



**YEAR 3 (2022)
MONITORING REPORT
Linnton Mill Restoration Site**

DECEMBER 2022 *UPDATED MARCH 2023*

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ACRONYMS AND ABBREVIATIONS

ACM – ACTIVE CHANNEL MARGIN

CI – CONFIDENCE INTERVAL

DBH – DIAMETER AT BREAST HEIGHT

DSAY – DISCOUNTED SERVICE ACRE YEAR

DO – DISSOLVED OXYGEN

DSL – DEPARTMENT OF STATE LANDS

FT – FEET

LWD – LARGE WOODY DEBRIS

NAVD – NORTH AMERICAN VERTICAL DATUM

OCH – OFF-CHANNEL HABITAT

ODA – OREGON DEPARTMENT OF AGRICULTURE

OHWM – ORDINARY HIGH WATER MARK

OLW – ORDINARY LOW WATER

SMP – SEAPORT MIDSTREAM PARTNERS

SSPP – SITE-SPECIFIC PERFORMANCE PLAN

USFWS – U.S. FISH AND WILDLIFE SERVICE

USGS – UNITED STATES GEOLOGICAL SURVEY

1. Overview and Summary

This monitoring report describes the results of Year 3 (2022) performance monitoring at the Linnton Mill Restoration Site (Site). This report covers the period between November 2021 and November 2022.

1.1 Site Overview

The Site is a 27.83-acre off-channel habitat restoration project located along the west side of the lower Willamette River, from river mile 4.5 to 4.8 (Figure 1). The Site was designed to provide off-channel and cold water refugia to support sub yearling and yearling juvenile Chinook salmon that rear within this portion of the lower Willamette River, as well as riparian and upland habitat to serve a range of wildlife species including eagle, other native birds, and mink. Restoration of the Site included construction of off-channel habitat (OCH), active channel margin (ACM), riparian, and upland habitats, as well as daylighting Linnton Creek (Figure 2). Initial planting was completed in early 2020 with additional planting in early 2021.

The Site is approved by the Portland Harbor Trustee Council to provide habitat credits in the form of Discounted Service Acre Years (DSAYs) for liabilities related to the Portland Harbor Natural Resources Damages Assessment (NRDA) process. Additionally, the Site is approved by the Interagency Review Team co-chaired by the Oregon Department of State Lands (DSL) and the U.S. Army Corps of Engineers to provide mitigation credits for unavoidable impacts to aquatic habitats in accordance with Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and Oregon DSL Removal/Fill permits.

1.2 Monitoring Summary

All performance standards related to Year 3 monitoring were met except A9 Fish Access, which was partially met. Table 1 presents a summary of elements monitored during 2022 and results compared to applicable performance standards.

Table 1. Summary of performance standards and results

| Performance Standards | Standard Met | Section |
|--|---|---------|
| Geomorphic/ Structural Habitat Elements | | |
| A6. OCH and ACM within 10% of as-built area | • YES | 4.1.1 |
| A7. Increase in elevation in OCH <20% | • YES | 4.1.2 |
| A8. Increase in elevation in ACM <20% | • YES | 4.1.2 |
| A9. Fish access: <ul style="list-style-type: none"> • No physical conditions that prevent fish access to the OCH • OCH channel gradient < 4% slope • Jump heights will not exceed 6 inches • The Linnton Creek culvert discharge 11/1-6/30 • Linnton Creek thalweg remain wetted during low water. | <ul style="list-style-type: none"> • PARTIALLY • YES • YES • YES • YES | 4.1.3 |
| A10. Presence of at least 80% LWD | • YES | 4.1.4 |

| Hydrology and Hydraulics | | |
|--|--|-------|
| Bl. Area of 50% inundation within 20% of as-built condition. | • YES | 4.2.1 |
| Vegetation* | | |
| Riparian/Upland Forested <ul style="list-style-type: none"> • C8. ≥ 1,200 native woody stems per acre. • C9. ≥ 3 native tree species and 5 native shrub species. • C10. Cover: <ul style="list-style-type: none"> ○ ≥ 10% native herbaceous ○ ≤ 30% invasive herbaceous | <ul style="list-style-type: none"> • YES (27,012) • YES (16 and 25) <ul style="list-style-type: none"> ○ YES (86.7%) ○ YES (3.9%) | 4.3.1 |
| Off-Channel Shrub <ul style="list-style-type: none"> • C11. ≥ 1,200 native woody stems per acre. • C12. ≥ 5 native shrub species • C13. Cover: <ul style="list-style-type: none"> ○ ≥ 10% native herbaceous ○ ≤ 30% invasive herbaceous | <ul style="list-style-type: none"> • YES (108,973) • YES (7 and 9) <ul style="list-style-type: none"> ○ YES (75.8%) ○ YES (2.8%) | 4.3.2 |
| Off-Channel Emergent <ul style="list-style-type: none"> • C14. ≥ 5 native emergent/herbaceous species. • C15. Cover: <ul style="list-style-type: none"> ○ ≥ 30% native herbaceous ○ ≤ 10% invasive herbaceous | <ul style="list-style-type: none"> • Yes (6+) ○ YES (78.9%) ○ YES (0.5%) | 4.3.3 |
| Water Quality | Dissolved Oxygen and Temperature | 4.4 |
| Fish and Wildlife (No Performance Standards) | | |
| <ul style="list-style-type: none"> • Fish presence and use of the site <ul style="list-style-type: none"> ○ Yes, juvenile salmonids observed in OCH | | 4.5.1 |
| <ul style="list-style-type: none"> • Bald eagle monitoring and avian use of the site <ul style="list-style-type: none"> ○ Yes, bald eagles observed perching, foraging, and bathing on site • Mink presence and use of site <ul style="list-style-type: none"> ○ No mink were detected | | 4.5.2 |
| Observations of wildlife included in Attachment 5 | | 4.5.3 |
| Photographic Monitoring | Attachment 3 | |

*Invasive refers to plants found on the ODA noxious weeds list or the Portland Plant List ranks A, B, or C. This varies from language used in the SSPP but is clarified here for simplicity. Future reports will follow this reference.

2. Monitoring Questions and Performance Standards

The monitoring program is presented in the Site-Specific Performance Plan (SSPP) for the Site (Exhibit B of the Restoration Plan; Grette Associates 2018). Please refer to that document for full details on the monitoring plan. The monitoring questions posed in the SSPP, applicable performance standards to gauge success, timing, and methods for monitoring years 1-5 are presented in Table 2. The focus of this report is on those standards applicable to Year 3 monitoring requirements.

Table 2. Monitoring questions, performance standards, monitoring schedule, and monitoring methods applicable for Year 3

| Monitoring Question | Performance Standards | Years Monitored | | | | | | Monitoring Methods |
|--|---|-----------------|---|---|---|----|------|---|
| | | 1 | 3 | 5 | 7 | 10 | 1-10 | |
| Geomorphic / Structural Habitat Elements | | | | | | | | |
| Is the restoration site meeting its interim performance standards (IPSs)? | A6. Total area of OCH or ACM habitat within 10% of the as-built condition (minimum 0.5 ft); A7. Increase in elevation within the OCH of no greater than 20%; A8. Increase in elevation within the ACM habitat of no greater than 20%; | X | X | X | X | X | | A6. Habitat zone mapping; CAD A7. Topographic survey A8. Topographic survey |
| Is the total quantity of Off-Channel and ACM habitat that was created being retained over time? | A9. No physical conditions that prevent fish access to the OCH. The channel gradient throughout the off-channel habitat will not exceed 4% slope and jump heights will not exceed 6 inches. | | | | | | X | A9. Visual survey, longitudinal profile |
| Are the fish able to enter and exit the site? | Linnton Creek culvert outlet will discharge from November 1st through June 30th, when juvenile Chinook are likely present in the Willamette River, and the channel thalweg downstream of Linnton Creek will remain wetted during low water conditions. | | | | | | | |
| Are habitat elements being retained on site? | A10. Presence of at least 80% of the total number of large woody debris/structural habitat elements that were placed below the 100-year flood elevation, including any volunteer LWD $\geq 18"$ diameter and $\geq 30'$ length. | | | | | | X | A10. Visual survey |
| Have the performance standards been met? If so, is the site ready to move into the long-term stewardship phase? | | | | | | | | |
| Hydrology and Hydraulics | | | | | | | | |
| What is the total area of the site that is inundated by the river during periods of high flow? | B1. Areal extent of the 50% inundation level within 20% relative to the as-built condition. | X | X | X | X | X | | B1. Water level data logger |
| Vegetation | | | | | | | | |
| Is vegetation developing in a way that will ultimately generate a native assemblage of appropriate vegetation types? | Riparian/Upland Forested C8. A minimum of 1,200 native woody stems per acre. C9. At least 3 native tree species and 5 native shrub species. C10. Cover (during the first 5 years, trees/shrubs will be excluded from percent cover): <ul style="list-style-type: none"> • $\geq 10\%$ native herbaceous • $\leq 30\%$ non-native herbaceous • The remaining percentage of cover can be made up of bare ground, rocks or native herbaceous | | | | | | X | C8-C10. Plot surveys |

| | | | | | | | | |
|---|---|--|--|--|--|--|---|-----------------------|
| Is the restoration site meeting its interim performance standards (IPSs)? | Off-Channel Shrub C11. A minimum of 1,200 native woody stems per acre. C12. At least 5 native shrub species. C13. Cover (during the first 5 years, shrubs will be excluded from percent cover): <ul style="list-style-type: none"> • ≥ 10% native herbaceous • ≤ 30% non-native herbaceous • The remaining percentage of cover can be made up of bare ground, rocks or native herbaceous | | | | | | X | C11-13. Plot surveys |
| | Off-Channel Emergent C14. At least 5 native emergent/herbaceous species. C15. Cover (during the first 5 years, trees/shrubs will be excluded from percent cover): <ul style="list-style-type: none"> • ≥ 30% native herbaceous • ≤ 10% non-native herbaceous • The remaining percentage of cover can be made up of bare ground, rocks or native herbaceous. | | | | | | X | C14-C15. Plot surveys |

Portland Harbor NRDA Restoration Goals Questions

| Monitoring Question | Performance Standards | Years Monitored | Timing of Monitoring | Monitoring Methods |
|--|-----------------------|-----------------------|----------------------|---|
| Water Quality | | | | |
| Is water quality at the site improving over time and comparable to an appropriate reference condition? | N/A | Years 1-10 | Continuous | Data logger |
| Fish and Wildlife | | | | |
| Are native fish using the newly restored habitat? What size salmonids are using the site? | N/A | Years 1, 3, 5, 7, 10 | 2x/mo, Feb - May | Snorkeling or beach seining |
| What size lamprey are using the site? | N/A | Years 1-5, 10, 15, 20 | Once, Apr - Oct | Electrofishing and sediment sample by USFWS |
| What birds are using the site? Do changes in the bird assemblage, diversity, and abundance at the site indicate that habitat quantity and quality have improved? | N/A | Years 1, 3, 5, 7, 10 | 3x, Apr - Jun | Bird surveys |
| Are bald eagles using the site? If so, how often and for what activities? | N/A | Years 1, 3, 5, 7, 10 | Weekly, mid Dec -Aug | |
| Are mink using the newly restored habitat? Has mink abundance at the site increased? | N/A | Years 1, 3, 5, 7, 10 | 6x, Apr - Jun | Shoreline survey, camera traps |
| Photo Monitoring | | | | |
| Is vegetation developing in a way that will ultimately generate a native assemblage of appropriate vegetation types? | N/A | Years 0-10 | Jul - Oct | Photo points |

3. Monitoring Methods

All elevations in this report are referenced to the North American Vertical Datum (NAVD) of 1988 (NAVD88).

3.1 Geomorphic Monitoring

Below are the monitoring questions related to geomorphic/structural habitat monitoring and the corresponding performance standard applicable for Year 3. The ACM/OCH zone is defined by the Trustee Council as the area between the ordinary high-water mark (OHWM; +20.1 feet [ft]) and the ordinary low water (OLW) line (+8 ft). Elevation monitoring is designed to ensure these habitat types are retained and that there are no barriers to fish access into the OCH.

3.1.1 A6: Total area of OCH or ACM habitat within 10% of the as-built condition

To detect changes in the total area of the OCH and ACM, a topographic survey was conducted by Waterways Consulting, Inc. at pre-determined cross-section locations (Figure 3) using field surveying equipment, with elevations collected every 3 meters or less. Area was calculated from a polygon created from topographic points between the OHWM and OLW, as outlined in the SSPP. Topographic data were compared to 2020 survey data.

3.1.2 A7 and A8: Increase in Elevation within OCH and ACM

To detect changes in elevation within the Off-Channel and ACM habitats, elevation data derived from the topographic survey described above were compared to 2020 and 2021 (Years 1 and 2, respectively) elevations. Both increases (indicating accretion) and decreases (indicating erosion) in elevation are tracked and quantified by percent change over the entirety of the transect.

3.1.3 A9: Fish Access

Changes in gradient were measured using the topographic survey described above to ensure the Linnton Creek channel gradient does not exceed 4% slope. Jump heights were assessed through a low-tide visual survey, looking for any vertical drops greater than 15 centimeters (~6 inches). Photo points (Attachment 3) throughout the site are also used to identify vertical drops. In addition to jump heights, visual surveys were conducted to identify areas with the potential for stranding at low tide. In 2020 a potential risk was identified at the upstream mouth of the OCH and was monitored further in 2021 and 2022 using a time-lapse camera placed facing the mouth, as well as the temperature and depth logger.

Linnton Creek discharge was visually checked periodically throughout the year to determine if the channel continues flowing at least through June 30 and begins flowing again by November 1. Photo point photographs were used to document flow. The Linnton Creek thalweg downstream outfall was also visually inspected throughout the year to document the presence of freshwater inputs. Photo point photographs, as well as dissolved oxygen (DO) and temperature data collected from the probe placed in the Linnton Creek plunge pool were used to confirm flow during the dates between visual inspections.

3.1.1 A10: Structural Habitat Elements

All structural elements placed below the 100-year flood elevation were visually surveyed to ensure retention. Volunteer large woody debris (LWD) greater than 18 inches diameter and 30 foot in length were counted as additional elements.

3.2 Hydrology and Hydraulics

3.2.1 B1: Areal extent of the 50% inundation level within 20% relative to the as-built condition.

Inundation was measured relative to the portion of the site that is inundated 50% of the time from April – June, which is +11.56 ft (Waterways Consulting 2013). The total area below this elevation within the OCH was calculated based on a polygon created by connecting the +11.56 ft elevation points from the monitoring transects described above in Section 3.1.2.

3.3 Vegetation Monitoring (C8 Through C14)

Vegetation performance was assessed by sampling vegetation within established plots, analyzing and interpolating sample results, and comparing these to site performance standards. Pre-determined transects were established in the SSPP and spacing of monitoring plots varies by habitat type (Grette 2018b). RestorCap established permanent markers for each monitoring plot within the forested and scrub-shrub habitats (Figures 2 and 4). Within each plot absolute cover of each species was recorded. Assessment differences by habitat type are described below.

After the field assessment, Daubenmire cover classes (Daubenmire 1958) were assigned to cover of each species and used for analyses in each habitat. Within each habitat, species were grouped by native, non-native (non-listed), invasive (listed¹) species, and bare ground. The June 2016 version of the Portland Plant List and the Noxious Weed Policy and Classification System 2022 (Oregon Department of Agriculture; ODA) were used to determine invasive classifications. For each habitat, species group (*e.g.*, native, invasive) cover averages were calculated, as well as 80% confidence intervals. Additionally, percent cover and percent frequency for each species were calculated (Coulloudon 1999). Although cover of terricolous bryophytes was collected, they were not used in the analyses to determine plant species cover. These species are included separately within the ground cover calculation. Where vascular plant species were unidentifiable or were identified to genus but unable to determine whether native or non-native, they were excluded from calculations.

To determine native herbaceous species diversity within each habitat, the number of species were counted across all plots.

3.3.1 Riparian / Upland Forested Habitat

This zone includes all Upland and Riparian zones, and the area between the OHWM and +13 ft, as established in the SSPP (Grette 2018a). Within this zone, 32 plots (1F-32F) were permanently marked with rebar and locations recorded with GPS (Figure 4). Upland

¹ Invasive species are defined as those found on the ODA noxious weed list or the Portland Plant List, ranks A, B, or C.

monitoring plots were initially established every 50 meters along established transects, beginning at a randomly selected starting point (Grette 2021). At each data collection point (n=32), absolute cover and stem count were recorded by species for all trees and shrubs within a 5-meter radius circle. Additionally, absolute cover of herbaceous species was sampled at two 1-square-meter plots within the 5-meter-radius circle. For the herbaceous species cover analysis, cover was averaged by species and then converted into the cover classes listed above.

For stem counts, all stems below 0.5-meter above ground level were counted as individual plants (*i.e.*, a single shrub with multiple stems close to the ground is counted as multiple individuals; SSPP). In areas with high densities of stems, clumps were pin flagged prior to conducting the stem count tally and individual stems within each clump held together to ensure that stems were not double counted.

3.3.2 Scrub-Shrub Habitat

The established scrub-shrub zone includes the portions of the OCH between approximately +13 ft and +10.5 ft. Within this zone, 16 plots (1S-16S) were permanently marked with rebar and locations recorded with GPS (Figure 4). At each plot (n=16), a three-meter radius plot was used to determine cover and stem counts of woody species. One herbaceous plot was sampled in the middle of the shrub plot.

3.3.3 Emergent Habitat

The Off-Channel emergent zone was defined as the area between +10.5 ft and +8.5 ft. Based on observations in 2021, this zone was monitored later in the season to capture the diversity and cover of species. Plots were established approximately six meters apart along each scrub-shrub transect (Figure 5). These plots were not marked with permanent markers given their location within the ACM. At each plot absolute cover of vegetation was recorded within a one-meter quadrat (n=23). One additional plot was added this year to capture diversity and cover of vegetation within the southern portion of the OCH and compensate for the five plots that are bare due to their locations on the beach and within the portion of the OCH influenced by daily tidal fluctuations. The added plot (11-12B) is highlighted in the attached vegetation tables.

3.4 Water Quality Monitoring

Water temperature was measured using Onset HOBO water level data loggers installed at the site, one near the downstream mouth of the OCH, one in the pool beneath the Linnton Creek outfall, and one within the upstream area of the OCH (“side channel”). The loggers within the side channel and Willamette River also recorded water levels. For 2022, loggers were reinstalled on March 1, 2022, and recorded data continuously until November 5th when data were collected for analysis. On-site temperatures were generally recorded every 15 minutes with the installed loggers and are presented as monthly averages. Dissolved oxygen (DO) was collected monthly using an Extech ExStik®II EC400 portable meter rather than continuous probe data. Per the HDP, *DO will be compared to the Oregon Department of Environmental Quality’s standard: DO should not be less than 11.0 mg/l (OAR 340-0401-0101 to 340-04100340).*

3.5 Fish and Wildlife Monitoring

3.5.1 Salmonid Monitoring

RestorCap contracted with Cascade Environmental Group to conduct surveys between February and May. A crew of two ichthyologists conducted surveys by snorkeling and using video via an underwater camera to document fish use at the site. Monitoring focused on shoreline habitat features including the large wood structures and flooded vegetations, as well as Linnton Creek. Seines were not used due to risk of collecting more than one salmonid in a net set.

3.5.2 Bird Assemblage Monitoring

RestorCap contracted Pacific Habitat Services to conduct the bald eagle and bird monitoring from mid-December to September. Surveys were scheduled weekly for approximately two hours either just after dawn or before dusk, and were conducted from three vantage points, north, south, or mid project area (Figure 6). Bald eagle presence/absence, behavior, age class, habitat element use, and time of use were recorded. Bird surveys were conducted for a minimum of five minutes and consisted of bird counts, including species, numbers of birds, and qualitative observations of habitat use. Additional species observed and on-site location were also recorded.

3.5.3 Mink Monitoring

Shoreline surveys consisted of visual surveys inspecting tracks in the sand and mud, scat, and partially eaten fish seen on site. Four camera traps were established to record wildlife and potential use by American mink (*Neovison vison*). One trap included a camera situated at the end of a tunnel with mustelid pheromones to attract mink. Two of the cameras were drowned during the high-water event in early June 2022. The locations of the other cameras were adjusted to account for water level fluctuations and based on lack of wildlife observations (Figure 6). These cameras were all located near wood and rock piles.

4. Results

4.1 Geomorphic Monitoring

4.1.1 A6: Total Area of OCH or ACM Habitat

Results from the topographic survey indicate there has been an approximately 1% increase in the area of the OCH/ACM habitat zone since the 2020 survey (Attachment 2, Figure 1). This increase is within the 10% threshold for this metric, therefore, **standard A6 was met.**

4.1.2 A7 and A8: Increase in Elevation Within OCH and ACM

Table 3 lists overall percent change by transect; Figure 3 depicts transect locations and elevation increase or decrease; profile cross sections are included in Attachment 2 (Figure 2). Positive percent change indicates aggradation, negative indicates erosion; blue indicates ACM transect and grey indicates Off-Channel transect. No transects exceeded the 20% change threshold, based on these data, the elevation performance **standards A7 and A8 were met.**

Table 3. Percent change comparison in each topographic transect

| Transect | 2021 to 2022 | 2020 to 2022 | Transect | 2021 to 2022 | 2020 to 2022 | Transect | 2021 to 2022 | 2020 to 2022 | Transect | 2021 to 2022 | 2020 to 2022 |
|----------------|--------------|--------------|----------------|--------------|--------------|-----------------|--------------|--------------|-----------------|--------------|--------------|
| | % Change | | | % Change | | | % Change | | | % Change | |
| A | +2 | +2 | K ³ | -2 | -3 | U ⁴ | -1 | +1 | AE ¹ | -1 | -3 |
| B | -1 | -1 | L ³ | -4 | -3 | V ⁴ | -1 | +1 | AF ¹ | -1 | -3 |
| C | 0 | -2 | M | +3 | +6 | W ⁴ | 0 | +3 | AG | -8 | -9 |
| D | -3 | -3 | N | +8 | +12 | X | +3 | +4 | AH | -3 | -2 |
| E | +0 | +0 | O | +2 | +2 | Y | +1 | +2 | AI | -5 | -5 |
| F | +1 | -2 | P | +1 | +1 | Z | 0 | +1 | AJ ² | +1 | -1 |
| G | -5 | -5 | Q | +2 | +2 | AA | 0 | +2 | AK ² | +1 | 0 |
| H ³ | -3 | -2 | R ⁴ | +3 | +2 | AB | +1 | 0 | AL ² | -2 | -4 |
| I ³ | -2 | -2 | S ⁴ | +0 | +2 | AC | +4 | +4 | | | |
| J ³ | -3 | -5 | T ⁴ | +1 | +2 | AD ¹ | -1 | -3 | | | |

To assist in tracking elevation changes within the aquatic restoration area, those transects located within decision units D, E, H, and I are noted below and on Figure 3.

¹Located within DU D, ²Located within DU E, ³Located within DU H, ⁴Located in DU I

4.1.3 A9: Fish Access

Based on a visual survey, no physical conditions (*i.e.*, no jump heights above 15 cm) exist that prevent fish access to the OCH via the downstream connection. The upstream portion of the OCH is blocked by a sand berm at times of low water. The sand berm that was identified in 2020 has remained in place but has not increased in height. Based on the topographic surveys, the elevation of the apex of the berm is approximately 12.1 ft. Representative photos of the OCH from between April and November 2022 and the corresponding gauge heights are presented in Attachment 3 (starts page 27).

The depression adjacent to the berm has not deepened from the previous survey and still retains water after water levels recede. This depression may pose a stranding risk to smaller fish using the OCH and prevents direct access to the upstream portion in low-water conditions. There was no evidence of fish being stranded (e.g., dead fish) in this portion of the OCH. Water elevations are discussed below in Section 4.4.

Adaptive management recommendations for this area are described in Section 7.1.

Site visits throughout the year and monthly DO and temperature monitoring indicate that Linnton Creek was flowing the entirety of year and remains connected to the Willamette River, allowing fish access (see Section 4.4). Photographs of the OCH and Linnton Creek are included in Attachment 3.

Based on visual observations, performance **standard A9 was partially met.**

4.1.4 A10: Structural Habitat Elements

All features placed below the 100-year flood elevation were retained from 2021. Since construction, two snags have been reduced by beaver. Performance standard A10 requires at least 80% of features be retained; 97% have been retained, thus this performance

standard was met. Additionally, approximately six large logs were deposited on the site during the high-water event in June.

4.2 Hydrology and Hydraulics

4.2.1 B1: 50% Inundation Level

Based on the topographic data, there has been an approximately 5% increase in the area below the 50% inundation elevation (Attachment 2, Figure 3). This standard requires less than 20% deviation from the as-built, thus, this performance **standard was met**.

4.3 Vegetation Monitoring

RestorCap biologists conducted 2022 vegetation monitoring July 13-22 for the upland forested, and September 24-30 in scrub-shrub / herbaceous areas. Results are presented below by habitat planting zone.

4.3.1 Riparian / Upland Forested Habitat

Summary statistics for forested plots are included in Table 4 below; full tables of data are included in Attachment 4.

C8: Native Stem Density

Based on data collected at 32 forested plots, approximately 27,012 native stems per acre were recorded. The C8 performance standard requires at least 1,200 native stems per acre², thus, this performance **standard was met**. Per plot, stem counts ranged from 35 to 2,554 and averaged 513.

C9: Native Species Diversity

Within the forested habitat, this performance standard requires at least three native tree and five native shrub species be present. In total, 41 native woody species were identified, 16 tree and 25 shrub species, thus, this performance **standard was met**.

Table 4. Average cover for herbaceous plots within Riparian/Upland Forested habitat

| Category | | Habitat Average | Standard Error |
|--|----------------|-----------------|----------------|
| Cover of Native Herbaceous Species | | 75.9 | 6.6 |
| | Lower CI (80%) | 67.5 | |
| | Upper CI (80%) | 84.3 | |
| Cover of Invasive Herbaceous Species | | 3.9 | 1.0 |
| | Lower CI (80%) | 2.6 | |
| | Upper CI (80%) | 5.2 | |
| Cover of Non-Native Herbaceous Species | | 5.1 | 1.1 |
| | Lower CI (80%) | 3.6 | |
| | Upper CI (80%) | 6.5 | |
| Cover of Native Shrubs and Trees in Herbaceous Plots | | 5.6 | 1.6 |

² The DSL permit requires 1,600 stems per acre or 50% coverage for two years before determining the site to be successful.

| | | | |
|-------------------------------|----------------|------|-----|
| | Lower CI (80%) | 3.5 | |
| | Upper CI (80%) | 7.7 | |
| Cover of Bare Ground and Moss | | 38.7 | 4.5 |
| | Lower CI (80%) | 32.9 | |
| | Upper CI (80%) | 44.4 | |

C10: Herbaceous Cover

Calculated herbaceous cover within the 64 forested plots constitutes approximately 75.9% (80% CI 67.5, 84.3), an increase from 62.6% in 2021. Ten invasive species were detected, wild carrot (*Daucus carrota*), creeping thistle (*Cirsium arvense*), bull thistle (*C. vulgare*), prickly lettuce (*Lactuca serriola*), bird’s foot trefoil (*Lotus corniculatus*), white sweetclover (*Melilotus albus*), rabbitsfoot clover (*Trifolium arvense*), red clover (*T. pratense*), white clover (*T. repens*), pennyroyal (*Mentha pulegium*), and reed canarygrass (*Phalaris arundinacea*). An additional 11 non-native, non-listed species were observed within these plots (Attachment 4). Plots within the forested zone exceed 10% native herbaceous cover and have less than 30% invasive weed cover, therefore **standard C10 was met**.

Although not required, percent cover and percent frequency of individual species are included in the attached data tables. These calculations are intended to provide additional information related to natural recruitment, species richness, and species diversity within the sampled plots. Six herbaceous species had cover above 5% and were present in more than 10% of the plots.

4.3.2 Scrub-Shrub Habitat

Summary statistics for scrub-shrub plots are included in Table 5 below; full tables of data are included in Attachment 4.

C11: Native Stem Density

Based on data collected at 16 plots, average native stems per plot was 763, totaling approximately 108,973 stems per acre (Attachment 4). The drastic increase in stem counts within this zone over 2020 monitoring is largely due to the increase in willow (*Salix* spp.) growth, which comprised approximately 70% of stems. The C11 performance standard requires at least 1,200 native stems per acre³, thus, this performance **standard was met**.

C12: Native Species Diversity

Diversity within the scrub-shrub zone requires at least five native shrub species. In total, 16 native woody species were identified, seven tree and nine shrub species; thus, this performance **standard was met**.

Table 5. Average cover for herbaceous plots within Scrub-Shrub habitat

| Category | | Habitat Average | Standard Error |
|--|----------------|-----------------|----------------|
| Cover of Native Herbaceous Species | | 72.0 | 12.1 |
| | Lower CI (80%) | 56.5 | |
| | Upper CI (80%) | 87.5 | |
| Cover of Invasive Herbaceous Species | | 2.8 | 1.2 |
| | Lower CI (80%) | 1.2 | |
| | Upper CI (80%) | 4.4 | |
| Cover of Non-Native Herbaceous Species | | 10.6 | 3.6 |

| | | | |
|--|----------------|------|-----|
| | Lower CI (80%) | 6.0 | |
| | Upper CI (80%) | 15.2 | |
| Cover of Bare Ground and Moss | | 62.2 | 6.2 |
| | Lower CI (80%) | 54.2 | |
| | Upper CI (80%) | 70.1 | |
| Cover of Native Trees and Shrubs | | 14.4 | 4.6 |
| | Lower CI (80%) | 8.5 | |
| | Upper CI (80%) | 20.3 | |
| Average Weighted Prevalence Index (All Strata) | | 2.5 | |

C13: Herbaceous Cover

Native herbaceous vegetation average cover was approximately 72.0% (80% CI 56.5, 87.5). The increase in cover from 2021 monitoring (38%) can be attributed to both the later season monitoring within this zone and the summer high-water event that inundated this area earlier than during the summer of 2021. Three herbaceous species had cover above 5% and were present in more than 10% of the plots; three additional species had 4% cover.

Within these plots, three invasive species were detected, bird’s foot trefoil (*Lotus corniculatus*), pennyroyal (*Mentha pulegium*), and water purslane (*Lythrum portula*). Invasive species cover was 2.8% (80% CI 1.2, 4.4).

Performance standard C13 requires >10% native herbaceous cover and <30% noxious cover, thus this performance standard was met.

4.3.3 Emergent Habitat

Summary statistics for emergent plots are included in Table 6 below; full tables of data are included in Attachment 4.

Table 6. Average cover for herbaceous plots within Off-Channel Emergent habitat

| Category | | Habitat Average | Standard Error |
|--|----------------|-----------------|----------------|
| Cover of Native Herbaceous Species | | 78.9 | 14.2 |
| | Lower CI (80%) | 60.7 | |
| | Upper CI (80%) | 97.2 | |
| Cover of Invasive Herbaceous Species | | 0.5 | 0.2 |
| | Lower CI (80%) | 0.3 | |
| | Upper CI (80%) | 0.8 | |
| Cover of Non-Native Herbaceous Species | | 4.2 | 2.8 |
| | Lower CI (80%) | 0.6 | |
| | Upper CI (80%) | 7.9 | |
| Cover of Bare Ground and Moss | | 51.2 | 7.8 |
| | Lower CI (80%) | 41.2 | |
| | Upper CI (80%) | 61.2 | |
| Cover of Native Shrubs and Trees in Herbaceous Plots | | 1.6 | 0.8 |
| | Lower CI (80%) | 0.6 | |
| | Upper CI (80%) | 2.7 | |
| Average Weighted Prevalence Index | | 1.4 | |
| Count of Native Herbaceous Species | | 22 | |

C14: At least five native emergent/herbaceous species

Within the emergent zone, 22 native herbaceous species were observed, and plot richness ranged from zero to 11 native species. The most common species was marsh seedbox (*Ludwigia palustris*), with 34.5% cover within this zone. Six herbaceous species had 5% cover and were present in more than 10% of the plots: creeping spikerush (*Eleocharis obtusa*), redroot flatsedge (*Cyperus erythrorhizos*), common waterweed (*Elodea canadensis*), false pimpernel (*Lindernia dubia*), teal lovegrass (*Eragrostis hypnoides*), and marsh seedbox (*Ludwigia palustris*). This performance standard requires at least five native herbaceous species; therefore, this standard was met.

C15: Herbaceous Cover

Within this zone, native herbaceous cover was approximately 78.9% (80% CI 60.7, 97.2), a major increase from 2021 (27.2%). Invasive species cover was 0.5% (80% CI 0.6, 7.9) with three invasive species present within plots: pennyroyal (*Mentha pulegium*), water purslane (*Lythrum portula*), and curly-leaf pondweed (*Potamogeton crispus*). Performance standard C15 requires 30% cover of native herbaceous species and <10% of invasive species; therefore, this standard was met.

