WASHINGTON NATURAL HERITAGE PROGRAM SITE SURVEY

Power Station Timber Sale, Units 1-6

August 2024

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&
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Executive Summary

The purpose of this inventory effort was to survey units 1-6 of Power Station sale for element occurrences (EOs) of globally critically imperiled or imperiled (i.e., G1 or G2) plant communities. Natural Heritage Methodology was used to identify plant associations and assess their ecological integrity. The site visits occurred in June and July 2024. Several G1 and G2 plant communities were identified in and adjacent to the units.

Stands of the following plant associations had sufficient ecological integrity to be considered element occurrences based on the Ecological Integrity Assessment (EIA): *Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum* Forest (G1/S1), *Thuja plicata - Abies grandis / Polystichum munitum* Forest (G1/S1), and *Pseudotsuga menziesii / Holodiscus discolor - Rosa gymnocarpa / Festuca occidentalis* Forest (G2G3/S2). These element occurrences are found in units 1, 2, 4, 5 and 5.

Stands of *Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon* Forest (G2/S1S2) and *Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor* Forest (G2/S2) did not score high enough on the Ecological Integrity Assessment (EIA) to be considered element occurrences.

Introduction

In June and July 2024 Erin Burke surveyed Units 1-6 of the Power Station sale for critically imperiled and imperiled ecosystems. Tynan Ramm-Granberg was present for the survey and assessment of Unit 4 and consulted on Units 1, 2, and 6. When critically imperiled or imperiled ecosystems were found, ecologists mapped and assessed ecological integrity and overall conservation value. The survey was conducted at the request of the DNR Olympic Assistant Region Manager.

Methods

Site Survey Approach
A site walkthrough approach was used to observe the ecological variation within the timber sale units and beyond. This approach ensured that the topographic variability of each unit was surveyed. The surveyor stopped frequently to classify and confirm the plant association using Chappell (2006).

Classification of Plant Associations
WNHP uses the U.S. National Vegetation Classification (USNVC, 2022) to document the plant associations that occur in the state. Chappell (2006) classified the forests of the Puget Lowlands using the USNVC—the field keys and plant association descriptions in that document were used to identify the plant associations occurring within the targeted survey areas. These descriptions were also cross-referenced with NatureServe Explorer (https://explorer.natureserve.org/) to check for any revisions that may have occurred since publication.

Conservation Status of Plant Associations
Plant associations are assigned global (G) and subnational (=State, S) conservation status ranks using NatureServe's Conservation Status Assessment Methodology (Faber-Langendoen et al., 2012; Master et al., 2012). A conservation status rank represents an assessment of a specific plant association's risk of elimination. Conservation status ranks have been assigned to each element (ecosystem type) for its entire range, incorporating rarity, threats, and other factors.

Ecological Integrity of Plant Association Stands
The Ecological Integrity Assessment (EIA) methodology provides a rapid, standardized assessment of the current ecological integrity of a stand of a given plant association (Faber-Langendoen et al., 2019; Rocchio et al., 2020a, 2020b). The EIA results in an EIA rank ranging from 'A' to 'D', with 'A' indicating excellent ecological integrity and 'D' indicating poor ecological integrity. A size metric is then integrated to produce an element occurrence rank (EO rank), which is an estimate of the overall conservation value of the stand.

If a plant association with conservation status rank of globally imperiled (G2) or globally critically imperiled (G1) was located, its extent was mapped, and then an EIA was conducted to determine its current ecological condition (landscape context, native plant composition, invasive weed cover, vegetation structure, surficial soil condition, overall size, etc.). We also used DNR forest inventory data, historical aerial imagery, and timber harvest records to determine the stand age, corroborated by keys from Van Pelt (2007) that we also used to assess old-growth characteristics of individual trees. This information was used to help score EIA metrics related to vegetation structure.

Element Occurrence Criteria

WNHP uses the combination of a plant association's conservation status rank and its EO rank to determine whether a stand of a given plant association is an "element occurrence". Element occurrences (EOs) are populations of species or specific examples of ecosystems with significant conservation value that contribute to the survival or persistence of the element (i.e. the species or ecosystem) (NatureServe, 2002). We use NatureServe's Element Occurrence data standards to guide our delineation of plant association occurrences (see http://www.natureserve.org/conservation-tools/standards-methods/element-occurrence-data-standard). The EO data standards provide guidelines for decisions such as whether a particular patch of a given plant association is large enough to be considered an element occurrence. The standard also provides guidance on whether two distinct stands of the same plant association should be lumped as a single EO or split into two occurrences. The EO rank is determined by completing an EIA of the specific stand of the ecosystem in question. Common ecosystems with relatively few threats (e.g. conservation status rank of G5/S5) must be in excellent condition (EO rank 'A+' or 'A-') to be considered EOs, while all critically imperiled ecosystems (G1/S1)—even in poor condition (D)—have significant conservation value. Element occurrences are entered in the Washington Natural Heritage Program's Biotics database used for a variety of conservation and management outcomes. For more information, please see the Washington Natural Heritage Program website (http://www.dnr.wa.gov/natural-heritage-program).

