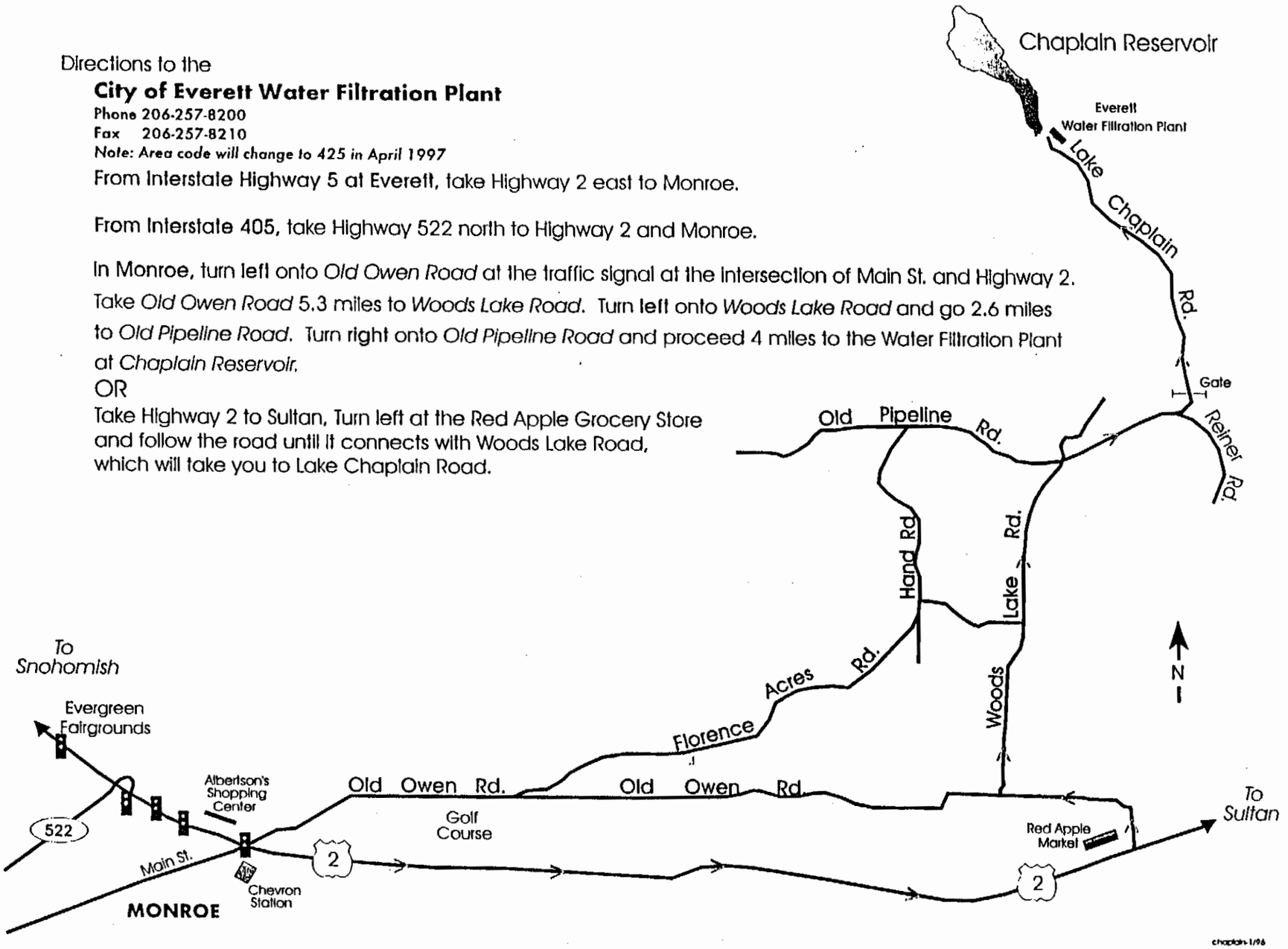
From Interstate Highway 5 at Everett, take Highway 2 east to Monroe.

From Interstate 405, take Highway 522 north to Highway 2 and Monroe.

In Monroe, turn left onto *Old Owen Road* at the traffic signal at the intersection of Main St. and Highway 2. Take *Old Owen Road* 5.3 miles to *Woods Lake Road*. Turn left onto *Woods Lake Road* and go 2.6 miles to *Old Pipeline Road*. Turn right onto *Old Pipeline Road* and proceed 4 miles to the Water Filtration Plant at *Chaplain Reservoir*.

OR

Take Highway 2 to Sultan, Turn left at the Red Apple Grocery Store and follow the road until it connects with Woods Lake Road, which will take you to Lake Chaplain Road.



1996 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

March, 1997

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1996 ANNUAL PROGRESS REPORT
WILDLIFE HABITAT MANAGEMENT PLAN

1.0 SUMMARY

1.1 MAJOR TASKS ACCOMPLISHED DURING 1996:

- Layout of road system on west side of Lake Chaplain.
- Layout of 2 harvest units - Tiki sale.
- Snag creation and inventory at Lake Chaplain.
- Coarse woody debris management program at Lake Chaplain.
- Diversion Sale units planted.
- Biosolids application at Lake Chaplain.
- Monitoring of test plantings in the Spada Lake drawdown zone.
- Seeding of the entire power pipeline right-of-way.
- Precommercial thinning at Spada Lake.
- Relocate floating platforms from Lake Chaplain to Spada Lake.
- New duck nest boxes installed at Spada Lake and Lost Lake.
- Incorporated contract foresters' report information into Spada Lake Tract Supplement to the WHMP, and prepared final draft in consultation with the resource agencies.

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 1997:

- Complete setup and sale of two (2) Lake Chaplain harvest units (Tiki Sale).
- Complete layout of two (2) units at Lake Chaplain to be sold in 1998.
- Continue snag management program on Lake Chaplain, Spada Lake and Lost Lake Tracts.
- Continue coarse woody debris management program at Lake Chaplain.
- Planting of shrubs in selected locations on the power pipeline.
- Submit final Spada Lake Tract Supplement to the FERC.
- Continue monitoring activities at nest structures.
- Continue deer forage monitoring.
- Conduct monitoring of Lake Chaplain biosolids application sites.
- Monitor stocking levels of Lake Chaplain plantations.
- Precommercial thinning at Spada Lake Tract.
- Install new duck nest boxes at Spada Lake, if appropriate sites are found.

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 1996 Annual Progress Report on the Wildlife Habitat Management Plan for the Henry M. Jackson Hydroelectric Project (Figure 1) 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 1996 and summarizes activities completed since the management program was initiated in 1988. Activities anticipated for calendar year 1997 are described. Activities, procedures and schedules described in this report are based on the (WHMP) submitted to FERC on May 25, 1988, in accordance with Project License Article 53 and subsequent related orders from the Commission.

3.0 WORK COMPLETED DURING 1995

3.1 FOREST VEGETATION MANAGEMENT

3.1.1 Timber Harvest - 1995 Units (Diversion Sale)

The two (2) units of the 1995 Diversion Sale, shown in Figure 2, were replanted in 1996. One (1) unit was planted with 300 stems per acre of Douglas fir. The other unit was planted with 300 stems per acre as well, but a mixture of Douglas fir and western red cedar was planted in wetter areas of the stand, and pure Douglas fir was planted in the remainder. A total of 1000 western red cedar saplings went into this unit.

3.1.2 Harvest Unit Setup

The upcoming Tiki Sale was described in the 1995 Annual Report as having four (4) units located on the west side of the Lake Chaplain Tract, and one (1) on the east side. Four (4) of these units were scheduled in the WHMP for harvest in 1995 and one (1) was scheduled for 1990. Two (2) of these units were laid out and marked with boundary tags during 1995, including the delineation of green tree areas (GTA) in both units and a stream buffer zone in one (1) unit. The original plan was to complete layout and sale of these units during 1996. However, because the timber market was unfavorable during 1996, these units were not sold. The two (2) units that were laid out in 1996 will be sold in 1997. Layout of a third unit, scheduled for harvest in the WHMP in 1990, was started during 1996, and the GTA was roughly identified. This unit will be included in a future sale.

3.1.3 Road System Layout

The road system layout to serve future harvest units on the west side of Lake Chaplain was refined in 1996, and portions that are required to serve the upcoming Tiki Sale were finalized (Figure 2). Future sale units will be accessed by extending this road system. A right-of-way application was submitted to the DNR for two (2) sections of the road.