4.4 Water Quality Monitoring

Monthly average temperatures and DO are included in Tables 7 and 8, respectively. Linnton Creek flowed continually throughout the year and was consistently colder than the Willamette River at the mouth of the OCH (average difference = 5.1°F).

Based on probe data, the average water surface elevation in the side channel was approximately 12.56 ft and exceeded the 12.1 ft berm apex 41% of the time between March and July. The maximum low elevation within the OCH was 10.35 ft (i.e., highest point within the low flow channel), measured just to the south of Linnton Creek on transect W. Water surface elevation measurements within the side channel exceeded this elevation approximately 79% of the time. Water surface elevations for the side channel and Willamette River probes on Site are included as Attachment 9.

No performance standard was established for this parameter.

Table 7. Monthly average temperatures (°F).

| Test Location | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov |
|-----------------------|------|------|------|------|------|------|------|------|------|------|------|
| Willamette River | * | * | 48.2 | 50.8 | 53.5 | 58.7 | 71.2 | 75.8 | 69.5 | 61.2 | 51.8 |
| Linnton Creek Outfall | 43.0 | 42.3 | 45.9 | 46.2 | 50.1 | 55.5 | 61.0 | 63.4 | 62.0 | 59.1 | 51.4 |
| Linnton Side Channel | * | * | 51.5 | 55.3 | 55.1 | 58.7 | 75.5 | 77.4 | 67.5 | 59.0 | 49.9 |

*Probe was lost and reinstalled at this location in March

Monthly dissolved oxygen readings are reported in Table 7. Readings for January to March were originally recorded in percent saturation and converted to mg/L using the monthly average temperature at each location. Readings after March were recorded in mg/L.

Table 8. Monthly dissolved oxygen (mg/L) measurements at six testing locations.

| Test Location | Jan ¹ | Feb ¹ | Mar ¹ | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov |
|-----------------------|------------------|------------------|------------------|------|------|------|-----|-----|-----|-----|------|
| Downstream Willamette | 11.74 | 10.97 | 11.23 | 10.6 | 10.9 | 11.0 | 9.4 | 8.0 | 9.1 | 9.8 | 11.7 |
| Unnamed Creek Outfall | 11.66 | 11.09 | 10.39 | 10.8 | 11.1 | 9.3 | NF | NF | NF | NF | NF |

| | | | | | | | | | | | |
|------------------------------------|-------|-------|-------|------|------|------|-----|-----|-----|------|------|
| Inlet NW of Island (North Island) | 11.25 | 11.32 | 11.44 | 11.4 | 10.9 | 11.2 | 9.4 | 7.7 | 9.2 | 11.9 | 11.5 |
| NE Portion of Inlet (South Island) | 10.67 | 9.96 | 10.22 | 12.4 | 8.3 | 6.7 | 7.0 | 7.6 | NF | 7.6 | 11.0 |
| Linnnton Creek Outfall | 11.36 | 11.37 | 11.35 | 10.5 | 11.3 | 10.1 | 7.5 | 9.0 | 8.3 | 9.5 | 10.2 |
| Upstream Willamette | 11.97 | 10.96 | 11.53 | 10.4 | 10.7 | 11.3 | 9.5 | 8.8 | 8.3 | 10.5 | 11.8 |

NF = No Flow

¹Mg/L converted from percent saturation

Based on sensor data from the probe installed within the side channel, 25.1% of the water surface elevation records from March 1 to November 5, 2022, exceed 12.1 ft. These exceedances occurred during March (n=6), April (n=1), May (n=24), June (n=30), and July (n=12), representing approximately 47.8% of the days within that time period. The maximum water elevation recorded was 21.23 ft in June.

4.5 Fish and Wildlife Monitoring

Incidental observations of wildlife are included in Attachment 5, results of the various required surveys are reported below.

4.5.1 Fish Surveys

Four surveys were conducted between February and May, approximately 1 per month; the accompanying report is included as Attachment 6. High water and fast flows within the Willamette as well as turbidity limited the ability to conduct additional surveys via snorkel and underwater video. Dates and results of the surveys are reported below in Table 9 and on Figure 7.

Table 9. Results of fish sampling during 2022

| Survey Date | Result | Size Information |
|------------------|---|---|
| February 7, 2022 | 9 Chinook salmon (<i>Oncorhynchus tshawytscha</i>) | Sub-yearling (40-60 mm) |
| March 10, 2022 | No fish observed | - |
| March 30, 2022 | One unidentified fish observed | - |
| May 23, 2022 | 3 Chinook salmon 3 Unidentified salmonids “Numerous” small fish | Sub-yearling (40-60 mm) Juvenile 1-2 inches |

4.5.2 Bird Assemblage Monitoring

Thirty-seven bald eagle surveys were conducted between December 21, 2021, and August 22, 2022, the full report is included as Attachment 7. Bald eagles were observed on-site in 32% (12) of the surveys and off-site during 70% of the surveys (26). Two to three sub-adults, two adults (residents), and one fledgling were observed. Behaviors and timing are included in Table 1 of Attachment 7.

A pair of bald eagles regularly nest on the forested ridge approximately 0.3 miles west-northwest of the site and were seen on-site with their fledgling perching on snags on the northeast slope. The most frequently used feature was a live remnant cottonwood tree

located on the south end of the site and the clump of deciduous trees along the Willamette River at the north end of the site was the second most used feature. Hunting and eating activities were observed within the OCH habitat, including use of the log jumble, pilings, and snags on the island, and nearshore areas for bathing.

During these surveys, North American beaver (*Castor canadensis*) were observed on three occasions swimming into the OCH from the river to browse on willows and other vegetation. On one occasion, three beavers were present on site near the south end of the island at the same time. Additionally, 65 other vertebrate species were noted using the site during these surveys (Table 2 of Attachment 7).

Results of bird surveys conducted concurrent with the bald eagle surveys indicate use of the site by 56 species. A comparison of surveys for the same time period as previous surveys shows a slight increase to 26 species (108 individuals) from 22 species detected during pre-construction surveys and 18 observed during Year 1 monitoring. Similar to previous years, species that utilize the shallow water and sandy beaches (e.g., Canada goose, bald eagle, violet-green swallows) were the most prevalent species during this time period. Several species, including bald eagle, Canada goose, killdeer, spotted sandpiper, northern flicker, red tailed hawk, and white crowned sparrows were observed nesting or foraging with chicks on site. A summary of species detected by date is included as Attachment 10.

4.5.3 Mink Monitoring

No mink were observed either on camera or in visual surveys of tracks and scat on the beach and mud. One long-tailed weasel (*Mustela frenata*) was observed on multiple occasions using the large wood piles in the scrub-shrub zone and on the island and moving between the north hill and the pedestrian pathway area on the north side of the site.

Cameras captured a range of species including beaver, river otter (*Lontra canadensis*), coyote (*Canis latrans*), black-tailed deer (*Odocoileus hemionus* ssp *columbianus*), California ground squirrels (*Otospermophilus beecheyi*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and a variety of birds. Representative photographs are included in the photo appendix (Attachment 3).

5. Goals and Performance Standards

The goals and objective of the project are presented below, with notes regarding if each objective was met or if on track to achieve performance standard. Goals 1, 2, and 3a were met at construction; Goal 4 was met in 2021.

Goal 3: Ensure the long-term success of the restored habitat through monitoring, maintenance, and stewardship.

Objective 3b: Implement a site-specific performance plan with performance standards to track the development of the site.

On track: Ongoing annual monitoring follows methods outlined in SSPP.

Objective 3c: Minimize colonization of the site by invasive species, as defined in the performance standards.

On track: The site was seeded with native species, and on-going monitoring and maintenance is being conducted to prevent colonization of invasive weeds. Adaptive management activities are described below in Section 7. The site passes the performance standards for invasive weed coverage.

Objective 3d: Maintain fish access to the OCH.

On track: Year 3 monitoring indicates the upstream berm represents an obstruction to fish access during low-water periods, freshwater inputs into the OCH are present year-round, no jump heights greater than 6 inches are present, and the OCH gradient remains less than 4%. However, potential stranding hazards were noted. These are addressed below.

Objective 3e: Identify and rectify obstacles to habitat development or use, as defined in the performance standards.

On track: Objective 3e is being met through implementation of the post-construction performance plan.

Objective 3f: After the Performance Period, implement a long-term stewardship program.

On track: The Long-Term Stewardship Plan has been preliminarily approved and will be implemented after the 10-year monitoring period.

6. Discussion

6.1 Geomorphic/Structural Habitat Elements

6.1.1 A6: Total Area of OCH or ACM within 10% of as built

The 1% increase in this zone is primarily due to the portion of the downstream end of the channel constructed to less than +8 ft filling in with sand and sediment shortly after construction. Cross sections M and N show the greatest accretion of sediment with the formation of sediment bars near the outlet, the remainder of the OCH has remained relatively stable since the 2021 survey.

6.1.2 A7 and A8: Increase in Elevation within OCH and ACM

Updated elevation profiles indicate sediment deposition within the OCH and slight erosion along the shoreline transects within the ACM. The greatest deposition has resulted in formation of sediment bars along the outlet of Linnton Creek to the Willamette River. RestorCap will continue to monitor this area to ensure continuous connection between Linnton Creek and the Willamette River.

Although transects within the DUs have exhibited a minor amount of erosion from 2020 (<2%), they have remained stable from the survey conducted in 2021.

6.1.3 A9: Fish Access

The site is physically accessible to the target fish species and life history stages—no jump heights or steep slopes are present within the OCH. The downstream connection to the OCH is accessible all year via Linnton Creek; the upstream end is disconnected from the Willamette River when the water elevation is below the berm height (12.1 ft). Cold-water discharge was present from both the Linnton Creek culvert and from hillside seeps year-round as anticipated. A potential concern regarding fish access is the berm that developed

at the upstream end of the OCH in 2020, which can be seen in transect AH (Attachment 2). Based on the photographic monitoring and topographic surveys, the berm has remained stable since monitoring in 2020 and is overtopped when water surface elevations exceed the 12.1 ft height of the berm (Attachment 3, page 26). This sand berm represents an obstruction for fish to directly access the OCH from the upstream end in low-water conditions. Based on water surface elevation data, fish had access to the side channel habitat, *over the berm*, approximately 47.8% of the time during the peak migration months (March – June). Water surface elevations indicate this section of the channel was connected via the downstream inlet approximately 79% of the time, which is within the 75-85% inundation connectivity design. Additionally, fish were able to access the downstream portion of the OCH through the downstream inlet that remains connected to the Willamette via Linnton Creek at all times. The flow-through channel is currently functioning as designed and was not intended to remain connected to the Willamette River at both ends for the entirety of the year (Grette 2018b, Waterways 2016).

As discussed in the 2020 monitoring report, there is potential for the ponded area to cause fish stranding when the river levels recede. RestorCap, in coordination with the Trustee Council, identified adaptive management actions to alleviate ponding in this area, but due to high water and the limited work window, the work was not completed. Topographic survey data was discussed during the summer, and it was decided to evaluate this area for an additional year before implementing any adaptive management actions. RestorCap will implement adaptive management actions to fill the ponded area with sand from on-site during the work window and dry conditions within this portion of the OCH.

6.2 Vegetation Monitoring

As described in Section 3, vegetation monitoring in 2022 was conducted in two surveys timed to the growth period of each specific habitat. High water in June and July caused grass die-off in the elevation zone from approximately 13 to 16 ft, which reduced herbaceous cover in a few of the shrub and forested plots in this area. The area is approximately 1,500 sq ft located southwest of plot 9S.

Qualitative observations of recruitment indicate that cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and willows are responding positively to the disturbance and flooding regime within the OCH, contributing to a large increase in seedlings within the shrub zone. Recruits were most prevalent in shrub plots nearest the downstream outlet (e.g., 2S-6S) at elevations of approximately 10.5 to 11 ft, where regular inundation is more frequent than full channel activation during high water.

Overall, sampling results indicate native vegetation is establishing quickly at the site and cover of invasive species remains low due to ongoing weed management.

6.2.1 Riparian / Upland Forested Habitat

All three performance standards (stem density, species diversity, and herbaceous cover) were met within the forested habitat. Similar to 2020 and 2021, stem density within this zone was largely dominated by species in the lower elevation zones including swamp rose (*Rosa pisocarpa*), snowberry (*Symphoricarpos albus*), cottonwood, Douglas spiraea (*Spiraea douglasii*), and Pacific and Scouler's willows (*S. lasiandra* and *S. scouleriana*). Cottonwood remains the most common woody species within these plots, followed by snowberry and Oregon white oak (*Quercus garryana*).

The larger oaks (3-4 in diameter at breast height; dbh) that were planted in 2021 were watered weekly during the summer and appear to have survived the dry summer months. Although these trees did not contribute much to stem counts (i.e., 1-2) due to their size, they contributed to an increase in cover (3-4%) within individual plots where present.

6.2.2 Scrub-Shrub Habitat

The scrub-shrub habitat met all three performance standards (stem density, species diversity, and herbaceous cover) and appears to be thriving throughout the zone. Timing for monitoring within this zone was shifted to late September, which proved to be better timing based on monitoring data and qualitative observations. Cover was dominated by the native marsh seedbox (*Ludwigia palustris*) along the edges of the OCH, areas generally outside of daily tidal fluctuations.

Plots located on beach sand and mudflat areas (i.e., 1S and 15S) had lower cover and fewer species than those within the seep wetland, as would be expected for highly functioning, frequently inundated habitat in areas of shifting sediment. In the drier, sandy areas, species such as Douglas spiraea (*Spiraea douglasii*) and Scouler's willow (*Salix scouleriana*) were the most abundant. Mosses like *Sphagnum* sp. and *Tortula truncata* were present within approximately 30% of the shrub plots and cover is slowly increasing.

6.2.3 Emergent Habitat

Herbaceous emergent vegetation cover was markedly higher than 2021 due to changes in timing of monitoring and the high-water event that inundated most of this area through July. Within these plots, 35 species were recorded, and cover increased approximately 40% from last year. The high cover is despite the five plots along the OCH inlet (1-2A-E) that had zero percent cover because of their location within the active channel and beach areas. One additional plot (11-12B) was added within the emergent vegetation to account for these low vegetation counts, though the habitat metrics were still met without the addition of this plot.

In early 2022, Broadleaf arrowhead (*Sagittaria latifolia*) corms and camas (*Camisia quamash*) bulbs were planted within the OCH. During April of 2022, camas plants were observed just prior to flowering. Likewise, broadleaf arrowhead plants were observed in flower in late August and with infructescence in September.

Invasive and non-native (non-listed) species covers were low within this zone due to the ongoing mechanical removal. Pennyroyal (*Mentha pulegium*) and water purslane (*Lythrum portula*) were the dominant weeds, and curly-leaf pondweed (*Potamogeton crispus*) was observed for the first time within the channel; adaptive management recommendations are included in Section 7.2.

6.3 Water Quality Monitoring

Per the HDP, the ODEQ water quality standard of 11.0 mg/L DO applies from January to July. Additionally, the statute includes the caveat that “where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/L criteria, DO levels must not be less than 95% saturation³”. Although the Linnton Creek outfall location

³ OAR 340-041-0016 (1)(b)

meets this standard in most months, it does not consistently meet the standard during the later summer months. Other portions of the OCH (e.g., the south side of the channel) did not meet this standard due to shallow water ponding with poor mixing, drawdown during the late summer months, and rising temperatures in late summer.

A literature review conducted by USEPA (1986) cites “slight production impairments” for juvenile and adult salmonids at DO concentrations below 6 mg/L and no production impairments at 8 mg/L. Although salmonids can survive when DO concentrations are low, swimming and foraging are adversely affected, especially at temperatures above 20°C (68°F). Various studies indicate juvenile salmonids exhibit varying levels of avoidance in areas with DO below 4.5-6 mg/L (Carter 2005). Generally, DO concentrations need to be highest for embryo and larval stages of salmonid development (11 mg/L for no impairment, 9 mg/L or above for slight impairment), and lower DO as described above (6-8 mg/L) is optimal for juvenile and adult salmonids. As only the juvenile and adult life stages are anticipated to occur within the OCH (no spawning habitat is present in the vicinity), the 6 mg/L or greater is suitable to optimal for salmonids with potential to occur at the Site.

Although portions of the OCH had elevated temperatures and reduced DO during the summer months, it is not likely this had a measurable negative effect on salmonid use of the Site as the inlet on the north side of the island and Linnton Creek maintained DO above 7 mg/L, monthly average DO was above 8.5 mg/L during the summer months, and temperatures averaged 2-4 degrees (F) below the Willamette River. These DO measurements are well above the limits where habitat avoidance or even slight impairment to juvenile salmonids are known to occur. Additionally, through annual monitoring of the OCH, juvenile salmonids have been documented on the Site during the January to July window. Therefore, temperatures and DO were generally optimal for salmonid use of the OCH during the period from January to July.

6.4 Wildlife Monitoring

Native fishes, including salmonids, are utilizing the site, specifically the OCH structural elements and submerged vegetation. Lamprey surveys conducted by the U.S. Fish and Wildlife Service (USFWS) have not detected Pacific lamprey (*Entosphenus tridentatus*) on site (Blanchard et al. 2021). A wide variety of birds are using the site, including bald eagles and osprey (*Pandion haliaetus*), for foraging, bathing, and rearing juveniles. A comparison of the species utilizing the site now compared to pre-construction surveys (SSPP) indicates a faunal shift to species that utilize shrub, forested, and wetland habitats. The site provides a diverse range of foraging habitats compared to other riverfront habitats in the area and is used by both birds and mammals for rearing young.

6.5 Credit Ledger

A copy of the current credit ledger is included herein as Attachment 8. Linnton Water Credits has currently set aside \$361,711 for long-term stewardship from the sale of credits.

7. Adaptive Management

As outlined in the SSPP, the adaptive management framework provides a plan for acting if it is determined the restoration site is not on track to meet interim performance standards, or if contingency actions are needed to respond to physical or biological

conditions. As monitoring data are collected, they will be evaluated relative to performance standards, and if necessary, consultation between the Trustee Council and RestorCap will determine if ongoing monitoring or remedial action is necessary.

7.1 Off-Channel Habitat

As discussed with the Trustee Council, the area within the upstream mouth of the OCH has been identified as a possible stranding risk for fishes, including lamprey. As requested by the Trustee Council, RestorCap installed probes to monitor depth and temperature as well as a camera to provide imagery to assess channel changes. Based on the photographic monitoring and topographic surveys, the berm is overtopped when water surface elevations exceed the 12.1 ft height of the berm (Attachment 3, page 26). Ongoing monitoring in 2023 will include water depth, temperature, and photographic monitoring of the inlets. Additionally, RestorCap will continue to coordinate with the Trustee Council and a fluvial geomorphologist to discuss ongoing sedimentation at the inlets and possible development of flow models.

RestorCap will implement adaptive management actions to fill the ponded area with sand from on-site during the work window and dry conditions within this portion of the OCH.

7.2 Vegetation

Adaptive Management work was conducted to address low woody vegetation cover and emergent herbaceous vegetation cover to meet Performance Standards C13, C15, C17, and C23. Additional plantings were installed by Ash Creek in October and December of 2021 and in January and March of 2022 (Table 10, Figure 8). The December 2021 installations included planting thirty-three, 2-4.25-inch dbh Oregon white oak and twenty, 10-gallon Pacific madrone (*Arbutus menziesii*) trees. Planting mature trees will aid in addressing the low level of woody vegetation cover in the upland sections of the Site. In January and March of 2022, a combination of plugs, bareroots, cuttings, and poles were planted in the emergent portion of the site to create additional habitat structure within the OCH. Broadleaf arrowhead tubers and camas bulbs were included to introduce First Nation species onto the site. Thorny vegetation like blackcap raspberry (*Rubus leucodermis*) was planted along the fence line and gabion near the public access area to prevent trespassers from accessing the site.

Table 10. Species replanted in 2021 and 2022

| Number | Species | Container | Installation Date |
|--------|-----------------------------|------------|-------------------|
| 25 | <i>Baccharis pilularis</i> | #2 | Oct-21 |
| 10 | <i>Ceanothus sanguineus</i> | #1 | |
| 20 | <i>Ceanothus velutinus</i> | #1 | |
| 5 | <i>Ceanothus velutinus</i> | #2 | |
| 100 | <i>Lonicera involucrata</i> | #1 | |
| 4 | <i>Rhamnus purshiana</i> | #3 | |
| 25 | <i>Ribes sanguinium</i> | #1 | |
| 10 | <i>Tsuga heterophylla</i> | #1, #2, #3 | |
| 500 | <i>Carex obnuta</i> | plug | |
| 500 | <i>Scirpus microcarpus</i> | plug | |
| 2000 | <i>Camassia quamash</i> | bulb | |

| | | | |
|------|--|------------|--------|
| 1000 | <i>Sagittaria latifolia</i> | tuber | |
| 500 | <i>Spiraea douglasii</i> | poles | |
| 80 | <i>Populus trichocarpa</i> | poles | |
| 35 | Mixed <i>Populus, Spiraea, Salix</i> | poles | |
| 2000 | <i>Chamaemerion angustifolium</i> | bareroot | Mar-22 |
| 1000 | <i>Salix hookeriana</i> | cuttings | |
| 25 | <i>Rosa nutkana</i> | cuttings | |
| 100 | <i>Rubus leucodermis</i> | bareroot | 22-Jan |
| 1000 | <i>Spiraea douglasii</i> | cuttings | |
| 250 | <i>Symphoricarpos albus</i> | cuttings | |
| 250 | <i>Physocarpus capitatus</i> | cuttings | |
| 500 | <i>Cornus sericea</i> | cuttings | |
| 20 | <i>Poles (Cornus sericea, Populus trichocarpa)</i> | poles | 21-Dec |
| 33 | <i>Quercus garryana</i> | (2"-4.25") | |
| 20 | <i>Arbutus menziesii</i> | 10 gal | |
| 25 | <i>Mahonia aquifolium</i> | 2 gal | |

7.2.1 Vegetation Management

Vegetation maintenance and management was conducted to assist in the establishment of the native plantings and to control invasives species from persisting on the site. The Oregon white oak and Pacific madrone trees were watered weekly during the hot, dry months of summer. While these species are known to be drought tolerant, watering was critical in getting these mature trees established in the nutrient-poor soil of the uplands where water retention is low. Other maintenance practices included hand and mechanical removal of competing non-native species near the native plantings.

Restorcap staff and Ash Creek Forest Management worked diligently to control invasive species from persisting on site. Methods include mechanical treatments (either by hand pulling, digging, mowing, or weed whacking), herbicide applications, or a combination of the two. Ash Creek conducted a site-wide spray treatment in June of 2022. A low concentration, Fabaceae-selective herbicide (Transline) prescription was used to treat yellow glandweed (*Bellardia viscosa*), white and yellow sweetclovers, and other non-native clover species. Restorcap staff performed additional spray treatments on reed canary grass, pennyroyal, and birds-foot trefoil over the course of spring and summer. All spray treatments were performed on dry days with little wind to reduce runoff and chemical drift. No herbicide applications were performed within inundated areas of the off-channel emergent wetland; mechanical treatments were conducted periodically by Restorcap staff in these areas. Mechanical treatments using a weed wrench and/or a shovel were performed to remove woody species like scotch broom (*Cytisus scoparius*), black locust (*Robinia psuedoacacia*), and butterfly bush (*Buddleja davidii*). Hand removal was most used in the emergent wetland area of the Site for species like floating primrose (*Ludwigia peploides*), yellow flag iris (*Iris psuedacorus*), and many of the semi-aquatic species mentioned above. Individuals were removed off-site during each treatment, and ongoing vegetation management will address additional occurrences, as necessary.

7.3 Trail Monitoring

Monitoring of the trail area in 2022 included visual observations during site visits. Additionally, security cameras were installed in areas where trespassing continues to pose an issue. Due to observations of trespassing near the gabion of the public access area, additional fencing has been installed where an apparent foot-trail was created from frequent access of the Willamette River shoreline. In January of 2022, thorny vegetation was installed along the fence line to provide another obstruction for people trespassing the site. Trespassers trample vegetation and cause erosion on the hillside walking down to the beach, an area already susceptible to erosion by natural causes. Trespassers were observed on video accessing the off channel emergent wetland and river for fishing and other activities. These trespassers were confronted and have not been observed since that discussion. Additional security cameras were installed around the perimeter of the site to locate where pedestrians are accessing the site. A more secure fence was installed near the public access area to deter people from accessing the hillside down to the beach.

7.4 Arco Bulk Terminal Plume

No visual signs of surface contamination were observed by RestorCap within the petroleum hydrocarbon plume remediation area during visits to the Site. During 2022, Seaport Midstream Partners (SMP) continued to implement actions related to the December 2021 sheen release. Remedial measures included injection of hydrogen peroxide in the urgent response excavation and applying Microblaze to the engineered sediment near the water line. SMP discontinued the use of “hot drains” for dewatering tanks and performed a camera survey of the process water piping to look for breaks. A significant piping break was discovered near the product testing station and was repaired.

Ongoing work will include air-sparge remediation when the river level has risen sufficiently that the screens for temporary use monitoring points installed along the excavation are submerged. Additionally, SMP submitted a general proposal to the Department of Environmental Quality for performing a targeted assessment of the engineered fill along the sheet pile wall to evaluate the potential for failures in other tiebacks. This proposal will be formalized into a work plan; due to the need for U.S. Army Corps of Engineers and Department of State Lands permits, this assessment is expected to occur in Fall 2023.

7.5 Shoreline Erosion

In early 2023, RestorCap identified some erosion areas along the shoreline on the north portion of the Site. Response actions include planting willow, alder, and cottonwood pole cuttings along the base on the hill and on the beach to stabilize the area. Additional visual monitoring will be conducted in 2023 and report in the Year 4 monitoring report.

8. References


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- Carter, K., The Effects of Dissolved Oxygen on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage. California Regional Water Quality Control Board North Coast Region. August 2005. Available online: <https://www.noaa.gov/sites/default/files/legacy/document/2020/Oct/07354626438.pdf> Accessed April 1, 2023.
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- U.S. Environmental Protection Agency (USEPA). 1986. Ambient Water Quality Criteria for Dissolved Oxygen. Office of Water. EPA 440/5-86-003. 35pp. Available online at: . <https://www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-1236.pdf> accessed April 1, 2023.
- Waterways. 2016. Basis of Design Memorandum – 100% Design Linnton Mill Site Habitat Restoration. December.

ATTACHMENT 1. FIGURES



FIGURE 1

Location Map

 Linnton Bank Boundary

Linnton Mill Restoration Site
Portland, Oregon

Data Source(s): RestorCap, Grette and Associates, Waterways Consulting, Inc.
Base Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Google, County of Clark, WA, Oregon Metro, Oregon State Parks, State of Oregon GEO, WA State Parks GIS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of





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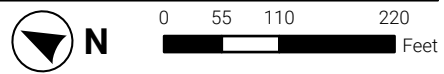
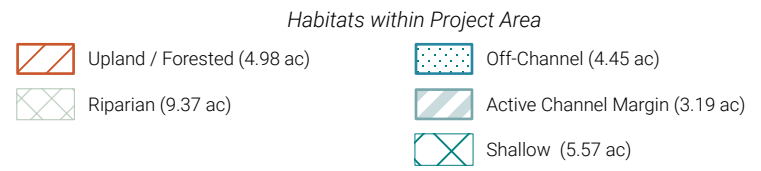


FIGURE 2

Linnton Habitat Types

Linnton Mill Restoration Site
Portland, Oregon



Data Source(s): RestorCap, Grette and Associates
 Base Source: Maxar, Microsoft, Esri Community Maps Contributors,
 County of Clark, WA, Oregon Metro, Oregon State Parks, State of Oregon
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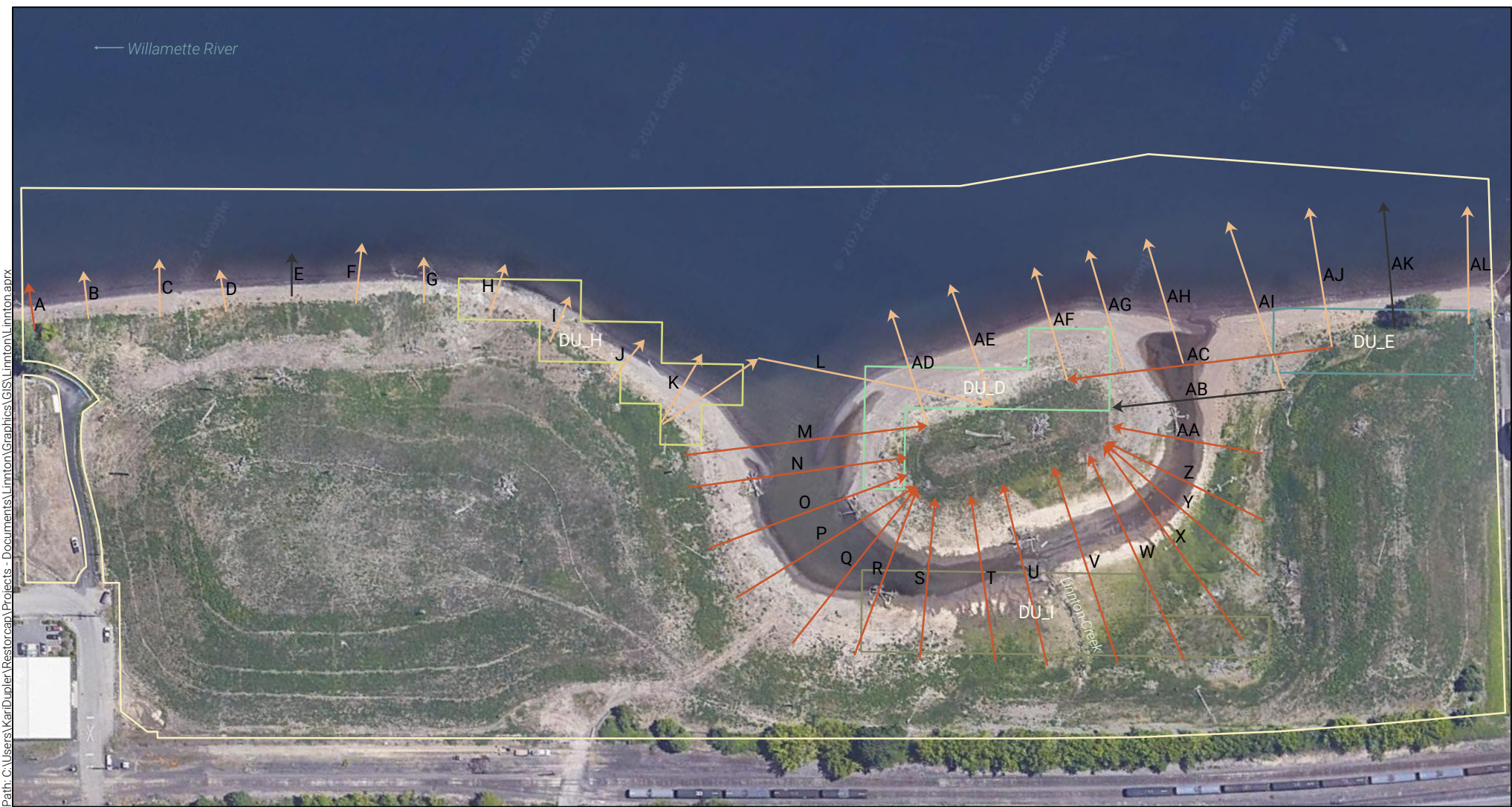










FIGURE 3

Topographic Monitoring Transects

Linnton Mill Restoration Site
Portland, Oregon

Data Source(s): RestorCap, Grette and Associates, Waterways Consulting, Inc.
Base Source: Google
12/6/2022 2:31 PM

Survey Results

| | |
|---|---|
|  Linnton Bank Boundary | Decision Unit Boundary |
| Off-Channel Monitoring |  D |
|  Decrease |  E |
|  Increase |  H |
|  No Change |  I |


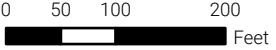
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FIGURE 4

Vegetation Monitoring Plots

Linnton Mill Restoration Site
Portland, Oregon

- Linnton Bank Boundary
- Plot Type
 - Forest
 - Scrub-shrub



Data Source(s): RestorCap, Grette and Associates
Base Source: Google, Maxar
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FIGURE 5

Off-Channel Emergent Monitoring Plots

Linnton Mill Restoration Site
Portland, Oregon

- Linnton Bank Boundary
- Off-Channel (4.45 ac)
- Plot Type**
- Herbaceous



Data Source(s): RestorCap, Grette and Associates
 Base Source: © 2023 Microsoft Corporation © 2023 Maxar © CNES (2023)
 Distribution Airbus DS
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FIGURE 6

Wildlife Monitoring

Linnton Mill Restoration Site
Portland, Oregon

- Monitoring Locations*
- Linnton Bank Boundary
 - Mink monitoring
 - ▲ Adjusted Mink Camera Location
 - Additional Camera Traps
 - Mink Transect
 - Bald Eagle Monitoring
 - Vantage Point

