5875

YEAR 5 (2024) MONITORING REPORT

Linnton Mill Restoration Site

DECEMBER 2024

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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 5 (2024) performance monitoring at the Linnton Mill Restoration Site (Site). This report covers the period between November 2023 and November 2024.

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, Attachment 1). The Site was designed to provide off-channel and cold water refugia habitat 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). Seeding occurred in late 2019, and 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 4 monitoring were met. Table 1 presents a summary of elements monitored during 2024 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:		4.1.3
• No physical conditions that prevent fish access to the OCH	• YES	
• OCH channel gradient < 4% slope	• YES	
• Jump heights will not exceed 6 inches.	• YES	
• The Linnton Creek culvert discharge 11/1-6/30	• YES	
• Linnton Creek thalweg remain wetted during low water.	• YES	
A10. Presence of at least 80% LWD	• YES	4.1.4

Hydrology and Hydraulics		
B1. Area of 50% inundation within 20% of as-built condition.	• YES	4.2.1
Vegetation*		
Riparian/Upland Forested • C8. ≥ 1,200 native woody stems per acre. • C9. ≥ 3 native tree species and 5 native shrub species. • C10. Cover: o ≥ 10% native herbaceous o ≤ 30% invasive herbaceous	 • YES (5,450) • YES (14 and 25) o YES (65.2%) o YES (1.9%)	4.3.1
Off-Channel Shrub • C11. ≥ 1,200 native woody stems per acre. • C12. ≥ 5 native shrub species • C13. Cover: o ≥ 10% native herbaceous o ≤ 30% invasive herbaceous	 • YES (17,866) • YES (6 and 8) o YES (90.3%) o YES (0.6%)	4.3.2
Off-Channel Emergent • C14. ≥ 5 native emergent/herbaceous species. • C15. Cover: o ≥ 30% native herbaceous o ≤10% invasive herbaceous	 • Yes (44) o YES (109.0%) o YES (0.9%)	4.3.3
Water Quality	**Dissolved Oxygen and Temperature**	4.4
Fish and Wildlife (No Performance Standards)		
• Fish presence and use of the site		4.5.1
• Bald eagle monitoring and avian use of the site o Yes, bald eagles observed perching, foraging, and bathing on Site. • Mink presence and use of site Observations of wildlife included in Attachments 6, 7, 8, and 9		4.5.2 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 5 monitoring requirements.

Table 2. Monitoring questions, performance standards, monitoring schedule, and monitoring methods applicable for Year 5

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)? Is the total quantity of Off-Channel and ACM habitat that was created being retained over time? Are the fish able to enter and exit the site? Are habitat elements being retained on site? Have the performance standards been met? If so, is the site ready to move into the long-term stewardship phase?	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
	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. 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.						X	A9. Visual survey, longitudinal profile
	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 ≥18" diameter and ≥30' length.						X	A10. Visual survey
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): • ≥ 10% native herbaceous • ≤ 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): • ≥ 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): • ≥ 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 5. 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 and 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 (Attachment 2) 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 the OCH and ACM

To detect changes in elevation within the Off-Channel and ACM habitats, elevation data derived from the 2024 topographic survey described above were compared to 2020 and 2022 (Years 1 and 3, 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

In previous years, gradients were measured using the topographic survey described above to ensure the Linnton Creek channel gradient does not exceed 4% slope. Elevations in the OCH are monitored along transects to develop the cross sections in Attachment 2. In 2024, an additional transect line was surveyed along the OCH thalweg to produce a longitudinal profile shown in Attachment 2, Figure 4. The transect lines and longitudinal profile will be conducted every year moving forward to determine percent slope.

Jump heights were assessed through the longitudinal profile, as well as through a low-tide visual survey, looking for any vertical drops greater than 15 centimeters (~6 inches). In addition to jump heights, RestorCap conducted an investigation into the potential for fish to get stranded in the upstream OCH during low water, when the upstream area becomes hydrologically disconnected from the downstream OCH. The investigation included as review of scientific literature, analysis of water level, temperature, and dissolved oxygen data from our on-site loggers, topographic surveys, fish survey data, and visual observations. This data was presented in the Fish Passage Memorandum provided to the Trustee Council and IRT in 2024.

Several time-lapse cameras were used to supplement survey data. One was already stationed at each of the inlets, upstream and downstream. A third time-lapse camera was installed on a habitat structure in the middle of the OCH facing upstream toward the

"speed bump", a high point between the upstream and downstream OCH. The intention of this camera was to monitor the area that may hinder egress out of the upstream portion of the OCH, just south of the Linnton Creek confluence, due to elevational differences in the channel. However, partway through the year, so much vegetation grew over the thalweg in this area that the camera does not show when the water cuts off. Rather, it shows higher levels of inundation at this location.

A temperature and depth logger were also placed in the side channel and compared to the Willamette River gauge at the Morrison Street bridge, to collect data on habitat conditions for fish. Unfortunately, the side channel logger was lost before the end of the year, so some data is missing. The side channel logger was reported as lost in March, likely from being buried under sediment in the OCH. New loggers were installed. One at the confluence of Linnton Creek and one in the upstream portion of the OCH, known as the "South Island" 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. The Linnton Creek thalweg/channel downstream of the 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 provided supplemental flow data between visual inspections.

To continue refining our topographic monitoring of the Site, four new transect lines were added at the outlet of the OCH and are numbered L2, M2, N2, and O2. Additionally, LiDAR was flown over the OCH during low tide to create a digital surface elevation model to compare to data collected the previous year.

3.1.4 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 3.1.1.

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 the 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 (listed[1]) 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).

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 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 counts were recorded by species for all trees and shrubs within a 5-meter radius circle. Per a request from the Trustee Council in 2023, stem counts were changed to an individual plant count to account for survivability comparison between years. In areas with high densities of woody vegetation, individuals were pin flagged prior to conducting the stem count tally to ensure that plants were not double counted. Additionally, absolute cover of herbaceous species was sampled at two 1-square-meter plots within the 5-meter-radius circle. The two 1-square meter plots are randomly placed diagonally from one another, with the monitoring post acting as the central point of the quadrant. For the herbaceous species cover analysis, cover was averaged by species between the two plots and then converted into the cover classes listed above using the Daubenmire cover class method.

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 each shrub plot and was assigned cover classes using the Daubenmire cover class method.

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

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

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 in 2022 to capture diversity and cover of vegetation within the southern portion of the OCH and compensate for the five plots that have generally been bare due to their locations on the beach and within the portion of the OCH influenced by daily tidal fluctuations. The added plot (l1-l2B) is highlighted in the attached vegetation tables.

3.4 Water Quality Monitoring

Water temperature was measured using water level data loggers installed at the Site, one near the downstream mouth of the OCH, one at the confluence of Linnton Creek ("side channel"), and one within the at the upstream end of the OCH ("south island") (Figure 8). The loggers also recorded water levels. For 2024, the side channel and south island loggers were installed in March, after discovering that the original side channel logger had been lost under sediment. 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 June. 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 vegetation, as well as Linnton Creek. Seines were not used due to risk of collecting more than one salmonid in a net set, and surpassing permitted take limits.

3.5.2 Bird Assemblage Monitoring

Bird monitoring was completed by Pacific Habitat Services, Incorporated. Per a request from the Trustee Council, bird assemblage monitoring occurred three times during the breeding season. Three surveys were conducted along five preestablished transect lines that are spaced approximately 100 meters apart and run perpendicular to the Willamette River and through all habitat types present on Site (Figure 6). Point count surveys are recorded every 50 meters down each transect line. All species heard and observed within 50 meters of the sample point were recorded, along with behavior and use of habitat features onsite.

Bald Eagle (*Haliaeetus leucocephalus*) surveys were scheduled weekly through December. Surveys included two hours of observations at three vantage points (North, South, Mid) located onsite (Figure 7). Bald Eagle presence/absence, abundance, behavior, age class, habitat element use, and time of use were 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. Three camera traps were established to record wildlife and potential use by American mink (*Neovison vison;* Attachment 1, Figure 8). One

trap included a camera situated at the end of a tunnel with crawfish oil to attract mink. Another camera was placed in a floating mink box facing the entrance into the box. The floating box was placed and anchored down in the southern portion of the OCH and would rise and fall with the water surface elevations. Crawfish oil was also placed inside of the box near the entrance. The last camera was set up on a habitat structure on the shoreline near the OCH outlet. Logs were stacked in front of the camera to create a habitat structure for mink. The locations of mink cameras were adjusted to account for water level fluctuations and wildlife activity observed at each.

4. Results

4.1 Geomorphic Monitoring

4.1.1 A6: Total Area of OCH and ACM

Results from the topographic survey indicate there has been an approximately 0.02% 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; profile cross sections are included in Attachment 2 (Figure 3). 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	2023 to 2024	2020 to 2024	Transect	2023 to 2024	2020 to 2024	Transect	2023 to 2024	2020 to 2024	Transect	2023 to 2024	2020 to 2024
	% Change			% Change			% Change			% Change	
A	NA	NA	K[3]	+1	-3	U[4]	+2	+5	AE[1]	0	-3
B	+3	+1	L[3]	0	0	V[4]	+1	+2	AF[1]	-1	-4
C	+2	0	M	+2	+5	W[4]	+1	+3	AG	-1	-2
D	0	-3	N	+1	+10	X	0	+3	AH	+1	+4
E	+1	-2	O	+1	+4	Y	-2	-1	AI	0	-2
F	+3	0	P	0	+2	Z	-2	-1	AJ[2]	+1	-2
G	-2	-8	Q	-1	+1	AA	-3	-1	AK[2]	-3	-4
H[3]	-1	-5	R[4]	-1	+1	AB	+1	+1	AL[2]	-1	-2
I[3]	0	-4	S[4]	0	+2	AC	+6	+11			
J[3]	-1	-7	T[4]	-1	+2	AD[1]	-1	-5			

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

4.1.3 A9: Fish Access

Based on visual surveys and the longitudinal profile (Attachment 2, Figure 4), no permanent physical conditions (*i.e.,* no jump heights above 15 cm) exist that prevent fish

access to the OCH via the downstream connection, north of the island. In recent months, a beaver has been constructing a dam in the upstream OCH immediately upstream of the Linnton Creek confluence, and the height relative to the thalweg was measured to be 0.74 feet (8.88 inches, 23 cm) during the Waterways topographic surveys (Attachment 2, Figure 4). The crest of the dam was measured at 11.04 feet (NAVD88) elevation. Although this appears to exceed the jump height performance standard, juvenile chinook do not need to jump over beaver dams to pass them. They are known to pass through partial breaches, shallow overflows, or by moving through the dam via submerged interstitial spaces. Additionally, research suggests that beaver dams are unlikely to pose a barrier to juvenile chinook below 24 inches in height (Pollock et al., 2003). Therefore, **this portion of the performance standard is met**.

The upstream inlet of the OCH is periodically blocked by a sand berm when water levels in the Willamette do not exceed the berm height. Based on the topographic surveys (Attachment 2, Figure 3), the elevation of the apex of the berm is approximately 13 ft, an increase from 12.6 ft in 2023. Based on probe data, the average water surface elevation in the side channel south of the island was approximately 10.04 ft (measured March 19-November 27, 2024), down from 11.34 ft last year (measured from January 1-October 5, 2023). The average water surface elevation in the Willamette immediately downstream of the OCH was 7.93 over the entire data set (January 1 – October 2, 2024), and 9.61 during the peak migration window. The average water surface elevation for the side channel and south island were 9.65 and 10.04 respectively between March 19 and November 27, and 9.92 and 10.64 respectively during the peak migration window. All averages are notably lower than previous years. Data on water surface elevation was only collected through October 2, 2024 for the Willamette River gage, and between March 19 and November 27, 2024 for the Side Channel and South Island gages.

