APPENDICES

APPENDIX A. OUTLINE OF SPADA LAKE SUPPLEMENT TO WHMP

بر در این افغانی DRAFT 3/5/92

OUTLINE FOR SPADA LAKE TRACT SUPPLEMENT

1.0 INTRODUCTION

- 1.1 BACKGROUND
- 1.2 OBJECTIVES
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APPENDIX B. SNAG SAMPLING PROCEDURE

Instructions for Data Collection for Snag Management and Understory Forage Programs

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By

Michael S. Schutt April 7, 1992

Adapted from <u>Instructions for Vegetation Structure Exam</u> <u>Level 1 - Ocular Estimate; Pacific Northwest Region</u> of the U.S.D.A. Forest Service

Survey Design and Procedure

This procedure was developed to allow rapid collection of vegetative information on a stand level while maintaining consistency and accuracy of information by field personnel. This technique will not be used on young, managed regeneration stands, but rather on older managed or unmanaged stands.

In order to implement the above parameters for this survey, three things must be remembered by field personnel: 1) measurements will be by estimation; 2) estimators must continually calibrate their eye (by actual measurement) to assure that estimates fall within acceptable limits; and, 3) it is not the intent that the estimator visit every tree once they have calibrated their eye to the accuracy standard of this survey. As much information should be gathered from plot center and centerline of the transects before seeking a better vantage point.

Estimation will provide a rapid way to gather survey information. The person doing the estimations needs to take actual measurements in order to maintain consistency and be within acceptable accuracy limits. At a minimum, actual diameter, height/length, etc. measurements should be taken on the first plot and transect of each stand. The estimator should continue to take measurements throughout the stand to ensure that estimates are within the appropriate accuracy range.

Below is the recommended procedure for constructing the vegetative survey maps.

Prior to field installation, stand packets should be put together. They should include an aerial photo of the stand to be surveyed and a copy of the compass bearings and distances from the starting point to each plot. Also, a map of the area with compass bearings, distances and plot numbers drawn in should be taken into the field - only copies will be used in the field, originals should be left in the office.

In drawing the survey map, plot locations should be established in such a manner so they are random and equal distance apart. Interior and edge area need to be sampled. Determine azimuths between plots and route of travel. Transect center lines will radiate along inter-plot azimuths.

Travel between plots should be such that there is an equal dispersion of transects running perpendicular, parallel and at acute angles to the slope. Transect lines should not be placed on contour or fall lines.

The following is the recommended sequence for installing the vegetative data plots in the field (see figure 1).

 The starting point of the stand survey should be clearly flagged and marked (i.e. "Stand 1-1, start"; "185" @ NE 30 to plot 1").

1

- Record plot data using appropriate codes and within 2. accuracy standards (see Appendix A).
 - Estimate 1/20th acre plot (26.3 foot fixed radius) a. for canopy closure, total shrub cover and ground cover species. All species present will be identified and the appropriate information recorded.
 - On the regeneration plot (1/100th acre 11.8 foot b. fixed radius plots), carry out a group tally of live trees less than 4" DBH by species.
 - Begin the regeneration and live tree tallies at 0 c. degree azimuth (North) and proceed in a clockwise direction.
- Estimate stand classification after completing all of the з. sample plots in a stand, determine and record Stand Plant Association and Clumpiness (%).
- Move on to the next stand. 4.

60 300 ' 8 80" NE TO PLOT 11 60 300 · @ 50 NETO PLOT 12 60 - 950 @ BO'NE TO

GATE.

Enter date and sign all exam cards at the bottom.

Figure 1. Example of vegetation plot map. (enlarged 300% from figure 3.4 of WHMP) From aerial photos and discussion with the city's forester, the stand is determined to be relatively homogeneous, therefore, 1 plot per four acres is required. Since the stand is 46 acres, 12 plots will be necessary. 4 ---*+ a. it 1 -.... TE J 11 SCALE (FEEP) 10 /1 FROM GATE AT SOUTH END OF FILTRATION PLANT; 60 700'@ 75'NW TO PLOT 1 - 8 Go 300' 20" NW TO PLOT 2 GO 300 · @ 50' NAK TO PLOT 3 60 300' @ 50 NW TO PLOT 4 60 300' @ 50 NW TO PLOTS 60 300' @ 75' SW TO PLOT 6 60 300' @ 75' Sw To flor7 60 300' @ 75 Sur TO PLOT 8 60 200' 8 00'NE TO PLOT 1 60 300' & DO'NE TO PLOTIO

Instructions for Vegetation Data Card

The following instructions are for the vegetation data card. This card will be used to complete a vegetative structure exam at a quantified "walk-through" level. Information from this exam will be used in part for the Snag Management and Dead/Down Woody Materials programs implemented in accordance with the Wildlife Habitat Management Plan (WHMP). Information collected at this level of the exam will be by ocular estimation and will have a broad range of reliability.

Number of Plots Required Per Stand

The number of plots/transects required for each stand will be variable. By evaluating aerial photos and other information sources, heterogeneity or homogeneity of the stand should be determined.

- If the stand is considered homogeneous throughout, a coverage of about 14% of the total area, or 1 plot per 5 acres, is satisfactory.
- In a relatively homogeneous stand, a coverage of 17.5%, or 1 plot per 4 acres, will be adequate.
- For a heterogeneous stand, 23% total area coverage is necessary, this equates to 1 plot per 3 acres.

Establish a triangular shaped series of plots within a stand when the stand shape allows it. When a triangular series of plots is not feasible, eg. long, narrow stands or highly irregular stands, establish a series of plots that effectively sample the attributes of the stand. Established plots should sample the general condition of the stand, including core and fringe areas. Mark on a map the locations visited and the route of travel within the stand.

Stand Level Attributes and Definitions

Stand Identification

- 1. Area Identification Any information which should be included to allow for easy future re-location of the stand and the plots within.
- Stand Number (3 digit) As designated on Figure 3.4; Management Stands of the Lake Chaplain Tract, in the WHMP. Record individual stand numbers for delineated stands which are surveyed.
- Photo # Record photograph number, year of photo and other identifying codes for photos used to assess stand characteristics.

Stand Geography

- 1. SLOPE (3-DIGIT) Record the average slope (%) of the major portion of the plot.
- 2. ASPECT (1-DIGIT) Record the average direction towards which the plot slopes.

Code	<u>Stand Direction</u>	<u>Code</u>	<u>Stand Direction</u>
1	North	6	Southwest
2	Northeast	7	West
3	East	8	Northwest
4	Southeast	9	Level or Rolling
5	South	_	-

3. TOPO SITE (3-DIGIT) - The first digit describes the slope position of the plot as a whole, the next two digits describe slope configuration with respect to the vertical and horizontal plane. Record the second digit for vertical plane slope configuration. The vertical plane is the direction in which water runs downhill. The third digit indicates the slope configuration in the horizontal plane (perpendicular to the vertical plane).

Slope Position

Slope Configuration

<u>Code</u>	<u>Description</u>	<u>Code</u>	<u>Description</u>
1	Ridge top	_1	Convex
2	Upper 1/3 slope	_2	Flat
3	Mid 1/3 slope	_3	Concave
4	Lower 1/3 slope	_4	Complex
5	Valley bottom		-
6	Flat		

 ELEVATION (2-DIGIT) - Mean stand elevation in hundreds of feet. Record the first two digits (i.e. 6200 elevation - record code as 62)

<u>Stand Classification</u>

- 1. PLANT ASSOCIATION Record the predominant plant association for the stand as a whole as determined from the plant indicators identified on each plot. This should be completed after the stand has been surveyed.
- 2. REMNANT TREES Remnant trees are small components (less than 5 trees per acre) that remain following harvest activity or natural disaster. Remnant trees are usually the oldest and tallest component of a new stand. From aerial photos, determine the total number of Remnant Trees per stand.
- 3. STAND STRUCTURE/HISTORY (3-DIGIT) Describes the number of tree canopy layers, existence of shrub and herb layers and history within a stand. The first digit indicates numbers of tree

layers, the second digit - shrubs/herbs, and the third digit stand history.

<u>Code</u> <u>Description</u>

- <u>0</u> No tree layer.
- <u>1</u> Single layered. Only one tree layer exists. Stand canopy makes up the average maximum height of
- the stand.
- 2 Two layered. LAYER 1: Trees whose height is equal to or greater than 66% of the average maximum height of the stand. LAYER 2: Trees whose height is 66% or less than the average maximum height of the stand.
- <u>3</u> Multi-layered. Relates to uneven-aged stand where there is no evident break in canopy layering.

The average maximum height of a stand is the average tree height of the top third of the stand, calculated after taking out any heights that are obviously taller (remnant trees) than the general canopy.

The second digit relates to shrub and herb layers present in the understory.

<u>Code</u>	<u>Description</u>	
0	None.	Shrub and herb layers are absent.
1	Shrub.	Only a shrub layer exists.
2	Herb.	Only an herb layer exists.
3	Shrub/Herb.	Shrub and herb layers are present.

The third digit relates to stand history regarding management or wildfire. Enter one of the single digit codes shown below to document previous management activity or natural catastrophic events that have effected a significant proportion of the stand, e.g. wildfire, blowdown, etc.

- <u>1</u> No evidence of management or natural catastrophe.
- <u>2</u> Management has occurred on the site within the last 20 years.
- <u>3</u> Management activity occurred on the site more than 20 years ago.
- <u>4</u> There is evidence of natural catastrophe.
- <u>5</u> There is evidence of natural catastrophe and management within 20 years.
- <u>6</u> There is evidence of natural catastrophe and management more than 20 years ago.

Plot and Transect Attributes and Definitions

Information will be recorded as line items for Canopy Closure, Shrub, Herb, Established Regeneration (less than 4" DBH), Live Tree, Dead Tree and Down Woody Material on fixed and variable radius plots, and fixed length transects.

Fixed Radius Plots (Canopy Closure, Total Shrub, Plant Indicator and Tree Regeneration plots, and Standing Dead Tree tally)

Fixed radius plots that are 1/20th acre (26.3 foot radius) will be established to estimate Canopy Closure, Maximum Canopy Height, Total Shrub Cover (Total Wildlife Hiding Cover), Plant Indicator Species Cover and Standing Dead Tree tallies. The plot center for the fixed radius plot will also be the plot center for the variable radius plot and the starting point of the next transect. Transects will run from one plot to the next and will be 300 feet long x 100 feet wide (30,000 sq. ft.; 0.69 sq. acres).

<u>Canopy Closure</u> (3-digit) - Estimate the average tree canopy closure at each fixed radius plot point by taking 2-3 readings using a densiometer. Record a "C" in the Code column, the estimated average maximum height of the tree canopy (excluding remnant trees) to the nearest 10 feet in the Height/Length column and closure estimates to the nearest 5% in the Canopy Closure column.

Total Shrub Cover (Wildlife Hiding Cover) - Percent canopy cover by all shrubs and average height of the shrub layer will be used as an indicator of potential wildlife hiding cover. An assessment of total cover by all shrub species and the average height of the shrub layer should be taken in the 1/20th acre fixed radius plot. Record an "S" in the Code column, the estimated shrub layer height (to the nearest foot) in the Height/Length column, and closure estimates to the nearest 1% in the Canopy Closure column.

<u>Shrub & Herb Species</u> - For all shrub species present record a "1" in the Code column, the alphanumeric code (see Appendix B) in the Species column, average height of that species in the Height/Length column and estimated % canopy closure for that species in the Canopy Closure column. For all herb species present, record a "2" in the Code column, and the alphanumeric code, height and % canopy closure just as for the shrub species.

<u>Tree Regeneration</u> - A 1/100th acre (11.8 foot radius) plot will be established to estimate tree regeneration. Use the same center point for the tree regeneration plot that was used for the fixed radius plot. All live trees less than 4 inches DBH are considered as Regeneration Trees. For group tallies, all trees will be grouped by species into 1" DBH classes (i.e. 1", 2", 3" & 4"), trees below 1" DBH will fall into the 1" DBH class. Record a "3" in the code column, the alphanumeric code, DBH class, and height in the correct columns. Also, record the number of trees (by species) in each DBH class in the Group Tally column. The following coding table should be used to enter the total # of

regeneration trees by species:

	Total # of	Total # of			
<u>Code_#</u>	<u>Regen trees</u>	<u>Code #</u>	<u>Regen trees</u>		
F (few)	1-9	6	60-69		
1	10-19	7	70-79		
2	20-29	8	80-89		
3	30-39	9	90-99		
4	40-49	10	Greater than 100		
5	50-59				

<u>Standing Dead Trees</u> - Data for standing dead trees (snags) will be recorded in the same manner as that for live trees, in addition, the decay condition and use will be noted. The Dead Tree Transect will extend from the center of the fixed radius plot for a distance of 300 feet with the side boundaries being 50 feet on either side of the centerline. Standing Dead Tree estimates will be collected along this 300 foot transect. If a Standing Dead tree is less than or equal to 50 feet horizontal distance from the centerline, it is considered "in" and tallied. For all standing dead trees, the distance from the previous plot should be recorded. This will allow accurate mapping of existing snags observed at the plots and along the transect lines.

<u>Variable Radius Plots</u> (Live Trees)

Live Tree information will be taken on a variable radius plot (using the same plot center as the one established for the fixed radius plot). Either a 20 or 40 Basal Area Factor (BAF) will be used so that an adequate number of trees (about 6-12) are tallied for each plot. From the aerial photo, familiarity with the stand and after a quick reconnaissance of the first plot, determine which prism will give an adequate number of "in" trees. (For ease of computation, the same BAF prism should be used for all plots throughout a stand. It is preferable to have too many "in" trees rather than too few). A 20 BAF prism should be used in areas where there are fewer trees, and a 40 BAF where there are more trees. All live trees that are "in" (according to the prism) will be tallied.

To use the prism, it must be held so that the bottom is parallel to the slope of the ground. Then, look through the prism at about 4.5 feet high on the tree. The tree should appear as three sections, 1 above and 1 below the prism, and a third through the prism. If the section viewed through the prism does not appear to be entirely separated from the tree, it is considered an "in tree" and is tallied. If this section is entirely separated from the remainder of the tree, it is too far away and therefore is not an "in tree" (see figure 2). The tally should start from true north and turn clockwise. For trees that are "in", record a "4" as the alphanumeric, DBH, and code. also, record the Height Damage/Severity if applicable (see "Damage," under Explanation of Data Entry Columns).

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For trees which are tallied, record only relative heights, not actual estimates. The relative height of a tally tree is determined by first dividing the total tree canopy into three equal layers. Then by identifying which third of the canopy (upper, middle, or lower) that the crown of the subject tree is in. Use the following codes for recording; 1 - upper canopy, 2 - middle canopy, and, 3 - lower canopy. For example, if the crown of the tally tree is in the middle layer of the tree canopy, enter a "2".

A tree is considered "live" if it has any amount of green foliage and normal root contact with the soil. In the case of deciduous trees, green foliage may be absent at the time of sampling, so the condition of the meristematic tissue (cambium or buds) should be substituted for the foliage criteria. "Dead" trees never have green foliage or healthy meristematic tissue unless the tree has recently been uprooted or severed from its roots.

Line Transects

Line transects and Transect plots will be established from the center of each fixed radius plot and will be laid out in the direction of the next fixed radius plot to be completed. Down Woody material and Standing Dead Tree counts will be done on the line transects.

<u>Minimum qualifications for Standing Dead Trees</u> - A Standing Dead Tree must be a minimum of 10 feet in height and 11 inches in diameter. Record dead trees as either a Code "5" or "7", depending upon whether they are located on the fixed radius plot or on the line transect, and include the alphanumeric, the DBH, Height (estimated to the nearest 10 feet), and Condition/Use (see Condition Codes and Descriptions for Standing Dead Trees).

<u>Down woody material</u> - Downed woody material is measured by using a line transect extending for the first 100 feet of the transect. Every piece encountered along the centerline (line transect) that is greater than 10" diameter at the point of intersection will be tallied. Record a code "6", the alphanumeric, DBH, Length, Diameter Intersect, and Condition/Use (see Explanation of Data Entry Columns for Length, Diameter Intersect and Condition/Use).



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Figure 2. A tree as seen through a prism.

"In Tree" - section is not entirely separate from remainder of tree.

"Out Tree" - section is entirely separate from remainder of tree.

- PLOT NO. (2-DIGIT) Record a 2-digit code for every line of data, e.g., 01 for sample plot 1, 14 for sample plot 14, etc.
- CODE NO. OR LETTER (1-DIGIT) Code indicating the type/position of information being recorded (Canopy closure, Shrub/Herb data, Regeneration, Live/Dead Trees and Down Woody Material).

Code Classification

- C Canopy closure/max. canopy height (fixed radius plot)
 S Total shrub cover/Shrub layer height (fixed radius plot)
- 1 Indicator shrubs for plant assoc. (fixed radius plot)
- 2 Indicator herbs for plant assoc. (fixed radius plot)
- 3 Regeneration (live trees >4" DBH, on fixed radius plot)
- 4 Live Tree (tallied on variable radius plot)
- 5 Dead Tree (tallied on fixed radius plot)
- 6 Down Woody Material (tallied on 100 foot transect line)
- 7 Dead Tree (tallied on 300 foot transect line)
- U Unique features Plot features which may not have been noted under other categories (see Unique Habitat Features below).
- 3. PLANT SPECIES (6-DIGIT)

Record alphanumeric code for tree, shrub and herb genus and species as appropriate. See appendix B for alpha codes of plant species.

