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February 6, 2024

Joshua Wright
Legacy Forest Defense Coalition
P.O. Box 715
Tacoma, WA 98417
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RE: Firvana timber sale #30-105262

Dear Mr. Wright,

Thank you for providing your October 31, 2023 letter concerning observation of the plant community *Pseudotsuga menziesii – Tsuga heterophylla* / *Rhododendron macrophyllum – Vaccinium ovatum* Forest (CEGL002615), ranked G2/S2 according to NatureServe within the planned Firvana Timber Sale.

In consideration of your information, DNR requested Washington Natural Heritage Program (WNHP) to survey the Firvana proposal and surrounding areas.

The WNHP surveyed the Firvana proposal area and other areas planned for future management in December 2023 and January 2024 to classify the forest plant association(s) present, assess whether those forest stands met the criteria of an element occurrence, and determine an Ecological Integrity Assessment (EIA). WNHP confirmed the presence of the *Pseudotsuga menziesii – Tsuga heterophylla* / *Rhododendron macrophyllum – Vaccinium ovatum* Forest (G2/S2) and *Pseudotsuga menziesii – Tsuga heterophylla* / *Vaccinium ovatum* Forest (G2/S2) in several areas within the Green Mountain State Forest. Attached is the associated report from WNHP. DNR will consider this information in future management decisions.

Sincerely,

Don Melton

Don Melton
South Puget Sound Region Manager

Enclosure

c: Region File No. 30-105262
Olympia File No. 30-105262

WASHINGTON NATURAL HERITAGE PROGRAM SITE SURVEY

Firvana, Breaking Bud, Hurd Rumors, and Green FY22 Timber Sales

January 2024

Tynan Ramm-Granberg
Lead Vegetation Ecologist

Executive Summary

The purpose of this inventory effort was to survey several timber sales in the Green Mountain and Tahuya State Forests for element occurrences (EOs) of globally critically imperiled or imperiled (i.e., G1 or G2) plant communities. Neighboring areas on Department of Natural Resources (DNR) property outside the timber sale units were also observed. Natural Heritage Methodology was used to identify plant associations and assess their ecological integrity. The site visits occurred in mid-December 2023, with follow-up visits in early January 2024. Stands of *Pseudotsuga menziesii - Tsuga heterophylla / Rhododendron macrophyllum - Vaccinium ovatum* Forest (G2/S2) and *Pseudotsuga menziesii - Tsuga heterophylla / Vaccinium ovatum* Forest (G2/S2) were found in portions of the Firvana, Breaking Bud, and Green FY22 unit 1 in the Green Mountain State Forest. They were also mapped in Hurd Rumors and other planned harvests in the Tahuya State Forest. Newly mapped G2 stands in the Firvana, Breaking Bud, and Green FY22 timber sales (Green Mountain State Forest) are being added to existing EOs in the area. Newly mapped G2 stands in the Hurd Rumors timber sale and adjacent areas (Tahuya State Forest) were neither of high enough ecological integrity nor extensive enough to clear the threshold necessary for an EO.

Introduction

In mid-December 2023 and early January 2024, Tynan Ramm-Granberg surveyed the Firvana, Breaking Bud, Hurd Rumors, and Green FY22 timber sales for critically imperiled and imperiled ecosystems. Neighboring Department of Natural Resources (DNR) parcels were also surveyed. When critically imperiled or imperiled ecosystems were encountered, Ecological Integrity Assessments (EIA) were performed to determine the overall conservation value of the stand. These surveys were conducted at the request of the DNR South Puget Sound Region Manager. Surveys occurred in the Green Mountain and Tahuya State Forests and results will be presented separately for the two forests.

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) (Table 1, 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.