Table 1. Decision Matrix for Ecosystem Element Occurrences. Element conservation status ranks vary from 1 (critically imperiled) to 5 (common/secure), calculated across the element's global (G) and subnational/state (S) range. 'NR' = not ranked.

EORANK	Global Rank / State Rank	Element Conservation Status Rank			
		G1S1, G2S1, GNRS1, GUS1	G2S2, GNRS2, G3S1, G3S2, GUS2	GUS3, GNRS3, G3S3, G4S1, G4S2, G5S1, G5S2, any SNR	G4S3, G4S4, G5S3, G5S4, G5S5, GNRS4, GNRS5, GUS4, GUS5
A+ (3.8 to 4.0)		EO	EO	EO	EO
A- (3.5 to 3.79)		EO	EO	EO	EO
B+ (3.0 to 3.49)		EO	EO	EO	Not an Element Occurrence
B- (2.5 to 2.99)		EO	EO	EO	
C+ (2.0 to 2.49)		EO	EO	Not an Element Occurrence	Not an Element Occurrence
C- (1.5 to 1.99)		EO	Not an Element Occurrence		
D (1.0 to 1.49)		EO			
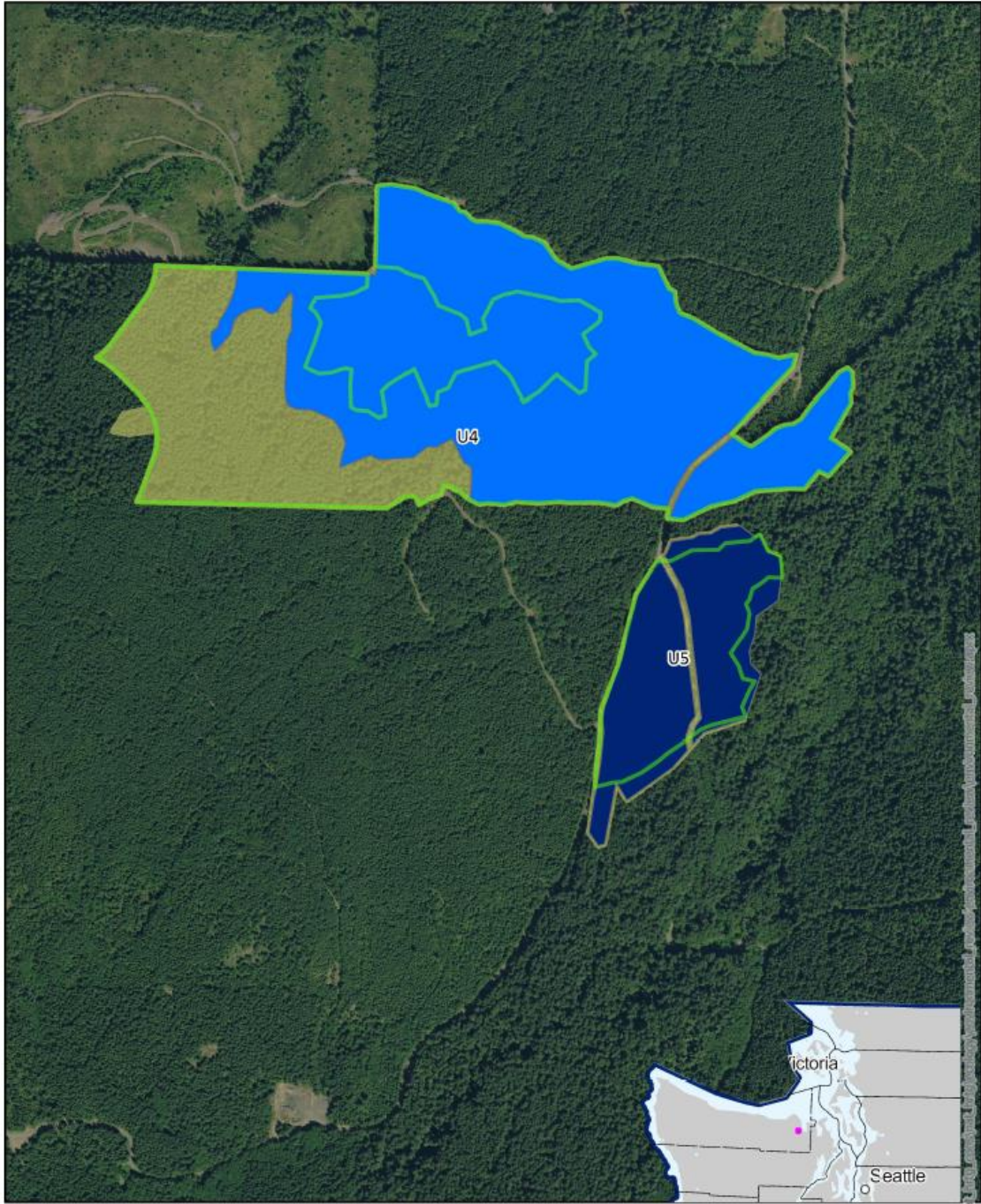
Power Station Units

Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum EO

Thuja plicata - Abies grandis / Polystichum munitum EO

Additional area suveyed

Disclaimer: Boundaries depicted here are preliminary and only intended to highlight general area of interest.