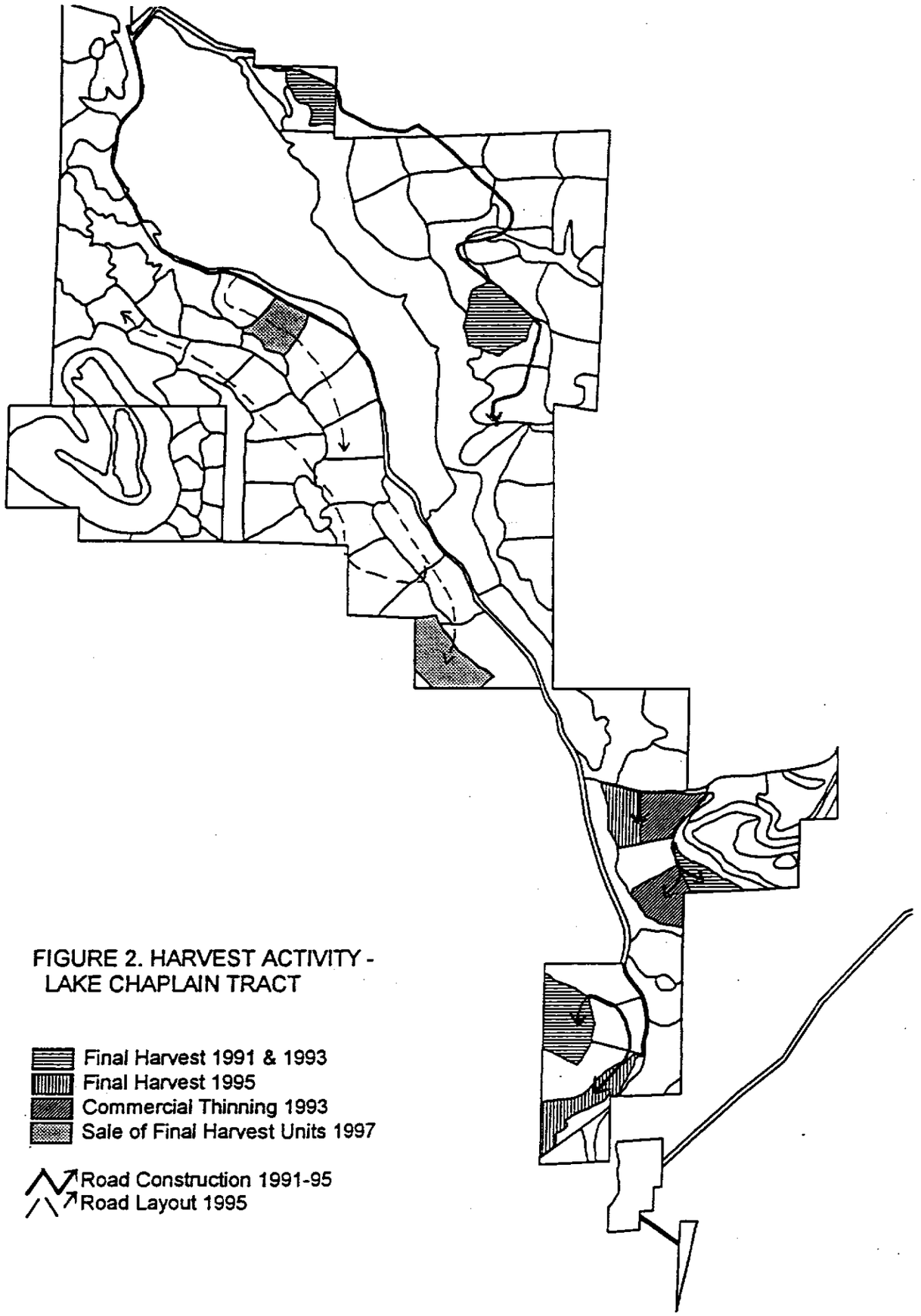

FIGURE 2. HARVEST ACTIVITY -
LAKE CHAPLAIN TRACT

3.1.4 Lost Lake Monitoring

Photo documentation stations in the precommercially-thinned unit at Lost Lake were re-visited in November 1996, more than five (5) years after the thinning was completed (July 1991). The slash resulting from the thinning remains thick in hemlock thickets, although almost all small branches have dropped. All of the large alders that were girdled during the thinning operation have fallen to the ground, and some are host to shelf fungi. A dense shrub layer dominated by salmonberry and salal has developed in trails that were cleared during the thinning, and in areas that were formerly dominated by an alder canopy. There was evidence of deer-browse on salmonberry twigs.

3.1.5 Spada Lake Precommercial Thinning

Portions of three (3) second growth stands at Spada Lake were precommercially thinned in September 1996 (Figure 3). These stands ranged in age from approximately 14 years to 30 years and were overstocked with conifers and red alder pockets. Prior to thinning, the average density of trees in the younger stand was approximately 2000 stems per acre, and approximately 800 stems per acre in the older stands. The younger stand had a dense understory dominated by huckleberry, and it was a priority to preserve this shrub layer by means of reducing the conifer canopy. Also, western red cedar and cottonwood were present on the stand, but scarce, and it was decided to favor these species in the thinning prescription. According to information provided by the forestry consultants who contributed to development of the Spada Supplemental Plan, western red cedar was an important component of the old growth stands that formerly existed on the Spada Lake Tract, but it is currently scarce.

The thinning prescription called for retaining an average of 225 dominant and co-dominant trees per acre, with the order of preference as follows: (most preferred) western red cedar, big-leaf maple and cottonwood, other conifers, and alder (least preferred). All existing snag trees and shrubs were retained, and one-hundred foot buffer zones were established adjacent to the main access road, and the shoreline of Spada Lake. The thinning, especially in the denser younger stand, resulted in a large quantity of woody debris that may impede wildlife movement for five (5) to ten years. However, long-term improvements in wildlife habitat quality are expected from the thinning.

3.2 SNAG MANAGEMENT

Snag trees were created in 1996 on five (5) units within the Lake Chaplain Tract (Figure 4). A total of 104 snags were created based on inventories conducted during 1995. These units comply with the WHMP targets for snag tree density and size class distribution. A summary of the snag component of each of these units, as well as other units on which snags have been created activity, is presented in Table 1. Snags were created, as in previous years, by topping live trees and leaving a few branch stubs. Created snags were mapped for future monitoring, and marked with numbered metal tags and a painted stripe 4 feet above the ground.

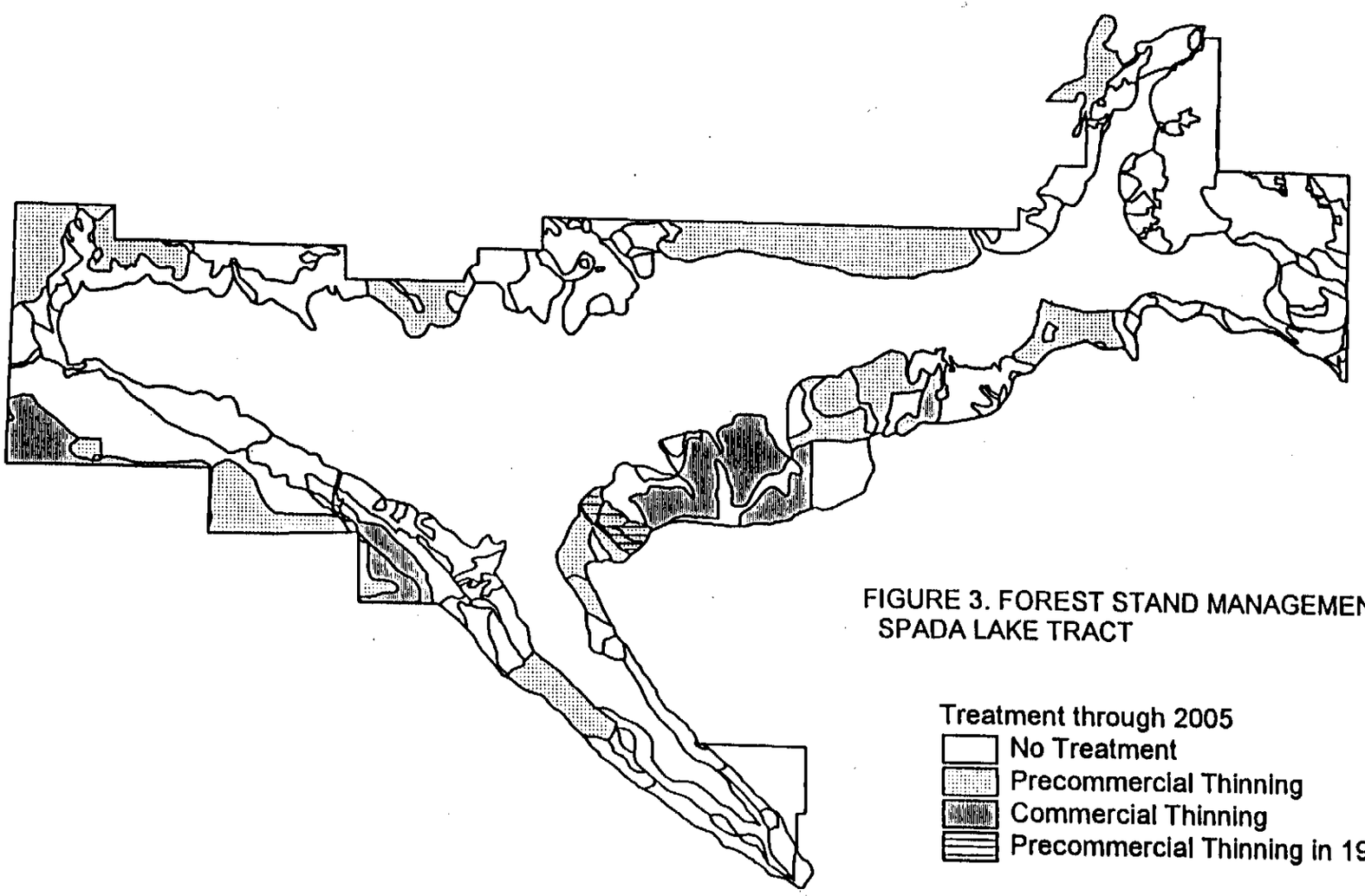

FIGURE 3. FOREST STAND MANAGEMENT
SPADA LAKE TRACT

Treatment through 2005
- No Treatment
- Precommercial Thinning
- Commercial Thinning
- Precommercial Thinning in 1996

