2019 WETLAND MONITORING REPORT

SR 14 Marble Road to Belle Center Safety Improvements
(Cleveland Oak) Compensatory Mitigation Site

USACE NWP (23) NWS-2011-544

Southwest Region

Wetlands Program
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Site Summary
SR 14 Marble Road to Belle Center Safety Improvements (Cleveland Oak) Compensatory Mitigation Site
USACE NWP (23) NWS-2011-544

<table>
<thead>
<tr>
<th>General Site Information</th>
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<tr>
<td>USACE NWP 23 Number</td>
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<tr>
<td>Ecology WQC</td>
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<tr>
<td>Mitigation Location</td>
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<tr>
<td>LLID Number</td>
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<tr>
<td>Construction Date</td>
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<tr>
<td>Monitoring Period</td>
</tr>
<tr>
<td>Year of Monitoring</td>
</tr>
<tr>
<td>Type of Impact</td>
</tr>
<tr>
<td>Area of Project Impact1</td>
</tr>
<tr>
<td>Type of Compensation</td>
</tr>
<tr>
<td>Planned Area of Compensation2</td>
</tr>
</tbody>
</table>

1 The project impact and compensation areas were referenced from the mitigation plan (WSDOT 2012).
2 Additional compensation for impacts associated with this project is provided at the SR 14 Homestead Lake Compensation Site, the SR 14 Marble Road NSA Compensation Site (on-site restoration), and the Wind Mountain Oak Preservation Site. See the mitigation plan for details (WSDOT 2012).
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1. Introduction

1.1. Summary
This report summarizes fifth-year (Year-5) monitoring activities at the 014 Cleveland Oak Compensatory Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities included vegetation surveys and photo-documentation. Vegetation monitoring took place on May 28-30, 2019.

1.2. Monitoring Results and Management Activities

<table>
<thead>
<tr>
<th>Performance Standards</th>
<th>2019 Results$^3$</th>
<th>Management Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density of 200 native trees/acre in the Oak Woodland</td>
<td>59% (CI$_{80%}$ = 53-65%)</td>
<td>9,147 plants/acre$^4$</td>
</tr>
<tr>
<td>Density of 4,000 native shrubs/acre in the Oak Woodland</td>
<td>9,147 plants/acre$^4$</td>
<td></td>
</tr>
<tr>
<td>Density of 100 Oregon white oak (Quercus garryana)/acre in the Oak Savannah</td>
<td>156 plants/acre (CI$_{80%}$ = 115-198)</td>
<td>Installed 250 serviceberry, 200 oceanspray, 200 Oregon grape, 300 Indian plum, 300 mock orange, and 400 snowberry in January 2020</td>
</tr>
<tr>
<td>90% cover of native herbaceous species in the Oak Savannah</td>
<td>43% (CI$_{80%}$ = 38-48%)</td>
<td></td>
</tr>
<tr>
<td>Less than 20% cover of non-native grasses and forbs in the Oak Savannah</td>
<td>78% (CI$_{80%}$ = 73-82%)</td>
<td></td>
</tr>
<tr>
<td>Less than 15% cover blackberry (Rubus) species and Class B noxious weeds across the site</td>
<td>1% cover (qualitative)</td>
<td>Weed control conducted in June and July 2019</td>
</tr>
<tr>
<td>No Class A noxious weeds, Japanese knotweed (Reynoutria japonica), or purple loosestrife (Lythrum salicaria) across the site</td>
<td>None observed</td>
<td></td>
</tr>
<tr>
<td>Less than 25% cover reed canarygrass (Phalaris arundinacea) across the site</td>
<td>1% cover (qualitative)</td>
<td></td>
</tr>
</tbody>
</table>

$^3$ Estimated values are presented with their corresponding statistical confidence interval. For example, 59% cover (CI$_{80\%}$ = 53-65%) means we are 80% confident that the true cover value is between 53% and 65%.

$^4$ Due to the colony-forming growth habit of snowberry (Symphoricarpos albus), cover was a more appropriate measurable attribute than density. Tree and shrub species were sampled as one combined strata.
2. Site Description

2.1. Location

This 12-acre compensatory mitigation site consists of an Oregon white oak (*Quercus garryana*) woodland establishment on a former hayfield west of Skamania, WA (Figure 1).

Driving Directions:
Contact WSDOT Southwest Region environmental staff to obtain a gate key. From I-5, take SR 14 East for 24 miles. Turn left on Belle Center Road. Drive 1.4 miles, then turn right onto Mount Pleasant Road. Drive 0.4 mile then turn right onto Strunk Road. Drive 0.6 mile to the end of Strunk Road. Turn right and go through the locked gate. Travel about 0.25 mile down the gravel road and the site will be on the right.