Figure 1. Surveys in and adjacent to Power Station Units 2 and 3.

Power Station Units

Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum EO

Thuja plicata - Abies grandis / Polystichum munitum EO

Pseudotsuga menziesii / Holodiscus discolor – Rosa gymnocarpa / Festuca occidentalis EO

Additional area suveyed

Disclaimer: Boundaries depicted here are preliminary and only intended to highlight general area of interest.

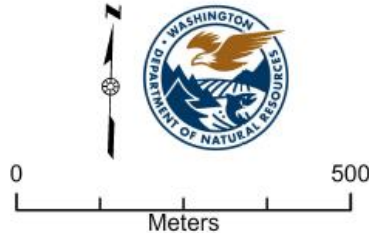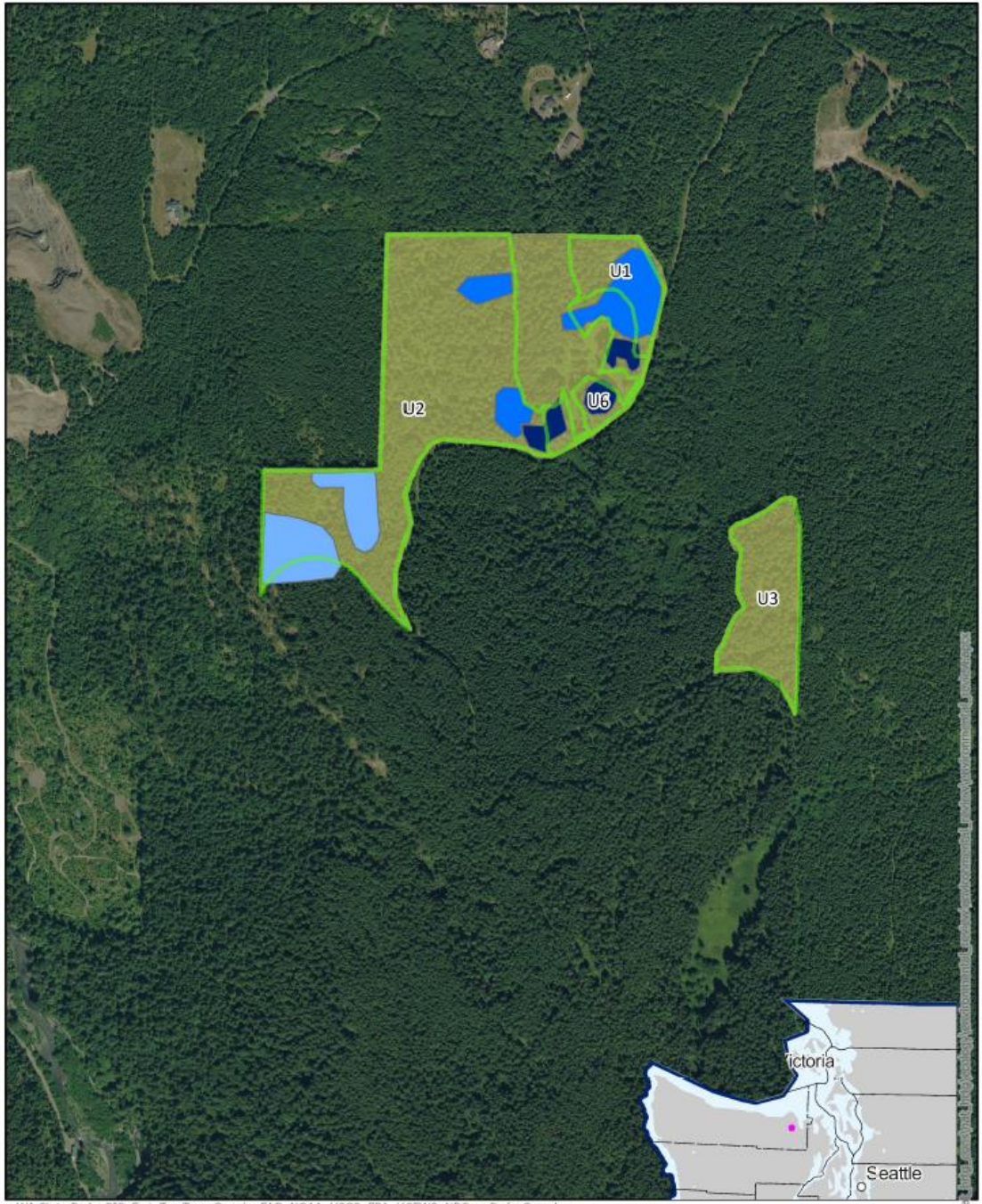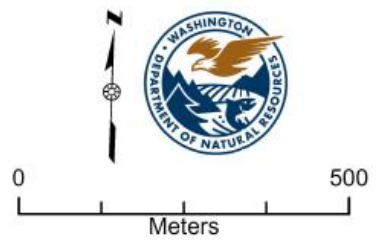WASHINGTON DEPARTMENT OF NATURAL RESOURCES

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Figure 2: Surveys in and adjacent to Power Station Units 1,2,3, and 6

Results

G1 & G2 Plant Associations

Six imperiled (G2) to critically imperiled (G1) plant associations were found within the Power Station units (Figure 1, Figure 2, Table 2).