As it was a low water year, percent exceedances of water surface elevations were lower than previous years. The berm at the south inlet was overtopped 13 out of the 276 days when data was recovered. The beaver dam was not present during peak migration, so there is insufficient data to determine exceedances; however, the dam was overtopped during our last site visit in December 2024. Percent exceedances for the lowest points along each topographic transect are provided below. Water surface elevation charts are presented in Attachment 11.

Table 4. Percent of the time that water surface elevations exceeded elevations of the thalweg within the OCH. Data taken between March 19 and November 27, 2024.

Transect:	Low Elevation:	Percent Exceeded:
L2	3.82	100
L	6.56	100
M2	7.97	100
M	8.60	100
N2	8.98	100
N	9.24	90
O2	8.75	100
O	8.42	100
P	7.81	100
Q	8.10	100
R	8.05	100

S	8.48	100
T	8.57	100
U	9.84	22
V	9.89	21
W	9.62	28
X	9.72	25
Y	9.66	26
Z	9.87	22
AA	9.54	31
AB	9.09	97
AC	9.15	96

Site visits throughout the year and monthly DO and temperature monitoring indicate that Linnton Creek was flowing every month of the year and remains connected to the Willamette River, allowing ingress and egress for fish beyond the required window (see Section 4.3). DO and temperature readings are done once a month, so they do not reflect daily conditions in these systems. However, RestorCap conducts visual observations each month to confirm. Photographs of the OCH and Linnton Creek are included in Attachment 3. Linnton Creek flowed continuously throughout the November 1 through June 30 window, thus **this portion of the performance standard was met.**

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

4.2 Hydrology and Hydraulics

4.2.1 B1: 50% Inundation Level

Based on the topographic data, there has been an approximately 0.8% increase in the area below the 50% inundation elevation (Attachment 2, Figure 2). This standard requires less than 20% deviation from the as-built, thus, this performance **standard was met.**

4.3 Vegetation Monitoring

RestorCap biologists conducted 2024 vegetation monitoring for herbaceous cover on June 15-16 in the riparian/upland forested habitat, and on September 14-15 in scrub-shrub/emergent habitats. Stem counts were collected on July 1-3 in the riparian/upland forested habitat, and on September 23-25 in the scrub-shrub/emergent habitats. Results are presented below by habitat planting zone. The methodology for counting stems was consistent to last year's monitoring where each individual plant counts as one stem. This methodology was approved by the Trustee Council.

4.3.1 Riparian / Upland Forested Habitat

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

C8: Native Stem Density

Based on data collected at 32 forested plots, approximately 5,450 native stems per acre were recorded. The C8 performance standard requires at least 1,200 native stems per acre[2], thus, this performance **standard was met**. Per plot, stem counts ranged from 6 to 1435 stems, with an average of 103 stems.

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, 39 native woody species were identified, 14 tree and 25 shrub species; thus, this performance **standard was met.**

Table 5. Average cover for herbaceous plots within Riparian/Upland Forested habitat

Category		Habitat Average	Standard Error
Cover of Native Herbaceous Species		**65.2**	**6.5**
	Lower CI (80%)	56.9	
	Upper CI (80%)	73.6	
Cover of Invasive Herbaceous Species		**1.9**	**0.7**
	Lower CI (80%)	1.0	
	Upper CI (80%)	2.8	
Cover of Non-Native Herbaceous Species		**7.0**	**1.6**
	Lower CI (80%)	5.0	
	Upper CI (80%)	9.1	
Cover of Native Shrubs and Trees in Herbaceous Plots		**11.4**	**3.2**
	Lower CI (80%)	7.3	
	Upper CI (80%)	15.5	
Cover of Bare Ground and Moss		**36.5**	**4.6**
	Lower CI (80%)	30.6	
	Upper CI (80%)	42.3	

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

C10: Herbaceous Cover

Calculated native herbaceous cover within the 64 forested plots constitutes approximately 65.2% (80% CI 56.9, 73.6), a decrease from 66.6% in 2022. Six invasive species were detected in the monitoring plots, wild carrot (*Daucus carota*), catsear (*Hypochaeris radicata*), bird's foot trefoil (*Lotus corniculatus*), pennyroyal (*Mentha pulegium*), reed canarygrass (*Phalaris arundinacea*), and Himalayan blackberry (*Rubus discolor*). An additional 19 non-native, non-listed species were observed within these plots (Attachment 4). The Site saw a reduction in invasive and non-native species cover, dropping from 6.2% to 1.9% and 17.2% to 11.4%, respectively. Plots within the forested zone exceed 10% native herbaceous cover and have less than 30% invasive weed cover, therefore **standard C10 was met.**

Percent cover and percent frequency of individual species are included in the attached data tables. While not required, this information provides insight into natural recruitment, species richness, and species diversity within the sampled plots. Three herbaceous species had a cover above 5% and were present in more than 40% of the plots. The most widespread herbaceous species was yarrow (*Achillea millefolium*) as it was found in 59.4% of the monitoring plots. Roemer's Fescue (*Festuca roemeri*) and bentgrass (*Agrostis exarata*) were both found in over 50% of the monitoring plots in the riparian/upland forested monitoring plots.

4.3.2 Scrub-Shrub Habitat

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

C11: Native Stem Density

Based on data collected at 16 plots, the average native stems per plot was 125, totaling approximately 17,866 stems per acre (Attachment 4). The C11 performance standard requires at least 1,200 native stems per acre[3], thus, this performance **standard was met.**

Table 6. Average cover for herbaceous plots within Scrub-Shrub habitat

Category		Habitat Average	Standard Error
Cover of Native Herbaceous Species		**90.3**	**17.1**
	Lower CI (80%)	68.4	
	Upper CI (80%)	112.2	
Cover of Invasive Herbaceous Species		**0.6**	**0.3**
	Lower CI (80%)	0.3	
	Upper CI (80%)	1.0	
Cover of Non-Native Herbaceous Species		**25.5**	**6.6**
	Lower CI (80%)	17.0	
	Upper CI (80%)	33.9	
Cover of Bare Ground and Moss		**42.3**	**7.2**
	Lower CI (80%)	33.1	
	Upper CI (80%)	51.6	
Cover of Native Trees and Shrubs		**37.8**	**6.8**
	Lower CI (80%)	29.1	
	Upper CI (80%)	46.6	
Average Weighted Prevalence Index (All Strata)		**4.8**	

C12: Native Species Diversity

Diversity within the scrub-shrub zone requires at least five native shrub species. In total, 14 native woody species were identified, six tree and eight shrub species; thus, this performance **standard was met.**

C13: Herbaceous Cover

Native herbaceous vegetation average cover was approximately 90.3% (80% CI 68.4, 112.2), a decrease from last year's average of 105.6%. Four native herbaceous species had a percent cover above 5% and were present in more than 25% of the plots. Tufted hairgrass (*Deschampsia cespitosa*) was the most prevalent native herbaceous species on site with a cover of 9.4% and occurred in 43.8% of the monitoring plots. Spanish clover (*Acmispon americanus*), slough sedge (*Carex obnupta*), and common rush (*Juncus patens*) also had a percent cover greater than 5% in the herbaceous monitoring plots within the scrub-shrub zone.

Within these plots, four invasive species were detected: yellow flag iris (*Iris psuedacorus*), prickly lettuce (*Lactuca serriola*), birds foot trefoil, and water purslane (*Lythrum portula*). Invasive species cover was 0.6% (80% CI 0.6, 0.3), a significant reduction from 12.3% in 2023. The Site did see an increase in non-native cover from 19.7% in 2023 to 25.5% in 2024.

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

4.3.3 Emergent Habitat

Summary statistics for emergent plots are included in Table 7 below; full tables of data are included in Attachment 4.

Table 7. Average cover for herbaceous plots within Off-Channel Emergent habitat

Category		Habitat Average	Standard Error
Cover of Native Herbaceous Species		**109.0**	**16.7**
	Lower CI (80%)	87.6	
	Upper CI (80%)	130.5	
Cover of Invasive Herbaceous Species		**0.9**	**0.7**
	Lower CI (80%)	0.0	
	Upper CI (80%)	1.7	
Cover of Non-Native Herbaceous Species		**5.5**	**2.3**
	Lower CI (80%)	2.6	
	Upper CI (80%)	8.5	
Cover of Bare Ground and Moss		**47.9**	**7.7**
	Lower CI (80%)	38.0	
	Upper CI (80%)	57.8	
Cover of Native Shrubs and Trees in Herbaceous Plots		**3.0**	**2.7**
	Lower CI (80%)	-0.4	
	Upper CI (80%)	6.5	
Average Weighted Prevalence Index		**3.0**	
Count of Native Herbaceous Species		**44**	

C14: At least five native emergent/herbaceous species

Within the emergent zone, 44 native herbaceous species were observed. The most common species was ovate spikerush (*Eleocharis ovata)* with 23.2% cover within this zone and occurred in 52.2% of the monitoring plots. Six native herbaceous species had 5% cover and were present in more than 15% of the plots: nodding beggar's tick (*Bidens cernua*), wrinkle-seed pygmyweed (*Crassula aquatica*), ovate spikerush, Nutall's waterweed (*Elodea nuttallii*), rice cutgrass (*Leersia oryzoides*), and water purslane (*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 109% (80% CI 87.6, 130.5), a slight increase from 2023 (102.7%). Invasive species cover decrease from 6.2% (80% CI 0.6, 7.9) in 2023 to 0.9% (80% CI 2.5, 9.9) with one invasive species present within plots: water purslane. Non-native cover increased from 4.7% in 2023 to 5.5%. 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 8 and 9, respectively. Dissolved oxygen samples are taken once a month, at roughly the same time and location each month. The samples are collected at high tide levels. When little water is present at the sample locations, a sample is taken as close to the original location as possible. It is important to note that if no flow in was recorded it does not necessarily mean that there was no flow for the entirety of each month. DO readings for the months of March and April are notably low compared to historical data. The contractor noted that after April's readings, they did a complete overhaul on equipment due to consistently low readings which justified replacement. Following the installation of the new equipment, DO readings returned to expected levels. This suggests that the low readings are a result of the meter being miscalibrated or damaged.

Temperature readings are taken onsite every 15 minutes by loggers. Following 2023, there were two water loggers present onsite. The locations included the upstream portion of the OCH near the berm (south island) and the mudflat near the downstream outlet of the OCH (Willamette River). RestorCap, in partnership with Waterways, decided to relocate the south island logger to the downstream alcove of the OCH to better capture temperature and WSE data representative of the side channel. However, on March 19, 2024, Waterways could not locate the relocated logger, suspecting it was buried under sediment shifting within the OCH. In response, two new loggers were installed: one at the confluence of Linnton Creek and another at the original south island location. Consequently, no data was collected at these two locations during January and February of this year. Temperature data revealed that the side channel near Linnton Creek's confluence was cooler than the Willamette River, except in March. Meanwhile, the ponded area's temperatures were higher, as expected, due to the absence of cold-water inputs and generally lower WSE. Weekly average temperatures in the OCH can be found in Attachment 5.

No performance standard was established for this parameter.

Table 8. Monthly average temperatures (°F).

Test Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Willamette River	44.2	46.6	47.5	53.5	57.3	65.4	74.6	73.2	68.2	63.7	45.0
Side Channel (Linnton Confluence)	*	*	48.3	50.0	54.9	63.6	69.8	66.8	63.1	55.5	49.6
South Island (Ponded Area)	*	*	56.2	59.2	60.6	69.1	77.1	74.5	65.5	56.2	50.2

*Loggers lost or buried. No data recorded.