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="4">Element Conservation Status Rank</th></tr>
<tr><th rowspan="2">EORANK</th><th>Global Rank</th><th rowspan="2">G1S1, G2S1, GNRS1, GUS1</th><th rowspan="2">G2S2, GNRS2, G3S1, G3S2, GUS2</th><th rowspan="2">GUS3, GNRS3, G3S3, G4S1, G4S2, G5S1, G5S2, any SNR</th><th rowspan="2">G4S3, G4S4, G5S3, G5S4, G5S5, GNRS4, GNRS5, GUS4, GUS5</th></tr>
<tr><th>State Rank</th></tr>
<tr><td colspan="2">A+ (3.8 to 4.0)</td><td>EO</td><td>EO</td><td>EO</td><td>EO</td></tr>
<tr><td colspan="2">A- (3.5 to 3.79)</td><td>EO</td><td>EO</td><td>EO</td><td>EO</td></tr>
<tr><td colspan="2">B+ (3.0 to 3.49)</td><td>EO</td><td>EO</td><td>EO</td><td rowspan="4">Not an Element Occurrence</td></tr>
<tr><td colspan="2">B- (2.5 to 2.99)</td><td>EO</td><td>EO</td><td>EO</td></tr>
<tr><td colspan="2">C+ (2.0 to 2.49)</td><td>EO</td><td>EO</td><td rowspan="2">Not an Element Occurrence</td></tr>
<tr><td colspan="2">C- (1.5 to 1.99)</td><td>EO</td><td rowspan="2">Not an Element Occurrence</td></tr>
<tr><td colspan="2">D (1.0 to 1.49)</td><td>EO</td></tr>
</table>