- 4. DBH (3-DIGIT) Estimate Diameter at Breast Height (DBH), outside bark to the specified accuracy standards. "Breast height" means 4.5 feet above ground on the uphill side of the tree.
- 5. HEIGHT/LENGTH (3-DIGIT) Where code indicates a Live Tree, estimate which third of the total canopy (1=upper, 2=middle, 3=lower) that the crown of the tally tree is in.
 Where code indicates a Dead Tree estimate height to the

Where code indicates a Dead Tree, estimate height to the nearest 10 feet.

Where code indicates Down Woody Material, estimate length from large end to 10" diameter of piece intersected. Down Woody Material must be at least 10" in diameter at point of intersection with line transect. A "piece" constitutes a continuous length free from abrupt physical change or discontinuity. Estimate length to the nearest whole foot.

 DIAMETER INTERSECT (2-DIGIT) Estimate Down Woody Material diameter at the point where the transect intersects down material. Record diameter to the nearest inch. 7.

CONDITION/USE (2-DIGIT) Record code for Dead Trees and Down Woody Material. The first digit is an indicator of condition (see also illustrations of snag or log conditions - figures 3 and 4).

Condition Codes and Descriptions for Standing Dead Trees (Snags)

<u>Code</u> <u>Description</u>

- <u>1</u> Hard snag. Limbs and branches all present. Top pointed. Sapwood is sound, incipient decay, bole has original color. Heartwood is sound, hard and has original color.
- <u>2</u> Hard snag. Few limbs present, no fine branches. Top broken. Sapwood has advanced decay, fibrous, firm to soft, light brown. Heartwood is sound at base, has incipient decay in outer edge of upper bole, hard, light to reddish brown.
- <u>3</u> Hard snag. Limb stubs only. Sapwood is fibrous, soft, light to reddish brown. Heartwood has incipient decay at base, advanced decay throughout upper bole, fibrous, hard to firm, reddish brown.
- <u>4</u> Soft snag. Few or no limb stubs. Sapwood is cubical, soft, reddish to dark brown. Heartwood has advanced decay at base. Sloughing from upper bole, fibrous to cubical, soft, dark reddish brown.
- <u>5</u> Decomposed snag. No limb stubs. Sapwood is gone. Heartwood is sloughing, cubical, soft, dark brown; or fibrous, very soft, dark reddish brown, encased in a hardened shell.

Condition Codes and Descriptions for Downed logs

<u>Code</u> <u>Description</u>

- <u>1</u> Bark intact. Twigs (1.18 inch) present. Texture intact. Shape round. Original wood color. Log elevated on support points.
- <u>2</u> Bark intact. Twigs absent. Texture intact to partially soft. Shape round. Original wood color. Log elevated on support points but sagging slightly.
- <u>3</u> Trace of bark. Twigs absent. Texture is hard, large pieces. Shape round. Original wood color to faded. Log is sagging near ground.
- <u>4</u> Bark absent. Twigs absent. Texture is small, soft, blocky pieces. Shape round or oval. Color of wood is light brown to faded brown or yellowish. All of log is on the ground.
- 5 Bark absent. Twigs absent. Texture is soft and powdery. Shape is oval. Color of wood is faded

The second digit provides an indication of wildlife use by excavators (for both Snags and Logs).

<u>Code</u> _1 2 Description No evidence of cavities or forage use. Evidence of cavity/forage use.



Figure 3. Five stages of deterioration of Douglas-fir snags (reproduced from Neitro et al. 1985).



Figure 4. When they fall, trees and snags immediately enter one of the first four log decomposition classes (reproduced from Bartels et al. 1985). 8. DAMAGE (3-DIGIT)

Record appropriate code for damage/defect or damage indicator as noted.

<u>Code</u> 30

Description

Dwarf Mistletoe, add 1-digit severity code in the last place digit if dwarf mistletoe is present in a live tree. Use the following to evaluate and code severity of infection.

The 6-class Dwarf Mistletoe Rating System by Hawksworth is used to code severity of infection. The live crown is divided into thirds and each third is assigned a numerical score of: "0" for no infection, "1" for 1/2 or less of the branches infected, or "2" for more than 1/2 of the branches infected. The scores for each third of the crown are totalled to give a severity rating of 1 through 6. A bole infection without branch infections is assigned a numerical score of "1". A rating of 5 or 6 is considered to be severe.

Physical Defects

The defect codes will be applied to all tree species (conifer and hardwood), although codes <u>73</u> and <u>74</u> are not necessarily "defects" for hardwood species such as Poplar, Maple, Alder etc. whose habits do include multiple tops and crooked stems.

Code Description

- 73 Forked top. Live tree with abnormally forked top or multiple stems.
- 74Deformed stem. Live tree with excessive crook in
stem usually resulting from a dead or broken top.75Dead top. Live tree with dead or spike top.
- 76Broken top. Live tree with broken or hollow top.91Unspecified deformity. Live trees with excessive
deformity, usually trees with multiple deformities
which are severely twisted, gnarled, tapered or

An estimation of the severity of the defect should be made and used as the third digit in the damage code. A scale from 1 to 6 will be used, with a "1" being only a slight defect or damage, and a "6" will be considered very severe.

9. GROUP TALLY (2-DIGIT) For Code 5 (regeneration) all trees will be grouped by species.

excessively forked.

10. CANOPY CLOSURE/COVER (3-DIGIT) For Codes C, S, 1, 2 and 3 (Canopy Closure, Total Shrub Cover, Regeneration, plus those shrub and herb species important to plant association identification and/or wildlife habitat and foraging). Estimate to the nearest percent for each line entry.

11. UNIQUE HABITAT FEATURES (2-DIGIT) Record the code for any of the following features that were observed in a stand. These will not be associated with line item entries, but will be assimilated as a stand attribute.

Bog (BG) Wet, spongy ground with soil composed mainly of decayed vegetative matter.

Cave (CV) A natural underground chamber that is open to the surface.

Cliff (CL) Steep, vertical or overhanging rock face.

Hardwood inclusion (HD) A patch of hardwood trees in a conifer stand that is too small or too irregularly shaped to map as a distinct stand.

Headwater (HE) The place where a stream originates.

Pond (PD) Small ephemeral or permanent body of water too small to be mapped on the water layer.

Seep (SE) Place where a small spring emerges from the ground generally forming a shallow pool.

Small opening (SM) Gaps in the forest canopy, generally less than 1 acre in size that support a different biological community than the surrounding forest.

Snag patches (SP) Areas containing a high density of hard and/or soft snags. These may be either naturally formed or created.

Small streams (SS) Stream courses too small to be included on the water layer.

Spring (SR) A surface discharge of water small enough to flow in a small rivulet.

Talus (TA) The accumulation of broken rocks that occurs at the base of cliffs or other steep slopes.

Wet meadow (WE) An area of grass, forb, and shrub vegetation that is periodically saturated with the water table at, near, or above the soil surface.

If there is no information to be recorded for a certain line item, record the Code, an "X" for the species, and "0" for all other categories normally measured for that item.

Figure 5 is an example of what a completed Vegetation Data Card might look like.

Figure 5. Example of a completed Vegetation Data Card.

STAND ID: Tract Mgt. Unit # Stand # $3-4$ Photo # Geography: Slope J Aspect \mathbb{Z} Topo Site 233 Elevation $0 > 00$. Classification: Plant Remnant Stand # $3-4$ Asso Trees History $J = 3$ Classification: Plant Remnant Stand # $3-4$ Stand # $3 = 0$ OD Stand # $3 = 0$ Asso Trees History $J = 3$ Classification: Plant Remnant Stand # $3 = 0$ Trees History $J = 3$ OD Stand # $3 = 0$ Trees History $J = 3$ OD Stand # $3 = 0$ Trees History $J = 3$ OD Stand # $3 = 0$ Classification: Plant Remnant Stand # $3 = 0$ Trees History $J = 3$ OD OD Trees Hog to colspan= 0 OD OD Class Trees		Vegetat				ion Dati		Pg of _4			
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Wildlife Tree Creation

In accordance with the WHMP, wildlife (snag) trees will need to be created on much of the land in the Lost Lake and Lake Chaplain tracts. The objective of the snag trees will be to benefit cavity nesters and foragers.

Selection of Wildlife Trees

Trees selected as potential wildlife trees should be at least 14" DBH and be able to be cut to a minimum of 40 feet tall, with a maximum of about 60 feet tall. (For more information, see also specific requirements stated in Tree Topping Contract).

Each tree species has a different rate of decay and differs in its usefulness to wildlife while it is decomposing. The following list is based on selection by wildlife and the length of time each remains standing after death. This preference list should be used to select candidate trees;

- 1. Douglas-fir
- 2. Hemlock and True firs
- 3. Cedar
- 4. Hardwoods and other species.

(For further information, see Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington - chapter 7)

When the data for the vegetation data cards is being collected, possible snaq trees should also be selected. Trees may be either along the inter-plot transects or at the plots. It is not necessary that the trees actually be within the boundaries of the transects (i.e. 300 feet x 100 feet) or the plots (i.e. 26.3 foot radius), but they should be visible from these areas to aid in finding them when they are to be cut or monitored. The trees should be marked with ribbon and numbered sequentially throughout each stand. On the vegetation data card, the following information should be recorded for each possible snaq tree: tree number, species, DBH, height class, and distance and bearing to the tree from the nearest plot or transect. The distance and bearing to each tree will be used to map the location of each candidate tree. The map will also contain the actual snag trees seen during the survey, this will allow adequate spacing of new snags among existing snags.

After the selected trees have been cut, a numbered tag should be affixed with an aluminum nail at about eye level. In addition, one or two rings of orange paint should be sprayed around the tree so that it may be easily seen from a distance. The numbered ribbon should also be left on the tree. The following information should then be recorded for each wildlife tree: tag number; ribbon number; species; DBH; height after cutting.

While the trees are being cut, the direct distances and bearings between wildlife trees should be recorded. This will allow mapping of the snags to be done, for the most efficient monitoring in the future.

Number of Wildlife Trees Per Acre

To meet the target number of three wildlife trees per acre, the approximate number of existing snags per acre must be known. bv calculating the number of acres covered during the stand examination, and knowing the number of snags found there, the number of snags per acre can be estimated. A transect of 300 feet X 100 feet is equal to 30,000 square feet or 0.69 square acres. A plot with a 26.3 foot radius is equal to 2,178 square feet or 0.05 square acres. Together, a plot with 26.3 foot radius and a transect of 300 X 100 feet equals a total of 0.74 square acres. By multiplying the number of plots and accompanying transects by 0.74, the total number of square acres covered can be determined. After computing the acreage covered, an estimate of the number of snag trees that should have been encountered can be determined (i.e. for every four plots/transects (3.0 acres), about three snags should be observed.

Since there is no way of estimating how many snags per acre the stand holds until all plots and transects have been completed, it is advisable to flag three trees per acre (two-three per plot/transect). Once all of the information has been gathered, the plots, transects, existing snags and candidate snags should be mapped. After doing so, about one tree per acre (two trees per three plots/transects) should be chosen to be topped. Trees should be selected so that there will be relatively even spacing from other snags.

When the trees are topped, the flagging on those threes which were not chosen for wildlife trees can be left on the tree. This will allow them to be used for future snag trees.

Appendix A: Technique Accuracy

This inventory will provide general information for a wide range of stands. To accomplish this task a "walk through" exam will be taken using ocular estimation as a method of measurement. In order to maintain a certain degree of reliability, the following accuracy standards were established.

Measurements for Live and Dead Trees and Down Woody Material should be taken at the start of each exam (plot 1) and intermittently throughout the stand to check accuracy of estimations.

- 1. Azimuth; +/- 2 degrees
- 2. Slope; +/- 10%
- 3. Aspect and Topo site; +/-1 class
- 4. DBH; A. < 32" +/- 2.0" B. > 32" +/- 4.0"
- 5. Number of Trees, Snags and Downed Woody Material tallied; Actual tree count
- Species;
 No incorrect species for live trees or plant indicator species
 dsadldowddwn Makdybmatepóskible identification of standing
- 7. Height/Length; +/- 15% (of measured height/length). Record height of Dead Trees to nearest 10 feet and length of Down Woody Material to the nearest whole foot.
- Condition/Use;
 Actual condition and use class.
- 9. Diameter Intersect; Same accuracy as DBH.

Appendix B: Alphanumeric Codes for Plant Species

TREE SPE	CIES	
<u>Code</u>	<u>Scientific Name</u>	<u>Common Name</u>
Snags	or Downed Woody Material:	
0007	· · · · · · · · · · · · · · · · · · ·	Hardwood species unknown
0008		Confier species unknown
<u>0009</u>		Species unknown (cannot
		differentiate confier
		or nardwood)
Dougla	as firs - Redwood:	
PSME	Pseudotsuga menziesii	Douglas fir
SESE2	Seguoia sempervirens	Redwood
True	firs:	
<u>ABAM</u>	Abies amabilis	Pacific silver fir
<u>ABCO</u>	A. concolor	White fir
<u>ABGR</u>	A. grandis	Grand fir
ABLA2	A. laslocarpa	Subalpine fir
ABMA	A. magnifica var. magnifica	California red fir
ABMA2	A. magnifica var. shastensis	Shasta red fir
<u>ABPR</u>	A. procera	Noble fir
Cedar	s:	
CHLA	Chamaecyparis lawsoniana	Port Orford cedar
CHNA	C. nootkatensis	Alaska cedar
CADE3	Calocedrus decurrens	Incense cedar
THPL	Thuja plicata	Western red cedar
Tarah	•	
LAOC	Larix occidentalis	Western larch
<u></u>		
Spruce	e:	
<u>PIBR</u>	Picea breweriana	Brewer spruce
<u>PIEN</u>	P. engelmannii	Engelmann spruce
<u>PISI</u>	P. sitchensis	Sitka spruce
Pines	•	
PICO	Pinus contorta	Lodgepole pine
PIJE	P. jeffrevi	Jeffrey pine
PILA	P. lambertiana	Sugar pine
PIMO	P. monticola	Western white pine
PIPO	P. ponderosa	Ponderosa pine
Hemlo	~ b •	
TSHE	Tsuga heterophylla	Western hemlock
TSME	T. mertensiana	Mountain hemlock
0+5	acrifora.	
LALV	Larix lvallii	Subalpine larch
CYAR	Cyprus arisatus	Suparprise faron
CYER	C. eragrostis	
CYER2	C. ervthrorhizos	
CYES	C. esculentus	

CONIFER	S (CONT.)	
CYIN	C. inflexus	
CYSC2	C. schweinitzii	
CVST	C strigosus	
	Juniperus communis	
<u>JUCC4</u>	T oggidontalig	Western juniper
<u>JUUC</u>		Western Juniper
JUSC	J. Scopulorum	Kocky mountain juniper
PIAT	Pinus attenuata	Knobcone pine
PIFL	P. Hexilis var. Hexilis	Limber pine
PIAL	P. albicaulis	whitebark pine
TABR	Taxus brevitolia	Pacific yew
Hardwoo	ds:	
ACMA	Acer macrophyllum	Big-leaf maple
ALRU	Alnus rubra	Red alder
BEPA	Betula papyrifera	Western paper birch
ADME	Arbutus monziossii	Pacific madrone
CACH	Castanonis chrysonbylla	Colden chinkanin
EDT AD	Fravinus latifolia	Orogon ach
<u>FRUAZ</u>	Flaxinus lacitolla Lithecompus densiflerus	
<u>L10E3</u>	Dithocarpus densifiorus	
POTR	Populus tremuloides	Quaking aspen
POTR2	P. trichocarpa	Black Cottonwood
<u>QUGA</u>	Quercus garryana	Oregon white oak
<u>QUKE</u>	Q. kelloggii	California black oak
<u>UCMA</u>	Umbellularia californica	Oregon myrtle
Other h	ardwoods:	
OUCH	Quercus chrysolensis	Canvon live oak
CONII	Cornus nuttallii	Pacific dogwood
CONU	Collus nuccallil Saliy enocioe	Willow
<u>SADIA</u>	Malua apagina	MITIOM MITIOM
MALUS DDINU	Maius species	Appie
PRUNU	Prunus species	Bitter Cherry
CRATA	Crataegus species	Hawthorn
GROUND COVE	<u>R (CODES 1 & 2)</u>	
<u>VAAL</u>	Vaccinium alaskaense	Alaska huckleberry
<u>PUTR</u>	Purshia tridentata	Antelope bitterbrush
<u>AGIN</u>	Agropyron spicatum var.interme	Awnless bluebunch whtgrass
<u>XETE</u>	Xerophyllum tenax	Beargrass
PREM	Prunus emarginata	Bittercherry
AGSP	Aqropyron spicatum	Bluebunch wheatgrass
ELGL	Elymus glaucus	Blue wildrye
CETH	Ceanothus thyrsiflorus	Blueblossom ceanothus
STHY	Sitanion hystrix	Bottlebrush squirreltail
PTAO	Pteridium aquilinum	Brackenfern
CESA	Ceanothus sanguineus	Buckbrush
LOHI	Lonicera hispidula	California honevsuckle
BRTE	Bromus tectorum	Cheatarase
DRIV	Prunus Virginiana	Common chokechorry
CRIN	Coanothus intorgerrimus	Doorbruch
<u>CEIN</u> BENE	Berberic pervoce	Duarf Orogon grand
CACE	Caroy govori	Fik codro
EFOD	Cater yeyers Focture ovine during only	BIR BEUYE Hard foccus
<u>F BOD</u> PPTD	rescuca ovina uuriuscula E idaboongia	natu tescue Tdaho fogono
<u>L PID</u>	r. Iudioensis Castanonsis shrusonhulla	Coldon chinguania
<u>CACR</u>	cascanopsis chrysophyria	Gorden chriddabru