Monthly dissolved oxygen readings are reported in Table 9. Readings were recorded in mg/L.

Table 9. Monthly dissolved oxygen (mg/L) measurements at six testing locations.

Test Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Upstream Willamette	13.0	12.4	4.7*	5.9*	10.8	10.0	11.0	10.8	9.7	10.0	10.5
NE Portion of Inlet (South Is.)	11.0	10.3	3.4*	6.2*	9.3	8.5	9.1	NF	NF	7.5	7.9
Linnton Creek Outfall	8.76	11.2	3.7*	5.2*	9.8	7.8	9.6	6.9	8.5	8.8	9.9
Inlet NW of Island (North Is.)	10.5	11.0	4.0*	4.5*	11.2	9.5	10.9	14.9	15.4	8.4	9.2
Unnamed Creek Outfall	NF	14.4	4.5*	6.3*	10.4	NF	NF	NF	NF	NF	NF
Downstream Willamette	10.0	13.0	4.3*	6.0*	11.0	9.8	11.0	10.7	9.1	9.1	10.7

NF = No Flow
*DO reader likely miscalibrated or damaged leading to inaccurate data.

4.5 Fish and Wildlife Monitoring

Incidental observations of wildlife are included in Attachment 6; results of the various required surveys are reported below.

4.5.1 Fish Surveys

The initial scope (February through May) for the performance standard had to be shifted due to undesirable survey conditions, particularly for the months of February and March. Therefore, five surveys were conducted between April and June. The accompanying report is included as Attachment 7. High and low water levels 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 10.

Table 10. Results of fish surveying during 2024

Survey Date	Method	Result	Size Information
April 26, 2024	Visual/Video	50-100 unidentified minnows	-
	Visual/Video	1 salmonid (steelhead)	Post spawn adult
	Snorkel	30-40 unidentified fish	-
May 10, 2024	Visual/Video	50-100 unidentified minnows	-
	Visual/Video	1 salmonid (mortality)	Post spawn adult
	Snorkel	2 salmonids (Chinook)	Juvenile

	Snorkel	15 stickleback	-
	Snorkel	40 unidentified minnows	-
May 24, 2024	Snorkel	2 salmonids (1 mortality-predation)	juvenile
	Snorkel	200 minnows (nonnative)	Juvenile
	Snorkel	20 stickleback	-
	Snorkel	15 sculpin	-
	Visual/Video	40-50 unidentified minnows	-
	Visual/Video	1 potential salmonid (parr marks not clear)	Juvenile
June 13, 2024	Snorkel	100-150 minnows	Juvenile
	Snorkel	13 stickleback	-
	Snorkel	5 sculpin	-
	Visual/Video	2 salmonid (chinook)	Juvenile
	Visual/Video	2 smallmouth bass	~8 inches
June 25, 2024	Snorkel	>300 minnows	Juvenile

4.5.2 Bird Assemblage Monitoring

The breeding bird surveys indicate that a total of 34 species were detected for the three surveying periods. This is an increase from the 32 species that were observed during last year's survey. Survey results show that 16 species were confirmed to be nesting and/or rearing young based on their behavior and/or the presence of nests. Birds were observed utilizing habitat structures and vegetation in all three habitat zones (upland/riparian forested, scrub/shrub, and emergent) present on site. Cliff swallow (*Petrochelidon pyrrhonota*) was the most prevalent species during the monitoring period with 44 observations, accounting for a relative species abundance of 13.8%. White-crowned sparrow (*Zonotrichi leucophrys*) was the only other species to have a relative abundance greater than 10% at 12.2%. Five species had a relative abundance greater than 5%. These species include barn swallow (*Hirundo rustica*), Canada goose (*Branta canadensis*), European starling (*Sturnus vulgaris*), Vaux's swift (*Chaetura vauxi*), and violet-green sparrow (*tahycineta thalassina).* Species richness and utilization increased on Site in 2024 likely due to the increase in food and habitat opportunities provided by vegetation in all three habitat zones. The vegetation, in conjunction with habitat structures, also provide cover that is essential for evading predators. For a more detailed analysis on the breeding bird surveys, see Attachment 8.

Bald Eagle Surveys were conducted onsite weekly, from February 16 through August 29, 2024. Out of 28 surveys, one or more bald eagles were observed onsite for 7, accounting for 25% of the surveys. Additionally, bald eagles were observed in the vicinity of the Site during 18 surveys, accounting for 64% of the total surveys. The most utilized feature onsite was the cluster of black cottonwoods located on the northeast corner of the Site. Other features used onsite were the log habitat structures, pilings, and snags on the island in the OCH, and the large snags on the northeastern slopes of the north hill. The bald eagles utilize these structures for perching, hunting, and eating their prey. A nesting pair of bald eagles continue to utilize the site. The nesting area is located on a ridge in Forest Park,

uphill from the Linnton. For a more detailed analysis of the bald eagle surveys, see Attachment 9.

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. Cameras captured a range of species this year including coyote (*Canis latrans*), black-tailed deer (*Odocoileus hemionus* ssp *columbianus*), California ground squirrels (*Otospermophilus beecheyi*), American deer mouse (*Peromyscus maniculatus*), and a variety of birds. Representative photographs are included in the photo appendix (Attachment 3).

5. Goals and Performance Standards

The goals and objectives 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 4 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

As the site continues to move toward equilibrium and sediment moves around in the OCH and ACM, it has only experienced a 0.02% change in area since 2020. The 0.02% 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 N and AC show the greatest accretion of sediment since 2020. At N, accretion is due to the formation of sediment bars near the outlet, and it occurred mostly after construction; accretion was limited to 1% since 2023. At AC, sedimentation appears to be occurring along the slopes of the channel rather than the thalweg, and increased by 6%since 2023. Cross sections G and J show the greatest erosion since 2020, though they only experienced 2% and 1% respectively since 2023, likely due to the implementation of erosion control adaptive management in 2023 and 2024. The remainder of the OCH has remained relatively stable since the 2023 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 occurred at transect AC, the transect that runs parallel to the sand berm and through the "ponded area" in the southern portion of the OCH. The percentage change for transect AC was 6% from 2023 to 2024. This could be a result of the adaptive management that was conducted in 2023, where sand was scraped from the berm into the ponded area. The goal of the adaptive management was to prevent stranding in that area of the OCH, thus allowing egress out into the northern portion of the OCH. Another plausible reason for the aggradation is sediment deposition from tidal fluctuations, where sediment is deposited when water levels of the OCH recede due to low tidal periods. Aggradation in the OCH also occurred at the downstream outlet and near the confluence of Linnton Creek, although small in magnitude. 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 (<3-5% in DU 1, 2-4% in DU 2, and 0-7% in DU 3), they have remained relatively stable from the survey conducted in 2023.

6.1.3 A9: Fish Access

There are no permanent, physical obstructions that prevent target fish from accessing the Site. There are no jump heights greater than six inches and the slope gradient throughout the OCH is less than 4%. Beaver dams, particularly as short as the one at Linnton, are not typically considered fish passage or jump height barriers, as juvenile chinook evolved for millennia with beavers and their associated habitat alterations. Scientific literature suggests that these structures do not significantly impede juvenile chinook movement under typical flow conditions (Kemp et al., 2012; Pollock et al., 2003). Field observations and telemetry data indicate that juvenile Chinook salmon are capable of navigating beaver dams by utilizing partial breaches, shallow overflows, or by moving through submerged sections during periods of elevated discharge (Taylor et al., 2010). Studies have found that juvenile Chinook salmon can generally navigate dams with heights up to

approximately 12–20 inches (30–50 cm) under moderate flow conditions by exploiting submerged pathways, partial breaches, or overflow areas (Kemp et al., 2012; Malison et al., 2015), and dam heights greater than 24 inches (60 cm) under low flow conditions are more likely to impede juvenile Chinook salmon (Pollock et al., 2003).

Additionally, the slow-water habitats created upstream of beaver dams may provide critical rearing environments that support growth and survival (Pollock et al., 2003; Bouwes et al., 2016). While some temporary delays in passage may occur, these are not necessarily detrimental and may be offset by the ecological benefits of habitat complexity introduced by beaver activity (Bouwes et al., 2016). Therefore, although the beaver dam exceeds the 6-inch jump height by 2.9 inches, it is likely fish do not need to jump over it to pass through. Additionally, beaver dams are temporary in nature and natural, beneficial structures in fish habitat; therefore, according to the literature, the beaver dam on site does not pose a significant fish passage or jump height barrier.

The Linnton Creek culvert discharged cold water into the OCH throughout the year. Based on performance standards, the Linnton Creek outlet must supply. Most importantly, the culvert must supply cold water from November through June, when juvenile target fish are likely present in the Willamette River. This was achieved in 2024.

In 2024, RestorCap wrote a Fish Passage Memorandum describing site conditions and potential fish passage issues. The memorandum was accepted by the Trustees and IRT, and topographic conditions in 2024 did not pose substantial, measurable fish passage issues in the OCH. It also documented the general conclusion that the upstream berm is part of the "new normal" conditions for the site. The berm continues to aggrade slowly, up 0.4 feet from 2023 (Attachment 2). It was overtopped only 13 days during the period when data was available. This reduction in days overtopped was primarily due to the low water conditions in the Willamette River this year. To a lesser degree, it may have been due to a) limited dates of data collection (March 19 – November 27), and b) the increase in height by 0.4 feet. Water surface elevations in the side channel were significantly lower than in the past 2 years. The average water surface elevation for the upstream OCH ("South Island") in 2024 was 10.04, down 1.3 ft from 2023, and down 2.52 ft from 2022. These low water levels also affect the percentage of the time that fish habitats are inundated, and it is important to note that the site's design was based on 25 years of water level data which was on average much higher than what the site experienced in 2024.

Water surface elevation data for this year showed that the fish had access to the upstream OCH from the downstream end of the channel approximately 26% of the time during peak migration months (March 19 – June 30). This was the percentage of time the Side Channel probe read >10.3 ft, the height of the high point in the thalweg. According to the Basis of Design Report (Waterways 2016), at typical water levels for the Willamette River, a 10.3-foot elevation should be inundated 70% of the time during these months. Thus, we expect the upstream OCH to be accessible closer to 70% of the time in a typical water year, which is in line with the 75% inundation connectivity design for the Site. Additionally, the upstream OCH was not intended to remain hydrologically connected to the Willamette River for the entirety of the peak outmigration period (Grette 2018b, Waterways 2016).

Juvenile salmonids can access the entire OCH, including the upper portion, via the downstream inlet. Fish were able to access the lower, downstream portion of the OCH from the Willamette River 100% of the time from at least March through June, and the central alcove 90% of the time, which is in line with the Basis of Design report. Sand bars appear to be aggrading and moving toward each other in the alcove, although aggradation

in the thalweg is limited and outflows from Linnton Creek appear to be preventing the sand bars from closing off the outlet. The high point in the downstream OCH outlet is 9.23 ft, up 0.23 ft from March 2024. The low point in the alcove upstream of the high point is 7.9 ft, a difference of 1.33 ft. As per the Fish Passage Memorandum (RestorCap 2024), this depth differential is not substantial enough to affect fish passage.