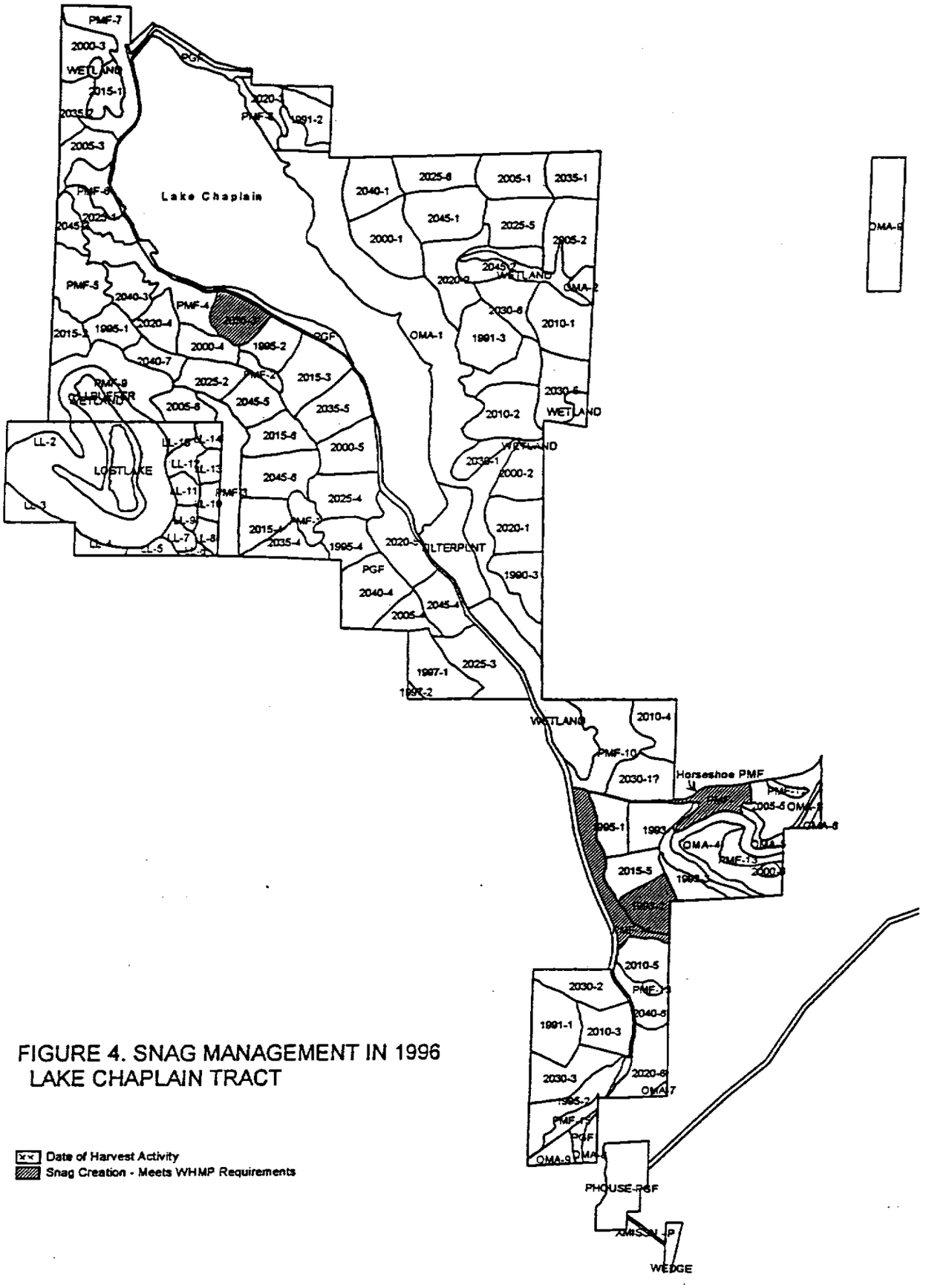

FIGURE 4. SNAG MANAGEMENT IN 1996
LAKE CHAPLAIN TRACT

Table 1. Summary of Snag Management Through 1996

UNIT	ACREAGE	# CREATED	AVG DBH (in.)	AVG HEIGHT (ft.)	#/ACRE	NOTES
1992-2CT	**18.0**	**23**	**16.9**	**55.2**	**4.6**	**√ Includes natural and created snag**
Horseshoe PMF	**14.7**	**35**	**17.0**	**58.1**	**4.4**	**√ Includes natural and created snag**
Chaplain Crk. Buffer	**8.7**	**23**	**16.6**	**46.6**	**4.5**	**√ Includes natural and created snag**
Chaplain Crk. PMF	**12.0**	**25**	**16.8**	**43.7**	**4.3**	**√ Includes natural and created snag**
2035-3	**18.5**	**30**	**18.0**	**55.0**	**4.9**	**√ Includes natural and created snag**
1991-1	26.0	70	16.6	33.5	3.1	√ Includes natural and created snags
1991-2	15.0	46	16.1	27.4	3.1	√ Includes only created snags
1991-3	24.0	66	18.0	31.0	3.6	√ Includes natural and created snags
1992-3	13.7	42	15.7	31.7	3.1	√ Includes only created snags
1993-1	15.6	41	16.8	50.3	3.1	√ Includes natural and created snags
1993-2	19.7	61	18.3	47.9	3.1	√ 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
Lost Lake Tract	112.0	43	16.9	49.5	1/	39 created
Lost Lake (City)	46.0	36	16.9	52.4	2/	38 created
Horseshoe OMA	16.7	25	17.1	54.0	1/	25 created
East side OMA	173.6	12	17.3	40 3/	2/	12 created
Stand 1-3 4/	13.8	6	21.5	55.0	2/	6 created
Div. Dam Rd. PMF	33.1	10	16.8	38.5	2/	10 created
Buffer Zone # 1	2.7	20	17.0	40 3/	2/	20 created
Buffer Zone # 2	3.8	10	15.7	40 3/	2/	10 created
Stand 2-1	8.9	4	19.5	48.8	2/	4 created
Stand 2-2 4/	30.7	12	19.0	47.9	2/	12 created
Stand 3-1	141.1	10	19.5	51.1	2/	10 created
Stand 4-5 4/	76.1	6	22.5	61.0	2/	6 created
Stand 4-7	14.0	11	18.8	55.0	2/	11 created
TOTALS	**272**	**561**	**Totals for those units which meets WHMP requirements**			
	944	**766**	**Totals for all units which have had snag management activity to d**			

BOLD denotes those units where snag management activity occurred in 1996.

√ 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.

A revised snag inventory and monitoring procedure has been developed with the assistance of a forestry consultant, and is now under review by the co-licensees. The procedures retain the WHMP's objectives of providing snag trees of various decay classes and size classes, monitoring their persistence and use by wildlife over time, and supplementing with additional snags to maintain the required density and size distribution over time. Details of the sampling procedure were modified in the draft procedure, however, based on the consultant's recommendations. The number of sample plots described in the WHMP (p. 4- 2) has been reduced, while the sample plot size has been increased. More frequent monitoring of specific snag trees, including created snags and naturally-occurring snags, will be performed. The procedure also presents appropriate statistical tests for evaluating differences in persistence and wildlife use in snags of different sizes and species, and among forested stands and harvested stands.

3.3 COARSE WOODY DEBRIS MANAGEMENT

We reported the procedure for Coarse Woody Debris (CWD) management on harvest units at the annual meeting with the agencies in March 1995. The procedure primarily addresses providing adequate supplies of decay Class 1 and 2 logs. Details of the procedure were described in the 1994 Annual Report. The procedure was implemented on the Diversion Sale at Lake Chaplain in 1995, (shown in Figure 2), and results were reported in the 1995 Annual Report. A cumulative summary of CWD management is presented in Section 4.3. In 1996, we marked created CWD logs in the two (2) units of the 1995 Diversion Sale at Lake Chaplain for long-term monitoring.

The 1995 Annual Report discussed problems encountered with the previously used CWD sampling method. During 1996, sampling design for inventory and long-term monitoring was revised with the assistance of consulting foresters. The revised method is similar to the method under review for snag inventory and monitoring, as described in Section 3.2. Additionally, it calls for marking and mapping the locations of a small set of existing logs that have particular interest, such as large size or evidence of wildlife use, prior to harvest, for monitoring immediately after harvest. The objective of this sample is to identify whether harvest is causing a significant loss or damage to preharvest CWD. The revised sampling/monitoring method is currently under review. As in the snag sampling/monitoring method, described in Section 3.2, the sampling method will include appropriate statistical tests to evaluate persistence and wildlife use of CWD.

The revised methods will be field tested on two (2) units of the Tiki Sale at Lake Chaplain which are scheduled for sale in 1997. The methods will include marking a set of existing pre-harvest logs for monitoring during harvest to determine whether harvest operations represent a problem for CWD retention as discussed at the agency meeting in March 1996.

3.4 REVEGETATION

Activities in 1996 consisted primarily of monitoring previously-revegetated sites. Details of the original plantings are described in earlier annual reports, and summarized in Section 4.

3.4.1 Spada Lake Drawdown Zone

The initial plantings in 1994 included nursery-grown plugs and root divisions of five (5) wetland emergent species, (Scirpus acutus, Scirpus microcarpus, Sparganium, Carex obnupta, Carex rostrata, and seed of a sixth species (Scirpus cyperinus). Plantings were done between 1430 ft. and 1445 ft. elevation at two (2) sites, the Williamson Creek arm of Spada Lake and the North Fork Sultan River arm. The test plantings at the North Fork site were monitored in October 1996. Results of monitoring since planting are shown in Table 2.

Table 2. Condition of Spada Lake Drawdown Zone Plantings

Site		Species				
North Fork	**No. of plants, all species**	***Carex rostrata***	***Carex obnupta***	***Sparganium***	***Scirpus acutus***	***S. microcarpus***
Oct. 1994	501 (20)	111 (5)[1]	103 (4)	81 (3)	96 (3)	110 (5)
Oct. 1996	300 (17)	85 (5)[2]	91 (4)[2]	6 (1)	80 (3)	38 (4)
% surviving	60	77	88	7	83	35

3.4.2 Power Pipeline Right-of-Way

Portions of the ROW which have not yet been successfully revegetated were seeded with a grass/forb mix again during 1996. Most of these areas are on the upper portion of the ROW closest to the tunnel portal. Alders and other invasive trees were mowed from the pipeline this year as well.

Planning and preliminary reconstruction began on the access road immediately adjacent to the pipeline, from Marsh Creek to the Tunnel Portal. We have previously attempted to revegetate this old gravel road with a grass/forb seed mix. With the reconstruction, a narrow (± 20 ft.) strip will be restored as a

[1] Number of plants (number of rows)
[2] Number of plants increased in some rows.

permanent gravel access road. The construction is expected to be completed by the end of Fall 1997. The purpose of the access roads is to facilitate inspection of the pipeline by Jackson Project staff. The roads are gated at their junction with the Sultan Basin Road in the vicinity of Marsh Creek, and are not open to vehicular use by the public.

3.4.3 Chaplain Marsh

Shrubs were planted in 1993 along the western edge of Chaplain Marsh to create a vegetative screen between Chaplain Road and the marsh. The plantings were monitored in November 1996. Mortality at this site has been negligible since the shrubs were originally planted, and growth of most species, especially holly and red-osier dogwood, was good. Many additional shrubs have grown in this border including red alder, willows, hawthorn, salmonberry, trailing and evergreen blackberry, plus forbs and grasses. The vegetation "screen" between the road and the marsh is at least 6 feet high, and is currently a continuous band that is 2 to 3 times broader and much denser than previously.

3.4.4 Powerhouse Site

Shrub and tree plantings at the powerhouse site, also done in February 1993, included Oregon ash, western crabapple, black hawthorn, red-flowering currant, serviceberry, Nootka rose, and red huckleberry. The original plantings consisted of ten tree groups that included 5 trees each, and ten shrub/tree groups that included three (3) trees and 13 shrubs each. Thirty-three more shrubs were added to the shrub/tree groups in September 1994 to replace some that had died. The plantings were monitored in April 1996 (Table 3).

Most of the tree species (crabapple, ash and hawthorn) showed satisfactory growth on this site, with little mortality. Among the shrubs, only Nootka rose did very well in the 3 years following planting, although about half of the huckleberries and serviceberries still survived. Three (3) of the planted species, most notably Nootka rose, propagated on site, and volunteer spirea, salmonberry and thimbleberry have also turned up.

Table 3. Condition of Tree and Shrub Groups at Powerhouse

Species	No. planted	No. Dead	Condition of Surviving Plants	No. Volunteers[1]
Crabapple	39	0	18excellent, 18 good, 2 fair, 1 poor	-
Oregon Ash	15	2	13 fair	-
Black Hawthorn	26	4	3 excellent, 14 good, 5 fair,	-
Red Flowering Currant	33	29	1 good, 1 fair, 2 poor	-
Serviceberry	52	19	6 good, 14 fair, 3 poor	9
Nootka Rose	32	0	3 excellent, 5 good, 16 fair	16
Huckleberry	43	24	3 good, 10 fair, 6 poor,	1
Spirea	0			6+
Thimbleberry	0			6
Salmonberry	0			1

3.4.5 North End Lake Chaplain

Plantings of Douglas fir and western red cedar seedlings at the north end of Lake Chaplain, to provide a visual screen between the lake and the adjacent road, were monitored in November 1996. Twenty-seven (60 percent) of the original 45 western red cedar have died since they were planted in 1992, possibly because they were planted in very wet sites. The remainder are in fair to good condition, and average about 5 feet in height. One hundred fifty-four Douglas fir seedlings were planted in drier areas, with only eight percent mortality (12 trees) since planting. All of the surviving Douglas fir are in excellent condition, and average about 10 feet in height.

