

**Lewis River Hydroelectric Projects Settlement Agreement
Terrestrial Coordination Committee (TCC)
Meeting Agenda**

Date & Time: Wednesday, September 11, 2013
9:00 a.m. – 3:00 p.m.

Place: Merwin Hydro Control Center
105 Merwin Village Court
Ariel, WA 98603

Contacts: Kirk Naylor: (503) 813-6619; cell (503) 866-8750

Time	Discussion Item
9:00 a.m.	Welcome <ul style="list-style-type: none"> ➤ Review Agenda & 6/12/13 Meeting Notes ➤ Comment & accept Agenda & 6/12/13 Meeting Notes
9:15 a.m.	Riparian Mix Evaluation for Unit 20
9:30 a.m.	Old Growth; Connectivity
9:45 a.m.	BPA and Cowlitz PUD transmission line status update
10:00 a.m.	Forestland habitat updates for units 4, 20, 33 etc.
10:15 a.m.	ROW Vegetation Clearing
10:45 a.m.	<ul style="list-style-type: none"> ➤ Next Meeting's Agenda ➤ Public Comment Opportunity Note: all meeting notes and the meeting schedule can be located at: http://www.pacificorp.com/es/hydro.html
11:00 a.m.	Safety ¹ orientation for tour of Devil's Backbone
11:15 a.m.	<ul style="list-style-type: none"> ➤ Depart for tour and plan to return to HCC by 3:00 p.m. ➤ View patch cuts laid out and the summer weed control ➤ Discuss 2013 implementation plan
3:00 p.m.	<i>Adjourn</i>

Please bring rain gear and sturdy walking shoes for hiking in the forest – PacifiCorp and Cowlitz PUD will have 2 vehicles for transportation of up to 6 additional passengers

Join by Phone
+1 (503) 813-5252 [Portland, Ore.]
+1 (855) 499-5252 [Toll Free]

Conference ID: 8098350

Please bring your lunch

FINAL Meeting Notes
Lewis River License Implementation
Terrestrial Coordination Committee (TCC) Meeting
September 11, 2013
Ariel, WA

TCC Participants Present: (11)

Diana Gritten-MacDonald
 Ray Crosswell, RMEF
 Peggy Miller, WDFW
 Eric Holman, WDFW
 Kimberly McCune, PacifiCorp Energy
 Kendel Emmerson, PacifiCorp Energy
 Erik White, Cowlitz Indian Tribe
 Nathan Reynolds, Cowlitz Indian Tribe
 Bob Nelson, RMEF

Eileen McLanahan, Meridian Environmental
 Jeff Boyce, Meridian Environmental

Calendar:

Wednesday – October 9, 2013	TCC Meeting	HCC
Wednesday – Nov. 13, 2013	TCC Meeting	HCC

Assignments from September 11, 2013	Status
Emmerson: Complete more research on fireweed distribution, best timing, etc. and get back to the TCC (Forestland Units 4 & 20).	Complete – 11/13/13

Assignments from June 13, 2012	Status
Naylor: Review the SA/WHMP budget(s) as well as determine status and opportunity for coordination with John Cook (NCASI) and Lisa Shipley (Washington State University) doing the blacktail study and report back to the TCC.	In Progress

Parking lot items from April 13, 2011 Meeting	Status
Naylor: Provide TCC with Riparian Management Plan for review.	Pending

Parking lot items from December 12, 2012 Meeting	Status
PacifiCorp: Work with TCC to proceed with second RMEF/PAC Project Proposal.	Pending

Parking lot items from February 12, 2013 Meeting	Status
Cowlitz PUD: Schedule a field tour of the Devil’s Backbone management unit	Complete – 9/11/13

Review of Agenda and Finalize Meeting Notes

Kendel Emmerson (PacifiCorp Energy) called the meeting to order at 9:05 a.m. Emmerson reviewed the agenda and requested that Property Update be added to the agenda. She asked the TCC if there were any other changes/additions they needed to request. No changes were requested.

Emmerson reviewed the June 12, 2013 meeting notes and assignments. The meeting notes were approved at 9:10am without change.

Riparian Mix Evaluation for Unit 20

Emmerson has been conducting the Riparian Mixed Stand Evaluations for WHMP lands. All stands have been completed except Unit 20 riparian mixed stands that are within the Panamaker and Cougar Creek Conservation Covenants. Emmerson provided a map for TCC to review that illustrated the riparian mixed stands and the conservation covenant area in Unit 20 (see **Attachment A for more detail**). She also noted 90% of the riparian mixed stands lie within the covenant which is denoted by the dashed line on the map.

These evaluations are to satisfy Riparian Chapter WHMP Objective C, which requires creating snags in riparian mixed stands that are deficient in snags but have adequate number of conifer trees. These Unit 20 riparian mixed stands are in conflict with the Cougar Creek Conservation Easement, Exhibit C – Conservation Measures it states:

3. Vegetation Management. As part of the Wildlife Habitat Management Plan included in the operating license issued by FERC, PacifiCorp will develop and implement vegetation management practices to include (by way of example and not limitation) removal of nonnative or invasive plant species.

Because the vegetation management conservation measure does not include snag creation; Emmerson requested that stands within the Conservation Covenant be removed from the riparian mixed evaluation.

Emmerson mentioned that Cougar Creek has some of the best pileated woodpecker habitat in Unit 20 and it is likely it would make the snag and conifer tree criteria. Panamaker creek may not make the conifer criteria. All of Unit 20 is currently being revegetation cover typed as part of the 2013 timber harvest activities. It is likely that Panamaker Creek may not even qualify as a riparian mixed and Cougar Creek may type out as mature or old-growth.

Diana Gritten-MacDonald (Cowlitz PUD) expressed that she votes for leaving Cougar Creek alone as it is post card perfect.

TCC approved the following:

Vegetation cover type review is ongoing. Complete review first and if it doesn't type out then TCC will discuss if riparian mixed stand evaluations are warranted.

BPA and Cowlitz PUD Transmission Line Status Update

Emmerson informed the TCC attendees that BPA signed PacifiCorp's site access agreement. PacifiCorp has no knowledge that BPA has accessed the sites or completed any work. Todd Olson (PacifiCorp) plans to contact BPA and inquire as to the status.

In addition, Cowlitz PUD wants to use the existing PacifiCorp transmission line corridor (Merwin substation to Cowlitz substation) and using the same alignment as proposed by BPA. Currently the electricity and economic feasibility studies are being conducted by PacifiCorp. PacifiCorp is close to completing its feasibility study. We know whether or not this project is a go/no go after the studies are completed.

Forestland Habitat Updates for Units 4, 20 & 33, etc.

Emmerson informed the TCC attendees that the goshawk surveys are complete and none were found. All trees in the proposed timber harvest areas and near the Woodland Park cabins have been cut down. Some additional hazard trees needed to be removed at Woodland Park. Currently the contractors are piling and scarifying the sites. Kirk Naylor (PacifiCorp) has ordered grass seed (white clover 25%, small burnett 20%, orchard grass 15%, perennial rye grass 20%, annual rye grass 5% and birdsfoot trefoil 15%).

Eric Holman (WDFW) wanted to know why the mix was steering away from the forbs to more traditional grass/clover seed mix. Emmerson explained that that past two years has not been as successful in germination as the grass/legume seeding mixes used before, so we returned to a more tried and true mix to just get some forage on the ground. Peggy Miller (WDFW) indicated she thought PacifiCorp had removed birdsfoot trefoil from the seed mix. Emmerson understood her concerns, but it is not listed on any state or county weed list in Washington, it is an excellent forage species that typically has good seed take, and it is both affordable and available. Until another comparable alternative is available then it is the best option. The TCC discuss the option of fireweed. Emmerson explained that there was zero success with it last year and it was difficult to spread. Emmerson said she will complete more research on fireweed distribution, best timing, etc. and get back to the TCC.

The scarification in Unit 33 has been complete. The road repair and tree removal to create a 3-4 acre forage area in Unit 38 has been completed.

