



Adapting Ecological Integrity Assessment Protocols for Monitoring Columbia Land Trust Conservation Properties

Prepared for
Columbia Land Trust

Prepared by
F. Joseph Rocchio and Tynan Ramm-Granberg
June 30, 2019



Adapting Ecological Integrity Assessment Protocols for Monitoring Columbia Land Trust Conservation Properties

Washington Natural Heritage Program Report Number: 2019-03

June 30, 2019

Prepared by:

F. Joseph Rocchio and Tynan Ramm-Granberg

Washington Department of Natural Resources, Natural Heritage Program
Olympia, WA

ON THE COVER: Oregon White Oak / Idaho Fescue Woodland at Logging Camp
Photograph by: Joe Rocchio

Table of Contents

	Page
Table of Contents	ii
Tables	iii
Figures.....	iv
Acknowledgments.....	v
1 Introduction.....	6
1.1 Project Objectives.....	7
1.2 Project Scope	8
2.0 Methods.....	10
2.1 EIA Overview	10
2.2 Refining Upland EIA Metrics and Manual.....	17
2.3 Modifications of EIA to Support Columbia Land Trust Objectives.....	17
2.4 EIA Field Work	18
2.5 Data Analysis and Storage.....	19
3.0 Results/Discussion	23
3.1 Refined Upland EIAs.....	23
3.2 EIA Results	23
3.3 Site Summaries	24
4.0 Lessons Learned.....	45
Literature Cited	46
Appendix A. EIA Metric Ranks.....	49

Tables

Table 1. Wetland and Riparian EIA Metrics	11
Table 2. Upland EIA Metrics.....	14
Table 3. Determining WNHP Element Occurrences	19
Table 4. Polygons with EIA Scores	23
Table 5. EIA Summary for Atfalati Prairie Polygons.....	24
Table 6. EIA Summary for Barlow Trail Polygons	25
Table 7. EIA Summary for Chinook River Polygons.....	26
Table 8. EIA Summary for Devil’s Elbow Marsh and Spruce Swamp Polygons	26
Table 9. Polygons Meeting Element Occurrence Criteria at Devil’s Elbow Marsh and Spruce Swamp.....	27
Table 10. EIA Summary for Four Sisters Polygons	27
Table 11. EIA Summary for Germany Creek Riparian Polygons	27
Table 12. EIA Summary for Kerry Island Polygons.....	28
Table 13. EIA Summary for Klickitat Canyon South Polygons.....	29
Table 14. Polygons Meeting Element Occurrence Criteria at Klickitat Canyon South.....	33
Table 15. EIA Summary for Logging Camp Polygons.....	34
Table 16. Polygons Meeting Element Occurrence Criteria at Logging Camp	35
Table 17. EIA Summary for Lower Elochoman Forest Polygons	36
Table 18. EIA Summary for Margerum Ranch Polygons.....	37
Table 19. Polygons Meeting Element Occurrence Criteria at Margerum Ranch	38
Table 20. EIA Summary for Mill Creek Ridge Polygons.....	39
Table 21. Polygons Meeting Element Occurrence Criteria at Mill Creek Ridge	39
Table 22. EIA Summary for North Nemah Polygons.....	40
Table 23. EIA Summary for Pierce Island Polygons.....	40
Table 24. EIA Summary for Rainbow Farm Polygons.....	41
Table 25. EIA Summary for Rock Creek Polygons.....	41
Table 26. EIA Summary for Secret River Polygons.....	42
Table 27. Polygons Meeting Element Occurrence Criteria at Secret River	42
Table 28. EIA Summary for Stordahl Polygons	42
Table 29. EIA Summary for Wallacut River Confluence Polygons.....	43
Table 30. EIA Summary for Youngs Wetland Polygons.....	44

Figures

Figure 1. Project Scope 9

Figure 2. Columbia Land Trust Conservation Properties Assessed for this Project (downstream of Longview, WA) 20

Figure 3. Columbia Land Trust Conservation Properties Assessed for this Project (between Longview, WA and Bonneville Dam) 21

Figure 4. Columbia Land Trust Conservation Properties Assessed for this Project (downstream of Longview, WA) 22

Acknowledgments

We thank Columbia Land Trust staff, especially Ian Sinks, Jennifer Zarnoch, Kate Conley, Lindsay Cornelius, Jeff Malone, and Austin Tomlinson, who all provided critical conceptual guidance, feedback on EIA metrics and integral logistical support for site access. Input from NatureServe's Upland Ecological Integrity Assessment Workgroup was helpful in refining many upland EIA metric protocols and ratings.

1.0 Introduction

Indicator-based approaches to assessing and reporting ecological integrity (Harwell et al. 1999, Young and Sanzone 2002, USEPA 2002) are now being used by numerous organizations to assist with regulatory decisions (USACE 2003, 2005, 2006), set mitigation performance standards, monitor land management (Schroeder et al. 2011), and set conservation priorities (Faber-Langendoen et al. 2006, 2008). The Washington Department of Natural Resources, Natural Heritage Program (WNHP) uses an indicator-based approach developed by NatureServe and the Natural Heritage Network called the Ecological Integrity Assessment (EIA) to assist in identifying ecosystem conservation priorities. Many of WNHP's partners have adopted EIA to assist with monitoring and assessment (Crawford et al. 2011, Schroeder et al. 2011, Crawford and Rocchio 2013).

The EIA method (Faber-Langendoen et al. 2019, Rocchio and Crawford 2011; Faber-Langendoen et al. 2016a,b,c,d) aims to measure the ecological integrity of a site through a standardized and repeatable assessment of current ecological conditions. Condition is assessed relative to expectations for an ecological system operating within the bounds of natural variation. The EIA enables a user to rapidly assess and communicate the composition, structure, and function of an ecosystem occurrence through an index of ecological integrity, which in turn aids in identifying conservation value, management effects, restoration success, and more. The EIA standardizes expert opinion and existing data up front, enabling the user to apply the EIA in a rapid manner to estimate a site's ecological integrity. The EIA improves our understanding of current ecological conditions, leading to more effective and efficient use of available resources for ecosystem protection, management, and restoration efforts.

Columbia Land Trust's Stewardship Program uses a Conservation Property Classification tool to classify and assess its conservation properties. This system is intended to provide a high level of information on the types of land conserved, how they are being managed, and to provide information on long-term planning. EIA is nested within this classification tool in order to provide an assessment of fine-scale ecological integrity and help Columbia Land Trust track trends over time. It is also intended to intersect with the Classification's Habitat Trend assessment, a "best professional judgment" perspective on habitat trajectory that informs anticipated stewardship needs. Because of the importance of EIA to the Columbia Land Trust stewardship goals, WNHP was contracted by Columbia Land Trust to help refine the EIA methodology for their specific management goals, provide staff training, and complete site assessments.

This report summarizes the first two years of collaboration between WNHP and the Columbia Land Trust, a collaboration that both organizations hope will increase efficiency and effectiveness of conservation and management of Washington's biodiversity. By 2015, Washington's land trusts owned or held easements on 224,430 acres, a 38% increase since 2010 (Land Trust Alliance 2016). This project is intended to provide a blueprint for other land trusts to follow in using existing conservation assessment tools to help manage protected lands, monitor effectiveness of management and/or restoration activities, and assist with acquisition prioritization. Along with leaders of the Washington Association of Land Trusts and several of the organization's members, Washington Department of Natural Resources Natural Areas and Natural Heritage program leaders identified topics to explore together, including:

- What priority species and ecosystems are already protected by Washington’s land trusts? To answer this question, we need to improve our information sharing, and in many cases, conduct additional survey and assessment to better understand what has been conserved by land trusts.
- Washington’s Natural Areas provide protection for the state’s highest quality and rarest ecosystems. While some areas conserved by land trusts may not specifically protect priority species and ecosystems, they still provide important conservation value. For example, they may provide ecosystem services, connect high quality habitat areas, and/or serve as areas for recreation and connection with nature. We will engage the land trust community, Natural Heritage Advisory Council, and other stakeholders in discussions of how these types of protected lands may be represented by future versions of the Natural Heritage Plan.
- We will explore opportunities to share technical support and capacity between the Natural Heritage Program, Natural Areas Program, land trusts, and other groups, such as the University of Washington Rare Care program.

This project provides a demonstration of how WNHP’s existing methods may be used to address many of these opportunity areas.

1.1 Project Objectives

The three objectives for this project were to develop upland EIA protocols, adjust EIA protocols for Columbia Land Trust management goals, and initial EIA of Columbia Land Trust properties.

1.1.1 Objective 1: Develop Upland EIA Protocols

In 2004, NatureServe organized a workgroup of Natural Heritage ecologists from across the United States to update the methods for assessing ecological integrity of ecosystem occurrences. The Ecological Integrity Assessment (EIA) was the final product. The first set of EIA protocols were designed for specific wetland types in various regions of the United States (Faber-Langendoen et al. 2006). After many years of EIA application, it became apparent that many metrics and associated criteria were exceedingly similar across various wetland types. In 2013, NatureServe received an EPA grant to consolidate region- and state-specific EIAs into a single approach applicable to any wetland type in the United States. The result was a simplified framework applicable to wetland types across the United States (Faber-Langendoen et al. 2019). Regionally specific information is often incorporated into metric rating criteria, but the overall metric rating thresholds are consistent nationwide.

In 2009, the Washington Department of Fish and Wildlife contracted WNHP to develop EIA protocols for the majority of Ecological Systems (Comer et al. 2003; Comer and Schultz 2007) that occur in Washington State (Rocchio and Crawford 2009, Rocchio and Crawford 2015). Appropriate metrics were identified and organized into Ecological System-specific scorecards. This represented one of the first efforts within the Natural Heritage network to develop EIAs for every ecosystem type (upland and wetland) within a given jurisdiction. EIA scorecards were completed for 67 of the 99 Ecological Systems that occur in Washington. One of the main objectives of this project was to consolidate these system-specific EIA metrics, in a manner similar

to that used for wetlands. Once a list of consolidated upland metrics was identified, we developed assessment protocols for each.

1.1.2 Objective 2: Adjust EIA Protocols for Columbia Land Trust Management Goals

The second objective was to adapt the EIA's approach for delineating assessment area (AA) boundaries to work with Columbia Land Trust mapping polygons. Columbia Land Trust staff completed hierarchical mapping for all but one of the conservation properties assessed for this project. The mapping was completed using Ecological System boundaries, habitat condition trends, and stewardship needs. Because the mapping polygons are not typical of how AA boundaries are delineated in a standard EIA, WNHP and Columbia Land Trust staff reviewed EIA metrics to determine which were still appropriate to apply when using these polygons as AA boundaries. For example, Size metrics are not applicable if the AA boundary does not encompass the full extent of the ecological system.

1.1.3 Objective 3: Initiate EIA of Columbia Land Trust properties

The third objective was to apply the EIA to a subset of Columbia Land Trust conservation properties. The outcome of this effort not only provided Columbia Land Trust with baseline EIA data but also served as a means of field-vetting the upland EIA metrics and protocols developed in Objective 1.

1.2 Project Scope

Columbia Land Trust's fee-owned conservation properties cover roughly 19,000 acres across 98 sites, from the eastern Columbia River Gorge to the mouth of the Columbia River (Figure 1). Columbia Land Trust selected a subset of these sites for WNHP to target for this project (Figures 2-4).