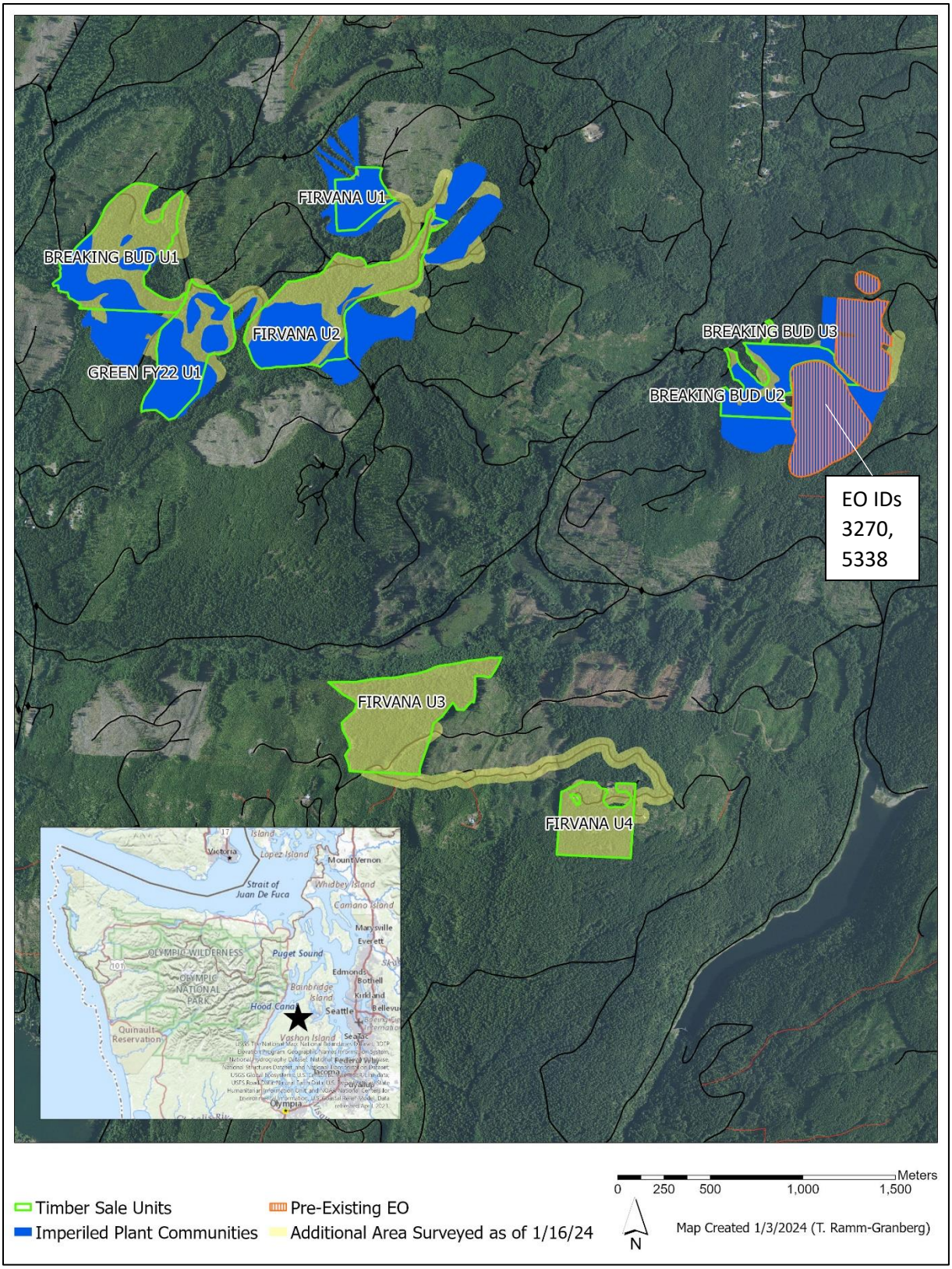

Figure 1. Surveys in and around Green Mountain State Forest. EO ID 5338 also includes ~200 acres of *Pseudotsuga menziesii - Tsuga heterophylla / Rhododendron macrophyllum - Vaccinium ovatum* Forest on private land to the NE.