In addition to existing monitoring methods, RestorCap flew LiDAR again in November 2024, to compare to LiDAR data taken the year prior. LiDAR was flown in November during low-water conditions to provide an additional source of information for topographical analysis in the OCH. Data from 2024 was compared to the 2023 data, and a digital surface elevation model comparison map was produced (Attachment 12). The map shows areas of change since 2023, show as feet of aggradation or erosion. The map shows some aggradation at the downstream outlet, but also that the passage from Linnton Creek through to the Willamette River remains open and accessible to fish in alignment with the Basis of Design report. It shows about 3 ft of sediment moving from north to south (dark blue to dark red), indicating that the northern sandbar at the outlet is shifting positions, and changing the alignment of the thalweg. It also shows some aggradation in the upstream OCH and Linnton Creek, though this is likely reflective of the increase in vegetative cover rather than actual, substantial sedimentation in the thalweg. Because the presence of vegetation can skew LiDAR data, vegetated areas which show aggradation on LiDAR should be interpreted with caution. RestorCap cross-checked these areas with the Waterways cross section data to verify when an area had actually aggraded or whether vegetation skewed LiDAR results.

RestorCap will continue monitoring these areas and will conduct additional surveys to better understand if any impediments and stranding occur in the OCH. Adaptive management actions and recommendations are provided in Section 7.1.

6.2 Vegetation Monitoring

As described in Section 3, the methodology of vegetation monitoring was consistent with the methodology in 2023. The methodology counts individual plants in the monitoring plots as one stem, as opposed to counting all stems on each individual plant in the monitoring plot. Herbaceous vegetation monitoring in 2024 was conducted in two surveys timed to reflect the growth period of each specific habitat: riparian/upland forest and lowland scrub-shrub/herbaceous. Herbaceous vegetation monitoring was conducted from June 15-16 for the riparian/upland forested areas and September 14-15 in scrub-shrub/herbaceous areas. Stem count monitoring, not as time-sensitive as herbaceous monitoring, was conducted on July 1-3 in the riparian/upland forested habitat and on September 13-25 in the scrub-shrub/emergent habitats. There were no significant sections of die-off throughout the site. Adaptive management was conducted to remediate the erosion along the shoreline of the north hill in 2024. Cuttings, produced on site, were densely planted in this section of the site with the goal of enhancing soil stabilization along the shoreline. The establishment and success of the plantings is directly reflected in monitoring plots within this area. Forestry plots 4F and 7F saw an increase in stem count totals from 47 and 98 to 142 and 157 stems, respectively.

Black cottonwood (*Populus trichocarpa*) and willows (*Salix sp.*) continue to contribute to a large amount in seedlings within the shrub zone. Many red alder (*Alnus rubra*) seedlings were also observed within this zone. Recruits were most prevalent in the northern portion of OCH, nearest the downstream outlet. This portion of the Site experiences prolonged

periods of inundation and disturbances relative to other parts because of its proximity to the outlet, tidal fluctuations, and consistent inputs from the seep wetland and Linnton creek.

Container plants of various sizes and additional cuttings were planted throughout the Site where density (stem count) and percent cover numbers are low. The goal of this round of planting was to increase canopy cover and species richness throughout the site. Additional details of this round of planting are included in the Adapative Management section of this report, Section 7.2.

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. Generally, species richness and abundance are greater in riparian areas at lower elevations closest to the OCH. Cottonwood remains the most common woody species within these plots, accounting for approximately 53% of the total stems. In addition to cottonwood, Sitka willow (*Salix sitchensis*), snowberry *(Symphoricarpos albus)*, swamp rose (*Rosa pisocarpa*), Douglas spiraea (*Spiraea douglasii*), and Pacific willow (*Salix lasiandra var. lasiandra)* all have stem count totals greater than 100.

Succession in the upland forested habitat continues to be slow yet is still progressing. This is likely because of the nutrient-poor compacted soils and lack of shade present onsite. Qualitative observations show that quick-growing, sun-tolerant tree species like Douglas fir (*Pseudotsuga menziesii*) and yellow pine (*Pinus ponderosa*) are thriving within the upland zone. In the riparian zone and the OCH, willow species and black cottonwood are the dominant species, thus contributing to the most canopy cover. Sitka willow has an average canopy cover of 9.1% amongst the monitoring plots within this habitat. Of the shrub species, Douglas spirea has the largest average canopy cover at 3.8% within the monitoring plots. Canopy cover for the site becomes a performance standard in Year 7; however, RestorCap has been recording this metric to help understand how succession is progressing at the Site. In November, RestorCap procured and planted container plants of various sizes and species throughout the Site to supplement areas where species richness and canopy cover are low. Cuttings and poles, sourced onsite, where also planted. While succession is progressing on Site, RestorCap wants to ensure that performance standards are met by Year 7. Additional information on the supplemental planting can be found in Section 7.2 of this report.

The large Oregon white oaks (*Quercus garryana*) (3-4 in diameter at breast height; dbh) that were planted in 2021 continue to receive care from RestorCap staff, although it appears that the oaks are progressing towards establishment. RestorCap staf continued to water the Oregon white oaks, although less frequently. Mulch and compost rings were placed around the base of each of the remaining trees. Mulch rings aid in water retention near the root zones of the trees and the compost provides essential nutrients for them to grow. There was no die-off recorded this year, a significant reduction from 8 deaths in 2023. It is imperative for these Oregon white oaks to survive not only for their ecological value, but because they contributed to the cover (3-4%) in upland areas where relative cover is low. RestorCap will continue to monitor the health of these oaks and take additional measures to ensure their survival moving forward.

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. Monitoring within this zone was again conducted in late September, which has proven to be the optimal timing to identify plant species and assess cover in the scrub-shrub zone. Results show that species richness is greater in the scrub-shrub zone for monitoring plots located in the northern portion of the OCH, near the channel outlet. These plots experience greater periods of inundation than the plots in the southern portion of the OCH where the berm periodically restricts water flow from the Willamette River. Inundation in the southern portion of the OCH is restricted to when water surface elevations of the river are higher than the elevation of the berm, tidal influences, and for some plots, surface and groundwater inputs from the seep wetland.

Black cottonwood, Pacific willow, Sitka willow, and Douglas spirea are the most common woody species and account for the majority of canopy cover within this zone. Sitka willow has an average canopy cover of 25% for the monitoring plots located within this zone, followed by Pacific willow with an average canopy cover of 15.5% and Douglas spires at 14.7%.

Tufted hairgrass is the most common native species within the monitoring plots, accounting for 9.4% average cover by individual species. Other prevalent natives in this habitat include Spanish clover, slough sedge, and common rush. The site saw a drop in invasive species cover from 12.3% in 2023 to 0.6%. The drop is a testament to continued weed management regimes by RestorCap staff and the succession of native species within this habitat. Non-native cover increased to 25.5% with colonial bentgrass (*Agrostis capillaris*), creeping bentgrass (*Agrostis stolonifera*), and broadleaf plantain (*Plantago major*) being the dominant species. To remediate the spread of the non-native and invasive species, RestorCap planted additional cuttings and poles and reseeded the areas where concentrations were high. Poles and cuttings will help to shade out invasive herbaceous species, while the seed, once established, will outcompete the non-native grasses.

6.2.3 Emergent Habitat

Herbaceous emergent vegetation met both performance standards (species diversity and herbaceous cover). Data collection was conducted in mid-September which is the optimal time for the hydrophytic species to develop. Within these plots, 55 species were recorded. There were 44 native species, 1 invasive species, and 6 non-native species recorded. Native cover increased by approximately 7% from last year, and invasive cover dropped by approximately 5%. Five plots near the OCH outlet (1-2A, 12C-F) continue to have zero percent cover because of their location within the active channel margin and the sandy shorelines.

First Nation plants like, Camas (*Camasia quamash)* and broadleaf arrowhead (*Sagittaria latifolia*), continue to establish themselves throughout the emergent habitat zone.

Invasive and non-native (non-listed) species covers were low within this zone due to the ongoing mechanical removal. Water purslane (*Lythrum portula*) and broadleaf plantain were the dominant weeds, but only resulting in an at an average cover of 0.9% and 1.6%, respectively. Any invasive species that is known to regenerate through fragments were removed, including root masses, placed in contractor bags and disposed of offsite. 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% saturation[3]". Dissolved oxygen (DO) levels were monitored across multiple test locations throughout the year. Notable fluctuations occurred in early spring, particularly in March and April, where several readings (*indicated by asterisks*) were unusually low compared to the rest of the year. This trend was consistent across all monitored locations, suggesting a potential equipment calibration issue or malfunction during this period. The Linnton Creek outfall location meets this standard for February, but it fails to meet the standard for January and March-July. Based on the DO data from 2023, one could expect the DO levels for the months of March and April to be approximately 11.3 mg/L, which was the average between the two months. The inlet northwest of the island did meet this performance standard for the months of February, May, and July. One could expect this location to meet the standard for March and April, as the monthly average between the two months in 2023 was 12.5 mg/L. as this area is more consistently wet than other areas of the OCH. The southern portion of the OCH (the south side of the channel) only met this standard for the month of January. This is expected due to shallow water ponding, occasional disconnection from the rest of the channel, poor mixing, and rising temperatures in the summer months. There were many inconsistencies in the data compared to 2023. This could be a result of the time in which the samples were taken and from faulty equipment (as mentioned earlier, the contractor purchased new equipment following the April readings). Factors like water levels, tide fluctuations, turbidity, temperature, etc. could influence the DO readings. Samples are also taken once a month and only indicate what the DO levels are for the day that they were taken. Increasing the number of collections could be more representative of monthly DO levels.

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. The northern portion of the OCH (Linnton Creek confluence to the outlet) had continuous flow throughout the year, and Linnton Creek and the inlet/outlet northeast of the island maintained DO readings above 6.9 mg/L and 8.4 mg/L, respectively. Peak

[3] OAR 340-041-0016 (1)(b)

migration for juvenile salmonids is March through June. The average DO (excluding invalid readings from March and April) in the OCH (Willamette River, side channel, south island), during this window was 9.4 mg/L and the average temperature was 57.1°F. Based on historic data, RestorCap would expect the average DO readings for the peak migration to be greater than 9.4 mg/L if the readings for March and April were correct. Yet, the DO measurements are above the limits where habitat avoidance and production impairments to juvenile salmonids are known to occur. Temperature measurements during the peak salmonid migration window were well below the 68°F threshold where swimming and foraging are adversely affected. As mentioned previously, there was no data collected at the south island and side channel locations for January and February, but one would expect the temperatures to be lower than the month of March. The average temperatures for March at the south island and side channel locations were, 56.2°F and 48.3°F, respectively. For the expanded salmonid window of January to July, all temperatures were below 68°F except for the month of July when average temperature was 73.8°F. The high average temperature in the OCH during July is likely attributed to the low water levels and increased atmospheric temperatures. However, salmonids would likely not use the OCH if temperatures are high and DO are low, and instead occupy the ACM of the Willamette. Temperatures and DO were generally optimal for salmonid use of the OCH during the period from January to July.

6.4 Wildlife Monitoring

A variety of birds were documented using the Site in all three habitat communities: riparian/upland forested, scrub-shrub, and emergent. Birds were observed using the habitat structures and snags in the riparian/upland forest habitat. Bald eagles and osprey were seen perched atop the snags, loafing and presumably foraging over the Site and Willamette River. The rapid growth of vegetation in the shrub-scrub habitat provides refuge for nesting birds and an opportunity to prey on insects and larvae throughout the OCH. Birds like killdeer, spotted sandpiper, and Canada goose utilize the shoreline along the Willamette River and the emergent zones for foraging, although fewer were seen in 2024 due to vegetative growth precluding activities such as killdeer nesting. These birds also utilize the mudflats at the north inlet/outlet of the OCH at low tide conditions. The diverse habitat structure of the Site provides birds with an abundance of food and shelter for local birds or birds that are flying through on their migration routes.

Mink were not observed in 2024, and have yet to be observed at Linnton. This is likely due to the limited vegetative growth along the Willamette River, which does not provide enough cover for mink and likely discourages movement into the site. We expect that as vegetation comes in on the river banks, mink will be more encouraged to utilize habitat at Linnton.