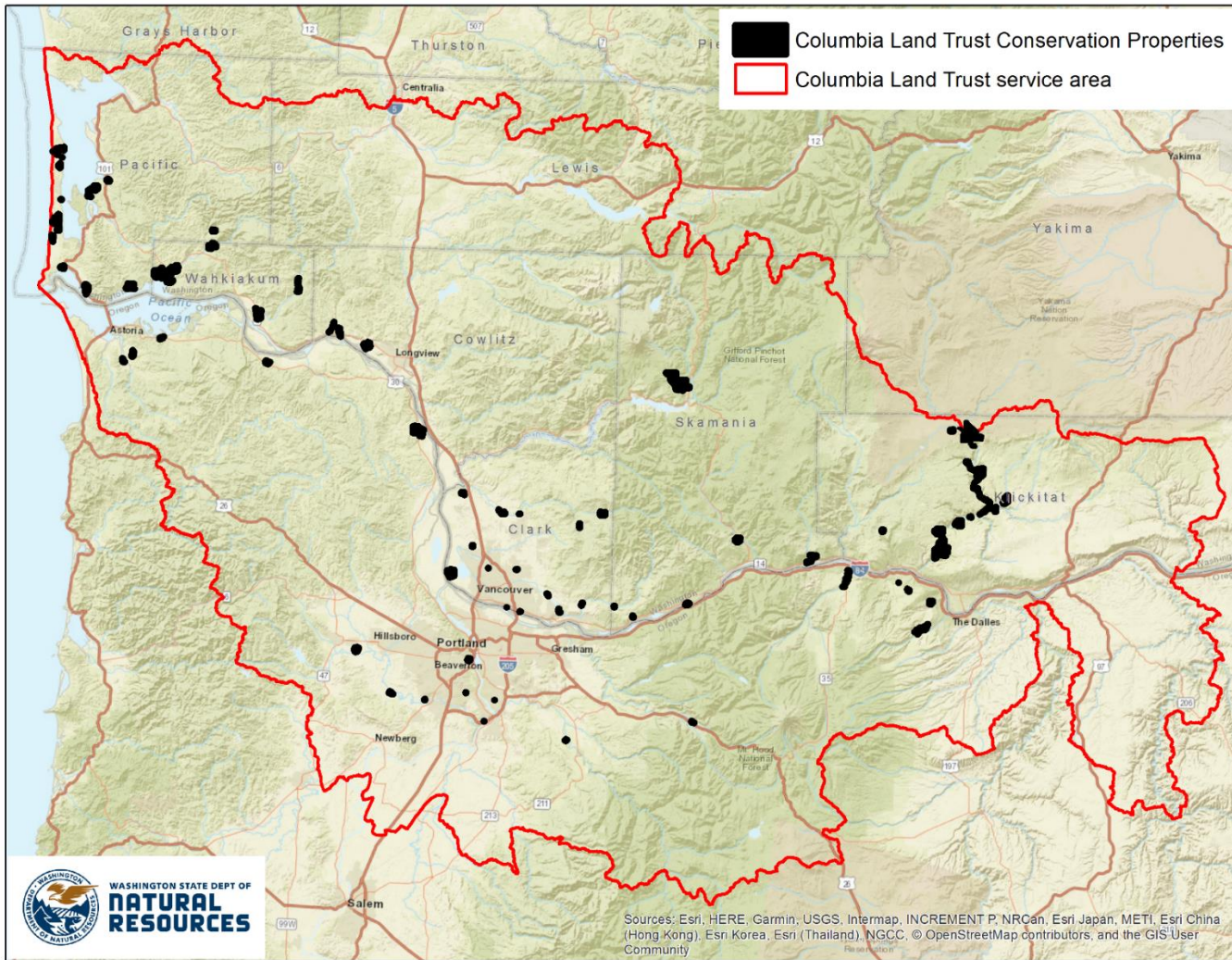


Figure 1. Project Scope

2.0 Methods

2.1 EIA Overview

Ecological Integrity Assessments (EIA) summarize the condition/ecological integrity of individual occurrences of ecosystems through consideration of composition, structure, and ecological processes (Faber-Langendoen et al. 2019). The method can be applied to occurrences as small as 0.05 ha and as large as thousands of hectares. EIAs can be conducted at three different sampling intensities: Level 1 (entirely GIS-based), Level 2 (rapid, mostly qualitative, field-based), and Level 3 (intensive, quantitative, field-based). The EIA is intended to measure current ecological condition as compared to a reference standard via a multi-metric index of biotic and abiotic measures of condition, size, and landscape context. Each metric is rated by comparing measured values with expected values under relatively unimpaired conditions (i.e. the reference standard), and the ratings are aggregated into a total score. The EIA uses a scorecard matrix to communicate individual metric ratings, as well as an overall index of ecological integrity. In summary, the EIA framework provides a standardized language for assessing and communicating ecosystem integrity across all terrestrial ecosystem types.

Classification is a necessary component of the development and use of an EIA, as it constrains natural variability and thus helps clarify whether differences in ecological condition are natural or anthropogenic. Developing ecological integrity indicators requires an understanding of the structure, composition, and processes that govern the wide variety of ecosystem types. Ecological classifications help ecologists account for natural variability within and among types so that differences between occurrences with good integrity and poor integrity may be more clearly recognized. In other words, classification helps differentiate between signals (indicators of degradation) and noise (natural variability). Classifications are also important in establishing “ecological equivalency” which is especially important for establishing restoration targets and benchmarks. There are a variety of classification schemes and ecoregional frameworks for structuring ecological integrity assessments. The EIA used in this project is primarily based on Ecological Systems (Comer et al. 2003; Comer and Schultz 2007; Rocchio and Crawford 2015) and wetland subgroups, a modification of the U.S. National Vegetation Classification created by WNHP (Rocchio et al. *In Progress*).

The metrics used in wetland/riparian and upland ecosystems are presented in Table 1 and Table 2. For detailed information about the metrics, see Rocchio et al. (2016, 2017). The process for establishing the assessment area using the EIA and protocols for collecting data necessary to apply metrics and calculate scores/ranks are provided in Rocchio et al. (2016, 2017). Once metrics are scored, they can be rolled up into major ecological factors scores/ranks (e.g., landscape, buffer/edge, vegetation, hydrology, soils, and size). These major ecological factor scores are in turn rolled up into three primary rank factors: landscape context, condition, and size. Lastly, these three factors can then be integrated to calculate an overall EIA score/rank. Whether one needs to roll up scores is dependent on the project objective. Land managers may only be interested in specific metric scores, as they provide insight into management needs, goals, and measures of success. On the other hand, if the goal is to compare or prioritize sites for conservation, restoration, or management actions, an overall EIA score/rank may be needed. Primary and major ecological factor scores/ranks can be helpful for understanding the current status of primary ecological drivers.

Table 1. Wetland and Riparian EIA Metrics

Primary Rank Factor	Major Ecological Factor	Metric/Variant NAME	Where Measured	Apply to:
LANDSCAPE CONTEXT	LANDSCAPE	LAN1 Contiguous Natural Cover (0-500 m)	Office then field check	All Types (not for use with sub-AAs or points)
		<i>Submetrics (optional; default is 0-500m):</i> <i>Inner Landscape (0-100 m)</i>		
		<i>Outer Landscape (100-500 m)</i>		
		LAN2 Land Use Index (0-500 m)	Office then field check	All Types (not for use with sub-AAs or points)
		<i>Submetrics (optional; default is 0-500m):</i> <i>Inner Landscape (0-100 m)</i>		
		<i>Outer Landscape (100-500 m)</i>		
	BUFFER	BUF1 Perimeter with Natural Buffer	Office then field check	All Types (not for use with sub-AAs or points)
		BUF2 Width of Natural Buffer Width	Office then field check	All Types (not for use with sub-AAs or points)
		BUF3 Condition of Natural Buffer	Office then field check	All Types (not for use with sub-AAs or points)
CONDITION	VEGETATION	VEG1 Native Plant Species Cover	Field	All Types; Use lowest submetric score
		<i>Submetrics:</i> <i>VEG1a. Tree Stratum</i>		Flooded & Swamp Forest Formation
		<i>VEG1b. Shrub/Herb Stratum</i>		All Types
		VEG2 Invasive Nonnative Plant Species Cover	Field	All Types
		VEG3 Native Plant Species Composition	Field	All Types
		<i>Submetrics:</i> <i>VEG3a. Native Diagnostic/Functional Species</i>		See USNNVC Subgroup descriptions for guidance
		<i>VEG3b. Native Species Diversity</i>		See USNNVC Subgroup descriptions for guidance
		<i>VEG3c. Native Increasers</i>		See USNNVC Subgroup descriptions for guidance
		<i>VEG3d. Native Decreasers</i>		See USNNVC Subgroup descriptions for guidance
		VEG4 Vegetation Structure	Field	All Types (variant differs by USNVC Formation)
		VEG4, variant 1		Flooded & Swamp Forest Formation

Primary Rank Factor	Major Ecological Factor	Metric/Variant NAME	Where Measured	Apply to:
		<i>Submetrics:</i> VEG4 var1a. Canopy/subcanopy age class diversity		
		VEG4 var1b. Old/large live trees		
		VEG4, variant 3		Freshwater Marsh, Wet Meadow and Shrubland Formation
		VEG4, variant 4		Salt Marsh Formation
		VEG4, variant 5		Bog and Fen Formation
		<i>Submetrics</i> VEG4 var5a. Tree encroachment		
		VEG4 var5b. Shrub cover		
		VEG4, variant 6		Aquatic Vegetation Formation
		VEG5. Woody Regeneration	Field	Flooded & Swamp Forest Formation
		VEG5 variant 1		Flooded & Swamp Forest Formation
		VEG5 variant 2		Freshwater Marsh, Wet Meadow and Shrubland Formation
		VEG5 variant 3		Bog and Fen Formation
		VEG6 Coarse Woody Debris	Field	Flooded & Swamp Forest Formation and optional for shrub-dominated types
		VEG6, variant 1		Forested Wetlands
		<i>Submetrics:</i> VEG6 var.1a. CWD Size Diversity		
		VEG6 var.1b. CWD Decay Class Diversity		
		VEG6 var.1c. Snag Size Diversity		
		VEG6 var.1d. Snag Decay Class Diversity		
		VEG6, variant 2		Nonforested Wetlands
		VEG6 var2a. Litter Source		
	VEG6 var2b. Litter Accumulation			
	Hydrology	HYD1 Water Source	Field & Office	All Types (varies by HGM Class)
		HYD1, variant 1		Riverine (non-tidal)
		HYD1, variant 2		Organic Soil Flats, Mineral Soil Flats
		HYD1, variant 3		Depression, Lacustrine, Slope
		HYD1, variant 4		Estuarine Fringe (tidal)
		HYD2 Hydroperiod	Field	All Types (varies by HGM)
		HYD2, variant 1		Riverine (non-tidal)
		HYD2, variant 2		Organic Soil Flats, Mineral Soil Flats

Primary Rank Factor	Major Ecological Factor	Metric/Variant NAME	Where Measured	Apply to:
		HYD2, variant 3		Depression, Lacustrine, Slope
		HYD2, variant 4		Estuarine Fringe (tidal)
		HYD3 Hydrologic Connectivity	Field	All Types (varies by HGM)
		HYD3, variant 1		Riverine (non-tidal)
		HYD3, variant 2		Organic Soil Flats, Mineral Soil Flats
		HYD3, variant 3		Depression, Lacustrine, Slope
		HYD3, variant 4		Estuarine Fringe (tidal)
		SOI1 Soil Condition	Field	All Types (variant differs by USNVC Formation)
		SOI1, variant 1		Flooded and Swamp Forest, Freshwater Marsh, Wet Meadow and Shrubland (nontidal), Bog and Fen, and Aquatic Vegetation formations.
		SOI1, variant 2		Salt Marsh Formation and Freshwater Marsh, Wet Meadow, and Shrubland (tidal) Formation
SIZE	SIZE	SIZ1 Comparative Size (Patch Type)	Office then field check	All Types (ratings vary by patch type); not for use with sub-AAAs or points
		SIZ2 Change in Size (optional)	Office then field check	All Types (not for use with sub-AAAs or points)

Table 2. Upland EIA Metrics.

Primary Rank Factor	Major Ecological Factor	Metric/Variant Name	Where Measured	Apply to:	
LANDSCAPE CONTEXT	LANDSCAPE	LAN1 Contiguous Natural Cover (0-500 m)	Office then field check	All Types (not for use with sub-AAs or points)	
		<i>Submetrics (optional; default is 0-500m): Inner Landscape (0-100 m) Outer Landscape (100-500 m)</i>			
		LAN2 Land Use Index (0-500 m)	Office then field check	All Types (not for use with sub-AAs or points)	
		<i>Submetrics (optional; default is 0-500m): Inner Landscape (0-100 m) Outer Landscape (100-500 m)</i>			
		EDGE	EDG1 Perimeter with Natural Edge	Office then field check	All EIA modules (all sizes; for large AAs, score entire AA, not assessment points)
			EDG2 Width of Natural Edge	Office then field check	All EIA modules (all sizes; for large AAs, score entire AA, not assessment points)
	EDG3 Condition of Natural Edge		Office then field check	All EIA Modules (small AAs)	
	CONDITION	VEGETATION	VEG1 Native Plant Species Cover	Field	All EIA modules (all sizes); Use lowest submetric score
			<i>Submetrics: VEG1a. Tree Stratum VEG1b. Shrub/Herb Stratum</i>		Forested EIA modules (all sizes) All EIA Modules (all sizes)
VEG2 Invasive Nonnative Plant Species Cover			Field	All EIA Modules (all sizes)	
VEG3 Native Plant Species Composition			Field	All EIA Modules (all sizes)	
<i>Submetrics: VEG3a. Native Diagnostic/Functional Species</i>					

Primary Rank Factor	Major Ecological Factor	Metric/Variant Name	Where Measured	Apply to:
		<i>VEG3b. Native Species Diversity</i>		
		<i>VEG3c. Native Increasers</i>		
		<i>VEG3d. Native Decreasers</i>		
		VEG4 Vegetation Structure	Field	All EIA Modules (all sizes; variant differs by EIA Module)
		VEG4 variant 7		Dry Forests and Woodlands (all sizes)
		VEG4, variant 8		Mesic / Hypermaritime Forests (all sizes)
		<i>Submetric for VEG4 var7 and var8</i>		
		<i>VEG4 var7/8a. Old live trees</i>		
		<i>VEG4 var7/8b. Canopy/subcanopy</i>		
		VEG4, variant 9		Shrublands (all sizes)
		<i>VEG4 var9a Shrub cover</i>		
		<i>VEG4 var9b Tree encroachment</i>		
		VEG4, variant 10		Shrub-Steppe (all sizes)
		VEG4, variant 11		Grasslands / Meadows (all sizes)
		<i>Submetrics for VEG4 var10 and var11:</i>		
		<i>VEG4 var10/11a Woody vegetation cover</i>		
		<i>VEG4 var10/11b Bunchgrass Cover</i>		
		<i>VEG4 var10/11c Biological Soil Crust</i>		
		VEG4, variant 12		Bedrock/Cliff (all sizes)
		VEG5 Woody Regeneration	Field	Forested EIA modules (all sizes; variant differs by EIA Module)
		VEG5, variant 4		Dry Forests and Woodlands (all sizes)
		VEG5, variant 5		Mesic / Hypermaritime Forests (all sizes)
		VEG5, variant 6		Shrublands & Grasslands / Meadows
		VEG6 Coarse Woody Debris	Field	Forested EIA modules (all sizes; variant differs by EIA Module)

