

WHAT HAPPENED HERE?

OAK SYSTEM CLASSIFICATION AND ASSESSMENT IN A COMPLEX LANDSCAPE



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EAST
CASCADES
OAK
PARTNERSHIP



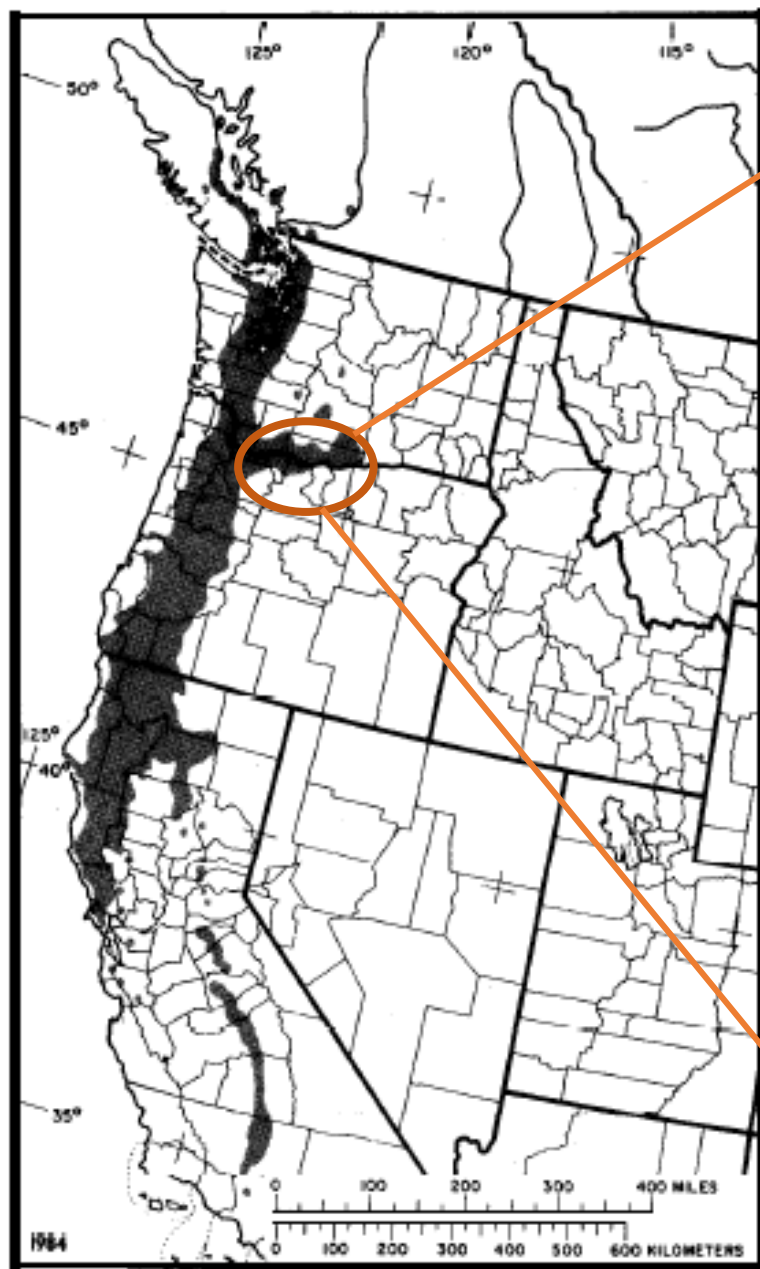
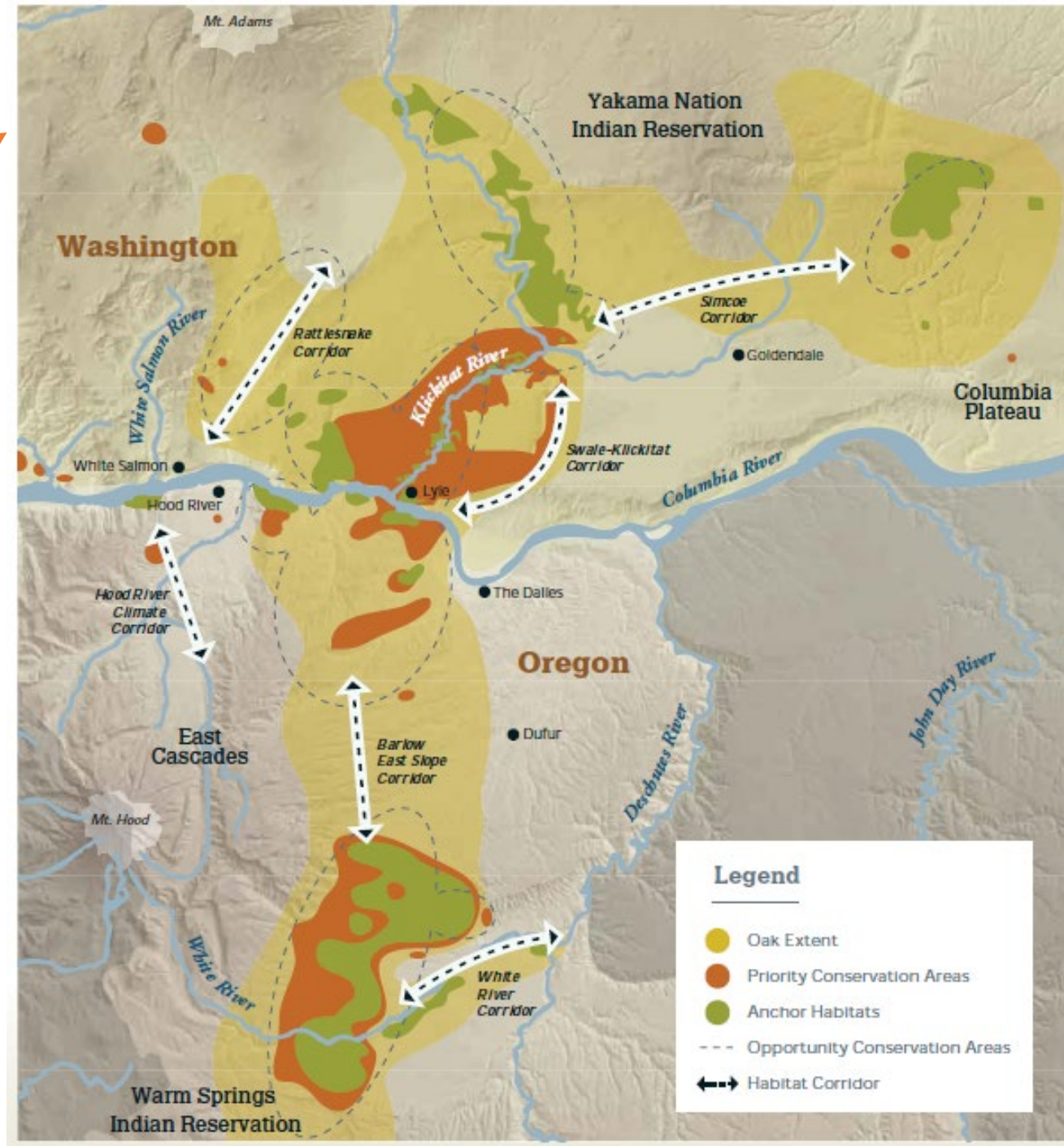