3.5 NEST STRUCTURES

3.5.1 Floating Nest Platforms

The platforms at Lost Lake were monitored by District Staff at least twice per month from April to the end of July for periods of at least 15 minutes. The two (2) platforms that had been in Lake Chaplain since 1990 were moved in February 1996 to Spada Lake (see Figure 5 for location). These platforms were monitored twice per month from March through June. Additional monitoring was performed by Jean Cross, on a weekly basis. There was no observed use by wildlife of any of the platforms. Lost Lake was used by beaver, otter, great blue herons, mallard, bufflehead, wood duck, hooded merganser, and pied-billed grebes. Shovelers, ring-necked ducks, common goldeneye, common mergansers and common loons were observed at Spada Lake.

[1] These shrubs were not planted by us, but are growing within the planted shrub/tree groups.

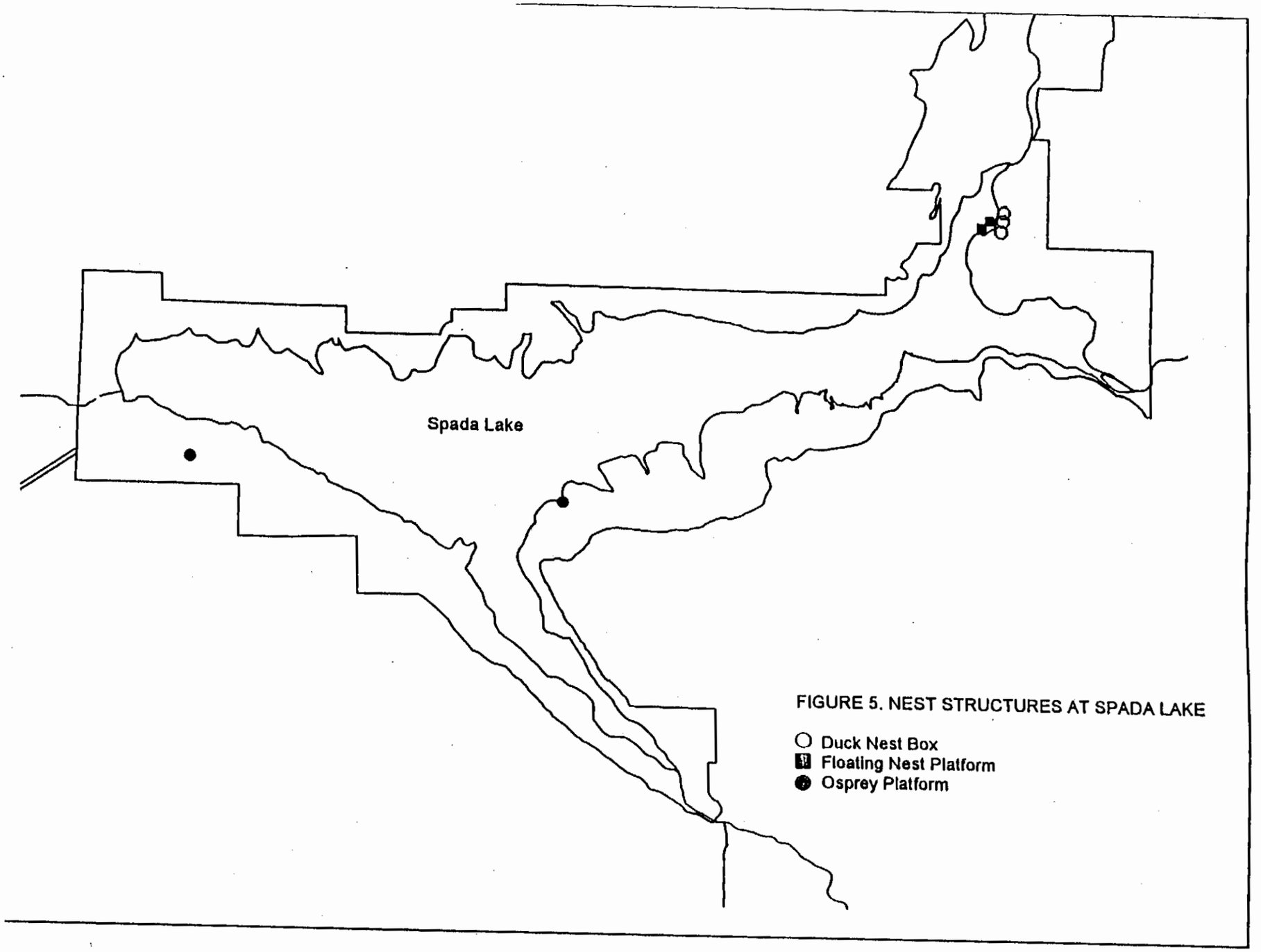

FIGURE 5. NEST STRUCTURES AT SPADA LAKE

3.5.2 Nest Boxes

All nest boxes were monitored by District staff. Production was estimated by examining eggshell remains in the boxes and observations of newly-hatched broods near the nest. Wood duck and hooded mergansers used the nest boxes at Lost Lake and Chaplain Marsh. Nesting results are summarized in Table 4.

Three (3) nest boxes at the north end of Chaplain Marsh which were attracting starlings, were moved to the north end of Lost Lake (See Figures 6 and 7, for locations). The two (2) original boxes installed at Lost Lake in 1990 were removed at the end of the nesting season because the trees they were on had died and were unstable. Three (3) new nest boxes were installed on Williamson Creek within the Spada Lake Tract at the end of the season (Figure 5).

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

Site	# Boxes	# Boxes with Clutches of Duck Eggs	# Successful Boxes (No. Eggs Hatched)	# Boxes Used by Other Species
Lost Lake	9	1	1 (7)	0
Chaplain Marsh	6	6	4 (30)	0

3.5.3 Osprey Nest Platforms

The osprey nest platform at Lost Lake was monitored by District staff and Jean Cross from the opposite side of the lake during Spring-Summer 1996. The platform was occupied in 1996 by a pair of osprey, but they did not successfully rear any young. The adults were seen at the nest platform, and appeared to be brooding through most of July. By the end of July, reproduction attempts had failed. One (1) osprey was observed at Lost Lake as late as 4 September 1996.

No osprey activity was observed on the two (2) nesting platforms at Spada Lake (see Figure 5 for locations). There are very few sticks left on the platform located east of the South Fork arm. A new osprey nest was observed approximately one (1) mile west of Culmback Dam above the Sultan River gorge. It appears that this pair successfully reared one (1) young through fledging.