Surveys at the Linnton Site in spring 2024 identified juvenile Chinook, native minnows, sculpin, stickleback, and non-native fish species. Juvenile salmonids were observed in May and early June, measuring approximately 60–80 mm, and are expected to rear until their ocean emigration in spring 2025. Cool water temperatures near Linnton Creek supported salmonid rearing, offering refuge from warmer, less complex habitats in the Willamette River. Survey effectiveness, particularly in the upstream OCH, was hindered by prolonged turbidity, fluctuating water levels, and vegetation/algal cover. Snorkeling was largely ineffective until May and June due to poor visibility. Due to these survey constraints, we recommend greater flexibility in future monitoring schedules to optimize survey conditions, and to consider increasing take levels to allow for seining surveys.

6.5 Shoreline Erosion

Based on topographic surveys in 2024, it appears that shoreline erosion is being addressed by seeding and pole cutting planting in 2024. Transect I is showing no erosion since pole cutting installation, which indicates a positive impact on erosion control. Transects G and H showed 2 and 1% erosion respectively, but this may have occurred before poles were established. Additionally, these represent a reduction in erosion since 2020, and we expect based on visual observations of the plantings that topographic data in 2025 will show a slowing of the erosion in this area.

6.6 Credit Ledger

A copy of the current credit ledger is included herein as Attachment 10. 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, IRT, and RestorCap will determine if ongoing monitoring or remedial action is necessary.

7.1 Off-Channel Habitat

As described in the Fish Passage Memorandum (RestorCap 2024), no adaptive management was recommended in the OCH to avoid fish stranding. No substantial fish passage issue was found, and the IRT did not receive enough justification to warrant permits to complete any associated adaptive management actions. Therefore, RestorCap will continue topographic, photographic, and LiDAR monitoring of the OCH to determine whether any future adaptive management actions are necessary to avoid fish stranding or remove impediments.

The beaver dam is not tall or developed enough to pose a threat to fish passage. Should the dam reach 24 inches or greater, RestorCap will work with the Trustees and IRT to determine the best option for adaptive management, if any is recommended. In a higher water year, adaptive management may not be necessary, even if the dam is over 24 inches. In low water years, it may be necessary to partially breach the dam, if it appears to prevent egress from the upstream OCH. At its current height and early stage of development, no adaptive management is recommended. RestorCap will visually estimate the dam height above the water level during peak migration.

RestorCap continues to monitor aggradation at both channel inlets for potential impediments to fishes accessing the OCH. The downstream inlet remains connected to the OCH year-round, even during low-water conditions, through inputs from Linnton Creek, the hillside seep, and tidal flow. At the upstream inlet of the OCH, the berm remains an impediment to fish passage for a portion of the fish window. As per our September 25, 2023 Site visit summary notes from the IRT, the OCH and ACM are highly dynamic systems which have yet to reach equilibrium. RestorCap will continue to

monitor both channel inlets using a combination of camera traps, visual inspections, water level and temperature loggers, DO monitoring, topographic surveys, and LiDAR. Additional transects were added to the yearly topographic monitoring to better understand how aggradation is impacting the inlets. This data will be the foundation to determine adaptive management strategies in the future.

Although the outlet opening appears to be maintained by a number of flow inputs, aggradation and a shifting of sand berms was observed in the LiDAR data between 2023 and 2024. To address this, RestorCap plans to complete a sediment deposition model to plan for adaptive management at the downstream inlet/outlet, should it become necessary.

7.2 Vegetation

The Site has achieved all its vegetation performance criteria in the riparian/upland forested, scrub-shrub, and emergent herbaceous habitats. Invasive species cover has dropped in all three habitat zones. Vegetation growth in the riparian/upland forested habitat remains gradual yet planting establishment and species succession are progressing steadily. The container sedges and rushes, cuttings, and poles that were planted in the OCH last year have successfully established, contributing to habitat structure, canopy complexity, and competition against non-native and invasive herbaceous species. The diversity of native cover in the herbaceous zone has increased from 21 species in 2023 to 44 species in 2024. Overall, the vegetation onsite appears to be progressing in its early successional state. RestorCap will continue to monitor the succession of the plantings throughout the Site and will propose additional plantings in areas where needed.

7.2.1 Vegetation Management

Vegetation maintenance and management activities were implemented to promote the establishment of native plantings and to suppress invasive and non-native species, ensuring compliance with Site performance standards. The Oregon white oak and Pacific madrone (*Arbutus menziesii*) plantings continued to receive supplemental irrigation during prolonged dry periods and heatwaves. Compost and mulch rings were placed around the trunks of the oaks. The compost, composed of natural amendments like redwood wood shavings, chicken manure, fir bark, bat guano, kelp meal, and alfalfa meal was applied around the trucks to enhance the condition of the soil and to slowly release organic nutrients near the root zones of the oaks. The hemlock mulch was layered over the compost to minimize evaporation and to protect the compost from solar exposure. The wells of the rings allow moisture to accumulate and gradually release in the surrounding soil. This treatment will continue in 2025.

RestorCap worked diligently to control non-native and invasive species from persisting on site. Integrated pest management methods were used including mechanical treatments (hand pulling, digging, mowing, or weed whacking), herbicide applications, or a combination of the two. In the riparian/upland forested and scrub-shrub habitats, species-specific herbicide prescriptions were used. A fabaceae-selective herbicide (Transline) prescription was used to treat birds foot trefoil, white and yellow sweetclovers (*Melilotus sp.*), vetch species (*Vicia sp.*) and other non-native pea species. A grass-selective herbicide was used to treat post emergent, annual and perennial grass weeds. This treatment was particularly used to control velvet grass (*Holcus lanatus*) populations on the south hill and in dry parts of the OCH, along with isolated reed canary grass occurrences

along the shoreline of the north hill. Nonselective herbicide prescriptions of Aquaneat (glyphosate), Garlon (triclopyr), or a combination of the two were used to hardier species like Himalayan blackberry and English ivy (*Hedera helix*), which are less responsive to weaker herbicide prescriptions and mechanical treatments. Herbicide treatments were excluded in these areas that were frequently inundated, and a minimum spray buffer of 5 feet was maintained wherever inundation was observed. Mechanical and hand removal treatments were used in inundated areas of the OCH. Hand removal techniques were most used in the scrub-shrub and emergent herbaceous habitat areas where water is present. Species controlled by hand included species like pennyroyal, trefoil, broadleaf plantain and other semi-aquatic plants. For extensive contiguous outbreaks of nonnative or invasive species, a hand-held weed scraper was utilized to remove plants and prevent seed production, effectively halting their reproductive cycle. Species capable of regenerating from fragments or residual tissue were carefully collected, sealed in contractor bags, and removed off-site following each treatment to prevent further propagation. Ongoing vegetation management will address additional occurrences, as necessary, in 2025.

7.2.2 Supplemental Planting and Seeding

Supplemental planting and seed were conducted at the Site during the month of November. The reseeding effort serves two primary objectives. The first objective is to outcompete non-native and invasive grasses and herbaceous species while enhancing native cover in areas where it is low. The Site saw an increase in the distribution of nonnative species like colonial bentgrass, creeping bentgrass, broadleaf plantain, and hawkweed (*Heracium sp.)* throughout the OCH, particularly in areas there is little to no canopy cover. Non-native grasses like velvet grass continue to pose a problem in portions of the Riparian/Upland Forested habitat. The second objective for reseeding aims to help stabilize soil and mitigate erosion along the shoreline of the north hill. Species for the reseeding effort were selected based on what is successfully established onsite, the growth structure of the species, and on the environmental and biological characteristics of the areas that need to be reseeded. Quantities for each species were determined based on the areas where the seeding will occur, and the application rates provided by the supplier of the seed. Seeding zones are mapped in Figure 9.

Table 11. Supplemental seeding species selection and application rates.

Species	Common Name:	Conditions:	App. Rate:	Procurement:
Achillea millefolium	Western yarrow	Sun to partial shade. Dry to moist soils.	2-2.5 lb/acre	16 lbs
Agrostis exarata	Spike bentgrass	Full sun. Wet to moist soils	2-2.5 lb/acre	10 lbs
Deschampsia cespitosa	Tufted hairgrass	Sun to partial shade. Wet to moist soils.	8-10 lb/acre	40 lbs
Deschampsia elongata	Slender hairgrass	Sun to partial shade. Wet to moist soils	12-15 lb/acre	30 lbs
Festuca roemeri	Roemer's fescue	Sun to partial shade. Dry soils	24-30 lb/acre	50 lbs
			Total:	**146 lbs**

Year 7 performance standard C17, C19 states that in both riparian/upland forested and scrub/shrub habitats must have a *cover greater than or equal to 55% for native woody species*. In preparation for this performance standard, RestorCap performed supplemental plantings in both habitat zones.

Cuttings were also harvested on site and planted in the scrub/shrub zone of the OCH. A diverse array of species known to establish well from cuttings was used. Species included Pacific willow, Sitka willow, Mackenzie's willow (*Salix prolixa*), Scouler willow (*Salix scouleriana*), black cottonwood, Douglas spirea, snowberry, and red osier dogwood (*Cornus stolonifera*). Cuttings of various sizes were strategically planted in large circular patterns, creating focal points for vegetative growth and habitat complexity. Branching cuttings and poles were prioritized to encourage canopy development. Smaller cuttings were planted at the center of each circle, while larger poles were positioned around the perimeter to provide shade for the central cuttings during the dry summer months. This planting technique will facilitate the establishment of vegetation clusters, promoting natural regeneration and advancing the development of a multi-story or tiered canopy structure, supporting natural, ecological succession.

For the riparian/upland forested habitat, RestorCap purchased and planted 424 container plants of various sizes, ranging from 1 gallon to 15 gallons. The species selected for the plantings was based on what has successfully established onsite, with an emphasis on quick-growing tree species. The containers were planted in areas where there was little canopy cover or where there was die-off. RestorCap staff ensured that no tree species were planted within 10 ft of preexisting trees onsite. Shrub species were planted around established trees species, as the trees will provide shade to help the plantings achieve establishment. RestorCap will continue to monitor the succession of woody cover in both riparian/upland forested and scrub/shrub habitat zones and will conduct additional supplemental planting in 2025, if the year 7 woody cover performance is not going to be achieved.

Table 12. Supplemental planting species selection

Species	Common Name:	Container	Procurement
Acer macrophyllum	Bigleaf maple	#5	14
		#3	8
Amelanchier alnifolia	Serviceberry	#5	6
Frangula purshiana	Cascara	#15	5
Holodiscus discolor	Oceanspray	#15	6
		#5	8
		#1	40
Malus fusca	Western crabapple	#5	15
		#1	40
Philadelphus lewisii	Wild mock orange	#3	50
Pinus Ponderosa	Yellow pine	#1	20
Prunus emarginata	Bitter cherry	#3	20
Prunus viginiana	Western choke cherry	#3	20
Pseudotsuga menziesii	Douglas fir	#5	19
		#1	20
Ribes sanguineum	Red flowering currant	#5	20
		#1	40

Rubus parviflorus	Thimbleberry	#5	6
		#1	40
Sambucus cerulea	Blue elderberry	#1	20
Thuja plicata	Western redcedar	#5	4
		#3	3
		Total:	**424**

7.3 Shoreline Erosion

In early 2024, RestorCap identified some erosion areas along the shoreline on the north portion of the Site. Adaptive management work was conducted on the shoreline of the north hill where erosion continues to pose a problem. The erosion is caused by the flow of the Willamette River at high water and by wave energy from ships entering and exiting the port. It may also be a result of pile removal in the ACM, where piles likely contributed to the stabilization of the shoreline along the Site. The erosion is occurring just where the shoreline curves north out of the OCH and runs parallel to the Willamette River near monitoring plot 4F. RestorCap staff conducted high density planting along this portion of the shoreline to stabilize the shoreline in these areas. Cuttings of the black cottonwood, willow species, dogwood, and Douglas spirea were planted in a 1 ft by 1 ft grid. The grid begins on the shoreline and continues up the hillside. The plantings are already showing signs of establishment in this area. RestorCap will continue to monitor this area for erosion and will plant supplemental cuttings if die-off is significant.