Data Source(s): RestorCap, Grette and Associates
Base Source: Maxar, Microsoft, Google
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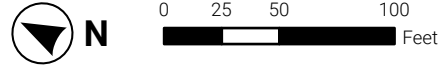



FIGURE 7


Fish Monitoring

Linnton Mill Restoration Site
Portland, Oregon

 Linnton Bank Boundary

Survey Results

Fish Monitoring Observations (2022)

 Salmonid

 Unknown Fish

Data Source(s): RestorCap, Grette and Associates
Base Source: Maxar, Microsoft, Google
11/30/2022 5:00 PM

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FIGURE 8

Adaptive Management Planting

Linnton Mill Restoration Site
Portland, Oregon

Data Source(s): RestorCap, Grette and Associates
Base Source: Maxar, Microsoft, Esri Community Maps Contributors, County of Clark, WA, Oregon Metro, Oregon State Parks, State of Oregon GEO, WA State Parks GIS, @ OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, Google
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Habitats within Project Area

-  Upland / Forested (4.98 ac)
-  Riparian (9.37 ac)
-  Off-Channel (4.45 ac)
-  Active Channel Margin (3.19 ac)
-  Shallow (5.57 ac)

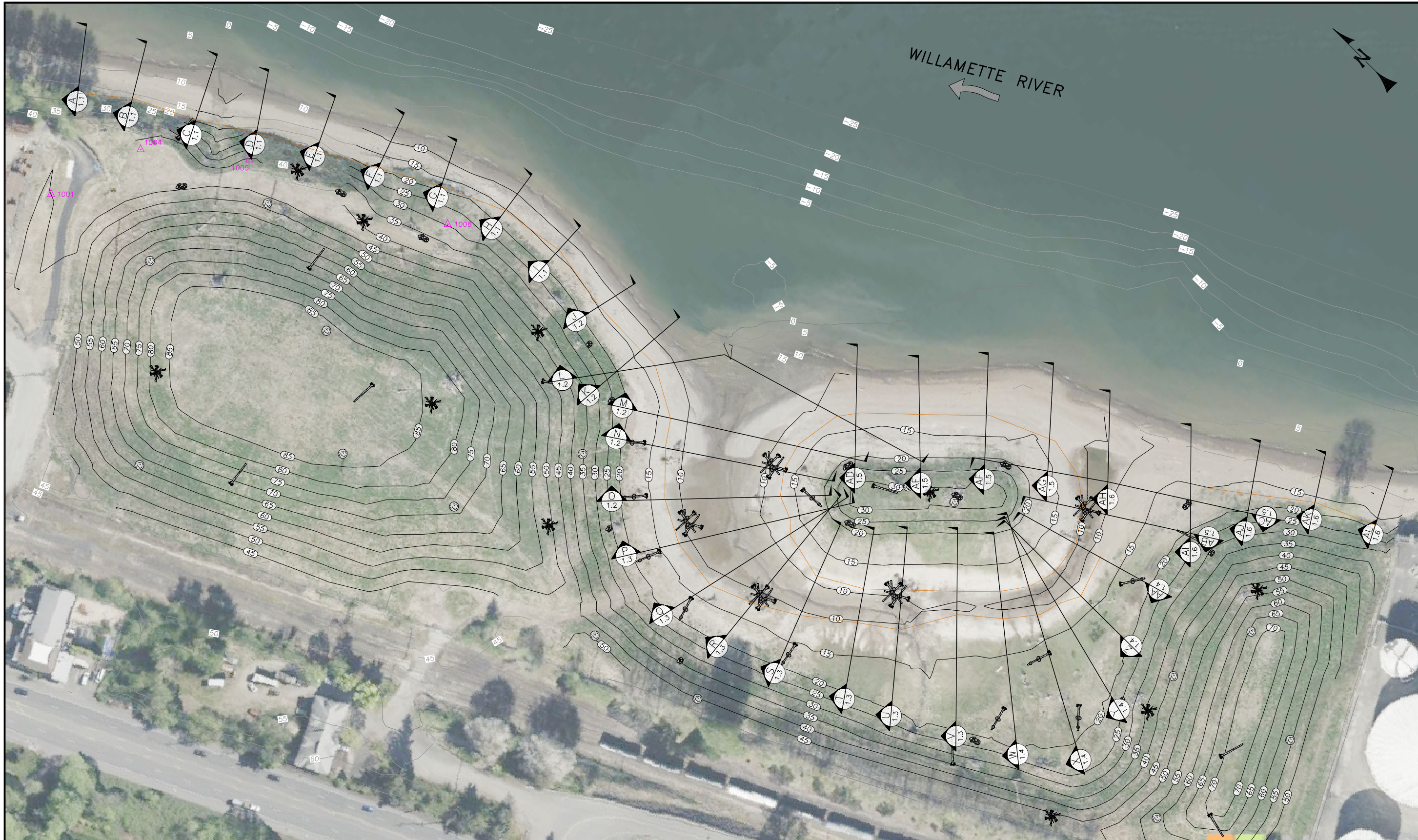
Upland/Forested:
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Ceanothus spp.
Quercus garryana
Tsuga heterophylla
Chamaenerion angustifolium
Mahonia aquifolium
Arbutus menziesii
Rubus leucodermis

Riparian:
Rhamnus purshiana
Populus trichocarpa
Cornus sericea
Physocarpus capitatus
Ribes sanguineus
Rosa nutka

Off-Channel:
Carex obnuta
Scirpus microcarpus
Camassia quamash
Sagittaria latifolia
Spirea douglasii
Lonicera involucrata
Salix spp.



ATTACHMENT 2. ELEVATION CROSS SECTION COMPARISONS

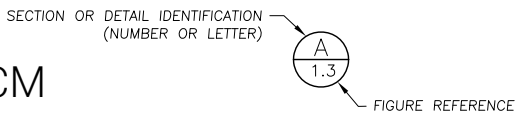


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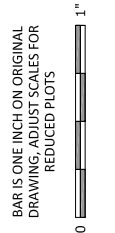
| | |
|--|--|
| | 2019 RECORD SURVEY CONTOURS (5' INTERVAL) |
| | PRE-CONSTRUCTION SURVEY CONTOURS (5' INTERVAL) |
| | SURVEY CONTROL POINT |
| | 2022 MONITORING VEGETATION LINE |

ANNUAL MONITORING SITE PLAN
SCALE: 1" = 120'

SECTION AND DETAIL CONVENTION



- NOTES:**
1. PRE-CONSTRUCTION SURVEY PREPARED BY AKS ENGINEERING AND FORESTRY IN 2013.
 2. RECORD SURVEY FOR PROJECT CONSTRUCTION COMPLETED BY WATERWAYS CONSULTING, INC. IN JANUARY 2020.
 3. YEAR 1 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN OCTOBER 2020.
 4. YEAR 2 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN JUNE 2021.
 5. YEAR 3 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN JULY 2022.

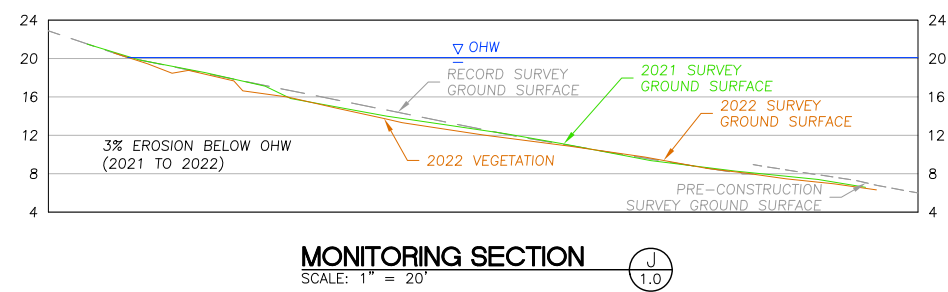
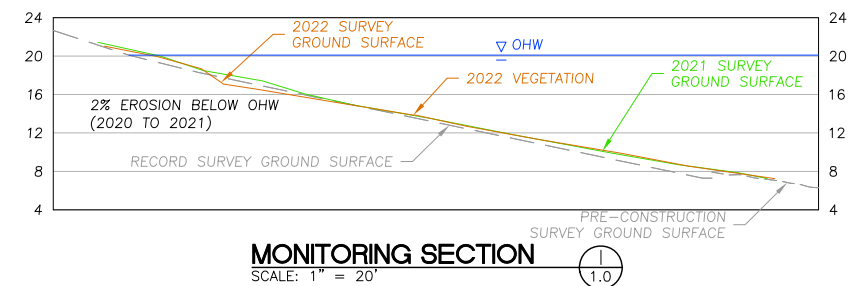
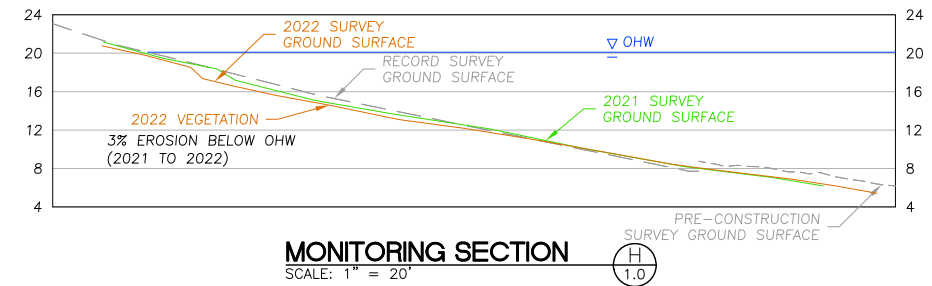
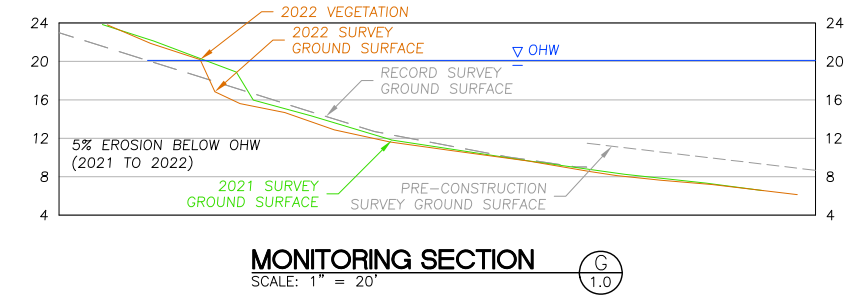
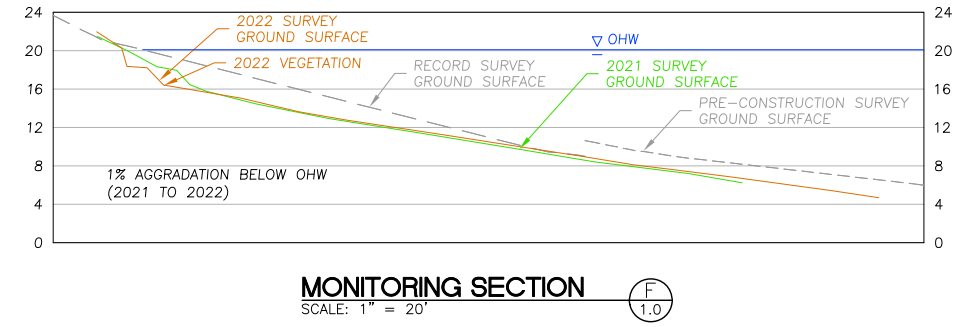
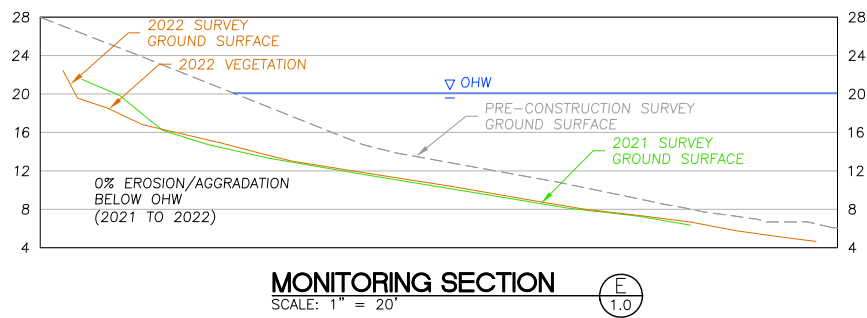
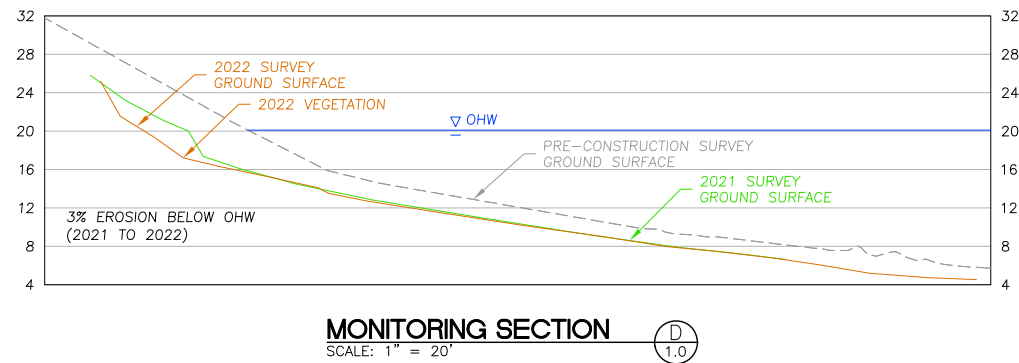
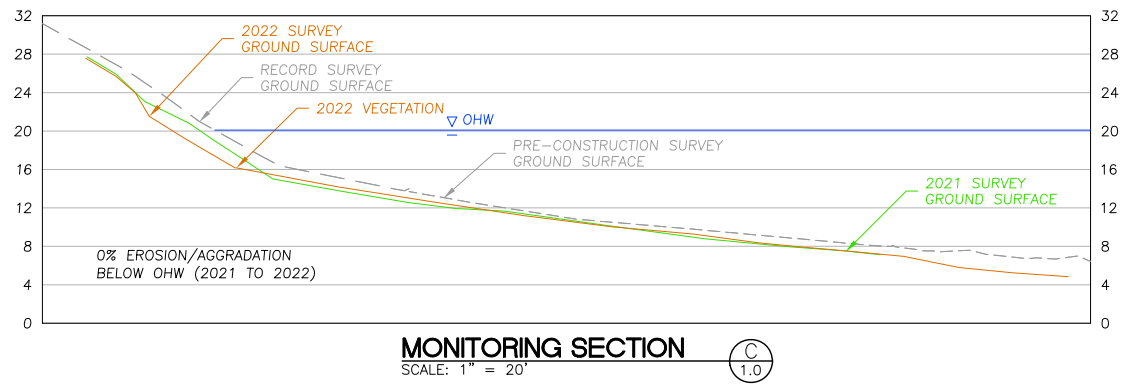
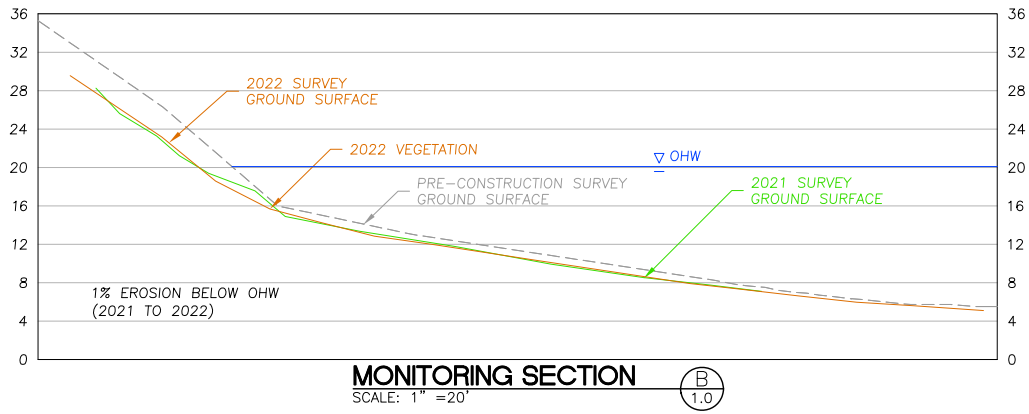
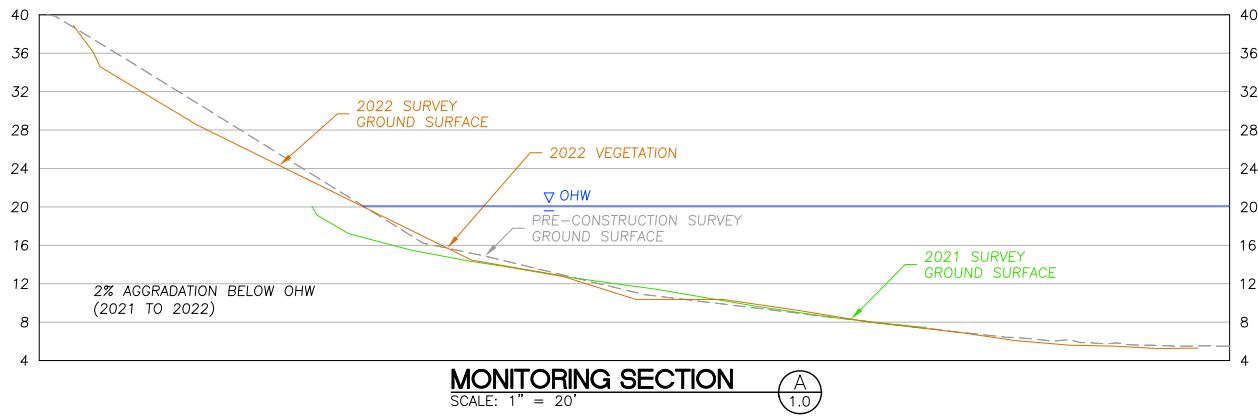


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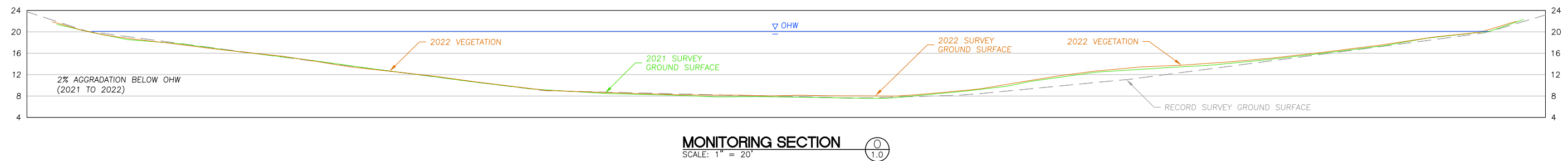
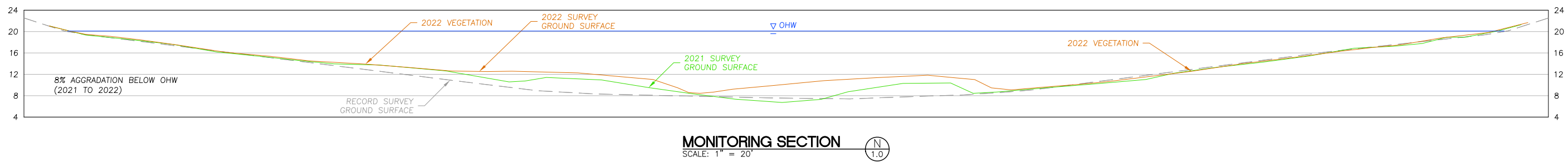
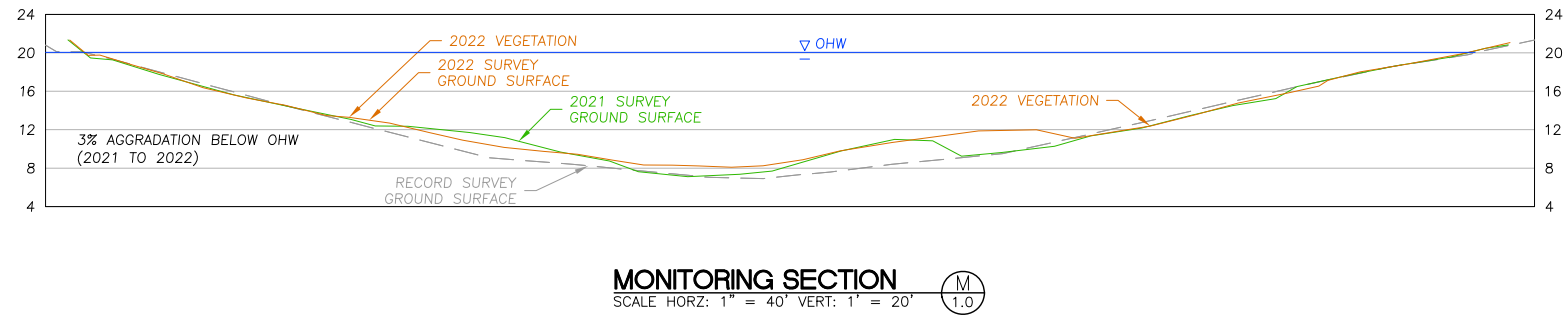
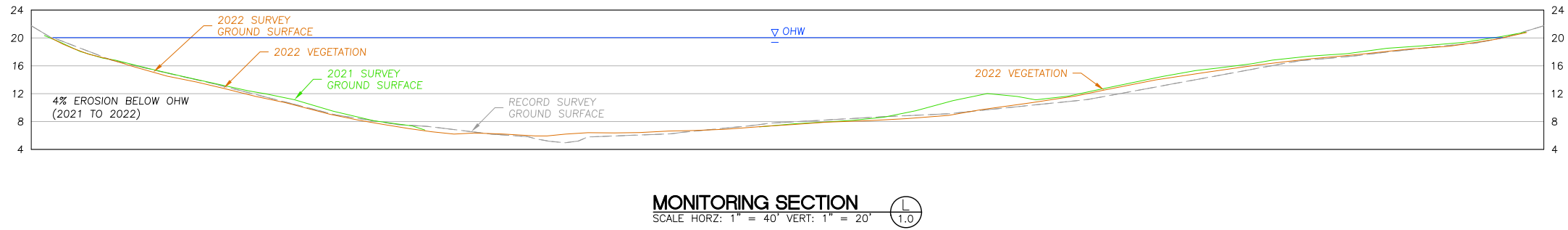
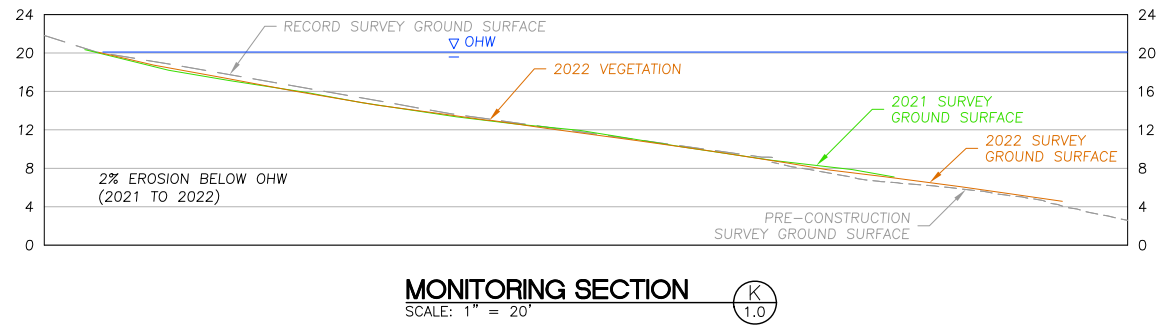
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TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2021**

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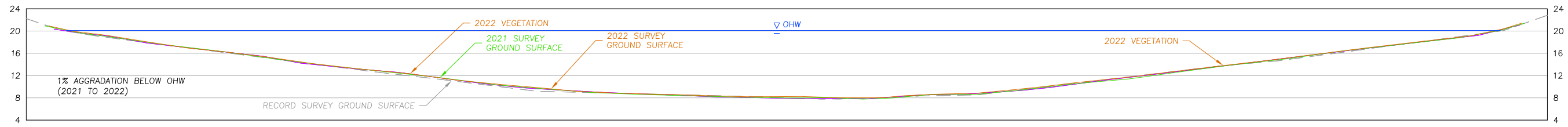
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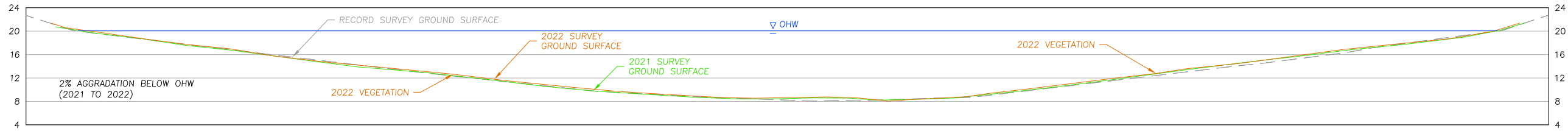
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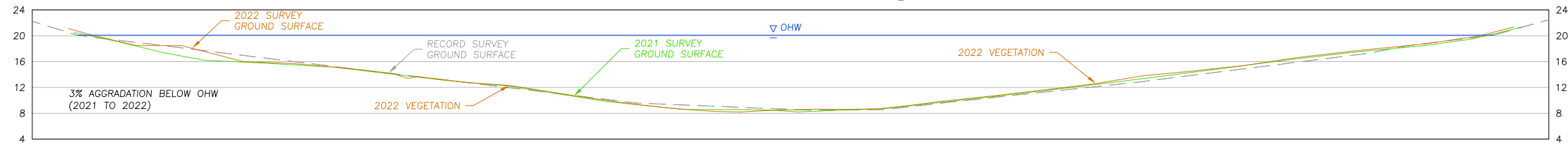
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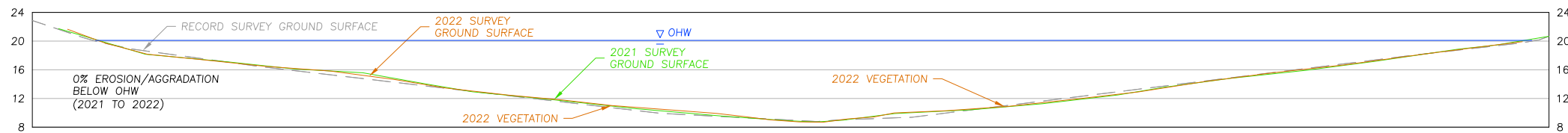
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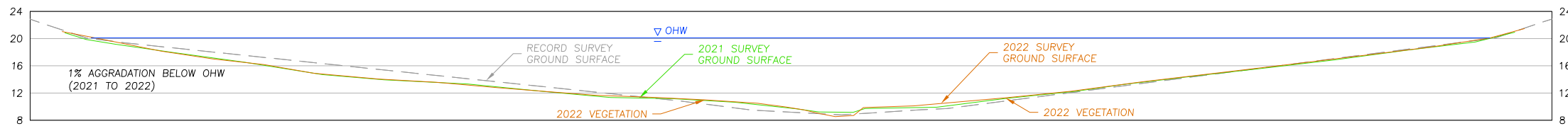
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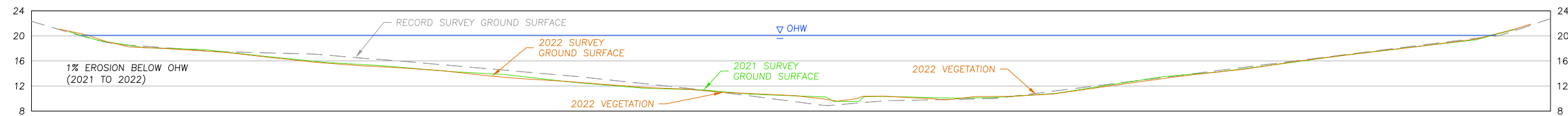
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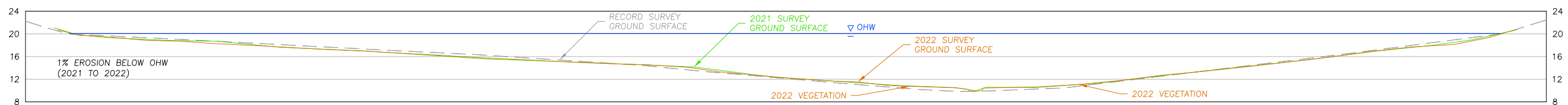
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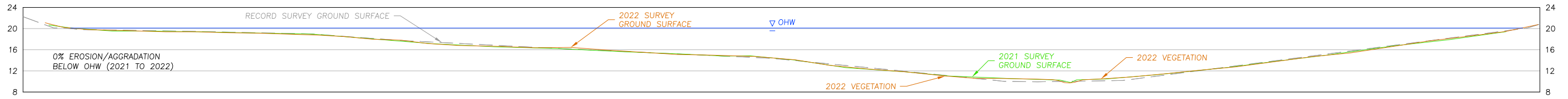
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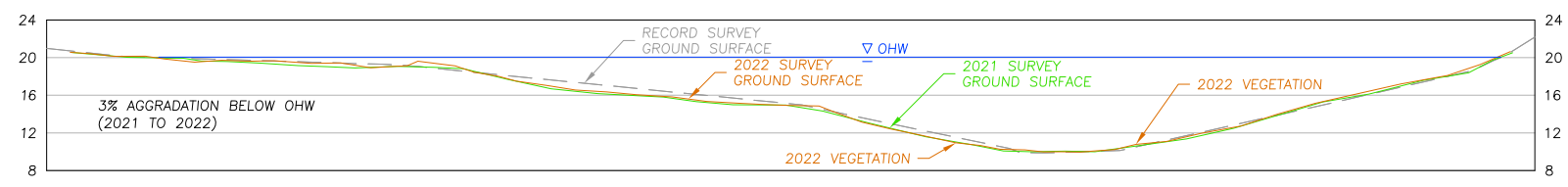
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BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS

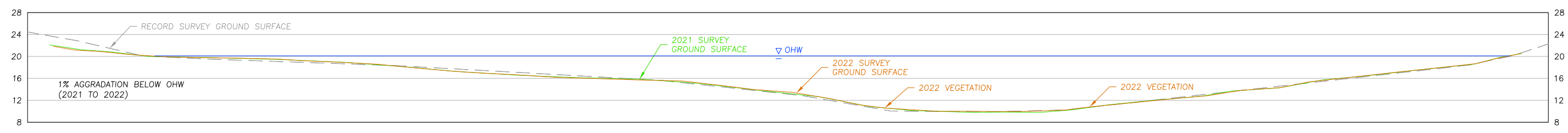
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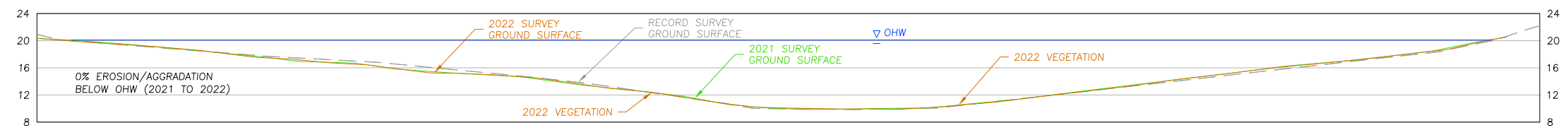
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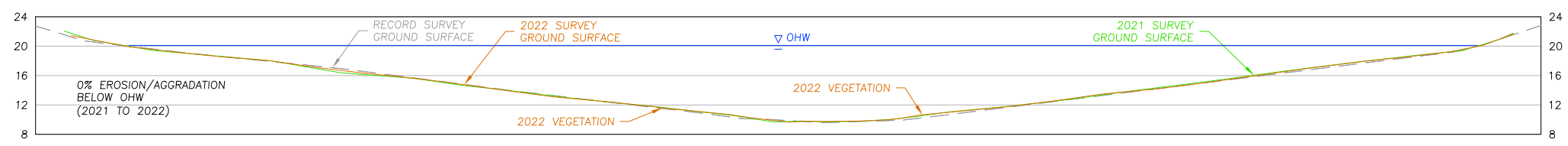
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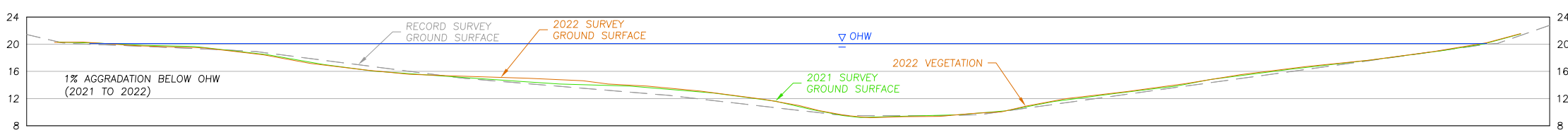
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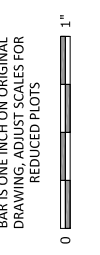
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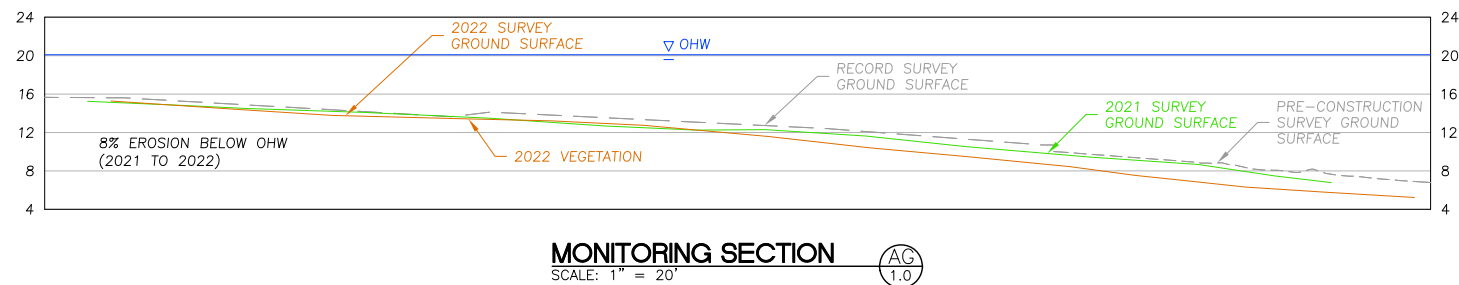
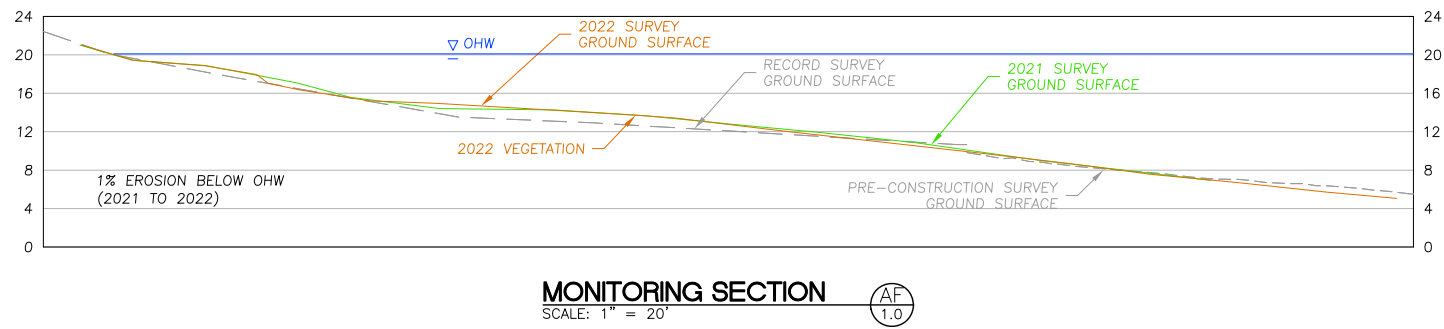
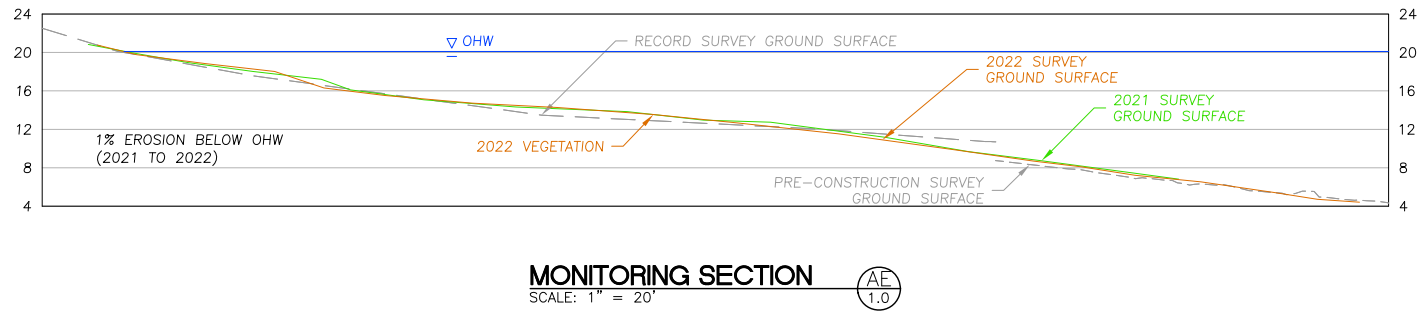
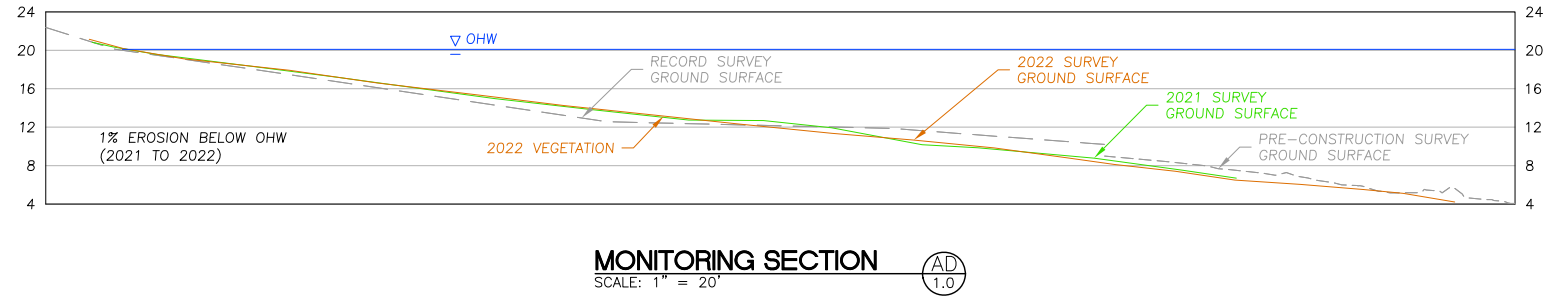
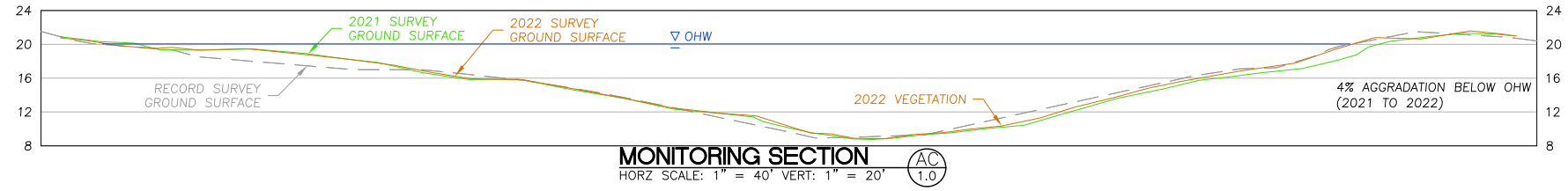


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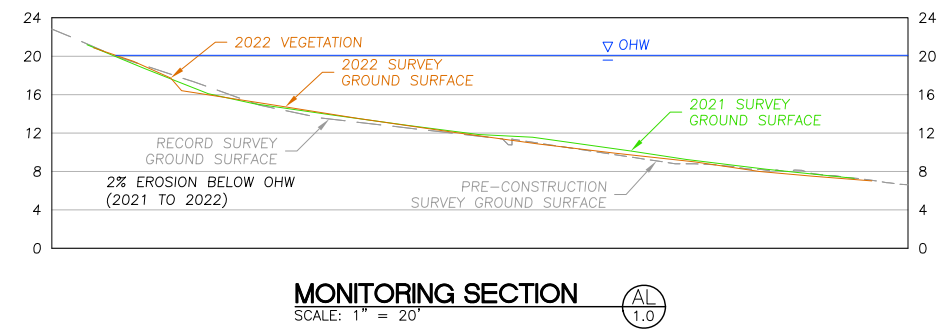
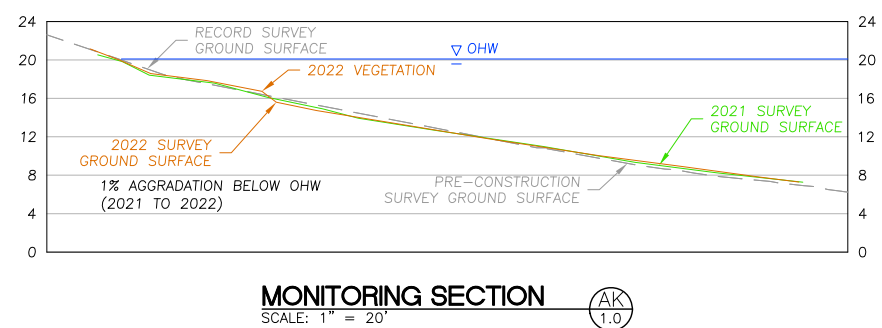
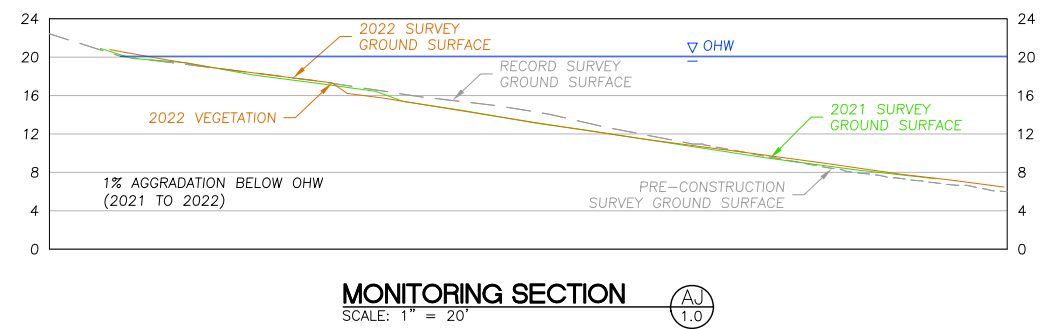
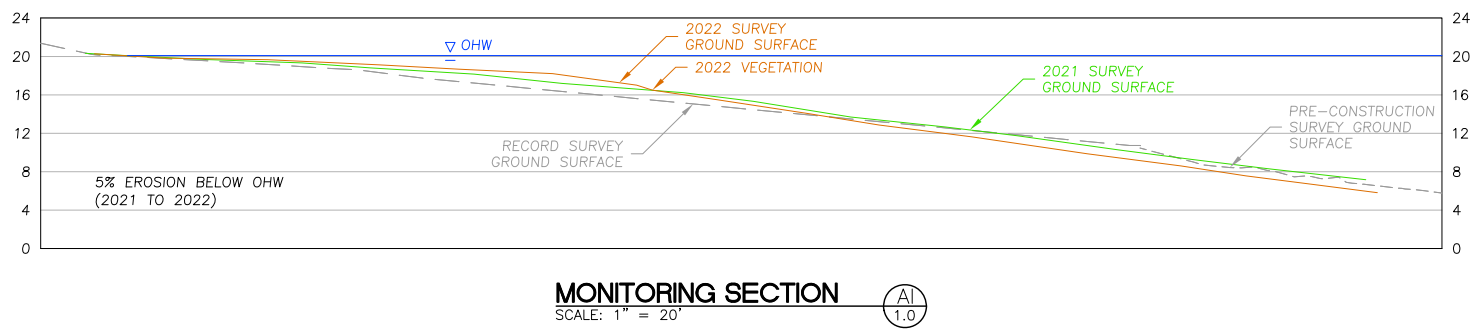
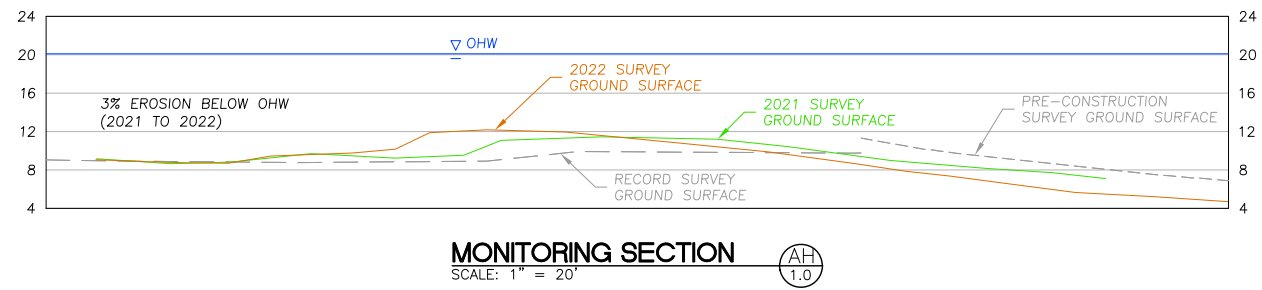


f:\engineering\13-044 linnton\13-044_Figure-Annual Monitoring.dwg - 11/29/2022 4:05 PM

f:\engineering\13-044_linnton\13-044_Figure-Annual_Monitoring.dwg - 11/29/2022 4:06 PM



BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS



f:\engineering\13-044 linnton\13-044_Figure-Annual Monitoring.dwg - 11/29/2022 4:06 PM

ATTACHMENT 3. PHOTO POINT PHOTOGRAPHS



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.



View looking north.



View looking south.



View looking east.



View looking west.

Off-Channel Habitat Photos



Photo taken March 8, 2022



Photo taken April 5, 2022



Photo taken June 22, 2022



Photo taken August 25, 2022

Off-Channel Upstream Photo Monitoring – Water surface elevation from on-site side channel probe (NAVD88)



Water surface elevation 10.18 ft



Water surface elevation 10.87 ft



Water surface elevation 12.74 ft



Water surface elevation 14.14 ft; previous 48-hour rainfall total 1.31 inches



Water surface elevation 14.56 ft; previous 48-hour rainfall total 2.45 inches



Water surface elevation 10.15 ft



Water surface elevation 10.09 ft



Water surface elevation 10.22 ft

Off-Channel Photo Monitoring – Water surface elevation from on-site side channel probe (NAVD88)



15:01:30 06/14/2022 77 °F ☉ Outfall
Water surface elevation 20.83 ft



14:14:02 07/01/2022 66 °F ☾ Outfall
Water surface elevation 14.59 ft



19:19:03 07/06/2022 60 °F ☾ Outfall
Water surface elevation 10.79 ft



07:07:03 07/15/2022 64 °F ☉ Outfall
Water surface elevation 12.98 ft



Water surface elevation 7.19 ft



Water surface elevation 8.58 ft



Water surface elevation 7.24 ft



Water surface elevation 9.96 ft



Photographs 109-112. Wildlife captured on mink and beaver monitoring cameras in 2022.





ATTACHMENT 4. VEGETATION MONITORING TABLES

| Native Upland / Riparian Forest Statistics | |
|---|---------------|
| Total Native Tree Species | 16 |
| Total Native Shrub Species | 25 |
| Average native stems per forest plot | 513 |
| Acre per Plot | 0.019 |
| Approximate native stems per forest acre | 27,012 |

Scrub-Shrub Plot - Native Stem Counts

| Species | Common Name | Form | Scrub-Shrub Plot | | | | | | | | | | | | | | | |
|---|-----------------------|-------|------------------|-------------|------------|------------|------------|------------|-------------|------------|------------|-----------|------------|------------|------------|-------------|------------|-------------|
| | | | 1S | 2S | 3S | 4S | 5S | 6S | 7S | 8S | 9S | 10S | 11S | 12S | 13S | 14S | 15S | 16S |
| <i>Lonicera involucrata</i> | coast twinberry | shrub | 0 | 4 | 0 | 8 | 0 | 0 | 0 | 0 | 65 | 70 | 0 | 0 | 0 | 0 | 10 | 0 |
| <i>Symphoricarpos albus</i> | common snowberry | shrub | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| <i>Cornus stolonifera</i> | red osier dogwood | shrub | 0 | 1 | 0 | 20 | 0 | 0 | 3 | 0 | 15 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| <i>Fraxinus latifolia</i> | Oregon ash | tree | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Crataegus douglasii</i> | Douglas' hawthorn | tree | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Oemleria cerasiformis</i> | Indian plum | shrub | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Rosa pisocarpa</i> | swamp rose | shrub | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Spiraea douglasii</i> | Douglas spiraea | shrub | 0 | 6 | 0 | 5 | 48 | 14 | 0 | 13 | 0 | 20 | 0 | 0 | 12 | 986 | 433 | 145 |
| <i>Populus trichocarpa</i> | black cottonwood | tree | 25 | 361 | 182 | 208 | 221 | 377 | 69 | 8 | 114 | 3 | 17 | 17 | 47 | 0 | 0 | 2 |
| <i>Salix fluviatilis</i> | Columbia willow | shrub | 0 | 86 | 48 | 67 | 20 | 26 | 0 | 17 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| <i>Salix hookeriana</i> | Hooker's willow | shrub | 0 | 0 | 0 | 0 | 0 | 44 | 1 | 3 | 0 | 0 | 0 | 12 | 25 | 0 | 0 | 0 |
| <i>Salix lasiandra</i> (var. <i>lasiandra</i>) | Pacific willow | tree | 437 | 391 | 16 | 179 | 253 | 79 | 162 | 27 | 0 | 0 | 386 | 25 | 48 | 0 | 0 | 9 |
| <i>Salix prolixa</i> | Mackenzie's willow | shrub | 0 | 243 | 0 | 75 | 17 | 27 | 9 | 0 | 0 | 0 | 2 | 0 | 98 | 0 | 0 | 0 |
| <i>Salix scouleriana</i> | Scouler willow | tree | 191 | 2 | 0 | 24 | 13 | 0 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 30 | 0 | 0 |
| <i>Salix sitchensis</i> | Sitka willow | tree | 671 | 0 | 27 | 5 | 0 | 144 | 899 | 911 | 0 | 6 | 588 | 170 | 583 | 0 | 0 | 1424 |
| <i>Salix exigua</i> var. <i>columbiana</i> | Columbia River willow | tree | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Stems | | | 1324 | 1099 | 273 | 591 | 582 | 711 | 1163 | 994 | 294 | 99 | 994 | 224 | 814 | 1020 | 443 | 1580 |

| Native Scrub-Shrub Statistics | |
|--|----------------|
| Total Native Tree Species | 7 |
| Total Native Shrub Species | 9 |
| Average native stems per shrub plot | 763 |
| Acre per Plot | 0.007 |
| Approximate native stems per shrub acre | 108,973 |

Upland / Riparian Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Forest Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency | | | | | | | | | | |
|-------------------------------|----------------------------------|--------------|----------|----------|----------------|-----------------------------------|----|------|-----|-----|------|------|------|------|-----|-----|-----|------|------|-----|-----|-----|-----|------|-----|-----|------|------|-----|------|-----|------|-----|-----|-----|------|------|---------------|-------------------|------|------|------|------|------|------|------|------|-----|-----|
| | | | | | | 1F | 2F | 3F | 4F | 5F | 6F | 7F | 8F | 9F | 10F | 11F | 12F | 13F | 14F | 15F | 16F | 17F | 18F | 19F | 20F | 21F | 22F | 23F | 24F | 25F | 26F | 27F | 28F | 29F | 30F | 31F | 32F | | | | | | | | | | | | |
| Native | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lemna minor</i> | common duckweed | Araceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | | | | | | | |
| <i>Achillea millefolium</i> | yarrow | Asteraceae | -- | -- | FACU | | | 2.5 | | 2.5 | 15 | 37.5 | 15 | 2.5 | | | 2.5 | 2.5 | 15 | 2.5 | | | | 37.5 | 2.5 | 2.5 | 15 | | | | | 15 | 15 | 2.5 | 15 | | | 37.5 | 7.5 | 59.4 | | | | | | | | | |
| <i>Grindelia integrifolia</i> | Puget Sound gumweed | Asteraceae | -- | -- | FACW | | | | | 15 | | | | | | | 2.5 | 2.5 | 2.5 | | | | 15 | 15 | 15 | 15 | | | | | 15 | 2.5 | 2.5 | | | | | 3.2 | 34.4 | | | | | | | | | | |
| <i>Carex densa</i> | dense sedge | Cyperaceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | | | 0.1 | 3.1 | | | | | | | | | | |
| <i>Equisetum hyemale</i> | common scouring rush | Equisetaceae | -- | -- | FACW | 37.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.2 | 3.1 | | | | | | | | | | |
| <i>Acmispon americanus</i> | Spanish clover | Fabaceae | -- | -- | - | | | | | 15 | | | | | | 2.5 | | | 62.5 | | 2.5 | 2.5 | | 2.5 | 85 | 15 | | | | | | | 2.5 | | | | 5.9 | 28.1 | | | | | | | | | | | |
| <i>Lupinus polyphyllus</i> | bog lupine (large-leaved lupine) | Fabaceae | -- | -- | FAC+ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 7.5 | 34.4 | | | | | | | | | | |
| <i>Juncus bufonius</i> | toad rush | Juncaceae | -- | -- | FACW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | | 0.1 | 3.1 | | | | | | | | | | |
| <i>Juncus effusus</i> | soft rush | Juncaceae | - | - | FACW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 37.5 | 37.5 | 5.2 | 15.6 | | | | | | | | | |
| <i>Juncus patens</i> | common rush | Juncaceae | -- | -- | FACW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | | 0.5 | 3.1 | | | | | | | | | |
| <i>Juncus sp.</i> | | Juncaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | | | 0.1 | 3.1 | | | | | | | | | |
| <i>Juncus tenuis</i> | slender rush | Juncaceae | -- | -- | FACW- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | | | 0.1 | 3.1 | | | | | | | | | |
| <i>Epilobium brachycarpum</i> | tall willowherb | Onagraceae | -- | -- | UPL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 2.5 | | | 0.2 | 6.3 | | | | | | | | | |
| <i>Epilobium ciliatum</i> | Slender willow herb | Onagraceae | -- | -- | FACW- | | | | | | 2.5 | | | | | | | | | | | | | 2.5 | | | | | | | | | | 2.5 | 15 | 2.5 | | | 0.9 | 18.8 | | | | | | | | | |
| <i>Agrostis exarata</i> | bentgrass | Poaceae | -- | -- | FACW | | | 37.5 | 15 | 15 | 15 | | | | | | | | | | | | | 37.5 | 15 | 15 | 15 | 37.5 | 2.5 | 37.5 | 2.5 | | 85 | | | 37.5 | 37.5 | 15 | | 62.5 | 37.5 | 2.5 | 62.5 | 18.3 | 62.5 | | | | |
| <i>Deschampsia cespitosa</i> | tufted hairgrass | Poaceae | -- | -- | FACW | 15 | | 15 | | 15 | 37.5 | 37.5 | 37.5 | 62.5 | | | 85 | 62.5 | 37.5 | | 2.5 | | | | 15 | | 62.5 | 15 | 15 | 15 | 15 | 37.5 | | | | | | | | | | | | 18.2 | 56.3 | | | | |
| <i>Deschampsia elongata</i> | hairgrass | Poaceae | -- | -- | FACW- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | | | | | | | | 0.1 | 3.1 | | | |
| <i>Elymus glaucus</i> | blue wildrye | Poaceae | -- | -- | FACU | | 15 | 2.5 | 2.5 | 2.5 | 2.5 | 15 | | | | | | | | | | | | 2.5 | 2.5 | | | | | | | | | | | | 2.5 | 15 | 15 | | | | | | 2.7 | 43.8 | | | |
| <i>Elymus trachycaulus</i> | bluebunch wheatgrass | Poaceae | -- | -- | - | | | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.2 | 15.6 | | |
| <i>Festuca idahoensis</i> | blue fescue | Poaceae | -- | -- | FACU | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 3.1 | |
| <i>Festuca occidentalis</i> | western fescue | Poaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 37.5 | | | | | 1.2 | 3.1 | |
| <i>Festuca roemerii</i> | Roemer's fescue | Poaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 3.1 |



Upland / Riparian Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Forest Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency |
|--|----------------------|----------------|----------|----------|----------------|-----------------------------------|-----|----|-----|-----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|---------------|-------------------|
| | | | | | | 1F | 2F | 3F | 4F | 5F | 6F | 7F | 8F | 9F | 10F | 11F | 12F | 13F | 14F | 15F | 16F | 17F | 18F | 19F | 20F | 21F | 22F | 23F | 24F | 25F | 26F | 27F | 28F | 29F | 30F | 31F | 32F | | |
| <i>Glyceria x occidentalis</i> | western mannagrass | Poaceae | - | - | OBL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 3.1 |
| <i>Galium trifidum</i> | three-petal bedstraw | Rubiaceae | -- | -- | - | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 3.1 |
| <i>Azolla filiculoides</i> | mosquito fern | Salviniaceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 3.1 |
| <i>Sparganium emersum</i> | simplestem bur-reed | Typhaceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 |
| Invasive | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Daucus carota</i> | wild carrot | Apiaceae | C | -- | - | | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 3.1 |
| <i>Cirsium arvense</i> | creeping thistle | Asteraceae | C | B | FACU+ | | | | | | | | | | 15 | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 3.1 |
| <i>Cirsium vulgare</i> | bull thistle | Asteraceae | C | B | FACU | | | | | | | | | | | | | | | | | 15 | | | | | | | | | | | | | | | | 0.5 | 3.1 |
| <i>Lactuca serriola</i> | Prickly lettuce | Asteraceae | C | -- | FACU | | | | | | | | | | | | | | | | | 2.5 | | | | | | | | | | | | | | | | 0.1 | 3.1 |
| <i>Lotus corniculatus</i> | bird's foot trefoil | Fabaceae | C | -- | FAC | | | | | | | | | | 2.5 | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 6.3 | |
| <i>Trifolium arvense</i> | rabbitsfoot clover | Fabaceae | C | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | |
| <i>Trifolium pratense</i> | red clover | Fabaceae | C | -- | FACU | | | | | | | | | | | | 15 | | | | | | | | | | | | | | | | | | | 2.5 | 0.5 | 6.3 | |
| <i>Trifolium repens</i> | white clover | Fabaceae | C | -- | FAC* | | | | 2.5 | 2.5 | 15 | 15 | | | | | | 2.5 | | | | | 2.5 | 2.5 | 2.5 | | | | | | | | | | 2.5 | 1.5 | 28.1 | | |
| <i>Mentha pulegium</i> | pennyroyal | Lamiaceae | C | -- | OBL | | | | | | | | | | | | | | | | | 2.5 | | | | | | | | | | | | | | | 0.1 | 3.1 | |
| <i>Phalaris arundinacea</i> | reed canarygrass | Poaceae | C | -- | FACW | | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 3.1 | |
| Non-Native (non-listed) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Medicago lupulina</i> | black medic | Fabaceae | -- | -- | FAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.5 | 6.3 | |
| <i>Medicago polymorpha</i> | toothed medic | Fabaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 3.1 | |
| <i>Melilotus officinalis</i> | yellow sweetclover | Fabaceae | W | -- | FACU | | | | | | | | | | | | | | | | | 2.5 | | | | | | | | | | | | | | | 0.1 | 3.1 | |
| <i>Trifolium dubium</i> | lesser trefoil | Fabaceae | -- | -- | UPL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.2 | 9.4 | |
| <i>Trifolium hirtum</i> | rose clover | Fabaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | |
| <i>Vicia tetrasperma</i> | slender vetch | Fabaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.4 | 15.6 | |
| <i>Vicia villosa</i> var. <i>villosa</i> | hairy vetch | Fabaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.2 | 6.3 | |
| <i>Bellardia viscosa</i> | yellow glandweed | Orobanchaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 1.4 | 25.0 | |
| <i>Veronica anagallis-aquatica</i> | water speedwell | Plantaginaceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 3.1 | |
| <i>Agrostis capillaris</i> | colonial bentgrass | Poaceae | D | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | |
| <i>Holcus lanatus</i> | common velvetgrass | Poaceae | -- | -- | - | 15 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 1.1 | 12.5 | |

Upland / Riparian Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Forest Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency | | | | | | | |
|---|-----------------------|------------------|----------|----------|----------------|-----------------------------------|------|----|------|-----|----|----|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-----|-----|------|-----|-----|-----|------|-----|---------------|-------------------|-----|------|-----|-----|-----|------|------|
| | | | | | | 1F | 2F | 3F | 4F | 5F | 6F | 7F | 8F | 9F | 10F | 11F | 12F | 13F | 14F | 15F | 16F | 17F | 18F | 19F | 20F | 21F | 22F | 23F | 24F | 25F | 26F | 27F | 28F | 29F | 30F | 31F | 32F | | | | | | | | | |
| Trees and Shrubs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Mahonia aquifolium</i> | tall Oregon grape | Berberidaceae | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | | |
| <i>Lonicera involucrata</i> | coast twinberry | Caprifoliaceae | -- | -- | FAC+* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | | |
| <i>Symphoricarpos albus</i> | common snowberry | Caprifoliaceae | -- | -- | FACU | | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.6 | 9.4 | | | | | | |
| <i>Cornus stolonifera</i> | red osier dogwood | Cornaceae | -- | -- | FACW | 2.5 | | | | | | | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.2 | 9.4 | | | | | | |
| <i>Philadelphus lewisii</i> | wild mock orange | Hydrangeaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | | |
| <i>Amelanchier alnifolia</i> | serviceberry | Rosaceae | -- | -- | FACU | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | |
| <i>Rosa pisocarpa</i> | swamp rose | Rosaceae | -- | -- | FAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 3.1 | | | | | |
| <i>Rubus parviflorus</i> | thimbleberry | Rosaceae | -- | -- | FAC- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | |
| <i>Spiraea douglasii</i> | Douglas spiraea | Rosaceae | -- | -- | FACW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | | |
| <i>Salix fluviatilis</i> | Columbia willow | Salicaceae | -- | -- | OBL | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 3.1 | | | | | |
| <i>Salix prolixa</i> | Mackenzie's willow | Salicaceae | - | - | FACW+ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 2.5 | 15 | 0.6 | 9.4 | | | |
| <i>Fraxinus latifolia</i> | Oregon ash | Oleaceae | -- | -- | FACW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 3.1 | | | | |
| <i>Salix lasiandra</i> (var. <i>lasiandra</i>) | Pacific willow | Salicaceae | - | - | FACW+ | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 3.1 | | | | | |
| <i>Salix scouleriana</i> | Scouler willow | Salicaceae | -- | -- | FAC | | | | | | | | | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 15 | 15 | 15 | 1.6 | 15.6 | |
| <i>Salix sitchensis</i> | Sitka willow | Salicaceae | -- | -- | FACW | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.2 | 9.4 | | | |
| Bryophytes and Bare Ground | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Tortula (truncata)</i> | moss1 | Pottiaceae | - | - | - | | | 15 | 15 | 15 | 15 | 15 | 15 | 37.5 | | 2.5 | | | 2.5 | 2.5 | 15 | 2.5 | | | | | | | | | | | | | | | | | | | 37.5 | 15 | 15 | 2.5 | 7.0 | 50.0 |
| <i>Sphagnum</i> sp. | Sphagnum moss (moss2) | Sphagnaceae | - | - | - | | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.5 | 6.3 | | |
| <i>Physcomitrium pyriforme</i> | moss3 | Funariaceae | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 15 | 0.5 | 6.3 | |
| <i>Pseudotaxiphyllum elegans</i> | moss4 | Plagiotheciaceae | - | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.5 | 3.1 | |
| Bare ground | - | - | - | - | - | 37.5 | 62.5 | 15 | 62.5 | 2.5 | 15 | 15 | 37.5 | 15 | 37.5 | 15 | 2.5 | 15 | 15 | 15 | 85 | 85 | 15 | 15 | 37.5 | 37.5 | 85 | 15 | 62.5 | 15 | 15 | 37.5 | 15 | 15 | 15 | 37.5 | 15 | | | | | | | | | |