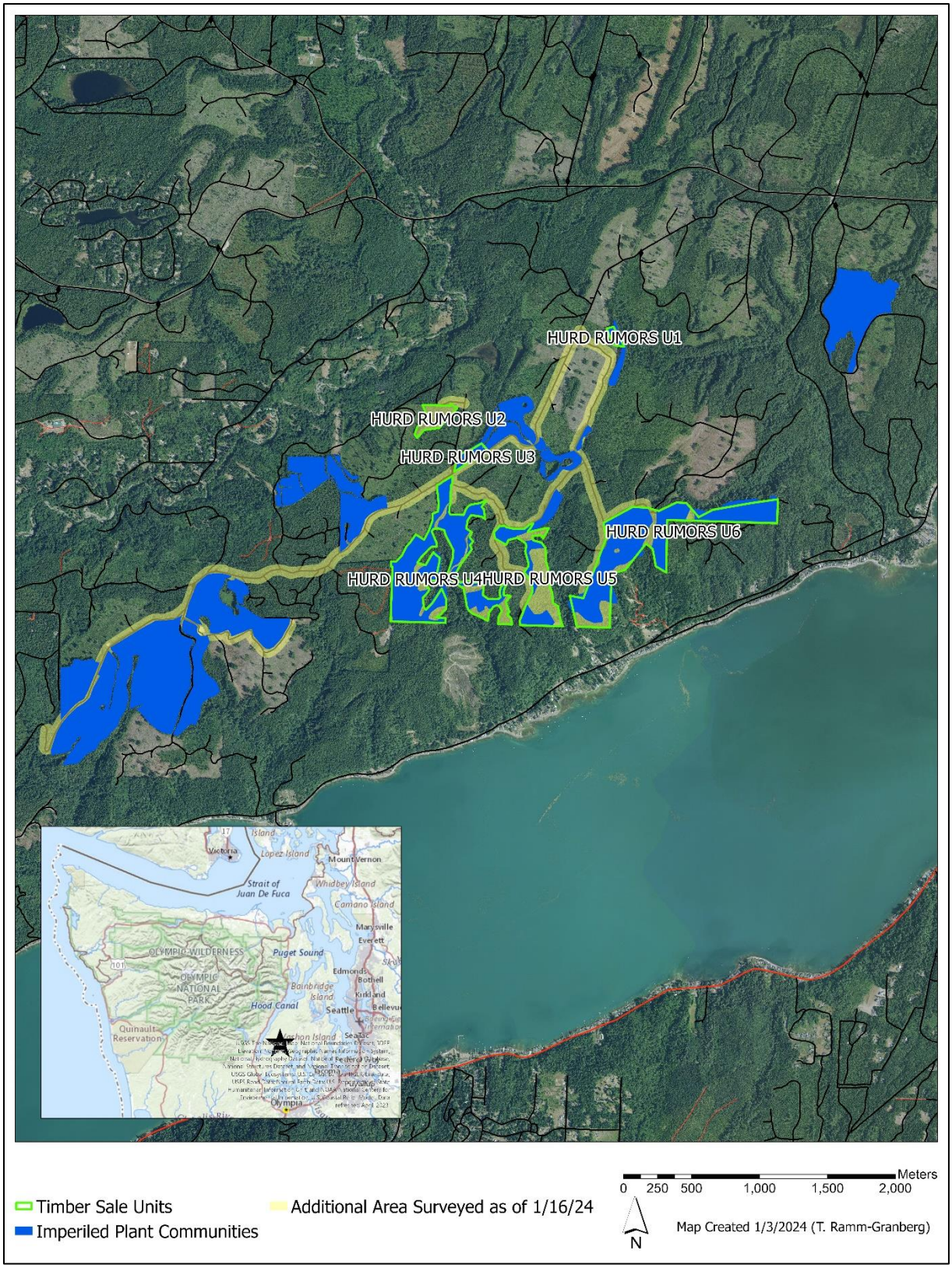

Figure 2. Surveys in and around Tahuya State Forest.

Results

G1 & G2 Plant Associations

Stands of *Pseudotsuga menziesii - Tsuga heterophylla / Rhododendron macrophyllum - Vaccinium ovatum* Forest (G2/S2; Table 2) and *Pseudotsuga menziesii - Tsuga heterophylla / Vaccinium ovatum* Forest (G2/S2; Table 2) were found in Firvana units 1 and 2, Breaking Bud units 1 and 2, Green FY22 unit 1, and Hurd Rumors units 1, 3, 4, 5, and 6. Additional stands were found on surrounding DNR parcels, combining to cover >1,000 acres. For practicality, these two closely related plant communities were mapped together. Both communities are locally common on the Kitsap Peninsula, but globally restricted to the central to northern Puget Lowlands of Washington (Kitsap, Island, Clallam, Jefferson, Mason counties).

Table 2. United States National Vegetation Classification (USNVC) hierarchy for globally imperiled plant (G2/S2) associations encountered.

1 Forest & Woodland

1.B Temperate & Boreal Forest & Woodland

1.B.2 Cool Temperate Forest & Woodland

1.B.2.Nd Vancouverian Forest & Woodland

M024 Vancouverian Lowland & Montane Forest

G240 North Pacific Maritime Douglas-fir - Western Hemlock Forest

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

CEGL002615	Pseudotsuga menziesii - Tsuga heterophylla / Rhododendron macrophyllum - Vaccinium ovatum Forest
CEGL002614	Pseudotsuga menziesii - Tsuga heterophylla / Vaccinium ovatum Forest

EIA Results

Sale units and neighboring parcels were assessed and then aggregated into potential EOs using standard EIA methodology. Assessment areas were split between Green Mountain (Firvana, Breaking Bud, and Green FY22) and Tahuya State Forests (Hurd Rumors and miscellaneous other stands that overlap with planned harvests). Results are presented below.