Old-Growth Connectivity Discussion

Emmerson provided the Mature Stand Connectivity map that is from the November 29, 2012 memo (see [Attachment B](#) for more detail). She informed the TCC that she has visited most of the priority mature stands and that she has changed the assessment methods from what was originally proposed in the WHMP. The original methods would provide a lot of quantitative data on how little or how much old-growth characteristics exist within the priority stand. Emmerson proposed utilizing a qualitative assessment to determine if a stand meets the criteria for a priority stand. From just walking through the stands she is able to confirm the vegetation cover type and easily see what old-growth characteristics are lacking (e.g. openings, snags, and/or down wood). She will also note if the unit is meeting management objectives for the unit, vegetation cover type, access, management and harvest opportunities, riparian buffers, raptor nest/roosts in the area, and characteristics and ownership of the land surrounding the unit. The TCC will be able to utilize this information to determine if a stand should be considered as a priority stand. The TCC agreed that corrections to the GIS model caused Unit 5 to become a non-priority mature stand because it no longer meets the criteria.

All of these observations and recommendations will be rolled out into a report with maps for the TCC to review. Right now Emmerson just needs approval to modify the approach from a more quantitative analysis to empirical assessment.

Holman expressed that qualitative way is good as Emmerson knows the area better than any other TCC member.

Nathan Reynolds (Cowlitz Indian Tribe) stated that qualitative data is good enough for the shoosins (obvious sites); but perhaps quantitative is better for sites less obvious. Emmerson stated that once everything is done than the TCC collectively could go to the sites that were less obvious. **All TCC attendees agreed to moving forward with a qualitative approach.**

ROW Vegetation Clearing

Emmerson provided illustrations from PacifiCorp Vegetation Management Specification manual to assist the TCC attendees with identifying transmission line right-of-way (ROW) wire-border zones and under line clearance regions ([Attachment C](#) – Figures 6.4, 6.4a and 6.5). She then explained that the ROW vegetation management needs to meet NERC clearance guidance of 62.5 feet from centerline and several areas on Speelyai Line are not in compliance. The ROW crew has completed a tree inventory of Speelyai line on WHMP lands. Although there are some areas that will need extensive tree removal and some areas are in riparian areas. Emmerson and Naylor have been working cooperatively with ROW to develop some best management practices (BMPs) for transmission line ROW on WHMP lands, which include:

Removal of any Oregon white oak within the ROW will be replanted in alternative location on WHMP lands that is outside of the ROW border zone at a ratio of 3 to 1. Reynolds requested that the ratio be applied to each stem.

In the Under Clearance Region B maintain shrubs that remain under 25 feet in height at maturity, create snags by topping all conifer trees that are greater than or equal to 20 inches diameter

In the Under Clearance Region C maintain all trees and shrubs; conifer trees that are greater than or equal to 20 inches in dbh and that have the potential to grow to height that will reach Clearance Region A should be topped

Retain shrubs with the border zone and within the first and last ¼ of the span to a height of 18 inches and allow them to resprout.

Retain shrubs within the downhill portion of the border zone where achievable.

Treat bigleaf map stumps with herbicide to prevent any resprouting.

Debris piles should be reduced to the extent possible and spaced apart to not impede big game travel across the transmission line ROW.

Maintain or develop effective vegetation screens along public crossings of the transmission ROW on WHMP lands.

The best management practices for Cougar Creek Conservation Covenant on WHMP lines includes but is not limited to:

Conduct work between May 1 and May 31 to minimize effects to fish in Cougar Creek.

Avoid dropping any portion of the tree into the creek.

The red alder saplings that are growing on the island between the two channels should be cut-and-stump treated with an aquatic approved herbicide to prevent potential hazard tree problems in the future.

Any portion of a tree should be lopped and scattered to reduce debris.

A PacifiCorp biologist will be onsite during the vegetation removal.

PacifiCorp will develop a re-vegetation plan that will provide riparian vegetation and eliminate potential hazards to the transmission line.

PacifiCorp will continue to update the TCC on its progress.

Property Update

Confidential and Propriety and not for public viewing

Public Comment Opportunity

No public comment was provided.

<10:45 a.m. meeting adjourned – depart for field tour>

Agenda items for August 14, 2013

- Review September 11, 2013 Meeting Notes
- Review Lewis River and Swift Budgets (Land Acquisition interests)
- Riparian Mix Update
- Site Visit – Units 33 & 38 (see exclosures; conifer cleared area in Unit 38)

Next Scheduled Meetings

October 9, 2013	November 13, 2013
TCC Meeting	TCC Meeting
Merwin Hydro Control Center	Merwin Hydro Control Center
Ariel, WA	Ariel, WA
9:00am – 3:00pm	9:00am – 3:00pm

Attachments:

- September 11, 2013 Meeting Agenda
- June 12, 2013 Meeting Notes
- **Attachment A** – WHMP Map of Riparian areas of Unit 20

- **Attachment B** – WHMP Map of Mature Stand Connectivity
- **Attachment C** – Transmission Line ROW, Figures 6.4, 6.4a and 6.5
- **Attachment D** – Swift No. 2 Wildlife Management Area Patch Cut Prescription (TCC Review Draft: August 31, 2013)

Depart for field visit at 11:00am of Devil’s Backbone to view the patch cuts laid out, summer weed control and discuss 2013 implementation plan. Gritten-MacDonald informed the TCC attendees that will stop at the powerhouse and drive along the canal; exit the canal at the fishing area; it’s a flat surface but watch your step. Be mindful of rough terrain when walking in the woods.

Gritten-MacDonald provided the Swift No. 2 Wildlife Management Area Patch Cut Prescription (TCC Review Draft: August 31, 2013 – **Attachment D**) for TCC review and reference during the site visit.

The intent of the site visit is to evaluate the Cowlitz PUD patch cut plan that includes three small forest openings in mid-successional stands within the Devil’s Backbone Management Unit (MU) and to view summer weed control. The photos below will illustrate marked trees for removal for improvement of light penetration to the forest floor, increase soil moisture and promote regeneration of shrubs and herbaceous cover as well as conifers.







Summer weed control

The TCC expressed concern that the patch cuts may not be large enough to meet the WHMP goals so they requested Gritten-MacDonald to solicit a contractor(s) to view the sites and provide a non-binding estimate on three (3) scenarios* for TCC consideration:

- 1. Complete patch cuts and commercial thin between patch cuts 1 & 2**
- 2. Commercial thin (larger scale)**
- 3. Proceed with proposed Patch Cut Implementation Plan**

The TCC also viewed the wetland that was replanted following a landslide 3 years ago. Although several plantings didn't survive the wetland has recovered very well.



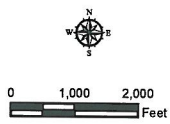
Lewis River Wildlife Habitat Management Plan