GROUND	COVER (CONT)
ARPA	Arctostaphylos patula
VAME	Vaccinium membranaceum
VAOV	V. ovatum
AGIN	Agropyron intermedium
POPR	Poa pratensis
LINU	Linanthastrum nuttallii
<u>CAPE</u>	Carex pensylvanica
PHMA	Physocarpus malvaceus
DAGL	Dactylis glomerata
<u>RHMA</u>	Rhododendron macrophyllum
<u>LOPE</u>	Loium pevenne
<u>CARU</u>	Calamagrostis rubescens
<u>ARNE</u>	Arctostaphylos nevadensis
<u>BEPI</u>	Berberis piperiana
<u>RILA</u>	Ribes lacustre
<u>HABL</u>	Haplopappus bloomeri
<u>CHNA</u>	Chrysothamnus nauseosus
<u>CHNI</u>	C. viscidiflorus
<u>OUSA</u>	Quercus sadleriana
<u>GASH</u>	Saultheria shallon
<u>RUSP</u>	Rubus spectabilis
<u>BRIN</u>	Bromus inevmis
<u>LUHI</u>	Luzula hitchcockii
<u>CEVE</u>	Ceanothus velutinus
<u>CEPR</u>	C. prostratus
<u>LALA</u>	Lathyrus lanszwertii
<u>PHPR</u>	Phleum pratense
<u>LIBO</u>	Linnaea borealis
<u>ACCI</u>	Acer circinatum
<u>STOC</u>	Stipa occidentalis
<u>RUPA</u>	Rubus parviflorus
PONE	Poa nervosa
<u>ARVI</u>	Arctostaphylos viscida

Greenleaf manzanita Big huckleberry Evergreen huckleberry Intermediate wheatgrass Kentucky bluegrass Linanthastrum Long-stolon sedge Ninebark Orchardgrass Pacific rhododendron Perennial ryegrass Pinegrass Pinemat manzanita Piper's Oregon grape Prickly currant Rabbitbrush goldenweed Gray rabbitbrush Green rabbitbrush Sadler oak Salal Salmonberry Smooth bromegrass Smoothwoodrush Snowbrush Squawcarpet ceanothus Thickleaf peavine Timothy Twinflower Vine maple Western needlegrass Western thimbleberry Wheeler's bluegrass Whiteleaf manzanita

APPENDICES C-1 TO C-9. HORTICULTURIST REPORTS ON REVEGETATION SITES

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APPENDIX C-1. POWER PIPELINE ROW

Received 5/3/91

POWER PIPELINE ROW (Stand 8-3)

JACKSON HYDROELECTRIC PROJECT-FERC NO. 2157 WILDLIFE HABITAT MANAGEMENT PLAN PROFESSIONAL SERVICES CONTRACT NO. 1657 HORTICULTURAL PROJECT-PHASE I

FIRST REVISION

Prepared by:

Syverson Seed, Inc. Ridgefield, Washington

April 1991

STAND 8-3 - POWER PIPELINE RIGHT-OF-WAY

INTRODUCTION

The power pipeline right-of-way (ROW) is 90 feet wide and 3.7 miles long. It is moderately level (total elev. rise of approximately 800 feet from powerhouse to portal) with coarse rocky soils that were heavily disturbed during construction.

A ROW inventory was conducted to assist in the managing and implementing of WMP practices on the ROW. The objectives were to:

- 1. Inventory major vegetation cover types.
- 2. Map pertinent physical features and habitat enhancement areas.

A general inventory was performed to identify dominant vegetation cover types on the ROW and adjacent borders, and map access and habitat enhancement areas. This report describes the methods and presents the results of the ROW inventory, and includes recommendations and technical specifications for ROW management. This report also includes maps that will provide a base for continuing work on the ROW.

MANAGEMENT AREA

The ROW management area runs in a northeasterly direction (see Fig. 1.1 & 1.2 of the WMP) from the powerhouse to the tunnel portal and begins with survey marker 400+00 and ends with survey marker 220+00. This 3.7 mile section of ROW contains 18 identifiable spans with the average span 1000 feet long, 90 feet wide and encompassing 2.07 acres, for a total of 37.26 acres.

During construction (approx. 1982) a 200 foot wide ROW corridor was cleared, but only the permanent 90 foot wide area is available for ongoing management. The heavily disturbed construction ROW borders the permanent right-of-way and is vegetated, with the exception of clearcut areas, with very high densities of conifer/alder tree saplings.

METHODS

Before surveying the ROW, base maps were developed utilizing black & white aerial photographs and Bechtel plan and profile blueprints. Aerial photos were analyzed to locate and identify ROW access points, corridor widths, and pertinent physical features such as drainages, road crossings, etc. The plan and profile prints were used to determine slope and distance between identifiable markers. Site inspections were used to verify corridor distances and access points. All information was transferred to the base maps producing a map for each 1000 foot span from the powerhouse to the portal.

Once grid maps were developed, a general inventory of existing ROW vegetation was taken. During December, 1990 an ocular survey and random 1/250th acre plots of dominant ground cover vegetation on the 18 spans was conducted by one observer. Each span was traversed and the following information recorded:

1.) Dominant Ground Cover

- 2.) Sidewall (vegetation adjacent to the ROW)
- 3.) Streams and Riparian Zones
- 4.) Wildlife Habitat Management Areas
- 5.) Other

Upon completion of the field work, data was compiled, summarized, and the individual span maps produced on a Macintosh computer.

RESULTS

Sparsely vegetated, coarse, rocky soils are consistent over the entire 3.7 mile ROW. Natural regeneration of red alder (Alnus rubra), Douglas-fir (Pseudotsuga menziesii) and western hemlock (Tsuga heterophylla) - (tree densities recorded as high as 40,000 stems/acre) - and sparse, scattered grass and forb species comprise the major ground cover.

Preferred shrub species are rare to non-existent.

Sidewalls (undisturbed ROW borders), are well stocked conifer or mixed conifer/hardwood second growth. Due to the 200 foot construction corridor preferred shrub species naturally occurring at sidewall bases are, unfortunately, well removed from the permanent ROW management area.

Stand 8-3 Area Summary:

	Area 1	Area 2	Area 3	Area 4	Total
Total Acres	8.28	10.76	7.24	10.97	37.25
Roads/Parking	2.00	2.24	1.57	0.87	6.68
Riparian			0.83	1.38	2.21
Other (manholes, etc)	0.01	0.01	0.01	0.05	0.08
Net Mgt. Acres					_
* Grassland * Riparian	6.27	8.51	4.83 0.83	8.67 1.38	28.28 2.21
Tertilizer restrict.	6.27	3.2	3.2+0.83	10:05	23,55

Fertilizer restrict. 6.27

ENHANCEMENT RECOMMENDATIONS

Management Area No. 1 - SM 400+00 to the chain link fence located at SM 360+00.

- * Map reference pages 1 thru 4
- * Total acres = 8.28
- * Mgt. acres = 6.27
- * Dominant ground cover = Rock/Tree
- * Constraints = No herbicides, No fertilizer
- * Other = N/A

Post very visible (and durable) access restriction, wildlife management and riparian area signs and block, barricade and/or gate all public access points. Particular emphasis should be placed on restricting public access from the powerhouse entry road (map ref. page 2) and via the Horseshoe Bend road (map ref. page 4).

Mechanically and manually site prep the area, spread topsoil and hydroseed with a sod forming grass/forb mix. Pile material removed during site preparation in strategic areas as described in the Technical Specifications.

Management Area No. 2 - Chain link fence located at SM 360+00 to the chain link fence located 200 feet east of SM 310+00.

- * Map reference pages 5 thru 10
- * Total acres = 10.76
- * Mgt. acres = 8.51
- * Dominant ground cover = Rock/Tree
- * Constraints = No herbicides, No fertilizer from 360+00 to 340+00
- * Other = Existing public access restriction is adequate with the possible exception of trespass via the Lake Bronson Camp (map ref. page 10).

Mechanically and manually site prep the area, spread topsoil from 360+00 to toe of slope located 300 east of 330+00 and hydroseed with a sod forming grass/forb mix. Fertilize at time of seeding (except for Sultan watershed border areas) and as indicated by monitoring. Pile material removed during site preparation in strategic areas as described in the Technical Specifications.

Management Area No. 3 - Chain link fence located 200 feet east of SM 310+00 to the creek drainage located 300 feet west of SM 270+00.

- * Map reference pages 10 thru 13
- * Total acres = 7.24
- * Mgt. acres = 5.66
- * Dominant ground cover = Bare/Rock/Tree
- * Constraints = No herbicides, No fertilizer from 290+00 to 270+00.
- * Other = Very severe off road and other vehicle use/damage/dumping.

Post very visible (and durable) access restriction and wildlife management signs and block, barricade and/or gate all public access points. Particular emphasis should be placed on restricting entry from the Sultan Basin road (map ref. page 9) and on posting the Marsh creek riparian area (map ref. page 7).

Mechanically and manually site prep the area, spread topsoil and hydroseed with a sod forming grass/forb mix. Fertilize at time of seeding and as indicated by monitoring. Pile material removed during site preparation in strategic areas as described in the Technical Specifications. Transport and strategically place additional (excess) site preparation material removed from other management areas.

Delay any further enhancement of the Marsh creek riparian area until the site is stabilized.

Management Area No. 4 - Drainage 300 feet west of SM 270+00 to SM 220+00 located just west of the Tunnel Portal.

- * Map reference pages 13 thru 18
- * Total acres = 10.97
- * Mgt. acres = 10.05
- * Dominant ground cover = Rock/Tree
- * Constraints = No herbicides, No fertilizer
- * Other = Severe off road vehicle use/damage.

Post very visible (and durable) access restriction, wildlife management and riparian area signs and block, barricade and/or gate all public access points. Particular emphasis should be placed on restricting area access on the Blue Mountain access road (map ref. page 6) and via the creek drainage 300 feet west of SM 270+00.

Mechanically and manually site prep the area, and direct seed with a sod forming grass/forb mix. Pile material removed during site preparation in strategic areas as described in the Technical Specifications.

Consider future development of a potential riparian area located at 230+00.

TECHNICAL SPECIFICATIONS

* Soil and site preparation procedures - All Management Areas (1 thru 4):

Mechanical scarification with brush blade (D7 or largest crawler permitted over pipeline centerline) is recommended to remove and pile existing trees, roots and stumps. Scarification piles should be strategically located to help control off road vehicle access and to provide "brush pile" habitat enhancement for small mammals and other evaluation species (i.e. birds and black-tailed deer). Slopes too steep (see map ref. page 8) for crawler scarification and areas around manholes, survey markers, fences etc. and riparian areas should be manually slashed, cleared and piled.

The addition of topsoil (2" minimum depth) is recommended to designated sites in Management Areas 1, 2 and 3.

* Recommended grass seed mixture:

25% Perennial ryegrass (Lolium perenne)
25% Annual ryegrass (Lolium multiflorum)
16% Alta tall fescue (Festuca arundinaceae)
10% Creeping red fescue (Festuca rubra)
24% Birdsfoot trefoil (Lotus corniculatus)

Consider additions to the above seed mixture (based on availability) from the list of plant species detailed on page 2-19 of the WMP.

* Recommended seed application rates:

5 - 10 lbs. per acre - hydroseed 25 - 30 lbs. per acre - direct

* Seed application procedures:

Hydroseed with tacifier, wood fiber mulch and slow release fertilizer (except for those areas with identified fertilizer restrictions). Steep slopes, or other areas inaccessible to machine hydroseeding, should be manually seeded via cyclone type seed spreaders. Approximately 50% of the seed mixture should be pre-germinated. Birdsfoot trefoil should be inoculated prior to blending/application.

* Seed application dates:

April

* Potential vendors:

Local or

Willamette Seed & Grain Albany, Oregon

Emerald Hydroturf Portland, Oregon

* Fertilization rates:

200 lbs./acre of urea or slow release formulated mix.

* Fertilizer application date:

Can apply to only 20.5 ac due to restrictions. -7946# Intal

At time of seeding and as indicated from monitoring.

* Fertilizer application procedures:

Hydroseed mix and follow-up hand and/or tractor mount spreader.

* Potential vendors:

Any local ag. supplier (Cenex, etc.)

* Estimate of Probable Costs:

Item	Units	Unit Cost	Quantity	Amount
Mobilization			1	\$ 10,000.00
Mechanical Site Prep	sq. ft.	0.015	1,045,440	15,681.60
Manual Clearing/Slashing	sq. ft.	0.25	174,240	43,560.00
Topsoil Application (soil, hauling, spreading)	yd.	15.00	1578	23,670.00
Hydroseeding (includes seed, fertilizer, etc.)	sq. ft.	0.10	712,640	71,264.00

Direct Seeding				
Seed cost	lb.	2.25	360	810.00
Seed applic.	m.hr.	25.00	80	2,000.00
Direct Fertilization				
Fert. cost (urea)	ton	295.00	0.6	177.00
Fert. applic.	m.hr.	25.00	40	1,000.00
Supervision	m. hr.	50.00	540	27,000.00

ALTERNATIVE MANAGEMENT PLANS - OPTION 1

Eliminate hydroseeding and replace with direct seeding utilizing hand and/or tractor mount spreaders. All other technical specifications would remain the same

* Estimate of Probable Costs:

Item	Units	Unit Cost	Quantity	Amount	
Mobilization			1	\$ 10,000.00	
Mechanical Site Prep	sq. ft.	0.015	1,045,440	15,681.60	24ac
Manual Clearing/Slashing	sq. ft.	0.25	174,240	43,560.00	4ac.
Topsoil application (soil, hauling, spreading.)	yd.	15.00	1,578	23,760.00	
Seed Cost Seed Applic. labor	lb. m.hr. ₂	2.25 25.00	800 80	1,800.00 2,000.00	
Fertilizer Cost (urea) Fert. Applic. labor	lb.ten '	295.00 25.00	1.25 160	368.75 4,000.00	
Supervision	hour	50.00	540	27,000.00	

NOTE: Seed and fertilizer should be re-applied annually for at least two years following the initial application (or as indicated by monitoring).

ALTERNATIVE MANAGEMENT PLANS - OPTION 2

Eliminate hydroseeding, topsoil application and manual clearing/slashing and replace with direct seeding utilizing hand and/or tractor mount spreaders. All other technical specifications would remain the same as Option 1.

* Estimate of Probable Costs:

Item	Units	Unit Cost	Quantity	Amount
Mobilization			1	\$ 5,000.00
 Mechanical Site Prep	sq. ft.	0.015	1,045,440	15,681.60
Seed Cost Seed Applic. labor	lb. m.hr.	2.25 25.00	800 80	1,800.00 2,000.00
Fertilizer Cost (urea) Fert. Applic. labor	ton m.hr.	295.00 25.00	1.25 160	368.75 4,000.00
Supervision	hour	50.00	80	4,000.00

NOTE: Seed and fertilizer should be re-applied for a minimum of 5 years following initial application or longer as indicated from site monitoring reports.

ALTERNATIVE MANAGEMENT PLANS - OPTION 3

Eliminate hydroseeding, topsoil application, mechanical scarification and manual clearing/slashing and replace with direct seeding utilizing hand and/or tractor mount spreaders. All other technical specifications would remain the same as Option 2.

* Estimate of Probable Costs:

-

Item	Units	Unit Cost	Quantity	Amount	
Mobilization			1	\$	2,500.00
Seed Cost	lb.	2.25	800		1,800.00
Seed Applic. labor	m.hr.	25.00	80	0	2,000.00
Fertilizer Cost	ton	295.00	1.25 2	.b ~	368.75
Fert. Applic. labor	m.hr.	25.00	160		4,000.00
Supervision	hour	50.00	80		4,000.00

NOTE: Seed and fertilizer should be re-applied for a minimum of 5 years following initial application or longer as indicated from site monitoring reports.

SHORT TERM OBJECTIVES

* Stabilize the ROW with a permanent grassland and restrict/prohibit public access. Enhance the forage value through periodic grass/forb seeding and fertilization.