Primary Rank Factor	Major Ecological Factor	Metric/Variant Name	Where Measured	Apply to:
		VEG6, variant 3		Dry Forests and Woodlands (all sizes)
		VEG6, variant 4		Mesic / Hypermaritime Forests (all sizes)
		<i>Submetrics for VEG6 var 3 and var 4:</i>		
		<i>VEG6 var3/4a. CWD Size Diversity</i>		
		<i>VEG6 var3/4b. CWD Decay class diversity</i>		
		<i>VEG6 var3/4c. Snag Size Diversity</i>		
		<i>VEG6 var3/4d. Snag Decay class diversity</i>		
		VEG6, variant 5		Nonforested (all sizes)
	SOIL	SOL1 Soil Condition	Field	All EIA Modules (all sizes)
		SOL1, variant 3		All EIA Modules (all sizes)
SIZE	SIZE	SIZ1 Comparative Size (Patch Type)	Office then field check	All EIA Modules (for large AAs, score entire AA, not assessment points)
		SIZ2 Change in Size (Optional)	Office then field check	Required for small AAs of large-patch ecosystems; optional for other small AAs

2.2 Refining Upland EIA Metrics and Manual

2.2.1 Consolidate Ecological System EIAs

WNHP staff had previously developed tailored EIA scorecards for 67 of the 99 ecological systems found in Washington State. At the initiation of this project, all 67 were reconsolidated into a single spreadsheet sorted by Primary Rank Factor (e.g. Condition, etc.), Major Ecological Factor (e.g. Vegetation, Hydrology, Soils, etc.), and Metric. We then sorted the ecological systems into broad physiognomic categories (“EIA modules”) that shared similar or identical metric language. For example, the North Pacific Hypermaritime Sitka Spruce Forest and North Pacific Hypermaritime Western Red-cedar-Western Hemlock Forest systems are both part of the “Mesic / Hypermaritime Forest” module. Similarly, the East Cascades Oak-Ponderosa Pine Forest and Woodland and Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest are both part of the “Dry Forest” module. At this point, we reviewed the metrics to determine how much consolidation was prudent and which metrics required customized variants for specific modules. For example, while it makes sense to use the same Invasive Nonnative Plant Species Cover (VEG2) metric language across all modules, the Vegetation Structure (VEG4) of a Mesic/Hypermaritime Forest and a Shrub-Steppe occurrence are different enough to require different standards for assessment.

Metrics that were identical across the board for multiple ecological systems were simply merged. Others required only a small amount of wordsmithing to adapt them for application to multiple systems. We conducted literature reviews to make sure the adopted language for each metric variant was applicable to each component ecological system (particularly for variants with numerical cutoffs between scores). Still other metrics were grouped together as submetrics within a single overarching metric. For example, the “Bunchgrass Cover”, “Woody Vegetation Cover” and “Biological Soil Crust” metrics found in the EIA scorecards for shrub-steppe ecological systems are now included as submetrics within the Vegetation Structure variant (VEG4 v10) for the Shrub-Steppe EIA module. Lastly, we also developed several new metrics for testing, including Natural Disturbance Regime (DIS1), Soil Moisture (SOI2), and Patch Diversity (LAN3).

2.2.2 Field verification / refinement

After the EIA metrics were consolidated, WNHP and Land Trust staff conducted field vetting of these metrics. This exercise resulted in modifications to some metric concepts, metric ratings, and metric protocols.

2.3 Modifications of EIA to Support Columbia Land Trust Objectives

The Assessment Area (AA) is the spatial area in which the EIA is applied. The AA is “the entire area, subarea, or point of an occurrence” of an ecosystem type “with a relatively homogeneous ecology and condition” (Rocchio et al. 2016, 2017). An individual AA must contain only one ecosystem type at the desired scale of classification. In other words, when using Ecological Systems as the target, the AA may contain only one Ecological System. When using United States National Vegetation Classification (USNVC) plant associations (<http://usnvc.org>) as the target, the AA may contain only one association. The AA may never be larger than the occurrence being assessed, but it *is* possible for the AA to be smaller than the occurrence. This may occur due to a property line, or when different portions of the occurrence have starkly different land use histories and thus very different current conditions.

As noted above, Columbia Land Trust completed hierarchical mapping for all but one of the conservation properties assessed for this project. The mapping was based on Ecological System

boundaries, habitat condition trends, and stewardship needs. Polygons with the same land cover, ecological system classification, and status/trends category were considered part of the same AA. This sometimes resulted in multi-polygon AAs.

Because many of these polygons are not congruent with how AA boundaries are typically delineated, WNHP and Columbia Land Trust reviewed EIA metrics to determine which were inappropriate to use with these atypical boundaries. For example, Size metrics are not applicable if the AA boundary is defined by non-ecological criteria. Thus, size metrics were not used for this project unless an occurrence of a rare USNVC association type was encountered (see section 2.4.3).

2.4 EIA Field Work

2.4.1. Selecting Sites

For this project, Columbia Land Trust prioritized sites according to on-going management planning efforts, pending management actions, and habitat quality. The sites at which WNHP completed EIAs are shown in Figure 2Figure 3Figure 4.

2.4.2 Site-based Surveys

At each site, each polygon (=AA) was traversed by WNHP ecologists to ensure that ecological variation within the polygon was observed. Variation was determined by visually interpreting aerial photography or observing ecological variation on-site. For example, variation in stand structure was often visible on orthophotography. An effort was made to walk through all areas showing such variation. Color and texture observed on orthophotos was also useful for guiding on-the-ground surveys. Some invasive species like reed canarygrass (*Phalaris arundinacea*) have a unique color/texture signature in photos, providing useful guidance for on-site surveys. After observing a polygon's internal variation, EIA metrics were scored based on protocols and rating criteria in the EIA manuals (Rocchio et al. 2016, 2017).

2.4.3 Polygons Meeting 'Element Occurrence' Criteria

During the course of this project, we documented numerous polygons meeting the minimum criteria for consideration as element occurrences of rare or common ecosystem types. Element occurrences (EOs) are specific sites or stands of a given ecosystem type with conservation value (<http://www.natureserve.org/conservation-tools/standards-methods/element-occurrence-data-standard>). Ecosystem element occurrences are prioritized for inclusion in WNHP's database based on a combination of the ecosystem element's Conservation Status Rank and the occurrence's Element Occurrence Rank (EORANK) (<https://www.dnr.wa.gov/NHPmethods>). The EORANK represents an integration of the EIA rank and Size metric scores (Rocchio et al. 2016, 2017). A decision matrix (Table 3) is then used to determine whether a site-specific example of an ecosystem meets the criteria of an element occurrence. Essentially, most occurrences of rare ecosystem types, regardless of their condition, are considered element occurrences, while more common ecosystem types must be in good to excellent condition to receive consideration as element occurrences.

When rare or high-quality examples of more common USNVC plant associations were encountered during field inventories conducted for this project, WNHP ecologists used these standards to determine whether the occurrence met EO criteria.

Table 3. Determining WNHP Element Occurrences

Global / State Conservation Status Rank	Ecological Integrity Assessment Rank			
	A Excellent integrity	B Good Integrity	C Fair integrity	D Poor integrity
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				
	Red Shading = EO			

2.5 Data Analysis and Storage

WNHP developed a Microsoft Excel EIA workbook to calculate rolled-up major ecological factors, primary rank factors, and overall EIA scores. Metric ranks, comments and calculations of major ecological factor, primary rank factor, and overall EIA scores were entered into this workbook. Raw metric scores, calculated scores, and associated comments are stored in individual worksheets within the workbook. Plant species lists generated for each polygon assessed are stored in a separate Excel workbook.

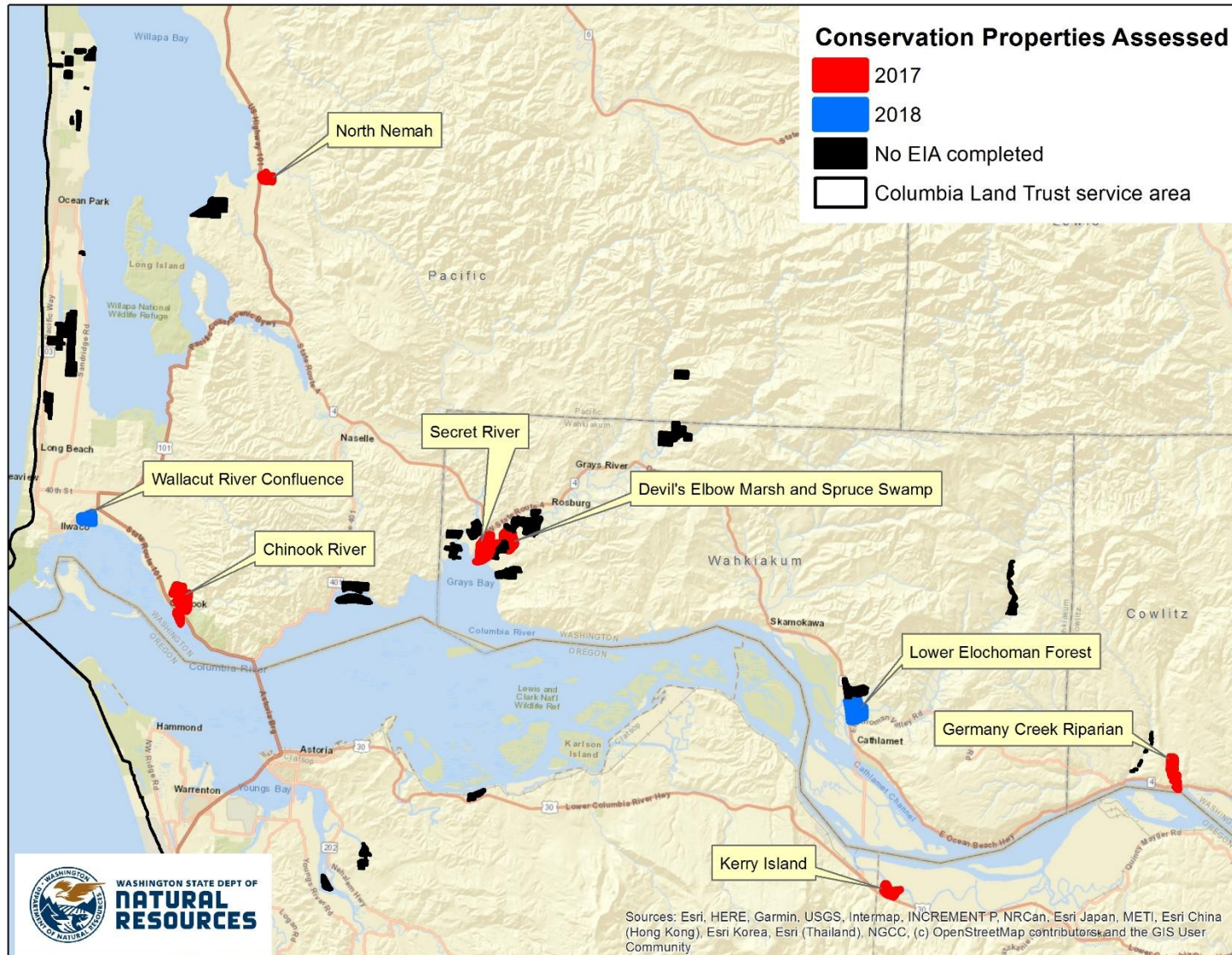


Figure 2. Columbia Land Trust Conservation Properties Assessed for this Project (downstream of Longview, WA)