Riparian Areas
Appendix 6-1

Sheet 6 of 9

Legend

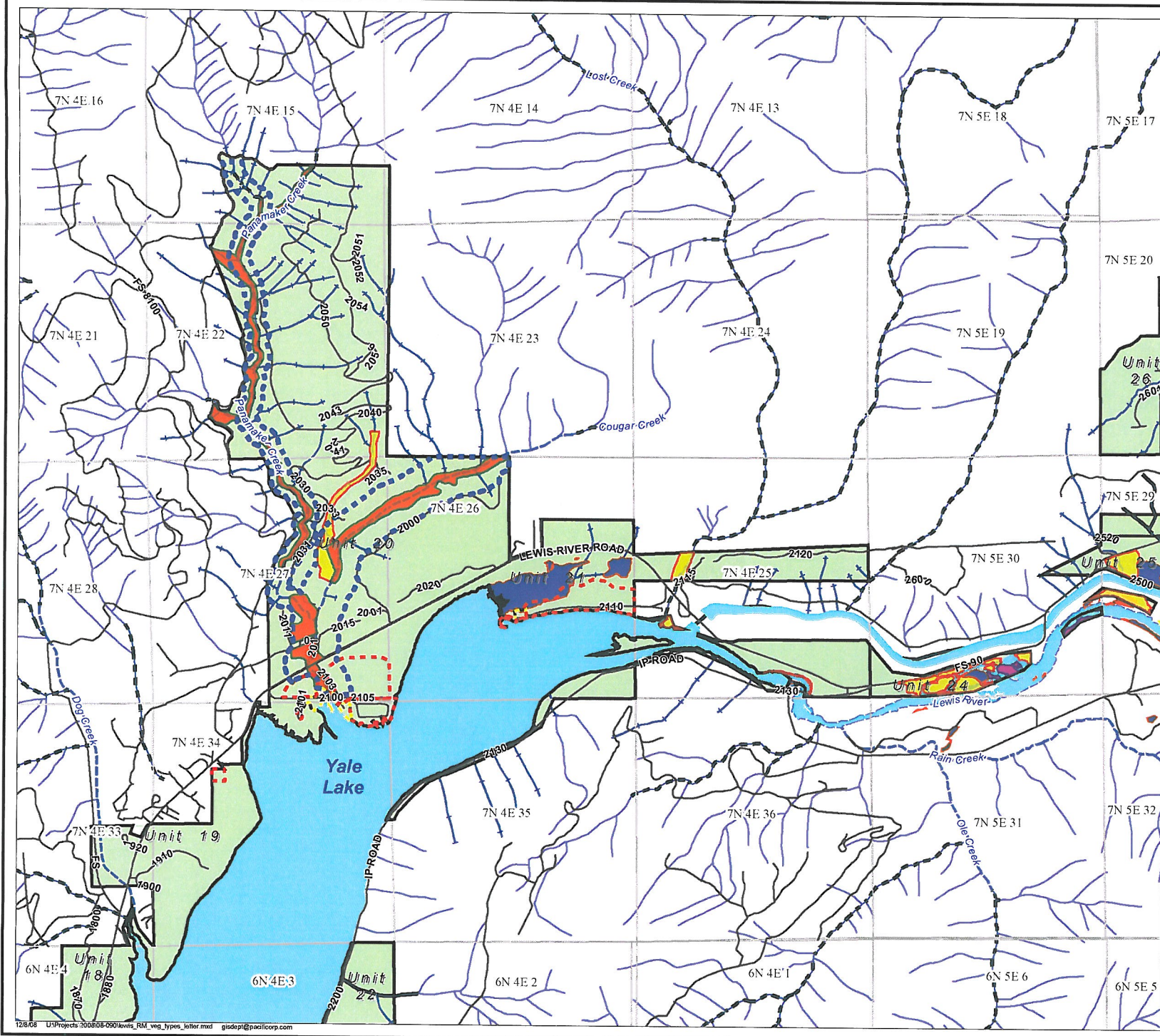
- Riparian Deciduous Forest
- Riparian Mixed Vegetation
- Riparian Shrubland
- Young Riparian Mixed Forest
- WHMP Management Lands**
- Exclusion
- Secondary Management Area
- Seasonal Management Area
- Conservation Covenant
- Management Unit
- PacifiCorp Ownership
- Stream**
- Fish
- Anadromous Fish
- Non-fish Perennial
- Non-fish Seasonal
- Other
- Road
- Water Body
- Wetlands



PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Data Management/
Geographic Information Systems
giddept@pacifiCorp.com

Data are projected in UTM Zone 10, NAD83, meters.
PacifiCorp GIS collects data from a variety of government and private sources. This map is not to be released nor put into any location that is accessible electronically or otherwise available to market affiliates. PacifiCorp makes no warranty as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. For complete validation, the source organization should be contacted or source documents consulted to verify the findings of this product.



MEMORANDUM

DATE: November 29, 2012

TO: Terrestrial Coordination Committee

FROM: Kendel Emmerson, PacifiCorp Energy Wildlife Biologist

SUBJECT: Lewis River Wildlife Habitat Management Plan Old-Growth Management
Objective D Old-Growth Connectivity

The 2008 Lewis River Wildlife Habitat Management Plan (WHMP) Old-growth Management Habitat Management section overall goal is to “promote the development, maintenance, and connectivity of old-growth coniferous forest and/or associated habitat components”. This goal is achieved by implementing a variety of objectives; in particular Objective c, d, and e promote connectivity. This memo describes the strategy meeting Objective d which reads as follows:

Objective d: Within 5 years of Lewis River WHMP implementation, identify and evaluate specific mature conifer stands or other areas that could improve habitat connectivity between old-growth stands or increase number or size of old-growth patches, and develop a schedule to manage/protect these areas as appropriate. Complete the identification/evaluation process within 5 years of the acquisition of Interests in Land.

Section 4.5.3 of the WHMP Old-growth Habitat Management Chapter described how Objective D will be achieved

Existing mature conifer stands (i.e., mature stands identified in the maps in PacifiCorp and Cowlitz PUD [2004a]) will also be assessed to determine the existing or potential connectivity to old-growth stands within 5 years of Lewis River WHMP implementation. Newly acquired mature conifer stands will be assessed within 5 years of acquiring the land.

Mature stands that are a priority to old-growth connectivity will include stands that are adjacent to and/or connected by forested buffers to old-growth stands. These priority mature stands will be evaluated in the field to determine if any management activities are required to develop old-growth habitat characteristics within the stand (i.e., snag development, thinning, and large woody debris development). Evaluations and management recommendations will be

documented and discussed with the TCC. Evaluations will follow the same procedures and use the same evaluation forms as used for the old-growth evaluations. The result of these stand evaluations will provide recommended management actions and will identify mature stands that may be developed into old-growth during the life of the licenses.

In order to identify the priority mature stands (i.e., a stand that is a priority to old-growth habitat connectivity) a GIS model was developed that essentially identified all of the old-growth (OG) and mature (M and M-t) stands that are greater than 1.0 acre in size on WHMP lands. The mature stands were then scored based on criteria for size, proximity to old-growth, spotted owl habitat rating, and designated raptor and/or riparian habitat buffer. The following table lists the criteria and its applicable points.

Table 1: Old-growth Connectivity Mature Stand Criteria and Associated Points

Criteria	Description	Points
Size	The stand is ≥ 10 acres	3
	The stand is between ≥ 5 and ≤ 9.99 acres	2
	The stand is between ≥ 1 and ≤ 4.99 acres	1
Old-Growth Proximity	The stand is adjacent (i.e., $\leq 1,000$ ft.) to an WHMP old-growth stand	3
	The stand is ≥ 1000 ft. and ≤ 0.25 miles from WHMP old-growth stand	2
	The stand is ≥ 0.25 and ≤ 0.5 miles from WHMP old-growth stand	1
Spotted Owl Habitat	Any portion of the stand is within Raptor Management Objective J lands (i.e., these are lands within the Siouxon SOSEA)	3
	Any portion of the stand that is within Raptor Management Objective I lands (i.e., These are lands, that unless separated by a reservoir, are within 2.0 miles of the Siouxon SOSEA)	2
	Any portion of the stand that is within Raptor Management Objective H lands (i.e., These are lands, that unless separated by a reservoir, are within a spotted owl circle and greater than 2.0 miles of the Siouxon SOSEA)	1
Protected Raptor Habitat	Any portion of the stand that is within a raptor nest buffer	2
	Any portion of the stand that is within a raptor roost buffer	1
Riparian Buffer	Any portion of the stand that is within a stream or shoreline buffer	2
	Any portion of the stand that is within the Cougar/Panamaker Conservation Covenant	3

Only one point category for size, old-growth proximity, and spotted owl habitat can be applied to a mature stand, whereas a stand can be multiple Protected Raptor Habitat and Riparian Buffer habitat point categories. For example the highest score that could be obtained for a mature stand on WHMP lands would be 17 points (3 points for being greater than 10 acres in size, 3 points for adjacent to an old-growth stand, 3 points for being within the Siouxon SOSEA, 6 points for being within a raptor nest and a raptor roost buffer, and 2 points for being in a stream buffer). Conversely the lowest score a

stand could obtain would be 1 point for a stand that is between ≥ 1 and ≤ 4.99 acres in size and meets no other criteria. The following table is a breakdown of the mature stand scores and a comparison in acres, size range, and average size.