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ATTACHMENT 1. FIGURES

FIGURE 1

Location Map

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

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)

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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Figure 3

Topographic Monitoring Transects

Linnton Mill Restoration Site
Portland, Oregon

Linnton Bank Boundary

2024 Topographic Monitoring Results
- Decrease
- Increase
- NA
- No Change

Legend

Decision Unit Boundary
- D
- E
- H
- I

Data Source(s): RestorCap, Waterways

Base Source: © 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS
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N

0 55 110 220 Feet

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
11/30/2022 3:37 PM

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N

0 25 50 100 Feet

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)
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N

0 62.5 125 250
Feet

FIGURE 6

Bird Monitoring Transects

Legend

- Bird Monitoring Transects
- Linnton Bank Boundary

Linnton Mill Restoration Site
Portland, Oregon

Data Source(s): RestorCap, Waterways
Base Source: © 2023 Microsoft Corporation © 2023 Maxar ©CNES (2023) Distribution Airbus DS, Google
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N

0 62.5 125 250
Feet

Figure 5

Bald Eagle Survey Locations

Legend

Linnton Bank Boundary

Vantage Points

Linnton Mill Restoration Site
Portland, Oregon

Data Source(s): RestorCap, Waterways
Base Source: © 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS
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Figure 8

Wildlife, Photo, and Water Quality Monitoring Locations

Linnton Mill Restoration Site
Portland, Oregon

Legend

- Linnton Bank Boundary
- Time Lapse Cameras
- Wildlife Camera
- Photo Points
- Mink Camera Traps
- Dissolved Oxygen
- Water Surface Elevations and Temperature

Data Source(s): RestorCap, Pacific Habitat Services
Base Source: © 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS
12/14/2024 8:36 PM

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Figure 9

Supplemental Seeding Locations

Linnton Mill Restoration Site
Portland, Oregon

Data Source(s): RestorCap,
Base Source: © 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024)
Distribution Airbus DS
12/18/2024 2:35 PM

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ATTACHMENT 2. TOPOGRAPHIC MONITORING

WILLAMETTE RIVER

N

LEGEND

- 2019 RECORD SURVEY CONTOURS (5' INTERVAL)
- PRE-CONSTRUCTION SURVEY CONTOURS (5' INTERVAL)
- SURVEY CONTROL POINT
- 2024 MONITORING VEGETATION LINE
- 2020 MONITORING SURVEY OFF-CHANNEL/ACM HABITAT
- 2024 MONITORING SURVEY OFF-CHANNEL/ACM HABITAT

ANNUAL MONITORING SITE PLAN

SCALE: 1" = 120'

SECTION AND DETAIL CONVENTION

SECTION OR DETAIL IDENTIFICATION (NUMBER OR LETTER) — A / 1.3 — FIGURE REFERENCE

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.
6. YEAR 4 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN NOVEMBER 2023.
7. YEAR 5 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN NOVEMBER 2024.

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LINNTON MITIGATION PROJECT
TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2024

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

0 1"

FIGURE
1.0

WILLAMETTE RIVER

N

LEGEND

- 2019 RECORD SURVEY CONTOURS (5' INTERVAL)
- PRE-CONSTRUCTION SURVEY CONTOURS (5' INTERVAL)
- SURVEY CONTROL POINT
- 2024 MONITORING VEGETATION LINE
- 2019 RECORD SURVEY 50% INUNDATION LEVEL
- 2024 MONITORING SURVEY 50% INUNDATION LEVEL

ANNUAL MONITORING SITE PLAN

SCALE: 1" = 120'

SECTION AND DETAIL CONVENTION

SECTION OR DETAIL IDENTIFICATION (NUMBER OR LETTER) — A / 1.3 — FIGURE REFERENCE

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.
6. YEAR 4 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN NOVEMBER 2023.
6. YEAR 5 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN NOVEMBER 2024.

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TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2024

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

0 1"

FIGURE
2.0

WILLAMETTE RIVER

N

LEGEND

- 75 / 70 — 2019 RECORD SURVEY CONTOURS (5' INTERVAL)
- 75 / 70 — PRE-CONSTRUCTION SURVEY CONTOURS (5' INTERVAL)
- 1002 — SURVEY CONTROL POINT
- 2024 MONITORING VEGETATION LINE

ANNUAL MONITORING SITE PLAN

SCALE: 1" = 120'

SECTION AND DETAIL CONVENTION

SECTION OR DETAIL IDENTIFICATION (NUMBER OR LETTER) — A / 1.3 — FIGURE REFERENCE

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.
6. YEAR 4 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN NOVEMBER 2023.
7. YEAR 5 CROSS SECTION MONITORING COMPLETED BY WATERWAYS CONSULTING, INC. IN NOVEMBER 2024.

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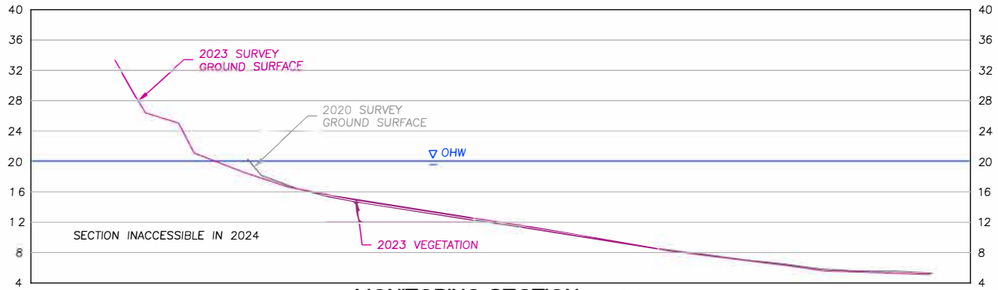
TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2024

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

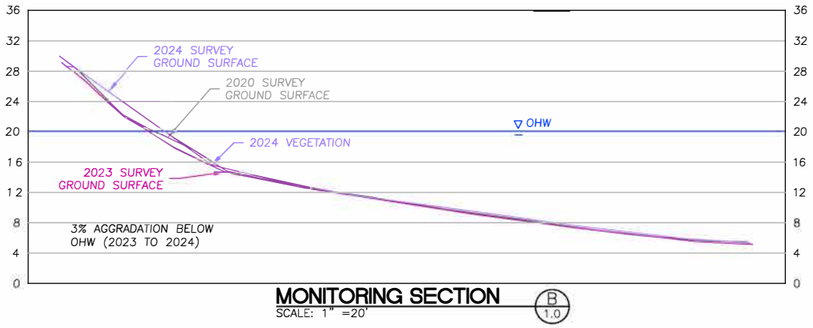
0 1"

FIGURE
3.0

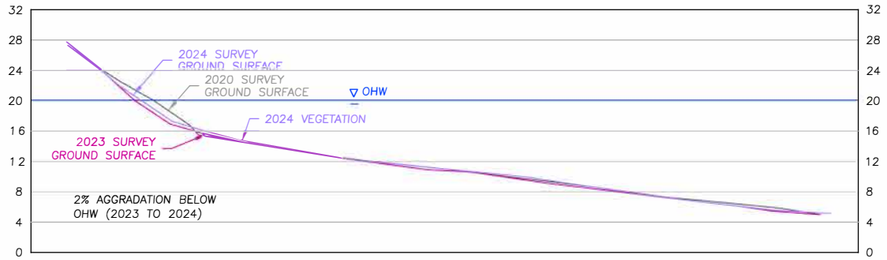
F:\Projects\15-044 Linnton Mitigation Bank\CAD\13-044_Figure-Annual Monitoring_2024.dwg — 12/16/2024 10:06 AM



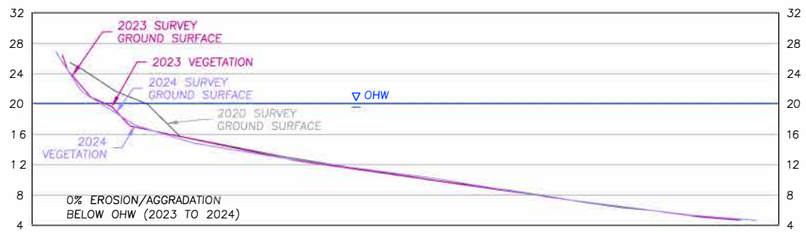
MONITORING SECTION A 1.0
SCALE: 1" = 20'



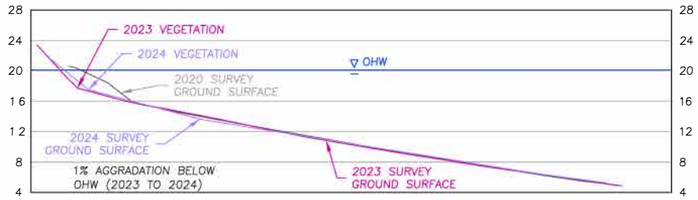
MONITORING SECTION B 1.0
SCALE: 1" =20'



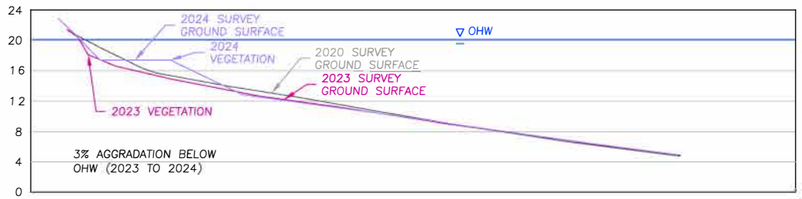
MONITORING SECTION C 1.0
SCALE: 1" = 20'



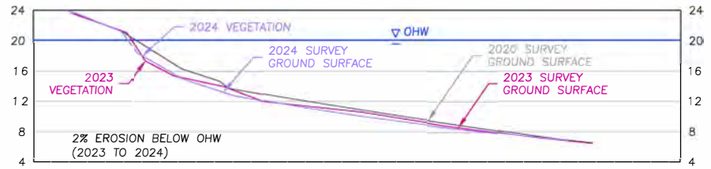
MONITORING SECTION D 1.0
SCALE: 1" = 20'



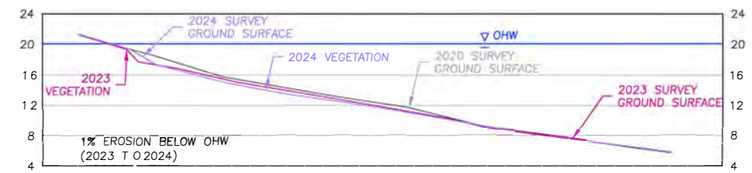
MONITORING SECTION E 1.0
SCALE: 1" = 20'



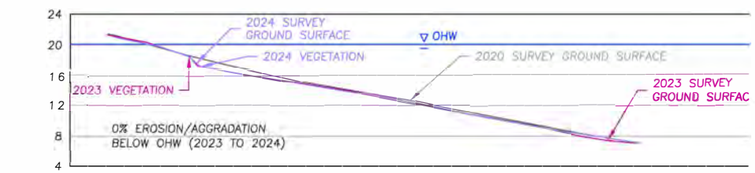
MONITORING SECTION F 1.0
SCALE: 1" = 20'