Upland / Riparian Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Forest Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency |
|---|-------------|--------|----------|----------|----------------|-----------------------------------|------|-----|------|------|-----|----|------|------|------|------|-----|------|------|-----|------|-----|------|-----|------|------|------|-----|------|-----|-----|------------------------|-----------|------|------|------|-----|---------------|-------------------|
| | | | | | | 1F | 2F | 3F | 4F | 5F | 6F | 7F | 8F | 9F | 10F | 11F | 12F | 13F | 14F | 15F | 16F | 17F | 18F | 19F | 20F | 21F | 22F | 23F | 24F | 25F | 26F | 27F | 28F | 29F | 30F | 31F | 32F | | |
| Upland / Riparian Vegetation Cover Monitoring Statistics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Habitat Average | SE | | | | | | |
| Cover of Native Herbaceous | | | | | | 67.5 | 15 | 60 | 17.5 | 97.5 | 103 | 90 | 55 | 65 | 2.5 | 85 | 105 | 108 | 92.5 | 80 | 17.5 | 15 | 113 | 130 | 87.5 | 103 | 0 | 100 | 52.5 | 85 | 113 | 90 | 82.5 | 85 | 108 | 70 | 138 | 75.9 | 6.6 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 67.5 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 84.3 | |
| Cover of Invasive Herbaceous Species | | | | | | 0 | 5 | 2.5 | 2.5 | 15 | 15 | 0 | 0 | 0 | 0 | 2.5 | 15 | 15 | 2.5 | 0 | 2.5 | 0 | 17.5 | 2.5 | 2.5 | 2.5 | 0 | 0 | 0 | 0 | 2.5 | 0 | 5 | 0 | 0 | 15 | 0 | 3.9 | 1.0 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.6 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 5.2 | |
| Cover of Non-Native (Non-Listed) Herbaceous Species | | | | | | 15 | 15 | 2.5 | 17.5 | 15 | 2.5 | 0 | 17.5 | 2.5 | 0 | 2.5 | 0 | 5 | 7.5 | 7.5 | 0 | 0 | 0 | 0 | 0 | 5 | 2.5 | 0 | 0 | 5 | 2.5 | 17.5 | 2.5 | 0 | 17.5 | 0 | 0 | 5.1 | 1.1 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3.6 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 6.5 | |
| Cover of Native Tree and Shrub Species within Herbaceous Plots | | | | | | 10 | 15 | 2.5 | 2.5 | 0 | 2.5 | 20 | 2.5 | 2.5 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 2.5 | 0 | 0 | 0 | 2.5 | 17.5 | 5 | 5 | 0 | 2.5 | 2.5 | 0 | 32.5 | 35 | 15 | 0 | 5.6 | 1.6 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3.5 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 7.7 | |
| Cover of Bare Substrate and Moss | | | | | | 37.5 | 77.5 | 30 | 77.5 | 17.5 | 30 | 30 | 52.5 | 52.5 | 37.5 | 17.5 | 2.5 | 17.5 | 17.5 | 30 | 87.5 | 85 | 15 | 15 | 75 | 37.5 | 85 | 15 | 62.5 | 30 | 30 | 40 | 17.5 | 17.5 | 15 | 67.5 | 15 | 38.7 | 4.5 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 32.9 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 44.4 | |

Scrub-Shrub Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Scrub-Shrub Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency | |
|---|------------------------|----------------|----------|----------|----------------|--|------|------|-----|------|------|------|-----|------|------|-----|-----|------|------|-----|------|---------------|-------------------|------|
| | | | | | | 1S | 2S | 3S | 4S | 5S | 6S | 7S | 8S | 9S | 10S | 11S | 12S | 13S | 14S | 15S | 16S | | | |
| Native | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Conyza canadensis</i> | horseweed | Asteraceae | - | - | FACU | | | | | | | | | | 2.5 | | | 2.5 | | | | 0.3 | 12.5 | |
| <i>Sagittaria latifolia</i> | broadleaf arrowhead | Alistamaceae | -- | -- | OBL | | | | | | | | | | | | | 15 | | | | 0.9 | 6.3 | |
| <i>Oenanthe sarmentosa</i> | water parsley | Apiaceae | -- | -- | OBL | | | | | | | | | | | | | 2.5 | | | | 0.2 | 6.3 | |
| <i>Bidens cernua</i> | nodding beggar's tick | Asteraceae | - | - | FACW+ | | | | | | | | | | | | | 2.5 | 2.5 | | | 0.3 | 12.5 | |
| <i>Coreopsis tinctoria</i> | Calliopsis | Asteraceae | -- | -- | FACU | | | | | 2.5 | | | | | | | | 15 | | 15 | | 15 | 3.0 | 25.0 |
| <i>Gnaphalium palustre</i> | marsh cudweed | Asteraceae | -- | -- | FAC+ | | | | | 2.5 | 2.5 | | 2.5 | | | | | 2.5 | | | | 0.6 | 25.0 | |
| <i>Pseudognaphalium stramineum</i> | cotton batting cudweed | Asteraceae | - | - | - | | 2.5 | | 2.5 | 2.5 | | | | | | | | 15 | | 2.5 | 2.5 | 1.7 | 37.5 | |
| <i>Rorippa palustris</i> | bog yellowcress | Brassicaceae | - | - | OBL | | | | | | | | | | | | | 2.5 | | 2.5 | | | 0.3 | 12.5 |
| <i>Crassula aquatica</i> | wrinkle-seed pygmyweed | Crassulaceae | - | - | OBL | | 2.5 | | 2.5 | 2.5 | | | | | | | | | | | | 0.5 | 18.8 | |
| <i>Carex cusickii</i> | Cusick's sedge | Cyperaceae | -- | -- | OBL | | | | | | | | | | | | | 2.5 | | | | 0.2 | 6.3 | |
| <i>Carex obnupta</i> | Slough sedge | Cyperaceae | -- | -- | OBL | | | | | | | | | | | | | 15 | | | | 0.9 | 6.3 | |
| <i>Cyperus erythrorhizos</i> | redroot flatsedge | Cyperaceae | -- | -- | OBL | | 15 | 2.5 | 2.5 | 2.5 | 2.5 | 15 | 2.5 | | | | | 15 | 15 | 2.5 | | 2.5 | 4.8 | 68.8 |
| <i>Eleocharis macrostachya</i> | creeping spikerush | Cyperaceae | - | - | OBL | | | | | | | | | | | | | 2.5 | | | | 0.2 | 6.3 | |
| <i>Eleocharis obtusa</i> | blunt spikesedge | Cyperaceae | - | - | OBL | | | | | 2.5 | | 15 | | | | | | | | | | 1.1 | 12.5 | |
| <i>Eleocharis palustris</i> | creeping spikerush | Cyperaceae | -- | -- | OBL | | | 2.5 | | | | | | | | | | | | | | 0.2 | 6.3 | |
| <i>Equisetum arvense</i> | field horsetail | Equisetaceae | -- | -- | FAC | | | | 2.5 | 2.5 | | 2.5 | | | | | | | | | | 0.5 | 18.8 | |
| <i>Acmispon americanus</i> | Spanish clover | Fabaceae | -- | -- | - | | | | | | | | | | | | | 2.5 | | 15 | | | 1.1 | 12.5 |
| <i>Juncus articulatus</i> ssp. <i>articulatus</i> | jointed rush | Juncaceae | -- | -- | OBL | | | | | 2.5 | | 2.5 | | | | | | 2.5 | | | | 0.5 | 18.8 | |
| <i>Juncus bufonius</i> | toad rush | Juncaceae | -- | -- | FACW | | 2.5 | 2.5 | 2.5 | 15 | | 2.5 | | | | | | 2.5 | | | | 1.7 | 37.5 | |
| <i>Juncus effusus</i> | soft rush | Juncaceae | -- | -- | FACW | | | | | | | | | | | | | 2.5 | | | | 0.2 | 6.3 | |
| <i>Juncus ensifolius</i> | sword-leaved rush | Juncaceae | -- | -- | FACW | | | | | 2.5 | | | | | | | | | | | | 0.2 | 6.3 | |
| <i>Juncus patens</i> | common rush | Juncaceae | -- | -- | FACW | | | | | 2.5 | | 15 | | | | | | | | 15 | | | 2.0 | 18.8 |
| <i>Juncus</i> sp. | | Juncaceae | -- | -- | - | | | 2.5 | | | | | | | | | | | | | | 0.2 | 6.3 | |
| <i>Lycopus americanus</i> | cut-leaved bugleweed | Lamiaceae | -- | -- | OBL | | | | | | | 15 | | | | | | | | | | 0.9 | 6.3 | |
| <i>Lindernia dubia</i> | false pimpernel | Linderniaceae | -- | -- | OBL | | 2.5 | | 15 | 15 | 2.5 | 2.5 | 2.5 | | | | | 2.5 | | | 2.5 | 2.8 | 50.0 | |
| <i>Epilobium ciliatum</i> | Slender willow herb | Onagraceae | -- | -- | FACW- | | 2.5 | | 2.5 | 15 | 2.5 | | | | | | | 2.5 | 2.5 | | 37.5 | 4.1 | 43.8 | |
| <i>Ludwigia palustris</i> | marsh seedbox | Onagraceae | -- | -- | OBL | | 62.5 | 62.5 | 85 | 37.5 | 37.5 | 15 | 15 | 2.5 | | | | 62.5 | 37.5 | 15 | | 15 | 28.0 | 75.0 |
| <i>Veronica peregrina</i> | American speedwell | Plantaginaceae | -- | -- | OBL | | | | | 2.5 | | | | | | | | | | | | 0.2 | 6.3 | |
| <i>Agrostis exarata</i> | bentgrass | Poaceae | -- | -- | FACW | | | | | | 2.5 | 37.5 | | 37.5 | 37.5 | | | | 15 | 15 | | | 9.1 | 37.5 |
| <i>Eragrostis pectinacea</i> var. <i>pectinacea</i> | purple eragrostis | Poaceae | - | - | FAC | | | | | | | | 2.5 | | | | | | | | | 0.2 | 6.3 | |
| <i>Leersia oryzoides</i> | rice cutgrass | Poaceae | -- | -- | OBL | | | | | 2.5 | | | | | | | | 15 | | | | 1.1 | 12.5 | |
| <i>Panicum capillare</i> | witch grass | Poaceae | - | - | FACU+ | | | | | | 2.5 | | 2.5 | | | | | 15 | | 15 | | | 2.2 | 25.0 |
| <i>Navarretia intertexta</i> | needle-leaf navarretia | Polemoniaceae | - | - | FACW | | | | | | | | | | | | | | | | 2.5 | 0.2 | 6.3 | |

Scrub-Shrub Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Scrub-Shrub Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency |
|---|------------------------|----------------|----------|----------|----------------|--|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-------------------|
| | | | | | | 1S | 2S | 3S | 4S | 5S | 6S | 7S | 8S | 9S | 10S | 11S | 12S | 13S | 14S | 15S | 16S | | |
| <i>Persicaria amphibia</i> | longroot smartweed | Polygonaceae | -- | -- | OBL | | | | 2.5 | 15 | | | | | | 2.5 | 2.5 | | | | | 1.4 | 25.0 |
| <i>Persicaria hydropiperoides</i> | water pepper | Polygonaceae | -- | -- | - | | 2.5 | | | | | | | | | | | | | | | 0.2 | 6.3 |
| <i>Persicaria punctata</i> | dotted smartweed | Polygonaceae | - | - | - | | | | | | | | | | | 2.5 | | 2.5 | | | | 0.3 | 12.5 |
| <i>Polygonum aviculare</i> | doorweed | Polygonaceae | - | - | - | | | | | | | | | | | | 2.5 | | | | | 0.2 | 6.3 |
| Invasive | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lotus corniculatus</i> | bird's foot trefoil | Fabaceae | C | -- | FAC | | | | | | | | | | | | | 2.5 | | | | 0.2 | 6.3 |
| <i>Mentha pulegium</i> | pennyroyal | Lamiaceae | C | -- | OBL | | | | | 2.5 | | | | | | | | | | | | 0.2 | 6.3 |
| <i>Lythrum portula</i> | water purslane | Lythraceae | B | -- | NI | | 15 | | 15 | 2.5 | | | | | | | 2.5 | | | | | 2.2 | 25.0 |
| <i>Hypochaeris radicata</i> | spotted cat's ear | Asteraceae | C | -- | FACU | | | | | | | 2.5 | | 2.5 | | | | | | | | 0.3 | 12.5 |
| Non-native (non-listed) | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Gnaphalium uliginosum</i> | marsh cudweed | Asteraceae | - | - | - | | 2.5 | 2.5 | 2.5 | 2.5 | | | | | | 15 | | 37.5 | | | 2.5 | 4.1 | 43.8 |
| <i>Hieracium sp.</i> | hawkweed | Asteraceae | -- | -- | - | | | | | | | | | | 2.5 | | | | | | | 0.2 | 6.3 |
| <i>Cardamine flexuosa</i> | wavy bittercress | Brassicaceae | -- | -- | - | | | | 2.5 | | | | | | | | | | | | | 0.2 | 6.3 |
| <i>Cardamine sp.</i> | | Brassicaceae | -- | -- | - | | | | | | | | | | | | 2.5 | | | | | 0.2 | 6.3 |
| <i>Chenopodium album</i> | common lamb's-quarters | Chenopodiaceae | -- | -- | FAC | | 2.5 | | | | | | | | | | | | | | | 0.2 | 6.3 |
| <i>Euphorbia maculata</i> | spotted spurge | Euphorbiaceae | -- | -- | UPL | | | 2.5 | 15 | | 15 | | 15 | 2.5 | | | | 15 | | | | 4.1 | 37.5 |
| <i>Kickxia elatine</i> | sharp-leaved fluellen | Plantaginaceae | - | - | UPL | | | | | | | | 2.5 | | | | | | | | | 0.2 | 6.3 |
| <i>Plantago major</i> | broadleaf plantain | Plantaginaceae | -- | -- | FACU+ | | | | 2.5 | 2.5 | 2.5 | | | | 2.5 | | | 2.5 | | | | 0.8 | 31.3 |
| <i>Echinochloa crus-galli</i> | barnyard grass | Poaceae | - | - | - | | | | | | | | | | | | | | | | 2.5 | 0.2 | 6.3 |
| <i>Rumex crispus</i> | curled dock | Polygonaceae | -- | -- | FAC+ | | | | | | | | | | | | | 2.5 | | | 2.5 | 0.3 | 12.5 |
| <i>Dysphania ambrosioides</i> | Mexican tea | Amaranthaceae | -- | -- | - | | | | | | 2.5 | | | | | | | 2.5 | | | 2.5 | 0.5 | 18.8 |
| Trees and Shrubs | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lonicera involucrata</i> | coast twinberry | Caprifoliaceae | -- | -- | FAC+* | | | | | | | | | 15 | | | | | | | | 0.9 | 6.3 |
| <i>Spiraea douglasii</i> | Douglas spiraea | Rosaceae | -- | -- | FACW | | | | 2.5 | | | | | | | | | 2.5 | | | | 0.3 | 12.5 |
| <i>Salix fluviatilis</i> | Columbia willow | Salicaceae | -- | -- | OBL | | 2.5 | 2.5 | | | | | | | | | | | | | | 0.3 | 12.5 |
| <i>Salix prolixa</i> | Mackenzie's willow | Salicaceae | - | - | FACW+ | | 2.5 | | | | | | | | | | | | | | | 0.2 | 6.3 |
| <i>Populus trichocarpa</i> | black cottonwood | Salicaceae | -- | -- | FAC | | | 2.5 | 2.5 | | 2.5 | 2.5 | | 2.5 | | | | | | | | 0.8 | 31.3 |
| <i>Salix lasiandra (var. lasiandra)</i> | Pacific willow | Salicaceae | - | - | FACW+ | 15 | | | 2.5 | | 2.5 | 2.5 | | | | | | 2.5 | | | | 1.6 | 31.3 |
| <i>Salix scouleriana</i> | Scouler willow | Salicaceae | -- | -- | FAC | 37.5 | | | | | | | | | | | | | | | | 2.3 | 6.3 |
| <i>Salix sitchensis</i> | Sitka willow | Salicaceae | -- | -- | FACW | 15 | | | | | | 2.5 | 37.5 | | 2.5 | 37.5 | 2.5 | 15 | | | 15 | 8.0 | 50.0 |
| Bryophytes and Bare Ground | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Tortula (truncata)</i> | moss1 | Pottiaceae | - | - | - | | 2.5 | | 15 | | | | | | | | | 2.5 | | | | 1.3 | 18.8 |
| Moss2 | moss2 | | -- | -- | - | | | | 15 | | 2.5 | | | | | | | | | | | 1.1 | 12.5 |
| Bare ground | -- | -- | -- | -- | -- | 97.5 | 15 | 37.5 | 15 | 62.5 | 62.5 | 37.5 | 85 | 62.5 | 62.5 | 37.5 | 62.5 | 62.5 | 62.5 | 97.5 | 97.5 | | |

Scrub-Shrub Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Scrub-Shrub Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency |
|---------|-------------|--------|----------|----------|----------------|--|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|---------------|-------------------|
| | | | | | | 1S | 2S | 3S | 4S | 5S | 6S | 7S | 8S | 9S | 10S | 11S | 12S | 13S | 14S | 15S | 16S | | |

| Scrub-Shrub Vegetation Cover Monitoring Statistics | | | | | | | | | | | | | | | | | | | Habitat Average | SE | | | |
|---|--|--|--|--|--|------|------|------|-------|-------|------|-------|------|------|------|------|------|------|-----------------|------|------|------|------|
| Cover of Native Herbaceous | | | | | | 0 | 92.5 | 72.5 | 117.5 | 127.5 | 52.5 | 122.5 | 27.5 | 40 | 95 | 150 | 120 | 82.5 | 32.5 | 0 | 20 | 72.0 | 12.1 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | 56.5 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | 87.5 | |
| Cover of Invasive Herbaceous Species | | | | | | 0 | 15 | 0 | 15 | 2.5 | 2.5 | 2.5 | 0 | 2.5 | 0 | 0 | 2.5 | 2.5 | 0 | 0 | 0 | 2.8 | 1.2 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | 1.2 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | 4.4 | |
| Non-Native (Non-Listed) Herbaceous Species | | | | | | 0 | 5 | 5 | 20 | 7.5 | 20 | 0 | 17.5 | 2.5 | 5 | 15 | 2.5 | 57.5 | 2.5 | 0 | 10 | 10.6 | 3.6 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | 6.0 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | 15.2 | |
| Cover of Native Tree and Shrub Species within Herbaceous Plots | | | | | | 67.5 | 5 | 5 | 5 | 2.5 | 5 | 7.5 | 37.5 | 17.5 | 2.5 | 37.5 | 2.5 | 17.5 | 2.5 | 0 | 15 | 14.4 | 4.6 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | 8.5 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | 20.3 | |
| Cover of Bare Substrate and Moss | | | | | | 97.5 | 17.5 | 37.5 | 30 | 77.5 | 62.5 | 40 | 85 | 62.5 | 62.5 | 37.5 | 62.5 | 65 | 62.5 | 97.5 | 97.5 | 62.2 | 6.2 |
| Lower CI (80%) | | | | | | | | | | | | | | | | | | | | | | 54.2 | |
| Upper CI (80%) | | | | | | | | | | | | | | | | | | | | | | 70.1 | |
| Weighted Prevalence Index All Strata | | | | | | 2.6 | 1.4 | 1.6 | 2.1 | 2.2 | 2.3 | 1.7 | 2.5 | 2.4 | 3.3 | 1.6 | 2.1 | 3.2 | 6.1 | 2.1 | 2.5 | | |

Off-Channel Emergent Herbaceous Vegetation Cover Monitoring Statistics

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency | | | | |
|--|------------------------|------------------|----------|----------|----------------|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|--------|--------|---------------|-------------------|--------|--------|--------|------|
| | | | | | | 1-2A | 1-2B | 1-2C | 1-2D | 1-2E | 1-2F | 2-3A | 2-3B | 2-3C | 2-3D | 2-3E | 5-6A | 5-6B | 5-6C | 7-8A | 7-8B | 9-10A | 9-10B | 11-12A | 11-12B | | | 13-14A | 13-14B | 15-16A | |
| Native | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Coreopsis tinctoria</i> | Calliopsis | Asteraceae | -- | -- | FACU | | | | | | | | | | | | | | | | | | | | | | 2.5 | 0.1 | 4.3 | | |
| <i>Bidens cernua</i> | nodding beggar's tick | Asteraceae | - | - | FACW+ | | | | | | | | 15 | | | | 2.5 | | 2.5 | 15 | 2.5 | 2.5 | 2.5 | 15 | | | 2.5 | 2.6 | 39.1 | | |
| <i>Gnaphalium palustre</i> | marsh cudweed | Asteraceae | -- | -- | FAC+ | | | | | | | | | | | | 2.5 | | | | | | | | | | | | 0.1 | 4.3 | |
| <i>Crassula aquatica</i> | wrinkle-seed pygmyweed | Crassulaceae | - | - | OBL | | | | | | 2.5 | 2.5 | | | | | 2.5 | | 2.5 | 2.5 | | | | | | | | | 0.5 | 21.7 | |
| <i>Eleocharis obtusa</i> | blunt spikeweed | Cyperaceae | - | - | OBL | | | | | | | | | | | 15 | | | 37.5 | 2.5 | 2.5 | 15 | 15 | 15 | 15 | 37.5 | | | 6.1 | 34.8 | |
| <i>Eleocharis palustris</i> | creeping spikerush | Cyperaceae | -- | -- | OBL | | | | | | | 2.5 | | | | 2.5 | | | | | | | | | | | | | 0.2 | 8.7 | |
| <i>Cyperus sp.</i> | flatsedge | Cyperaceae | -- | -- | - | | | | | | 2.5 | | | | | | | | | | | | | | | | | | 0.1 | 4.3 | |
| <i>Carex aperta</i> | Columbia sedge | Cyperaceae | -- | -- | FACW | | | | | | | | | | | | | | | | | | | | | 15 | | | 0.7 | 4.3 | |
| <i>Cyperus erythrorhizos</i> | redroot flatsedge | Cyperaceae | -- | -- | OBL | | | | | | | 2.5 | | | | 2.5 | | 2.5 | 15 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 15 | 15 | | 10.4 | 47.8 | |
| <i>Elodea canadensis</i> | common waterweed | Hydrocharitaceae | -- | -- | OBL | | | | | | | | 2.5 | 2.5 | 37.5 | | 2.5 | 2.5 | | | | | | | | 2.5 | | 62.5 | 4.9 | 30.4 | |
| <i>Isoetes howellii</i> | Howell's quillwort | Isoetaceae | - | - | OBL | | | | | | | | | | | 2.5 | | | | | | | | | | | | | 0.1 | 4.3 | |
| <i>Juncus articulatus ssp. articulatus</i> | jointed rush | Juncaceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | | | | 2.5 | | | 0.1 | 4.3 | |
| <i>Juncus bufonius</i> | toad rush | Juncaceae | -- | -- | FACW | | | | | | | 2.5 | 2.5 | | | | | | | | | | | | | | | | 0.3 | 13.0 | |
| <i>Juncus patens</i> | common rush | Juncaceae | -- | -- | FACW | | | | | | | | | | | | | 2.5 | | | | | | | | 15 | | | 0.7 | 4.3 | |
| <i>Lindernia dubia</i> | false pimpernel | Linderniaceae | -- | -- | OBL | | | | | | | 2.5 | | | | 2.5 | | 15 | | 2.5 | | | 85 | 15 | 2.5 | 15 | 15 | | 6.7 | 39.1 | |
| <i>Montia fontana</i> | water chickweed | Montiaceae | -- | -- | OBL | | | | | | 2.5 | | | | | | | | | | | | | | | | | | 0.1 | 4.3 | |
| <i>Ludwigia palustris</i> | marsh seedbox | Onagraceae | -- | -- | OBL | | | | | | 62.5 | 85 | 15 | | | | 97.5 | 37.5 | | 85 | 62.5 | 85 | 62.5 | | 85 | 62.5 | 37.5 | 15 | | 34.5 | 56.5 |
| <i>Eragrostis hypnoides</i> | teal lovegrass | Poaceae | -- | -- | OBL | | | | | | | | | | | | | | | | | | 2.5 | 85 | 15 | 15 | | | 5.1 | 17.4 | |
| <i>Leersia oryzoides</i> | rice cutgrass | Poaceae | -- | -- | OBL | | | | | | | | | | | 15 | | | | | | | | | | 15 | 37.5 | | | 2.9 | 13.0 |
| <i>Persicaria amphibia</i> | longroot smartweed | Polygonaceae | -- | -- | OBL | | | | | | | 2.5 | | | | | | | | | | 2.5 | 2.5 | 2.5 | 2.5 | | | | 0.5 | 21.7 | |
| <i>Persicaria lapathifolia</i> | dock-leaf smartweed | Polygonaceae | -- | -- | - | | | | | | | | | | | | | | | | | | | | | | 2.5 | | | 0.1 | 4.3 |
| <i>Limosella aquatica</i> | mudwort | Scrophulariaceae | -- | -- | OBL | | | | | | 2.5 | 2.5 | 2.5 | | | | 2.5 | 2.5 | | 15 | | | | | | | | | | 1.2 | 26.1 |
| Invasive | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Mentha pulegium</i> | pennyroyal | Lamiaceae | C | -- | OBL | | | | | | | | | | | | | | | | | | | | | | 2.5 | | | 0.1 | 4.3 |
| <i>Lythrum portula</i> | water purslane | Lythraceae | B | -- | NI | | | | | | | 2.5 | | | | | | | | | | | | | 2.5 | | | | | 0.2 | 8.7 |
| <i>Potamogeton crispus</i> | curly-leaf pondweed | Potamogetonaceae | C | - | OBL | | | | | | | | | | | 2.5 | | | | | | | | | | | 2.5 | | | 0.2 | 8.7 |
| Non-native (non-listed) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Dysphania ambrosioides</i> | Mexican tea | Amaranthaceae | - | - | - | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 4.3 |
| <i>Gnaphalium uliginosum</i> | marsh cudweed | Asteraceae | - | - | - | | | | | | | 2.5 | | | | | | | | | | 2.5 | 2.5 | 2.5 | | | | 2.5 | | 0.5 | 21.7 |
| <i>Euphorbia maculata</i> | spotted spurge | Euphorbiaceae | -- | -- | UPL | | | | | | | | | | | | | | | | | | | | | | 62.5 | | | 2.7 | 4.3 |
| <i>Plantago major</i> | broadleaf plantain | Plantaginaceae | -- | -- | FACU+ | | | | | | | | | | | | | | | | | 2.5 | | | | | | | | 0.1 | 4.3 |
| <i>Echinochloa crus-galli</i> | barnyard grass | Poaceae | - | - | - | | | | | | | | | | | | | | | | | | 2.5 | 15 | | | | | | 0.8 | 8.7 |
| Trees and Shrubs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Populus trichocarpa</i> | black cottonwood | Salicaceae | -- | -- | FAC | | | | | | 2.5 | | | | | | | | | | | | | | | | 2.5 | | | 0.2 | 8.7 |
| <i>Salix lasiandra (var. lasiandra)</i> | Pacific willow | Salicaceae | - | - | FACW+ | | | | | | | 2.5 | | | | | 2.5 | | | | | 2.5 | 2.5 | 2.5 | | | | | | 0.5 | 21.7 |
| <i>Salix sitchensis</i> | Sitka willow | Salicaceae | -- | -- | FACW | | | | | | | | | | | | | | | | | 2.5 | | | | 15 | | | | 0.8 | 8.7 |
| Bare ground | - | - | - | - | - | 97.5 | 97.5 | 97.5 | 97.5 | 97.5 | 37.5 | 15 | 97.5 | 97.5 | 62.5 | 2.5 | 62.5 | 97.5 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | | | |

*Plot 11-12B was added in the upstream off-channel habitat in 2022

| Species | Common Name | Family | PPL Rank | ODA Rank | Wetland Status | Herbaceous Monitoring Plot | | | | | | | | | | | | | | | | | | | | Percent Cover | Percent Frequency | | | |
|---|-------------|--------|----------|----------|----------------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|--------|--------|-----------------|-------------------|--------|--------|--------|
| | | | | | | 1-2A | 1-2B | 1-2C | 1-2D | 1-2E | 1-2F | 2-3A | 2-3B | 2-3C | 2-3D | 2-3E | 5-6A | 5-6B | 5-6C | 7-8A | 7-8B | 9-10A | 9-10B | 11-12A | 11-12B | | | 13-14A | 13-14B | 15-16A |
| Herbaceous / Emergent Vegetation Cover Monitoring Statistics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Cover of Native Herbaceous | | | | | | | | | | | | | | | | | | | | Habitat Average | SE | | | |
| | | | | | | 0 | 0 | 0 | 0 | 0 | 72.5 | 103 | 37.5 | 2.5 | 37.5 | 105 | 85 | 2.5 | 125 | 133 | 133 | 110 | 228 | 200 | 150 | 142.5 | 85 | 65 | 78.9 | 14.2 |
| | | | | | | Lower CI (80%) | | | | | | | | | | | | | | | | | | | | 60.7 | | | | |
| | | | | | | Upper CI (80%) | | | | | | | | | | | | | | | | | | | | 97.2 | | | | |
| | | | | | | Cover of Invasive Herbaceous Species | | | | | | | | | | | | | | | | | | | | 0.5 | 0.2 | | | |
| | | | | | | Lower CI (80%) | | | | | | | | | | | | | | | | | | | | 0.3 | | | | |
| | | | | | | Upper CI (80%) | | | | | | | | | | | | | | | | | | | | 0.8 | | | | |
| | | | | | | Cover of Non-Native (Non-Listed) Herbaceous Species | | | | | | | | | | | | | | | | | | | | 4.2 | 2.8 | | | |
| | | | | | | Lower CI (80%) | | | | | | | | | | | | | | | | | | | | 0.6 | | | | |
| | | | | | | Upper CI (80%) | | | | | | | | | | | | | | | | | | | | 7.9 | | | | |
| | | | | | | Cover of Native Tree and Shrub Species within Herbaceous Plots | | | | | | | | | | | | | | | | | | | | 1.6 | 0.8 | | | |
| | | | | | | Lower CI (80%) | | | | | | | | | | | | | | | | | | | | 0.6 | | | | |
| | | | | | | Upper CI (80%) | | | | | | | | | | | | | | | | | | | | 2.7 | | | | |
| | | | | | | Cover of Bare Substrate and Moss | | | | | | | | | | | | | | | | | | | | 51.2 | 7.8 | | | |
| | | | | | | Lower CI (80%) | | | | | | | | | | | | | | | | | | | | 41.2 | | | | |
| | | | | | | Upper CI (80%) | | | | | | | | | | | | | | | | | | | | 61.2 | | | | |
| | | | | | | Weighted Prevalence Index All Strata | | | | | | | | | | | | | | | | | | | | 1.4 | | | | |