LONG TERM OBJECTIVES

Same as the short term. Consider, after site stabilization, shrub plantings as indicated in the WMP.
SNOHOMI HENRY M STAND 8-	SH COUNTY PUD . JACKSON PROJECT 3 POWER PIPELINE	N	EXISTING SITE CONDITIONS APRIL 1991
	MICROWAVE SITE '	SULTAN WATERSHED	
_/ _		PERM. ROW BOUNDARY	
	500'	ACCESS ROAD	
PARKING	ROCK/TRE	32	ROCK/TREE
400+0	•	ROOT DEPTH RESTRICTION AREA PIPELINE C/L ROOT DEPTH RESTRICTION AREA	390+00
	ROCKATREE	PERM. ROW BOUNDARY	ROCK/TREE

SCALE VERT....3/8 INCH = 20 FEET HORIZ...3/4 INCH = 100 FEET PAGE 1 OF 18

NOTES: NORTH SIDEWALL = CONIFER SECOND GROWTH SOUTH SIDEWALL = CONIFER SECOND GROWTH AVE. ELEV. 510

DATE

COMMENTS/RECOMMENDATIONS



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MANAGEMENT AREA I

SULTAN WATERSHED FERTILIZER RESTRICTION AREA



DATE

COMMENTS/RECOMMENDATIONS

APRIL 1991 SNOBOMISH COUNTY PUD HENRY M. JACKSON PROJECT STAND 8-3 POWER PIPELINE → MANAGEMENT AREA 1 SULTAN WATERSHED FERTILIZER RESTRICTION AREA PERM. ROW BOUNDARY ACCESS ROAD ROCK/TREE ROCK/TREE _ . . - - -_ . _ . _ - -- - -• - -ROOT DEPTH RESTRICTION AREA MH OLD SERVICE ROAD OLD SERVICE ROAD PIPELINE C/L = P-13 370+00 380+00 4 ROOT DEPTH RESTRICTION AREA - -- - -_ - ---ROW NARROWS ROCK/IREE PERM. ROW BOUNDARY SULTAN WATER SUPPLY LINE -SCALE VERT....3/8 INCH = 20 FEET HORIZ...3/4 INCH = 100 FEET NOTES: NORTH SIDEWALL = CONIFER SECOND GROWTH SOUTH SIDEWALL = CONIFER SECOND GROWTH PAGE 3 OF 18 AVE. ELEV. 515

COMMENTS/RECOMMENDATIONS

EXISTING SITE CONDITIONS

ATTENTION

DATE



MANAGEMENT AREA 2

SULTAN WATERSHED FERTILIZER RESTRICTION AREA



SCALE

VERT....3/8 INCH = 20 FEET HORIZ...3/4 INCH = 100 FEET

PAGE 5 OF 18

NOTES: NORTH SIDEWALL = CONIFER/HARDWOOD SECOND GROWTH SOUTH SIDEWALL = CONIFER/HARDWOOD SECOND GROWTH AVE. ELEV. 560

DATE

CHAIN LINK

FENCE

COMMENTS/RECOMMENDATIONS

SNOHOMISH COUNTY PUD HENRY M. JACKSON PROJECT STAND \$-3 POWER PIPELINE	N	EXISTING STEE CONDITIONS APRIL 1991
	MANAGEMENT AREA 2	
	PERM. ROW BOUNDARY	600.
ROCK/TREE		ROCK/TREE
350+00	ROOT DEPTH RESTRICTION AREA MH PIPELINE C/L P-11 ROOT DEPTH RESTRICTION AREA	
ROCK/TREE	PERM. ROW BOUNDARY	ROCK/TREE
		SCALE
NOTES:		VERT
NORTH SIDEWALL = CLEARCUT SOUTH SIDEWALL = CONIFER/HARDWOOD SECONI AVE. ELEV. 605	DGROWTH	PAGE 6 OF 18
DATE	COMMENTS/RECOMMENDATIONS	ATTENTION

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→ MANAGEMENT AREA 2 🔔



NOTES: NORTH SIDEWALL = CLEARCUT/CONIFER SECOND GROWTH SOUTH SIDEWALL = CONIFER/HARDWOOD SECOND GROWTH AVE. ELEV. 650 HORIZ...3/4 INCH = 100 FEET

SCALE

PAGE 7 OF 18

VERT.....3/8 INCH = 20 FEET

DATE

COMMENTS/RECOMMENDATIONS



VERT....3/8 INCH = 20 FEET HORIZ...3/4 INCH = 100 FEET

PAGE 8 OF 18

NOTES: NORTH SIDEWALL = CONIFER SECOND GROWTH SOUTH SIDEWALL = CONIFER SECOND GROWTH AVE. ELEV. 712*

DATE

COMMENTS/RECOMMENDATIONS





SNOHOMISH COUNTY PUD HENRY M. JACKSON PROJECT STAND 8-3 POWER PIPELINE	N —	EXISTING SITE CONDITIONS APRIL 1991
	MANAGEMENT AREA 3	
ROCK/TREE	PERM. ROW BOUNDARY	<u> </u>
300+00 STUMPS	ROOT DEPTH RESTRICTION AREA PIPELINE C/L ROOT DEPTH RESTRICTION AREA	ROCK/TREE 290+00
ROCK/TREE	ROCK	/TREE
· ·	ACCESS ROAD	
	PERM, ROW BOUNDARY	
		SCALE
NOTES: WEST SIDEWALL = CONIFER SECOND GROWTH EAST SIDEWALL = CONIFER SECOND GROWTH AVE. ELEV. 740'		VERT3/8 INCH = 20 FEET HORIZ3/4 INCH = 100 FEET PAGE 11 OF 18

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COMMENTS/RECOMMENDATIONS

ATTENTION

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COMMENTS/RECOMMENDATIONS









COMMENTS/RECOMMENDATIONS



COMMENTS/RECOMMENDATIONS



COMMENTS/RECOMMENDATIONS

APPENDIX C-2. TRANSMISSION LINE ROW

. - - -

Received 4/12/91

TRANSMISSION LINE ROW (Stand 8-5)

JACKSON HYDROELECTRIC PROJECT-FERC NO. 2157 WILDLIFE HABITAT MANAGEMENT PLAN PROFESSIONAL SERVICES CONTRACT NO. 1657 HORTICULTURAL PROJECT-PHASE I

FOURTH REVISION

Prepared by:

Syverson Seed, Inc. Ridgefield, Washington

April 1991

TRANSMISSION LINE ROW (Stand 8-5)

INTRODUCTION

The transmission line ROW is 50 feet wide and approximately 800 feet long with moderately productive soils. The ROW terrain is level with an average elevation of 500 feet.

A ROW inventory was conducted to assist in the managing and implementing of WMP practices on the ROW. The objectives were to:

- 1. Inventory major vegetation cover types
- 2. Map pertinent physical features and habitat enhancement areas.

A general inventory was performed to identify dominant vegetation cover types on the ROW and adjacent ROW borders and map access and habitat enhancement areas. This report describes the methods and presents the results of the ROW inventory and includes recommendations and technical specifications for ROW management. This report also includes a map that will provide a base for continuing work on the ROW.

MANAGEMENT AREA

The ROW management area runs in in a southeasterly direction from the top of the powerhouse cut bank to the powerhouse entry road. This 800 foot section of ROW contains 1 identifiable span encompassing about 1.00 acre.

METHODS

Before surveying the ROW, a base outline was developed utilizing black & white aerial photographs. Aerial photos were analyzed to locate and identify ROW access points, corridor lengths and widths and pertinent physical features such as road crossings, pole locations, etc. An ocular survey of dominant ground cover and sidewall vegetation was next conducted by two observers in December and January of 1990/91. After completion of the field work data was compiled, summarized and an individual span map produced on a Macintosh computer.

RESULTS

The ROW is vegetated with a desirable mixture of grass, forb and shrub species with only a minor tree component (mostly red alder). Existing species, such as salmonberry, vine maple, evergreen and trailing blackberry, etc. are preferred species for wildlife enhancement. Vegetation, occurring at the base of the conifer ROW border, consists of salal, fern, rubus spp., vine maple, huckleberry and various other native species listed on the attached ROW map. The ROW border overstory (sidewall) consist of 8 to 10" DBH Douglas-fir and western hemlock second growth.

ENHANCEMENT RECOMMENDATIONS

The existing preferred species (vine maple, rubus, etc.) occurring on the ROW should not be disturbed. The current management procedure of periodic mowing does, in a sense, aid the ROW by rejuvenating the existing vegetation and providing excellent browse via new sprouting.

Direct grass seeding of the ROW (without site disruption) and periodic fertilization is recommended.

TECHNICAL SPECIFICATIONS

* Soil and site preparation procedures:

Not required

- * Recommended grass seed mixture:
 - 25% Perennial ryegrass (Lolium perenne)
 25% Annual ryegrass (Lolium multiflorum)
 16% Alta tall fescue (Festuca arundinaceae)
 10% Creeping red fescue (Festuca rubra)
 24% Birdsfoot trefoil (Lotus corniculatus)
- * Recommended seed application rates:

15 - 20 lbs. per acre

* Seed application procedures:

Hand (Cyclone type) seeder

* Seed application dates:

Fall and/or early spring

* Potential Vendors:

Local or

Willamette Seed & Grain Albany, OR.

* Fertilization rates:

Urea (46-0-0) @ 200 lbs./acre

* Fertilizer application date:

Spring (Annual or as indicated by monitoring)

* Fert. application procedures:

Hand or tractor mount spreader

* Potential Vendors:

Any local ag. supplier (Cenex, etc.)

* Estimated costs:

Seed	\$ 35.00				
Seed applic. labor	65.00				
Fertilizer	\$ 50.00				
Fert. applic. labor	125.00				
Supervision	\$ 150.00				

ALTERNATIVE MANAGEMENT PLANS

* Not applicable to this site

SHORT TERM OBJECTIVES

* Maintain the current ratio of forage, browse and thermal/hiding cover currently existing on and/or adjacent to the ROW. Enhance the forage value through periodic grass/forb seeding and fertilization. Prevent (if possible) any harvest of the adjacent conifer cover. Continue mowing the ROW to promote sprouting.

LONG TERM OBJECTIVES

* Same as the short term. Consider (if future traffic flow on the Powerhouse access road increases) a hedgerow adjacent to the entry road for sight blockage.

Future date

ou'de

Plant identification codes used on the Transmission line ROW:

Abbrev.Common NameOr. grpeOregon grapeEv. BBEvergreen blackberryHuckHuckleberryCasc.CascaraV. mpleVine mapleTr. BBTrailing blackberryWillowWillow spp.HollyHollyB. Rasp.Black RaspberryElder B.ElderberryHim. BBHimalayan blackberry



NOTES: AVE. ELEV. 500'

SCALE:

VERT....1 INCH = 25 FEET HORIZ....1 INCH = 100 FEET

PAGE 1 OF 1

APPENDIX C-3. WATER PIPELINE ROW (CHAPLAIN MARSH)

WATER PIPELINE ROW (Stand 4-8)

JACKSON HYDROELECTRIC PROJECT-FERC NO. 2157 WILDLIFE HABITAT MANAGEMENT PLAN PROFESSIONAL SERVICES CONTRACT NO. 1657 HORTICULTURAL PROJECT-PHASE I

FIRST REVISION

Prepared by:

Syverson Seed, Inc. Ridgefield, Washington

June 1991

STAND 4-8 - WATER PIPELINE RIGHT-OF-WAY

INTRODUCTION

The water pipeline right-of-way (ROW) is a narrow 3200' long corridor bordering the Chaplain marsh. It is moderately level with coarse rocky soils that were heavily disturbed during construction.

A ROW inventory was conducted to assist in the managing and implementing of WMP practices on the ROW. The objectives were to:

- 1. Inventory major vegetation cover types.
- 2. Map pertinent physical features and habitat enhancement areas.

A general inventory was performed to identify dominant vegetation cover types on the ROW and adjacent borders, and map access and habitat enhancement areas. This report describes the methods and presents the results of the ROW inventory, and includes recommendations and technical specifications for ROW management. This report also includes maps that will provide a base for continuing work on the ROW.

MANAGEMENT AREA

The ROW management area runs in a southeasterly direction (see Fig. 3.4 & 3.5 of the WMP) from the filtration plant to approximately 700 feet west of the diversion dam access road and begins with survey marker 630+00 and ends approximately 200 feet east of survey marker 600+00. This 3200 foot section of ROW contains 1 identifiable management area.

METHODS

Before surveying the ROW, base maps were developed utilizing black & white aerial photographs and Bechtel plan and profile blueprints. Aerial photos were analyzed to locate and identify ROW access points, corridor widths, and pertinent physical features such as drainages, road crossings, etc. The plan and profile prints were used to determine slope and distance between identifiable markers. Site inspections were used to verify corridor distances and access points. All information was transferred to the base maps producing a map for each 1000 foot span bordering the marsh.

Once grid maps were developed, a general inventory of existing ROW vegetation was taken. During December, 1990 an ocular survey and random 1/250th acre plots of dominant ground cover vegetation was conducted by one observer. The management area was traversed and the following information recorded:

- 1.) Dominant Ground Cover
- 2.) Sidewall (vegetation adjacent to the ROW)
- 3.) Streams and Riparian Zones
- 4.) Wildlife Habitat Management Areas
- 5.) Other

Upon completion of the field work, data was compiled, summarized, and the individual span maps produced on a Macintosh computer.

RESULTS

The water pipeline (stand 4-8) management area is confined between the filtration plant access road and the Chaplain wetland with a dominant ground cover of grass and red alder (Alnus rubra). The pipeline centerline (which lies between the road and the marsh) is being periodically mowed to control tree and other vegetation potentially damaging to the buried pipeline.

Isolated second growth stems of Douglas-fir (Psuedotsuga menziesii), western hemlock (Tsuga heterophylla), western red cedar (Thuja plicata) black cottonwood (Populus trichocarpa) and red alder are scattered along the marsh perimeter. Scattered groupings of salal, salmonberry, fern and trailing blackberry are also present.

Visually, the wetland is very exposed to the filtration plant access road.

ENHANCEMENT RECOMMENDATIONS

Post visible and durable "wildlife management area" signs at strategic areas along the ROW and visible to traffic on the filtration plant access road.

Supplement the existing grass/forb sod component with direct seeding with a sod forming grass/forb seed mixture.

Establish a shallow rooted, evergreen sight blockage hedgerow parallel to to the wetland.

COMMENT:

There has been considerable discussion regarding species selection for the Chaplain marsh hedgerow. A native, evergreen species would be preferred...however, root depth restrictions (within the 15' pipeline centerline area) complicate and, basically, eliminate any known native species able to reach appropriate sight blockage height. The following Technical Specifications propose use of a non-evasive, non-native species compatible to management objectives.

TECHNICAL SPECIFICATIONS

* Grass seed soil and site preparation procedures:

Not required

* Recommended grass seed mixture:

25% Perennial ryegrass (Lolium perenne)
25% Annual ryegrass (Lolium multiflorum)
16% Alta tall fescue (Festuca arundinaceae)
10% Creeping red fescue (Festuca rubra)
24% Birdsfoot trefoil (Lotus corniculatus)

Consider additions to the above seed mixture (based on availability) from the list of plant species detailed on page 2-19 of the WMP.

* Recommended seed application rates:

25 - 30 lbs. per acre - direct

* Seed application procedures:

Direct seed with hand (cyclone type) or tractor mount seed spreaders. Birdsfoot trefoil should be inoculated prior to blending/application.

* Seed application dates:

April

* Potential vendors:

Local or

Willamette Seed & Grain Albany, Oregon

* Hedgerow soil and site preparation procedures (planting plan):

Auger 1 foot depth 12 to 18" diameter planting holes ("x") for the hedgerow in the following configuration:

- Wetland x - -x - -x - -x - -x - -x - -etc. 2' to 3' max. horiz. & vert. spacing - -x - -x - -x - -x - -x - -etc.

- Pipeline-

- Access Road-

Augered holes should follow contour of the wetland edge a top the marsh bank and well removed (as possible) from standing, stagnant water.

* Recommended hedgerow plant species;

Arborvitae prymadalis - or equivalent

* Planting rates:

Approx. 3200 plants - average 3' to 4' average height

* Planting procedures:

Plant material in vertical alignment no deeper/shallower than apparent nursery soil line. Roots will be spread uniformly with no "J' rooting or exposed roots permitted. Soil will be "tamped" in firmly. No staking or other support of the planted material is considered necessary, although some remedial straightening of plants may be required if physical disturbance occurs.

Application of big game repellant (BGR) - powder form - is recommended directly after planting and every 2 to 4 months following planting or as indicated by periodic monitoring.

* Planting dates:

Early spring

* Expected/acceptable rates of mortality:

15 to 35%

* Replacement criteria and procedures:

Remove dead material and replace

* District maintenance plan:

Protect plants from accidental damage/mortality from ROW mowing and provide periodic irrigation as seasonally required. District could also apply BGR as necessary and straighten plants disturbed from vertical alignment.

Periodic hand clearing of alder (or other undesirable vegetation) immediate to the planted hedgerow should also be anticipated and scheduled along with normal ROW maintenance.

* Potential vendors:

Local wholesale nursery

or

Teufel Wholesale Nursery Portland, Oregon

* Plant availability constraints:

Confirm order for plant material minimum one year prior to intended planting date.

* Fertilization rates:

Not applicable - fertilizer restriction area.

* Fertilizer application date:

N/A

* Fertilizer application procedures:

N/A

- * Potential vendors: N/A
- * Estimate of Probable Costs:

Item	Units	Unit Cost	Quantity	Amount
Mobilization	••-	••-	1	\$ 5,000.00
Mechanical Site Prep (Augered planting holes)	ea.	0.50	3200	1,600.00
Direct Seeding				
Seed cost	lb.	2.25	65	146.25
Seed applic.	m.hr.	25.00	16	400.00
Planting Cost				
Plants	ea.	12.30	3,200	39,360.00
Planting	ea.	4.50	3,200	14,400.00
Maintenance				
BGR mat. cost	lb.	18.00	10*	180.00*
Applic. labor	m. hr.	25.00	16*	400.00*
Supervision	m. hr.	50.00	80	4,000.00

* Initial application only

ALTERNATIVE MANAGEMENT PLANS

* Research has found no plant material other than arborvitae spp. which meets the evergreen, height and non-aggressive - shallow rooting characteristics required.

SHORT TERM OBJECTIVES

* Stabilize the ROW with a permanent grassland and establish wetland sight blockage hedgerow.

LONG TERM OBJECTIVES

*Same as the short term.