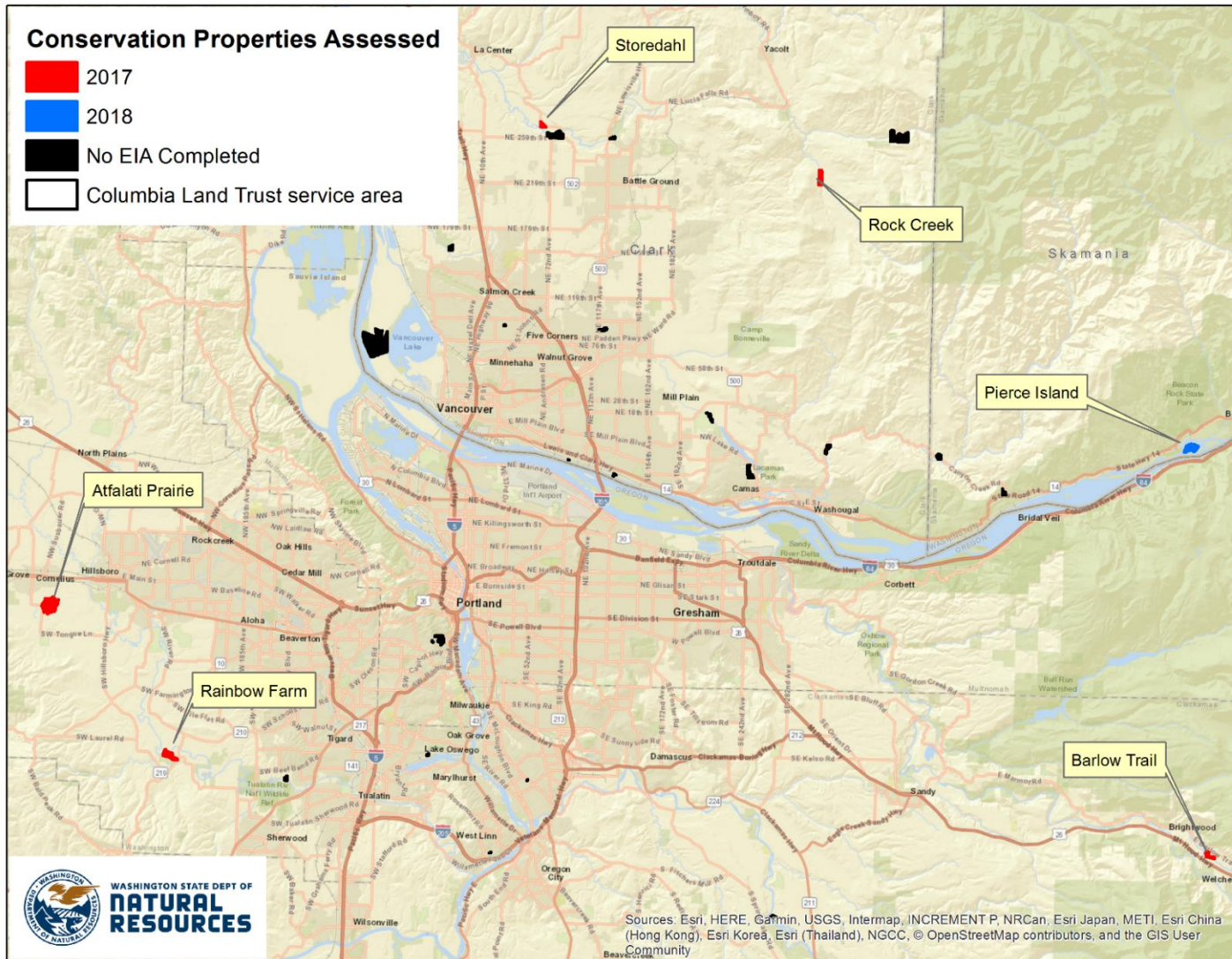


Figure 3. Columbia Land Trust Conservation Properties Assessed for this Project (between Longview, WA and Bonneville Dam)

3.0 Results/Discussion

3.1 Refined Upland EIAs

Metrics from the 67 Ecological System EIAs were reduced to one upland manual (Rocchio et al. 2017). Following the approach used for wetlands, in which USNVC Formations and HGM classes were used to account for natural variation, upland ecosystems were aggregated into six EIA “modules” according to shared primary ecological drivers. For many metrics, specific metric ratings were developed for each module. The modules are: (1) Dry Forests & Woodlands (2) Mesic/Hypermaritime Forests, (3) Shrub-steppe, (4) Grasslands and Meadows, (5) Shrublands, and (6) Bedrock / Cliffs.

Over the course of the project, a few adjustments were made to the EIA protocols. All of the entirely new trial metrics were ultimately dropped as components of a level 2 EIA. After testing, the new metrics were determined to be too time-intensive/quantitative (e.g. Patch Diversity), were already scored in some way within existing metrics (e.g. Natural Disturbance Regime), or were too generalized and insensitive to be useful (e.g. Soil Moisture). Field verification is an ongoing process as WNHP implements EIA on Land Trust properties. Submetrics for Native Composition (VEG3), Vegetation Structure (VEG4), and Coarse Woody Debris, Snags, and Litter (VEG6) were modified. In addition, weights used in the EIA roll-up were adjusted. Initial calculations of many forested EIA ranks resulted in much higher scores than expected. Investigation of individual metric scores suggested that native plant composition did not vary significantly across varying structural conditions and anthropogenic stressors. Accordingly, these metrics appeared to inflate the overall EIA scores of 2nd- or even 3rd-growth forests. We decided to afford greater weight to structural metrics (VEG4, VEG5, and VEG6) than composition metrics (VEG1, VEG2, and VEG3) when calculating overall EIA rank in forested ecosystems.

3.2 EIA Results

During 2017 and 2018, 20 sites were assessed. Within those sites, 324 polygons were delineated by Columbia Land Trust staff and, at Klickitat Canyon South, WNHP. Some of those polygons were not assessed because they were either water features, roads, or simply inaccessible. Of the 324 polygons, 285 were assessed and assigned EIA Ranks (Table 4).

Across all sites, approximately 577 native plant species, 161 nonnative plant species, and 150 plant taxon of unknown nativity were observed. Many of the unknowns were identified to the genus level. In some cases, the unknowns represent uncertain identifications (indicated by a *cf* modifier, denoting “compared” to).

Table 4. Polygons with EIA Scores

Site Name	Mapped Polygons	Polygons with EIA Rank
Atfalati Prairie	17	17
Barlow Trail	13	13
Chinook River	11	9
Devil’s Elbow Marsh and Spruce Swamp	4	4
Four Sisters	8	8
Germany Creek Riparian	20	19
Kerry Island	7	7

Site Name	Mapped Polygons	Polygons with EIA Rank
Klickitat Canyon South	90	74
Logging Camp	19	15
Lower Elochoman Forest	12	10
Margerum Ranch	29	27
Mill Creek Ridge	12	11
North Nemah	8	8
Pierce Island	8	8
Rainbow Farm	12	12
Rock Creek	6	4
Secret River	4	4
Storedahl	5	5
Wallacut River Confluence	28	20
Youngs Wetland	11	10
TOTAL	324	285

3.3 Site Summaries

In this section, a brief summary of the results of the EIA surveys are presented for each site. Full results are found in the accompanying Excel workbooks. For each site, primary rank factor and overall EIA ranks are provided in tables. Any polygons meeting Element Occurrence criteria are highlighted.

3.3.1 Atfalati Prairie

Three ecological systems were observed at this site. The polygons labeled as wet prairies were recently plowed agricultural fields at the time of the site visits. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 5. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 5. EIA Summary for Atfalati Prairie Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
WP1	Willamette Valley Wet Prairie	D	D	D
WP2	Willamette Valley Wet Prairie	D	D	D
RF6	North Pacific Lowland Riparian Forest and Shrubland	C	C	C+
RF5	North Pacific Lowland Riparian Forest and Shrubland	C	D	C-(r)
RF4	North Pacific Lowland Riparian Forest and Shrubland	C	D	C-(r)
RF3	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-(r)
RF2	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-
RF1	North Pacific Lowland Riparian Forest and Shrubland	C	D	C-(r)
RF9	North Pacific Lowland Riparian Forest and Shrubland	C	C	C+
RF7	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
OW1	North Pacific Oak Woodland	D	D	D(r)
OW2	North Pacific Oak Woodland	D	D	D(r)
OW3	North Pacific Oak Woodland	D	D	D(r)
OW4	North Pacific Oak Woodland	D	D	D(r)
OW5	North Pacific Oak Woodland	D	D	D(r)
OW6	North Pacific Oak Woodland	D	D	D(r)
OW7	North Pacific Oak Woodland	D	D	D(r)
OW8	North Pacific Oak Woodland	D	D	D(r)

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.2 Barlow Trail

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 6. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 6. EIA Summary for Barlow Trail Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
RF1	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
RF2	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
RF3	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
RF4	North Pacific Lowland Riparian Forest and Shrubland	B	C	C+
RF5	North Pacific Lowland Riparian Forest and Shrubland	B	A	B+
RF7	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
RF8	North Pacific Lowland Riparian Forest and Shrubland	B	C	C+
RF9	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
RF10	North Pacific Lowland Riparian Forest and Shrubland	B	C	C+
RF11	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
UF2	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	C	C	C-
UF2	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	C	C	C-
UP1	North Pacific Mesic-Wet Douglas-fir Western Hemlock Forest	C	A	B-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details.

3.3.3 Chinook River

Three ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 7. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 7. EIA Summary for Chinook River Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
HW1	North Pacific Freshwater Intertidal Wetland	C	C	C-(r)
WW1-N	North Pacific Freshwater Intertidal Wetland	C	B	B-
WW2	Old road grade. EIA not applied	NA	NA	NA
WW1-S	North Pacific Freshwater Intertidal Wetland	C	C	C-
HW2-N	North Pacific Intertidal Freshwater Wetland	C	C	C-
HW2-S	North Pacific Intertidal Freshwater Wetland	C	C	C+
MF	Temperate Pacific Intertidal Flat	B	A	B+
SSF1-E	North Pacific Hardwood-Conifer Swamp	C	B	C+
SSF1-N	North Pacific Hardwood-Conifer Swamp	C	B	C+
SSF1-S	North Pacific Hardwood-Conifer Swamp	C	B	B+
SSF2	Old road grade. EIA not applied	NA	NA	NA

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.4 Devil's Elbow Marsh and Spruce Swamp

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 8. Polygon WW encompasses an Element Occurrence that was already in WNHP's Biotics database (Table 9). Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 8. EIA Summary for Devil's Elbow Marsh and Spruce Swamp Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
HW	North Pacific Intertidal Freshwater Wetland	C	C	D
LRF1	North Pacific Lowland Riparian Forest and Shrubland	B	D	D(r)
LRF2	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-
WW	North Pacific Intertidal Freshwater Wetland	C	B	B-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

Table 9. Polygons Meeting Element Occurrence Criteria at Devil’s Elbow Marsh and Spruce Swamp

Polygon ID	USNVC Association	G/S Rank	EO Rank
WW	<i>Picea sitchensis</i> / <i>Cornus sericea</i> / <i>Lysichiton americanus</i> Swamp Forest	G2/S1	B-

3.3.5 Four Sisters

Three ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 10. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 10. EIA Summary for Four Sisters Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
1	Temperate Pacific Freshwater Emergent Marsh	B	B	C+
2	Temperate Pacific Freshwater Emergent Marsh	B	B	C+
3	Temperate Pacific Freshwater Emergent Marsh	B	B	B-
4	Temperate Pacific Freshwater Emergent Marsh	B	B	B-
5	Temperate Pacific Freshwater Emergent Marsh	B	A	B+
6	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	C-
7	East Cascades Oak-Ponderosa Pine Forest and Woodland	C	C	C+
370	Temperate Pacific Freshwater Emergent Marsh	B	B	C+

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details.

3.3.6 Germany Creek Riparian

Three ecological systems and one ruderal type were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 12. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 11. EIA Summary for Germany Creek Riparian Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
NM1-SW	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	C	B	C-
NPI1	North Pacific Lowland Riparian Forest and Shrubland	B	B	B-
NPL1	North Pacific Intertidal Freshwater Wetland	C	B	C-(r)

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
NPL10	North Pacific Lowland Riparian Forest and Shrubland	C	C	D(<i>r</i>)
NPL11	North Pacific Lowland Riparian Forest and Shrubland	C	B	C+(<i>r</i>)
NPL12-RIP	North Pacific Lowland Riparian Forest and Shrubland	C	C	C+
NPL12-UP	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	C	B	C+
NPL2	Western North American Ruderal Wet Shrubland, Meadow & Marsh Group	C	D	D
NPL3-N	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-
NPL3-S	North Pacific Intertidal Freshwater Wetland	C	D	D(<i>r</i>)
NPL4	North Pacific Lowland Riparian Forest and Shrubland	C	B	C+
NPL5	North Pacific Lowland Riparian Forest and Shrubland	B	B	C+
NPL6	North Pacific Lowland Riparian Forest and Shrubland	C	C	C+
NPL7	Merged with NPL4	NA	NA	NA
NPL8	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-(<i>r</i>)
NPL9	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-(<i>r</i>)
NPM1-E	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	C	B	B-
NPM1-NW	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	B	C	C-
NPM1-RIP	North Pacific Lowland Riparian Forest and Shrubland	B	B	C-
NPM2	Western North American Ruderal Wet Shrubland, Meadow & Marsh Group	C	C	C-(<i>r</i>)

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The *r* modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.7 Kerry Island

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 12. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 12. EIA Summary for Kerry Island Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
DW	North Pacific Intertidal Freshwater Wetland	B	D	D(<i>r</i>)
HW	North Pacific Intertidal Freshwater Wetland	C	C	C-
LRF1	North Pacific Lowland Riparian Forest and Shrubland	C	D	D
LRF2	North Pacific Lowland Riparian Forest and Shrubland	C	D	D
LRF3	North Pacific Lowland Riparian Forest and Shrubland	C	D	D
WW1	North Pacific Intertidal Freshwater Wetland	C	C	C-
WW2	North Pacific Intertidal Freshwater Wetland	B	C	C-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The *r* modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.8 Klickitat Canyon South

The presence of a rare plant (*Penstemon barrettiae*) and numerous rare plant associations reflecting a diverse range of ecosystem types, including oak and oak-pine woodlands, mature dry-mesic forests, grasslands, talus and cliffs, fens, riparian forests, and seeps make this site suitable for inclusion in the Statewide System of Natural Areas (WNHP 2018). The site is also a part of a large intact corridor of protected lands along the Klickitat River. Eleven ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 13. Thirty-two polygons met Element Occurrence criteria (Table 14). Because of their close proximity to each other, many polygons of the same Association will be lumped and entered into WNHP’s database as a single element occurrence. This could change the EIA Rank, especially since the Size rank would be much higher than it is for a given polygon. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 13. EIA Summary for Klickitat Canyon South Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
1	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B-
2	River	NA	NA	NA
3	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
4	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	D	C-(<i>r</i>)
5	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
6	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	D
7	Paved road	NA	NA	NA
8	Rocky Mountain Cliff, Canyon and Massive Bedrock	B	A	A+
9	Rocky Mountain Cliff, Canyon and Massive Bedrock	A	B	B+