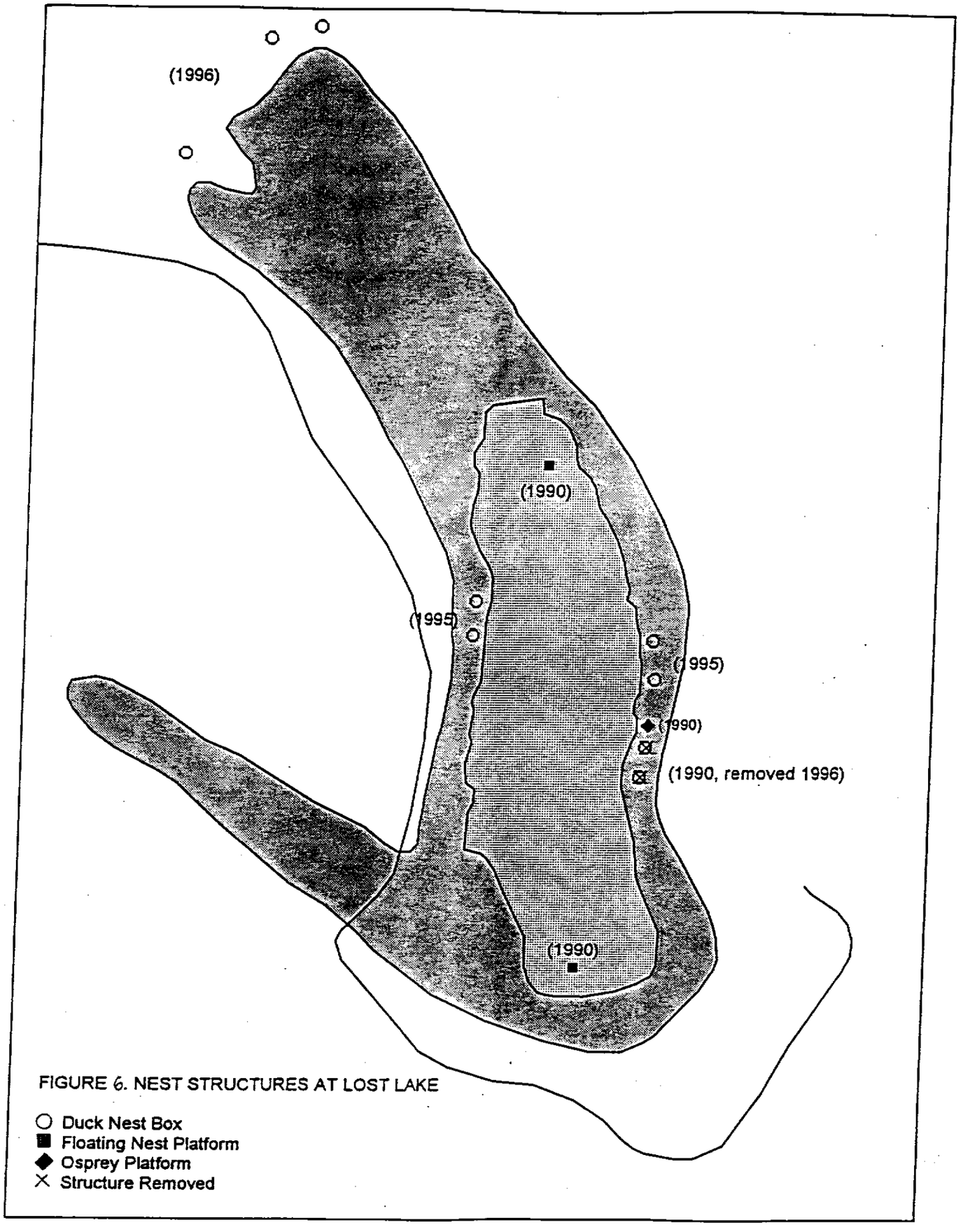

FIGURE 6. NEST STRUCTURES AT LOST LAKE

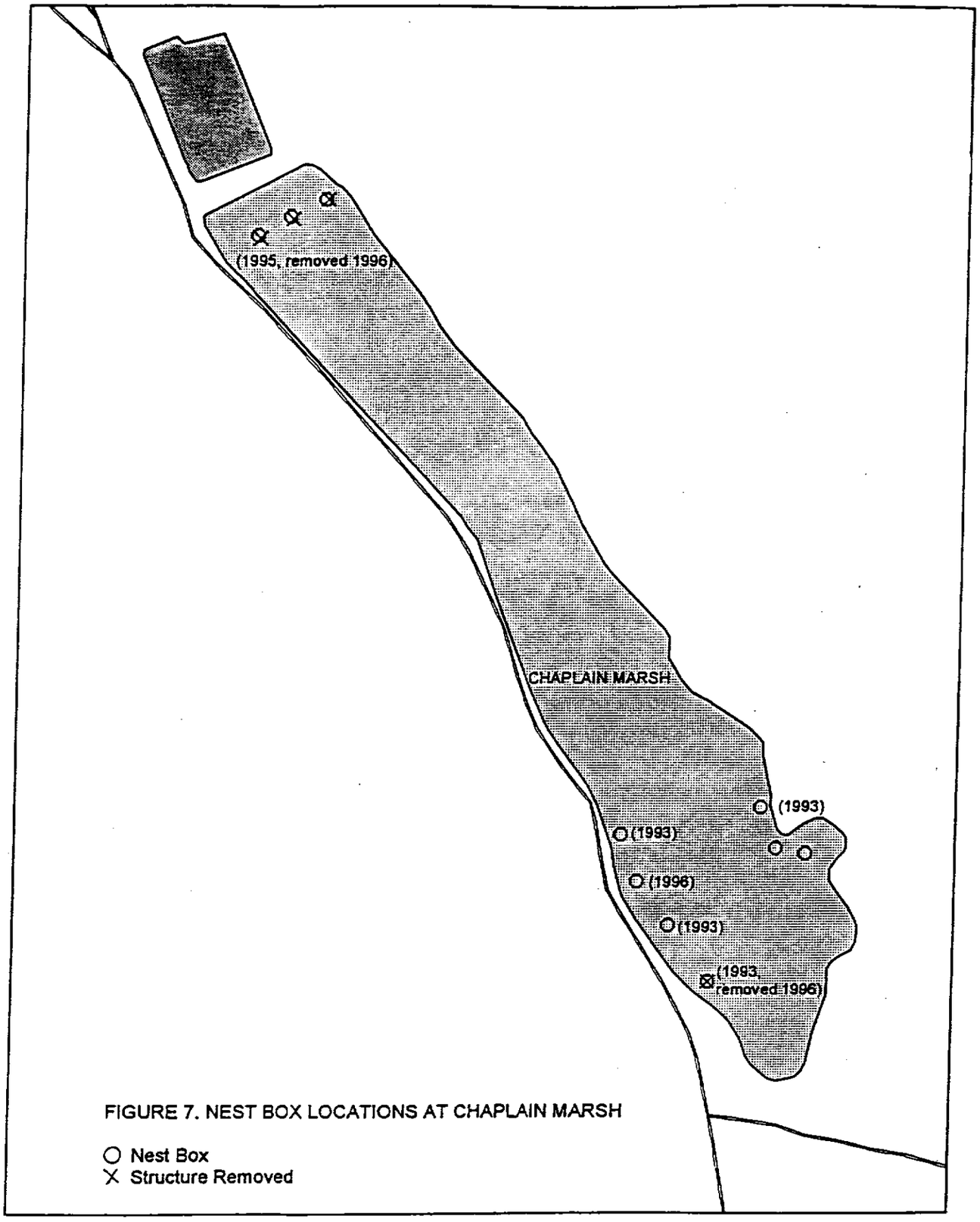

FIGURE 7. NEST BOX LOCATIONS AT CHAPLAIN MARSH

○ Nest Box
X Structure Removed

3.6 WHMP SUPPLEMENT FOR SPADA LAKE tract

The District incorporated appropriate information from the forestry consultants' report (received in late 1995) into the draft Spada Supplement. Detailed stand prescriptions were further examined for feasibility and to determine more accurate acreage estimates included in treatment. A schedule and cost estimates were developed. Various drafts of the plan were reviewed by the District, City, and resource agencies. Comments were incorporated into the plan and figures were finalized. The final plan was submitted to the FERC in January 1997.

3.7 LAND USE ACTIONS AT LAKE CHAPLAIN TRACT

The City of Everett Planning Department proposed changing the City's Zoning Code designation for its Chaplain Tract, which encompasses the WHMP's Lake Chaplain Tract and adjacent forest lands acquired by the City during the past few years. Currently classified as Suburban Residential, the Chaplain Tract will be rezoned as Watershed - Resource Management. The Watershed - Resource Management (WRM) Zone is a designation specifically created for the Chaplain Tract that recognizes its unique role in maintaining the City's water supply management system. Urban development is specifically discouraged in the WRM Zone. Permitted uses in the WRM Zone include:

1. Public water supply management
2. Hydro-electric power generation
3. Forestry management
4. Biosolids application
5. Public recreation, where allowed
6. Wildlife habitat management
7. Uses incidental to the above listed uses

3.8 BIOSOLIDS APPLICATION AT LAKE CHAPLAIN TRACT

The City of Everett applied biosolids to units 2035-6 and 2040-5 in the Lake Chaplain Tract in August and September of 1996. 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. (See Figure 2 for the locations of these units.) 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.

Two (2) water quality monitoring sites were established on Chaplain Creek. Creek waters were sampled in August and will be sampled monthly for two (2) years. Parameters examined were nitrates, phosphorus, fecal coliform, ammonia, and chloride. Results of the monitoring are in Table 5.

Table 5. Lake Chaplain Tract Biosolids Application
Water Quality Monitoring Results

Sample Date		8/27/96	9/19/96	10/29/96	11/21/96	12/10/96	1/27/97
Analyte/Sample Site	Units	Results					
Ammonia (NH3)							
Upstream (CHAPCR08)	mg/L	0.020	0.005	<0.003	<0.003	<0.004	0.011
Downstream (CHAPCR38)		0.008	<0.005	<0.003	<0.003	0.005	0.011
Nitrate (NO3)							
Upstream (CHAPCR08)	mg/L	not sampled	<0.002	0.197	0.073	0.201	0.233
Downstream (CHAPCR38)		not sampled	<0.002	0.315	0.125	0.286	0.194
Total Phosphorus							
Upstream (CHAPCR08)	mg/L	0.010	<0.005	0.006	0.005	<0.005	<0.005
Downstream (CHAPCR38)		0.009	<0.005	0.006	0.005	<0.005	<0.005
Chloride							
Upstream (CHAPCR08)	mg/L	2.2	2.5	1.5	1.4	1.7	1.5
Downstream (CHAPCR38)		2.1	2.2	1.7	1.8	1.7	1.4
Fecal Coliforms							
Upstream (CHAPCR08)	CFU/100mL	11	7	<2	2	5	<2
Downstream (CHAPCR38)		16	27	8	2	11	<2
pH							
Upstream (CHAPCR08)	s.u.	6.8	6.8	6.5	6.5	6.4	6.6
Downstream (CHAPCR38)		7.1	7.1	6.6	6.6	6.6	6.6

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3.9 DEER FORAGE MONITORING

Deer forage availability was sampled on one (1) unit of the Chaplain Sale, harvested in 1991, and one (1) unit of the Diversion Sale, harvested in 1995, using methods described in the WHMP (p. 4-12 to 4-13). In practice, the sampling procedure proved to be very time-consuming, and the actual sampling effort was less than the WHMP's prescription. The WHMP called for sampling fifteen 100 m. transects, whereas only 10 transects were sampled in the 1991 unit and 7 in the 1995 unit. Results of the sampling are summarized in Table 6. The older stand, harvested in 1991, had an understory dominated by fern species, which are fairly unpalatable to deer, and fireweed, which is palatable. Most of the stand had a shrub or forb layer. The more recent clearcut, (in its first growing season since harvest), had less fern, a large population of fireweed, and substantial areas with no shrub or forb cover.

Forage utilization by wildlife was not sampled. In consultation with USFWS, WDFW and the Tribes' representatives, it was decided that utilization will not be sampled. Sampling was very time consuming and results were highly subjective. In the future, notes regarding evidence of browsing will be taken while sampling for availability. Instead of sampling for utilization, baseline sampling prior to harvest and sampling in an unharvested second growth forest stand for availability will be conducted.

The District prepared a draft sampling procedure, based on the WHMP method, and submitted it to a consulting statistician for review. The consultant concluded that the WHMP method, using ten 100 m. transects rather than 15, was satisfactory for characterizing vegetation on units at any given point in time, and for detecting a 50 percent change in understory species composition over time. An alternative, less time-consuming, method was recommended that may deliver the same reliability in detecting changes. This method will be tested in 1997, and the revised procedure will be reviewed. The consultant's recommendations included appropriate statistical tests for deer forage data.

Table 6. Summary of Deer Forage Monitoring in Two Lake Chaplain Harvest Units

	Percent Cover[1] of Most Common Species	
Species	Unit 1991-1	Unit 1995-1
Fern species	31	11
Fireweed	16	31
Salal	8	3
Huckleberry	4	-
Thimbleberry	4	-
Other Rubus species	6	1
Oregon Grape	6	-
Aster species	-	8
Grass species	-	3
Forb species	-	2
Unvegetated	7	42

[1] Percent cover = sum of the lengths of transects covered by each species divided by the total length of the transects.

4.0 CUMULATIVE SUMMARY

A summary of all activities completed under the WHMP, from the earliest implementation in 1989 through the end of December 1996, is presented here.

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 Lake Chaplain and the area south of the Diversion Dam Road has been constructed, as shown in Figure 2. Some spur roads will be constructed to serve individual harvest units in the future, but the major construction in these areas has been completed. We require that openings be left in the slash along rights-of-way at 100 foot intervals to allow wildlife to easily pass through. Deer have been observed using these breaks, and we will continue using this practice in future road construction.

The main road system for the west side of Lake Chaplain has been laid out, and construction is expected to follow as part of the next timber sale.

4.1.2 Final Harvest

Five (5) units were scheduled in the WHMP for final harvest from 1990-1995, and five (5) units were scheduled from 1995-2000 (Figure 8). Three (3) of the units in the first group have been harvested. Harvest of a fourth 1990 unit was been delayed pending road construction, and will be included in a future sale. Harvest of the remaining 1990 unit was deferred, because upon detailed field visits to set up the harvest unit, it was discovered that this unit contained many snags and other habitat characteristics which we are trying to preserve and promote. Another unit was substituted in the Diversion sale, which was harvested in 1995. This substitution will not compromise the WHMP requirement for a 15-year green-up period between the harvest of adjacent units. One (1) 1995 unit was harvested in 1993 as part of the Horseshoe Sale. Two (2) other 1995 units will be included in the Tiki Sale, which is scheduled for sale in 1997. Thus six (6) units have had final harvests and two (2) are expected to be sold in the next year, compared to the target of five (5) for 1990-1995 in the WHMP schedule, and five (5) for 1995-2000. The WHMP provides flexibility in scheduling final harvest - actual harvest may occur within ten years before or after the target year. Therefore, accomplishments to date are within the acceptable range.