Figure 1—The native range of Oregon white oak.



ECOP 2020 Strategic Plan

Vision: Oak systems are abundant, diverse, and healthy, supporting rich biodiversity and human uses for generations to come.

Mission: We empower people to make decisions and take actions that improve outcomes for Oregon white oak systems.

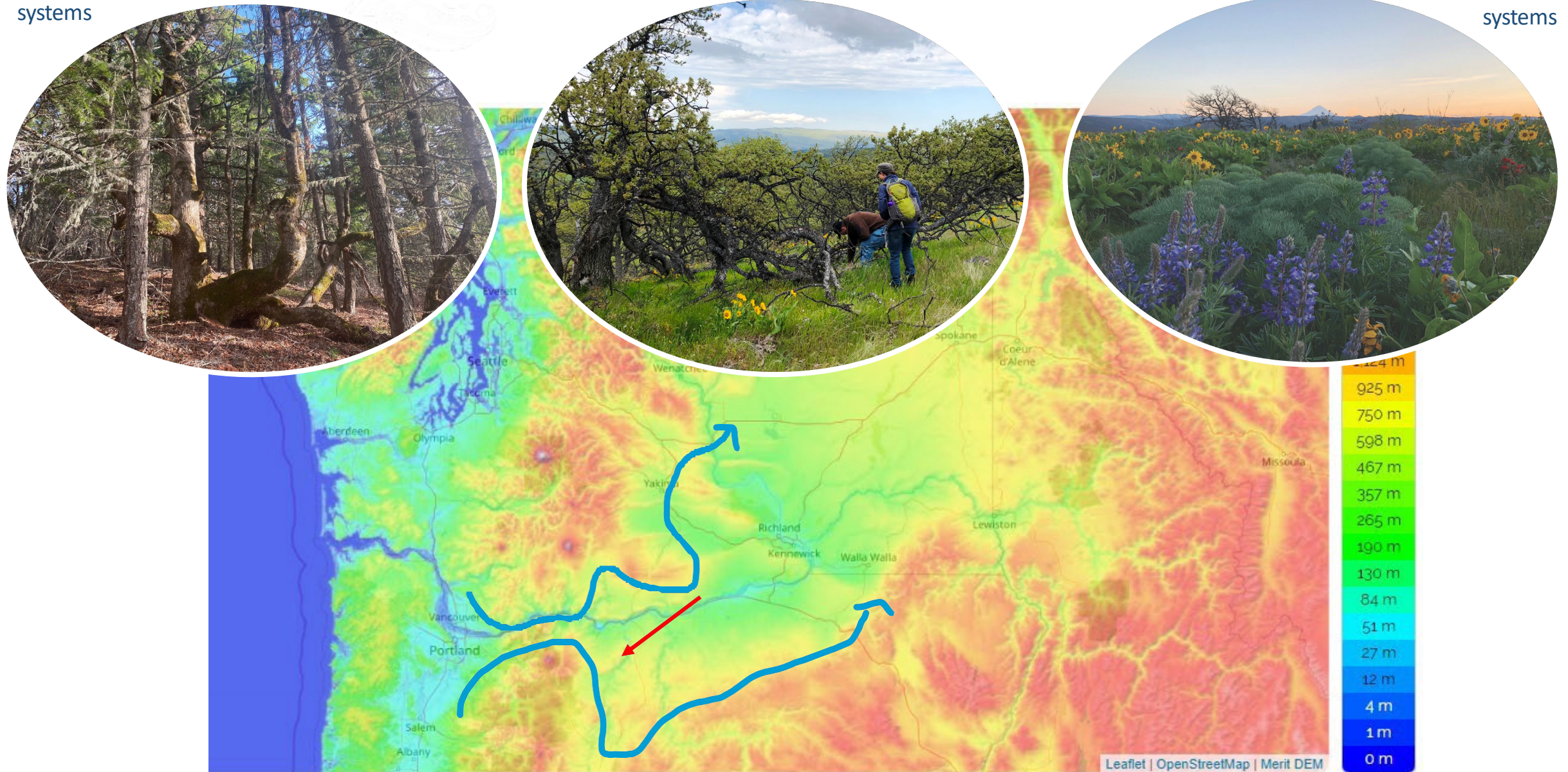
Limiting Factor:

Management uncertainty

Develop stewardship projects on a strong research, monitoring, and adaptive management framework.

- *Deploy standardized assessment and monitoring tools*
- *Develop research and community learning projects that address key questions*
- *Establish and share management guidance*





GORGE GAP FLOW: Marine air flows through the Columbia River Gorge, creating unique climate conditions that promote endemism and allow establishment of Oregon white oak



Open Oak Woodland + Savanna

Varies from grasslands with scattered oaks to more woodland-like stands. At low elevations, they occur on a variety of sites, while typically restricted to very dry sites at mid- and higher-elevations, like balds, steep slopes, and shallow soils.



Closed Oak Woodland

Characterized by a relatively closed canopy. At low elevations, they appear on wetter sites; at mid- and higher elevations, they're generally restricted to dry and very dry sites.



Oak Forest

Characterized by a nearly closed canopy, high-levels of competition lead to inverted-vase and columnar-shaped tree crowns with limited branching and foliar volume. Sub-canopy on dry sites is devoid of woody vegetation; on wetter sites, they can be densely vegetated.



Mixed Oak-Conifer Forest + Woodland

On dry sites, more open woodland savanna with pine. On wetter sites, more closed woodlands with fir and pine. Both habitats occur in transition zones or on north-facing slopes and terraces. Found in wetter sites at low elevations, while restricted to dry/very dry sites at mid- and higher-elevations.



Riparian Oak

Mixed stands of oak and various hardwoods found in ravines and creeks at lower elevations. They often grow straight and tall, with larger diameters, than similar oak stands on dry soils.



Forests With Oak

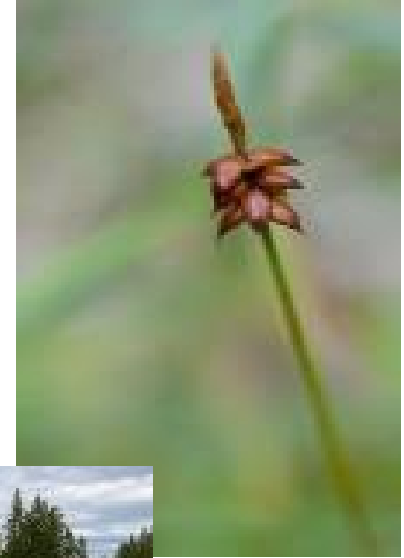
Mixed conifer stands with oak components in the understory, or on bands of shallow soils and balds.



What Does WNHP Do?

Catalogue (classify)

- Fine filter – rare species / rare ecosystems
- Coarse filter – high-quality examples of ecosystem types



Inventory

- Are they common? rare?
- Where are they? ecological condition?