2.2. Purpose and Description

This site was created as partial compensation for the loss of 2.25 acres of Oregon white oak woodlands due to safety improvements on SR 14 from the Marble Road vicinity to the Belle Center Road vicinity.
2.3. Study Area

The 014 Cleveland Oak Compensatory Mitigation Site contains 6.4 acres of oak woodland establishment designed to eventually have a closed tree canopy and dense woody understory. The site also contains 5.7 acres of savannah establishment designed with clumps of oak plantings interspersed with an understory of native grasses and forbs.

Figure 1. Site Sketch
3. Performance Standards and Methods

3.1. Performance Standards

**Year 5**

**Performance Standard 1**
Minimum density of 200 living native trees per acre in woody species planting areas [Oak Woodland].

**Performance Standard 2**
Minimum density of 4,000 living native shrubs per acre when included in woody species planting areas [Oak Woodland].

**Performance Standard 3**
Minimum density of 100 living native [Oregon white oak (*Quercus garryana*)] trees per acre [Oak Savannah].

**Performance Standard 4**
Minimum 90 percent cover of native herbaceous species (seeded and volunteer) except within maintained tree rings [Oak Savannah].

**Performance Standard 5**
At monitoring Year 5, the aerial extent of non-native grasses and forbs should not exceed 20 percent total cover in herbaceous portions of the oak savannah areas.

**Performance Standard 6**
The aerial extent of blackberry species and Class B noxious weeds will not exceed 15 percent in the combined scrub-shrub, buffer, and riparian planting areas, exclusive to each mitigation site (i.e. – invasive species totals at both sites shall not be added together to create a single percent cover for reporting purposes).

**Performance Standard 7**
If/when detected, Class A noxious weeds, Japanese knotweed, and purple loosestrife shall be treated so that the species do not exist on the site. These species shall not be included in the 15 percent cover allowed for invasive species.

**Performance Standard 8**
At monitoring Years 1, 3, 5, and 7, the aerial extent of reed canarygrass at each mitigation site shall not exceed 25 percent total cover in the wetland creation or buffer enhancement areas.

Appendix A shows the as-built planting plan (WSDOT 2012).
3.2. Methods

The tables below document sample methods used for all of the performance standards (PS) required by the mitigation plan or permits. Additional details on our methods are located here: WSDOT Wetland Mitigation Site Monitoring Methods Paper (WSDOT 2008).

Placement of Baseline: The creation of the baseline and transects occurred in ArcGIS Pro. GPS units were utilized in the field to locate sampling transects.

The baseline was placed through the center of the site, running roughly north to south.

Baseline: Length 382m Transects 1-19

See Appendix C, Table 1 for the sample design used to address each performance standard.
4. Discussion

4.1. Site development

The site is meeting all fifth-year standards for woody density. The woody community in the oak woodland was dense and dominated by snowberry (Symphoricarpos albus). Distinguishing between individual plants was most difficult in the southern section of the oak woodland, and therefore, cover was a more appropriate attribute to measure than density. The dominant tree species included douglas-fir (Pseudotsuga menziesii), red alder (Alnus rubra), and Oregon white oak (Quercus garryana). The dominant shrub species included common snowberry (Symphoricarpos albus), red flower currant (Ribes sanguineum), and oceanspray (Holodiscus discolor).

Some Oregon white oak (Quercus garryana) in the oak savannah appear to be growing slowly, possibly as a result of recent drought conditions. Similarly, clumps of snowberry (Symphoricarpos albus) and red-flowering currant (Ribes sanguineum) in the southern end of the oak woodland had experienced some die off. At any rate, the planted clumps of Oregon white oak (Quercus garryana) appear to mimic natural establishment, and most stressed individuals were growing back.

The herb community in the oak savannah is dominated by native bigleaf lupine (Lupinus polyphyllus) and non-native sweet vernalgrass (Anthoxanthum odoratum). The site was monitored earlier this year in order to capture different native species that bloom in the spring. Even still, many native species, such as chocolate lily (Fritillaria lanceolate) and camas (Camassia quamash), had already bloomed. Many native species, such as showy milkweed (Asclepias speciosa), Nuttall’s larkspur (Delphinium nuttallii), Cascade beardtongue (Penstemon serrulatus), and meadow checker-mallow (Sidalcea campestris) were not captured by the sample design, because they were only observed in trace quantities. Non-native grasses and forbs were dominant and may need to be removed or treated in order for native herbaceous species to meet the seventh-year performance standard.