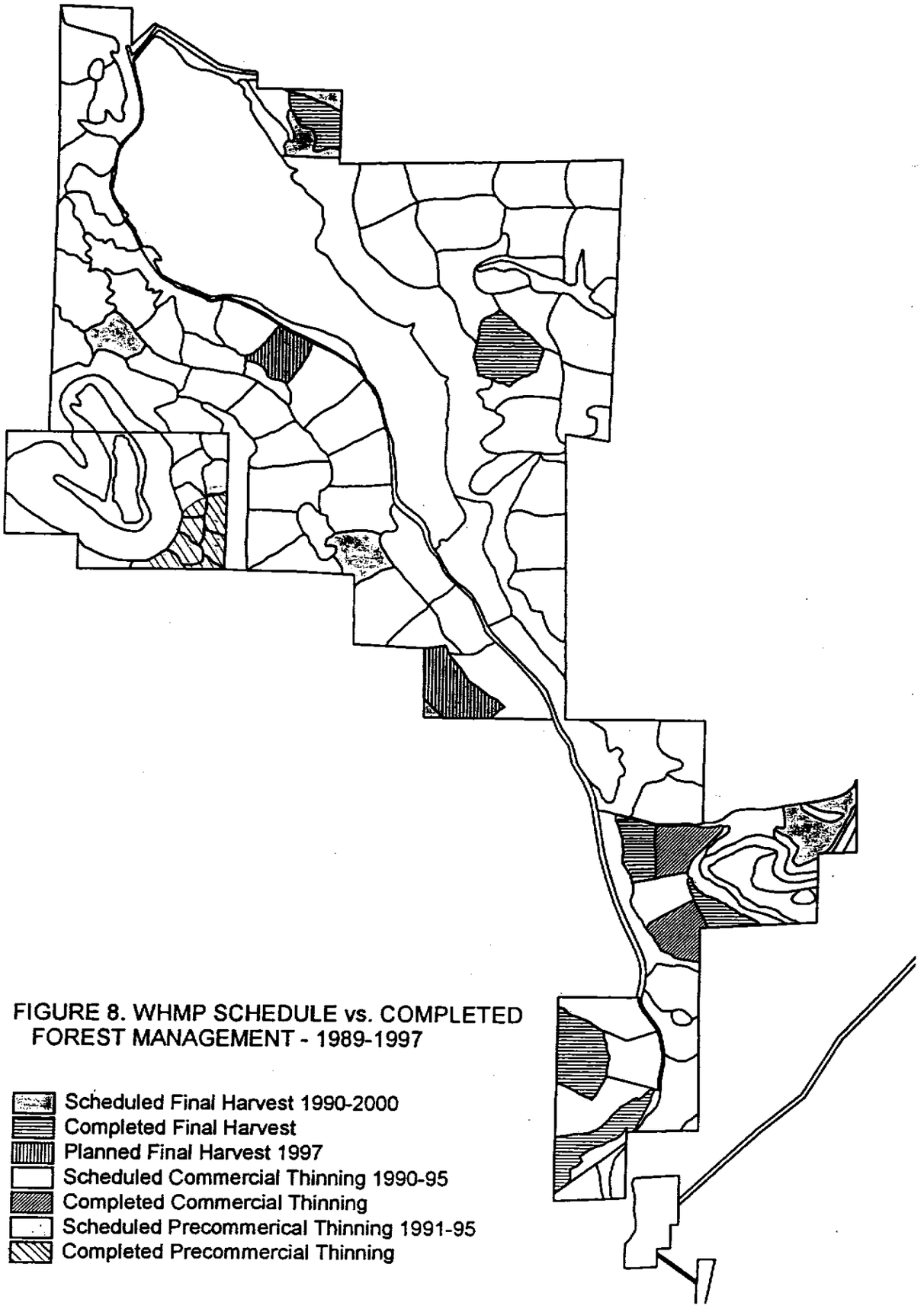


FIGURE 8. WHMP SCHEDULE vs. COMPLETED FOREST MANAGEMENT - 1989-1997

4.1.3 Commercial Thinning

Two (2) units (36 acres) were commercially thinned in 1993 (Figure 8). These units were not specified in the WHMP schedule, but were thinned because it appeared that the understory vegetation would respond favorably, and because the thinning operation was feasible with little impact to the stand or soils.

Five (5) other units (totaling approximately 106 acres) that were scheduled for thinning in the WHMP through 1994 (Figure 8) have been deferred until roads are constructed to nearby final harvest units (Figure 2). It is likely that some of these units may not be thinned due to unsuitable site conditions, such as soil, timber type, or slope. Scheduled units that are suitable will be thinned as the major road system reaches completion, and other unscheduled units will be evaluated as possible candidates for thinning. Criteria for thinning will include wildlife habitat benefits and operational feasibility.

4.1.4 Management of Roads and Post-Harvest Units

All final harvest units have been seeded with a grass/forb mix after harvest, and replanted with fir and cedar seedlings. Cottonwood cuttings were planted in moist areas of two (2) of the final harvest units. The rights-of-way of new access roads and spur roads were also seeded with a grass/forb mix. Access roads have been gated to prevent their use by the public, and a spur road in one (1) of the Diversion Sale (1995) units was abandoned.

In addition to harvest of scheduled units, described in Section 4.1.1, some trees adjacent to the three (3) Chaplain Sale (1991) units were salvaged after being blown down by a major storm in January 1993. The affected areas were replanted with Douglas fir seedlings after harvest, and were added to the adjacent unit for future management. The green tree area of one (1) unit was reduced by the same storm, but the downed trees were not salvaged to avoid damaging surviving trees. The affected area was replanted with Douglas fir seedlings, and will remain part of the GTA.

4.2 FOREST VEGETATION MANAGEMENT AT LOST LAKE TRACT

Precommercial thinning of approximately 46 acres at Lost Lake was completed as scheduled in 1991 (Figure 8), and photo documentation stations were established to monitor the results annually. As of November 1996, hemlock thickets that were thinned had significant amounts of slash remaining on the ground that may limit their use by anything other than small birds and mammals. Alder pockets and trails that were cut through the unit had shrub layers consisting primarily of salmonberry, which were not present prior to thinning. Salmonberry was lightly browsed at three (3) out of five (5) of the monitoring stations.

4.3 FOREST VEGETATION MANAGEMENT AT SPADA LAKE TRACT

Three (3) young second growth stands (totaling about 30 ac.) on the south shore of Spada Lake were precommercially thinned in September 1996, following a prescription that is

described in Section 3.1.5 (Figure 3). The Spada Lake Tract Supplemental Plan was submitted to the FERC in January 1997 and will guide future forest vegetation management.

4.4 SNAG MANAGEMENT

Earlier Annual Reports, particularly the 1994 and 1995 Annual Reports discussed the problems that have slowed progress on performing inventories and snag creation as scheduled in the WHMP. These reports described our priorities in snag management. In the 1994 Annual Report, areas that would be targeted for snag management over the next four (4) years (through 1998) were identified. As shown in Figure 9, we have made good progress toward meeting this goal. Snag inventory/creation has been completed in all of the units that have had final harvest, plus all of the units scheduled for final harvest in 2015, except for one (1) unit that may be commercially thinned. Additional units, including buffer zones, permanent mixed forest and old growth management areas have been inventoried and snag trees have been created (Table 1). A total of 766 snags has been created since implementation of the WHMP began in 1989. A total of 272 acres has now been verified as meeting the WHMP requirements of 3.07 snags per acre as well as the target size distribution for snags.

Since implementation began, we have continued to refine our inventory and snag creation procedures. A draft inventory/monitoring method, described in Section 3.2, is under review that will ensure accurate and consistent collection of data.

4.5 COARSE WOODY DEBRIS MANAGEMENT

The 1995 Annual Report describes results of previous pre- and post-harvest CWD inventories on final harvest units of the Chaplain (1991) and Horseshoe (1992) Sales. This report also described the development of the CWD management procedure during 1995, which ensures compliance with the WHMP targets for CWD density and size at the time of harvest.

The CWD procedure was implemented on the two (2) units of the Diversion Sale at Lake Chaplain, which was harvested in 1995. Pre-harvest CWD inventories were sampled using the circular plot method (see Appendix A of the 1995 Annual Report), but no post-harvest sampling was done. Instead, as prescribed in the CWD procedure, (and discussed in detail in the 1995 Annual Report), a complete post-harvest inventory of all of the designated created CWD trees was done to ensure compliance. Created CWD on the Diversion Sale Units was marked and mapped in 1996 for long-term monitoring. Agency representatives approved the CWD procedure for supplementing class 1 and 2 logs on harvest units (See Annual Meeting Notes p. 11, and letter dated April 22, 1996 from the Tribes, in Appendix A of the 1995 Annual Report), but had a further request regarding logs in existence prior to harvest. Agency representatives requested that the co-licensees investigate the potential impacts of timber harvest on existing CWD, especially in the decay classes 3, 4 and 5, and develop a quantitative monitoring procedure that involved re-visiting the same sample plot and/or logs.