Conservation planning

- What sites are in need of conservation action?
- What are the management needs of the biological feature(s) and of the site(s)?



An aerial photograph of a forest stream. The stream flows from the top center towards the bottom center of the frame. The banks are covered in dense, green coniferous trees. The water in the stream is a light, milky brown color, suggesting sediment or organic matter. The overall scene is a natural, undisturbed landscape.

WHAT IS ECOLOGICAL INTEGRITY?

"the structure, composition, function and connectivity of an ecosystem operating within the bounds of natural or historical disturbance regimes"

"the ability of any ecosystem to support and maintain a full suite of organisms with species composition, diversity, and function comparable to similar systems in an undisturbed state"

Lindemayer and Franklin 2002; Young and Sanzone 2002; Parrish et al. 2003; Karr and Dudley 1981

What is an Ecological Integrity Assessment (EIA)?

- Evaluates current condition of major ecological factors (MEFs)
- **Metric-based approach**
 - Multi-metric index to assess levels of integrity associated with MEFs
 - Metric ratings reflect deviations from natural range of variability
 - Metric ratings roll-up into overall score



- Landscape Context
- Vegetation
- Hydrology
- Buffer/Edge
- Soils
- Size (optional)

Current Condition Assessment Tool

Draft review

Purpose of the tool:

1. Ground truth model results
2. Serve as a basis for management decision making
 - Discern probable historical condition
 - Assess current condition
 - Track trends in condition
3. Inform conservation priorities
 - Improving model outputs
 - Sort by metrics/evaluate restoration need

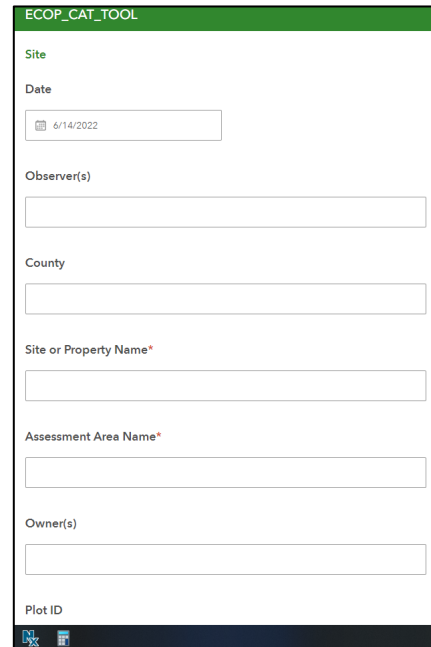
Limitations of the tool:

Historical NRV – limited resolution

Climate change

Breadth of deployment

Complexity of analysis



The screenshot shows a web form titled "ECOP_CAT_TOOL" with a green header. The form contains several input fields: "Site" (a label), "Date" (with a calendar icon and the date 6/14/2022), "Observer(s)" (a text box), "County" (a text box), "Site or Property Name*" (a text box), "Assessment Area Name*" (a text box), "Owner(s)" (a text box), and "Plot ID" (a label). At the bottom left, there are small icons for a printer and a document.



Characterizing Historical Condition...



Clues like the growth forms of large old trees help indicate historical condition

Indicators of historical condition :

- Species and age class of vegetation
- Oak crown structure and evidence of pruning
- Evidence of fire or disturbance
- Landscape context
- Soil type and other abiotic factors

These are incorporated into a dichotomous key that helps the user choose the best module for assessment.

1. Are you in a riparian area or on a slope strongly influenced by a riparian area?
 - YES: RIPARIAN OAK SYSTEM MODULE
 - NO: Go to 2.
2. Are legacy* oak or stumps present? *Legacy oak are live or dead oak trees with deeply furrowed bark, large limbs (live, dead, or dropped) and may include a variety of stem morphologies including clonal & single stems, as well as a variety of crown shapes including mushroom, columnar, and inverted vase. Cavities may be present. Lichens are present and complex, including multiple types. Though not all legacy oak are large, most will be part of a larger size class (>15" dbh) or a clearly older cohort of oak.
 - YES: Go to 3.
 - NO: Go to 7.
3. Do most of the legacy oak show open grown* tree structure? *Open grown trees developed with plenty of space to grow. They will have large live or dead limbs that are oriented horizontal to and/or sweeping toward the ground in addition to branches that are growing up. The resulting crown shape is mushroom, or round shaped. Open grown oaks that have been encroached on by conifer or other vegetation, may have started pruning, or dropping, lower limbs, so you may have to look for stubs of limbs and how low on the bole the limb developed or horizontal they are to determine former limb structure. Large, mature oaks whose major limbs are oriented toward the canopy, like an inverted vase shape, are legacy trees, but they are not considered open grown, so the answer to this question would be NO.
 - YES: Go to 4.
 - NO: Go to 6.
4. Are the oak occurring in relatively small, isolated patches within conifer dominated forest (i.e. the conifers are constrained by shallow or rocky soils)?
 - YES: FOREST WITH OAK MODULE (legacy open-grown oaks occurring on balds in a conifer forest matrix)
 - NO: Go to 5.
5. Are there fewer than 5 legacy oak trees/acre with only scattered individual pine or fir? (An acre is 208 feet by 208 feet, or slightly smaller than a football field).
 - YES: OAK SAVANNA MODULE (if there is a secondary smaller diameter cohort of oak present, choosing this module based on larger oak assumes the larger oak are older and developed without the presence of a more dense secondary cohort).
 - NO: Go to 6.