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
10	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	NA	NA	NA
11	Rocky Mountain Cliff, Canyon and Massive Bedrock	NA	NA	NA
12	East Cascades Oak-Ponderosa Pine Forest and Woodland	NA	NA	NA
13	East Cascades Oak-Ponderosa Pine Forest and Woodland	NA	NA	NA
14	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B+
15	Columbia Basin Foothill Riparian Woodland and Shrubland	NA	NA	NA
16	Rocky Mountain Cliff, Canyon and Massive Bedrock	NA	NA	NA
17	Rocky Mountain Cliff, Canyon and Massive Bedrock	B	A	A-
18	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C-
19	Rocky Mountain Cliff, Canyon and Massive Bedrock	B	B	B+
20	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	A	B-
21	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
22	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B-
23	Rocky Mountain Cliff, Canyon and Massive Bedrock	B	B	B-
25	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	B-
26	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
27	Dirt road	NA	NA	NA
28	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
29	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	B+
30	Rocky Mountain Alpine-Montane Wet Meadow	B	B	C+
31	Rocky Mountain Alpine-Montane Wet Meadow	B	B	C+
32	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B+
33	Rocky Mountain Cliff, Canyon and Massive Bedrock	NA	NA	NA
34	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	D	C-
35	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	D
36	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	B	A-
37	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	A	B-

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
38	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
39	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
40	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
41	Bridge	NA	NA	NA
42	Rocky Mountain Alpine-Montane Fen	B	A	B+
43	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	D	D(r)
44	Talus (not accessible to EIA)	NA	NA	NA
45	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
46	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	A-
47	Rocky Mountain Alpine-Montane Fen	B	A	B+
48	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	D	C-(r)
49	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	C+
50	Modoc Basalt Flow Vernal Pool	B	B	B-
51	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
52	Modoc Basal Flow Vernal Pool	NA	NA	NA
53	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	B-
54	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
55	Columbia Basin Foothill Riparian Woodland and Shrubland	B	A	B+
56	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	B+
58	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	NA	NA	NA
59	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	C+
60	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
61	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
62	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
63	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	C	B	C+

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
64	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	C+
65	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	C+
66	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	C+
67	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	C+
68	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
69	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	B-
70	Rocky Mountain Subalpine-Montane Riparian Shrubland	NA	NA	NA
71	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
72	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
73	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
74	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	A	A-
75	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B-
76	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	B-
77	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	A-
78	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
79	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B-
80	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
81	Columbia Basin Foothill Riparian Woodland and Shrubland	B	A	A-
82	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B-
ROC01	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
ROC02	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
ROC03	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	B+
ROC04	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
ROC05	Rocky Mountain Alpine-Montane Wet Meadow	B	B	C+
ROC10	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
ROC11	Columbia Basin Foothill Riparian Woodland and Shrubland	B	A	A-
ROCXX	Columbia Basin Foothill Riparian Woodland and Shrubland	NA	NA	NA
S1	Columbia Basin Foothill Riparian Woodland and Shrubland	C	B	B-
S2	Rocky Mountain Alpine-Montane Wet Meadow	C	C	C+

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

Table 14. Polygons Meeting Element Occurrence Criteria at Klickitat Canyon South

Polygon ID	USNVC Association	G/S Rank	EO Rank
20	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	B-
26	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Balsamorhiza sagittata</i> Woodland	G2/SNR	C+
28	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Balsamorhiza sagittata</i> Woodland	G2/SNR	C+
29	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	B+
32	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	B+
35	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	D
36	<i>Pseudoroegneria spicata</i> - <i>Festuca idahoensis</i> Canyon Grassland	G3S2	A-
37	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Balsamorhiza sagittata</i> Woodland	G2/SNR	B-
39	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Balsamorhiza sagittata</i> Woodland	G2/SNR	B-
40	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	C+
42	<i>Carex cusickii</i> Fen	G3S2S3	B+
46	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	A-
47	<i>Carex cusickii</i> Fen	G3S2S3	B+
53	<i>Populus balsamifera</i> (ssp. <i>trichocarpa</i> , ssp. <i>balsamifera</i>) / <i>Symphoricarpos</i> (<i>albus</i> , <i>oreophilus</i> , <i>occidentalis</i>) Forest	G2S1S2	B-
55	<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> Temporarily Flooded Woodland	G2?S1S2	B+
56	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	B+

Polygon ID	USNVC Association	G/S Rank	EO Rank
59	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	C+
68	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	C+
69	<i>Quercus garryana</i> / <i>Symphoricarpos albus</i> Riparian Woodland	G2G3/S2S3	B-
71	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Balsamorhiza sagittata</i> Woodland	G2/SNR	C+
72	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	C+
73	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	C+
74	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Balsamorhiza sagittata</i> Woodland	G2/SNR	A-
75	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	B-
76	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	B-
77	<i>Alnus rhombifolia</i> / <i>Philadelphus lewisii</i> Riparian Forest	G1/S1	A-
78	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	B-
79	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	B-
80	<i>Quercus garryana</i> / <i>Festuca idahoensis</i> Woodland	G1?S1	B-
81	<i>Acer macrophyllum</i> / <i>Holodiscus discolor</i> Riparian Woodland	G2?/S1	A-
ROC01	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Purshia tridentata</i> Woodland	G3/S2	B-
ROC02	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Purshia tridentata</i> Woodland	G3/S2	B-

3.3.9 Logging Camp

Four ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 15. Six polygons met Element Occurrence criteria (Table 16). Because of their close proximity to each other, polygons 1951 and 1955 will be lumped and entered into WNHP's database as a single element occurrence. This could change the EIA Rank, especially since the Size rank will be higher than it is for a single polygon. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 15. EIA Summary for Logging Camp Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
188	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	not assessed	not assessed	not assessed

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
189	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	C-
190	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
191	East Cascades Oak-Ponderosa Pine Forest and Woodland	NA	NA	NA
192	East Cascades Oak-Ponderosa Pine Forest and Woodland	NA	NA	NA
193	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	B-
194	Columbia Basin Foothill Riparian Woodland and Shrubland	B	A	B+
195	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+
196	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C-
197	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C-
198	East Cascades Oak-Ponderosa Pine Forest and Woodland	NA	NA	NA
199	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	D(r)
201	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	B-
1951	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
1952	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	D
1953	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	D	C-(r)
1954	Columbia Basin Foothill Riparian Woodland and Shrubland	B	A	B-
1955	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+
1956	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

Table 16. Polygons Meeting Element Occurrence Criteria at Logging Camp

Polygon ID	USNVC Association	G/S Rank	EO Rank
194	<i>Populus balsamifera ssp. trichocarpa</i> - <i>Alnus rhombifolia</i> Riparian Forest	G1/S1	A

Polygon ID	USNVC Association	G/S Rank	EO Rank
195	<i>Pinus ponderosa</i> - <i>Quercus garryana</i> / <i>Carex Geyeri</i> Woodland	G2G3/S2S3	C
1951	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	B
1954	<i>Quercus garryana</i> / <i>Symphoricarpos albus</i> Riparian Woodland	G2G3/S2S3	A
1955	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	B
1956	<i>Quercus garryana</i> / <i>Festuca idahoensis</i> Woodland	G1?S1	B

3.3.10 Lower Elochoman Forest

All polygons were classified as the North Pacific Freshwater Intertidal Wetland. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 17. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 17. EIA Summary for Lower Elochoman Forest Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
8	North Pacific Freshwater Intertidal Wetland	C	C	C+
10	River	NA	NA	NA
11	North Pacific Freshwater Intertidal Wetland	NA	NA	NA
12	North Pacific Freshwater Intertidal Wetland	C	D	C-(r)
13	North Pacific Freshwater Intertidal Wetland	D	D	D
15	North Pacific Freshwater Intertidal Wetland	C	C	C-
16	North Pacific Freshwater Intertidal Wetland	C	C	C-(r)
17	North Pacific Freshwater Intertidal Wetland	D	C	C-
18	North Pacific Freshwater Intertidal Wetland	C	C	C-
330	North Pacific Freshwater Intertidal Wetland	D	D	D
9N	North Pacific Freshwater Intertidal Wetland	C	C	C-(r)
9S	North Pacific Freshwater Intertidal Wetland	C	C	C-(r)

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.11 Margerum Ranch

The presence of rare plants (not discussed in this report), relatively high-quality occurrences of numerous oak types, and rare riparian types make this site suitable for inclusion in the Statewide System of Natural Areas (WNHP 2018). Compared to element occurrences that already exist in WNHP’s Biotics database, Margerum Ranch appears to support Washington’s best example of the *Quercus garryana* / *Cares geyeri* Woodland (G1G2), one of Washington’s best examples of *Quercus garryana* / *Pseudoroegneria spicata* Woodland (G1G2), and high quality examples of *Pinus ponderosa* – *Quercus garryana* / *Carex geyeri* Woodland (G2G3) and *Pseudotsuga*

menziesii / *Holodiscus discolor* / *Carex geyeri* Woodland (G3). Also found at the site is a good example of the *Quercus garryana* / *Symphoricarpos albus* Riparian Woodland (G2G3) and fair example of the *Alnus rhombifolia* / *Philadelphus lewisii* Riparian Forest.

Six ecological systems and a ruderal type were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 18 Table 15. Eight polygons met Element Occurrence criteria (Table 19). Because of their close proximity to each other, some polygons representing the same association will be lumped and entered into WNHP’s database as one single element occurrence. This could change the EIA Rank, especially since the Size rank may be much higher than it is for a given polygon. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 18. EIA Summary for Margerum Ranch Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
202	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	C-
203	East Cascades Oak-Ponderosa Pine Forest and Woodland	NA	NA	NA
204	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	C	C+(r)
205	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B+
206	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	C+(r)
207	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	B-
208	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
209	Modoc Basalt Flow Vernal Pool	B	B	C+
210	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	A	B-
211	Columbia Basin Foothill Riparian Woodland and Shrubland	B	A	B+
213	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	C+
214	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B+
215	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	C+
218	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
219	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	C+
220	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	A-

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
221	Ruderal (but scored as East Cascades Oak-Ponderosa Pine Forest and Woodland)	B	D	D(r)
222	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
223	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
224	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	C+
225	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	C+
226	Columbia Basin Foothill Riparian Woodland and Shrubland	NA	NA	NA
227	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	C	C+
228	East Cascades Oak-Ponderosa Pine Forest and Woodland	B	B	B-
229	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	B	C+
230	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	B	A	B-
231	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	D	D(r)
232	Rocky Mountain Cliff, Canyon and Massive Bedrock	B	C	C+
233	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	C+

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

Table 19. Polygons Meeting Element Occurrence Criteria at Margerum Ranch

Polygon ID	USNVC Association	G/S Rank	EO Rank
205	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2S1S2	B+
207	<i>Pseudotsuga menziesii</i> / <i>Holodiscus discolor</i> / <i>Carex geyeri</i> Forest	G3/S2?	B-
208	<i>Quercus garryana</i> / <i>Carex geyeri</i> Woodland; <i>Quercus garryana</i> / <i>Festuca idahoensis</i> Woodland	G1G2/S1S2; G1?S1	B-
210	<i>Quercus garryana</i> / <i>Carex geyeri</i> Woodland	G1G2/S1S2	B-
211	<i>Quercus garryana</i> / <i>Symphoricarpos albus</i> Riparian Woodland	G2G3S2S3	B+
214	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2S1S2	B+
220	<i>Quercus garryana</i> / <i>Carex geyeri</i> Woodland	G1G2/S1S2	A-
225	<i>Alnus rhombifolia</i> / <i>Philadelphus lewisii</i> Riparian Forest	G1/S1	C+

3.3.12 Mill Creek Ridge

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 20. Four polygons met Element Occurrence criteria (Table 21). Because of their close proximity to each other, some of these polygons will be lumped and entered into WNHP's database as a single element occurrence. This could change the EIA Rank, especially since the Size rank may be much higher than it is for a given polygon. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 20. EIA Summary for Mill Creek Ridge Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
D1	Parking lot	NA	NA	NA
F1	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	D	D(<i>r</i>)
F2	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	D	D(<i>r</i>)
G1	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	D	C-(<i>r</i>)
G1-N	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	C+
G2	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	D	C-(<i>r</i>)
G3	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	D	C-(<i>r</i>)
O1	East Cascades Oak-Ponderosa Pine Forest and Woodland	C	C	B-
O2	East Cascades Oak-Ponderosa Pine Forest and Woodland	C	B	C+
O3	East Cascades Oak-Ponderosa Pine Forest and Woodland	C	C	C+
O4	East Cascades Oak-Ponderosa Pine Forest and Woodland	C	D	D
R1	East Cascades Oak-Ponderosa Pine Forest and Woodland	C	C	C+

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The *r* modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

Table 21. Polygons Meeting Element Occurrence Criteria at Mill Creek Ridge

Polygon ID	USNVC Association	G/S Rank	EO Rank
O1	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	B-
O2	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	C+
O3	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	C+
R1	<i>Quercus garryana</i> / <i>Pseudoroegneria spicata</i> Woodland	G1G2/S1S2	C+