Table 2. G1 and G2 plant associations found within Power Station timber sale.

USNVC Plant Association	EL Code	State Conservation Status (G/S Rank)	EO Rank	Element Occurrence?
Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum (Western Red-cedar - Douglas-fir - Grand Fir / Cascade Oregon-grape / Swordfern) Forest	CEGL002848	Endangered (G1/S1)	B+	Yes
Thuja plicata - (Abies grandis) / Polystichum munitum (Western Red-cedar - Grand Fir / Swordfern) Forest	CEGL000468	Endangered (G1/S1)	C+	Yes
Pseudotsuga menziesii / Holodiscus discolor - Rosa gymnocarpa / Festuca occidentalis (Douglas-fir /Oceanspray – Baldhip Rose / Western Fescue) Forest	CEGL000456	Threatened (G2G3/S2)	C+	Yes
Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon (Douglas-fir - (Grand Fir, Western Red-cedar) / Cascade Oregon-grape – Salal) Forest	CEGL002845	Threatened (G2/S1S2)	D	No
Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor (Douglas-fir - Western Hemlock / Salal – Oceanspray) Forest	CEGL005537	Threatened (G2/S2)	D	No

Two globally critically imperiled (G1) associations were found within the sale boundary. Stands of *Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum* (G1/S1; Table 3) were found in Power Station Units 1, 4, and 6. Stands of *Thuja plicata - Pseudotsuga menziesii - Abies grandis / Polystichum munitum* (G1/S1; Table 3) were found in Power Station Units 1, 2, 5, and 6. Both plant communities are restricted to the rainshadow of the Olympic Mountains and Vancouver Island, were uncommon historically, and have experienced significant declines (NatureServe, 2024a; NatureServe, 2024b).

Stands of globally imperiled (G2) *Pseudotsuga menziesii / Holodiscus discolor - Rosa gymnocarpa / Festuca occidentalis* (G2G3/S2; Table 3) were found in Power Station Unit 2. This plant community is restricted to the rainshadow of the Olympic Mountains in Washington (NatureServe, 2024c).

Additionally, two globally imperiled (G2) forests, *Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon* (G2/S1S2; Table 3) and *Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor* (G2/S2; Table 3) were found in Power Station Units 2 and 3. These

associations are in the same USNVC Group and occurred in a mosaic on the landscape, so they were mapped and analyzed together as one assessment area. These associations are both matrix forests within their range. The range of *Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon* is restricted to lowland forests within the rainshadow around the Strait of Georgia in British Columbia and the San Juan Islands and rainshadow of the Olympic Mountains in Washington. It is thought to have once been a dominant forest ecosystem within its range (NatureServe, 2024d). *Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor* occurs in the lowlands from Washington to northern Oregon. It is most commonly found in the northern and eastern foothills of the Olympic Mountains (Chappell, 2006).

Table 3. United States National Vegetation Classification (USNVC) hierarchy for globally critically imperiled (G1) and imperiled (G2) plant associations encountered.

1 Forest & Woodland

TT2 Temperate & Boreal Forest & Woodland

TT2.a Temperate Forest & Woodland

TT2.a5 Oceanic Cool Temperate Rainforest

TT2.a5.Na Pacific Coast Temperate Rainforest

M024 Vancouverian Coastal Rainforest

####### G240 North Pacific Maritime Douglas-fir - Western Hemlock Rainforest

######## A3378 Tsuga heterophylla -Pseudotsuga menziesii / Cornus unalaschkensis Mesic Forest Alliance

CEGL002845   Pseudotsuga menziesii – (Abies grandis, Thuja plicata) / Mahonia nervosa -Gaultheria shallon Forest

######## A3379 Tsuga heterophylla -Pseudotsuga menziesii / Holodiscus discolor Dry Forest Alliance

CEGL002848   Pseudotsuga menziesii – Tsuga heterophylla / Gaultheria shallon – Holodiscus discolor Forest

####### G751 North-Central Pacific Western Hemlock -Sitka Spruce Rainforest

######## A3609 Abies grandis – Picea sitchensis -Thuja plicata Rainforest Alliance

CEGL002848   Pseudotsuga menziesii – Abies grandis – Thuja plicata / Mahonia nervosa -Gaultheria shallon Forest

TT2.a6 Temperate Conifer Forest & Woodland

TT2.a6.Nc Pacific Mountains Forest and Woodland

M886 Southern Vancouverian Dry Foothill Forest & Woodland

####### G800 Southern Vancouverian Dry Douglas fir – Madrone Woodland

######## A3716 Pseudotsuga menziesii - Abies grandis – Arbutus menziesii Forest & Woodland Alliance

CEGL002848   Pseudotsuga menziesii / Holodiscus discolor – Rosa gymnocarpa / Festuca occidentalis Forest

EIA Results

Sale units and adjacent areas were assessed and then aggregated into potential EOs using standard EIA methodology. Results are below.

Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum Forests

These stands received an 'A+' (3.83) for Condition and a 'C+' (2.22) for Landscape Context. The overall size of the documented stands is approximately 84 acres (consisting of multiple, smaller individual patches) and the largest single contiguous patch is approximately 72 acres—resulting in a size rank of 'B' (3.0) for this large-patch type. The overall EO Rank of 'B+' (3.44) meets the EO criteria for a G1/S1 community (Table 1). A complete EIA score breakdown may be found in Appendix A, Table A-1.

Thuja plicata - Abies grandis / Polystichum munitum Forests

These stands received an 'A-' (3.66) for Condition and a 'C+' (2.22) for Landscape Context. The overall size of the documented stands is approximately 23 acres (consisting of multiple, smaller individual patches) and the largest single contiguous patch covers approximately 11 acres—resulting in a size rank of 'C' (1.0) for this large-patch type. The overall EO Rank of 'C+' (2.35) meets the EO criteria for a G1/S1 community (Table 1). A complete EIA score breakdown may be found in Appendix A, Table A-2.

Pseudotsuga menziesii / Holodiscus discolor – Rosa gymnocarpa / Festuca occidentalis Forests

These stands received an 'A-' (3.51) for Condition and a 'B-' (2.61) for Landscape Context. The overall size of the documented stands is approximately 5 acres (consisting of two smaller individual patches) and the largest single contiguous patch is approximately 3 acres, resulting in a size rank of 'D' (1.0) for this large-patch type. The overall EO Rank of 'C+' (2.11) meets the EO criteria for a G2/S2 community (Table 1). A complete EIA score breakdown may be found in Appendix A, Table A-3.

Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon and *Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor* Forests

These stands were evaluated as one assessment area and together received a 'B+' (3.32) for Condition and a 'C+' (2.33) for Landscape Context. The overall size of the documented stands is approximately 17 acres (consisting of multiple, smaller individual patches fragmented by roads) and the largest single continuous patch is approximately 10 acres. This resulted in a comparative size rank of 'D' (1.0) for these matrix types, which lowered the overall EO Rank (Table A-7) to a 'D' (1.37). Note that stand size is weighted more heavily for "matrix" forest types. The overall EO Rank of 'D' does not meet the EO criteria for a G2/S2 community (Table 1). A complete EIA score breakdown may be found in Appendix A, Table A-4.

Conclusion

The stands of *Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum* Forest (G1/S1), *Thuja plicata - Abies grandis / Polystichum munitum* Forest (G1/S1), and *Pseudotsuga menziesii / Holodiscus discolor – Rosa gymnocarpa / Festuca occidentalis* Forest (G2G3/S2) found in and adjacent to the Power Station sale represent new element occurrences. Stands *Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon* Forest (G2/S1S2) and *Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor* Forest (G2/S2) did not meet EO criteria.

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Appendix A: Ecological Integrity Assessment (EIA) Calculations

Ecological integrity varied somewhat over portions of fragmented Assessment Areas (AAs). The table below presents the range of metric ranks and major ecological factors, followed by the weighted average of primary factors, EIA scores, and the overall EO rank.

Table A- 1. EIA Calculations for *Thuja plicata - Pseudotsuga menziesii - Abies grandis / Mahonia nervosa / Polystichum munitum* stands in Power Station timber sales.

Roll-up Calculations	Rating	Score	Comments
LAN1. Contiguous Natural Land Cover	C	2	Each unit is between 20-60% (C). Weighted average 35%. Numerous fragmenting roads.
LAN2. Land Use Index	C	2	LUI = 5.91; primarily timberland in various stages of regeneration with some land use conversion to rural home development.
LAN MEF Score = (LAN1+LAN2)/2	C+	2.00	
EDG1. Perimeter with Natural Edge	C	2	Weighted average is a C but varied from 25-75% (C) to 100% (A).
EDG2. Width of Natural Edge	C	2	Weighted average is a C but values included 25-75m (C), 75-95m (B), and 100m (A).
EDG3. Condition of Natural Edge	B	3	Surroundings are mostly logged areas that include a wide range of logging practices (clearcut, thinning, select cut) and a range of stages of regeneration. There is one recent clear cut.
EDG MEF Score = $(((EDG1*EDG2)^{1/2}*EDG3)^{1/2}$ [Note: ½ exponent = square root]	C+	2.45	
LANDSCAPE CONTEXT PRIMARY FACTOR SCORE = (EDG Score*0.67)+(LAN Score*0.33)	Large		
Matrix = (EDG Score*0.33)+(LAN Score*0.67) Large-Patch = (EDG Score*0.50)+(LAN Score*0.50) Small-Patch = (EDG Score*0.67)+(LAN Score*0.33)	C+	2.22	
VEG1. Native Plant Species Cover	A	4	Weighted average is A (4). Values ranged from A to A-.
VEG2. Invasive Nonnative Plant Species Cover	A	4	Within some units, trace cover of *Ilex aquifolium, Geranium robertianum* and *Hedera hibernica*.
VEG3. Native Plant Species Composition	A	4	Increasers in north end of Unit 1 where windthrow (likely due to root rot combined with edge exposure from adjacent logging).