EIA & Site-Scale Monitoring

Effectiveness of Conservation or Management Actions

EIA Measure	Baseline (2018)	Year XXX
Rank Factor: Condition	C	B
Major Ecological Factor: Vegetation	C	B
VEG1. Native Plant Species cover	C	B
VEG2. Invasive Nonnative Plant Species Cover	B	B
VEG3. Native Plant Composition	C	B
VEG4. Vegetation Structure	A	A
Major Ecological Factor: Hydrology	B	B+
HYD1. Water Source	A	A
HYD2. Hydroperiod	C	B
HYD3. Hydrological Connectivity	B	B
Major Ecological Factor: Soil	B	B
SOI1. Soil Condition	B	B

Condition Metrics: Understory Composition and Structure

ECOP_CAT_TOOL

VEG_UND Understory Composition & Structure

VEG_UND Rank

☐ A: Native plant species composition (species abundance and diversity) minimally to not disturbed

☐ B: Native plant species composition with minor disturbed conditions

☐ C: Native plant species composition with moderately disturbed conditions

☐ D: Native plant species composition with severely disturbed conditions

VEG_UND Comments

– VEG_UND Submetrics (Optional) ⓘ

Understory Composition ▾

Native Forbs

0-5%

5-25%

25-50%

50-75%

75-95%

>95%

Metric Rating	Oak Savannah
EXCELLENT (A) Native plant species composition (species abundance and diversity) minimally to not disturbed:	Submetrics: DIAGNOSTICS: <u>Native bunchgrasses are dominant in the understory with 10-50% relative cover between the oaks.</u> These communities are generally shrub-free with only scattered shrubs generally less than 2m in height. DIVERSITY: Overall herbaceous diversity is high (often >20 species). Species sensitive to anthropogenic disturbance such as grazing (i.e., “decreaser” species like <i>Poa cusickii</i>) may be present, but may naturally be absent.
GOOD (B) Native plant species composition with minor disturbed conditions:	Submetrics: DIAGNOSTICS: Slightly increased shrub cover, including oak regeneration, may be observed, however the site remains within the natural range of variability for an oak savannah. Shrub encroachment may be driven by fire suppression, or other anthropogenic disturbance. Bunchgrass and native forb cover are slightly decreased due to aforementioned shrub encroachment or displacement by non-native species. DIVERSITY: Herbaceous diversity may be reduced but remains within the natural range of variability.
FAIR (C) Native plant species composition with moderately disturbed conditions:	Submetrics: DIAGNOSTICS: Many diagnostic understory features of the oak savannah community are substantially altered. Understory is significantly different than described above, i.e. native herbaceous cover are moderately reduced due to shrub encroachment, displacement by non-native species, or other anthropogenic disturbance. DIVERSITY: Native bunchgrass and forb species richness moderately reduced due to shrub encroachment, displacement by non-native species, or other anthropogenic disturbance.
POOR (D) Native plant species composition with severely disturbed conditions:	Submetrics: DIAGNOSTICS: Most or all diagnostic understory features of the oak savannah community are absent. <u>Shrub cover is much higher than expected.</u> It is difficult to tell from first glance that this is an oak savannah due to the significant shrub encroachment. DIVERSITY: Native bunchgrasses may be nearly absent and overall herbaceous diversity is extremely low (may be <10 species) due to shrub encroachment, canopy closure, displacement by non-native species, or other anthropogenic disturbance.

Condition Metrics: Tree Composition and Structure

VEG_TREE Submetrics (Optional) 

Canopy Structure

☐ EXCELLENT (A) ☐ GOOD (B) ☐ FAIR (C)

☐ POOR (D)

Old/Large Live Trees

☐ EXCELLENT (A) ☐ GOOD (B) ☐ FAIR (C)

☐ POOR (D)

Oak Architecture

☐ EXCELLENT (A) ☐ GOOD (B) ☐ FAIR (C)

☐ POOR (D)

VEG_TREE Reference Table

Metric Rating	Oak Savannah
	Submetrics: 1. CANOPY STRUCTURE: Stands with up to 25% total tree canopy cover and with non-oak cover less than 10% and oak cover less than 25%. 1-5 trees or 3-10 young oaks.