3.3.13 North Nemah

Four ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 22. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 22. EIA Summary for North Nemah Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
BM	Temperate Pacific Tidal Salt and Brackish Marsh	B	B	B-
HW-E	North Pacific Intertidal Freshwater Wetland	B	A	B+
HW-W	Temperate Pacific Tidal Salt and Brackish Marsh	B	B	B-
HW-M	Temperate Pacific Tidal Salt and Brackish Marsh	B	B	B-
LRF	North Pacific Lowland Riparian Forest and Shrubland	B	A	B+
SSF1-E	North Pacific Seasonal Sitka Spruce Forest	B	C	C-(r)
SSF1-W	North Pacific Seasonal Sitka Spruce Forest	B	B	C+
SSF2	North Pacific Seasonal Sitka Spruce Forest	C	C	C-(r)
WW	North Pacific Intertidal Freshwater Wetland	B	A	B-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.14 Pierce Island

Three ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 23. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 23. EIA Summary for Pierce Island Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
30	North Pacific Lowland Riparian Forest and Shrubland	A	B	C+
31	Temperate Pacific Freshwater Emergent Marsh	A	B	B+
32	North Pacific Lowland Riparian Forest and Shrubland	A	C	C+
33	Temperate Pacific Freshwater Emergent Marsh	A	C	C+
35	Temperate Pacific Freshwater Emergent Marsh	A	C	C-(r)
50	North Pacific Lowland Riparian Forest and Shrubland	A	C	C+
51	Temperate Pacific Freshwater Mudflat	A	B	B-
52	Temperate Pacific Freshwater Mudflat	A	B	C-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.15 Rainbow Farm

At the time of the survey, the majority of the site was recently plowed and barren. Three ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 24. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 24. EIA Summary for Rainbow Farm Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
OW1	North Pacific Oak Woodland	C	D	D(r)
OW2	North Pacific Oak Woodland	C	D	D(r)
OW3	North Pacific Oak Woodland	C	D	D(r)
OW4	North Pacific Oak Woodland	C	D	D(r)
RF1	North Pacific Lowland Riparian Forest and Shrubland	D	C	D(r)
RF2	North Pacific Lowland Riparian Forest and Shrubland	C	D	D(r)
RF3	North Pacific Lowland Riparian Forest and Shrubland	C	D	D(r)
RF4	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-(r)
RF5	North Pacific Lowland Riparian Forest and Shrubland	C	C	C+
WP1	Willamette Valley Wet Prairie	D	C	D(r)
WP2	Willamette Valley Wet Prairie	D	D	D(r)
WP3	Willamette Valley Wet Prairie	D	D	D(r)

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.16 Rock Creek

Three ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 25. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 25. EIA Summary for Rock Creek Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
RC1	Footbridge	NA	NA	NA
RC2	North Pacific Dry-Mesic Douglas-fir Western Hemlock Forest	C	C	C-
RC3	North Pacific Mesic-Wet Douglas Fir-Western Hemlock Forest	C	B	C+

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
RC4	Old road, revegetating	NA	NA	NA
RC5	North Pacific Hardwood-Conifer Swamp	C	B	B-
RC6	North Pacific Hardwood-Conifer Swamp	C	C	C-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.17 Secret River

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 26. One polygon met Element Occurrence criteria (Table 27). It will be added as an extension of the existing element occurrence in WNHP Biotics database located at Devil’s Elbow Marsh and Spruce Swamp. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 26. EIA Summary for Secret River Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
HW	North Pacific Intertidal Freshwater Wetland	B	B	B-
SF1	North Pacific Seasonal Sitka Spruce Forest	B	B	C+
SF2	North Pacific Seasonal Sitka Spruce Forest	B	C	D
WW	North Pacific Intertidal Freshwater Wetland	B	B	B+

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

Table 27. Polygons Meeting Element Occurrence Criteria at Secret River

Polygon ID	USNVC Association	G/S Rank	EO Rank
WW	<i>Picea sitchensis</i> / <i>Cornus sericea</i> / <i>Lysichiton americanus</i> Swamp Forest	G2/S1	B-

3.3.18 Storedahl

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 28. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 28. EIA Summary for Storedahl Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
NPL1	North Pacific Lowland Riparian Forest and Shrubland	C	C	D(r)
NPL2	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-
NPL3	North Pacific Lowland Riparian Forest and Shrubland	C	C	C-
NPL4	North Pacific Lowland Riparian Forest and Shrubland	C	C	D(r)
NPL5	North Pacific Dry-Mesic Douglas-fir Western Hemlock Forest	C	D	C-(r)

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.19 Wallacut River Confluence

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 29. No polygons met Element Occurrence criteria. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 29. EIA Summary for Wallacut River Confluence Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
89	North Pacific Intertidal Freshwater Wetland	B	D	D(r)
91	Temperate Pacific Tidal Salt and Brackish Marsh	C	B	C+
93	North Pacific Intertidal Freshwater Wetland	C	B	B-
94	North Pacific Intertidal Freshwater Wetland	C	B	C+
96	North Pacific Intertidal Freshwater Wetland	C	C	C-
97	North Pacific Intertidal Freshwater Wetland	C	B	C+
98	North Pacific Intertidal Freshwater Wetland	C	C	C-(r)
99	North Pacific Intertidal Freshwater Wetland	C	C	C-(r)
100	North Pacific Intertidal Freshwater Wetland	NA	NA	NA
101	North Pacific Intertidal Freshwater Wetland	C	B	B-
102	North Pacific Intertidal Freshwater Wetland	B	D	D(r)
103	North Pacific Intertidal Freshwater Wetland	C	A	B-
104	North Pacific Intertidal Freshwater Wetland	C	A	B+
105	North Pacific Intertidal Freshwater Wetland	B	D	D(r)
106	North Pacific Intertidal Freshwater Wetland	NA	NA	NA
108	North Pacific Intertidal Freshwater Wetland	B	B	B-
109	Temperate Pacific Tidal Salt and Brackish Marsh	B	B	B-
117	North Pacific Intertidal Freshwater Wetland	B	B	C+
119	North Pacific Intertidal Freshwater Wetland	C	C	D(r)
120	North Pacific Intertidal Freshwater Wetland	NA	NA	NA
121	North Pacific Intertidal Freshwater Wetland	B	B	C+

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
122	Water	NA	NA	NA
123	Water	NA	NA	NA
124	Water	NA	NA	NA
125	Water	NA	NA	NA
126	Temperate Pacific Tidal Salt and Brackish Marsh	NA	NA	NA
1181	North Pacific Intertidal Freshwater Wetland	B	C	C-(r)
1182	Temperate Pacific Tidal Salt and Brackish Marsh	B	C	C-

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

3.3.20 Youngs Wetland

Two ecological systems were observed at this site. The summary for Landscape Context and Condition primary factor ranks and overall EIA ranks are shown in Table 30. EIA Summary for Youngs Wetland Polygons. No polygons met Element Occurrence criteria. However, polygon 323 supports a fen-like wetland. Fens are peatlands—wetlands with organic soils. They reflect distinct ecological conditions relative to other wetland types. Peat depth of at least 40 cm is the typically the standard for classifying organic soils. Peat depths at polygon 323 range from 15-30 cm, but the vegetation and hydrology of the polygon are indicative of a fen. Appendix A lists the metric scores for each polygon. The accompanying Microsoft Excel workbooks contain the full list of metric scores, ranks, associated comments, and species lists.

Table 30. EIA Summary for Youngs Wetland Polygons

Polygon ID	Ecological System	Landscape Context Rank	Condition Rank	EIA Rank
313	Northern Rocky Mountain Conifer Swamp	B	A	B+
314		NA	NA	NA
315	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	C	A	B+
316	Rocky Mountain Alpine-Montane Wet Meadow	B	B	C+
317	Rocky Mountain Alpine-Montane Wet Meadow	B	B	B-
318	Rocky Mountain Alpine-Montane Wet Meadow	B	C	C-(r)
320	Rocky Mountain Alpine-Montane Wet Meadow	B	C	C-
321	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	C	D	D(r)
322	Rocky Mountain Alpine-Montane Wet Meadow	B	B	C-
323	Rocky Mountain Subalpine-Montane Fen	B	B	B-
324	Rocky Mountain Alpine-Montane Wet Meadow	B	C	C-(r)

Note: Landscape Context, Condition, and EIA ranks are auto-calculated based on metric ranks. WNHP ecologists occasionally overrode calculated ranks. See accompanying Excel workbooks for details. The r modifier indicates an EIA rank applied to a ruderal type. NA = not assessed.

4.0 Lessons Learned

This project enabled WNHP to make great strides in our upland EIA metrics and protocols. Numerous modifications were made based on lessons learned during the course of this project:

- As with wetland EIA, upland EIA metrics proved amenable to lumping across Ecological Systems.
- The entirely new “Combined Point/Polygon” method for delineating assessment areas proved to be an effective means of applying the EIA to large and otherwise unwieldy matrix ecosystem occurrences.
- “Seral Class Proportion” (a submetric of Vegetation Structure to be applied to large AAs) proved impractical. The goal of this submetric was to measure the proportion of different seral classes across an upland ecosystem occurrence and determine the degree of deviation from modeled historical proportions. Application of the submetric proved impractical within a rapid, level 2 assessment of a single site.
- Additional metrics developed for this project (Natural Disturbance Regime and Soil Moisture) were tested, but then dropped. These metrics proved either too generalized or duplicative of information already captured within existing metrics.
- We added a number of submetrics and reorganized the text of existing metrics in order to better present the occasionally complex rating criteria. This was particularly useful for Native Plant Composition (VEG3) and Coarse Woody Debris, Snags, and Litter (VEG6).
- This project enabled us to subdivide metric rating language for forested types based on seral class (determined using a key developed by Van Pelt (2007, 2008). For example, a naturally early seral forest (resulting from natural fire or other disturbance) should not be marked down in Vegetation Structure (VEG4) for lacking large, old-growth trees.
- The numeric roll-up weights used to calculate overall EIA rank often resulted in inflated scores relative to our professional opinions of EIA rank.
- Spurred in part by this observation--and because composition rarely varied as much as structure across logged forest stands--metrics dealing with structure, regeneration, and litter (VEG4-6) were assigned greater weight during roll-up calculations for forested ecosystem types.
- AA units must contain only a single Ecological System or USNVC Plant Association. Existing maps with polygons that span multiple types will require additional (often field-based) effort to modify boundaries.
- This project helped demonstrate the flexibility of the EIA framework across a wide range of ownerships, management objectives, and ecosystem types.

Literature Cited

- Comer, P., and K. Schulz. 2007. Standardized Ecological Classification for Meso-Scale Mapping in Southwest United States. *Rangeland Ecology and Management* 60 (3) 324-335.
- Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. *Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems*. NatureServe, Arlington, VA.
- Crawford, R.C, J. Rocchio, and E. Aubert. 2011. Using the Ecological Integrity Assessment Framework for Identifying Protection and/or Restoration Priorities in the Washington State Park System. Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report 2011-02. Olympia, WA.
- Crawford, R.C and J. Rocchio. 2013. Willapa NWR Phase 3 Ecological Integrity Assessment Project. Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report 2013-10. Olympia, WA.
- Faber-Langendoen, D., J. Rocchio, M. Shafale, C. Nordman, M. Pyne, J. Teague, and T. Foti. 2006. Ecological Integrity Assessment and Performance Measures for Wetland Mitigation. NatureServe, Arlington VA. Report Submitted to U.S. Environmental Protection Agency. Available online at: http://www.natureserve.org/getData/eia_integrity_reports.jsp
- Faber-Langendoen, D., G. Kudray, C. Nordman, L. Sneddon, L. Vance, E. Byers, J. Rocchio, S. Gawler, G. Kittel, S. Menard, P. Comer, E. Muldavin, M. Schafale, T. Foti, C. Josse, J. Christy. 2008. Ecological Performance Standards for Wetland Mitigation based on Ecological Integrity Assessments. Report Submitted to U.S. Environmental Protection Agency. NatureServe, Arlington, VA. + Appendices
- Faber-Langendoen, D., W. Nichols, F.J. Rocchio, J. Cohen, J. Lemly, Kathleen Walz. 2016a. Ecological Integrity Assessments and the Conservation Value of Ecosystem Occurrences: *General Guidance on Core Heritage Methodology for Element Occurrence Ranking*. NatureServe, Arlington, VA.
- Faber-Langendoen, D., W. Nichols, F.J. Rocchio, K. Walz, and J. Lemly. 2016b. An Introduction to NatureServe's Ecological Integrity Assessment Method. NatureServe, Arlington, VA.
- Faber-Langendoen, D., W. Nichols, J. Rocchio, K. Waltz, J. Lemly, R. Smyth, and K. Snow. 2016c. Rating the Condition of Reference Wetlands Across States: NatureServe's Ecological Integrity Assessment Method. *National Wetland Newsletter*, Vol. 38, No. 3. Online: http://file.dnr.wa.gov/publications/amp_nh_ref_wetland_condition.pdf
- Faber-Langendoen, D., B. Nichols, K. Walz, J. Rocchio, J. Lemly, and L. Gilligan. 2016d. NatureServe Ecological Integrity Assessment: Protocols for Rapid Field Assessment of Wetlands. V2.0. NatureServe, Arlington, VA. + Appendices.