Table 2: Mature Stand Scores and Total, Average, and Range Size Comparison

Score	Number of Stands	Total acres	Average Size	Size Range
1	7	12.01	1.72	1.05-3.34
2	3	17.05	5.68	2.78-8.67
3	15	34.87	2.32	1.00-4.16
4	17	91.66	5.39	1.13-21.69
5	17	162.61	9.57	1.56-33.88
6	16	86.31	5.39	1.53-14.99
7	21	201.68	9.60	1.85-44.86
8	8	82.66	10.33	1.68-19.85
9	5	42.38	8.48	4.55-12.91
10	1	5.32	5.32	5.32
11	0	0	0	0
12	2	23.57	11.79	10.36-13.21
13	1	22.80	22.80	22.80
Total	113	782.92	6.93	1.00-44.86

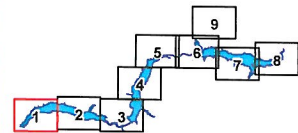
A priority ranking was assigned to all mature stands that scored an 8 or better. This included 17 stands for a total of 176.73 acres or 22.57% of the stands. Stands that scored a 7 were individually assessed to determine if they were a priority to old-growth connectivity. Sixteen of these 21 stands were identified as priority mature stand for additional 178.30 acres and based on the following reasons:

- 9 stands are unable to be harvested because of steep slopes or access
- 3 stands were immediately adjacent to each other and collectively made one large mature stand
- 1 stands is within a raptor buffer
- 1 stand is large size
- 2 provided good connectivity based on their shape and location

This made a total of 26 priority mature stands totaling 355.03 acres or 45.35 % of the total mature stand acreages. Any stand that scored less than 6 was considered non-priority to old-growth connectivity. These stands totaled 427.89 acres or 54.65% of the total mature stand acreages.

The following maps show the priority vs. non-priority mature stands in relation to old-growth stands, riparian buffer, raptor nest and roosts. Each stand is labeled with its unique 6 digit number known as Asset ID and it associated score. There is also an associated table that is sorted by Asset ID that shows the score for each criterion to see how the polygon ranking was determined.

Lewis River Mature Stand Connectivity Sheet 1



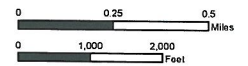
Mature Stands are labelled with the total score and the Asset ID.

Legend

- Priority Mature Stand
- Non-priority Mature Stand
- Road
- Stream
- Stream Buffer
- Raptor Nest Buffer
- Raptor Roost Buffer
- Spotted Owl Area
- Old Growth
- Cougar Creek Conservation Covenant
- Siouxeon SOSEA
- Siouxeon SOSEA Buffer
- Management Unit
- Water Body



1:20,000



GIS Support Services
Solutions Group
gisdept@pacificorp.com

Data is projected in UTM Zone 10, NAD83, meters.
No Warranty. With respect to any information, including but not limited to the Confidential Information, which a Party furnishes or otherwise discloses to another Party for the purpose of evaluating Compliance, it is understood and agreed that the Disclosing Party does not make any representations or warranties as to the accuracy, completeness or fitness for a particular purpose thereof. It is further understood and agreed that no Party or its Representatives shall have any liability or responsibility to another Party or to any other person or entity resulting from the use of any information so furnished or otherwise provided pursuant to this Agreement.

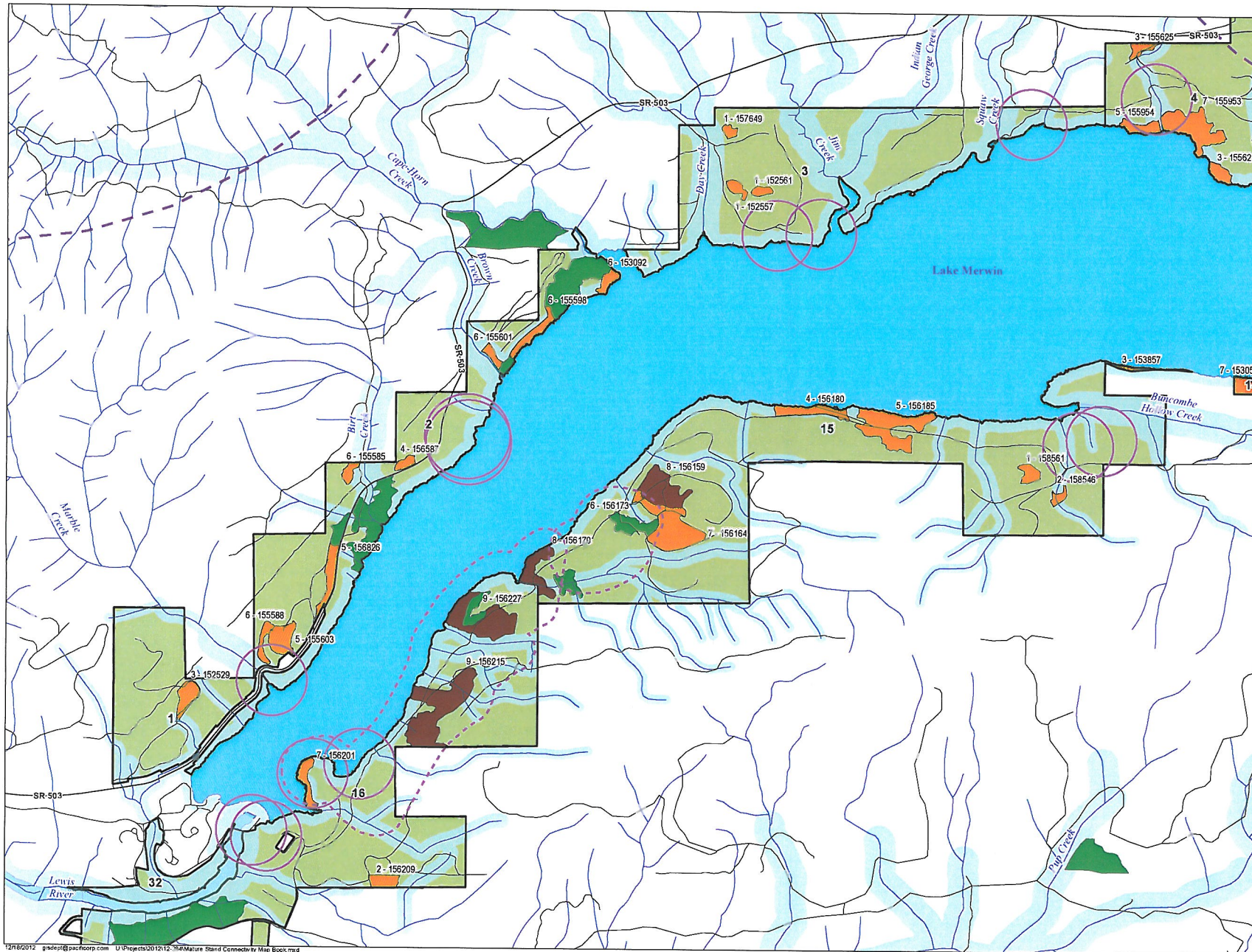


Figure 6.4a. Bramble and Byrnes Wire Zone - Border Zone (adapted from Yahner, Bramble and Byrnes, 2001).