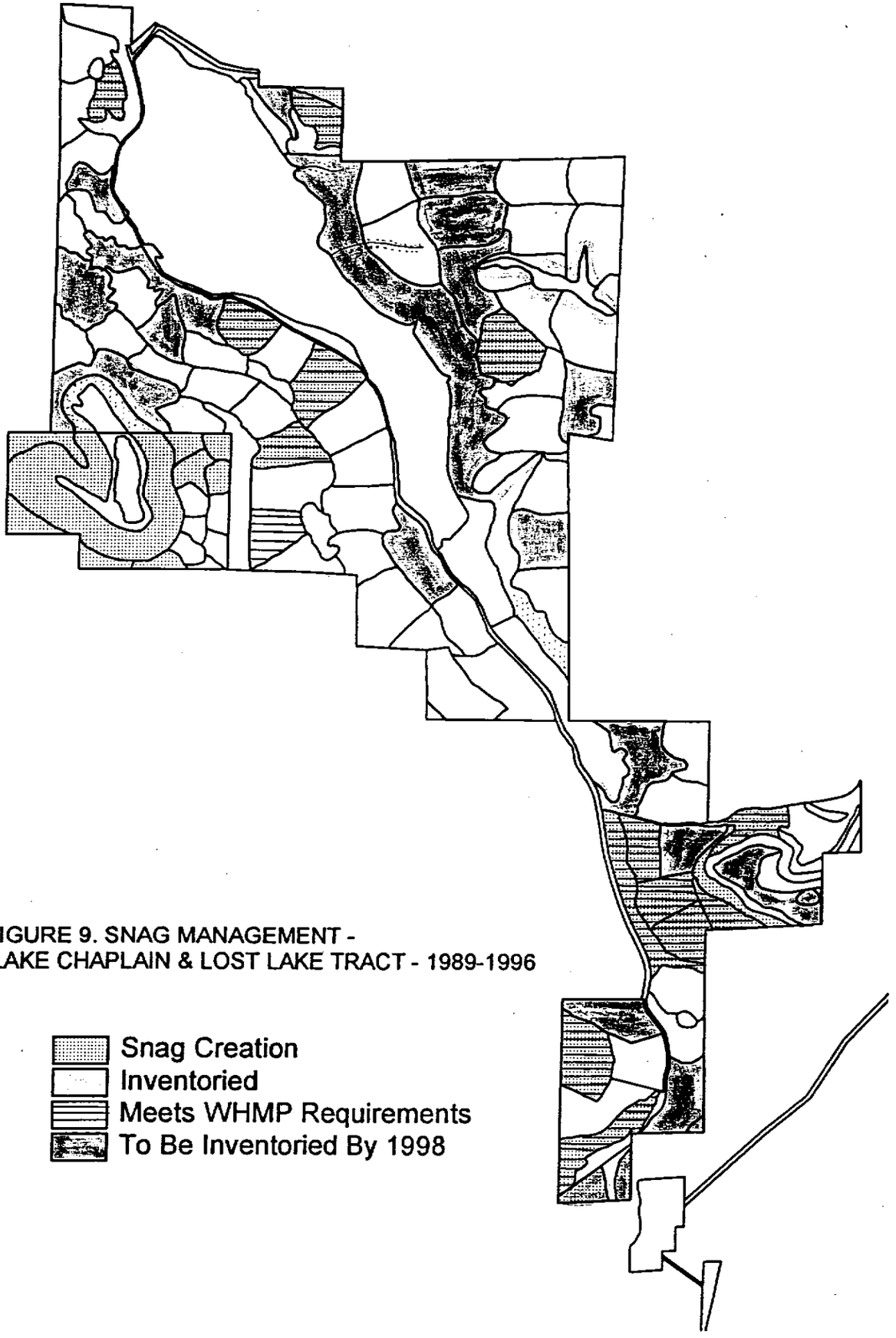


FIGURE 9. SNAG MANAGEMENT -
LAKE CHAPLAIN & LOST LAKE TRACT - 1989-1996

In 1996, a draft inventory/monitoring method was developed (which is currently under review), that includes marking specific logs of decay classes 3, 4 and 5 and monitoring their condition immediately following harvest. The draft method also will change some details of previously-used sampling designs for estimating CWD density, as described in Section 3.3

4.6 REVEGETATION

Tree/shrub plantings at the north end of Lake Chaplain (Stand 1-17), Chaplain Marsh (Stand 4-8), and the powerhouse (Stand 8-4) have been completed as described in consultant reports attached to the 1991 Annual Report. The plantings are consistent with the objectives of the WHMP, to provide screening between the Lake Chaplain Road and the lake and marsh, and to provide forage and shelter at all three (3) sites.

4.6.1 North End of Lake Chaplain and West Side of Chaplain Marsh

The required plantings at the north end of the lake, and adjacent to Chaplain Marsh were monitoring twice annually between planting (in 1992 and 1993, respectively) and 1995, and once in 1996. Survival of shrubs adjacent to the marsh has been close to 100 percent with generally good growth. Douglas fir saplings at the north end of the lake have also had very good growth, with overall survival over 90 percent.

4.6.2 Powerhouse

Shrub and tree plantings were monitored at least twice each growing season between planting in 1993 and 1995, and once in 1996. Survival of tree species has been greater than 90 percent, and growth has been variable: crabapples have had fair to excellent growth, and Oregon ash and hawthorn have had poor to good growth (Table 3). Most of the shrubs, with the exception of Nootka rose, have not done very well most likely due to poor soil on the site.

4.6.3 Power Pipeline Right-Of-Way

As described in previous annual reports, the pipeline ROW from the Marsh Creek gate to the Powerhouse has been seeded annually since 1990. On this portion of the ROW, those areas where revegetation has not been successful are re-seeded annually. Fertilizer has been applied where permitted, outside of the City of Sultan's watershed. Results of seeding and fertilizing the pipeline right-of-way have been qualitatively evaluated each year. It will still be necessary to mow alders every few years. Some shrubs (mostly salal) are coming in and will be protected from mowing in the future. Small piles of tree stumps have been placed at intervals on the right-of-way to encourage wildlife use and shrub growth (Figure 10a).

North of the Marsh Creek gate, the ROW has been seeded since 1994 and has a good grass layer in most areas. Sparse growth prior to 1994 made it unnecessary to sample percent grass/forb ground cover, but there was improved coverage in 1995 (Figure 10b). Re-construction of a portion of the access road along the pipeline between the tunnel portal and Marsh Creek has been initiated.

FIGURE 10a. View of Pipeline Right of Way near Manhole P13. Photo taken in 1995.

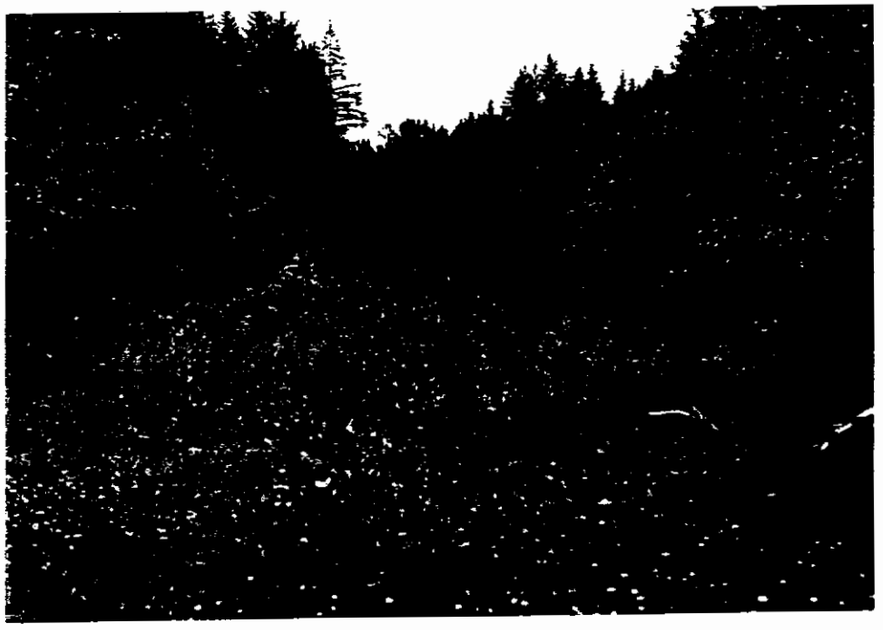
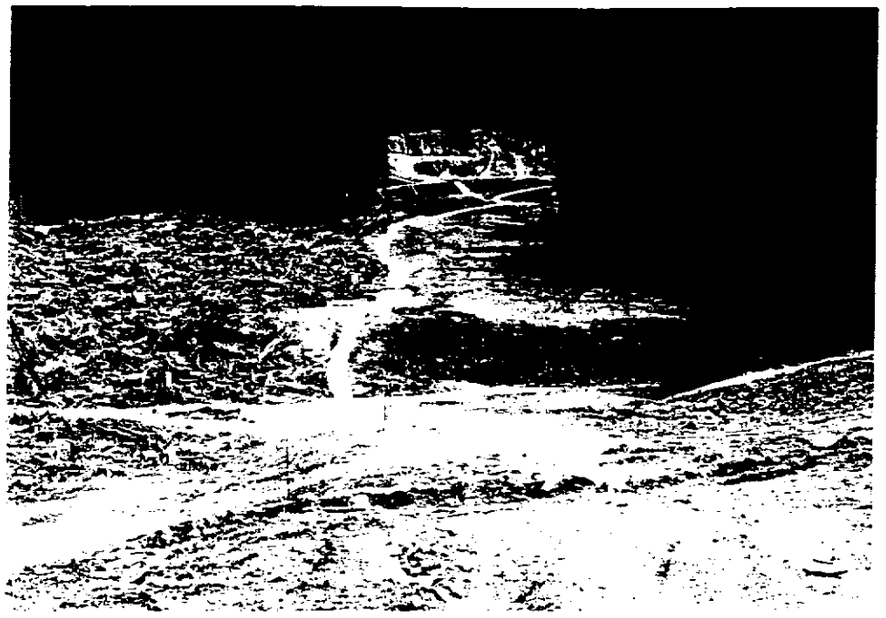
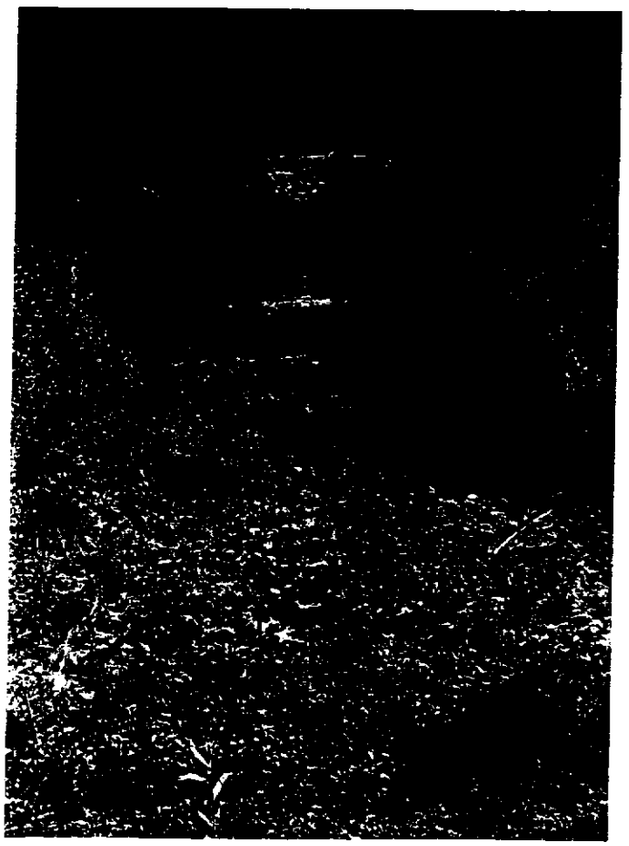


FIGURE 10b. Pipeline Right of Way looking NE from Manhole P3. Upper photo taken in 1987; lower photo taken in 1996





Trees and shrubs have not yet been planted on the power pipeline right-of-way, based on the consultant's recommendation in 1991 that a sod layer should be developed first to help improve the soil. Other improvements, such as gates over access roads, boulders and ecology blocks, have reduced the damage caused by off-road vehicle traffic and garbage dumping on the upper portion of the pipeline north of the Marsh Creek gate. Figure 10c shows improvements to Marsh Creek.