ATTACHMENT 5. FLORA AND FAUNA SPECIES LISTS

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|------------------------------------|--------------------------|---------------|------------|----------------|-----------------|------------------|----------|-------------------------|
| <i>Sambucus cerulea</i> | blue elderberry | Adoxaceae | native | shrub | Y (SSP) | - | - | FACU |
| <i>Sambucus racemosa</i> | red elderberry | Adoxaceae | native | shrub | Y (SSP) | -- | -- | FACU |
| <i>Viburnum ellipticum</i> | Oregon viburnum | Adoxaceae | native | shrub | Y | -- | -- | - |
| <i>Alisma lanceolatum</i> | lanceleaf water plantain | Alistamaceae | non-native | aquatic forb | No | -- | -- | OBL |
| <i>Alisma triviale</i> | northern water plantain | Alistamaceae | native | aquatic forb | No | -- | -- | OBL |
| <i>Sagittaria latifolia</i> | broadleaf arrowhead | Alistamaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Dysphania ambrosioides</i> | Mexican tea | Amaranthaceae | non-native | forb | No | - | - | - |
| <i>Daucus carota</i> | wild carrot | Apiaceae | invasive | annual forb | No | C | -- | - |
| <i>Oenanthe sarmentosa</i> | water parsley | Apiaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Lemna minor</i> | common duckweed | Araceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Hydrocotyle ranunculoides</i> | floating pennywort | Araliaceae | native | aquatic forb | No | - | -- | OBL |
| <i>Achillea millefolium</i> | yarrow | Asteraceae | native | perennial forb | Y | -- | -- | FACU |
| <i>Arctium lappa</i> | greater burdock | Asteraceae | non-native | biennial forb | No | -- | -- | - |
| <i>Baccharis pilularis</i> | coyote brush | Asteraceae | native | shrub | No | -- | -- | - |
| <i>Bidens cernua</i> | nodding beggar's tick | Asteraceae | native | forb | Y | - | - | FACW+ |
| <i>Chondrilla juncea</i> | skeletonweed | Asteraceae | invasive | forb | No | B | B | - |
| <i>Cirsium arvense</i> | creeping thistle | Asteraceae | invasive | annual forb | No | C | B | FACU+ |
| <i>Cirsium vulgare</i> | bull thistle | Asteraceae | invasive | annual forb | No | C | B | FACU |
| <i>Conyza canadensis</i> | horseweed | Asteraceae | native | annual forb | No | - | - | FACU |
| <i>Coreopsis tinctoria</i> | Calliopsis | Asteraceae | native | annual forb | Y | -- | -- | FACU |
| <i>Echinops sphaerocephalus</i> | glandular globe-thistle | Asteraceae | non-native | forb | No | -- | -- | - |
| <i>Eriophyllum lanatum</i> | Oregon sunshine | Asteraceae | native | annual forb | Yes | - | - | - |
| <i>Euthamia occidentalis</i> | western goldenrod | Asteraceae | native | forb | No | - | - | FACW* |
| <i>Gnaphalium palustre</i> | marsh cudweed | Asteraceae | native | forb | Y | -- | -- | FAC+ |
| <i>Gnaphalium uliginosum</i> | marsh cudweed | Asteraceae | non-native | forb | No | - | - | - |
| <i>Grindelia integrifolia</i> | Puget Sound gumweed | Asteraceae | native | forb | Y | -- | -- | FACW |
| <i>Helenium autumnale</i> | common sneezeweed | Asteraceae | native | forb | No | - | - | FACW |
| <i>Helminthotheca echioides</i> | bristly ox tongue | Asteraceae | non-native | forb | No | - | - | - |
| <i>Hieracium sp.</i> | hawkweed | Asteraceae | non-native | forb | | -- | -- | - |
| <i>Hypochaeris radicata</i> | spotted cat's ear | Asteraceae | invasive | forb | Yes | C | -- | FACU |
| <i>Lactuca serriola</i> | Prickly lettuce | Asteraceae | invasive | annual forb | No | C | -- | FACU |
| <i>Matricaria discoidea</i> | pineappleweed | Asteraceae | non-native | forb | No | -- | -- | - |
| <i>Matricaria recutita</i> | German chamomile | Asteraceae | non-native | annual forb | No | -- | -- | - |
| <i>Pseudognaphalium stramineum</i> | cotton batting cudweed | Asteraceae | native | forb | No | - | - | - |
| <i>Solidago canadensis</i> | California goldenrod | Asteraceae | native | forb | No | -- | -- | FACU |
| <i>Symphyotrichum subspicatum</i> | Douglas aster | Asteraceae | native | forb | Y | - | - | - |
| <i>Tanacetum vulgare</i> | tansy | Asteraceae | invasive | perennial forb | No | C | -- | NI |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|----------------------------------|--------------------------|-----------------|------------|----------------|-----------------|------------------|----------|-------------------------|
| <i>Taxacum officinale</i> | common dandelion | Asteraceae | non-native | perennial forb | No | - | - | - |
| <i>Xanthium strumarium</i> | rough cocklebur | Asteraceae | native | perennial forb | No | -- | -- | FAC |
| <i>Impatiens capensis</i> | spotted jewelweed | Balsaminaceae | invasive | aquatic forb | No | C | -- | FACW |
| <i>Mahonia aquifolium</i> | tall Oregon grape | Berberidaceae | native | shrub | Y | - | - | - |
| <i>Alnus rhombifolia</i> | white alder | Betulaceae | native | tree | No | -- | -- | FACW |
| <i>Alnus rubra</i> | red alder | Betulaceae | native | tree | Y | -- | -- | FAC |
| <i>Cryptantha intermedia</i> | clearwater cryptantha | Boraginaceae | native | forb | Y | -- | -- | - |
| <i>Phacelia tanacetifolia</i> | lacy phacelia | Boraginaceae | native | annual forb | No | -- | -- | - |
| <i>Plagiobothrys nothofulvus</i> | rusty popcornflower | Boraginaceae | native | annual forb | No | -- | -- | FAC |
| <i>Plagiobothrys scouleri</i> | Scouler's popcornflower | Boraginaceae | native | aquatic forb | No | -- | -- | FACW |
| <i>Alliaria petiolata</i> | garlic mustard | Brassicaceae | invasive | forb | No | B | B | NI |
| <i>Cardamine flexuosa</i> | wavy bittercress | Brassicaceae | non-native | forb | No | -- | -- | - |
| <i>Cardamine pensylvanica</i> | Pennsylvania bittercress | Brassicaceae | native | aquatic forb | Y | - | - | FACW |
| <i>Hirschfeldia incana</i> | shortpod mustard | Brassicaceae | non-native | forb | No | -- | -- | - |
| <i>Lepidium virginicum</i> | least pepperwort | Brassicaceae | native | forb | No | - | - | FACU |
| <i>Rorippa palustris</i> | bog yellowcress | Brassicaceae | native | aquatic forb | No | - | - | OBL |
| <i>Rorippa sylvestris</i> | creeping yellowcress | Brassicaceae | invasive | aquatic forb | No | - | B | OBL |
| <i>Downingia elegans</i> | Californian lobelia | Campanulaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Dipsacus laciniatus</i> | wild teasel | Caprifoliaceae | invasive | biennial forb | No | - | B | - |
| <i>Lonicera involucrata</i> | coast twinberry | Caprifoliaceae | native | shrub | Y | -- | -- | FAC+* |
| <i>Symphoricarpos albus</i> | common snowberry | Caprifoliaceae | native | shrub | Y | -- | -- | FACU |
| <i>Honckenya peploides</i> | | Caryophyllaceae | native | perennial forb | No | -- | -- | - |
| <i>Sagina procumbens</i> | bird-eye pearlwort | Caryophyllaceae | non-native | aquatic forb | No | -- | -- | FAC |
| <i>Chenopodium album</i> | common lamb's-quarters | Chenopodiaceae | non-native | annual forb | No | -- | -- | FAC |
| <i>Calystegia sp.</i> | bindweed | Convulvulaceae | non-native | perennial forb | No | -- | -- | - |
| <i>Cornus nuttallii</i> | mountain dogwood | Cornaceae | native | deciduous tree | Y | -- | -- | - |
| <i>Cornus stolonifera</i> | red osier dogwood | Cornaceae | native | shrub | Y | -- | -- | FACW |
| <i>Crassula aquatica</i> | wrinkle-seed pygmyweed | Crassulaceae | native | forb | Y | - | - | OBL |
| <i>Sedum album</i> | white stonecrop | Crassulaceae | native | perennial forb | No | -- | -- | - |
| <i>Calocedrus decurrens</i> | Incense cedar | Cupressaceae | native | tree | Y | -- | -- | - |
| <i>Thuja plicata</i> | western redcedar | Cupressaceae | native | tree | Y | -- | -- | FAC |
| <i>Carex aperta</i> | Columbia sedge | Cyperaceae | native | herb | Y | -- | -- | FACW |
| <i>Carex cusickii</i> | Cusick's sedge | Cyperaceae | native | herb | Y | -- | -- | OBL |
| <i>Carex densa</i> | dense sedge | Cyperaceae | native | herb | Y | -- | -- | OBL |
| <i>Carex obnupta</i> | Slough sedge | Cyperaceae | native | herb | Y | -- | -- | OBL |
| <i>Carex pachystachya</i> | Thick headed sedge | Cyperaceae | native | herb | No | -- | -- | FAC |
| <i>Carex scoparia</i> | | Cyperaceae | native | herb | | - | - | - |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|--|----------------------------------|-----------------|------------|----------------|-----------------|------------------|----------|-------------------------|
| <i>Carex stipata</i> | Sawbeak sedge | Cyperaceae | native | perennial forb | Y | -- | -- | - |
| <i>Carex unilateralis</i> | one-sided sedge | Cyperaceae | native | herb | Y | -- | -- | FACW |
| <i>Cyperus erythrorhizos</i> | redroot flatsedge | Cyperaceae | native | herb | Y | -- | -- | OBL |
| <i>Cyperus</i> sp. | flatsedge | Cyperaceae | native | grasslike herb | | -- | -- | - |
| <i>Eleocharis acicularis</i> | needle spikerush | Cyperaceae | native | aquatic forb | Y | - | - | OBL |
| <i>Eleocharis macrostachya</i> | creeping spikerush | Cyperaceae | native | aquatic forb | No | - | - | OBL |
| <i>Eleocharis obtusa</i> | blunt spikesedge | Cyperaceae | native | aquatic forb | Y | - | - | OBL |
| <i>Eleocharis palustris</i> | creeping spikerush | Cyperaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Schoenoplectus tabernaemontani</i> | soft-stemmed bulrush | Cyperaceae | native | aquatic forb | No | -- | -- | OBL |
| <i>Scirpus microcarpus</i> | panicled bulrush | Cyperaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Polystichum munitum</i> | western sword fern | Dryopteridaceae | native | perennial fern | Y | -- | -- | FACU |
| <i>Equisetum arvense</i> | field horsetail | Equisetaceae | native | perennial forb | Y | -- | -- | FAC |
| <i>Equisetum hyemale</i> | common scouring rush | Equisetaceae | native | perennial forb | Y | -- | -- | FACW |
| <i>Arbutus menziesii</i> | Pacific madrone | Ericaceae | native | shrub | Y | - | - | UPL |
| <i>Euphorbia glyptosperma</i> | rib seed sandmat | Euphorbiaceae | native | forb | No | - | - | - |
| <i>Euphorbia maculata</i> | spotted spurge | Euphorbiaceae | non-native | forb | No | -- | -- | UPL |
| <i>Acmispon americanus</i> | Spanish clover | Fabaceae | native | annual forb | Y (var) | -- | -- | - |
| <i>Acmispon parviflorus</i> | Spanish clover | Fabaceae | native | perennial forb | Y | -- | -- | - |
| <i>Cytisus scoparius</i> | Scotch broom | Fabaceae | invasive | shrub | No | C | B | - |
| <i>Lathyrus latifolius</i> | broad-leaved sweet pea | Fabaceae | non-native | perennial vine | No | W | B | - |
| <i>Lotus corniculatus</i> | bird's foot trefoil | Fabaceae | invasive | perennial forb | No | C | -- | FAC |
| <i>Lupinus bicolor</i> | miniature lupine | Fabaceae | native | annual forb | Y | -- | -- | - |
| <i>Lupinus polyphyllus</i> | bog lupine (large-leaved lupine) | Fabaceae | native | perennial forb | Y | -- | -- | FAC+ |
| <i>Medicago lupulina</i> | black medic | Fabaceae | non-native | forb | No | -- | -- | FAC |
| <i>Medicago polymorpha</i> | toothed medic | Fabaceae | non-native | forb | No | -- | -- | - |
| <i>Melilotus albus</i> | white sweetclover | Fabaceae | non-native | forb | No | -- | -- | - |
| <i>Melilotus officinalis</i> | yellow sweetclover | Fabaceae | non-native | annual forb | No | W | include | FACU |
| <i>Trifolium arvense</i> | rabbitsfoot clover | Fabaceae | invasive | forb | No | C | -- | - |
| <i>Trifolium campestre</i> | | Fabaceae | non-native | annual forb | No | -- | -- | - |
| <i>Trifolium dubium</i> | lesser trefoil | Fabaceae | non-native | annual forb | No | -- | -- | UPL |
| <i>Trifolium hirtum</i> | rose clover | Fabaceae | non-native | annual forb | No | -- | -- | - |
| <i>Trifolium incarnatum</i> | crimson clover | Fabaceae | non-native | annual forb | No | -- | -- | - |
| <i>Trifolium pratense</i> | red clover | Fabaceae | invasive | forb | No | C | -- | FACU |
| <i>Trifolium repens</i> | white clover | Fabaceae | invasive | forb | No | C | -- | FAC* |
| <i>Vicia sativa</i> | common vetch | Fabaceae | non-native | annual forb | No | D | -- | UPL |
| <i>Vicia tetrasperma</i> | slender vetch | Fabaceae | non-native | annual forb | No | -- | -- | - |
| <i>Vicia villosa</i> var. <i>villosa</i> | hairy vetch | Fabaceae | non-native | annual forb | No | -- | -- | - |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|--|--------------------------|------------------|------------|----------------|-----------------|------------------|----------|-------------------------|
| <i>Quercus garryana</i> | Oregon oak | Fagaceae | native | tree | Y | -- | -- | - |
| <i>Physcomitrium pyriforme</i> | moss3 | Funariaceae | native | moss | No | - | - | - |
| <i>Centaureum erythraea</i> | common centaury | Gentianaceae | non-native | forb | No | -- | -- | - |
| <i>Geranium dissectum</i> | common wild geranium | Geraniaceae | non-native | annual forb | No | -- | -- | - |
| <i>Geranium lucidum</i> | shiny geranium | Geraniaceae | invasive | annual forb | No | C | B | - |
| <i>Geranium oreganum</i> | western Geranium | Geraniaceae | native | forb | No | -- | -- | - |
| <i>Geranium purpureum</i> | little-robin | Geraniaceae | non-native | annual forb | No | -- | -- | - |
| <i>Ribes sanguineum</i> | flowering currant | Grossulariaceae | native | shrub | Y | -- | -- | - |
| <i>Philadelphus lewisii</i> | wild mock orange | Hydrangeaceae | native | shrub | Y | -- | -- | - |
| <i>Elodea canadensis</i> | common waterweed | Hydrocharitaceae | native | aquatic forb | No | -- | -- | OBL |
| <i>Sisyrinchium idahoense</i> | blue-eyed Grass | Iridaceae | native | perennial forb | No | -- | -- | FACW |
| <i>Isoetes howellii</i> | Howell's quillwort | Isoetaceae | native | aquatic forb | No | - | - | OBL |
| <i>Juncus acuminatus</i> | sharp-fruited rush | Juncaceae | native | herb | Y | -- | -- | OBL |
| <i>Juncus articulatus</i> | jointed rush | Juncaceae | native | perennial forb | Y | - | - | - |
| <i>Juncus articulatus ssp. articulatus</i> | jointed rush | Juncaceae | native | grasslike herb | No | -- | -- | OBL |
| <i>Juncus bufonius</i> | toad rush | Juncaceae | native | herb | Y | -- | -- | FACW |
| <i>Juncus effusus</i> | soft rush | Juncaceae | native | herb | No | - | - | FACW |
| <i>Juncus ensifolius</i> | sword-leaved rush | Juncaceae | native | herb | Y | -- | -- | FACW |
| <i>Juncus oxymeris</i> | pointed rush | Juncaceae | native | herb | Yes | - | - | FACW+ |
| <i>Juncus patens</i> | common rush | Juncaceae | native | herb | Y | -- | -- | FACW |
| <i>Juncus sp.</i> | rush | Juncaceae | native | grasslike herb | No | -- | -- | - |
| <i>Juncus tenuis</i> | slender rush | Juncaceae | native | herb | Y | -- | -- | FACW- |
| <i>Lycopus americanus</i> | cut-leaved bugleweed | Lamiaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Lycopus europaeus</i> | European water-horehound | Lamiaceae | non-native | perennial forb | No | -- | -- | - |
| <i>Lycopus uniflorus</i> | northern bugleweed | Lamiaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Mentha pulegium</i> | pennyroyal | Lamiaceae | invasive | aquatic forb | No | C | -- | OBL |
| <i>Prunella vulgaris</i> | self heal | Lamiaceae | native | perennial forb | Y | -- | -- | - |
| <i>Scutellaria lateriflora</i> | mad-dog skullcap | Lamiaceae | native | aquatic forb | No | - | - | FACW |
| <i>Stachys cooleyae</i> | hedge-nettle | Lamiaceae | native | forb | Y | -- | -- | FACW |
| <i>Camassia quamash</i> | small camas | Liliaceae | native | forb | Y | - | - | - |
| <i>Lindernia dubia</i> | false pimpernel | Linderniaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Lythrum portula</i> | water purslane | Lythraceae | invasive | perennial forb | No | B | -- | NI |
| <i>Lythrum salicaria</i> | purple loosestrife | Lythraceae | invasive | aquatic forb | No | B | B | FACW+ |
| <i>Malva sylvestris</i> | common mallow | Malvaceae | non-native | perennial forb | No | -- | -- | - |
| <i>Malvella leprosa</i> | alkali mallow | Malvaceae | native | perennial forb | No | -- | -- | FACU |
| <i>Marchantia polymorpha</i> | common liverwort | Marchantiaceae | native | liverwort | No | - | - | FACW |
| <i>Mollugo verticillata</i> | carpetweed | Molluginaceae | native | forb | No | -- | -- | FAC |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|------------------------------------|----------------------------|------------------|------------|-----------------|-----------------|------------------|----------|-------------------------|
| <i>Montia fontana</i> | water chickweed | Montiaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Fraxinus latifolia</i> | Oregon ash | Oleaceae | native | tree | Y | -- | -- | FACW |
| <i>Chamaenerion angustifolium</i> | fireweed | Onagraceae | native | perennial forb | Y | - | - | FACU+ |
| <i>Clarkia amoena</i> | farewell to Spring | Onagraceae | native | forb | Y | -- | -- | - |
| <i>Epilobium brachycarpum</i> | tall willowherb | Onagraceae | native | forb | No | -- | -- | UPL |
| <i>Epilobium ciliatum</i> | Slender willow herb | Onagraceae | native | aquatic forb | Y (var) | -- | -- | FACW- |
| <i>Epilobium densiflorum</i> | dense-flowered willow herb | Onagraceae | native | perennial forb | | - | - | - |
| <i>Epilobium minutum</i> | little willowforb | Onagraceae | native | annual forb | No | -- | -- | - |
| <i>Ludwigia hexapetala</i> | Six petal water primrose | Onagraceae | invasive | perennial forb | No | A | B | - |
| <i>Ludwigia palustris</i> | water purslane | Onagraceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Ludwigia peploides</i> | Marsh purslane | Onagraceae | invasive | perennial forb | No | - | B | - |
| <i>Oenothera biennis</i> | evening primrose | Onagraceae | native | forb | Y | - | - | - |
| <i>Bellardia viscosa</i> | yellow glandweed | Orobanchaceae | non-native | annual forb | No | -- | -- | - |
| <i>Eschscholzia californica</i> | California poppy | Papaveraceae | native | perennial forb | Y | -- | -- | - |
| <i>Erythranthe guttata</i> | yellow monkeyflower | Phrymaceae | native | perennial forb | No | -- | -- | OBL |
| <i>Erythranthe moschata</i> | musk monkeyflower | Phrymaceae | native | forb | No | -- | -- | OBL |
| <i>Phytolacca americana</i> | pokeweed | Phytolaccaceae | invasive | shrub | No | A | - | NI |
| <i>Abies grandis</i> | grand fir | Pinaceae | native | tree | Y | -- | -- | FACU-* |
| <i>Pinus ponderosa</i> | yellow pine | Pinaceae | native | tree | Y (var) | -- | -- | FACU- |
| <i>Pseudotsuga menziesii</i> | Douglas fir | Pinaceae | native | tree | Y | -- | -- | FACU* |
| <i>Tsuga heterophylla</i> | western hemlock | Pinaceae | native | tree | Y | - | - | - |
| <i>Pseudotaxiphyllum elegans</i> | moss4 | Plagiotheciaceae | native | moss | No | - | - | - |
| <i>Callitriche sp.</i> | water starwort | Plantaginaceae | native | aquatic forb | - | - | - | OBL |
| <i>Kickxia elatine</i> | sharp-leaved fluellen | Plantaginaceae | non-native | forb | No | - | - | UPL |
| <i>Plantago lanceolata</i> | ribwort | Plantaginaceae | non-native | perennial forb | No | -- | -- | FAC |
| <i>Plantago major</i> | broadleaf plantain | Plantaginaceae | non-native | forb | No | -- | -- | FACU+ |
| <i>Veronica anagallis-aquatica</i> | water speedwell | Plantaginaceae | non-native | aquatic forb | No | -- | -- | OBL |
| <i>Veronica peregrina</i> | American speedwell | Plantaginaceae | native | aquatic forb | No | -- | -- | OBL |
| <i>Agrostis capillaris</i> | colonial bentgrass | Poaceae | non-native | perennial grass | No | D | - | - |
| <i>Agrostis exarata</i> | bentgrass | Poaceae | native | perennial grass | Y | -- | -- | FACW |
| <i>Agrostis scabra</i> | rough hairgrass | Poaceae | native | perennial grass | Y | - | - | FAC |
| <i>Agrostis sp.</i> | bentgrass | Poaceae | native | grass | No | -- | -- | - |
| <i>Agrostis stolonifera</i> | creeping bentgrass | Poaceae | non-native | perennial grass | No | D | - | FAC* |
| <i>Beckmannia syzigachne</i> | sloughgrass | Poaceae | native | perennial grass | Y | - | - | OBL |
| <i>Danthonia californica</i> | California oatgrass | Poaceae | native | perennial grass | Y | -- | -- | FACU* |
| <i>Deschampsia cespitosa</i> | tufted hairgrass | Poaceae | native | perennial grass | Y | -- | -- | FACW |
| <i>Deschampsia elongata</i> | hairgrass | Poaceae | native | perennial grass | Y | -- | -- | FACW- |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|---|------------------------|------------------|------------|-----------------|-----------------|------------------|----------|-------------------------|
| <i>Echinochloa crus-galli</i> | barnyard grass | Poaceae | non-native | annual grass | No | - | - | - |
| <i>Elymus elymoides</i> | bottlebrush | Poaceae | native | perennial grass | No | -- | -- | - |
| <i>Elymus glaucus</i> | blue wildrye | Poaceae | native | perennial grass | Y ssp | -- | -- | FACU |
| <i>Elymus trachycaulus</i> | bluebunch wheatgrass | Poaceae | native | perennial grass | Y | -- | -- | - |
| <i>Eragrostis hypnoides</i> | teal lovegrass | Poaceae | native | perennial grass | No | -- | -- | OBL |
| <i>Eragrostis pectinacea</i> var. <i>pectinacea</i> | purple eragrostis | Poaceae | native | annual grass | No | - | - | FAC |
| <i>Festuca idahoensis</i> | blue fescue | Poaceae | native | perennial grass | No | -- | -- | FACU |
| <i>Festuca occidentalis</i> | western fescue | Poaceae | native | perennial grass | Y | -- | -- | - |
| <i>Festuca roemerii</i> | Roemer's fescue | Poaceae | native | perennial grass | Y | -- | -- | - |
| <i>Glyceria elata</i> | tall mannagrass | Poaceae | native | perennial grass | Y | -- | -- | FACW+ |
| <i>Glyceria x occidentalis</i> | western mannagrass | Poaceae | native | perennial grass | Y | - | - | OBL |
| <i>Holcus lanatus</i> | common velvetgrass | Poaceae | non-native | perennial grass | No | -- | -- | - |
| <i>Leersia oryzoides</i> | rice cutgrass | Poaceae | native | perennial grass | Y | -- | -- | OBL |
| <i>Panicum capillare</i> | witch grass | Poaceae | native | annual grass | Y | - | - | FACU+ |
| <i>Panicum dichotomiflorum</i> | fall panicgrass | Poaceae | non-native | perennial grass | No | -- | -- | FACW |
| <i>Phalaris arundinacea</i> | reed canarygrass | Poaceae | invasive | perennial grass | No | C | -- | FACW |
| <i>Poa secunda</i> | pine bluegrass | Poaceae | native | perennial grass | Y | -- | -- | - |
| <i>Polypogon monspeliensis</i> | rabbitsfoot grass | Poaceae | non-native | annual grass | No | -- | -- | FACW |
| <i>Gilia capitata</i> | bluehead gilia | Polemoniaceae | native | forb | Y | -- | -- | - |
| <i>Navarretia intertexta</i> | needle-leaf navarretia | Polemoniaceae | native | aquatic forb | Yes | - | - | FACW |
| <i>Persicaria amphibia</i> | longroot smartweed | Polygonaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Persicaria hydropiperoides</i> | water pepper | Polygonaceae | native | aquatic forb | No | -- | -- | - |
| <i>Persicaria lapathifolia</i> | dock-leaf smartweed | Polygonaceae | native | forb | No | -- | -- | - |
| <i>Persicaria maculosa</i> | spotted lady's thumb | Polygonaceae | non-native | aquatic forb | No | -- | -- | FACW |
| <i>Persicaria punctata</i> | dotted smartweed | Polygonaceae | native | aquatic forb | No | - | - | - |
| <i>Polygonum aviculare</i> | doorweed | Polygonaceae | native | aquatic forb | Y | - | - | - |
| <i>Polygonum paronychia</i> | beach knotweed | Polygonaceae | native | shrub | No | - | - | - |
| <i>sachalinensis</i>) | giant knotweed | Polygonaceae | non-native | forb | No | - | - | - |
| <i>Rumex crispus</i> | curled dock | Polygonaceae | non-native | forb | No | -- | -- | FAC+ |
| <i>Rumex obtusifolius</i> | bitter dock | Polygonaceae | non-native | perennial forb | No | - | - | FAC |
| <i>Rumex salicifolius</i> | willow dock | Polygonaceae | native | aquatic forb | No | -- | -- | FACW |
| <i>Potamogeton crispus</i> | curly-leaf pondweed | Potamogetonaceae | invasive | aquatic herb | No | C | - | OBL |
| <i>Tortula (truncata)</i> | moss1 | Pottiaceae | native | moss | No | - | - | - |
| <i>Anagallis arvensis</i> | scarlet pimpernel | Primulaceae | non-native | forb | No | -- | -- | - |
| <i>Lysimachia nummularia</i> | creeping jenny | Primulaceae | non-native | forb | No | W | - | - |
| <i>Adiantum jordanii</i> | maiden hair fern | Pteridaceae | native | perennial fern | No | -- | -- | - |
| <i>Delphinium trolliifolium</i> | Columbian Larkspur | Ranunculaceae | native | forb | No | -- | -- | - |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|--|-----------------------|------------------|------------|--------------|-----------------|------------------|----------|-------------------------|
| <i>Ranunculus muricatus</i> | creeping buttercup | Ranunculaceae | non-native | aquatic forb | No | -- | -- | FACW |
| <i>Ranunculus sceleratus</i> | cursed buttercup | Ranunculaceae | native | aquatic forb | | - | - | OBL |
| <i>Ceanothus sanguineus</i> | Oregon tea tree | Rhamnaceae | native | shrub | Y | - | - | - |
| <i>Ceanothus velutinus</i> | mountain balm | Rhamnaceae | native | shrub | Y | - | - | - |
| <i>Frangula purshiana</i> | casacara | Rhamnaceae | native | shrub | Y | - | - | - |
| <i>Amelanchier alnifolia</i> | serviceberry | Rosaceae | native | shrub | Y | -- | -- | FACU |
| <i>Crataegus douglasii</i> | Douglas' hawthorn | Rosaceae | native | tree | Y | -- | -- | FAC |
| <i>Geum macrophyllum</i> | large-leaved geum | Rosaceae | native | forb | Y | -- | -- | FACW-* |
| <i>Holodiscus discolor</i> | oceanspray | Rosaceae | native | shrub | Y | -- | -- | - |
| <i>Malus fusca</i> | western crabapple | Rosaceae | native | tree | Y | -- | -- | FACW |
| <i>Oemleria cerasiformis</i> | Indian plum | Rosaceae | native | shrub | Y | -- | -- | FACU |
| <i>Physocarpus capitatus</i> | ninebark | Rosaceae | native | shrub | Y | -- | -- | FACW- |
| <i>Potentilla gracilis</i> | slender cinquefoil | Rosaceae | native | forb | Y var | -- | -- | FAC |
| <i>Prunus emarginata</i> | bitter cherry | Rosaceae | native | tree | Y | -- | -- | FACU* |
| <i>Prunus virginiana</i> var. <i>demissa</i> | western choke cherry | Rosaceae | native | shrub | Y | - | - | FACU |
| <i>Rosa nutkana</i> | Nootka rose | Rosaceae | native | shrub | Y | - | - | FAC |
| <i>Rosa pisocarpa</i> | swamp rose | Rosaceae | native | shrub | Y | -- | -- | FAC |
| <i>Rubus discolor</i> | Himalayan blackberry | Rosaceae | invasive | shrub | No | C | B | - |
| <i>Rubus leucodermis</i> | blackcap raspberry | Rosaceae | native | shrub | Y | -- | -- | - |
| <i>Rubus parviflorus</i> | thimbleberry | Rosaceae | native | shrub | Y | -- | -- | FAC- |
| <i>Rubus spectabilis</i> | salmonberry | Rosaceae | native | shrub | Y | -- | -- | FAC+ |
| <i>Rubus ursinus</i> | trailing blackberry | Rosaceae | native | shrub | Y | -- | -- | FACU |
| <i>Spiraea douglasii</i> | Douglas spiraea | Rosaceae | native | shrub | Y | -- | -- | FACW |
| <i>Galium aparine</i> | cleavers | Rubiaceae | native | forb | Y | -- | -- | - |
| <i>Galium trifidum</i> | three-petal bedstraw | Rubiaceae | native | forb | Y | -- | -- | - |
| <i>Populus trichocarpa</i> | black cottonwood | Salicaceae | native | tree | Y ssp | -- | -- | FAC |
| <i>Salix exigua</i> var. <i>columbiana</i> | Columbia River willow | Salicaceae | native | tree | Y | -- | -- | OBL |
| <i>Salix fluviatilis</i> | Columbia willow | Salicaceae | native | shrub | No | -- | -- | OBL |
| <i>Salix hookeriana</i> | Hooker's willow | Salicaceae | native | shrub | Y | - | - | FACW |
| <i>Salix lasiandra</i> var. <i>lasiandra</i> | Pacific willow | Salicaceae | native | tree | Y | - | - | FACW+ |
| <i>Salix prolixa</i> | Mackenzie's willow | Salicaceae | native | shrub | Y | - | - | FACW+ |
| <i>Salix scouleriana</i> | Scouler willow | Salicaceae | native | tree | Y | -- | -- | FAC |
| <i>Salix sitchensis</i> | Sitka willow | Salicaceae | native | tree | Y | -- | -- | FACW |
| <i>Azolla filiculoides</i> | mosquito fern | Salviniaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Acer circinatum</i> | vine maple | Sapindaceae | native | shrub | Y | -- | -- | FAC- |
| <i>Acer macrophyllum</i> | bigleaf maple | Sapindaceae | native | tree | Y | -- | -- | FACU |
| <i>Buddleja davidii</i> | butterfly bush | Scrophulariaceae | invasive | shrub | No | B | B | - |

| Scientific Name | Common Name | Family | Origin | Form | PPL Native list | PPL Noxious Rank | ODA Rank | Wetland Status (Oregon) |
|----------------------------|-----------------------|------------------|----------|---------------|-----------------|------------------|----------|-------------------------|
| <i>Limosella aquatica</i> | mudwort | Scrophulariaceae | native | aquatic forb | Y | -- | -- | OBL |
| <i>Verbascum blattaria</i> | moth mullein | Scrophulariaceae | invasive | biennial forb | No | C | -- | UPL |
| <i>Verbascum thapsus</i> | great mullein | Scrophulariaceae | invasive | biennial forb | No | C | - | - |
| <i>Sphagnum</i> sp. | Sphagnum moss (moss2) | Sphagnaceae | native | moss | No | - | - | - |
| <i>Sparganium emersum</i> | simplestem bur-reed | Typhaceae | native | aquatic forb | Yes | -- | -- | OBL |
| <i>Typha angustifolia</i> | narrow-leaf cattail | Typhaceae | native | aquatic forb | Y | - | - | OBL |
| <i>Typha latifolia</i> | broad-leaf cattail | Typhaceae | native | aquatic forb | Y | - | - | OBL |
| <i>Urtica dioica</i> | stinging nettle | Urticaceae | native | forb | No | -- | -- | FAC+ |

| Scientific Name | Common Name |
|----------------------------------|------------------------|
| <i>Actitis macularius</i> | spotted sandpiper |
| <i>Agelaius phoeniceus</i> | red-winged blackbird |
| <i>Anas platyrhynchos</i> | mallard |
| <i>Aphelocoma californica</i> | western scrub jay |
| <i>Ardea herodias</i> | great blue heron |
| <i>Bombycilla cedrorum</i> | Cedar waxwing |
| <i>Branta canadensis</i> | Canada goose |
| <i>Bubo virginianus</i> | great horned owl |
| <i>Buteo jamaicensis</i> | Red-tailed hawk |
| <i>Butorides virescens</i> | green heron |
| <i>Calipepla californica</i> | California quail |
| <i>Calypte anna</i> | Anna's hummingbird |
| <i>Cathartes aura</i> | turkey vulture |
| <i>Chaetura vauxi</i> | Vaux's swift |
| <i>Charadrius vociferus</i> | killdeer |
| <i>Colaptes auratus</i> | Northern flicker |
| <i>Contopus sordidulus</i> | western wood-pewee |
| <i>Corvus brachyrhynchos</i> | American Crow |
| <i>Cyanocitta stelleri</i> | Stellar's jay |
| <i>Falco peregrinus</i> | peregrine falcon |
| <i>Falco sparverius</i> | American kestrel |
| <i>Haemorhous mexicanus</i> | house finch |
| <i>Haliaeetus leucocephalus</i> | bald eagle |
| <i>Hirundo rustica</i> | barn swallow |
| <i>Junco hyemalis</i> | dark-eyed junco |
| <i>Megaceryle alcyon</i> | belted kingfisher |
| <i>Melospiza melodia</i> | song sparrow |
| <i>Mergus merganser</i> | common merganser |
| <i>Molothrus ater</i> | brown-headed cowbird |
| <i>Pandion haliaetus</i> | osprey |
| <i>Passer domesticus</i> | house sparrow |
| <i>Passerculus sandwichensis</i> | savannah sparrow |
| <i>Petrochelidon pyrrhonota</i> | cliff swallow |
| <i>Picoides pubescens</i> | downy woodpecker |
| <i>Pipilo maculatus</i> | spotted towhee |
| <i>Piranga ludoviciana</i> | western tanager |
| <i>Podilymbus podiceps</i> | pied-billed grebe |
| <i>Poecile atricapillus</i> | black-capped chickadee |
| <i>Regulus calendula</i> | ruby-crowned kinglet |
| <i>Sayornis nigricans</i> | black phoebe |
| <i>Setophaga petechia</i> | yellow warbler |

| | |
|---------------------------------------|-------------------------------|
| <i>Spinus tristis</i> | American goldfinch |
| <i>Stelgidopteryx serripennis</i> | northern rough-winged swallow |
| <i>Streptopelia decaocto</i> | Eurasian collared dove |
| <i>Sturnus vulgaris</i> | European starling |
| <i>Tachycineta bicolor</i> | tree swallow |
| <i>Tachycineta thalassina</i> | violet-green swallow |
| <i>Thryomanes bewickii</i> | Bewick's wren |
| <i>Turdus migratorius</i> | American robin |
| <i>Tyrannus verticalis</i> | western kingbird |
| <i>Tyto alba</i> | barn owl |
| <i>Vermivora celata</i> | orange-crowned warbler |
| <i>Zenaida macroura</i> | mourning dove |
| <i>Zonotrichia leucophrys</i> | white-crowned sparrow |
| | |
| <i>Acipenser transmontanus</i> | white sturgeon |
| <i>Fundulus diaphanus</i> | banded killifish |
| <i>Gambusia affinis</i> | mosquitofish |
| <i>Gasterosteus aculeatus</i> | threespine stickleback |
| <i>Misgurnus anguilicaudatus</i> | oriental weatherfish |
| <i>Oncorhynchus tshawytscha</i> | Chinook salmon |
| | |
| <i>Canis latrans</i> | coyote |
| <i>Castor canadensis</i> | American beaver |
| <i>Lontra canadensis</i> | river otter |
| <i>Mephitis mephitis</i> | striped skunk |
| <i>Mustela frenata</i> | long-tailed weasel |
| <i>Myodes californicus</i> | western red-backed vole |
| <i>Odocoileus hemionus</i> | black-tailed deer |
| <i>Phoca vitulina</i> | harbor seal |
| <i>Procyon lotor</i> | raccoon |
| <i>Spermophilus beecheyi</i> | California ground squirrel |
| <i>Zalophus californianus</i> | California sea lion |
| | |
| - | Unknown turtle |
| <i>Lithobates catesbeianus</i> | bullfrog |
| <i>Pseudacris regilla</i> | Pacific chorus frog |
| <i>Sceloporus occidentalis</i> | western fence lizard |
| <i>Thamnophis atratus hydrophilus</i> | Oregon garter snake |
| <i>Thamnophis sirtalis concinnus</i> | red-spotted garter snake |

ATTACHMENT 6. FISH MONITORING REPORT



LINNTON MILL RESTORATION PROJECT

YEAR 3 FISH MONITORING REPORT



LINNTON MILL RESTORATION PROJECT

YEAR 3 FISH MONITORING REPORT

OCTOBER 2022

Prepared for:

RestorCap

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Cascade Environmental Group, LLC. Project Name: Linnton Mill Restoration Project – Year 3
Fish Monitoring Report. Portland, OR. RestorCap, Portland, OR.