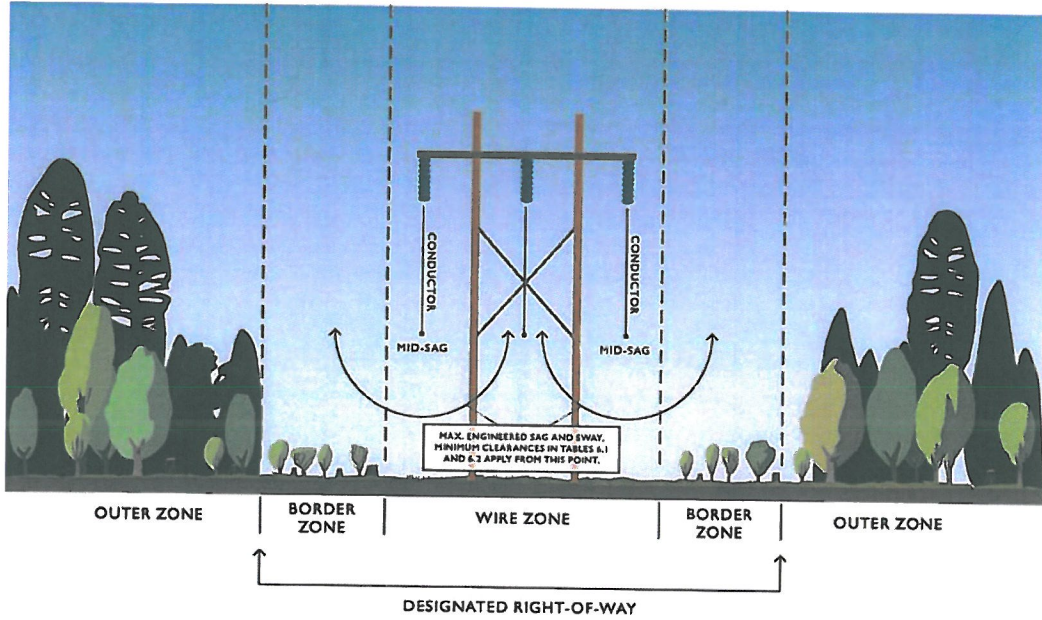
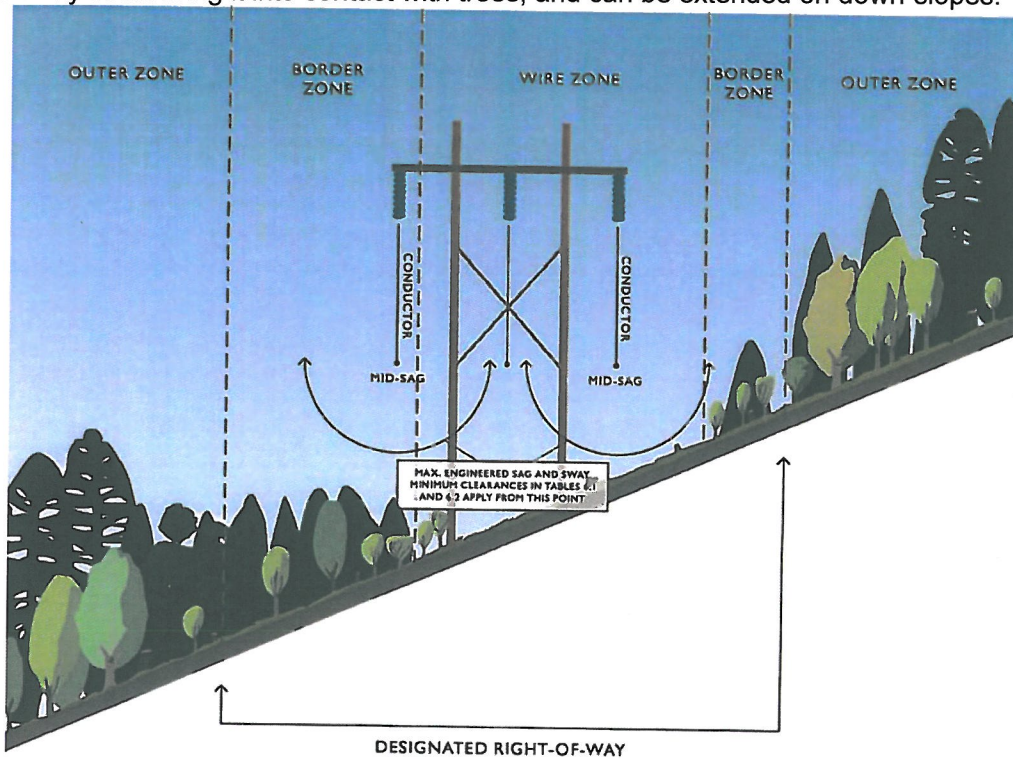
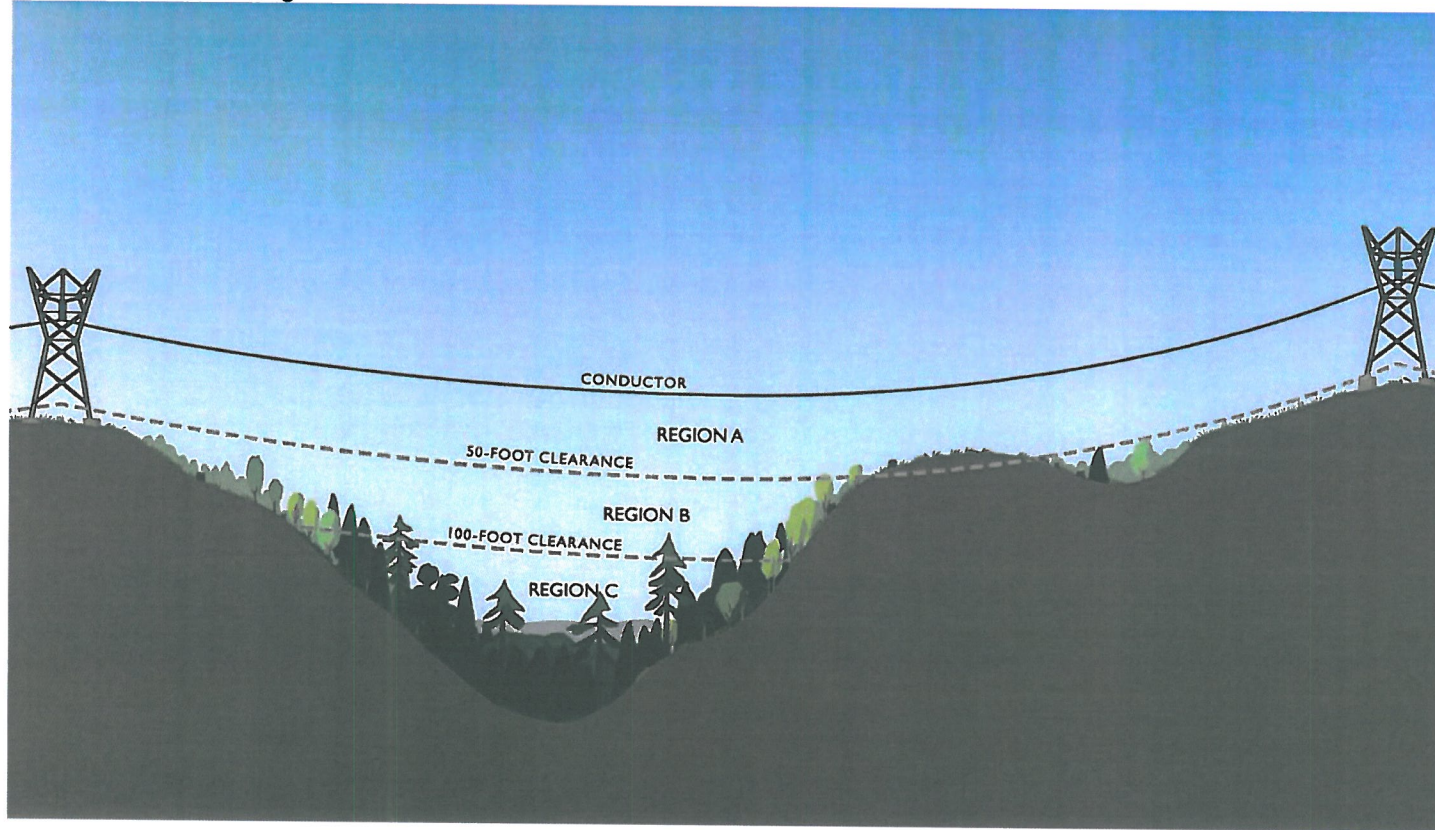


Figure 6.4b. The border zone may be reduced or eliminated on up-slopes where wire sag and sway could bring it into contact with trees, and can be extended on down-slopes.