VEG4. Vegetation Structure	B	3	Most of this AA was selectively logged for best (straight grain) *Pseudotsuga menziesii,* but there are unlogged portions. Stand development in proposed units is Maturation 2, but there is a patch of unlogged old growth excluded from the sale (Van Pelt 2007). Proposed sale area in and adjacent to Unit 4 has been assessed by old growth specialist.
VEG5. Woody Regeneration	A	4	Appears to be natural regeneration. Minimal regeneration, which is within natural range of variability (NRV) for stand development phase.
VEG6. Coarse Woody Debris	A	4	Selective logging likely reduced both CWD and snags, but CWD and snags are still within NRV in Maturation 2. In Old growth and unlogged portions, there is a good range of size and decay class for both CWD and snags. CWD in logged areas was a B, in unlogged areas it was an A. Snags were an A throughout.
VEG MEF Score = (VEG4+VEG6)/2*0.7+(VEG1+VEG2+VEG3+VEG5)/4*0.3	A+	3.80	
SOI1. Soil Condition	A	4	Minimal signs of soil disturbance in most areas despite prior logging. Mountain & dirt bike trails in Unit 4. Old logging roads in Unit 4.
SOI MEF Score = SOI1	A+	4.00	
CONDITION PRIMARY FACTOR SCORE = (VEG Score*0.85)+(SOI Score*0.15)	A+	3.83	
ECOLOGICAL INTEGRITY (EIA) SCORE Matrix/Large-Patch = (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45) Small-Patch = (CONDITION SCORE*0.7)+(LANDSCAPE CONTEXT SCORE*0.3)	B+	3.11	
SIZ1. Comparative Size	B	3	Total mapped area = ~84 acres (B); Largest contiguous patch = ~72 acres (B).
SIZ2. Change in Size (optional)	Not Scored		Original stand extent not known at this time.
SIZ MEF Score = SIZ1 OR (SIZ1+SIZ2)/2	B	3.0	
SIZE Points		0.33	Large patch

CALCULATED EO RANK = EIA Score + SIZE Points	B+	3.44	
ASSIGNED EO RANK	B+		

Table A- 2. EIA Calculations for *Thuja plicata - Abies grandis / Polystichum munitum* stands in Power Station timber sales.

Roll-up Calculations	Rating	Score	Comments
LAN1. Contiguous Natural Land Cover	C	2	Varied from <20% (D) to 20-60% (C). Numerous fragmenting roads.
LAN2. Land Use Index	C	2	LUI = 6.61; primarily timberland in various stages of regeneration and some land use conversion to rural home development
LAN MEF Score = (LAN1+LAN2)/2	C+	2.00	
EDG1. Perimeter with Natural Edge	C	2	Weighted average is a C but values included 20-60% (C) and 100% (A)
EDG2. Width of Natural Edge	C	2	Weighted average is a C but values included <25 m (D) and 25-75 m (C).
EDG3. Condition of Natural Edge	B	3	Surroundings are mostly logged areas that include a range of logging practices (clearcut, thinning, selective logging) and a range of stages of regeneration.
EDG MEF Score = $(((EDG1*EDG2)^{1/2})*EDG3)^{1/2}$ [Note: ½ exponent = square root]	C+	2.45	
LANDSCAPE CONTEXT PRIMARY FACTOR SCORE = (EDG Score*0.67)+(LAN Score*0.33)	Large		
Matrix = (EDG Score*0.33)+(LAN Score*0.67) Large-Patch = (EDG Score*0.50)+(LAN Score*0.50) Small-Patch = (EDG Score*0.67)+(LAN Score*0.33)	C+	2.22	
VEG1. Native Plant Species Cover	A	4	Weighted average is A. Values ranged from A to B.
VEG2. Invasive Nonnative Plant Species Cover	A	4	Weighted average is A. One small patch had 1-4% *Geranium robertianum* and 1% *Ilex aquifolium*. Trace cover of these species elsewhere.
VEG3. Native Plant Species Composition	A	4	Increasers near road and in disturbed, compacted soils in western units. In one small patch, the understory was so altered by the presence of *Symphoricarpos alba* in