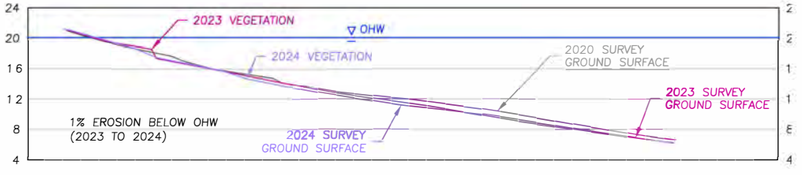
MONITORING SECTION G 1.0
SCALE: 1" = 20'



MONITORING SECTION H 1.0
SCALE: 1" = 20'



MONITORING SECTION I 1.0
SCALE: 1" = 20'



MONITORING SECTION J 1.0
SCALE: 1" = 20'

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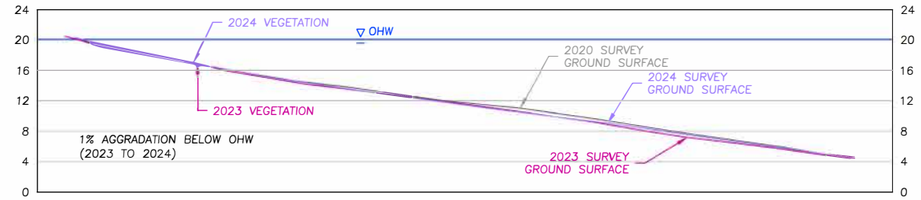
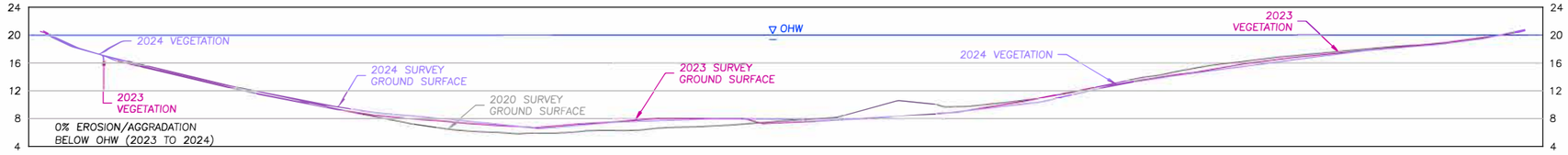
TOPOGRAPHIC CROSS SECTION MONITORING PLAN 2024

BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

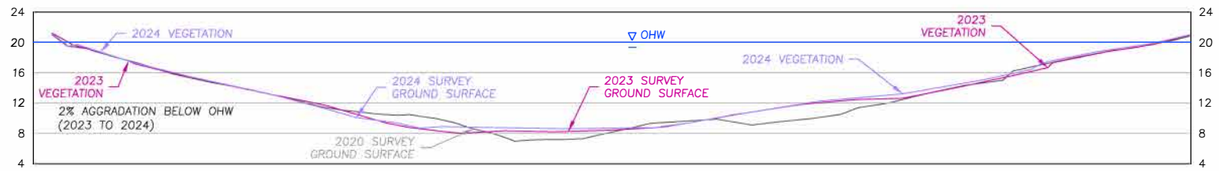
FIGURE
3.1



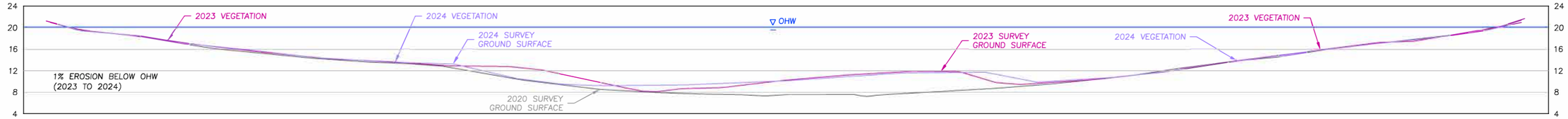
MONITORING SECTION K 1.0
SCALE: 1" = 20'



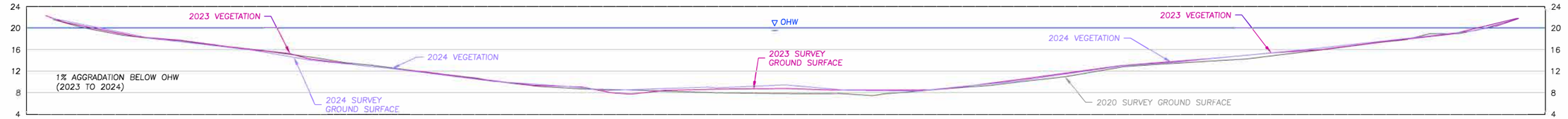
MONITORING SECTION L 1.0
SCALE HORZ: 1" = 40' VERT: 1" = 20'



MONITORING SECTION M 1.0
SCALE HORZ: 1" = 40' VERT: 1" = 20'



MONITORING SECTION N 1.0
SCALE: 1" = 20'



MONITORING SECTION O 1.0
SCALE: 1" = 20'

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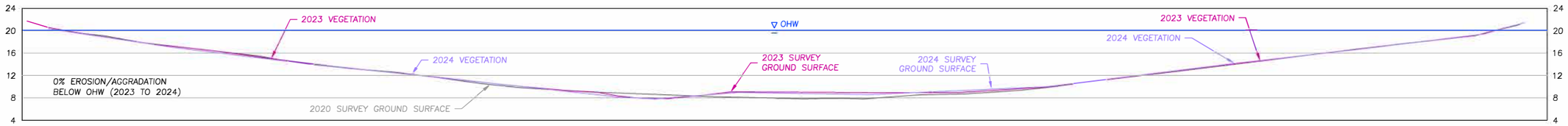
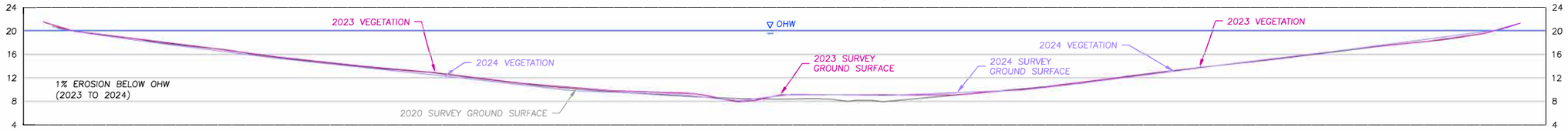
TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2024

BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

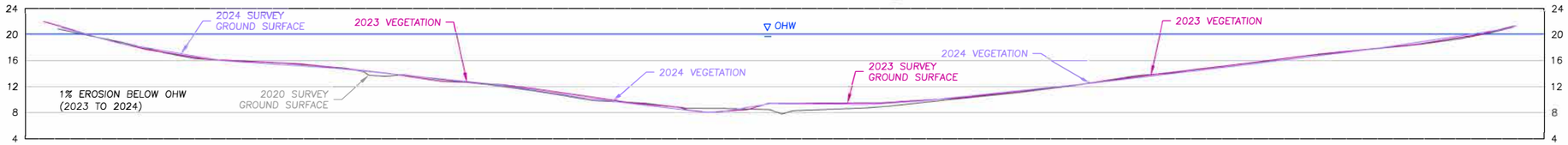
FIGURE
3.2



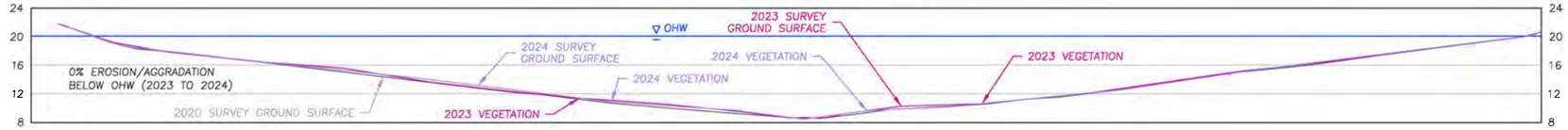
MONITORING SECTION P 1.0
SCALE: 1" = 20'



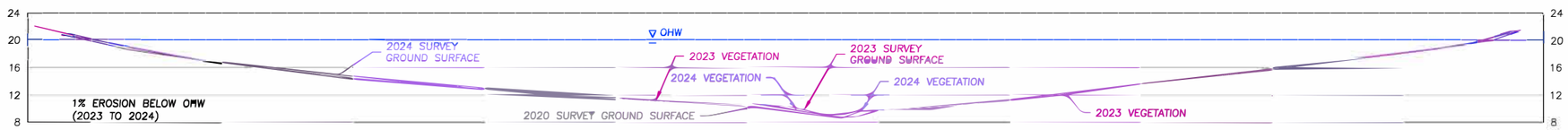
MONITORING SECTION Q 1.0
SCALE: 1" = 20'



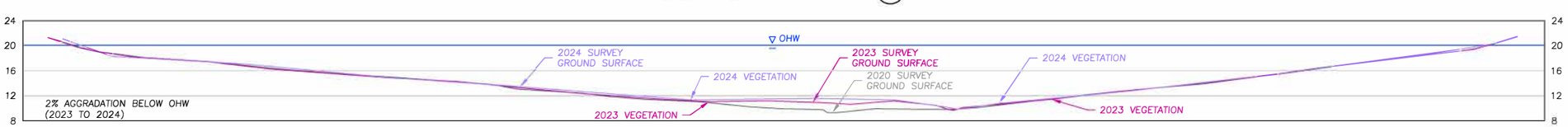
MONITORING SECTION R 1.0
SCALE: 1" = 20'



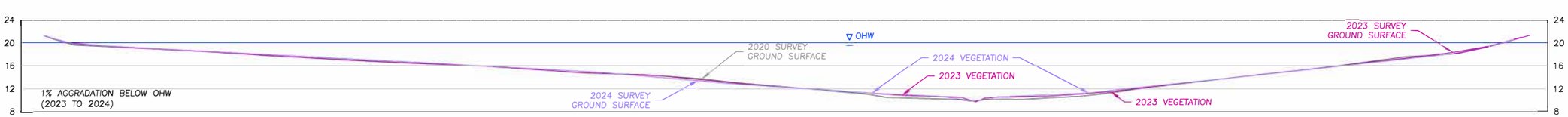
MONITORING SECTION S 1.0
SCALE: 1" = 20'



MONITORING SECTION T 1.0
SCALE: 1" = 20'



MONITORING SECTION U 1.0
SCALE: 1" = 20'



MONITORING SECTION V 1.0
SCALE: 1" = 20'

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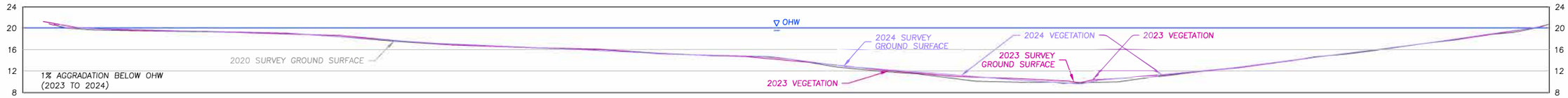
TOPOGRAPHIC CROSS SECTION MONITORING PLAN 2024

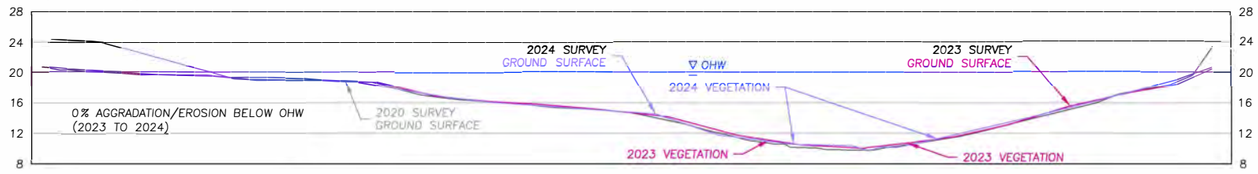
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