EXISTING STITE CONDITIONS SNOHOMISH COUNTY PUD HENRY M. JACKSON PROJECT STAND 4-5 WATER PIPELINE ROW APRIL 1991 -----WETLAND -----÷÷, CITY OF EVERETT FILTRATION FACILITIES EDGE OF WETLAND ALDER SM1165 GRASS/TREE GRASS/TREE GRASS/TREE

PIPELINE CAL

ACCESS ROAD

SM 1170

мн

C7

630+00

SCALE: NOTES: VERT 3/8 INCH = 20 FEET AVE. ELEV. 575 HORIZ ... 3/4 INCH = 100 FEET PAGE 1 OF 4

SALMONDERRY -

GRASS/TREE

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620+00

DATE	COMMENTS/RECOMMENDATION	S ATTENTION



NOTES:	SCALE:
AVE. ELEV. 575	VERT
	PAGE 2 OF 4

			 -	-	
r	ATE				

COMMENTS/RECOMMENDATIONS



DATE COMMENTS/RECOMMENDATIONS ATTENTION

8



VERT.....3/8 INCH = 20 FEET HORIZ....3/4 INCH = 100 FEET

NOTES:

AVE. ELEV. 575

PAGE 4 OF 4

DATE

COMMENTS/RECOMMENDATIONS
June 12, 1991

Snohomish County PUD P.O. Box 1107 Everett, WA. 98206

Attn: Bernice Tannenbaum

RE: YOUR LETTER OF 31 MAY, 1991 - WATER PIPELINE ROW

Dear Bernice:

Thank you for your letter and comments regarding the water pipeline ROW report. While most of your suggestions have been incorporated in the enclosed report revision, I thought it best to answer several other questions within the context of this letter.

First: Snow load

I honestly don't know of any lowland species able to withstand 18 inches of wet snow load without sustaining some damage. However, arborvitae is more tolerant than most (due to the pyramidal shape) and while it may suffer some limb breakage, or deformity, it generally heals quickly. (see species description)

Second: Fall Planting

Fall planting is possible although expense would likely increase due to the need for all plants to be either potted or ball & burlap. Bareroot plants could be used during an early spring plant.

Third: Irrigation

The requirement for irrigation would be dependent on two factors:

1.) The desired growth rate (see species description).

2.) Pest protection during periods of extended drought (see spp. description).

Fourth: Big Game Repellant

The need for game repellent or fencing (animal exclosures) is dependent on animal populations in the area. BGR is far cheaper than fence construction and we have had very good success in deterring deer and elk browse in areas that receive over 100 inches of annual precip. However, if you or Don feel that potential big game usage would be minimal...BGR or fencing could be delayed and only considered if indicated by monitoring.

Fifth: Species Description

Arborvitae spp. is a fast growing evergreen(6 to 12 inch/year under ideal conditions). It is very tolerant of drought, low temperatures and pollution and is very resistant to pest or disease infestation. Only one (extremely rare) blight is known to cause potential damage and the only other concern involves mites which periodically attack individual plants stressed from severe drought. Overall, these concerns are minimal.

Arborvitae should reach a max. height of approximately 10 to 12 feet with a non aggressive (compared to other alternative spp.) root system. I do not believe the root system would ever impose a problem to the buried pipeline.

Bernice, I have attempted to locate a decent picture of the spp. for you but have not been successful. I will take several pictures and forward to you as developed. Meanwhile, arborvitae hedgerows are extremely prevalent. I'm sure you or Don could find many examples within your immediate neighborhood or local nursery.

Thanks again for your input Bernice and please feel free to call at (206) 887-4094.

Best regards.

SYVERSON SEED, INC.

July 19, 1991

Karen-Please read this 11 return to me BT

Snohomish County PUD P.O. Box 1107 Everett, WA. 98206

Attn: Bernice Tannenbaum

RE: STAND 4-8

Bernice:

Regarding our recent telephone conversation, I think your decision to consider native plant groupings (in lieu of a permanent, evergreen hedgerow) has merit, although there may be several limiting factors.

First, as far as species selection is concerned, I would refer you to Table 2.4, page 2-19 of the WMP which lists a variety of appropriate native plants. Of particular interest on this list are:

elderberry (both red and blue varieties) vine maple serviceberry salmonberry (although that already exists on the site) ocean spray hazel

For particular wet areas, planting of Douglas spirea and red osier dogwood should also be considered. For those few areas outside of the 15' pipeline root restriction area (see area maps attached to Stand 4-8 report) the existing alder, western red cedar and cottonwood tree mixture could be complimented with supplemental plantings of:

western red cedar cottonwood bitter cherry pacific dogwood big leaf maple

Regarding mountain laurel, or selection of other ornamental or introduced species, the sky is almost the limit. I have been unable to locate my notes regarding mountain laurel and, since I have no personal experience with the species, I would be hesitant to recommend its use. At any rate, I think consideration of too many non-native species fall outside the scope and objective of the WMP and, therefore, caution is urged.

As far as limitations are concerned, I doubt that non-evergreen shrub species will ever effectively sight block the marsh and some, particularly elderberry and vine maple, may pose a future root problem to the pipeline. Also, considering the current maintenance practice of mechanical brush mowing/slashing on the ROW any non-evergreen spp. is likely to be inadvertently "chopped". One final limitation is potential plant availability problems.

Regarding arborvitae, I still believe the species is the most appropriate choice (considering ROW constraints) to accomplish visual sight blockage objectives. If the shrub is allowed to grow wild (ie: not trimmed) it will take on, in time, a ragged cedar appearance and would, in my opinion, blend in nicely with the surrounding, native vegetation.

Thanks for your input Bernice and I hope these thoughts are of some help.

Best regards.

SYVERSON SEED, INC.

τ) Solar

Dan Syverson

APPENDIX C-4. NORTH END LAKE CHAPLAIN

Received 7/16/91 R

NORTH END LAKE CHAPLAIN (Stand 1-17)

JACKSON HYDROELECTRIC PROJECT-FERC NO. 2157 WILDLIFE HABITAT MANAGEMENT PLAN PROFESSIONAL SERVICES CONTRACT NO. 1657 HORTICULTURAL PROJECT-PHASE I

Prepared by:

Syverson Seed, Inc. Ridgefield, Washington

July 1991

STAND 1-17- NORTH END LAKE CHAPLAIN

INTRODUCTION

Site 1-17 is a level, lakeside grass/shrub meadow within the City of Everett's Lake Chaplain watershed. An inventory was conducted to assist in the managing and implementing of WMP practices for this management area. The objectives were to:

- 1. Inventory major vegetation cover types.
- 2. Map pertinent physical features and habitat enhancement areas.

A general inventory was performed to identify dominant vegetation cover types on the site and adjacent borders, and map access and habitat enhancement areas. This report describes the methods and presents the results of the inventory, and includes recommendations and technical specifications for future management. This report also includes a map that will provide a base for continuing work and monitoring on this management unit.

MANAGEMENT AREA

Stand 1-17 is located at the north end of Lake Chaplain (see Fig. 3.4 of the WMP) and contains 1 identifiable management unit encompassing approximately 11 acres. Access is excellent with the majority of the unit bordering a permanent access road that is restricted access to the general public. Soils tend to be damp to wet and appear to be moderately productive.

METHODS

Before surveying the site, a base map was developed utilizing black & white aerial photographs. Aerial photos were analyzed to locate and identify access points and pertinent physical features such as drainages, road crossings, etc.

Once grid maps were developed, a general inventory of existing vegetation was taken. An ocular survey and random 1/250th acre plots of dominant ground cover vegetation was conducted by one observer. The management area was traversed and the following information recorded:

- 1.) Dominant Ground Cover
- 2.) Existing Vegetation
- 3.) Streams and Riparian Zones
- 4.) Wildlife Habitat Management Areas
- 5.) Other

Upon completion of the field work, data was compiled, summarized, and the individual span map produced on a Macintosh computer.

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RESULTS

The majority of Stand 1-17 is confined between the permanent access road and the north shoreline of Lake Chaplain. The site is a grass/forb meadow with established communities of evergreen and Himalayan blackberry, salmonberry and spirea. Trailing blackberry and scattered alder and black cottonwood also occur on the site.

ENHANCEMENT RECOMMENDATIONS

Supplement (as indicated by future monitoring) the existing grass/forb sod component with direct seeding with a "preferred" (see Tables 2.1 & 2.4 of the WMP) grass/forb/shrub seed mixture.

Establish a "visual screen" Douglas fir hedgerow east of the dam and parallel to the permanent access road (see attached site map).

TECHNICAL SPECIFICATIONS

* Grass seed soil and site preparation procedures:

Not required

* Recommended grass seed mixture:

25% Perennial ryegrass (Lolium perenne) 25% Annual ryegrass (Lolium multiflorum) 16% Alta tall fescue (Festuca arundinaceae) 10% Creeping red fescue (Festuca rubra) 24% Birdsfoot trefoil (Lotus corniculatus)

Consider additions to the above seed mixture (based on availability) from the list of plant species detailed on page 2-19 of the WMP.

* Recommended seed application rates:

10 - 15 lbs. per acre - direct

* Seed application procedures:

ied Emycovh. powder "inndculant" Direct seed with hand (cyclone type) seed spreader. Birdsfoot trefoil should be inoculated prior to blending/application.

* Seed application dates:

April

* Potential vendors:

Local or

Willamette Seed & Grain Albany, Oregon

* Hedgerow soil and site preparation procedures (planting plan):

Not required

* Recommended hedgerow plant species:

Douglas-fir plug+1-seedlings Seed Zone 411 Seed source elevation 500 - 1000 feet

- NOTE: A plug+1 seedling is a tree grown one season in a greenhouse container and a second growing season in a bareroot transplant nursery. The plug+1 seedling has repeatedly demonstrated superior survival and subsequent growth to alternative seedling types.
- * Planting rates:

Plant a single row of trees spaced approximately 5 feet apart (600 trees estimated).

* Planting procedures:

Shovel plant trees in vertical alignment no deeper/shallower than apparent nursery soil line. Roots will be spread uniformly with no "J' rooting or exposed roots permitted. Soil will be "tamped" in firmly. No staking or other support of the planted material is considered necessary, although some remedial straightening of trees may be required if physical disturbance occurs.

* Planting dates:

Early spring

* Expected/acceptable rates of mortality:

5 to 10%

* Replacement criteria and procedures:

Remove dead material and replace

How for from

* District maintenance plan:

Protect trees from accidental damage/mortality from incidental mowing and straighten plants disturbed from vertical alignment.

Periodic hand clearing of alder (or other undesirable vegetation) immediate to the planted hedgerow should also be anticipated and scheduled along with normal area maintenance.

* Potential vendors:

Local Forest nursery

eg. Neysharrier Should be ~ \$1 aprece

* Plant availability constraints:

Confirm seedling order minimum one year prior to intended planting date.

* Fertilization rates:

Not applicable - fertilizer restriction area.

* Fertilizer application date:

N/A

* Fertilizer application procedures:

N/A

- * Potential vendors: N/A
- * Estimate of Probable Costs:

Item	Units	Unit Cost	Quantity	Amount
Mobilization			1	\$ 2,500.00
Direct Seeding (future)				
Seed cost	lb.	5.00	50	250.00
Seed applic.	m.hr.	25.00	16	400.00
Planting Cost				
DF seedlings	ea.	0.50	600	300.00
Planting	ea.	0.50	600	300.00
Supervision	m. hr.	50.00	16	800.00

ALTERNATIVE MANAGEMENT PLANS

* None at this time...some residual clearing of undesirable tree species (ie: red alder) should be anticipated and scheduled as indicated from future monitoring. An additional option is placement of downed logs or other woody material recovered from logging operations or other activity in the immediate area...the placement of dead or down woody material would further enhance wildlife site diversity.

SHORT TERM OBJECTIVES

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* Maintain the area as a permanent grass/shrub meadow.

LONG TERM OBJECTIVES

*Same as the short term.



Sept. 19, 1991

Snohomish County PUD P.O. Box 1107 Everett, Wa. 98206

Attn: Bernice Tannenbaum

RE: LAKE CHAPLAIN - STAND 2-26

Bernice:

As you are aware, Stand 2-26 is a narrow road border on the west shoreline of Lake Chaplain (for map reference, please see WMP, fig. 3&4). The Wildlife Habitat Management Plan (WMP) recommends the site be permanently maintained as an incidental "grass/meadow for early-successional stage species". Site inspections have verified that the grass/meadow condition is present, requires no further enhancement activity and is complimented with a desireable shrub component including trailing blackberry, salmonberry and red huckleberry.

Although no enhancement activity is needed, or recommended, the option for establishing a roadside hedgerow (for lake/road sight blockage) has been discussed. The purpose of this letter is to estimate the number of plants required for the optional hedgerow.

On August 28,1991 Stand 2-26 was traversed and the following information noted:

- * Douglas-fir would be the preferred hedgerow plant species.
- * Douglas-fir seedlings should be from seed zone 411, elevation 500 to 1000 feet....a plug +1** seedling would be the preferred planting stock.
- * Seedlings should be planted on 5 foot centers.
- * Approximately 700 seedlings would be required to establish the hedgerow from the earth filled dam to (and including) stand 2-27.

* Estimate of probable cost:

-Seedling cost: Approx. \$350.00 -Planting cost: Approx. \$350.00 -Supervision: Approx. \$400.00

Received 9/23/91

* Potential vendors:

-Webster State Nursery -Weyerhaeuser Co. -Other local forest nurseries

For any questions or comments please call at (206) 887-4094.

** A plug +1 seedling is a tree grown one season in a greenhouse container and a second growing season in a bareroot transplant nursery.

Best regards.

SYVERSON SEED, INC.

D.S.

Dan Syverson President

APPENDIX C-5. POWERHOUSE SITE

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POWERHOUSE SITE (Stand 8-4)

JACKSON HYDROELECTRIC PROJECT-FERC NO. 2157 WILDLIFE HABITAT MANAGEMENT PLAN PROFESSIONAL SERVICES CONTRACT NO. 1657 HORTICULTURAL PROJECT-PHASE I

FIRST REVISION

Prepared by:

Syverson Seed, Inc. Ridgefield, Washington

September 1991

STAND 8-4 - POWERHOUSE

INTRODUCTION

Stand 8-4 is an accessible, moderate to steeply sloped 27 acre site with soils that were heavily disturbed during the pipeline and powerhouse construction.

A site inspection and general inventory was conducted on the Project and adjacent border areas to assist in the managing and implementing of WMP practices. The objectives were to:

- 1. Inspect and inventory existing soil conditions and major vegetation cover types.
- 2. Map pertinent physical features and potential habitat enhancement areas.
- 3. Identify any site constraints or other limiting factors.

This report describes the methods and presents the results of the general inventory, and includes recommendations and technical specifications for area wildlife enhancement management. This report also includes maps that will provide a base for continuing site development.

MANAGEMENT AREA

Stand 8-4 is located on the east bank of the Sultan river in the SW1/4, Sec. 17, T.28N., R.8E., W.M. of Snohomish County, WA. (see Fig. 1.2 of the WMP).

Except for the immediate Sultan river shoreline, site 8-4 was used as a staging area for pipeline and powerhouse construction activities (approx. 1982/83). Area soils were severely disturbed and/or removed by heavy equipment operation and there remains various concentrations of buried construction spoils scattered throughout the Project area. With the exception of grass seeding (seed mixture unknown) the construction site was left, after construction, to revegetate naturally.

Currently, there are several potential construction projects pending which may further impact immediate and future area wildlife enhancement profiles.

METHODS

Before surveying the management area, a base map was developed utilizing color and black & white aerial photographs and Bechtel plan and profile blueprints. Aerial photos were analyzed to locate and identify access points and pertinent physical features such as drainages, road crossings, etc. The plan and profile prints were used to determine slope and distance between identifiable areas. Site inspections were used to verify distances and access points.

Once a grid map was developed, a general inventory of existing vegetation was taken. The Project area and bordering sidewalls were traversed and site and vegetation profiles prepared. Random test holes were dug to check soil depths and various (random) check plots (1/250th acre) were established. The following information was recorded:

- 1.) Dominant Ground Cover
- 2.) Existing vegetation
- 3.) Streams and Riparian Zones
- 4.) Potential Wildlife Habitat Management Areas
- 5.) Other

Upon completion of the field work, data was compiled, summarized, and the individual span maps produced on a Macintosh computer.

SITE CONSTRAINTS:

- Herbicide and pesticide restriction area
- Probable fertilizer restriction area
- No heavy equipment operation allowed on slopes
- No plantings, or other obstructions, which would visually block or shade the entry road.

SUMMARY OF EXISTING SITE CONDITIONS: (see attached site map)

Area 1 - Sultan River Riparian

The area is a narrow strip of tree/shrub habitat bordered by the Sultan river (west side) and a parallel, construction road grade (east). Existing tree and shrub species range in age from seedling to mature second growth, are well dispersed and include:

Douglas-fir Western red cedar western hemlock cottonwood willow cascara alder elderberry salmonberry sword fern huckleberry spirea

Moderately heavy deer and beaver use was observed throughout the management area.

Area 2 - Cascade Creek Riparian

The drainage area below (west) of the powerhouse access road is bordered by a permanent rock/wire bulkhead...seasonal flooding of the immediate area was noted. Although devoid of any mature vegetation capable of providing site blockage, the following plant species are present:

grass spp. spirea thistle queens ann lace plantain clover bigleaf maple seedlings western red cedar seedlings cottonwood sprouts

The riparian area above the access road (east) was left relatively undisturbed during construction activities. Existing vegetation includes:

Douglas-fir western red cedar cottonwood alder willow western white pine (one) salal sword fern

Area 3 - Contoured Powerhouse Slope

This area was terraced and seeded to grasses following Project construction. A drainage system was also installed to aid site stability and control slope erosion. The following plant species are currently present:

grass spp. thistle Douglas-fir seedlings big leaf maple seedlings willow sprouts cottonwood sprouts alder seedlings horse tail buddlia wild strawberry moss buttercup pearly everlasting

A small area of unstable sand (some slippage evident) exists on the northerly slope area immediately bordering the Cascade creek drainage (see attached map).