- Faber-Langendoen, J. Lemly, W. Nichols, J. Rocchio, K. Waltz, and R. Smyth. 2019. Development and evaluation of NatureServe's multi-metric ecological integrity assessment method for wetland ecosystems. *Ecological Indicators* Vol. 104, September 2019. Pp. 764-775.
- Harwell, M.A., V. Myers, T. Young, A. Bartuska, N. Gassman, J. H. Gentile, C. C. Harwell, S. Appelbaum, J. Barko, B. Causey, C. Johnson, A. McLean, R. Smola, P. Templet, and S. Tosini. 1999. A framework for an ecosystem integrity report card. *BioScience* 49: 543-556.
- Land Trust Alliance. 2015. National Land Trust Census Report. *Our Common Ground and Collective Impact*. Land Trust Alliance, Washington D.C.
- Rocchio, F.J. and R.C. Crawford. 2009. Monitoring Desired Ecological Conditions on Washington State Wildlife Areas Using an Ecological Assessment Framework. Prepared for Washington Department of Fish and Wildlife. Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report 2009-13. Olympia, WA. Available at: https://www.dnr.wa.gov/publications/amp_nh_wdfw_eia_final.pdf
- Rocchio, F.J. and R.C. Crawford. 2015. Ecological Systems of Washington State. A Guide to Identification. Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report 2015-04. Olympia, WA. Available at: https://www.dnr.wa.gov/publications/amp_nh_ecosystems_guide.pdf
- Rocchio, F.J. R.C. Crawford, and T. Ramm-Granberg. 2016. Field Manual for Applying Rapid Ecological Integrity Assessment in Wetlands and Riparian Areas in Washington State. Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report 2016-01. Olympia, WA.
- Rocchio, F.J. R.C. Crawford, and T. Ramm-Granberg. 2017. Field Manual for Applying Rapid Ecological Integrity Assessment in Upland Plant Communities of Washington (draft). Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report XXXX-XX. Olympia, WA.
- Rocchio, F.J. R.C. Crawford, and T. Ramm-Granberg. *In Progress*. Ecological Classification of Native Wetland & Riparian Vegetation of Washington. A Guide to Wetland Subgroups. Washington Department of Natural Resource, Natural Heritage Program. Natural Heritage Program Technical Report XXXX-XX. Olympia, WA.
- USACE (U.S. Army Corps of Engineers). 2003. The U.S. Army Corps of Engineers' Guidance for Wetland and Stream Mitigation Banking in the Omaha District. Prepared by Karen Lawrence coordinated in consultation with the following: Dr. Robert Brumbaugh, Omaha District's field office personnel, Mike Gilbert, Dave LaGrone, Nebraska Mitigation Review Team, Mr. Jack Chowning, and many others.
- USACE (U.S. Army Corps of Engineers). 2005. Chicago District Regional Permit Program. U.S. Army Corps of Engineers, Chicago District, Chicago, IL.

- USACE (U.S. Army Corps of Engineers). 2006. Detroit District, U.S. Army Corps of Engineers Mitigation Guidelines and Requirements. U.S. Army Corps of Engineers, Detroit District, Detroit, MI.
- U.S. Environmental Protection Agency (EPA). 2002. Methods for Evaluating Wetland Condition: Wetlands Classification. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-017.
- Van Pelt R. 2007. *Identifying mature and old forests in western Washington*. Washington State Department of Natural Resources, Olympia, WA.
- Van Pelt R. 2008. *Identifying old trees and forests in eastern Washington*. Washington State Department of Natural Resources, Olympia, WA.
- Washington Natural Heritage Program (WNHP). 2018. *State of Washington Natural Heritage Plan*. Department of Natural Resources, Olympia, WA.
- Young, T. F. and S. Sanzone (editors). 2002. A framework for assessing and reporting on ecological condition. Prepared by the Ecological Reporting Panel, Ecological Processes and Effects Committee. EPA Science Advisory Board. Washington, DC. 142 p.

Appendix A. EIA Metric Ranks

Metrics: LAN1. Contiguous Natural Land Cover; LAN2. Land Use Index; BUF/EDG 1. Perimeter with Natural Buffer; BUF/EDG2. Width of Natural Buffer; BUF/EDG3. Condition of Natural Buffer; VEG1. Relative Cover of Native Plants; VEG2. Absolute Cover of Invasive Nonnative Plants; VEG3. Native Plant Composition; VEG4. Vegetation Structure; VEG5. Woody Regeneration; VEG6. Coarse Woody Debris, Snags, and Litter; HYD1. Water Source; HYD2. Hydroperiod; HYD3. Hydrological Connectivity; SOI1. Soil Condition; SIZ1. Comparative Size.

EIA Ranks: A = excellent ecological integrity; B = good ecological integrity; C = fair ecological integrity; and D = poor ecological integrity. NA = not assessed. See Rocchio et al. 2017 for further details.

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Atfalati	OW1	C	C	D	D	D	D	A	D	D	D	D				D	
Atfalati	OW2	C	C	D	D	D	D	A	D	D	D	D				D	
Atfalati	OW3	C	C	D	D	D	D	A	D	D	D	D				D	
Atfalati	OW4	C	C	D	D	D	D	D	D	D	D	D				D	
Atfalati	OW5	C	C	D	D	D	D	A	D	D	D	D				D	
Atfalati	OW6	C	C	D	D	D	D	D	D	D	D	D				D	
Atfalati	OW7	C	C	D	D	D	D	A	D	D	D	D				D	
Atfalati	OW8	C	C	D	D	D	D	A	D	D	D	D				D	
Atfalati	RF1	C	C	C	C	C	D	D	D	D	D	D	C	C	C	D	
Atfalati	RF2	C	C	C	C	C	B	C	C	C	C	C	C	C	C	C	
Atfalati	RF3	C	C	D	C	C	D	D	D	D	C	D	C	B	B	D	
Atfalati	RF4	C	C	C	C	C	D	D	D	D	D	D	C	C	C	D	
Atfalati	RF5	C	C	C	C	C	D	D	D	D	D	D	C	C	C	D	
Atfalati	RF6	C	C	C	C	C	B	C	C	C	C	C	C	C	C	C	
Atfalati	RF7	C	C	C	C	C	D	D	D	B	C	B	C	C	C	B	
Atfalati	RF9	C	C	C	D	C	A-	C	C	B	D	C	C	C	C	B	
Atfalati	WP1 & WP2	C	C	D	D	D	D	C	D	D			C	C	C	D	
Barlow Trail	RF1	C	C	A	B	B	B	C-	C	C	C	C	B	B	B	A	
Barlow Trail	RF10	C	C	A	A	B	D	D	C	D	C	D	B	B	B	A	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Barlow Trail	RF11	C	C	A	B	B	B	C	B	B	A	C	B	B	B	A	
Barlow Trail	RF2	C	C	A	B	B	B	C	B	C	C	C	B	B	B	A	
Barlow Trail	RF3	C	C	B	B	B	C	C	C	C	B	C	B	B	B	A	
Barlow Trail	RF4	C	C	A	A	B	D	D	C	C	C	C	B	B	B	B	
Barlow Trail	RF5	C	C	A	A	B	B	C	A	A	A		B	A	A	A	
Barlow Trail	RF7	C	C	A	A	B	A	A	A	C	B	C	B	B	B	B	
Barlow Trail	RF8	C	C	A	B	B	B	C	C	C	A	C	B	C	C	C	
Barlow Trail	RF9	C	C	A	B	B	C	C-	B	C	A	C	B	A	A	A	
Barlow Trail	UF2	C	C	B	C	B	A	A	B	C	C	D				A	
Barlow Trail	UF3	C	C	B	C	B	A	A	B	C	C	D				A	
Barlow Trail	UP1	C	C	C	C	B	A	A	A	B	A	C				A	
Chinook	HW1	C	C	B	B	C	D	D	D	C			B	C	B	B	
Chinook	HW2-N	C	C	C	D	C	B	C-	D	C			D	D	D	A	
Chinook	HW2-S	C	C	B	B	C	A	B	D	C			D	D	D	A	
Chinook	MF	C	C	C	C	A	A	A	A	A			A	A	B	A	
Chinook	SSF1-E	C	C	C	C	B	A-	B	B	C	A	C	B	B	B	A	
Chinook	SSF1-N	C	C	C	B	B	A-	B	C	D	D	D	A	B	B	A	
Chinook	SSF1-S	C	C	B	C	B	A-	B	A	B	A	C	A	B	B	A	
Chinook	SSF2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chinook	WW1-N	C	C	B	C	B	A-	B	A	A	A	B	B	C	C	A	
Chinook	WW1-S	C	C	B	C	C	D	D	D	D	C	C	B	B	B	B	
Chinook	WW2																
Devil's Elbow	HW	C	C	B	C	C	D	D	D	D			B	B	C	B	
Devil's Elbow	LRF1	C	C	A	A	C	D	D	D	D	D	D	C	D	D	D	
Devil's Elbow	LRF2	C	C	B	B	C	C	D	B	B	B	D	C	D	D	D	
Devil's Elbow	WW	C	C	A	B	C	A-	B	A	B	B	C	B	B	B	A	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SI1
Four Sisters	1	C	C	A	A	C	C	C-	C	B			A	A	A	B	
Four Sisters	2	C	C	A	A	C	C	C-	C	B			A	A	A	B	
Four Sisters	3	C	C	A	A	C	B	B	B	B			A	A	A	B	
Four Sisters	4	C	C	A	A	C	B	B	B	B			A	A	A	B	
Four Sisters	5	C	C	A	A	C	A	A	B	B			A	A	A	B	
Four Sisters	6	C	C	A	A	C	C	D	C	C						B	
Four Sisters	7	C	C	A	B	C	D	D	C	B	B	C				B	
Four Sisters	370	C	C	A	A	C	C	B	B	B			A	A	A	B	
Germany Creek	NM1-SW	C	C	C	C	B	A	A	B	D	C	C				B	
Germany Creek	NPI1	C	C	A	A	B	D	D	C	B	B		B	A	A	A	
Germany Creek	NPL1	C	C	A	B	D	D	D	C	B			B	A	B	A	
Germany Creek	NPL10	C	C	B	C	C	D	D	D	D	B	D	B	A	B	D	
Germany Creek	NPL11	C	C	A	B	C	D	D	C	C	B		B	A	A	A	
Germany Creek	NPL12-RIP	C	C	C	C	B	C	C-	B	C	C	D	B	C	A	B	
Germany Creek	NPL12-UP	C	C	B	C	B	A	A	B	D	D	D				A	
Germany Creek	NPL2	C	C	B	C	D	D	D	D	D			C	D	D	D	
Germany Creek	NPL3-N	C	C	A	C	C	D	D	D	D	D	D	B	B	B	B	
Germany Creek	NPL3-S	C	C	B	C	D	D	D	D	C	B	D	D	D	D	D	
Germany Creek	NPL4	C	C	B	B	C	C	C-	B	C	B	C	B	A	A	B	
Germany Creek	NPL5	C	C	B	B	B	D	D	B	C	B	C	B	A	A	B	
Germany Creek	NPL6	C	C	A	B	C	D	D	C	C	C	B	B	B	B	B	
Germany Creek	NPL7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Germany Creek	NPL8	C	C	A	C	C	D	D	D	D	D	D	B	B	B	B	
Germany Creek	NPL9	C	C	A	B	D	D	D	D	D	D	D	B	B	B		
Germany Creek	NPM1-E	C	C	B	C	B	A	A	A	C	B	C				B	
Germany Creek	NPM1-NW	C	C	A	A	B	A	A	C	D	D	D				C	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Germany Creek	NPM1-RIP	C	C	A	B	B	B	B	C	D	B	D	B	A	A	C	
Germany Creek	NPM2	C	C	A	B	C	D	D	D	C			B	B	B	B	
Kerry Island	DW	C	C	A	A	C	D	B	D	D			C	D	D	D	
Kerry Island	HW	C	C	A	B	C	D	D	C	C			B	B	B	C	
Kerry Island	LRF1	C	C	B	B	C	D	D	C	C	B	D	C	D	D	D	
Kerry Island	LRF2	C	C	C	C	C	D	C-	D	D	C	D	C	D	D	D	
Kerry Island	LRF3	C	C	C	C	C	D	D	D	D	D	D	C	D	D	D	
Kerry Island	WW1	C	C	A	B	C	D	D	D	C	C	D	B	B	B	C	
Kerry Island	WW2	C	C	A	A	C	C	D	C	D	B	D	B	B	C	C	
Klickitat Canyon South	1	A	C	C	C	A	B	C	B	B	A	B				B	
Klickitat Canyon South	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	3	A	C	D	C	B	C	C-	B	C	C	C				B	C
Klickitat Canyon South	4	A	C	C	C	B	B	C	D	D	D	D				C	
Klickitat Canyon South	5	A	C	A	A	B	D	D	C	C	C	C				A	C
Klickitat Canyon South	6	A	C	B	C	C	A-	B	B	C	A	B				B	D
Klickitat Canyon South	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	8	A	C	A	B	A	A	A	A	A	A	A				A	
Klickitat Canyon South	9	A	C	A	A	A	C	B	A	A	A	A				A	
Klickitat Canyon South	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Klickitat Canyon South	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Klickitat Canyon South	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Klickitat Canyon South	14	A	C	A	A	B	A	A	A	B	B	B				A	
Klickitat Canyon South	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	17	A	C	C	C	A	A	A	A	A	A	A				A	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SI1
Klickitat Canyon South	45	A	C	A	B	B	C	C	C	D	C	C				B	C
Klickitat Canyon South	46	A	C	C	C	B	A	A	A	A	A	A				A	B
Klickitat Canyon South	47	A	C	A	B	B	A-	B	B	A		A	A	A	A	A	C
Klickitat Canyon South	48	A	C	A	A	C	D	D	D	D						D	
Klickitat Canyon South	49	A	C	B	C	B	A	A	A	C	B	C				B	
Klickitat Canyon South	50	A	C	A	A	B	C	C-	B	A		B	A	A	A	A	
Klickitat Canyon South	51	A	C	A	B	B	D	D	C	C	B	B				C	
Klickitat Canyon South	52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	53	A	C	B	B	B	A-	B	A	C	B	C	A	A	A	A	C
Klickitat Canyon South	54	A	C	C	B	B	C	C	C	C	B	C				A	
Klickitat Canyon South	55	A	C	C	C	B	A	A	A	B	A	B	A	A	A	A	B
Klickitat Canyon South	56	A	C	B	B	B	A	A	A	A	B	A				A	
Klickitat Canyon South	58	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	59	A	C	C	C	B	A	A	A	C	A	B				B	
Klickitat Canyon South	60	A	C	A	B	B	A-	B	C	D	D	C				B	C
Klickitat Canyon South	61	A	C	B	C	B	A	A	B	C	C	C				B	
Klickitat Canyon South	62	A	C	A	A	B	A-	B	B	C	C	B				A	
Klickitat Canyon South	63	A	C	D	D	B	A	A	B	C	B	C				B	
Klickitat Canyon South	64	A	C	C	C	B	A	B	A	C	A	C				B	
Klickitat Canyon South	65	A	C	C	C	B	A	A	A	C	A	C				B	
Klickitat Canyon South	66	A	C	C	C	B	A-	A	A	C	A	C				B	
Klickitat Canyon South	67	A	C	A	A	C	C	C-	B	C		A				C	
Klickitat Canyon South	68	A	C	A	B	A	A	A	B	C	A	B				A	D
Klickitat Canyon South	69	A	C	B	B	C	A	A	A	B	A	C	A	C	C	B	C
Klickitat Canyon South	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klickitat Canyon South	71	A	C	B	C	C	C	C-	B	A	A	A				A	D