			compacted soils that it was hard to key. Over submetrics in all units it is still an A.
VEG4. Vegetation Structure	B	3	Some reduction in large trees due to logging. All of the AA was selectively logged for straight grain *Pseudotsuga menziesii* at one point in time, but there are still pockets of old trees, especially in eastern portions. Eastern portions also had recent tree poaching of very large trees (mostly *Thuja plicata*). Stand development is Maturation 2 (Van Pelt 2007). Proposed sale area in Unit 5 has been assessed by old growth specialist.
VEG5. Woody Regeneration	A	4	Appears to be natural regeneration. Minimal regeneration, which is within NRV for stand development phase.
VEG6. Coarse Woody Debris	B	3	Selective logging and tree poaching likely reduced CWD and snags. These stands lightly logged, so impacts are minimal to moderate.
VEG MEF Score = (VEG4+VEG6)/2*0.7+(VEG1+VEG2+VEG3+VEG5)/4*0.3	A-	3.6	
SOI1. Soil Condition	A	4	Minimal signs of soil disturbance in most areas despite prior logging. Mountain & dirt bike trails in western stands. Old logging roads in eastern units. Parts of eastern units show signs of heavy soil compaction and are probably a B for soils.
SOI MEF Score = SOI1	A+	4	
CONDITION PRIMARY FACTOR SCORE = (VEG Score*0.85)+(SOI Score*0.15)	A-	3.66	
ECOLOGICAL INTEGRITY (EIA) SCORE Matrix/Large-Patch = (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45) Small-Patch = (CONDITION SCORE*0.7)+(LANDSCAPE CONTEXT SCORE*0.3)	B+	3.01	
SIZ1. Comparative Size	CD	1.5	Total mapped area = ~23 (C); Largest contiguous patch = ~11 acres (D).
SIZ2. Change in Size (optional)	Not Scored		Original stand extent not known at this time.

SIZ MEF Score = SIZ1 OR (SIZ1+SIZ2)/2	C	1.5	
SIZE Points		-0.67	Large patch
CALCULATED EO RANK = EIA Score + SIZE Points	C+	2.35	
ASSIGNED EO RANK	C+		

Table A- 3. EIA Calculations for *Pseudotsuga menziesii / Holodiscus discolor – Rosa gymnocarpa / Festuca occidentalis* stands in Power Station timber sales.

Roll-up Calculations	Rating	Score	Comments
LAN1. Contiguous Natural Land Cover	C	2	Weighted average is a C. All values between 20-60% (C).
LAN2. Land Use Index	C	2	LUI = 6.16; primarily timberland in various stages of regeneration with some open pit mining and land use conversion to rural home development.
LAN MEF Score = (LAN1+LAN2)/2	C+	2.00	
EDG1. Perimeter with Natural Edge	A	4	All units have 100% natural edge.
EDG2. Width of Natural Edge	B	3	Weighted average is a B. Values included were 25-75m (C) and 75-99m (B).
EDG3. Condition of Natural Edge	B	3	Surroundings are mostly logged areas that include a range of logging practices (clearcut, thinning, selective logging) and a range of stages of regeneration.
EDG MEF Score = $(((EDG1*EDG2)^{1/2})*EDG3)^{1/2}$ [Note: ½ exponent = square root]	B+	3.22	
LANDSCAPE CONTEXT PRIMARY FACTOR SCORE = (EDG Score*0.67)+(LAN Score*0.33)	Large		
Matrix = (EDG Score*0.33)+(LAN Score*0.67) Large-Patch = (EDG Score*0.50)+(LAN Score*0.50) Small-Patch = (EDG Score*0.67)+(LAN Score*0.33)	B-	2.61	
VEG1. Native Plant Species Cover	A	4	>99% relative native cover.
VEG2. Invasive Nonnative Plant Species Cover	A	4	Trace *Leucanthemum vulgare*, *Ranunculus repens*, *Cirsium vulgare* along dirt bike trail.
VEG3. Native Plant Species Composition	A	4	Increasers present along old roads, trails.
VEG4. Vegetation Structure	B	3	At one point in time selectively logged for straight grained *Pseudotsuga menziesii*. Trees are smaller diameter here

			than in adjacent stands, likely due to growing conditions (thin, rocky soils). Stand development stage is Maturation 2.
VEG5. Woody Regeneration	A	4	Appears to be natural regeneration. Minimal regeneration, which is within NRV for stand development phase.
VEG6. Coarse Woody Debris	B	3	Very few snags and CWD, may be somewhat reduced by logging, but also naturally low in Maturation 2 stands.
VEG MEF Score = (VEG4+VEG6)/2*0.7+(VEG1+VEG2+VEG3+VEG5)/4*0.3	A-	3.60	
SOI1. Soil Condition	B	3	Many dirt bike and hiking trails in a relatively small area with thin, sensitive soils.
SOI MEF Score = SOI1	B+	3.00	
CONDITION PRIMARY FACTOR SCORE = (VEG Score*0.85)+(SOI Score*0.15)	A-	3.51	
ECOLOGICAL INTEGRITY (EIA) SCORE Matrix/Large-Patch = (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45) Small-Patch = (CONDITION SCORE*0.7)+(LANDSCAPE CONTEXT SCORE*0.3)	B+	3.11	
SIZ1. Comparative Size	D	1	Total mapped area = ~5 acres (D); Largest contiguous patch = ~3 acres (D).
SIZ2. Change in Size (optional)	Not Scored		Original stand extent not known at this time.
SIZ MEF Score = SIZ1 OR (SIZ1+SIZ2)/2	D	1.0	
SIZE Points		-1.0	Large patch
CALCULATED EO RANK = EIA Score + SIZE Points	C+	2.11	
ASSIGNED EO RANK	C+		

Table A- 4. EIA Calculations for *Pseudotsuga menziesii - (Abies grandis, Thuja plicata) / Mahonia nervosa - Gaultheria shallon and Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon - Holodiscus discolor* stands in Power Station timber sales.