Area 4 - Entry Road Switchback

This moderate to rather steeply sloped (and visually exposed) management area is vegetated with the following plant species:

grass spp. moss spp. alder seedlings/saplings Douglas-fir seedlings western red cedar seedlings Alder is the most predominate tree species and is rapidly invading the management area... preferred shrub species are rare to non-existent. This area also contains a knoll (see attached map) which may be leveled to improve entry road conditions.

Area 5 - Upper Entry Road

This management area has several distinct grass/forb meadows bordered (and eventually blending into) the Sultan river riparian, conifer second growth and/or pipeline/microwave Project boundary areas. Existing plant species include:

grass spp. moss spp. alder Douglas-fir Oregon grape sword fern bracken fern salmonberry trailing blackberry thimble berry salal western hemlock western red cedar cottonwood

Alder saplings (12 to 15 feet) are rapidly invading the area.

ENHANCEMENT RECOMMENDATIONS

General Recommendations:

1.) Establish a direct grass/forb/shrub seeding program as detailed in the Technical Specifications.

2.) Implement a scheduled alder control maintenance program.

3.) Locate and randomly place downed logs, brush piles or other woody material throughout the site to further enhance wildlife site diversity.

4.) Allow the forested portions of the site to mature with minimal intervention.

5.) Establish a monitoring program to record plant vigor, animal interest, etc. and to chartarea development and schedule of future area habitat enhancement procedures.

Specific Area Recommendations:

Management Area No. 1 - Sultan River Riparian

Protect and enhance the existing, well diversified vegetation by manual control of western red alder (see Technical Specifications).

Management Area No. 2 - Cascade Creek Riparian

All/any management activity on the lower (west of entry road) riparian area should be delayed until the proposed Visitor Center construction project is located and possible impacts assessed. The upper (east entry road area) should receive manual alder control.

Management Area No. 3 - Contoured Powerhouse Slope

Implement a direct seeding program of preferred grass/forb/shrub species. Additional applications of the grass seed mixture (per detail in the Tech. Spec.) is recommended on the slippage area. No direct shrub planting is currently recommended.

Management Area No. 4 - Entry Road Switchback

Manage the area to maintain a permanent grass/forb meadow interspersed with a diversity of shrub/tree vertical structure. Implement a seeding program (as previously discussed) and establish ten, protected shrub/tree "islands" as specified in the Technical Specifications.

Implement manual alder control.

Management Area No. 5 - Upper Entry Road

Basically the same as Mgt. Area No. 4, but more emphasis should be placed on establishment of fruit and mast tree groupings. Approximately ten, protected fruit/mast "groups" are recommended. However, before planting, manual alder control (within the time frame designated in the Technical Specifications) should be completed.

TECHNICAL SPECIFICATIONS

* Grass seed soil and site preparation procedures - All Management Areas

Not required

* Recommended grass seed mixture:

25% Perennial ryegrass (Lolium perenne)
25% Annual ryegrass (Lolium multiflorum)
16% Alta tall fescue (Festuca arundinaceae)
10% Creeping red fescue (Festuca rubra)
24% Birdsfoot trefoil (Lotus corniculatus)

Consider additions to the above seed mixture (based on availability) from the list of plant species detailed on page 2-19 of the WMP.

* Recommended seed application rates:

12 to 15 lbs. per acre

* Seed application procedures:

Direct seed with hand or tractor mount (cyclone type) seed spreader...birdsfoot trefoil should be inoculated prior to blending/application.

* Seed application dates:

April

* Potential vendors:

Local or

Willamette Seed & Grain Albany, Oregon

Emerald Hydroturf Portland, Oregon

* Fertilization rates:

Not applicable - probable fertilization restriction area

* Alder control methods and timing:

Alder should be manually severed (chain saw) below the lowest live bud during the months of June and July. This time frame seems to be the most effective in limiting the trees natural tendency to re-sprout.

* Shrub/tree island soil and site preparation procedures:

Till intended planting areas or auger planting holes.

* Shrub/tree plant species (actual selections based on availability):

Trees:

European mountain ash Crab and other apple spp. Filbert Hazel Oregon white oak Canyon live oak Pacific dogwood Hawthorn Walnut

Shrubs (dry to medium sites):

Ocean spray Red and blue huckleberry Rose spp. (nootka, woods, bald-hip, multiflora, rugosa Himalayan and evergreen blackberry Currant Snowberry Shrubs (medium to wet sites):

Highbush cranberry Red and blue elderberry Douglas spirea Salmonberry Red osier dogwood

Vines and groundcovers: (optional - would be randomly distributed within exclosure area)

> Grass spp. Wild strawberry Columbine Trailing blackberry honevsuckle Plus additions from the species list detailed on page 2-19 of the WMP.

* Planting procedures:

Auger holes or shovel plant trees/shrubs in vertical alignment no deeper/shallower than apparent nursery soil level. Roots will be spread uniformly with no "J" rooting or exposed roots permitted. Soil will be "tamped" in firmly. No staking or other support of the planted material is considered necessary, although some remedial straightening of trees/plants may be required if physical disturbance occurs.

* Planting plan and protective fencing detail:

- Shrub / Tree Island - Typical:



Exclosure area = approx. 10' per side



* Planting dates:

March/September

* Planting rates:

12 to 15 shrub species and 3 to 4 tree species per planted island. 5 mixed fruit/mast tree species are recommended per fruit/mast grouping.

* Expected/acceptable rates of mortality:

To be determined from monitoring

* Replacement criteria and procedures:

Remove dead material and replace

* District maintenance plan:

Protect trees/shrubs from accidental damage/mortality from area maintenance procedures and straighten plants disturbed from vertical alignment. Periodic hand clearing of undesirable vegetation immediate to the planted material should also be anticipated and scheduled along with normal area maintenance.

* Potential vendors:

Local nurseries or other native plant supplier

* Plant availability constraints:

Confirm tree/shrub order minimum one year prior to intended planting date.

ESTIMATE OF PROBABLE COSTS:

Item	Units	Unit Cost	Quantity		Amount			
Mobilization			1	\$	5,200.00			
Direct Seeding Seed cost (per app Seed applic. labor	plic.) lb. m.hr.	\$ 5.00 25.00	400 48		2,000.00 1,200.00			
Plant Cost Va est on	Variable, depending on plant size and variety selected estimated to range from .50 to 15.00 per ea. depending on size and grade (estimated not to exceed \$ 3,200.00)							
Mechanical Site Prep. Till or auger	ea.	100.00	20		2,000.00			
Planting Cost	m.hr.	25.00	96		2,400.00			
Alder control	m.hr.	25.00	225		5,625.00			
Fencing (exclosures)	ea.	100.00	20		2,000.00			
Supervision/monitoring	m.hr.	50.00	150		7,500.00			

ALTERNATIVE MANAGEMENT, PLANTING, MAINTENANCE PLANS

* None at this time

SHORT TERM OBJECTIVES

Stabilize the site with repetitive direct seeding of enhancement and erosion control grass/forb/shrub species. Determine, from planted shrub/tree islands, the appropriate species to plant and the degree of site preparation, protection and maintenance procedures required to maintain and expand area wildlife enhancement diversity.

LONG TERM OBJECTIVES

Compliment, for a myriad of wildlife, the surrounding forest structure with a forage meadow interspersed with a diversity of tree, shrub and ground cover heights and species. Establish and maintain a habitat area that promotes valued food sources and provides sight blockage, vertical structure, shelter and a seasonal variety of fruiting and flowering.

For any questions, comments or need for further clarification please contact Dan or Laurine Syverson at (206) 887-4094.

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APPENDIX C-6. DRAWDOWN ZONE TEST PLOT (SPADA LAKE)

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

September 9, 1991

Dan Syverson Syverson Seed, Inc. P.Ol Box 520 Ridgefield, Washington 98642

Dear Dan:

You wanted to know what wetland plants I have seen growing in Spada Lake. Karen and I have collected specimens when they've been available, but haven't identified all of the grasses. The following plants have been identified, however:

<u>Juncus tenuis</u> <u>Glyceria elata</u> <u>Scirpus cyperinus</u> (probably) <u>Carex obnupta</u> <u>Salix</u> - both Pacific and Scoulers, but I think only Pacific willow was actually found growing in the water. Red-osier dogwood Douglas spirea

I would say there are 3 or 4 more grassy species that we haven't identified.

Hope this is helpful.

Sincerely,

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me

Bernice Tannenbaum Environmental Coordinator 9/23/91

Snohomish County PUD P.O. Box 1107 Everett, Wa. 98206

Attn: Bernice Tannenbaum

RE: SPADA LAKE - DRAWDOWN ZONE TEST PLOT

Bernice:

Thank you for your letter of 9 September detailing the wetland plants you and Karen have identified in the drawdown zone of Spada Lake. In addition to the species listed in your letter, we did locate and identify <u>Scirpus</u> microcarpus (small-fruited bulrush).

On August 29, 1991 we inspected the south shoreline of Spada Lake and were pleasantly surprised to observe how well portions of the drawdown zone have naturally regenerated. The variety of grasses, sedges, etc. were a marked improvement and contrast to our last site visit (summer of 1987).

At this time, if a test plot of wetland and/or aquatic species is considered, we would recommend the following parameters:

TEST PLOT LOCATION:

- Site #3, south shore

PLANTING CONFIGURATION

- Plant approximately 5 ea. of the selected species in rows oriented perpendicular to the Spada Lake shoreline. Plants should be spaced 1 to 3 feet apart.

PLANT SPECIES

- Existing species:

Junctus tenuis Glyceria elata Scirpus cyperinus Carex obnupta Salix spp. Red osier dogwood Douglas spirea. Scirpus microcarpus (small-fruited bulrush) Recommended species (in addition to those listed above) Western crabapple (Pyrus fusca)
 Pacific ninebark (physocarpus capitatus)
 Reed canary grass (Phalaris arundinacea)
 Cattail (Typhalatifolia, T. angustifolia)
 Burreed (sparganium spp.)
 Reed grass (Phragmites communis)
 Water parsley (Oeanthe sarmentosa)

No fencing or other protective exclosure is recommended. However, plot location should be well identified via compass bearing and distance from a prominent landmark. Aluminum tags affixed to area stumps is also recommended.

POTENTIAL VENDORS:

- Newall Wholesale Nursery

Note: Tom Newall has indicated that plants could be acquired and delivered for early 1992 planting if ordered prior to November 1, 1991.

ESTIMATE OF PROBABLE COST:

- Plants are estimated to cost from .50 to \$2.00 per unit depending on species and quantity. Prices could be obtained directly from Newall Nursery.

- Planting cost and supervision is estimated not to exceed \$250.00.

SHORT TERM OBJECTIVES:

- Evaluate success of the trial plot species based on the following criteria:

-Survival after two years of innundation -Reproductive ability

LONG TERM OBJECTIVES:

- Use information from the test plot species to expand or abandon future Spada Lake drawdown zone plantings.

For any questions or comments please contact Syverson Seed, Inc. at (206) 887-4094.

Best regards.

SYVERSON SEED, INC.

Dan Syverson President

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October 29,1991

Snohomish County PUD P.O. Box 1107 Everett, Wa. 98206

Attn: Bernice Tannenbaum

RE: SPADA LAKE

Bernice:

Thank you for your letter of 10/23/91. Hopefully, the following will answer the questions you have regarding the Spada Lake test plot:

* As indicated in my leter of 9/23 Site 3, South Shore is the preferred planting area. This site is a uniform, gentle slope with excellent access. Regarding test plot location (in relation to the 1450 ft. high-water level) it is my understanding from the WMP that the plot should be placed in the mid drawdown zone (1445-1435 ft.).

* Regarding test plot configuration, it is recommended that the plants selected be oriented in rows perpendicular to the shoreline. Since the purpose of the test plot is to evaluate a variety of species tolerance to innundation, I do suggest that each row be oriented the same in relation to the high water line.

*The preferred planting month is dependent on climatic and water level conditions. Generally, March/April or September/October time frames would be appropriate. Regarding rising or falling water levels, it is my understanding that power, water supply, fisheries and flood control take precedence over other activities. Considering the time frame for planting recommended above, you are probably in a better position to assess the probability of water level regimes. At any rate, while a falling water level might be somewhat beneficial (to give some period of root growth prior to flooding) the regime is not considered critical to test plot establishment.

*The plants should be planted above the existing water level. Attempting to plant in standing water would be, in my opinion, self-defeating.

*No site preparation is necessary.

*The majority of the plants listed would be obtained (via a permit process) from federal, state, or private ground. The plants would be physically lifted and then planted at Spada within a reasonably short time period. Therefore, the plants would be mature, bareroot and of any size specified or available.

*Regarding reed grass and/or reed canary grass there is no problem with eliminating those species. Just for general information, the Corp. of Engineers have

A Natural Resource & Regeneration Company

reported that while reed grass is a pest on the Atlantic coast, it does not appear to be as prolific or intrusive in the Pacific Northwest.

*Tom Newall would be receptive to a Fall 1992 planting but would appreciate a 12 month notification prior to the intended planting date.

Bernice, we appreciate the opportunity to have met and worked with you, Deborah and Karen. While we seem to frequently have a difference of opinion or viewpoint, it is hoped that some value was derived from this project.

The enclosed invoice finalizes billing. Also, insurance coverage has been subsequently reduced for Snohomish.

Best of luck.

SYVERSON SEED, INC.

Dan Syverson President

APPENDIX D. REVEGETATION SITE PLANS










APPENDIX E. NEST STRUCTURE MONITORING PROCEDURES

2.3.3 Osprey Nest Platform

• Task: An osprey nest platform was installed in a fir tree near the east shore of Lost Lake in 1990. Use of the platform by ospreys is monitored annually.

Procedures and Responsibilities: Nest platforms are designed using specifications developed by (Corps of Engineers, Beal, pers. comm., Appendix B). Monitoring of the Lost Lake osprey nest platform will occur at least twice per month from April through July, if the platform is not used for breeding, and from April Using a spotting scope through early September, if it is used. from a location on the opposite side of the lake, the District's biologist will examine the platform, attempting to detect ospreys and/or signs of recent use such as new branches with green leaves, down feathers, etc. Data will be recorded on a survey sheet (Figure 2.5) during each visit, including the following: status of occupancy/use, number and location of adults and immatures present, activities when first observed, perch type, location, and weather. The nest site at Lake Chaplain should be monitored on the same days for comparison. Survey sheets will be completed for both nest sites on each visit.

If the platform falls from the tree, a new one based on criteria listed in the WHMP will be installed. If the tree itself falls, or replacement in the same tree is unfeasible, a platform will be placed in another appropriate tree adjacent to the lake, or on a pole.

2.3.4 Duck Nest Boxes

• Task: Two wood duck nest boxes were installed on the east shore of Lost Lake in 1990. Use of the boxes by breeding birds is monitored during the nesting season. Although not required by the WHMP, District's biologists may install additional nest boxes in the Lost Lake wetland complex.

• Procedures and Responsibilities: Nest boxes should be designed as specified in (U.S. Fish and Wildlife Service booklet, undated, Attachment B). Nest boxes should be placed in areas away from human use, preferably on large sturdy live trees adjacent to the lake. Hard snags in the water may also be used. The box should be attached to the tree trunk about 12-20 feet above water, with the entrance hole facing the water, and with no obstruction.

Wood duck nest boxes will be monitored by a District's biologist for three (3) years beginning in spring 1990. After three (3) years, the success of the program will be assessed and the program modified if needed. Nest boxes will be visited four times a year. During each visit a data sheet (Figure 2.6) will be filled out and the visit documented with photographs if needed. Information regarding nest box monitoring visits will be filed for

Figure 2.5 Osprey Nest Platform Survey Sheet

Date	Time	Weat	ther		_
Observer(s)					
Site Name or No. N	est Status ¹	No. Young	No. Adults	Location Adults	Comments

 $^{^{1}}$ Nest Status: OCC = Occupied \$UNK\$ = Unknown \$UNOCC\$ = Unoccupied \$ALT\$ = Alternate Nest \$F\$ = Failed nest \$BD\$ = Nest blown down

Box No./Location	_ Date	Time
Observer(s)	Weather	
	_	
	<u>Comments</u>	
Condition of Box		
(vandalism, warping,		
rot etc.)		
Maintanana Potinition		
Maintenance Activities		
Use of Box		
Species		
Evidence (eggs, eggshells, membrane	es, feathers,	pellets, etc.)
Location of adults		
Number of eggs/young		
Number hatched/fledged		
Predation/evidence		

Figure 2.6 Nest Box Data Sheet

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use in annual reports and for assessing success of program. Information to be gathered for the program includes: use of boxes, presence of other wood ducks in area, productivity of birds using boxes, vandalism and structural integrity of boxes.

Each box will be visited four times a year as follows:

1. Maintenance Visit- This visit should be conducted prior to the breeding season (Jan-mid February) to do the following: repair or replace box if needed; remove old nesting materials, wood chips, debris; put in fresh wood chips; complete data sheet. New nest boxes should be installed at this time.

2. Breeding Visit 1- This visit should be performed early in the breeding season (mid-March to late March) mainly to displace certain undesirable species like starlings. The following should be performed: remove starling nests or materials if needed; change wood chips if needed; complete data sheet to document starling use. Bi-weekly or weekly visits may be required in mid to late March in order to discourage starlings. If the box is being used by a mammal as a den, the biologist will decide whether to allow the current resident to remain or clean out the box.