Brad Gouch drawings (Figures 6.4 and 6.5).

Figure 6.5. Under clearance regions.



Region Definitions:

- Region A: Where conductor to ground clearance is less than 50 feet (from maximum engineered sag and sway).
- Region B: Where the conductor to ground clearance is 51-100 feet (from maximum engineered sag and sway).
- Region C: Where the conductor to ground clearance is over 100 feet (from maximum engineered sag and sway).

Appropriate Region Plant Species:

- Region A: Grasses, legumes, ferns and low-growing shrubs (<5' at maturity).
- Region B: Region A species as well as large shrubs and short-growing trees (<25' at maturity).
- Region C: All tree and shrub species.

Swift No. 2 Wildlife Management Area

Patch Cut Prescription

TCC Review Draft: August 31, 2013

Introduction

The Patch Cut Implementation Plan included in the 2013 (Year 5) Annual Plan described Cowlitz PUD's proposal to create small forest openings in mid-successional stands within the Devil's Backbone Management Unit (MU). Task 1a of the plan called for a site visit to select patches and mark trees. This step was accomplished on June 20 and 21, 2013. Task 1b called for preparation of a map showing the location of the patches and access to the site, and preparation of a detailed silvicultural prescription. The following discussion takes into account the data collected during patch cut lay-out and identifies issues associated with the volume of material that would result from patch creation that must be addressed before a final prescription is selected. A final prescription will be developed based on further discussion with the TCC and input from the contractor selected to implement the prescription.

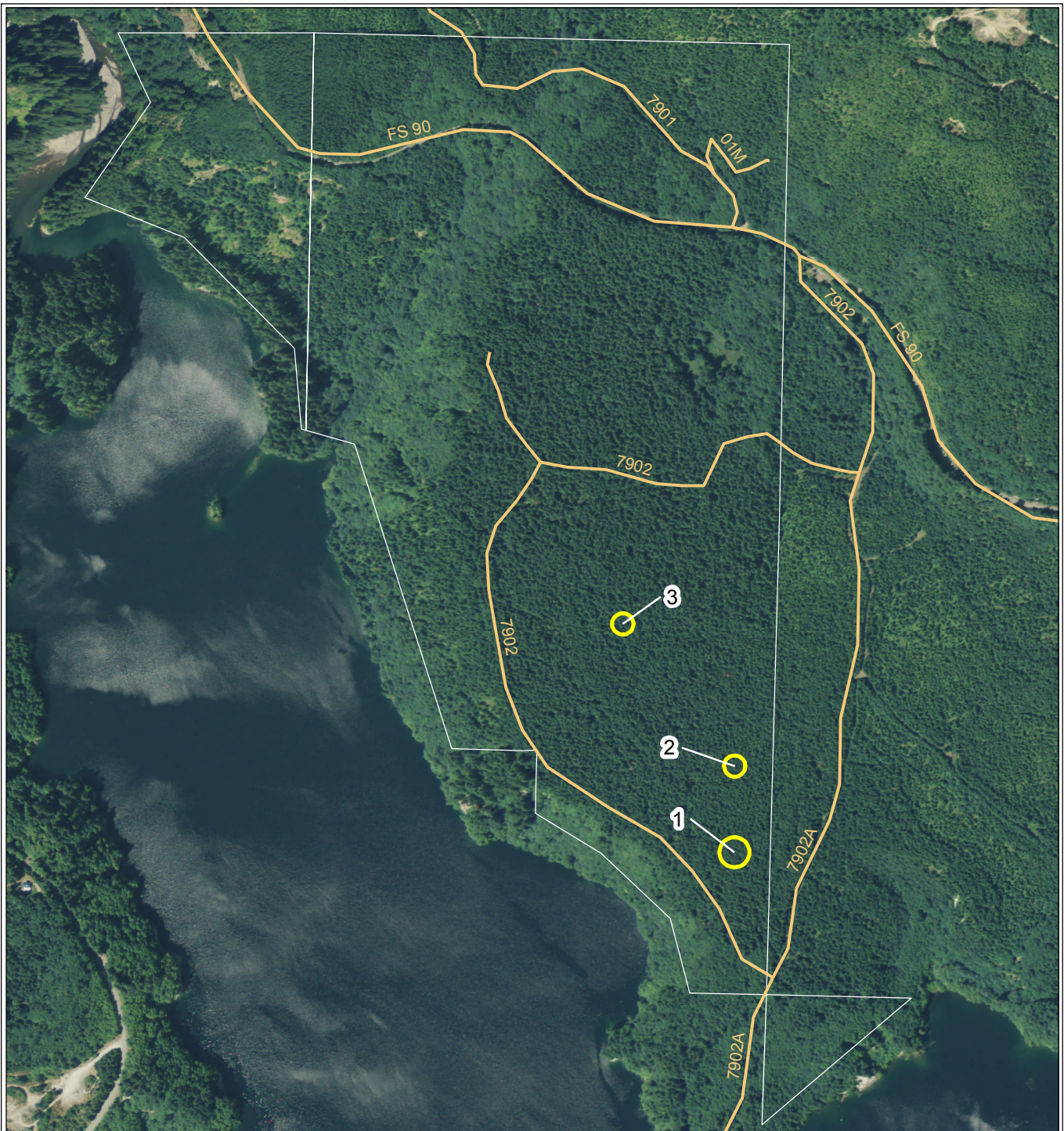
Specific management objectives

The management objectives for mid-successional stands in the Devil's Backbone MU are to increase understory species and structural diversity and improve Habitat Suitability Index (HSI) values for elk over time by improving the cover/forage ratio. The creation of patch cuts is one approach to achieving these objectives. Specifically, removal of trees within the patches is anticipated to accomplish the following:

- Improve light penetration to the forest floor, increase soil moisture, and reduce root competition to promote regeneration of shrubs and herbaceous cover, as well as conifers
- Add dead and down material to the forest floor to provide microsites for seedling establishment and cover for small mammals and ground-feeding birds, which would also increase the prey base for raptors
- Increase the cover of desirable elk browse species that occur within each site, such as vine maple, huckleberry, and rose, in addition to swordfern and Oregon grape, which are more abundant under existing conditions

Patch cut lay-out

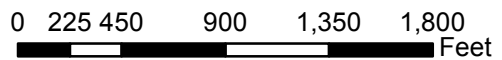
On June 20, 2013, Cowlitz PUD and Meridian Environmental, Inc. staff performed a walk-through of Devil's Backbone Site 2 (DBMU-2), shown on an air photo in Figure 1 and a cover type map in Figure 2 to select locations for two 0.25-acre and one 0.5-acre patch cuts.



COWLITZ COUNTY
 "CUSTOMER-OWNED for CUSTOMER BENEFIT"