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Logging Camp	193	B	C	A	A	B	B	C	B	C	C	D				A	
Logging Camp	194	B	C	A	A	C	A	A	A	B	A	C	A	A	A	A	C
Logging Camp	195	B	C	B	A	B	C	D	B	C	C	C				B	C
Logging Camp	196	B	C	A	A	C	D	D	C	B		C				A	
Logging Camp	197	B	C	A	A	C	C	C-	B	C	B	D				A	
Logging Camp	198	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Logging Camp	199	B	C	A	A	C	D	D	D	C						A	
Logging Camp	201	B	C	A	A	B	A-	A	A	C	C	C				B	
Logging Camp	1951	B	C	A	A	A	A-	B	A	B	B	B				A	C
Logging Camp	1952	B	C	B	B	A	A	A	A	C	A	D				B	D
Logging Camp	1953	B	C	A	B	B	D	D	C	D		B				C	
Logging Camp	1954	B	C	B	B	B	A-	B	A	B	A	B	A	A	A	B	D
Logging Camp	1955	B	C	A	A	B	D	D	C	B	B	B				A	C
Logging Camp	1956	B	C	A	A	C	D	D	B	A	B	A				A	C
Lower Elochoman Forest	8	D	C	C	C	C	D	D	C	C	C	C	B	B	B	B	
Lower Elochoman Forest	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Elochoman Forest	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Elochoman Forest	12	D	C	C	C	C	D	D	D	D	D	D	B	C	C	D	
Lower Elochoman Forest	13	D	C	D	D	D	D	D	D	D	D	D	B	C	C	D	
Lower Elochoman Forest	15	D	C	C	C	C	C	C-	C	C	C	C	B	B	B	C	
Lower Elochoman Forest	16	D	C	B	C	D	D	D	D	D	D	D	B	B	B	C	
Lower Elochoman Forest	17	D	C	D	D	D	D	D	D	C	C	D	B	B	D	C	
Lower Elochoman Forest	18	D	C	C	C	C	D	D	C	C	C	C	B	B	B	B	
Lower Elochoman Forest	330	D	C	D	D	D	D	D	D	D	D	D	B	C	C	D	
Lower Elochoman Forest	9N	D	C	C	D	C	D	D	D	D	D	D	B	C	B	C	
Lower Elochoman Forest	9S	D	C	C	C	C	D	D	D	D	D	D	B	C	B	C	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Margerum Ranch	202	B	B	A	A	C	D	D	C	C						C	
Margerum Ranch	203	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margerum Ranch	204	B	B	A	A	B	C	D	D	C	C	C				B	
Margerum Ranch	205	B	B	A	A	B	A-	B	A	B	C	C				B	B
Margerum Ranch	206	B	B	A	A	B	A-	B	C	B	C	C				B	
Margerum Ranch	207	B	B	A	A	B	A-	B	A	A	A	A				A	D
Margerum Ranch	208	B	B	A	A	B	D	D	C	A	B	A				B	C
Margerum Ranch	209	B	B	A	B	B	A	A	B	B			A	B	C	C	
Margerum Ranch	210	B	B	A	A	B	A	B	A	A	A	A				B	C
Margerum Ranch	211	B	B	A	B	B	C	C	B	A	A	A	A	A	A	A	C
Margerum Ranch	213	B	B	A	A	B	D	D	C	C						B	
Margerum Ranch	214	B	B	A	A	B	A	A	A	B	A	C				A	B
Margerum Ranch	215	B	B	A	B	B	D	D	C	B	A	C	A	A	A	A	D
Margerum Ranch	218	B	B	A	A	B	A-	B	A	C	B	C				B	
Margerum Ranch	219	B	B	A	A	B	C	D	B	B						B	
Margerum Ranch	220	B	B	A	A	B	B	C	A	A	A	B				B	B
Margerum Ranch	221	B	B	C	C	B	D	D	D	D	D	D				C	
Margerum Ranch	222	A	C	A	B	C	A-	B	B	B	B	C				B	
Margerum Ranch	223	B	B	A	A	B	A-	B	B	B	C	C				B	
Margerum Ranch	224	B	B	B	B	B	C	D	B	C	C	C	A	A	A	A	
Margerum Ranch	225	B	B	A	B	B	D	D	C	C	B	B	A	A	A	A	C
Margerum Ranch	226	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Margerum Ranch	227	B	B	A	A	B	C	D	C	C						B	
Margerum Ranch	228	B	B	A	A	B	A	A	A	B	C	C				B	
Margerum Ranch	229	B	B	A	A	B	A	A	B	C	C	B				B	
Margerum Ranch	230	B	B	A	A	B	A	A	A	A	B	A				B	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Margerum Ranch	231	B	B	A	A	C	D	D	D	D						C	
Margerum Ranch	232	B	B	A	A	B	D	C	C	B						A	
Margerum Ranch	233	B	B	A	B	B	D	D	C	B	B	C	A	A	A	A	C
Mill Creek Ridge	D1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mill Creek Ridge	F1	C	C	A	B	C	D	D	D	D		C				B	
Mill Creek Ridge	F2	C	C	A	B	B	D	D	D	D		D				B	
Mill Creek Ridge	G1	C	C	A	A	C	D	D	D	D		C				C	
Mill Creek Ridge	G1-N	C	C	A	A	C	D	D	C	B		B				B	
Mill Creek Ridge	G2	C	C	A	B	C	D	D	D	D		C				B	
Mill Creek Ridge	G3	C	C	A	B	C	D	D	D	D		C				B	
Mill Creek Ridge	O1	C	C	B	C	C	D	D	D	B	B	B				B	A
Mill Creek Ridge	O2	C	C	C	C	C	C	C-	B	C	B	B				B	
Mill Creek Ridge	O3	C	C	B	B	C	D	D	D	B	A	B				B	
Mill Creek Ridge	O4	C	C	C	C	B	D	C-	D	D	D	D				D	
Mill Creek Ridge	R1	C	C	A	A	C	D	D	D	B	A	B				B	A
North Nemah	BM	C	C	A	A	B	D	D	B	B			A	A	A	A	
North Nemah	HW-E	C	C	A	B	B	B	C	A	A			A	A	A	A	
North Nemah	HW-W & HW-M	C	C	A	B	B	C	D	B	B			A	A	A	A	
North Nemah	LRF	C	C	A	B	B	A-	B	A	A		A	B	A	A	A	
North Nemah	SSF1-E	C	C	A	B	B	A	B	D	D	C	D				B	
North Nemah	SSF1-West	C	C	B	B	B	A	B	A	C	A	C				B	
North Nemah	SSF2	C	C	C	C	B	A	A	C	D	D	D				B	
North Nemah	WW	C	C	A	B	B	A	B	A	B	B	C	A	A	A	A	
Pierce Island	30	A	A	A	A	B	C	D	C	A	A	B	C	C	A	A	
Pierce Island	31	A	A	A	A	B	A-	B	A	A		C	C	C	A	A	A
Pierce Island	32	A	A	A	A	B	D	D	D	B	B	C	C	C	A	A	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SI21
Pierce Island	33	A	A	A	A	B	C	D	C	B			C	C	A	A	
Pierce Island	35	A	A	A	A	B	D	D	D	C			C	C	A	A	
Pierce Island	50	A	A	A	A	B	D	D	D	B	B	C	C	C	A	A	
Pierce Island	51	A	A	A	A	B	D	B	B	A			C	C	A	A	
Pierce Island	52	A	A	A	A	B	C	B	B	A			C	C	A	B	D
Rainbow Farm	OW1	C	C	D	D	D	D	A	D	D	D	D				D	
Rainbow Farm	OW2	C	C	D	D	D	D	D	D	D	D	D				D	
Rainbow Farm	OW3	C	C	D	D	D	D	D	D	D	D	D				D	
Rainbow Farm	OW4	C	C	D	D	D	D	A	D	D	D	D				D	
Rainbow Farm	RF1	C	C	D	D	D	D	D	D	D	D	D	B	C	C	C	
Rainbow Farm	RF2	C	C	C	C	D	D	D	D	D	D	D	B	C	C	D	
Rainbow Farm	RF3	C	C	C	C	D	D	D	D	D	D	D	B	C	C	D	
Rainbow Farm	RF4	C	C	B	B	D	D	D	D	D	C	D	B	C	C	C	
Rainbow Farm	RF5	C	C	C	C	D	B	C	B	C	C	C	B	C	C	C	
Rainbow Farm	WP1	C	C	D	D	D	D	C	D	D			B	C	C	D	
Rainbow Farm	WP2	C	C	D	D	D	D	D	D	D			B	C	C	D	
Rainbow Farm	WP3	C	C	D	D	D	D	D	D	D			B	C	C	D	
Rock Creek	RC1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Rock Creek	RC-2	C	C	B	C	B	A	B	B	D	D	D				C	
Rock Creek	RC3	C	C	C	C	B	A	A	B	D	C	D				B	
Rock Creek	RC4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Rock Creek	RC-5	C	C	C	D	B	A	A	B	D	B	D	A	A	A	B	
Rock Creek	RC-6	C	C	C	C	B	B	C	C	D	C	D	A	B	B	B	
Secret River	HW	C	C	A	A	A	C	D	C	C			B	A	A	A	
Secret River	SF1	C	C	C	C	A	A-	B	B	C	A	C				B	
Secret River	SF2	C	C	B	B	A	A	B	D	D	D	D				B	

Site Name	PolygonID	LAN1	LAN2	BUF1/ EDG1	BUF2/ EDG2	BUF3/ EDG3	VEG1	VEG2	VEG3	VEG4	VEG5	VEG6	HYD1	HYD2	HYD3	SOI1	SIZ1
Wallacut River Confluence	121	C	C	A	C	B	B	C	B	B	B	B	B	B	A	A	
Wallacut River Confluence	122	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wallacut River Confluence	123	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wallacut River Confluence	124	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wallacut River Confluence	125	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wallacut River Confluence	126	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Wallacut River Confluence	1181	C	C	A	C	B	D	D	D	D	D	D	B	B	A	D	
Wallacut River Confluence	1182	C	C	A	C	B	D	D	C	C	C	B	B	B	A	C	
Youngs Wetland	313	C	C	A	A	C	A	A	A	B	A	B	A	A	B	B	
Youngs Wetland	314	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Youngs Wetland	315	C	C	A	B	B	A	A	A	C	A	B				A	
Youngs Wetland	316	C	C	A	A	C	B	C	C	B			A	C	C	C	
Youngs Wetland	317	C	C	A	A	B	B	C	B	B			A	C	C	B	
Youngs Wetland	318	C	C	A	A	B	D	C-	D	D			A	D	D	B	
Youngs Wetland	320	C	C	A	A	C	D	D	C	C			A	C	C	C	
Youngs Wetland	321	C	C	A	A	C	D	D	D	D	D	C				C	
Youngs Wetland	322	C	C	A	A	C	A-	B	C	C			A	C	C	C	
Youngs Wetland	323	C	C	A	A	C	A-	B	B	B	B		A	B	B	B	
Youngs Wetland	324	C	C	A	A	C	D	C-	C	C			A	C	C	C	