Firvana, Breaking Bud, and Green FY22 Timber Sales (Green Mountain State Forest)

Importantly, mapped stands of G2 plant communities at Green Mountain were near or adjacent to existing EOs representing the same communities. Those EOs were documented in the mid to late 1990s and represent apparently unlogged, naturally regenerated stands. Existing EOs were revisited and reassessed at the same time as the timber sale surveys. Scores for all timber sale units and existing EOs were then integrated via a simple weighted average.

On their own, newly mapped stands from the timber sale surveys received a ‘B-‘ (2.83) for Condition and ‘C+’ for Landscape Context (2.03). Newly mapped stands totaled ~257 acres and the largest patch was ~93 acres, resulting in a size rank of ‘CD’ (1.50) and an overall calculated EO Rank of ‘D’ (1.47). Those stands

would not clear the threshold for an EO on their own. As noted above, however, the newly mapped stands were assessed along with the existing EOs in the area, following standard Natural Heritage separation distance guidelines (NatureServe, 2002).

When assessed along with the existing EOs, the Condition rank moves to 'B+' (3.43) and Landscape Context remains 'C+' (2.39). The overall size of the documented stands totals ~533 acres (consisting of multiple, smaller individual patches) and the largest single patch covers ~191 acres—resulting in a size rank of 'CD' (1.50) and an overall calculated EO Rank of 'C-' (1.97). The assigned EO Rank was rounded up to a 'C+' (as allowed in EIA methodology) because of the important core areas of unlogged forest and the known existence of other G2 stands in the area that were not mapped or assessed as part of this effort. That rank meets the EO criteria for a G2/S2 community (Table 1) and the existing EOs will be expanded to incorporate the newly mapped stands that overlap with the Firvana, Breaking Bud, and Green FY22 sales. Expanding the size improves the long-term viability and conservation significance of these EOs. A complete EIA score breakdown may be found in Appendix A, Table A-1.

Hurd Rumors Timber Sale & Adjacent Areas (Tahuya State Forest)

G2 plant communities mapped in Hurd Rumors units 1, 3, 4, 5, and 6—and in portions of adjacent planned harvests—are located far enough from any existing EOs that these stands were assessed on their own as a potential new EO . These stands received a 'C+' for Condition (2.47) and 'C-' for Landscape Context (1.98). Area totaled ~543 acres (C) and the largest patch reached ~166 acres (D), bringing the calculated EO Rank down to a 'D' (1.25). This does not meet the threshold needed to be considered an EO. A complete EIA score breakdown may be found in Appendix A, Table A-2

Conclusion

The stands of *Pseudotsuga menziesii - Tsuga heterophylla / Rhododendron macrophyllum - Vaccinium ovatum* Forest (G2/S2) and *Pseudotsuga menziesii - Tsuga heterophylla / Vaccinium ovatum* Forest (G2/S2) found in Firvana units 1 and 2, Breaking Bud units 1 and 2, and Green FY22 unit 1 were added to existing element occurrences (EO IDs 3270 and 5338). These same forest types were also mapped in Hurd Rumors units 1, 3, 4, 5, and 6, as well as other planned harvests in the Tahuya State Forest but these stands were neither of high enough ecological integrity nor extensive enough to clear the threshold necessary for an EO.

References

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Appendix A: Ecological Integrity Assessment (EIA) Calculations

Ecological Integrity varied over the timber sale units and neighboring parcels. 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 stands in Firvana, Breaking Bud, and Green FY22 timber sales (Green Mountain State Forest). This includes a revisit and re-assessment of the portions of existing EO IDs 3270 and 5338 that are adjacent to Breaking Bud Unit 2.