Swift No. 2 Hydroelectric Project
 FERC No. 2213

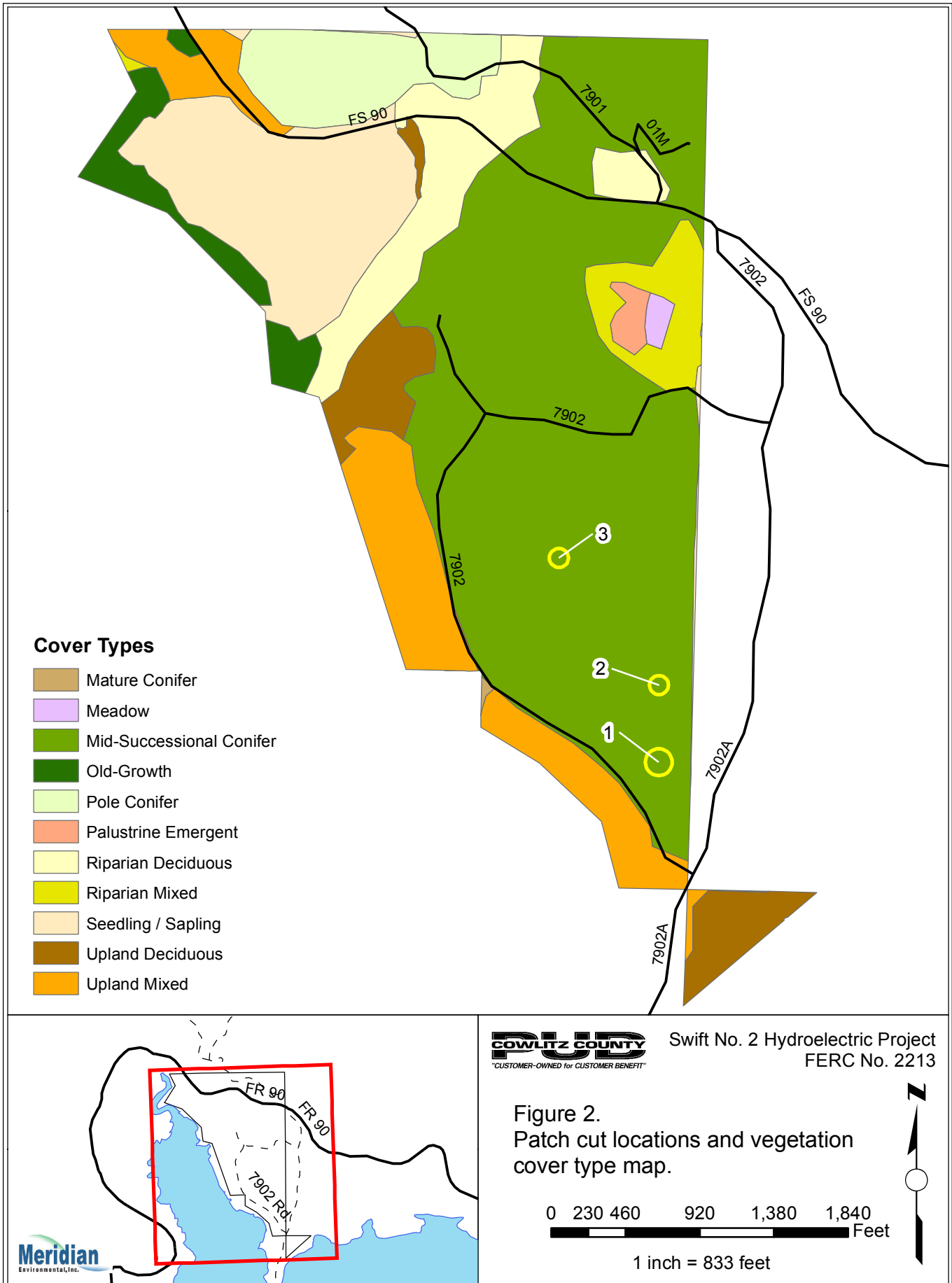
Figure 1.
 Devil's Backbone Management Unit
 Patch Cut Treatment Locations



1 inch = 833 feet



Meridian
 Environmental, Inc.



Cover Types

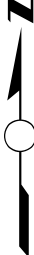
- Mature Conifer
- Meadow
- Mid-Successional Conifer
- Old-Growth
- Pole Conifer
- Palustrine Emergent
- Riparian Deciduous
- Riparian Mixed
- Seedling / Sapling
- Upland Deciduous
- Upland Mixed

COWLITZ COUNTY Swift No. 2 Hydroelectric Project
 "CUSTOMER-OWNED for CUSTOMER BENEFIT" FERC No. 2213

Figure 2.
 Patch cut locations and vegetation
 cover type map.

0 230 460 920 1,380 1,840
 Feet

1 inch = 833 feet



The walk-through focused on finding areas with the least groundcover, highest tree densities, fewest large-diameter trees, presence of desirable understory species that would be likely to increase in abundance after treatment, and the absence of noxious weeds.

Once selected, patches were laid out by marking trees along the boundaries with pink flagging. Patches are roughly circular in shape, with a radius of 83.3 feet for Patch 1 (0.5 acres) and 58.9 feet for Patch 2 and Patch 3 (0.25 acres each). All three patches are located in DBMU-2 (Figure 2) on relatively flat terrain. No streams or wetlands are present, and the sites are located well away (over 125 feet) from the 7902 Road to the west and north and the property line to the east. The patches would not be visible from the 7902 Road. Site 1, the closest to the 7902 Road is hidden from view by a small ridge.

On June 21, 2013, all trees within each patch were marked with blue paint, and their condition (live or dead) and diameter at breast height (dbh), by species, was recorded. After completing the lay-out of all three patches, four stand density sampling Quick-Plots were measured at randomly-selected locations within DBMU-2 to obtain an estimate of the density of the remaining stand. This data is used for comparison against the patch cut locations, and also to compare against previous stand measurements.

Stand conditions

Data from the patch cut sites was entered into a spreadsheet to enable a comparison with data collected from the four randomly selected plots, and with data collected in September 2005 from five randomly-selected plots. The comparison (shown below) confirms that the patches are located where tree density is higher than in most of the stand.

Stand characteristics for randomly selected plots and Patch 3.

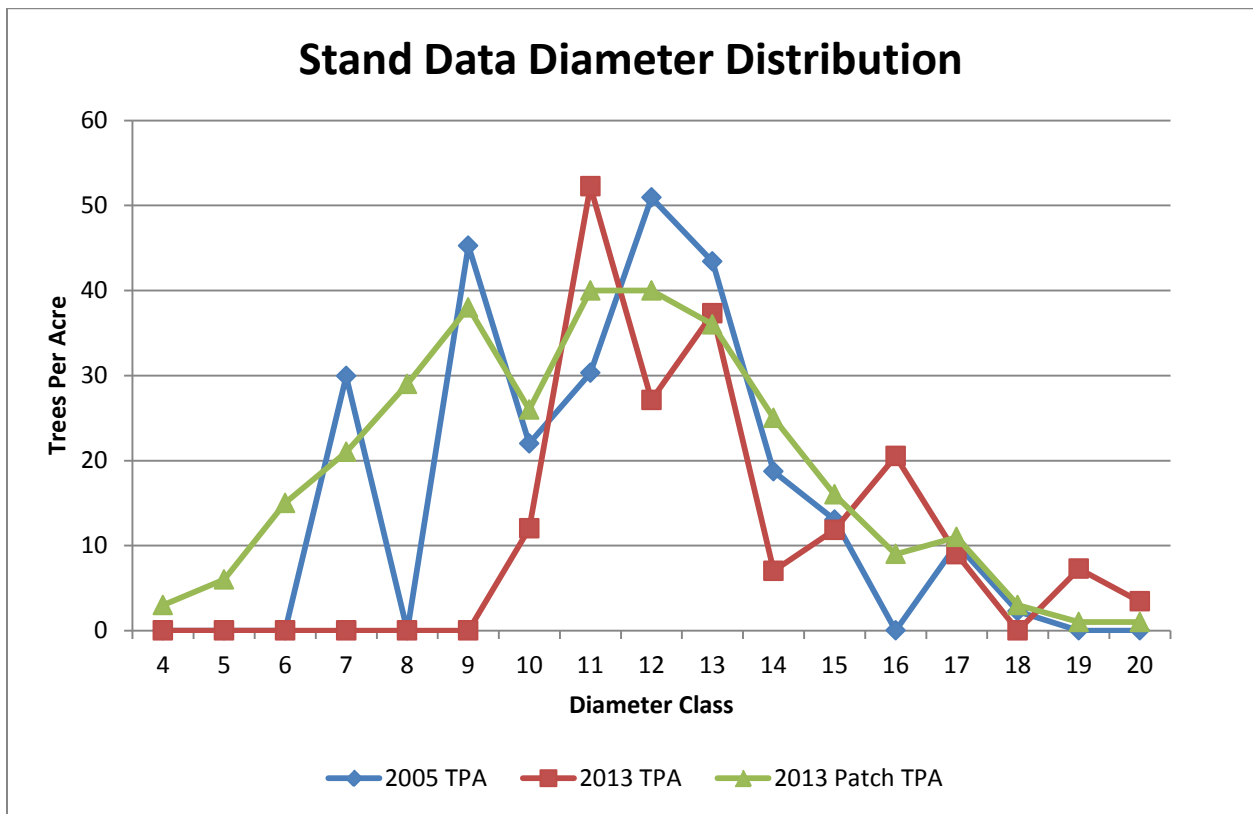
Stand Density Attribute	2005 Random	2013 Random	2013 Patch 1	2013 Patch 2	2013 Patch 3
Trees Per Acre	266	188	344	308	288
Basal Area Per Acre	196	195	269	191	182
Quadratic Mean Diameter	11.6	13.8	12.0	10.7	10.7
Relative Density	57.5	52.5	77.6	58.6	55.4