3. Breeding Visit 2 - At least one nest box check should be scheduled for mid-April, the peak site selection and egg-laying period for wood ducks. If a desirable species appears to be using the box when observed from a distance, the box should not be opened, and the box should be noted as occupied.

If no birds appear in the vicinity of the box, a quick check of the box for eggs or nesting material can be made. Open the door cautiously to avoid flushing a female which may be inside the box. Notes regarding occupancy should be recorded on the data sheet (Figure 2.6). Starling nests and eggs should be removed.

Human disturbance during April and May may contribute to nest failure and should be minimized.

Breeding Visit 3- This visit should be conducted by the 4. District's biologist in mid-late June, after the 30-day incubation period is over, to determine productivity of birds using the boxes. More than one visit may be required to obtain a complete The following tasks should be performed: collect data data set. on number of eggs hatched, number of young observed, evidence of predation, complete data sheet. Check first for birds in Document presence, location and activities of birds in vicinity. If birds are present near the boxes, do not open the boxes. area. If no birds are present, check boxes for evidence of use. If box is used by other species, document the use and decide whether to displace them. If birds are in the area, minimize time at nest box and in area to minimize disturbance to adults, eggs, young. If eggs are present and no female in area, determine stage of development by candling as described in Weller (1959) and Westerskov (1950).

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At the end of three years of monitoring, results should be evaluated and recommendations for revisions of these procedures should be made. Evaluation points should include the effectiveness of nest box design, occupancy rates of boxes, productivity rates, effectiveness of starling checks, vandalism problems, adequacy of monitoring schedule. Nest boxes may be moved to new locations if, after the end of the monitoring period, no occupancy is documented and alternate sites exist. Additional nest boxes may be installed at any point during the project implementation period, prior to the breeding season at appropriate sites.

2.3.5 Floating Nest Platforms

• Task: Two floating nest platforms were installed in Lost Lake in 1991. This is a departure from the plan stated in the WHMP. Justification is provided in the 1990 Annual Report to FERC. The platforms are hauled out of the water and stored on shore during the non-breeding season in order to prevent vandalism, and facilitate maintenance of the vegetation mat on the platform. Use of the platforms by breeding waterfowl is monitored during the nesting season.

• Procedures and Responsibilities: Platforms are constructed loosely based on specifications developed by Young (1971, Attachment C) and the Seattle Water Department (Paige, pers. comm.). Two platforms will be placed each year in February or March at the north end of the lake, preferably out of sight of the access road and boat launch area on the west shore. The platforms will be anchored with cable or chain to stumps or concrete blocks.

The platforms will be covered with live vegetation "plugs" dug from the adjacent wetland buffer zone. Vegetation plugs should include mosses, ferns, small shrubs and herbs with 4-5 inches of attached soil. Care should be taken to ensure that the platform deck is 1-3 inches higher than the water, to ensure that birds like loons can easily climb up, while avoiding direct contact of nest materials with the water.

Nest platforms will be monitored from a position on the shoreline screened from view by vegetation at a distance of at least 100 feet. The monitoring period will be from mid-April through late June, with 30-minute visits at least twice per month. Visits will be more frequent if it is determined that the platforms are being used for nesting. During each monitoring visit a data sheet (Figure 2.7) will be completed, documenting use, productivity, and structural integrity of the platform.

Nest platforms will be removed from the lake in September and stored on the lakeshore during the non-breeding season. Monitoring of platforms at the same locations will continue for at

Figure 2.7 Floating Nest Platform Data Sheet

Platform No./Locat	ion	<u>_</u>	_ Date	Time	
Observer(s)		We	ather		
Site Name or No.	Nest Status ¹	No. Young	No. Adults	Location Adults	Comments
					

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 $^{^1}$ Nest Status: OCC = Occupied $$\rm UNK$$ = Unknown $$\rm UNOCC$$ = Unoccupied $$\rm ALT$$ = Alternate Nest ${\rm F}$ = Failed nest ${\rm BD}$ = Nest blown down

least three years to determine use. Islands that are not used after three years will be moved to other locations and monitored again. Platforms may be modified or replaced if it appears that design or construction problems are causing birds to avoid them.

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APPENDIX F. DEER FORAGE MONITORING PROCEDURES

Study Plan for Deer Forage Production and Habitat Utilization

This plan was drafted as a result of the alteration of the Black-tailed Deer Forage monitoring methods stated in the Wildlife Habitat Management Plan (p. 4-12).

OBJECTIVES:

- 1. Document an increase in forage production in harvested/thinned timber units relative to un-managed stands (over a 20 year period).
- 2. Provide data on various forest management methods so that those which provide maximum benefit to wildlife can be implemented.
- Update/validate forest succession model (fig 2.2; p. 2-5 in WHMP).

To meet the stated objectives, it will be necessary to establish a means of sampling forage production and utilization by deer within the selected harvest units. The following are the methods which will be used to gather that information. For alternative methods which were considered, see "Big Game" file.

METHODS FOR DATA COLLECTION:

Vegetation Data

Data on vegetation production will be collected to record the effects of timber management on deer forage. Data will be collected for 1 year prior to harvest and will be used for comparison to post harvest data.

The method which will be used for monitoring vegetation is the 5 square meter circular plot method. The first plot (plot A) will be randomly located near the border of the sale unit. A wooden stake will be driven in at the center of the plot and numbered with the transect and plot numbers. The distance and bearing to the first plot should be carefully noted so that it may be easily found in the future. The plot will be circular with a radius of 1.26 meters (area of 5 sq. meters). Within the plot, measurements of height (estimated to nearest 6 inches) and % cover (estimated to nearest percent) will be recorded. Estimates of plant height should be to a maximum of 6 feet, as deer cannot browse much beyond this level. Record this information for the following plant species;

Salmonberry
Vaccinium sp.
Bigleaf maple
Bracken fern

(1) For a set of the set of th

>	Salal
>	Sword fern
>	Vine Maple

> Evergreen blackberry
 > Himalayan blackberry
 > Trailing blackberry

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Also, it should be noted on the data card if the plant appears to have been browsed. Species may be substituted or changed as more information on their palatability becomes known.

A second plot will be placed 10 meters away in a somewhat randomly established direction (staying within the unit boundary). The transect direction will not be totally random because a line of 10 transects will be established, therefore, the direction chosen must be able to provide a line 150 meters long. Data from the vegetation plot at the end of the transect (plot B) will be taken in the same manner as that of the first plot.

Forage Utilization - Pellet Transects -

Using the plot A center stake as a starting point, a 10 meter pellet transect will be established running to the plot B center stake. Along the 10 meter transect, for one-half meter to each side, deer pellet groups will be counted. A pellet group will be defined as a group of 6 or more pellets. Any signs of deer activity near the pellets should be noted, i.e. foraging, bedding, trail, etc. All pellets, whether part of a group or not, will be removed so that all pellets deposited prior to the next visit will be from a known period of time. Care should be taken so that neither the plots nor the transects are walked on while being monitored. All disturbance associated with the monitoring should be kept to a minimum.

Pellet information should be gathered twice yearly. Once in the early spring before the green-up period, and again in the early fall, prior to leaf-fall. During the early fall pellet monitoring period, vegetation information should also be recorded.

Installation of Plots & Transects

The sequence for laying out the plots and transects is to first place the stake in the center of plot A. Then, with a 10 meter rope, proceed on the chosen bearing to plot B and place a center stake (remembering not to walk directly on the transect or plots). Go back to plot A and place a 1.26 meter rope at the stake and take vegetation measurements. Next, using a one-half meter rope, walk along both sides of the transect looking for pellet groups. Take the 1.26 meter rope to plot B, place it on the stake and again measure the vegetation.

After the information from both plots and the transect has been recorded, a distance of 5 meters will be measured from plot B to plot A of the next transect, using the same compass bearing as the last transect. At the end of 5 meters, a stake will be placed to mark the beginning of the next transect and the center of plot A for that transect. Again, the transect and plot number should be recorded on the plot center stake. The process of recording vegetation and deer pellet data will be the same as the last plot and transect.

After completing 10 transects, move to the right 5 meters and begin another 10 transects in the same manner.

DATA TREATMENT:

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The data from each monitoring period will be compared statistically to baseline data (before cut if possible, immediately after cut otherwise) and to data from the previous monitoring periods. This will allow evaluation of any change in forage production, deer use index or rate of succession.

Areas with different treatments (i.e. fertilization, seeding, pre-commercial thinning, etc.) will also be compared to evaluate the effects of these treatments.

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APPENDIX G. AGENCY COORDINATION



2320 California St., Everett, Washington 98201258-8211Mailing Address: P. O. Box 1107, Everett, Washington 98206

February 18, 1992 PUD-19675

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

Mr. Al McGuire Washington Department of Natural Resources 919 North Township Street Sedro Woolley, WA 98282 Mr. Gwill Ging U.S. Fish & Wildlife Service 2625 Parkmont Lane SW Olympia, WA 98502

Mr. Kurt Nelson Tulalip Tribes, Inc. 6700 Totem Beach Road Marysville, WA 98270

Gentlemen:

RE: Jackson Project - FERC #2157 Wildlife Habitat Management Plan <u>Agency Consultation Meeting</u>

The District plans to submit an annual report to the Federal Energy Regulatory Commission for activities conducted under the Wildlife Habitat Management Plan for the Jackson Hydroelectric Project. The report will be submitted to the FERC no later than March 31, 1992, and must include comments from your agencies.

The annual report is in preparation at present, and will be sent to you for your review and comments prior to our annual meeting. We have scheduled this meeting for March 11 at 10:00 a.m. at the City of Everett's water filtration plant near Monroe. A map of its location is enclosed. We plan to present a briefing on the past year's activities and plans for the current year, followed by lunch (to be provided by the District) at the filtration plant. We will then go on-site to some locations around Lake Chaplain and Lost Lake to discuss specific activities and issues. I will attach a meeting agenda to the draft annual report that you will receive within the next three weeks. Letter to Joint Agencies

Will you please contact me at 347-4319 if you are unable to attend the meeting on this date.

,

Sincerely,

Original Signed By B.R. TANNENBAUM Bernice Tannenbaum Environmental Coordinator

BRT:vr

cc: D. Farwell, City of Everett

- bcc: B. Tannenbaum 01
 - K. Bedrossian Ol
 - M. Schutt Ol B. Meaker Ol



r Treek Lake

D10 F6

C10

D8

G13

Salmon Creek San Juan Creek Saucer Lake Sauk River Sauk River, No. Fk. C; Sauk River, So. Fork C Scrabble Lake Scriber Lake Seven Mile Creek



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

> March 6, 1992 PUD-19684

Mr. Gary Engman Washington Dept. of Wildlife 16018 Mill Creek Boulevard Mill Creek, WA 98012

Mr. Greg Ariss
Washington Dept. of Natural
 Resources
919 North Township Street
Sedro Woolley, WA 98282

Mr. Gwill Ging U.S. Fish & Wildlife Service 2625 Parkmont Lane SW Olympia, WA 98502 Mr. Larry Cordova U.S. Forest Service Mt. Baker-Snoqualmie National Forest Skykomish Ranger District P.O. Box 305 Skykomish, WA 98288

Mr. Tom Hoppensteadt Tulalip Tribes, Inc. 6700 Totem Beach Road Marysville, WA 98270

Gentlemen:

RE: Jackson Project - FERC #2157 Wildlife Habitat Management Plan Annual Report

A draft Annual Report on the District's progress on implementing the Wildlife Habitat Management Plan for the Jackson Project is enclosed for your review and comments. The final report must be submitted to the FERC by March 31, 1992, and must include comments received from your agencies.

Please send us your written comments by March 23, 1992, so that we will be able to respond and revise the draft report appropriately. If we do not receive comments from any agency we will assume that the report is satisfactory to that agency.

We have also scheduled a meeting to present details of activities conducted during 1991 and to discuss future implementation plans. The meeting will take place on March 11 at 10:00 a.m. at the City of Everett's Water Treatment Plant, near Monroe, Washington. Will you please contact Bernice Tannenbaum at 347-4319 if you are unable to attend the meeting on this date.

Sincerely,

Bruce Meaker, Acting Manager Jackson Hydroelectric Project

cc: D. Farwell, City of Everett

bcc: K. Bedrossian

B. Tannenbaum

AGENCY MEETING - MARCH 11, 1992 - 10: A.M.

CITY OF EVERETT WATER TREATMENT PLANT CONFERENCE ROOM

I. Introductions

II. WHMP Progress

Land Acquisition/Easements Williamson Creek Lake Chaplain

Forest Vegetation Management Final Harvest/Road Construction - Lake Chaplain Pre-Commercial Thinning - Lost Lake Commercial Thinning - Lake Chaplain

Snag Management Program

Revegetation Program

Nest Structures

GIS

Monitoring Deer Forage Coarse Woody Debris

WHMP Supplement for Spada Lake Tract

III. Problems and Concerns

IV. 1992 Schedule

V. Lunch at Lost Lake, weather permitting

VI. Tour of Management Sites

Lost Lake Nest Structures Concrete Ford Pre-Commercial Thinning Unit

Final Harvest Units - Lake Chaplain

VII. Summary

Jackson Project - Wildhfe Mart. Plan Annual Meeting - March 11, 1992.

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Name Bernice Tannenbaum R. GARY ENGMAN Von Eanwell MIKE SCHUTT GREG ARIS> Tom Hoppiestandt. Bruce Meaker GWILL GING Karen Bechossian

Organization Sno-PUD LOW City of Evenett Sur-Pub Dor Tulolip Tribes 653-0220 Snohomish PUD-UFFWS 5no PUN

JACKSON PROJECT - FERC 2157 WILDLIFE HABITAT MANAGEMENT PLAN

AGENCY MEETING - MARCH 11, 1992 - 10:00 A.M.

CITY OF EVERETT WATER TREATMENT PLANT CONFERENCE ROOM

I. INTRODUCTIONS

Those in attendance: Bruce Meaker, Bernice Tannenbaum, Karen Bedrossian, Mike Schutt (PUD); Don Farwell (City of Everett); Gary Engman (Washington Department of Wildlife); Gwill Ging (U.S. Fish and Wildlife Service); Tom Hoppensteadt (Tulalip Tribes); Greg Ariss (Washington Department of Natural Resources.

II. WHMP PROGRESS

A. Land Acquisition

Bedrossian described the acquisition of the Williamson Creek Tract from the DNR, and Farwell described the City's exchange of lands around Lake Chaplain with DNR. With these actions, all of the mitigation lands described in the WHMP have now been acquired by the colicensees.

B. Forest Vegetation Management

Farwell described the planning and current status of access road construction and final harvest on three units in the Lake Chaplain Tract. Completion of this harvest, which was originally scheduled for 1990 in the WHMP, is anticipated in early April 1992. The harvest units will be replanted with Douglas fir, western red cedar, a few cottonwoods, and bare areas will be seeded with a grass/forb mix. Few snags or green trees have been retained in the units, but green trees were retained at the edges to allow snag tree creation. In addition, green tree retention areas were set aside for each harvest unit.

Tannenbaum described pre-commercial thinning on approximately 46 acres at Lost Lake. The amount of slash is very great due to the density of the stand and large size of the trees. Some unthinned corridors were retained within the thinned area in order to provide slash-free access to the interior.

Farwell described plans for commercial thinning at Lake Chaplain in 1992. Some of the units identified in the WHMP for thinning appear to be unfeasible due to soils and slope. Two other units, not identified for thinning in the WHMP, appear to be suitable and could be substituted for the unfeasible units. Scheduled and substitute units will be evaluated in the field during 1992, and a contract for thinning two to four units will be prepared. Agency representatives were asked whether unplanned thinning was acceptable. Engman stated that changes of this sort, plus schedule changes, would be acceptable, but the PUD/City must document why the changes were made, and that they meet the objectives of the WHMP. Hoppensteadt stated that wildlife habitat improvement was the main justification for forest vegetation management, and not just timber stand improvement.

Hoppensteadt asked if different timber harvest prescriptions (i.e. leaving green trees and snags in the unit) could be used in the future. He has seen cable harvest systems employed elsewhere, where scattered or clumped trees have been retained inside the harvested unit. Farwell responded that this will be possible on the 1993 units, and possibly on 1995 units, depending on timber type and soils.

The time allowed in the WHMP (from 15 to 30 years) between commercial thinning and final harvest of a unit was discussed. Farwell stated that, from the point of view of timber stand improvement, thinning on some units may not achieve much increase in growth by the time of final harvest, making the thinning not worth the effort for stand improvement by itself.

C. Snag Management

Tannenbaum described snag inventory and creation work in 1991. There are large deficits in numbers of existing soft snags relative to the targets prescribed in the WHMP. Created snags must decay before they can satisfy deficits in the soft snag classes. Hoppensteadt recommended dynamiting tree tops rather than sawing them in order to speed up the decay process.

D. Revegetation Program

Tannenbaum described progress and future plans in revegetation of the sites specified in the WHMP.

E. Nest Structures

Tannenbaum described the installation of nest structures and results of monitoring in 1991.

F. GIS

Tannenbaum described progress on implementation of the Jackson Project GIS.

G. Monitoring

Tannenbaum and Schutt described procedures that were developed and used in 1991 to monitor deer forage and coarse woody debris on harvest units. The procedures depart from instructions given in the WHMP, but are believed to be more efficient, objective, and appropriate for statistical treatment. Utilization of forage by deer on unmanaged forest stands at Lake Chaplain will be compared with post-harvest utilization. Post-harvest results will be used to revise the timber growth model (and timber harvest schedule) if appropriate. This is a departure from the prescription of the WHMP, which called for comparisons between units on mitigation lands with adjacent lands under commercial forest management.