Roll-up Calculations	Rating	Score	Comments
LAN1. Contiguous Natural Land Cover	D to C	1 to 2	Varied from <20% to 20-60%. Numerous fragmenting roads.
LAN2. Land Use Index	C	2	LUI = 4.0-7.9; primarily timberland in various stages of regeneration.
LAN MEF Score = (LAN1+LAN2)/2	C- to C+	1.50 to 2.00	
EDG1. Perimeter with Natural Edge	C to A	2 to 4	Varied from 25-75% to 100%.
EDG2. Width of Natural Edge	C	2	All units had average natural edge widths of 25-75m.
EDG3. Condition of Natural Edge	B	3	Extensively logged and areas of OHV recreation, but minimal exotic species away from road edges.
EDG MEF Score = $(((EDG1*EDG2)^{1/2})*EDG3)^{1/2}$ [Note: ½ exponent = square root]	C- to C+	2.45 to 2.91	
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+**	**2.39**	
VEG1. Native Plant Species Cover	A	4	>99% relative native cover in all units. Trace amounts of *Mycelis muralis* in addition to invasives noted in VEG2.
VEG2. Invasive Nonnative Plant Species Cover	A	4	In some units, trace cover of *Ilex aquifolium* and *Geranium robertianum* (within) and *Cytisus scoparius* (on edges).
VEG3. Native Plant Species Composition	B to A	3 to 4	Outside existing EOs: Reduced *Tsuga heterophylla* in some stands due to logging and thinning. Some stands with very little or no *T. heterophylla* due to very young post-harvest stand ages (stem exclusion stage). | Within

			EOs: Little *Tsuga heterophylla*, but may be natural due to the location on a rocky knob.
VEG4. Vegetation Structure	D to A	1 to 4	Outsided existing EOs: Logged and likely burned post-logging. Oldest stands are very early Maturation I stage, many are still late stem exclusion (Van Pelt, 2007). Subcanopy development absent in many stands, but some development in Firvana Unit 1, portions of Breaking Bud 1, and elsewhere. Very little age class diversity. Stumps larger in diameter than any live trees. | Within EOs: Some age class diversity. Mature trees present w/ windblown tops. Apparently unlogged. Site is rocky and growing conditions apparently ideal.
VEG5. Woody Regeneration	B to A	3 to 4	Apparently natural regeneration. Some units with reduced *Tsuga heterophylla* in regeneration, possibly reduced by lack of CWD (nurse logs).
VEG6. Coarse Woody Debris	D to A	1 to 4	Outside existing EOs: Almost no snags. Those present are from current cohort. Minimal size and decay diversity. CWD is nearly all pole-sized and with minimal decay diversity. Almost no visible debris remnants from previous stands aside from stumps. Breaking Bud Unit 1 has more size and decay class diversity of CWD than elsewhere, but still poor. | Within EOs: Some snags present w/ good decay diversity and fair size diversity. Some CWD decay diversity, mostly small. Apparently unlogged though, and may be natural for the relatively poor growing conditions.
VEG MEF Score = (VEG4+VEG6)/2*0.7+(VEG1+VEG2+VEG3+VEG5)/4*0.3	C+ to A+	2.47 to 4.00	
SOI1. Soil Condition	B to A	3 to 4	Skid trails & old roads pervasive in some units. Numerous maintained trails, though small in areal extent.
SOI MEF Score = SOI1	B to A	3 to 4	
CONDITION PRIMARY FACTOR SCORE = (VEG Score*0.85)+(SOI Score*0.15)	B+	3.43	
ECOLOGICAL INTEGRITY (EIA) SCORE Matrix/Large-Patch = (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45)	B-	2.97	

Small-Patch = (CONDITION SCORE*0.7)+(LANDSCAPE CONTEXT SCORE*0.3)			
SIZ1. Comparative Size	CD	1.5	Total mapped area = ~533 acres (C); Largest contiguous patch = ~191 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	CD	1.5	
SIZE Points	CD	-1.0	
CALCULATED EO RANK = EIA Score + SIZE Points	C-	1.97	
ASSIGNED EO RANK	C+		Rounded up to C+ (2.00-2.49) due to core areas of unlogged forest (existing EOs). Additionally, other stands of these G2 plant associations are known to occur nearby—based on roadside observations—but have not been assessed.