- An assessment of the composition, age, and structural complexity of the tree layer
- 2 major components:
 - Tree Composition: Are the species you'd expect to see here?
 - Tree Architecture: Are the trees growing in a way that you'd expect?
 - Open grown vs. Columnar



▼ CAT Scores		
▼ Landscape Context Score		
LAN.1 Score	LAN2. Score	
3	2	
LAN MEF Score		
= (LAN1+LAN2)/2 (TABLE 2)		
2.5		
EDG1. Score	EDG2. Score	EDG3. Score
3	2	3
EDG MEF Score		
= (((EDG1*EDG2)^(1/2))*EDG3)^(1/2) [Note: 1/2 exponent = square root]		

▼ CAT Score

CAT Score

= (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45)

3.0094313524366454

CAT Rank

B+

3
CONDITION PRIMARY FACTOR SCORE Forested
= (VEG Score*0.85)+(SOI Score*0.15) (TABLE 2)
3.34
▼ CAT Score
CAT Score
= (CONDITION SCORE*0.55)+(LANDSCAPE CONTEXT SCORE*0.45)
3.0094313524366454
CAT Rank
B+

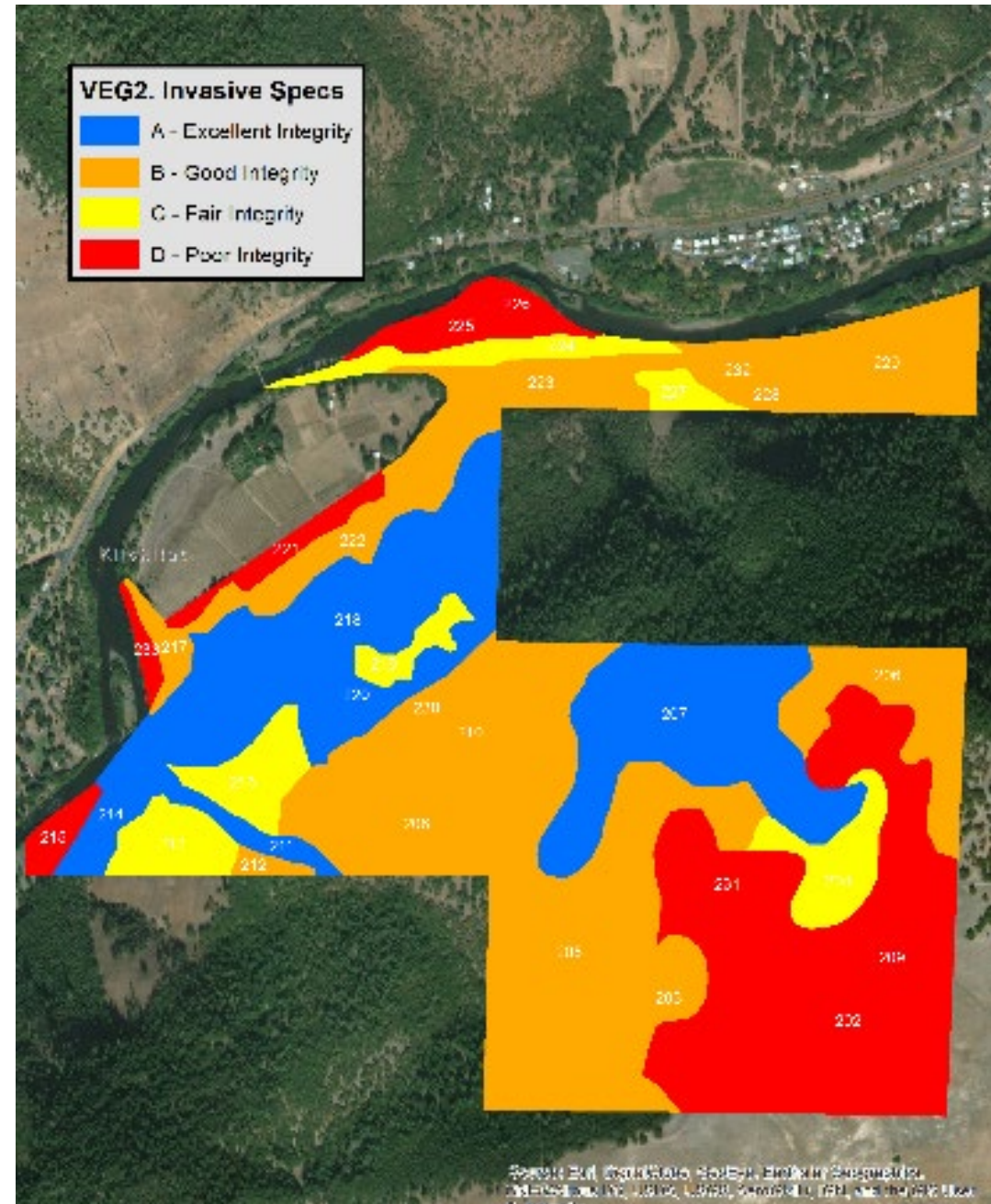
EIA & Management & Restoration Priorities

Where is restoration or management needed?