4.6.4 Spada Lake Drawdown Zone

Test plots of five (5) wetland emergent species were planted at two (2) sites in October/November 1994 and monitored in 1995 and 1996. Several species, including two (2) sedge species, survived well during the first growing seasons at Williamson Creek. Wave action damaged many of the plantings at the North Fork site.

4.7 NEST STRUCTURES

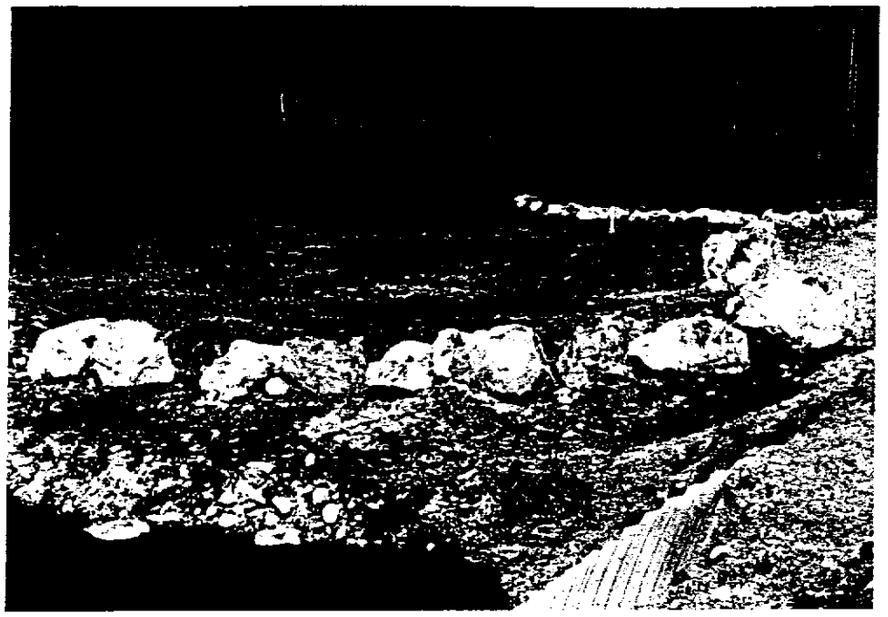
All of the nest structures that were required by the WHMP have been installed and monitored annually thereafter. In 1990, two (2) floating nest platforms were placed in Lost Lake. The required two (2) duck nest boxes were installed at Lost Lake in 1990. One (1) osprey platform was installed at Lost Lake in 1990, and two (2) at Spada Lake in 1992. In addition to the required nest structures, we placed two (2) floating platforms, (one (1) of these in place of the third platform required at Lost Lake), in Lake Chaplain in 1990 in hopes of recruiting loons. We placed six (6) nest boxes in Chaplain Marsh in 1993. In 1995 we placed four (4) additional nest boxes at Lost Lake and three (3) more at the north end of Chaplain Marsh. In 1993 we removed the three (3) boxes from the north end of Chaplain Marsh because only starlings were using them. They were installed at Lost Lake in 1996 (see Figures 6 and 7). Three (3) new nest boxes were put up at Williamson Creek in the Spada Lake Tract in summer 1996 (Figure 5).

The nest structures have been monitored every year since installation. About half of the duck nest boxes have been used by wood ducks and/or hooded mergansers each year. The osprey platform at Lost Lake produced one (1) fledgling in 1994 and one (1) in 1995. 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. The floating platforms have been used for resting and feeding by waterfowl and otters, but no breeding attempts have been noted.

4.8 DEER FORAGE MONITORING

The 1991 and 1995 Annual Reports described several changes from the WHMP's methods. As discussed in the 1991 Annual Report, the objective of monitoring deer forage was changed from a comparison of WHMP harvest methods with typical industrial forest management to a comparison of Lake Chaplain units before and after harvest. Also, we experimented with two (2) methods for estimating forage availability and a method for estimating deer utilization of harvest units, as described in previous annual reports. In 1996 it was decided, with agency consent, to eliminate estimates of forage utilization, and to concentrate on comparing forage availability on post-harvest units with the pre-harvest condition and other unharvested second growth stands.

FIGURE 10c. Improvements to Pipeline Right of Way Crossing at Marsh Creek. Upper photo taken in 1988; lower photo taken in 1996.



5.0 WORK PLANNED FOR 1997

5.1 FOREST VEGETATION MANAGEMENT

5.1.1 Lake Chaplain Harvest Units

Layout of two (2) units of the Tiki Sale on the west side of Lake Chaplain will be completed, including allocating trees for created snags and CWD. These units will be sold during 1997, and harvest may take place in 1997 or 1998. Final road layout work will be done on the west side of the lake to provide access to these, and other future harvest units. The roads may be built in 1997 or 1998, as part of the Tiki Sale contract. Layout of 1998 harvest units, consisting of two (2) units scheduled in the WHMP for 1995, will be completed, but they are not expected to be sold during 1997.

5.1.2 Lake Chaplain Plantation Monitoring

During 1997, plots will probably be put in the Chaplain Sale units (harvested in 1991) to check whether hardwood density is sufficient. Stocking levels for Douglas fir appear to be high, with average annual growth of about three (3) feet. Some of the western red cedar seedlings have been browsed by deer, but the remainder appear to be growing well.

5.1.3 Buffer Zone and Green Tree Area Management

Buffer zones (BZ's) and green tree areas (GTA's) that have been established as part of past timber sale layout on the Lake Chaplain Tract will be monitored during 1997. We also plan to develop management plans for GTA's, which may involve snag creation, light thinning, and underplanting. The management objective for GTA's is to preserve trees for future snag creation needs of the associated harvest unit. In some cases a light thinning, interplanting, or other measures may improve growth rates of the trees that are retained in the GTA, as well as other habitat values. The feasibility of making such improvements on established GTA's will be explored during 1997.

5.1.4 Spada Lake Precommercial Thinning

We will investigate the benefits of additional precommercial thinning on young second growth stands on the Spada Lake Tract that were identified in the Spada Lake Tract Supplemental Plan. If prompt action is most beneficial to wildlife, we will thin the stands in 1997; otherwise, thinning may be deferred.

5.2 SNAG MANAGEMENT

Inventory efforts will continue during 1997 to ensure that those units shown on Table 1 as having incomplete inventories or no inventory at all, as well as those shown in Figure 9 as requiring action by 1998, will be inventoried by the end of 1998. Additionally, units scheduled for harvest in the year 2020 will be added to our inventory priority list so that necessary snag creation can be completed by the year 2000. We will begin long-term

necessary snag creation can be completed by the year 2000. We will begin long-term monitoring of a subset of the snags, revisiting them every three (3) years. This monitoring, which is more frequent than that required by the WHMP, will provide us with additional information on decay rates and wildlife use of different snag species and sizes, which we may use to adjust our snag management program. The details of the sampling/long-term monitoring method will be finalized.

5.3 COARSE WOODY DEBRIS MANAGEMENT

In 1997 we will follow the CWD Procedure (see 1995 Annual Report, Appendix A) in completing the setup of the upcoming Tiki Sale. An appropriate number of existing snags and green trees will be designated for CWD on these units. The procedure for evaluating the impacts of harvest on pre-harvest logs in decay classes 3, 4 and 5 will be implemented in this sale. The details of the sampling/ long-term monitoring method will be finalized, and logs on the Tiki Sale units will be marked for long-term monitoring.

5.4 REVEGETATION

The areas that were previously planted (powerhouse site, Chaplain Marsh, north end of Lake Chaplain, Spada Lake drawdown zone, and pipeline right-of-way) will be monitored. Seeding and possible fertilization of the ROW will be done again this year in those areas where it is needed. Thinning of the buffer strip between the access road and the pipeline will likely begin this year as well, as time permits. The reconstruction of the portion of the access road along the pipeline from Marsh Creek to the tunnel portal will also be completed this year.

We will begin quantitative monitoring of the vegetation cover on the pipeline ROW in 1997 to document changes over time. Results will be used to adjust the seeding and fertilizing program if necessary.

5.5 NEST STRUCTURES

Floating nest platforms in Lost Lake and Spada Lake (depending on accessibility) will be monitored from March at least through the end of June. If there is any use of the platforms, monitoring will continue through the entire breeding season.

Nest boxes and platforms and any new osprey nests at any of the lakes will be monitored following the procedure in the 1991 Annual Report.

5.6 DEER FORAGE MONITORING

In 1997 we will test the alternate sampling method recommended by the consultant in 1996, compare the results with those obtained with the WHMP method in 1996, and decide which will be used in the future. The details of the procedure will be finalized in 1997.

5.7 BIOSOLIDS APPLICATION AT LAKE CHAPLAIN

Vegetation monitoring will be conducted in accordance with the vegetation monitoring plan (Appendix A). Sample plots have been established in units 2040-5 and 2035-6. Check plots have been established southwest of units 2040-5.

5.8 WHMP SUPPLEMENT FOR SPADA LAKE TRACT

The supplement was submitted to the FERC in January, 1997 and we are waiting for approval.

6.0 SCHEDULE OF ACTIVITIES FOR 1997

Activities scheduled for 1997 are reported in Table 7.

Table 7. Habitat Management Activity Schedule for 1997

Major Activities	Location	Quantity
Final Harvest		
Complete layout and sale	Tiki Sale; see Figure 2	2 units (approx. 35 ac.)
Road Layout	West side of L. Chaplain, see Fig. 2	Approx. 6000 ft.
Snag Creation	TBD	TBD
Snag Inventory	Areas shown in Figure 9	TBD
Revegetation		
Grass seeding/fertilizer	Pipeline ROW	As needed to improve bare spots.
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.
Monitoring		
Deer Forage	Chaplain Sale and Horseshoe Sale units	2 FH units and 2 unharvested reference units.
Coarse Woody Debris	Tiki Sale units	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 Lake.
GTA and BZ Management	All established units	Monitor and develop long-term management plans.
Spada Lake Supplemental Plan	Spada Lake Tract	Final plan submitted to FERC in January 1997.

APPENDIX A
VEGETATION MONITORING PLAN
CHAPLAIN FOREST FERTILIZATION PROJECT

1. Twelve (12) permanent, nested plots will be located.

   Four (4) plots will be located in stand 2035-6. Four (4) plots will be located in stand 2040-5 and four (4) 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 (2) years after fertilization. Data will be collected between July 15 and September 15.

2. Plots will consist of two (2) 0.025 ac. Understory vegetation plot and one (1) 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 (2) dominant or codominants and two (2) intermediate or suppressed).
   Crown class (all trees): Dominant, codominant, intermediate, suppressed, dead
   Species