Table A-2. EIA Calculations for stands in Hurd Rumors Timber Sale and Adjacent Areas (Tahuya State Forest).

Roll-up Calculations	Rating	Score	Comments
LAN1. Contiguous Natural Land Cover	D to B	1 to 3	Varied from <20% to 60-90%. Numerous fragmenting roads.
LAN2. Land Use Index	C	2	LUI = 4.0-7.9; primarily timberland in various stages of regeneration.
LAN MEF Score = (LAN1+LAN2)/2	C- to B-	1.50 to 2.50	
EDG1. Perimeter with Natural Edge	C to B	2 to 3	Varied from 25-75% to 75-99%.
EDG2. Width of Natural Edge	D to B	1 to 3	Varied from <25m to 75-99m.
EDG3. Condition of Natural Edge	B	3	Extensively logged and areas of OHV recreation, but minimal exotic species away from road edges.
EDG MEF Score = $(((EDG1*EDG2)^{1/2})*EDG3)^{1/2}$ [Note: ½ exponent = square root]	C+ to B+	2.06 to 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)	C-	1.98	

Large-Patch = (EDG Score*0.50)+(LAN Score*0.50) Small-Patch = (EDG Score*0.67)+(LAN Score*0.33)			
VEG1. Native Plant Species Cover	A	4	>99% relative native cover in all units.
VEG2. Invasive Nonnative Plant Species Cover	A- To A	3.5 to 4	In some units, >1% of *Ilex aquifolium* (within) and *Cytisus scoparius* (on edges).
VEG3. Native Plant Species Composition	C to B	2 to 3	Reduced *Tsuga heterophylla* in some stands due to logging and thinning. Some stands with very little or no *T. heterophylla* due to very young post-harvest stand ages (stem exclusion stage). *Alnus rubra* and other soil disturbance increasers in skid trails.
VEG4. Vegetation Structure	D	1	Logged and likely burned post-logging. Oldest stands are very early Maturation I stage, many are still late stem exclusion (Van Pelt, 2007). Subcanopy development absent in many stands. A few remnant mature trees observed, particularly in Hurd Rumors 3 and 6, but very little age class diversity overall. Stumps larger in diameter than any live trees.
VEG5. Woody Regeneration	C to B	2 to 3	Older stands have apparently natural regeneration. Some units with reduced *Tsuga heterophylla* in regeneration, possibly reduced by lack of CWD (nurse logs). Younger stem exclusion stands may have been planted. These have very little *Tsuga heterophylla* establishment at this time.
VEG6. Coarse Woody Debris	D	1	Almost no snags. Those present are from current cohort. Minimal size and decay diversity. CWD is nearly all pole-sized and with minimal decay diversity. Almost no visible debris remnants from previous stands aside from stumps.
VEG MEF Score = (VEG4+VEG6)/2*0.7+(VEG1+VEG2+VEG3+VEG5)/4*0.3	C+	2.07 to 2.47	
SOI1. Soil Condition	B to A	3 to 4	Skid trails & old roads pervasive in some units. Maintained trails are small in areal extent and impact.
SOI MEF Score = SOI1	B to A	3 to 4	
CONDITION PRIMARY FACTOR SCORE = (VEG Score*0.85)+(SOI Score*0.15)	**C+**	**2.47**	
ECOLOGICAL INTEGRITY (EIA) SCORE	**C+**	**2.25**	

Matrix/Large-Patch = (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45) Small-Patch = (CONDITION SCORE*0.7)+(LANDSCAPE CONTEXT SCORE*0.3)			
SIZ1. Comparative Size	CD	1.5	Total mapped area = ~543 acres (C); Largest contiguous patch = ~166 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	CD	1.5	
SIZE Points	CD	-1.0	
CALCULATED EO RANK = EIA Score + SIZE Points	D	1.25	
ASSIGNED EO RANK	D		

Table A-3. Metric Rank / Score Conversions

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

Table A-4. 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-5. 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