H. WHMP Supplement for Spada Lake Tract

Bedrossian described elements that will be included in this document, a draft of which will be submitted to the agencies for review. It is expected that the document will be completed in 1992.

III. Problems and Concerns

A. Timber Harvest on Adjacent Land

Farwell presented information on timber harvest activity on private land adjacent to the Lost Lake and Lake Chaplain tracts. Virtually all forest stands on the north and west boundaries of the mitigation lands are expected to be clearcut within the next few years. The boundary of one 1991 cutting unit on Lake Chaplain was modified in order to provide a buffer strip of trees between this unit and a large adjacent clearcut on private land. Farwell pointed out two other potential conflicts in future WHMP-scheduled harvest units. Ariss stated that DNR's plans for harvest of its land northeast of Lake Chaplain should be available in July 1992.

B. DNR Proposal to Close Access to Marsh Creek Area

Ariss described DNR plans to restrict motorized vehicle access to the Marsh Creek/Blue Mountain area, and the Pilchuk area, in response to abuse of state forest lands by the public. He stated that most abuse occurs on the PUD's pipeline right-of-way. The DNR hopes to close the areas by the summer of 1992, using a to-be-determined combination of gates, closure signs, and enforcement.

Engman and Meaker cited the need to maintain an access for fishing on the Sultan River, <u>per</u> the co-licensees' agreement with the resource agencies, in the vicinity of the area to be closed. Ging requested a map of locations of gates and closed areas, showing how closures would affect fishing access.

IV. SCHEDULE

Tannenbaum discussed the schedule of activities for the period 1992-1995.

V. FIELD TRIP TO LOST LAKE AND LAKE CHAPLAIN

A. Lost Lake

Tannenbaum and Bedrossian discussed changes in water levels of Lost Lake and associated wetlands. A concrete ford installed at the southeast end of the lake will control high water levels and prevent drainage from going northeast toward the Lake Chaplain watershed. Permanent monitoring posts have been placed in the Lost Lake wetland to assist in monitoring any changes that may result from water level control.

B. Lake Chaplain

Farwell showed the group the three 1991 final harvest units. Hoppensteadt recommended "feathering" the edges of harvest units to increase the amount of edge. He also recommended leaving more existing snag trees and green trees within the units, even if there is some question whether they would remain standing. He recommended monitoring retained trees to see if this works. Engman expressed concern over proceeding with the WHMP harvest schedule in the context of intensive harvest on adjacent lands. Farwell stated that the City of Everett could not be expected to forgo timber revenue to mitigate for the over-harvest of Snohomish County.

Farwell described new methods of small log harvest which could be employed on portions of the Lake Chaplain tract, outside of WHMP scheduled harvests. Hoppensteadt stated that timber stand improvement procedures of this sort would be acceptable, but the end result should be to improve the structural diversity of the stand, i.e. a. multi-storied canopy. He said that small log harvest should be done on small units. Ging asked that the size and distribution of areas where existing snag trees can be retained on harvest units be reported. Farwell stated that most of the additional information needed to make this estimate, especially regarding logging systems, will be obtained during field reconnaissance in 1992.

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United States Department of Agriculture Forest Service Skykomish Ranger District P.O. Box 305 Skykomish, Washington 98288

Caring for the Land and Serving People

Reply to: 2630

Date: March 7, 1992

Bruce Meaker, Acting Manager Jackson Hydroelectric Project Snohomish County (PUD) 2320 California St. Everett, Washington 98201

Dear Mr. Meaker:

As you are aware, the 1991 Spada Land Exchange transferred ownership of land from the Forest Service to the Snohomish County PUD. Although I am interested in maintaining occasional telephone contact concerning the project, it is no longer necessary for you to send me copies of progress reports, project plans and related materials. Please continue to contact and share information with our district wildlife biologist for site specific project.

I appreciate the valuable information which you have shared with us over the years, and I look forward to future cooperation.

Sincerely,

Viva a.W. Hechman

DANIEL T. HARKENRIDER District Ranger





Board of Directors: Stanley G. Jones, Sr., Chairman Raymond L. Fryberg, Vice Chairman Calvin L. Taylor, Treasurer Maie M. Zackuse, Secretary Dawn E. Simpson, Board Member Herman A. Williams, Sr., Board Member Herman A. Williams, Jr., Board Member Clarence H. Hatch, Executive Director

6700 TOTEM BEACH ROAD MARYSVILLE, WA 98270 653-4585 FAX 653-0255 The Tulalip Tribes are the successors in interest to the Snohomish, Snoqualmie and Skykomish tribes and other tribes and bands signatory to the Treaty of Point Elliott.

March 20, 1992

Bernice Tannenbaum Snohomish County FUD No. 1 2320 California Street Everett, WA 98206

Dear Bernice:

The following comments represent our concerns and position regarding the progress of the mitigation project for FERC #2157. We recognize and support the primary objective for the mitigation lands; wildlife management. Subsequently, our comments represent our interpretation of which activities are beneficial for particular wildlife species and which species may be adversely impacted due to habitat alteration associated with project activities. We understand that management for species selected as priority species may present adverse impacts to other species. Our comments are intended to assist in the identification of potential impacts.

We advocate a holistic landscape ecology approach when managing for wildife. This approach requires managers to consider management activities on lands not only within their control but also lands which have a direct effect on wildlife species within the general vicinity of their ownership or management area. Activities on mitigation lands should recognize this need and adjustments to long range plans should be made accordingly. We recommend that you take into consideration all habitat and management activities within 7 km of your boundaries. This distance will include average home range for; ungulates, most small and medium size mammals, and most cavity dependant birds , it has also been implicated with the negative effects of fragmentation through isolation.¹ Parameters that should be considered on adjacent land are those that effect species richness, particularly species sensitive to change. We suggest that you investigate

¹ Lehmkuhl, J. and Ruggiero, L.F. <u>Forest Fragmentation in the</u> <u>Pacific Northwest and its Potential Effects on Wildlife</u>. 1991. PNW-GTR-285.pp35-47. Sno.Co.PUD FERC #2157 WHMP ~ 1991 March 20, 1992

Page 2.

percent cutover, interior-forest availability and snag densities and distributions within this zone of influence. This evaluation would provide you with habitat availability information which could be used to identify sensitive species that may be in need of specific management programs in order to persist within the area.

In your draft progress report and during discussions on March 11 you presented an interest to prepare more sites through forest thinning prescriptions. We can support this activity only if the primary objective is to increase habitat suitability for wildlife Thinning is most often used to increase the value of species. timber through the removal of suppressed and defective trees competing for nutrients and sunlight. For this project we think that thinning should be used to increase the structural diversity of the second growth forest. Thinning should not remove deformed or defective trees nor should it decrease vertical stratification unless the desired future condition is projected to provide greater niche availability than is achievable through natural succession given an appropriate temporal scale. If thinning programs are utilized there needs to be a method to control slash. Aqain, having the primary objective to provide suitable habitat for wildlife will limit your options for slash control. If habitat suitability is significantly impaired and wildlife benefits from thinning will not more than compensate for this initial decrease then thinning should be discontinued.

Included in the WHMP is approximately 1,292 acres of second growth coniferous forest which was proposed to be managed on a 60year harvest rotation to maximize habitat for black-tailed deer, ruffed grouse, black-capped chickadee and other species that find optimal habitat in a mixture of second growth forest types. As indicated above we recommend that management proposals within the second growth be evaluated in consideration with other influential lands adjacent to the project lands. Furthermore, we suggest that management of these lands be respectful to other species that are not specifically identified but which are impacted through habitat manipulations. We believe that habitat suitability for the three identified species will not be impaired if additional wildlife trees remain distributed throughout harvest units after final harvest. In fact this would probably increase suitability due to benefits for feeding, nesting, resting, displaying and screening. We recommend that a minimum of three snags, six green trees and two large hard down logs be left for each acre harvested. The goal for distributing these components throughout the unit should be established at a minimum of one clump/retention area on every five acres, where possible even distribution should be achieved. If snags and recruitment trees cannot be maintained on a site due to Sno.Co.PUD FERC #2157 WHMP - 1991 March 20, 1992

Page 3.

operational constraints then an alternative prescription, capable of leaving the desired conditions, should be selected.

We have agreed, at an earlier date, that you will provide public access to the Lost Lake Tract through a hike-only, without designated trails option. We feel that due to potential increases in use and subsequent impacts to vegetation and wildlife you may want to limit access to marked trails. If you identify and document any substantial access associated impacts we would support your position to control future access.

You have recommended a change to the deer forage monitoring program. As described the procedures measure forage productivity and utilization within treated units and compare this information to baseline data pertaining to the site prior to treatment. Due to ubiquitous clear-cutting and open road densities on adjacent lands we expect your lands to be increasingly important to black-tailed Results from the monitoring program may demonstrate an deer. artificial increase in deer productivity due to the effects of packing associated with the loss of suitable habitat on adjacent lands. This potential should be documented as part of your program. We recommended (above) that you include the surrounding landscape into an evaluation designed to identify sensitive species that may be maintained or are finding refuge on lands directly under your control. The parameter, percent cutover has many implications for wildlife including forage availability and if under your control. displayed in map form will document the areas most likely to be affected by packing due to the associations deer have with forage/cover and edge and their reluctance to utilize large exposed areas.

Thank you for your time and consideration. We look forward to working with you in the future. Please feel free to contact me if you have any questions or comments.

Sincerely,

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Tom Hoppensteadt Habitat Biologist



2320 California St., Everett, Washington 98201 258-8211 Mailing Address: P. O. Box 1107, Everett, Washington 98206 April 7, 1992 PUD-19710

Mr. Tom Hoppensteadt Tulalip Tribes 6700 Totem Beach Road Marysville, WA 98270

Dear Tom:

RE: Henry M. Jackson Project - FERC No. 2157 Wildlife Habitat Management Program Annual Report

Thank you for your comments, dated March 20, 1992, on the District's draft Annual Report. A copy of the final document, which we have submitted to the Federal Energy Regulatory Commission, is enclosed. Your comments clearly point out some of the conflicts we face in implementing our wildlife habitat management program. We would like to respond to several specific issues in your letter.

Page 1. Paragraph 2. We agree that managers need to look beyond the lands within their control and consider habitat and management activities on lands outside of the mitigation area. For example, we presented information in our draft report on timber harvest activity on lands adjacent to our Lake Chaplain and Lost Lake tracts. Using our GIS, we intend to track these types of changes within one mile of all of the lands covered under the WHMP, including our newly-acquired lands in the Sultan Basin.

However, the WHMP was intended to mitigate the impacts of the Jackson Project, and cannot be expected to do much more than this. We are disturbed, as you are, by the rate of forest fragmentation in the area, but a response to all habitat and management activities within 7 km of our boundaries would likely require significant departures from the WHMP's objectives, management prescriptions, activity schedules, and past agreements between the co-licensees and resource agencies. We believe we are being responsive to changes on adjacent lands, by modifying our own harvest boundaries and schedules within the frame work of our plan.

<u>Page 2, Paragraph 2</u>. With regard to discussions of commercial thinning, we agree with you that the primary objective must be to increase habitat suitability for wildlife species. Each stand proposed for thinning will be examined for such opportunities and potential problems before any decision to thin will be made.

Mr. Tom Hoppensteadt Tulalip Tribes

<u>Page 2. Paragraph 3.</u> WHMP management prescriptions for 60-year rotation forest stands include retention of snag trees, green trees and coarse woody debris in final harvest units wherever possible. It is unfortunate that the three 1991 final harvest units had timber types, slope and soil conditions that were not conducive to leaving snags and recruitment trees in the middle of the units. Even if a different logging system had been employed, it was questionable whether green tree clumps left scattered through the unit would have remained standing. Other sites and timber types will permit logging systems that will enable us to leave trees in the unit, with a reasonable expectation that the trees will remain standing.

<u>Page 3. Paragraph 3.</u> Extensive clearcutting on forest lands surrounding WHMP lands will probably affect the results we obtain in our deer monitoring program, but it will be difficult to demonstrate cause-effect relationships. Unharvested stands within our boundaries may show increased use by deer because cover is less available outside and/or because more forage will become available within our boundaries. It is also difficult to predict what the effect of clearcutting on adjacent lands might be on deer usage of our harvest units.

We will use our GIS to record and evaluate land use changes on adjacent properties within one mile of our boundaries. This distance encompasses the area that the resident deer population probably uses. To the extent that we can draw conclusions from our monitoring data and evaluation of cover/forage on adjacent lands, we will do so.

Again, we thank you for your insightful comments on the progress of our mitigation project. Please call me (347-4319) if you have any additional comments or questions.

Sincerely,

Original Signal By B.R. TANNENSAUM

Bernice Tannenbaum Environmental Coordinator

Enclosure BRT:vr cc: D. Farwell, City of Everett bcc: B. Meaker - Ol K. Bedrossian - Ol B. Tannenbaum - Ol M. Schutt - Ol On April 6, 1992, I spoke with Greg Ariss, Washington Department of Natural Resources, about the 1991 Annual Report for the Jackson Project Wildlife Habitat Management Program. He said he had some additional comments on the annual report and information presented during the agency meeting/field trip on March 11, 1992. [Meèting notes are attached to the Annual Report, Appendix G.]

He recommended that the co-licensees incorporate state-of-the-art wildlife habitat management procedures into harvest plans. An example of these procedures includes designating green tree retention areas within each harvest unit. He also recommended addressing a wide range of wildlife species in management plans than is called for in the WHMP. He said that FERC mitigation projects are often focused on game species, but the forest industry and DNR in this region are under pressure to manage in favor of other species. Examples include forest-interior species such as cavity-nesting birds, amphibians, and other non-game species. He thinks a more consistent direction should be given land managers by the resource agency reviewers.

Pernice Janne bour

Bernice Tannenbaum Environmental Coordinator

April 6, 1992



Ph: (206) 856-3500

BRIAN BOYLE Commissioner of Public Lands

April 7, 1992

NORTHWEST REGION 919 N. Township St. Sedro Woolley, WA 98284

(206) 856-3500

Bernice Tannenbaum Snohomish County PUD #1 P. O. Box 1107 Everett, Washington 98206

Dear Bernice:

Thank you for the excellent presentation and field tour of the City of Everett/PUD watershed. You had asked that I provide comments to the wildlife plan.

The plan appears to focus on big game and some bird species. You may be able to cover a much wider variety of animal and bird species with very little effort. some of the concepts that Department of Wildlife have proposed for forest practice regulation would tie in very nicely with your plan.

Although the small clearcut size and 15 year green-up requirements address major wildlife issues, scattered green trees, snags and downed logs will provide substantial opportunities for other species. As I pointed out on the tour, the Department is providing green tree retention on all current timber sales. I invite you to see what we are doing.

I have asked the Monroe Unit Forester, Allen McGuire, to contact you and Don Farwell to update plans along our common boundary.

I look forward to further encounters.

Sincerely Grieg

Cascade District Manager

GA:ts

cc: Allen McGuire

ts804.mis


2320 California St., Everett, Washington 98201 258-8211 Mailing Address: P. O. Box 1107, Everett, Washington 98206 April 13, 1992 PUD-19712

Mr. Greg Ariss Cascade District Manager Washington State Department of Natural Resources 919 N. Township Street Sedro Woolley, WA 98282

Dear Greg:

RE: Henry M. Jackson Project - FERC No. 2157 Wildlife Habitat Management Program Annual Report

Thank you for your comments on the District's draft Annual Report. A copy of the final document, which we have submitted to the Federal Energy Regulatory Commission, is enclosed.

You commented in your letter that the WHMP appears to focus on big game and some bird species. This was the intention of the WHMP on forest lands in a 60-year rotation. The WHMP prescribes mitigation for certain species, such as black-tailed deer, that experienced the greatest losses of habitat due to the construction and operation of the Jackson Project. For example, the WHMP timber harvest schedule resulted from the need to improve habitat for deer. However, it should be remembered that other forest land is not included in the timber harvest program, and will be allowed to develop into late-successional habitat.

Other measures, such as providing green tree retention areas, snags and downed logs, are also prescribed in the WHMP for the benefit of other species. The first three harvest units at Lake Chaplain had timber types, slope and soil conditions that made it difficult to leave green trees or snags within the units, rather than at the edges. We expect that it will be possible to provide these elements on many other units, including some that we are currently planning.

We gladly accept your invitation to visit some of DNR's current timber sales to see how you are providing green tree retention. We have recently visited two other major wildlife management areas, both of which have objectives similar to those of the WHMP, to observe their timber harvest methods and results. Mr. Greg Ariss Washington State Department of Natural Resources April 13, 1992 PUD-19712 of

We are looking forward to these and other exchanges of information between the DNR and the District and City of Everett.

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Sincerely,

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Bernice Tannenbaum Environmental Coordinator

Enclosure BRT:vr cc: D. Farwell, City of Everett On April 2, 1992, I spoke with Gwill Ging, U.S. Fish and Wildlife Service, about the 1991 Annual Report for the Jackson Project Wildlife Habitat Management Program. He said that he had no additional comments to make, aside from those made during the agency meeting/field trip on March 11, 1992. [Meeting notes are attached to the Annual Report, Appendix G.] He said he did not intend to write a letter to the District on the annual report and meeting.

Bernice Tannenbaum

Bernice Tannenbaum Environmental Coordinator

April 6, 1992

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