Noxious weed cover is low throughout the site. Class A and B species were not observed, and the cover of targeted species for the performance standard was estimated at less than one percent. Class C noxious weeds, such as oxeye daisy (Leucanthemum vulgare) and Queen Anne’s lace (Daucus carota) were common in the oak savannah. Himalayan blackberry (Rubus armeniacus) was dense along the southwestern and eastern border of the site, and will continue to be monitored. A small clump of reed canarygrass (Phalaris arundinacea) was observed at the center of the site where the two zones meet.

The site is providing usable habitat for at least ten species of birds and a plethora of small mammals. Deer and elk scat were also observed on site.
4.2. Results

**Performance Standard 1 and 2**
(Density of 200 native trees/acre and 4,000 shrubs/acre in the Oak Woodland)

The cover of native trees and shrubs, combined, is estimated at 59% (CI80% = 53-65%) (Photo 1). Density for trees and shrubs is qualitatively estimated at 9,147 plants/acre.

Density was qualitatively assessed using non-random 10mx10m plots scattered throughout representative areas in the oak woodland.

**Performance Standard 3**
(Density of 100 Oregon white oak (Quercus garryana)/acre in the Oak Savannah)

Density of Oregon White Oak trees is estimated at 156 plants/acre (CI80% = 115-198) (Photo 2). Density of native trees is estimated at 217 plants/acre (CI80% = 159-275). This exceeds the performance standard target.

Other trees observed in this zone included red alder (Alnus rubra), Douglas-fir (Pseudotsuga menziesii), and bigleaf maple (Acer macrophyllum).
Performance Standard 4
(90% cover of native herbaceous species in the Oak Savannah)

Cover of native herbaceous species in the oak savannah area is estimated at 43% ($CI_{80\%}= 38-48\%$). This is below the performance standard. Broadleaf lupine ($Lupinus polyphyllus$) was the most dominant species (Photo 3). Yellow rattler ($Rhinanthus minor$) and Western goldenrod ($Solidago lepida$) were also observed.

Performance Standard 5
(Less than 20% cover of non-native grasses and forbs in the Oak Savannah)

Cover of non-native grasses and forbs in the oak savannah is estimated at 78% ($CI_{80\%}= 73-82\%$) (Photo 4). This exceeds the performance standard threshold.

Sweet vernalgrass ($Anthoxanthum odoratum$), narrowleaf plantain ($Plantago lanceolata$), and common velvetgrass ($Holcus lanatus$) were dominant species. Other species observed include oxeye daisy ($Leucanthemum vulgare$), hairy cat’s ear ($Hypochaeris radicata$), tall fescue ($Schedonorus arundinaceus$), and red clover ($Trifolium pretense$).
Performance Standard 6
(Less than 15% cover blackberry (*Rubus*) species and Class B noxious weeds across the site)

The cover of blackberry species is qualitatively estimated at one percent. No Class B noxious weeds were observed on site.

Performance Standard 7
(No Class A noxious weeds, Japanese knotweed (*Reynoutria japonica*), or purple loosestrife (*Lythrum salicaria*) across the site)

None observed.

Performance Standard 8
(Less than 25% cover reed canarygrass (*Phalaris arundinacea*) across the site)

Cover of reed canarygrass (*Phalaris arundinacea*) is qualitatively estimated at one percent. This is below the performance standard threshold.

4.3. Adaptive Management

The region has plans to replant the oak savannah zone with six different species of shrubs and about 1600 total plants. Weed control was conducted on June 18, 2019 to treat oxeye daisy (*Leucanthemum vulgare*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and Himalayan blackberry (*Rubus armeniacus*). Queen Anne’s lace (*Daucus carota*) was treated on June 19, 2019.
5. References


Appendix A. Planting Plan with Photo Point Locations

(from WSDOT 2012)

Figure 10c. Cleveland oak woodland mitigation site concept
Appendix B. Photo Points

The photographs below were taken from permanent photo-points on May 30, 2019 and document current site development.

Photo Point 1a

Photo Point 1b

Photo Point 1c
### Appendix C. Data Tables

#### Table 1. Sample Design

<table>
<thead>
<tr>
<th>Attribute</th>
<th>PS 1</th>
<th>PS 2</th>
<th>PS 3</th>
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<td>Target population</td>
<td>Cover</td>
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<td>Density</td>
<td>Cover</td>
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<td>Presence/ Absence</td>
<td>Cover</td>
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<tr>
<td>Zone</td>
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<td>Native Shrubs</td>
<td>Oregon white oak trees</td>
<td>Native herbaceous cover</td>
<td>Non-native herbaceous species</td>
<td>Himalayan blackberry (<em>Rubus armeniacus</em>) or Class B weeds</td>
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<td>Class A</td>
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