Roll-up Calculations	Rating	Score	Comments
LAN1. Contiguous Natural Land Cover	C	2	Weighted average is a C. All values between 20-60% (C). Numerous fragmenting roads.
LAN2. Land Use Index	C	2	LUI = 6.16; primarily timberland in various stages of regeneration.
LAN MEF Score = (LAN1+LAN2)/2	C+	2.00	
EDG1. Perimeter with Natural Edge	B	3	Weighted average is a B but values ranged from 25-75% (C) to 75-95% (B)
EDG2. Width of Natural Edge	B	3	Weighted average is a B but values ranged from 25-75m (C) to 75-99m (B).
EDG3. Condition of Natural Edge	B	3	Surroundings are mostly logged areas that include a range of logging practices (clearcut, thinning, selective logging) and a range of stages of regeneration.
EDG MEF Score = (((EDG1*EDG2)$^{1/2}$)*EDG3)$^{1/2}$ [Note: ½ exponent = square root]	B+	3.00	
LANDSCAPE CONTEXT PRIMARY FACTOR SCORE = (EDG Score*0.67)+(LAN Score*0.33)	Matrix		
Matrix = (EDG Score*0.33)+(LAN Score*0.67) Large-Patch = (EDG Score*0.50)+(LAN Score*0.50) Small-Patch = (EDG Score*0.67)+(LAN Score*0.33)	C+	2.33	
VEG1. Native Plant Species Cover	A	4	Weighted average is A. Values ranged from A to A-.
VEG2. Invasive Nonnative Plant Species Cover	A	4	Trace *Leucanthemum vulgare* found along road in eastern unit.
VEG3. Native Plant Species Composition	A	4	*Mahonia nervosa* usually prominent but not here. Herb layer is characteristically sparse. Increasers in windthrow area (caused by root rot and edge effect), along old logging roads, and along edge with adjacent cuts.
VEG4. Vegetation Structure	C	2	Stand development phase is Maturation 2 (Van Pelt 2007). Selectively logged for best *Pseudotsuga menziesii*. Windthrow area has moderately altered canopy structure and a reduction in large, live trees. Small pockets of old trees in other areas.
VEG5. Woody Regeneration	A	4	No planted trees. Minimal regeneration, which is within NRV for stand development phase. Dense shrub cover, which is characteristic for these stands, likely inhibits tree regeneration

VEG6. Coarse Woody Debris	B	3	Increased CWD due to windthrow in large portion of stand. Snags are also likely reduced in this area.
VEG MEF Score = (VEG4+VEG6)/2*0.7+(VEG1+VEG2+VEG3+VEG5)/4*0.3	B+	3.20	
SOI1. Soil Condition	A	4	Old logging roads present.
SOI MEF Score = SOI1	A+	4.00	
CONDITION PRIMARY FACTOR SCORE = (VEG Score*0.85)+(SOI Score*0.15)	B+	3.32	
ECOLOGICAL INTEGRITY (EIA) SCORE Matrix/Large-Patch = (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45) Small-Patch = (CONDITION SCORE*0.7)+(LANDSCAPE CONTEXT SCORE*0.3)	B-	2.87	
SIZ1. Comparative Size	D	1	Total mapped area = ~17 acres (C); Largest contiguous patch = ~10 acres (D).
SIZ2. Change in Size (optional)	Not Scored		Original stand extent not known at this time.
SIZ MEF Score = SIZ1 OR (SIZ1+SIZ2)/2	D	1.0	
SIZE Points		-1.50	Matrix
CALCULATED EO RANK = EIA Score + SIZE Points	D	1.37	
ASSIGNED EO RANK	D		

Table A- 5. Metric Rank / Score Conversions.

Rank	A	A-	B	C	C-	D
Score	4	3.5	3	2	1.5	1

Table A- 6. Score / Rank Conversions for MEF, EIA, and EORANK calculations.

Rank	A+	A-	B+	B-	C+	C-	D
Score	3.8 - 4.00	3.5 - 3.79	3.0 - 3.49	2.5 - 2.99	2.0 - 2.49	1.5 - 1.99	1 - 1.49

Table A- 7. Point Contribution of Size Primary Factor Score.

Size Primary Factor Rating	Very Small/Small Patch	Large Patch	Matrix
A = Size meets A ranked rating	+ 0.75	+ 1.0	+1.5
B = Size meets B ranked rating	+ 0.25	+ 0.33	+0.5
C = Size meets C ranked rating	- 0.25	- 0.33	-0.5
D = Size meets D ranked rating	- 0.75	-1.0	-1.5