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1 INTRODUCTION

We conducted fish monitoring at the Linnton Mill Restoration site for the purpose of documenting results of restoration actions implemented by RestorCap in 2019. The permit methodology requires monitoring the site two times per month in February, March, April, and May and document fish that are using the site to forage and rear in off-channel habitat of the Willamette River. Turbidity and very high or low flows created challenges to monitoring in 2022 and may inform future monitoring efforts.

1.1 BACKGROUND

The Linnton Plywood Mill played a critical role in achieving economic prosperity during the 1900s. At its peak, the local mill employed 250 people and processed lumber 16 hours a day, six days a week. The mill closed in 2000 and remained vacant until RestorCap purchased the property in 2015. After purchasing the site, one of the firm's priorities was to appreciate and acknowledge the mill's century-long history while restoring and supporting natural wildlife.

The goals of the restoration were to create off-channel habitat for juvenile salmonids, lamprey, and other native fishes and restore floodplain habitat adjacent to the Willamette River. The property provides critical off-channel habitat for juvenile salmonids in the Willamette River and over 80,000 native trees and shrubs. The site also provides upland and riverine habitat to many native birds and animals. Linnton Creek, which flows from Forest Park, providing important cold-water inflow to the habitat.

As required by section 7 of the ESA, the National Marine Fisheries Service provided an incidental take statement with the biological opinion (WCR-2017-6525, NWP-2014-477-1). The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action, including monitoring. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal action agency must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species. Potential take associated with fish monitoring is covered by the incidental take statement.

2 METHODS

The biological opinion describes post construction monitoring to be conducted to determine the presence or absence of juvenile salmonids. Monitoring is to take place during years 1,3,5,7, and 10. This is year 3 of the fish monitoring effort. Surveys are conducted up to two times per month from February through May. The BO describes using snorkel surveys or beach seining to monitor fish use. Beach seining can only be conducted until juvenile salmonids are captured so it was determined that snorkeling would be the most effective means of monitoring the site.

A crew of two conducted surveys by snorkeling and using an underwater camera to document fish use in the Linnton Mill project area. Monitoring focused on shoreline habitat features including large wood structures and flooded vegetation as well as Linnton Creek, a source of cool, clear water to the off-channel habitat. One crew person conducted the snorkel survey while the other documented results. Seines were not used as a method of sampling due to risk of collecting more than one salmonid in a net set. This creates significant challenge monitoring a site like Linnton due to high background turbidity that often occurs in the Willamette River during late winter/spring months. Seines can be very effective when used by skilled practitioners that know how to effectively set and pull nets as well as safely enumerate and release fish unharmed.

Scheduling monitoring events proved challenging as flows and turbidity in the Willamette River dictated when snorkeling and underwater video would be effective means of viewing fish underwater. Water temperatures were very cold (<7 C) early in the sampling season but increased to >15 C by May when the last monitoring event occurred.

3 RESULTS

2/7/2022

Snorkel survey documented 9 juvenile Chinook salmon in the side channel directly downstream of the mouth of Linnton Creek. Water clarity limited survey effectiveness leaving the area downstream of Linnton Creek as the only location where snorkel or camera

survey could effectively view underwater. Other fish were seen along the shoreline, but they could not be identified due to turbidity. No fish were observed on underwater video.

- **Oncorhynchus tshawytscha (Chinook salmon) – 9**
 - **Sub-yearling 40-60mm**

3/10/2022

Low flow conditions limited effectiveness of underwater surveys (snorkel and camera) and no fish were observed during the survey (along shoreline or underwater).

- **No fish observed**

3/30/2022

Low flow conditions again limited effectiveness of underwater surveys. No fish were observed from shoreline surveys and one unidentified fish was observed during snorkel surveys. No fish were observed in underwater video.

- **One unidentified fish**

5/23/2022

Numerous small fish (1 - 2 " +/-) were visible in schools in the shallowest water areas, but identification wasn't possible. The creek outlet/mixing zone was the only area where snorkeling seemed practicable, and 3 juvenile chinook and 3 other juvenile salmonids were seen in the mixing zone area. Snorkeling was terminated after it was confirmed that it was unproductive moving past the mixing zone to the south/southeast, where turbidity increased again, and visibility was too poor. No fish were observed on underwater video.

- **Oncorhynchus tshawytscha (Chinook salmon) – 3**
 - **sub-yearling 60-80mm**
- **Unidentified salmonids - 3**

4 DISCUSSION

Juvenile salmonids were identified during surveys conducted in the Linnton Mill Restoration site. They were documented on two occasions, in early March and late May. The fish observed in early March were 40-60mm “sub-yearling” Chinook salmon that had likely emigrated from their natal stream in the Willamette system in late fall/early winter. These “fry” migrants move downstream into the lower Willamette River and rear for another year prior to out-migrating to the ocean, The juvenile salmonids seen later in the spring were larger in size (60-80mm) but not yearling or smolt sized juveniles.

A significant portion of the site was not accessible to survey due to limitations on both snorkel and underwater video surveys. Snorkel passes only see about 5% of the project site and that is restricted to shoreline habitat where water clarity allows underwater viewing. On most occasions, the snorkeler could not see farther than arm’s length except for the area immediately downstream of Linnton Creek.

Beach seines would be the most effective means of sampling the site but limits on take do not allow for continued use of seines after the first salmonid is collected. There is high confidence that beach seining would collect more than one salmonid, particularly after what was observed during snorkel surveys that were very limited in scope and effectiveness. In the future, seining could be used to sample other fish using the site in less complex habitats along with juvenile salmonids, but the take limitation impacts use of a safe and very effective means of sampling fish if used properly by experienced crews.

Forecasting conditions that provided water clarity good enough for underwater observations proved challenging. In future monitoring years, it is recommended the monitoring plan allows for flexibility in when monitoring is conducted. There may be weeks at a time when water is too low or too high in late winter/early spring to conduct monitoring.

5 PHOTO DOCUMENTATION

2/7/2022



Photo 1. Underwater video survey provided a clear view under most large wood structures when they were wetted. Unfortunately, the angle of the camera proved to be critical when viewing footage. The camera changed angle often when it hit an obstruction underwater.



Photo 2. View upstream of Linnton Creek. Linnton Creek provides a continual source of cool, clean water to the side channel and provided habitat conditions that appeared the most suited to fish using the side channel.

3/10/2022



Photo 3. Snorkeling was limited to a water depth that allowed free movement of the snorkeler.

*Photo at mouth of Linnton Creek.



Photo 4. Low flow conditions created challenges finding the right time of the tidal sequence to perform the underwater (snorkel and camera) surveys.

3/30/2022



Photo 5. Very high turbidity in the upper end of the channel limited monitoring opportunities. There is no connection to the Willamette River at the upper end of the channel at very low flows

5/23/2022



Photo 6. Conditions in late spring provided the best opportunity to conduct underwater surveys but turbidity still limited effectiveness of snorkeling and underwater camera.



Photo 7. Spring flows in the Willamette combined with backwater from the Columbia created ideal conditions for fish rearing in the side channel.

*Photo at mouth of Linnton Creek where all juvenile salmonids were documented. Area also provided best underwater viewing opportunity.

6 FIELD NOTES

02/07/2022

Todd Alsbury (Cascade), Kari Dupler (RestorCap), Rod Lundberg (Cascade)

Conditions: Calm wind, approximately 40F air temp, overcast 6.9C water temp

First sweep: used polarized glasses to scan for fish presence along alcove shorelines

Second sweep: used GoPro camera on an extension arm to capture underwater video along shoreline and around LWD structures in contact with the water, for later review for fish presence

Third sweep: completed snorkel survey of alcove. Sub-optimal water conditions with turbidity limiting sightlines to approximately arm's length in many areas.

Snorkel survey results:

5 chinook sub-yearling identified near LWD structure "downstream" from tributary entrance

4 chinook sub-yearling identified in shallow channel of alcove leading from the tributary entrance

03/10/2022

Todd A, Rod L.

From the USGS gauge at the Morrison Bridge, water temperature was about 47F, river stage was about 4.5 - 5.5 ft, and turbidity was about 10.0 FNU.

Weather was mostly clear with a light breeze and high haze later, air temperature about 42F - 47F.

No fish were observed via shoreline scanning through polarized sunglasses or via snorkel survey. Snorkeling occurred throughout the inlet areas, both downstream from the creek tributary and in the upstream inlet area. Water levels were less engaged with LWD structures compared to our last monitoring event (slightly lower river stage). Visibility was relatively poor.

03/30/2022

Todd A., Rod L.

Arrived on site 10AM and discovered water level was at least 1 foot lower than had been forecast, apparently due to a more rapidly dropping tide than predicted.

Water temperature 11.2 degrees C in the downstream cove; stage approximately 5 ft and falling, and turbidity approximately 3.6 at the Morrison Bridge gauge.

First search pass completed using polarized sunglasses from the shoreline in the downstream cove, continued upstream to where the small tributary enters the cove.

Followed up with a GoPro underwater camera used on an extension arm to capture video of the downstream cove, around any submerged structure, and video capture continued up the small tributary stream upstream to the daylighted culvert.

Final pass completed via snorkeling in the downstream cove, though this was curtailed due to very low water which was too shallow to practically swim through and search for fish. One unidentified small fish was observed during snorkeling.

5/23/2022

Todd A., Rod L.

We arrived at 10am with a low overcast/marine layer and about 60 degrees, little to no wind. Water level was approximately 8.0 feet (low tide) at the Morrison Bridge gauge, with a high tide of only 8.25 feet forecast for the afternoon. Turbidity at the gauge was in the 6 - 7 FNU range. Water temps in the cove were 14.4 C to start, with 11.7 C at the end of the creek, and 12.2 C in the mixing zone between the creek and the cove. Turbidity seemed manageable in the shallow margins.

We started with an underwater camera survey of the shallows along the full perimeter of the cove - both the mainland and island shores. Numerous small fish (1 - 2 " +/-) were visible in schools in the shallowest water areas, but identification wasn't possible. Some of these fish may have been captured on video. Todd also saw a slightly larger fish dart out of the shallows that did not allow ID. Video was also taken in the creek itself up to the culvert outlet below the railroad tracks.

The snorkel survey started at the northerly cove outlet, working along the landward shallows/shoreline in the upstream direction toward the creek confluence. Turbidity was problematic with poor visibility. The creek outlet/mixing zone was the only area where snorkeling seemed practicable, and 3 juvenile chinook and 3 other juvenile salmonids were seen in the mixing zone area. Snorkeling was terminated after it was confirmed that it was unproductive moving past the mixing zone to the south/southeast, where turbidity increased again, and visibility was too poor.

Boat wave wakes intermittently entered the cove. While the shallow water zone seemed unaffected, it's possible that the up-and-down water level was causing fines to lift off the cove bottom and mix, increasing turbidity in the middle/main part of the cove.

We spotted a small fur-bearing mammal on the island as we walked down the slope to the cove. It sat on one of the rock piles and watched us then disappeared. With binoculars it was still too far to identify but seemed too light colored (tan-ish) to be a mink (It was not a squirrel.)

ATTACHMENT 7. BALD EAGLE MONITORING REPORT



Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070

Telephone number: (503) 570-0800 Fax number: (503) 570-0855

TECHNICAL MEMORANDUM

Date: November 9, 2022

To: Kari Dupler, Associate
RestorCap
337 17th Street, Suite 200
Oakland, CA 94612

From: Carole Hallett, Ornithologist

Re: Bald Eagle Surveys at the Linnton Mill Restoration Project along the
Willamette River in Portland
PHS # 7418

PROJECT BACKGROUND

Pacific Habitat Services, Inc. (PHS) was contracted to conduct bald eagle monitoring at the Linnton Mill Restoration Project along the Willamette River in Portland (Figure 1; all figures and tables in Attachment 1). The restoration project is designed to provide high quality habitat for fish and wildlife injured by hazardous releases in the Portland Harbor Superfund site. Restored habitats include off channel wetland, riparian, upland/forested and active channel margin (river beach). The purpose of monitoring was to document bald eagle use of the restoration area. An additional goal was to note the presence of American beaver and mink.

PROJECT METHODOLOGY

Because no single point was found to be both unobtrusive and offer unobstructed views of the entire site, observations were conducted from one of three vantage points: North, South or Mid (Figure 1). See notes in the Summary regarding these vantage points.

Surveys were scheduled weekly, and included two hours of observation; either just after dawn or just before dusk. Inclement weather or other circumstances interfered with scheduling on some days resulting in three instances with no survey being conducted during a given week (in those instances, the missed survey was conducted as soon as possible), and some surveys were conducted during a break in the rain even if it were not just after dawn or right before dusk.

PHS ornithologist, Carole Hallett listened, scanned the area with a naked eye, and used 10x42 binoculars and 12-40x60 spotting scope to detect and inspect bald eagles and other species. Bald eagle presence/absence, abundance, behavior, age class (adult or sub-adult), habitat element use, and time of use were recorded (Table 1) along with a list of other species detected (Table 2).

RESULTS

Bald Eagle (BAEA)

Presence/Absence/Abundance

Thirty-seven surveys of the Linnton site were conducted between December 21, 2021, and August 22, 2022. Thirty-two percent of surveys (12) resulted in one or more on-site BAEA sightings. Additionally, BAEA were observed off-site during seventy percent of surveys (26) (Table 1). A minimum of two to three sub-adults, two adults (residents) and one fledgling BAEA were seen on site during surveys.

Habitat elements used

The most frequently used feature (5 times) was a live remnant cottonwood tree (south tree) near the SE corner of the site (Figure 1). Adult and sub-adult BAEA were observed in this tree. BAEA flew between this south tree and an off-site nest grove, as well as hunting perches across the river, and off-site night roosts. (Figure 2.) The clump of deciduous trees (north trees) on the riverbank at the NE corner of the site was the second most frequently used feature (4 times) (Figure 1). These trees were used by sub-adult BAEAs for night roosting and for staging prior to going to roost off-sites (Table 1). Additional on-site BAEA locations used for hunting and eating by the resident BAEA pair and one fledgling, included the log jumble, pilings and snags on the island which were used for perching and hunting (3 times), near shore (2 times) for bathing; and the stout riverside snags on the northeast slope (Figure 2). The fledgling was only seen on the riverside snags.

Timing and seasonality

Of the 12 surveys with on-site BAEA sightings, half were morning surveys and half were evening surveys. All on-site BAEA observations through February were of sub-adult BAEAs. Sightings of sub-adult BAEAs, both on and off site, dropped off in late February. The first adult BAEA was recorded on-site on April 8. The fledgling from the resident pair was recorded on-site on July 27. No BAEA were seen on or off site after August 8 (Table 1).

Nesting bald eagles

A BAEA pair nested on the forested ridge approximately 0.3 miles west-northwest of the site (Figure 2). These adult BAEA flew over and past the site, hunted from light poles, trees and railings across the river to the east and flew as far south as the St. John's Bridge to chase other BAEA (Figure 2). Based on the date that both adults were last seen together away from the nest prior to nest initiation, the age of the BAEA nestlings when first seen and approximate date of fledging, egg laying and incubation is estimated to have started in early March. They had 2 chicks, but one disappeared about 2 weeks prior to fledging. They were seen on-site with their single surviving young approximately two weeks post-fledging; the adults and the fledgling were perched atop the very stout snags on the NE slope at the north end of the site (Figure 1). Given the close proximity of the nest to the Linnton Mill Restoration site it is reasonable to assume that BAEA use of this site during nesting season may be limited to this pair and their offspring.

Other bald eagles

At least three sub-adult BAEA (two second-year and at least one third-year) roosted on-site or staged on-site prior to flying to off-site roosts on the forested ridge (Figure 2). At least one non-resident adult was seen flying over the river. BAEA were seen flying to roosts in two areas; approximately 0.5 mile to 0.75 miles south of the site on the forested slope between Linnton and the St. John's Bridge (Figure 2).

Other Species

American Beaver

On three occasions one to three beaver were observed swimming into the off channel waterway from the river to browse willows and other vegetation. On one occasion all three beavers were present at the same time on site. All were swimming in the off channel waterway near the south end of the island. One was seen swimming in wide circles occasionally tail slapping while the others swam nearby.

SUMMARY

The Linnton Mill Restoration Site was used by wintering sub-adult bald eagles and a pair of breeding adults and their offspring. Live remnant trees near the river at both ends of the site received the most BAEA use. BAEA use of the site is expected to increase as trees on the restoration site becomes better established.

One to three American beaver were observed foraging on-site on three occasions and more than 65 additional vertebrate species were noted using the site (Table 2).

Notes on Vantage Points

Due to the topography of the site, a single observation point that was both unobtrusive and offered an unobstructed view of the entire property was not found. Three sites, therefore, were used for observations (Figure 1). Their advantages/disadvantages are summarized below:

South Vantage Point: This vantage point on the south upland gave the best overall view but a nearby cottonwood tree (south tree), the only tree in this area, was a favored perch for Bald Eagles, Red-tailed Hawks and other birds; observer presence kept birds from using this perch. The other two vantage points were used to conduct observations when accessing the south point would have disrupted birds already in the area. Neither of these alternate vantage points was entirely satisfactory, and the vantage point used for a given survey was selected based on bird activity on-site or in the vicinity at the time of arrival.

North Vantage Point: Had good views, but other than the large log jumble it lacked cover. Using the log jumble for cover then required shifting position to see towards the north and would interfere with birds using that feature.

Mid Vantage Point: Gave good views of the wetland, the island, the south upland including the much used south tree, many of the snags and the log jumble on the north upland, good views out over the river to watch for BAEA approaching from hunting perches across the river, was located in an area unlikely to be used by BAEA, and offered excellent cover to reduce the likelihood of interfering with BAEA use of the site. The disadvantages to this vantage point were restricted views to the north and no view at all of several of the snags, the east facing slopes or much of the river beach, areas that could be expected to be used by BAEA for hunting/perching. To compensate for the lack of view of these areas from the vantage point they were viewed while walking between the entry point and the mid-vantage point. (No BAEA were seen on these walk throughs).

For future surveys with a single vantage point, I recommend using the mid-vantage point. Although it does not give a clear view of the entire site it is the least obtrusive and allows a good view of many important and often used habitat features. Additionally, I suggest viewing the north upland riverside snags (Figure 1) either prior to starting p.m. surveys or after a.m. surveys. These snags were the only feature with documented use by the resident BAEA family in 2022 and they are entirely hidden from view from the mid vantage point. The riverside snags and the nest grove can be viewed from the paved walkway near the interpretive sign at the north end of the site.

Attachment 1: Figures 1 and 2
Tables 1 and 2

Attachment 1

Figures and Tables





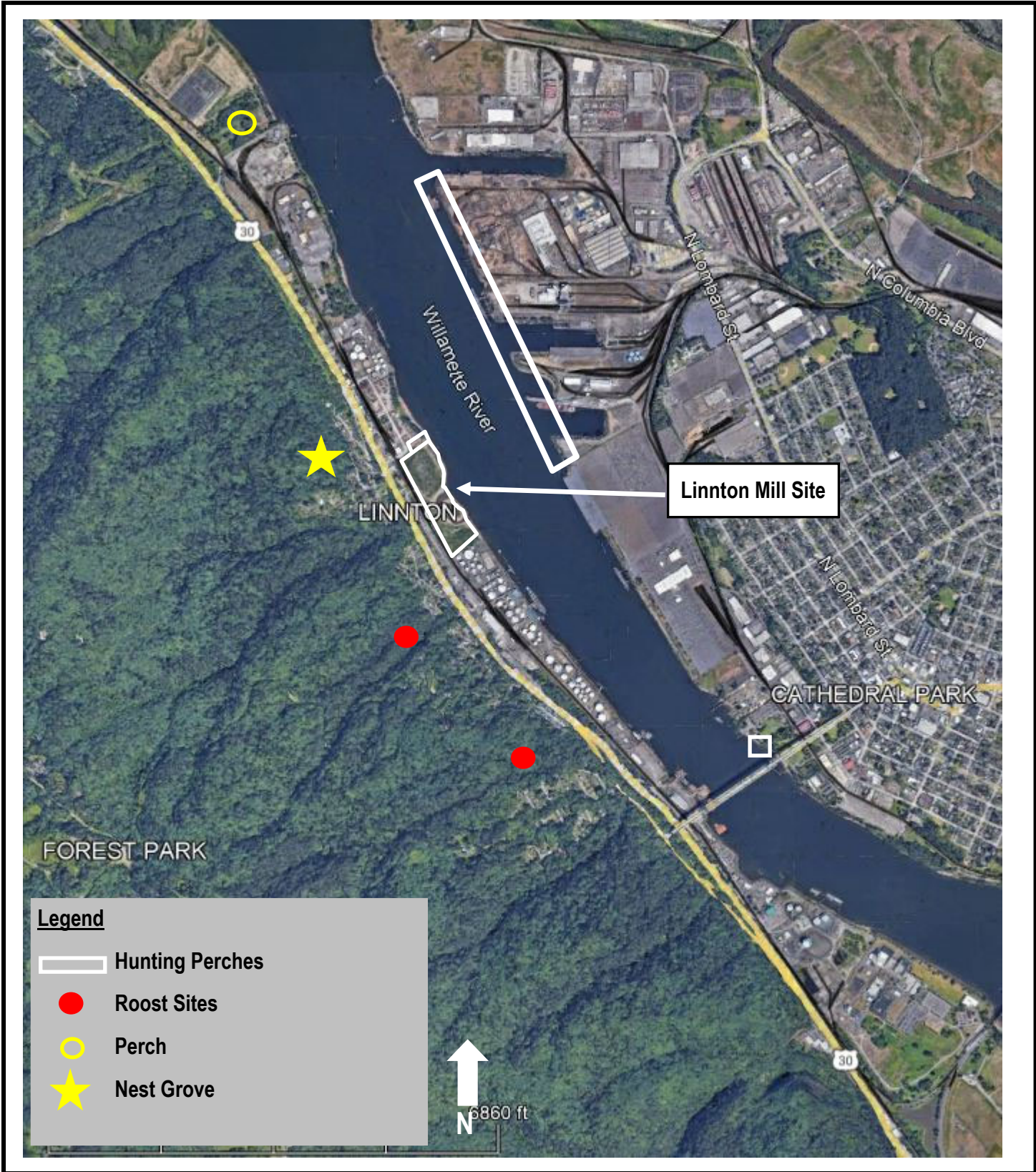
Project #7418
11/3/2022



Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Site Boundary, Vantage Points, and On-site Bald Eagle Locations
Bald Eagle Surveys at the Linnton Mill Restoration Project – Portland, Oregon
United States Geological Survey (USGS), National Map Viewer, 2022

FIGURE
1



Project #7418
11/3/2022



Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Off-site Nest Grove, Roost sites, and Perches
Bald Eagle Surveys at the Linnton Mill Restoration Project – Portland, Oregon
United States Geological Survey (USGS), National Map Viewer, 2022

FIGURE
2

Table 1. Bald Eagle Surveys - Linnton Mill Restoration Site (December 22, 2021 to September 13, 2022)

| Date | BAEA on-site | Location | Time and Behavior on-site/(off-site) | BAEA off-site |
|-----------|--------------|----------------------------------|--|--------------------|
| 12/22/21 | 0 | n/a | no BAEA seen | 0 |
| 12/29/21 | 0 | n/a | no BAEA seen | 0 |
| 1/8/22 | 2 SY | N. trees | 16:45: SY BAEA fly over site from SE, land briefly in Douglas Fir in /near Linnton Park then fly to roost on-site in N.trees. A 2nd SY BAEA already in N trees. | 0 |
| 1/14/22 | 0 | n/a | (earlier today, worker saw a BAEA catch a fish and land on riverside snag n. Upland to eat. not included in tally.) | 0 |
| 1/21/22 | 0 | n/a | (09:05: 1 Ad flew by at treetop level at edge of site then crossed Hwy 30 to fly along the face of forested slope toward St John's Bridge. Lost to view in the fog) | 1Ad |
| 1/25/22 | 0 | n/a | (16:15: 1 Ad perched near nest grove; 16:40:1 SY and 1 unkn roost on ridge in/near Linnton Park, same area where SY landed on 1/8/22) | 1 SY, 1 Ad, 1 unkn |
| 2/5/22 | 1 SY | N. trees | (08:33: 1 Ad and 1 SY off site near 1/25 night roost); 0834: the SY flew out over river then turned to perch on-site in N trees; (08:40: see Ad across the river on light pole, same or a second Ad). | 1Ad |
| 2/10/2022 | 2 SY, 1 TY | N. trees, S. tree | 15:43 1 SY in N. trees; 15:45 1 SY in S. tree; 16:35 1 TY land in N. trees; 17:02 SY and TY left N. trees to roost on the ridge; 17:15: SY gone from S. tree to unknown night roost; (17:15: 1 Ad flew in from across the river to roost in nest grove) | 2 Ad |
| 2/17/22 | 1 SY | River beach, S.tree | 15:40 1 SY over river flying near sealion with sturgeon, 15:42 lands on beach near island, bathes in river; 16:05 SY flies to S. tree; (16:25 Ad catches fish in river, flies to railing x river to eat, 16:29 2nd Ad lands nearby; 16:44 2 Ad actively hunting over river, 2x fly over sealion eating fish up river near St. John's Bridge;), 16:54 SY gone from S. tree to unknown roost off site. | 2 Ad |
| 2/24/22 | 2 SY | N. trees, S. tree | 16:23 1 SY lands in S. tree,. 16:26 SY flew to chase gull carrying food, lost to view; 16:45 SY lands in S.tree; 17:30 SY launches after (Ad BAEA fishing over river, joined by a second SY BAEA then a second Ad BAEA.) 17:33 1 SY returns to S. tree, (others out of sight up river; 17:39 2 Ad BAEA over river chased by a SY BAEA, Adults land side by side on light pole x river) and the SY goes to roost on-site in N. tree ; 1800: SY fly from S. tree out of sight on ridge) | 2 Ad |
| 3/4/2022 | 0 | n/a | (16:40 1 Ad fly from south toward nest grove, lost to view; 17:09 Ad fly from vicinity of nest grove, over site, past S. tree and cross river to light pole near 2nd Ad BAEA; 17:28 Both Ad fly strongly from light pole towards nest grove lost to view) | 2 Ad |
| 3/11/22 | 0 | n/a | no BAEA seen | 0 |
| 3/18/22 | 0 | n/a | 18:26 (1 Unk heard) not seen off site | 1 Unk |
| 3/22/22 | 0 | n/a | 18:56 (1 Ad fly up river along opposite shore then cross river heading toward nest grove, lost to view; 19:01 a 2nd Ad BAEA follows same line) | 2 Ad |
| 4/3/2022 | 0 | n/a | (15:13 1 Ad flew from nest grove to chase Osprey with fish, 2nd Ad BAEA out there, too; 15:56 1 Ad BAEA fly to perch on tower ~.75 mi NW; 16:26 Ad gone from tower; 16:30 Ad soars over river N. of site, crossed river towards buildings then farther NE - looks like a boundary display - returns x river heading toward nest grove; lost to view; 17:25 Ad fly from nest grove x river to chase Osprey by nest on light pole then returned to nest grove; 1st obs of Ad BAEA in nest incubation/laying; estimate hatch early May and fledge mid-July) | 2 Ad |
| 4/8/22 | 1 Ad | S.tree, river beach, island snag | 19:08: 1 Ad fly in from across the river lands in S. tree perch; 19:13 Ad fly to ls. snag ; 19:27 swoop over 2 MALL and a CAGO near the off channel outflow and land on the river beach; 19:35 fly to light pole on fuel farm. Late day hunting. | 0 |
| 4/15/22 | 0 | n/a | no BAEA seen | 0 |
| 4/18/22 | 0 | n/a | no BAEA seen | 0 |
| 4/22/22 | 1 Ad, 1 SY | S.tree | (07:40 1 Ad down tight on nest; 08:04 Ad fly from nest grove out over river then turns to land on ridge above condos by bridge; 08:08 Sub adult BAEA flies from this area to x river); 08:19 Ad flies from ridge to S. tree, vocalizes. 08:20 adult continues to vocalize and sub-adult flies in to land in S. tree near the Ad; 08:45 sub-adult (SY) fly from S. tree x river to small Douglas fir hunting perch | 1 Ad |

Table 1. Bald Eagle Surveys - Linnton Mill Restoration Site (December 22, 2021 to September 13, 2022)

| Date | BAEA on-site | Location | Time and Behavior on-site/(off-site) | BAEA off-site |
|---------|--------------|-------------------------------|---|----------------|
| 5/3/22 | 0 | n/a | (17:40 Ad down tight on nest); 19:43 food delivery to nest, female feeding chicks but c. not seen) | 2 Ad |
| 5/7/22 | 0 | n/a | (15:19 2 Ad at nest, 16:09 1 Ad flies from nest grove to chase a 3rd Ad from the area) | 3 Ad |
| 5/13/22 | 0 | n/a | (13:00 2 Ad at nest; 14:29 1 Ad flies towards ridge near St. John's Bridge; 16:55 Ad returns with small prey item, drops in nest, no feeding behavior) | 2 Ad |
| 5/16/22 | 0 | n/a | (Brief nest check only; 2 Ad, 2 chicks in nest) | 2 Ad, 2 chicks |
| 5/20/22 | 0 | n/a | (13:15 2 Ad, perched near nest; 14:46 Sub Ad (SY) circle over N. upland, pass in front of nest grove, circle over roost area on ridge; 15:13 Ad BAEA fly from nest grove to mid river then return to nest grove, challenged by AD RTHA; 15:25 Ad BAEA fly from nest in aggressive manner toward Ad and Sub Ad BAEA over the river but RTHA Ad is between him and nest, Ad BAEA quickly circles in front of RTHA, RTHA moves away 15:30, BAEA returns to nest) | 2 Ad, 1 SY |
| 6/5/22 | 0 | n/a | (07:45 1 Ad, perched above nest; 10:17 1 Ad perched above, 2 big chicks in nest) | 1 Ad, 2 chicks |
| 6/10/22 | 0 | n/a | no BAEA seen | 0 |
| 6/17/22 | 1 Ad | Island snag | (06:14 2 chicks in nest); 06:31 1Ad lands on ls. snag, vocalizing, 06:46 Ad moved to piling; (06:47 flew across river to blue railing, hunting perch) | 2 chicks |
| 6/26/22 | 1 Ad | island snag, pilings and logs | (05:15 2 lg nestlings) 05:30 1Ad on island snag and jumble of logs and pilings close to water, apparently fishing; 07:18 Ad vocalized and flew across the river when I stepped out from cover | 2 chicks |
| 7/2/22 | 0 | n/a | (06:30 1 Ad perched above nest, 1 chick in nest eating) | 1 Ad, 1 chick |
| 7/6/22 | 0 | n/a | (07:30 1 eaglet in nest, flapping) | 1 chick |
| 7/13/22 | 1 Ad | S.tree | (19:05 1 Ad near nest) 20:43 Ad flew to S. tree; (20:43 Ad flew across the river) | 1 Ad |
| 7/21/22 | 0 | n/a | (07:30 1 fledgling in trees near nest) | 1 fledgling |
| 7/27/22 | 2 Ad, 1 HY | N. upland riverside snags | 06:45 2 Ad, and 1 fledgling on snags above river on N. upland; Ad M and HY eating fish, Ad F watching. | 0 |
| 8/3/22 | 1 Ad | N. upland riverside snags | 06:40 1 Ad flew to snag above river below the N. upland; 07:00 Ad BAEA on snag mobbed by two Osprey | 0 |
| 8/9/22 | 0 | n/a | (07:18 1 Ad perched near nest, and 2nd Ad fly over site towards nest grove) | 2 Ad |
| 8/18/22 | 0 | n/a | no BAEA seen | 0 |
| 8/22/22 | 0 | n/a | no BAEA seen | 0 |
| 9/7/22 | 0 | n/a | no BAEA seen; walk through | 0 |