Comparing the Quick-Plot data from 2005 and 2013¹ shows two other important changes. The average tree diameter has increased approximately 2 inches, and the density of the trees has decreased by approximately 78 trees per acre. The amount of growing space used by the trees

¹ The 2005 and 2013 Quick Plots were intended to provide a broad level of information about conditions in mid-successional stands in the Devil's Backbone MU; a more intensive sampling effort would be needed to establish statistically valid comparisons.

that are present (represented by the basal area per acre) has remained the same. The relative density of the stand has slightly decreased in 2013; however the estimated change is probably within sampling error and could be considered constant at approximately 55 percent.

A diameter distribution chart showing each of the samples is provided below. The patch cut data shows a classic bell shaped diameter distribution with more trees in the mid-range of diameters and fewer trees in both the upper and lower diameter classes. There is also a slight shift in the diameter distribution curve between the 2005 and the 2013 data; however the small sample sizes for both these data sets may limit the accuracy of comparing individual diameter classes between years.



The three tables below show the tally of trees within each plot that are marked to be cut.

Patch 1: 0.5-acres

Diameter Class (Inches dbh)	Douglas-fir		Hemlock		Total All Trees
	Dead	Live	Dead	Live	
4	3	1	1	1	6
5	4		1	2	7
6	7	2		3	12
7	2	7	1	1	11
8	2	9		5	16
9		14		2	16
10		12		1	13
11	1	20		2	23
12	1	18		7	26
13		13		6	19
14	1	14		2	17
15		7		4	11
16		3		3	6
17		3		4	7
18		2		1	3
19				1	1
20				1	1
Total Live and Dead trees within Patch 1					195

Patch 2: 0.25-acres

Diameter Class (Inches dbh)	Douglas-fir		Hemlock		Total All Trees
	Dead	Live	Dead	Live	
3	2				2
4	11			1	12
5	1	2		1	4
6	7	4		1	12
7	1	3			4
8		4		4	8
9		8		5	13
10		3		2	5
11		7		4	11
12		3		5	8
13		4		8	12
14		2		1	3
15		1		2	3
16				2	2
Total Live and Dead Trees within Patch 2					99

Patch 3: 0.25-acres

Diameter Class (Inches dbh)	Douglas-fir		Hemlock		Total All Trees
	Dead	Live	Dead	Live	
3			1	1	2
4	2		1		3
5	1			1	2
6		1		4	5
7		3		7	10
8		2		4	6
9		4		5	9
10		1		6	7
11				7	7
12		4		3	7
13		1		4	5
14		1		5	6
15		1		1	2
16		1			1
17		2		2	4
Total Live and Dead Trees within Patch 3					76

Anticipated regeneration

The dominant tree species in all three patches are Douglas-fir and western hemlock, with a few red alder also present. The dominant shrub species are Oregon grape and swordfern. The dominant herbaceous species are vanilla leaf and inside-out-flower. Small amounts of vine maple are present in each patch and within the adjacent stand, and a few Wood’s rose shrubs were observed in Patch 3. Very little brackenfern is present, but plants were observed to be scattered around the margins of each patch. Brackenfern is not designated as a noxious weed, and while it can spread aggressively, it is also heavily browsed in the DBMU-11 meadow and in a natural opening in DBMU-2 suspected to be caused by root-rot.

Regeneration of trees, shrubs, and herbaceous cover within gaps will depend on several factors, including light availability, soil temperature, soil moisture, root density, seed dispersal and the existing seed bank, and microsite characteristics, and the interactions between them. It is anticipated that all of the plant species that currently occupy these patches would regenerate, with vine maple, Wood’s rose, and brackenfern increasing and swordfern and Oregon grape staying about the same. Both Douglas-fir and hemlock trees would regenerate within the opening. Hemlock is more tolerant of shaded conditions and is expected to be the dominant conifer species within the openings over the long-term. The regeneration of conifer trees would add a younger age class and more vegetative layers to the forest canopy in the immediate area of the treatment.

Anticipated slash accumulation

The height of the dominant tree canopy is approximately 100 to 110 feet tall, with live crown branching for approximately 30 to 50 percent of the total canopy height. Slash accumulations on the site would consist of two classes of material, branches and tops less than 3 inches in diameter, and stems greater than three inches diameter.

During the logging process, all trees would be felled away from the center of the patch. This would minimize the accumulation of slash within the patch and disperse it around the perimeter of the patch. All felled trees would have the branches cut from the stem (limbed) and the stems cut (bucked) to get the material close to the ground. This process decreases the depth of accumulated slash, increases the decay rate for the woody material, minimizes the length of time it would impede travel for elk and deer, and reduces the fire hazard at the site.

Patch 1 is 0.5 acres in size and would have 196 trees felled to create the patch opening. Approximately 50 percent of the tree stems on the ground would be larger than 11 inches dbh, with the largest stem 20 inches dbh.

Patch 2 is 0.25 acres in size and would have 99 trees felled to create the patch opening. Approximately 50 percent of the tree stems on the ground would be larger than 9 inches dbh, with the largest stem 16 inches dbh.

Patch 3 is 0.25 acres in size and would have 76 trees felled to create the patch opening. Approximately 50 percent of the tree stems on the ground would be larger than 9 inches dbh, with the largest stem 17 inches dbh.

Site constraints

The 7902 Road provides good access to all three sites for loggers on foot, but overgrown skid roads off the 7902 Road are not currently accessible to heavy equipment. The lack of equipment access limits the options for managing felled trees, either by distributing them into the adjacent stand or by hauling them off-site.

Prescription

1. Schedule patch cuts for implementation in September/October to prevent disturbance to nesting raptors.²
2. Fell all marked trees within designated patches.
3. Work with the selected logging contractor to determine the best approach to directional felling. Felling trees into the patch opening would result in the accumulation of coarse and fine

² A barred owl was observed between Patch 1 and Patch 2 on June 21, 2013 and barred owl calls were heard during invasive plant and public access surveys on June 29, 2013.

woody debris within a small area; felling trees away from the patch opening would disperse coarse woody debris, but make it more difficult to pile and burn small diameter slash.

4. Limb tops and branches and buck stems into lengths as needed to drop the material to the ground.
5. Hand-pile and burn slash less than 3 inches in diameter.
6. Retain vine maple where possible.
7. Conduct post-treatment site visit within 2 weeks of implementation to document site conditions and confirm that work has been completed as specified in the contract documents.
8. Monitor for invasive plant species annually and treat as needed.
9. Monitor groundcover response to treatment at 3 and 6 years post-treatment using photo comparisons to evaluate whether patch cuts are helping to move the stand toward desired conditions.

Estimated Costs and Benefits

The estimated cost of implementation is approximately \$4,810, including \$3,000 for logging, hand-piling and burning slash, and burn permitting; and \$1,810 for the post-treatment site visit. Costs of invasive plant monitoring and management and groundcover response monitoring will be included in the annual weed and public access surveys.

Creating patch cuts is expected to increase the growth and regeneration of understory species within the patches, accelerate the diameter growth of trees immediately adjacent to the canopy opening, and increase structural diversity in DBMU-2. The addition of coarse woody debris is expected to provide habitat niches for a variety of wildlife species.