Highlight areas outside of desired conditions

Which areas to protect?

Highlight areas meeting desired conditions



Future Iterations

The first version of this tool has been tested by a group of ECOP partners. Proposed edits include:

- Developing finer resolution by incorporating ecological site descriptions from NRCS (see right). These are still in draft form and need to be field verified.
- Edits will also be made to improve workflow and metrics in the assessment:
 - Add fuel loading metric
 - Simplify landscape metrics
 - Bulk up training documentation (photos/diagrams)
- Provide guidance on how to translate results into conservation action



Juniper-oak association

Ecological Site Descriptions:

Basis for EIA

Provide state and transition models

Consider abiotic and biotic characteristics

Manageable number to develop for assessment?

8/15/22, 10:28 AM
USDA Natural Resources
Conservation Service

Ecological site R006XA3100R

Ecological site R006XA3100R Juniper-Oak Clayey

Accessed: 08/15/2022

General information

MLRA notes

Major Land Resource Area (MLRA): 006X-Cascade Mountains, Eastern Slope

Stretching from northern Washington to southern Oregon, MLRA6 encompasses the mountain slopes, foothills, elevated plateaus and valleys on the eastern slopes of the Cascade mountains. This MLRA is a transitional area between the Cascade Mountains to the west and the lower lying Columbia Basalt Plateau to the east. Situated in the rain shadow of the Cascade Crest, this MLRA receives less precipitation than portions of the cascades further west and greater precipitation than the basalt plateaus to the east. Geologically, the majority of the MLRA is dominated by Miocene volcanic rocks, while the northern portion is dominated by Pre-Cretaceous metamorphic rocks and the southern portion is blanketed with a thick mantle of ash and pumice from Mount Mazama. The soils in the MLRA dominantly have a mesic, frigid, or cryic soil temperature regime, a xeric soil moisture regime, and mixed or glassy mineralogy. They generally are moderately deep to very deep, well drained, and loamy or ashy. Biologically, the MLRA is dominated by coniferous forest, large expanses of which are dominated by ponderosa pine, Douglas-fir or lodgepole pine. Areas experiencing cooler and moister conditions include grand fir, white

unit is generally warm and dry with a predominately xeric soil moisture regime and mesic soil temperature regime. Historically, the drier extent of these forests have been influenced by a fire regime whereby frequent low and mixed severity fires would have favored the development of open canopied forests. Higher elevations and more westerly locations receiving more moisture within this unit would have been influenced by moderately frequent, low and mixed severity fires favoring a mosaic of forest stages with closed canopy conditions common.

Ecological site concept

This site represents a dry woodland community at the transition zone between the eastside foothills of the Oregon Cascades and the Columbia plateau. The Reference Plant Community is that of a woodland with an overstory of Oregon white oak (*Quercus garryana*) and western juniper (*Juniperus occidentalis*), as well as scattered ponderosa pine (*Pinus ponderosa*), and an herbaceous layer largely dominated by Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) with a shrub layer of antelope bitterbrush (*Purshia tridentata*). This site exists toward the southern-most extent of white oak within the Columbia river basin of Oregon. Sites further north within the same precipitation range, experience fewer frost-free days as a result of the climate influences of the Columbia Gorge and therefore support higher cover of white oak and lower cover of juniper. Compared to adjacent shallow, south aspect influenced sites,

THANK YOU!

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QUESTIONS?

East Cascade Oak Partnership Condition Assessment Tool User Manual

Washington Natural Heritage Program Report Number: Year-2022

January 03, 2022

Prepared by:

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& Joe ~~Rocchio~~

Washington Natural Heritage Program

Washington Department of Natural Resources

Olympia, [Washington](#) 98504-7014

ECOP_CAT_TOOL

Site

Date

6/14/2022

Observer(s)

County

Site or Property Name*

Assessment Area Name*

Owner(s)

Plot ID

[https://survey123
.arcgis.com/share
/815d6cfbf70e4b
15966d4bc0bb02
ff8d](https://survey123.arcgis.com/share/815d6cfbf70e4b15966d4bc0bb02ff8d)

Landscape Context

This metric serves as a proxy measure of the capacity for natural disturbances to occur on the landscape (e.g. fire). This metric also addresses the broader connectivity of the natural land cover by measuring the natural habitat that is directly contiguous to the AA.