SY - Second Year
 TY = Third Year
 Ad= Adult
 HY = Hatch Year
 Unkn = Unknown
 MALL = Mallard
 CAGO = Canda Goose

Table 2. Species Observed Linnton Mill Restoration Site 12/22/21 - 9/13/22

| Species observed | Scientific Name | Nest on site | Areas seen on site |
|---------------------------|--|---------------------|---------------------------------|
| American Beaver | <i>Castor canadensis</i> | | Wetland |
| American Crow | <i>Corvus brachyrhynchos</i> | | all |
| American Goldfinch | <i>Spinus tristis</i> | | Uplands, Island |
| American Kestrel | <i>Falco sparverius</i> | | Uplands, Island |
| American Robin | <i>Turdus migratorius</i> | X | Uplands Island, Fencerow |
| Anna's Hummingbird | <i>Calypte anna</i> | X | all |
| Bald Eagle | <i>Haliaeetus leucocephalus</i> | | Uplands, Wetland, Island |
| Barn Swallow | <i>Hirundo rustica</i> | | Forage over site |
| Belted-kingfisher | <i>Megaceryle alcyon</i> | | Wetland, Island |
| Bewick's Wren | <i>Thryomanes bewickii</i> | | Fencerow |
| Black-capped Chickadee | <i>Poecile atricapillus</i> | | Fencerow |
| Black-tailed Deer | <i>Odocoileus hemionus</i> | | Uplands, Wetland |
| Brown-headed Cowbird | <i>Molothrus ater</i> | | Fencerow |
| Bumblebee sp. | <i>Bombus sp.</i> | | Uplands |
| California Groundsquirrel | <i>Otospermophilus beecheyi</i> | x | all |
| California Quail | <i>Calipepla californica</i> | x | Island, Uplands |
| California Scrub Jay | <i>Aphelocoma californica</i> | | Uplands, Island and Fencerow |
| California Sealion | <i>Zalophus californianus</i> | | BAEA attracted by their fishing |
| Canada Goose | <i>Branta canadensis</i> | x | Uplands, Wetland, Island |
| Cedar Waxwing | <i>Bombycilla cedrorum</i> | | Fencerow |
| Cliff Swallow | <i>Petrochelidon pyrrhonota</i> | | Forage over site |
| Common Merganser | <i>Mergus merganser</i> | | Wetland |
| Coyote | <i>Canis latrans</i> | | all |
| Dark-eyed Junco (Oregon) | <i>Junco hyemalis</i> | | Fencerow |
| Double-crested Cormorant | <i>Phalacrocorax auritus</i> | | Wetland |
| Downy Woodpecker | <i>Picoides pubescens</i> | | Fencerow |
| Eurasian Collared Dove | <i>Streptopelia decaocto</i> | | Fencerow |
| European Starling | <i>Sturnus vulgaris</i> | | all |
| Flycatcher | <i>Empidonax sp.</i> | | Wetland |
| Garter Snake | <i>Thamnophis sp.</i> | | N. Upland |
| Great-blue Heron | <i>Ardea herodias</i> | | Wetland |
| Harbor Seal | <i>Phoca vitulina</i> | | near shore |
| Hooded Merganser | <i>Lophodytes cucullatus</i> | | Wetland |
| House Finch | <i>Haemorhousus mexicanus</i> | | Fencerow |
| House Sparrow | <i>Passer domesticus</i> | | Fencerow |
| Killdeer | <i>Charadrius vociferus</i> | x | Uplands, Wetland, Island |
| Lazuli Bunting | <i>Passerina amoena</i> | | N. Upland |

Table 2. Species Observed Linnton Mill Restoration Site 12/22/21 - 9/13/22

| Species observed | Scientific Name | Nest on site | Areas seen on site |
|-------------------------|-----------------------------------|---------------------|---------------------------------------|
| Lesser Goldfinch | <i>Spinus psaltria</i> | | Uplands, Fencerow |
| Mallard | <i>Anas platyrhynchos</i> | | Wetland |
| Mourning Dove | <i>Zenaida macroura</i> | x | Uplands, Fencerow |
| N. Rough-winged Swallow | <i>Stelgidopteryx serripennis</i> | | Forage over site |
| Northern Flicker | <i>Colaptes auratus</i> | | Uplands, Fencerow |
| Osprey | <i>Pandion haliaetus</i> | | Wetland, Upland |
| Pacific Chorus Frog | <i>Pseudacris regilla</i> | | Wetland |
| Pied-billed Grebe | <i>Podilymbus podiceps</i> | | Wetland |
| Red-tailed Hawk | <i>Buteo jamaicensis</i> | | Uplands, Island, Fencerow |
| Red-winged Blackbird | <i>Agelaius phoeniceus</i> | | Island |
| River otter | <i>Lontra canadensis</i> | | River shore tracks |
| Ruby-crowned Kinglet | <i>Regulus calendula</i> | | Fencerow |
| Savannah Sparrow | <i>Passerculus sandwichensis</i> | | Uplands |
| Song Sparrow | <i>Melospiza melodia</i> | x | Uplands, Fencerow |
| Spotted Sandpiper | <i>Actitis macularius</i> | x | Wetland |
| Spotted Towhee | <i>Pipilo maculatus</i> | | Fencerow |
| Stellar's Jay | <i>Cyanocitta stelleri</i> | | Fencerow |
| Sturgeon sp | <i>Acipenser transmontanus</i> | | caught by sealion, bits eaten by BAEA |
| Tree Swallow | <i>Tachycineta bicolor</i> | | Forage over site |
| Turkey Vulture | <i>Cathartes aura</i> | | N. Upland |
| Turtle | <i>turtle</i> | | Wetland |
| Vaux's Swift | <i>Chaetura vauxi</i> | | Forage over site |
| Violet-green Swallow | <i>Tachycineta thalassina</i> | | Forage over site |
| Western Kingbird | <i>Tyrannus verticalis</i> | | N. Upland |
| Western Tanager | <i>Piranga ludoviciana</i> | | Fencerow |
| Western Wood-Pewee | <i>Contopus sordidulus</i> | | Fencerow |
| White-crowned Sparrow | <i>Zonotrichia leucophrys</i> | x | Uplands |
| Yellow Warbler | <i>Setophaga petechia</i> | | Wetland |
| Orange-crowned Warbler | <i>Vermivora celata</i> | | Fencerow |

ATTACHMENT 8. CREDIT LEDGER

Linnton Water Credits - Credit Ledger

12/16/2022

| Credit Type | Max Approved | Credits Released to Date | | Credits Currently Available | | Credits Sold to Date | |
|-------------------------|---------------|--------------------------|--------------|-----------------------------|--------------|----------------------|--------------|
| | | | 404 Approved | | 404 Approved | | 404 Approved |
| NRD Only | 148.91 | 147.81 | | 47.22 | | 100.59 | |
| Dual-Purpose Riverine | 216.10 | 52.35 | 43.22 | 50.34 | 41.21 | 2.01 | 2.01 |
| Dual-Purpose Palustrine | 137.50 | 52.34 | 27.5 | 52.34 | 27.5 | 0 | 0 |
| Total | 502.51 | 252.5 | 70.72 | 149.9 | 68.71 | 102.6 | 2.01 |

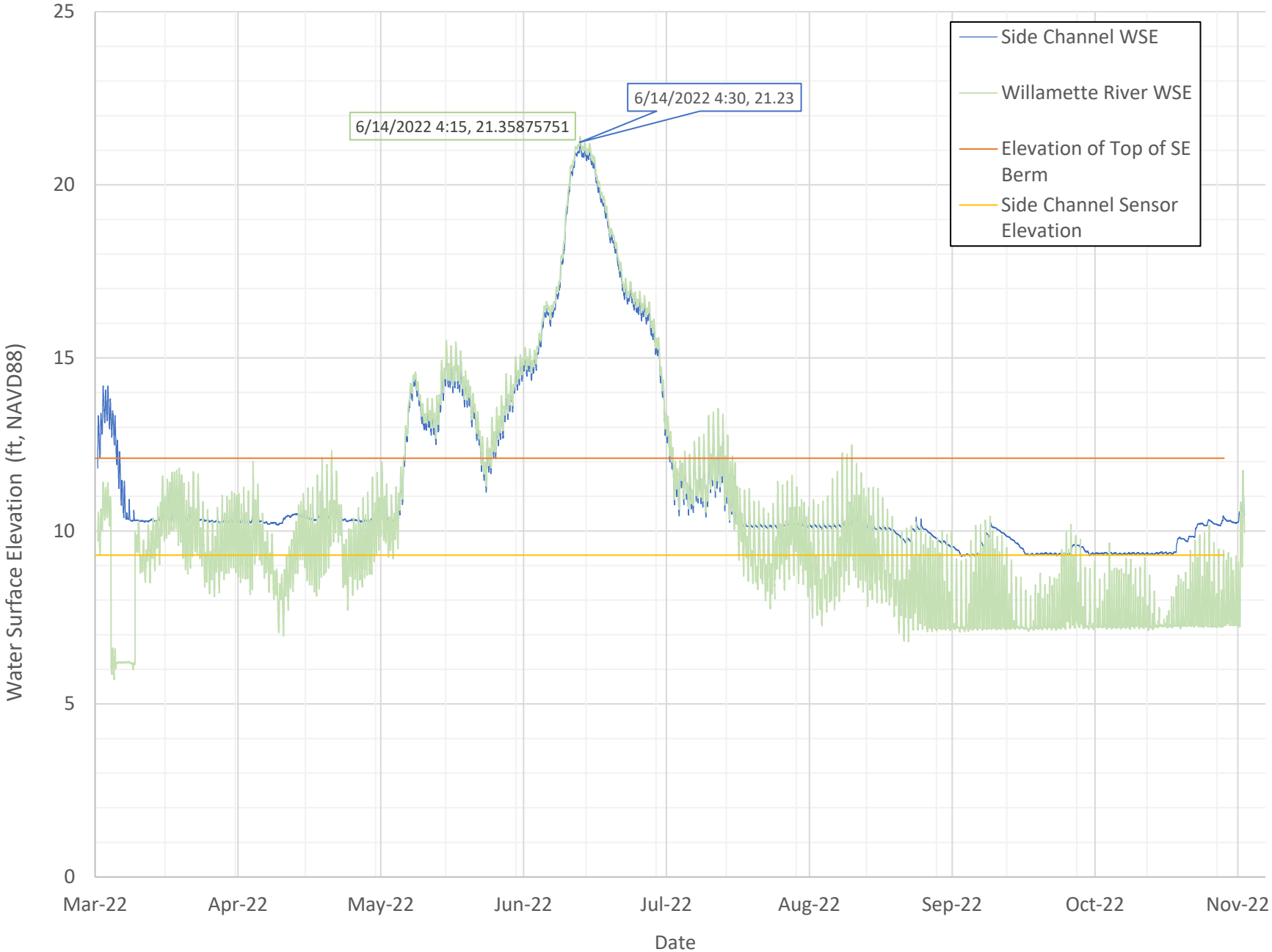
| Date | Transaction Type (Release/ Sale/ Deduction) | Credit Type | Serial No. | Purchaser/Permittee | Purchaser Address/ Phone/Permit No. | Credit Reduced | Credit Add | Notes |
|------------|---|-------------------------|---|-----------------------|---|----------------|------------|---|
| 5/1/2019 | Release | NRD-Only | LWC-NRD-001 through LWC-NRD-077(.62) | - | - | - | 76.62 | Release 1 - 4/25/19 letter from Portland Harbor NRD Trustee Council authorizing Release 1; 15% of the total. 404 credits not approved yet |
| 5/2/2019 | Sale | NRD-Only | LWC-NRD-001 through LWC-NRD-077(.62) | - | - | 76.62 | - | Sale of all available NRD single-purpose credits |
| 8/20/2020 | Release | NRD-Only | LWC-NRD-077 (.38) through LWC-NRD-147.81 | - | - | - | 79.48 | Release 2 - 8/20/20 letter from Portland Harbor NRD Trustee Council authorizing Release 2; 35% of the total, NRD serial numbers adjusted to reflect the November 2020 updated total from Trustee Council and "adjustments" below. 404 credits not approved yet. |
| 8/20/2020 | Release | Dual-Purpose Riverine | LWC-Riverine-001 through LWC-Riverine-042.21 | - | - | - | 42.21 | |
| 8/20/2020 | Release | Dual-Purpose Palustrine | LWC-Palustrine-001 through LWC-Palustrine-042.22 | - | - | - | 42.22 | |
| 8/27/2020 | Sale | NRD-Only | LWC-NRD-077 (.38) through LWC-NRD-099 | - | - | 22.38 | - | Sale of remainder of 99 single-purpose credits per agreement dated 7/31/2018 |
| 10/8/2020 | Sale | NRD-Only | LWC-NRD-099 through LWC-NRD-099 (.75) | Foss Maritime Company | 9030 NW St. Helens Rd, Portland OR, 97231 | 0.75 | - | Sale of flood storage volume for Land Use Review number LUR 20-195001 GW AD, per agreement dated 8/30/20. |
| 11/2/2020 | Adjustment | NRD-Only | N/A | (MRFSCV) | - | 8.29 | - | Adjusts relative allocation to three credit categories to match final total credits approved by Trustees' modified revised forecast settlement credit value (502.51), dated 11/2/20, and leaving the previous dual-purpose credit estimates unchanged. Final adjustment of relative totals to occur following MBI approval of dual-purpose credit totals. |
| 11/2/2020 | Release | Dual-Purpose Riverine | LWC-Riverine-042.21 through LWC-Riverine-052.35 | (MRFSCV) | - | - | 10.14 | |
| 11/2/2020 | Release | Dual-Purpose Palustrine | LWC-Palustrine-042.22 through LWC-Palustrine-052.34 | (MRFSCV) | - | - | 10.12 | |
| 4/8/2021 | Sale | NRD-Only | LWC-NRD-099.75 through LWC-NRD-100.35 | Port of Portland | - | 0.6 | - | |
| 10/20/2021 | Sale | NRD-Only | LWC-NRD-100.35 through LWC-NRD-100.45 | NW Natural | - | 0.1 | - | Sale of flood storage volume for Land Use Review number LUR 20-195001 GW |
| 9/30/2021 | Release | Dual-Purpose Riverine | LWC-Riverine-001 through LWC-Riverine-043.22 | - | - | - | 43.22 | September 30, 2021 letters from DSL and Army Corps releasing a total of 70.72 dual-purpose credits |
| 9/30/2021 | Adjustment | Dual-Purpose Riverine | - | - | - | 43.22 | - | Adjustment used to account for dual approval ledger calculation |

Linnton Water Credits - Credit Ledger

| Date | Transaction Type (Release/ Sale/ Deduction) | Credit Type | Serial No. | Purchaser/Permittee | Purchaser Address/ Phone/Permit No. | Credit Reduced | Credit Add | Notes |
|------------|---|-------------------------|--|----------------------------|--|-------------------|------------|--|
| 9/30/2021 | Release | Dual-Purpose Palustrine | LWC-Palustrine-001 through LWC-Palustrine-027.50 | - | - | | 27.5 | September 30, 2021 letters from DSL and Army Corps releasing a total of 70.72 dual-purpose credits |
| 9/30/2021 | Adjustment | Dual-Purpose Palustrine | - | - | - | 27.5 | | Adjustment used to account for dual approval ledger calculation |
| 10/14/2021 | Sale | Dual-Purpose Riverine | LWC-Riverine-001 through LWC-Riverine-002 | SeaPort Midstream Partners | - | 2 | | DSL Permit #60800-RF, NWP-2006-946-3, HUC 1709001203 |
| 12/29/2021 | Sale | NRD-Only | LWC-NRD-100.45 through LWC-NRD-100.58 | Northwest Natural | | 0.13 | | Sale of flood storage volume for City of Portland permit number PR 18-257210 |
| 3/1/2022 | Sale | NRD-Only | LWC-NRD-100.58 through LWC-NRD-100.59 | Northwest Natural | | 0.01 | | Sale of flood storage volume for City of Portland permit number PR 18-257210 |
| 8/8/2022 | Sale | Dual-Purpose Riverine | LWC-Riverine | Philips 66 Company | | 0.01 | | DSL Permit #63706, Portland Terminal Maintenance Project, 10 square feet of fill |

ATTACHMENT 9. WATER SURFACE ELEVATIONS

Attachment 9. Water surface elevations for two probes at the Linnton Mill Restoration Site.



ATTACHMENT 10. BIRD MONITORING RESULTS

Attachment 10. Year 3 (2022) Bird Monitoring Results

| Species Common Name | Total Individuals | Survey Date | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|-------------------|-------------|----------|----------|--------|---------|---------|---------|--------|---------|---------|---------|--------|---------|---------|---------|--------|--------|---------|---------|---------|---------|--------|--------|--|
| | | 12/17/21 | 12/22/21 | 12/29/21 | 1/8/22 | 1/14/22 | 1/21/22 | 1/25/22 | 2/5/22 | 2/10/22 | 2/17/22 | 2/24/22 | 3/4/22 | 3/11/22 | 3/18/22 | 3/22/22 | 4/3/22 | 4/8/22 | 4/15/22 | 4/18/22 | 4/19/22 | 4/22/22 | 5/3/22 | 5/7/22 | |
| American Crow | 164 | 12 | | | | | 30 | | 22 | | 65 | 4 | | 1 | | 1 | 1 | 1 | 4 | | | 3 | 3 | | |
| American Goldfinch | 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| American Kestrel | 24 | | | | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | | 1 | 1 | 1 | 1 | | | 1 | | 1 | |
| American Robin | 16 | | | | | | | | | | | | 1 | 1 | 1 | | 1 | 1 | | | | | | | |
| Anna's Hummingbird | 3 | | | | | | 1 | | | | | | 1 | | | | | | | | | | | | |
| Bald Eagle | 66 | | | | 2 | | 1 | 2 | 2 | 3 | 3 | 3 | 2 | | 1 | 2 | 2 | 1 | | | | 3 | 2 | 3 | |
| Barn Swallow | 90 | | | | | | | | | | | | | | | | 15 | | | | | | 10 | | |
| Belted-kingfisher | 21 | 1 | 1 | | 1 | 1 | 1 | | 1 | 1 | | | | 1 | 1 | 2 | | | | | | 1 | | | |
| Bewick's Wren | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Black-capped Chickadee | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Brown-headed Cowbird | 2 | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| California Quail | 12 | | | | | | | | 1 | | | 1 | | | | | | 1 | | | | | | | |
| California Scrub Jay | 7 | | 1 | | | | 1 | | 1 | | | | | | 1 | | | | | | | | | | |
| Canada Goose | 773 | 20 | 20 | 60 | 110 | | 75 | | 20 | 50 | 30 | 4 | | 2 | 7 | 20 | 60 | 3 | 3 | 96 | | | | | |
| Cedar Waxwing | 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cliff Swallow | 28 | | | | | | | | | | | | | | | | | | | | | | | | |
| Common Merganser | 19 | 1 | | | 10 | | | | | | | | | | 5 | 2 | | | | | | | | | |
| Dark-eyed Junco (Oregon) | 12 | | | 10 | 1 | | | | 1 | | | | | | | | | | | | | | | | |
| Double-crested Cormorant | 5 | | | | 3 | | | | | | | | 1 | | | | | | | | | | | | |
| Downy Woodpecker | 1 | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Eurasian Collared Dove | 5 | | | | | 2 | | | | | | | | | | | 2 | | | | | | | | |
| European Starling | 134 | | | | | | 40 | | 10 | | | 15 | 4 | | | 20 | 1 | | | | | 4 | 1 | | |
| Flycatcher sp | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Great-blue Heron | 14 | | | | 1 | | | | | | 1 | | | | | | | 1 | | | | 1 | | 1 | |
| Hooded Merganser | 4 | | | | | | 2 | | | | | | | | | 2 | | | | | | | | | |
| House Finch | 2 | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| House Sparrow | 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| House Wren | 1 | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| Killdeer | 85 | | | 3 | | | 1 | | 5 | 8 | 6 | 2 | 4 | 5 | 2 | 2 | 2 | 3 | 2 | 1 | | 1 | 3 | 1 | |

| Species Common Name | Total Individuals | Survey Date | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|-------------------|-------------|----------|----------|--------|---------|---------|---------|--------|---------|---------|---------|--------|---------|---------|---------|--------|--------|---------|---------|---------|---------|--------|--------|--|--|
| | | 12/17/21 | 12/22/21 | 12/29/21 | 1/8/22 | 1/14/22 | 1/21/22 | 1/25/22 | 2/5/22 | 2/10/22 | 2/17/22 | 2/24/22 | 3/4/22 | 3/11/22 | 3/18/22 | 3/22/22 | 4/3/22 | 4/8/22 | 4/15/22 | 4/18/22 | 4/19/22 | 4/22/22 | 5/3/22 | 5/7/22 | | |
| Lazuli Bunting | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lesser Goldfinch | 2 | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| Mallard | 83 | 7 | | 5 | | 6 | 4 | | | 7 | | 12 | | 10 | 3 | 5 | 2 | 2 | | | | 1 | 2 | 2 | | |
| Mourning Dove | 4 | | | | | | | | | | | | 1 | | | | | | | | | | 2 | | | |
| N. Rough-winged Swallow | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Northern Flicker | 56 | 5 | | 3 | 1 | 1 | 9 | | 7 | 2 | | 3 | 2 | 5 | | 2 | 2 | 1 | | | | 1 | 2 | 1 | | |
| Orange-crowned Warbler | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Osprey | 11 | | | | | | | | | | | | | | | 2 | 2 | 1 | | | | | | 1 | | |
| Pied-billed Grebe | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Red-tailed Hawk | 15 | 1 | | 1 | | | | 2 | | | | | | | | 1 | | | | | | | 1 | 2 | | |
| Red-winged Blackbird | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ruby-crowned Kinglet | 5 | | | 3 | | 1 | | | 1 | | | | | | | | | | | | | | | | | |
| Savannah Sparrow | 7 | | | | | | | | | | | | | | | | 2 | | | | | | | | | |
| Song Sparrow | 35 | | 1 | 8 | | 1 | | | 1 | 1 | | | 1 | 2 | | | 2 | 1 | 1 | | | 1 | 2 | | | |
| Spotted Sandpiper | 31 | | | | | | | | | 1 | | 1 | | 1 | | 2 | | | 1 | | | | 2 | 1 | | |
| Spotted Towhee | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stellars Jay | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tree Swallow | 20 | | | | | | | | | | | | | | | | | | | | | | 10 | | | |
| Turkey Vulture | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vaux's Swift | 70 | | | | | | | | | | | | | | | | | | | | | | | 20 | | |
| Violet-green Swallow | 200 | | | | | | | | | | | | | | 50 | | 15 | 50 | | | | | 10 | 10 | | |
| Western Kingbird | 2 | | | | | | | | | | | | | | | | | | | | | | | 2 | | |
| Western Tanager | 1 | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| Western Tanager | 1 | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| Western Wood-Pewee | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| White-crowned Sparrow | 33 | | | | | | | | | | | | | | | | 2 | | 2 | 1 | | 1 | 3 | 1 | | |
| Yellow Warbler | 1 | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| Total Individuals | 2096 | 40 | 30 | 88 | 134 | 6 | 170 | 9 | 73 | 68 | 113 | 34 | 30 | 22 | 78 | 59 | 117 | 66 | 19 | 98 | 0 | 20 | 54 | 49 | | |

Attachment 10. Year 3 (2022) Bird Mor

| Species Common Name | Total Individuals | Survey Date | | | | | | | | | | | | | | | | | | | | |
|--------------------------|-------------------|-------------|---------|---------|---------|--------|--------|---------|---------|---------|---------|--------|--------|---------|---------|---------|--------|--------|---------|---------|--------|---------|
| | | 5/13/22 | 5/16/22 | 5/20/22 | 5/27/22 | 6/2/22 | 6/5/22 | 6/10/22 | 6/17/22 | 6/22/22 | 6/26/22 | 7/2/22 | 7/6/22 | 7/13/22 | 7/21/22 | 7/27/22 | 8/3/22 | 8/9/22 | 8/18/22 | 8/22/22 | 9/7/22 | 9/13/22 |
| American Crow | 164 | 2 | | | | | | | | | 4 | | 1 | 1 | | 3 | 4 | 2 | | | | |
| American Goldfinch | 4 | | | | | | | | | | | | 4 | | | | | | | | | |
| American Kestrel | 24 | | | 1 | | | 1 | | | | | | | 1 | | 1 | | 1 | | | | 1 |
| American Robin | 16 | | | | | | | | 1 | | | 1 | 1 | | | 6 | | 1 | | | 1 | |
| Anna's Hummingbird | 3 | | | | | | | | | | | | | | | | | | | | 1 | |
| Bald Eagle | 66 | 2 | 4 | 3 | 4 | | 3 | | 3 | | 3 | 2 | 1 | 2 | 1 | 3 | 1 | 2 | | | | |
| Barn Swallow | 90 | | | 10 | | | 5 | 20 | 10 | | | | 2 | | 1 | | 5 | | 3 | 5 | 4 | |
| Belted-kingfisher | 21 | | | 1 | | | 1 | | | | | | 1 | | | | | 2 | | 2 | | 2 |
| Bewick's Wren | 2 | | | | | | | | | | | | | | | | | | 1 | 1 | | |
| Black-capped Chickadee | 2 | | | | | | | | | | | | 1 | | | | | | 1 | | | |
| Brown-headed Cowbird | 2 | | | | | | | | | | | | 1 | | | | | | | | | |
| California Quail | 12 | | | | 1 | | | 1 | 1 | | 1 | 1 | | | | | | | | 4 | | |
| California Scrub Jay | 7 | | | | | | | 1 | | | | | | | | | | | | | 1 | 1 |
| Canada Goose | 773 | 2 | | 4 | 13 | | 50 | 30 | 11 | | 11 | | 15 | 15 | 4 | | 4 | | | | 4 | 30 |
| Cedar Waxwing | 4 | | | 1 | | | | | | | | | | | | | | | 1 | 1 | | |
| Cliff Swallow | 28 | | | | | | | | 5 | | | | 10 | | 10 | | 3 | | | | | |
| Common Merganser | 19 | | | | | | | | | | | | 1 | | | | | | | | | |
| Dark-eyed Junco (Oregon) | 12 | | | | | | | | | | | | | | | | | | | | | |
| Double-crested Cormorant | 5 | | | | | | 1 | | | | | | | | | | | | | | | |
| Downy Woodpecker | 1 | | | | | | | | | | | | | | | | | | | | | |
| Eurasian Collared Dove | 5 | | | | | | | | | | | | | | 1 | | | | | | | |
| European Starling | 134 | 1 | | 1 | 15 | | 1 | 10 | 8 | | | | | | 1 | | 2 | | | | | |
| Flycatcher sp | 1 | | | | | | | | | | | | | | | | | | | | 1 | |
| Great-blue Heron | 14 | | | | | | 1 | 1 | 1 | | | | 1 | 1 | | | 1 | 1 | 1 | 1 | | |
| Hooded Merganser | 4 | | | | | | | | | | | | | | | | | | | | | |
| House Finch | 2 | | | | | | | | | | | | | | | | 1 | | | | | |
| House Sparrow | 6 | 1 | | 3 | | | | | | | | | | 1 | | | | | | | | |
| House Wren | 1 | | | | | | | | | | | | | | | | | | | | | |
| Killdeer | 85 | 1 | | 2 | 1 | | 1 | 3 | 1 | | 1 | 2 | 7 | 2 | 1 | 1 | 2 | | 2 | 2 | 4 | 1 |

| Species Common Name | Total Individuals | Survey Date | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|-------------------|-------------|---------|---------|---------|--------|--------|---------|---------|---------|---------|--------|--------|---------|---------|---------|--------|--------|---------|---------|--------|---------|--|
| | | 5/13/22 | 5/16/22 | 5/20/22 | 5/27/22 | 6/2/22 | 6/5/22 | 6/10/22 | 6/17/22 | 6/22/22 | 6/26/22 | 7/2/22 | 7/6/22 | 7/13/22 | 7/21/22 | 7/27/22 | 8/3/22 | 8/9/22 | 8/18/22 | 8/22/22 | 9/7/22 | 9/13/22 | |
| Lazuli Bunting | 1 | | | | | | | | | | | 1 | | | | | | | | | | | |
| Lesser Goldfinch | 2 | | | | | | | 1 | | | | | | | | | | | | | | | |
| Mallard | 83 | | | 2 | | 2 | 3 | 1 | | 1 | 1 | | | | | | 1 | | 4 | | | | |
| Mourning Dove | 4 | | | | | | 1 | | | | | | | | | | | | | | | | |
| N. Rough-winged Swallow | 1 | | | | | | 1 | | | | | | | | | | | | | | | | |
| Northern Flicker | 56 | | 1 | | | | | | | | 1 | | 3 | 1 | 1 | | | 1 | 1 | | | | |
| Orange-crowned Warbler | 1 | | | | | | | | | 1 | | | | | | | | | | | | | |
| Osprey | 11 | 1 | | 1 | | 1 | | | | | | 1 | | | 1 | | | | | | | | |
| Pied-billed Grebe | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Red-tailed Hawk | 15 | 2 | 1 | | | | | | | | 1 | | | | 1 | 1 | | 1 | | | | | |
| Red-winged Blackbird | 2 | | | | | | | | | 2 | | | | | | | | | | | | | |
| Ruby-crowned Kinglet | 5 | | | | | | | | | | | | | | | | | | | | | | |
| Savannah Sparrow | 7 | | | 4 | | | | 1 | | | | | | | | | | | | | | | |
| Song Sparrow | 35 | | 1 | | | 1 | 1 | 1 | | 3 | 1 | 1 | 1 | 1 | | 1 | | 1 | | | | | |
| Spotted Sandpiper | 31 | | 1 | 2 | | 1 | 1 | 2 | | 3 | 2 | 2 | 2 | 4 | | | | 1 | | | | 1 | |
| Spotted Towhee | 2 | | | | | | | 1 | | | | | 1 | | | | | | | | | | |
| Stellars Jay | 1 | | | | | | | | | | | | | | | | | 1 | | | | | |
| Tree Swallow | 20 | | | | | | | 10 | | | | | | | | | | | | | | | |
| Turkey Vulture | 1 | | 1 | | | | | | | | | | | | | | | | | | | | |
| Vaux's Swift | 70 | 5 | | | | 5 | 2 | | 5 | 20 | | 5 | 3 | | 5 | | | | | | | | |
| Violet-green Swallow | 200 | 10 | 8 | | | 5 | 10 | | 5 | 20 | | | 2 | | 5 | | | | | | | | |
| Western Kingbird | 2 | | | | | | | | | | | | | | | | | | | | | | |
| Western Tanager | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Western Tanager | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Western Wood-Pewee | 2 | | | | | | 1 | | 1 | | | | | | | | | | | | | | |
| White-crowned Sparrow | 33 | 1 | 2 | 2 | | 2 | 1 | 1 | | 2 | 2 | 3 | 1 | 1 | | 1 | 1 | 2 | 1 | | | | |
| Yellow Warbler | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Total Individuals | 2096 | 28 | 4 | 41 | 45 | 0 | 81 | 75 | 71 | 0 | 43 | 71 | 33 | 51 | 22 | 15 | 34 | 12 | 24 | 25 | 39 | 5 | |