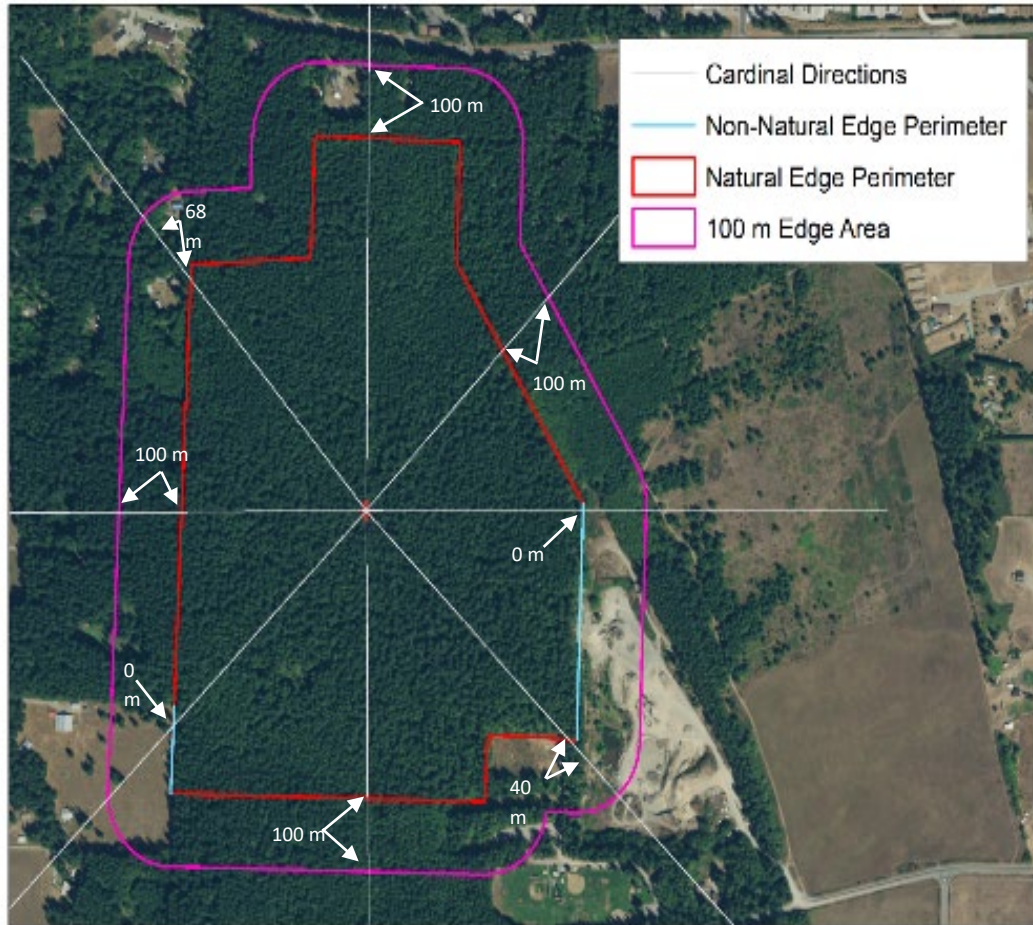
ECOP_CAT_TOOL	
Land Use	
▼ LAN2 Landscape Use Index	
Land Use Index Rate	
☐	Very Low Human Modification: Surrounding land use is >90% natural area or land managed for native vegetation
☐	Low Human Modification: Surrounding land use is 80-90% natural area or land managed for native vegetation, some light to moderate human development impacts
☐	Moderate Human Modification: 40-80% of the surrounding land use is natural area or land managed for native vegetation. The remaining land use includes recreation of varying intensity, logging, grazing, extensive roads, paved areas or other development.
☐	High Human Modification: Less than 40% of the surrounding land use is natural area or land managed for native vegetation. The remaining land use is greatly impacted by high intensity human modification.

Condition Metrics

Vegetation metrics were adapted from the EIA and customized for rapid application in oak systems.

- Invasive Non-native Plant Species Cover
- Understory Composition and Structure
- Tree Composition and Structure
- Woody Regeneration
- Coarse Woody Debris, Snags, and Litter
- Soil Condition

Edge



Metric Ratings	Natural Edge Condition
EXCELLENT (A)	Buffer/edge is characterized by abundant (> 95%) cover of native vegetation, with intact soils, no evidence of loss in water quality, and little or no trash or refuse.
GOOD (B)	Buffer/edge is characterized by substantial (75 – 95%) cover of native vegetation...
FAIR (C)	Buffer/edge is characterized by low (25 – 75%) cover of native vegetation, barren ground and moderate to highly compacted or otherwise disrupted soils, ... moderate or greater intensity of human visitation or recreation.
POOR (D)	Buffer/edge is characterized by very low (< 25%) cover of native plants, dominant (> 75%) cover of nonnative plants, ...or recreation, OR no natural edge at all.