FIGURE
3.3

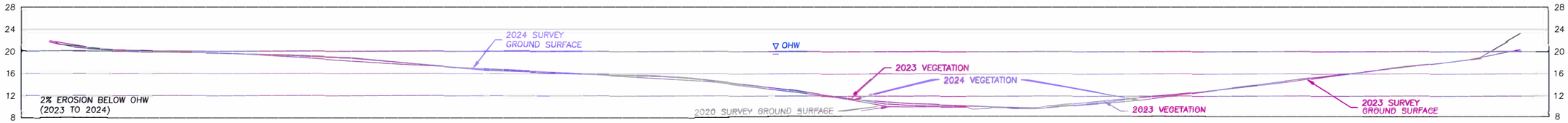
F:\Projects\13-044 Linnton Mitigation Bank\CAD\13-044_Figure-Annual Monitoring_2024.dwg — 12/16/2024 10:41 AM



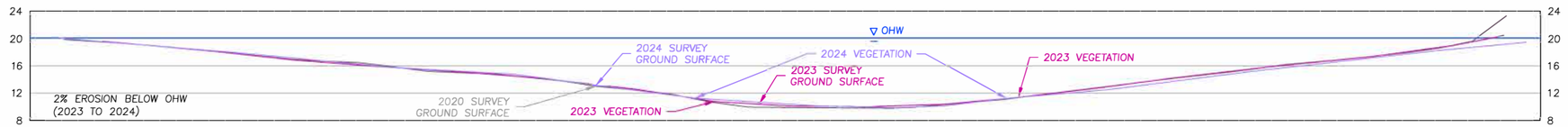
MONITORING SECTION W 1.0
SCALE: 1" = 20'



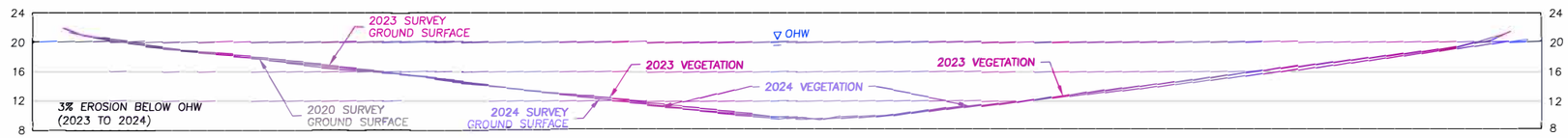
MONITORING SECTION X 1.0
HORZ SCALE: 1" = 40' VERT: 1" = 20'



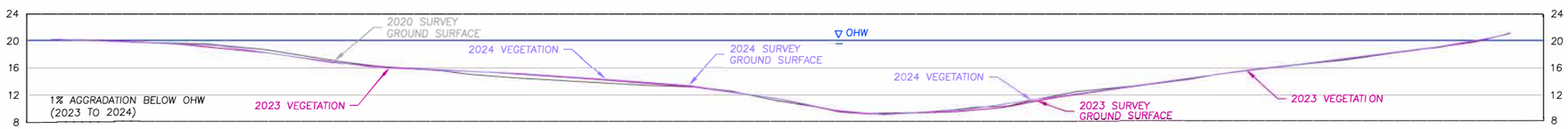
MONITORING SECTION Y 1.0
SCALE: 1" =20'



MONITORING SECTION Z 1.0
SCALE: 1" = 20'



MONITORING SECTION AA 1.0
SCALE: 1" = 20'



MONITORING SECTION AB 1.0
SCALE: 1" = 20'

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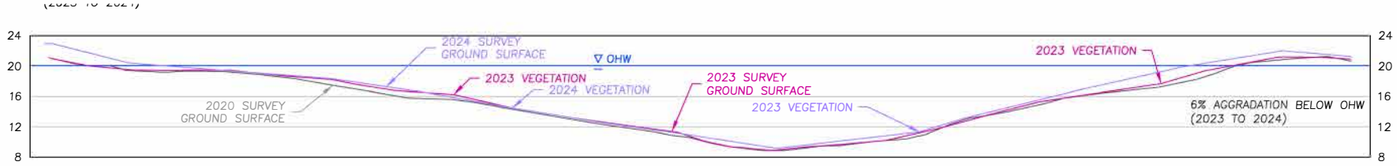
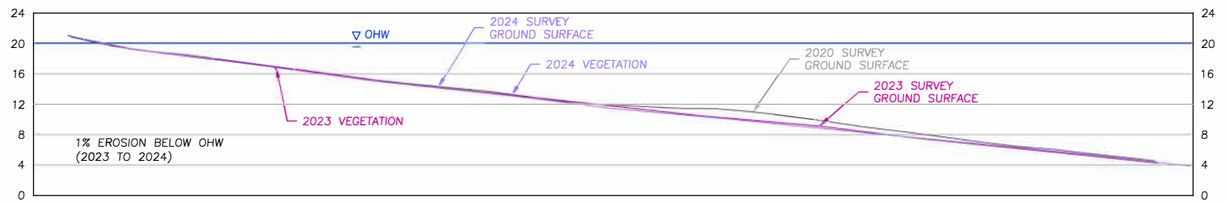
TOPOGRAPHIC CROSS SECTION MONITORING PLAN 2024

BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

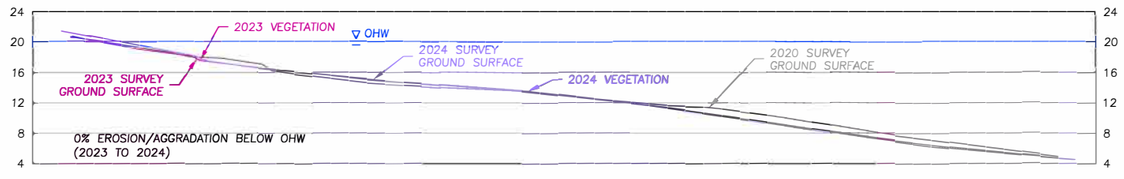
FIGURE
3.4



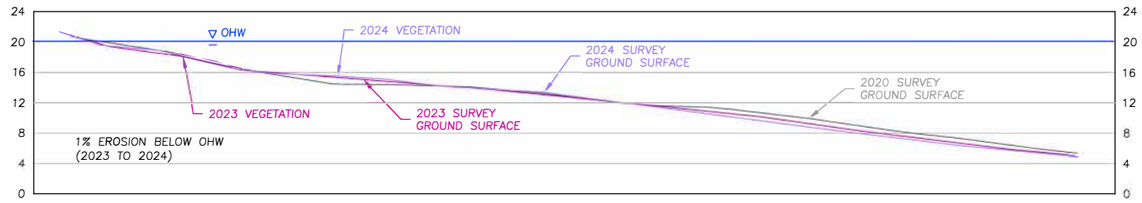
MONITORING SECTION AC 1.0
HORZ SCALE: 1" = 40' VERT: 1" = 20'



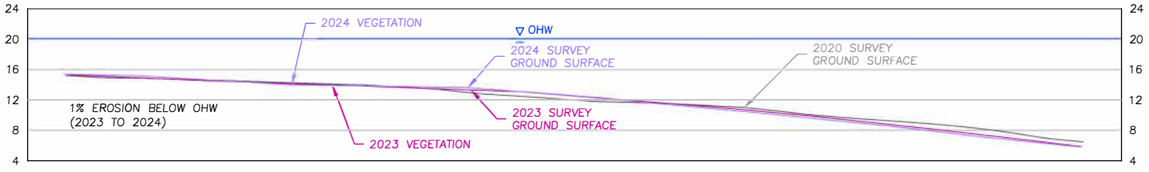
MONITORING SECTION AD 1.0
SCALE: 1" = 20'



MONITORING SECTION AE 1.0
SCALE: 1" = 20'



MONITORING SECTION AF 1.0
SCALE: 1" = 20'



MONITORING SECTION AG 1.0
SCALE: 1" = 20'

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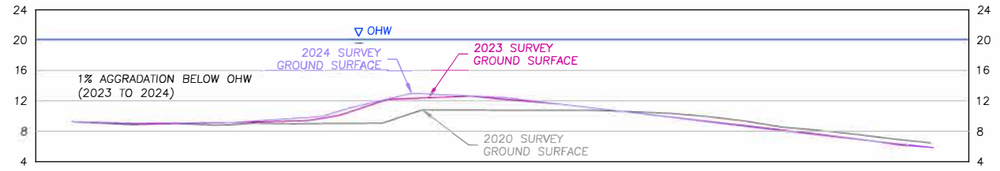
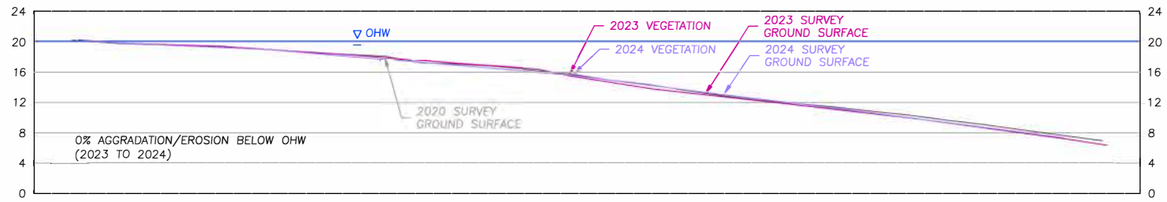
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

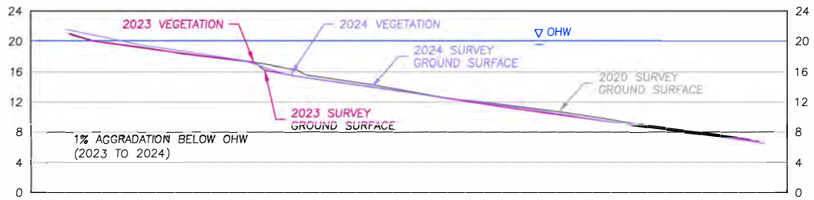
FIGURE
3.5



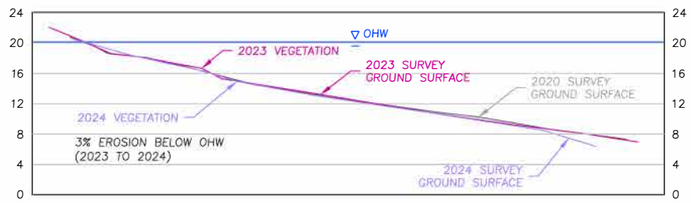
MONITORING SECTION (AH / 1.0)
SCALE: 1" = 20'



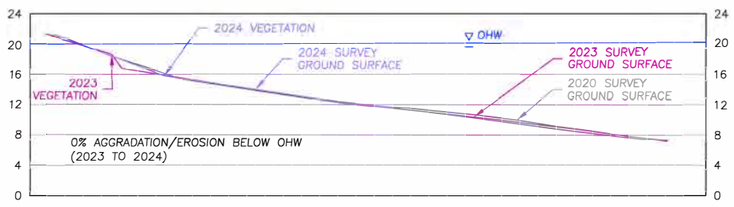
MONITORING SECTION (AI / 1.0)
SCALE: 1" = 20'



MONITORING SECTION (AJ / 1.0)
SCALE: 1" = 20'



MONITORING SECTION (AK / 1.0)
SCALE: 1" = 20'



MONITORING SECTION (AL / 1.0)
SCALE: 1" = 20'

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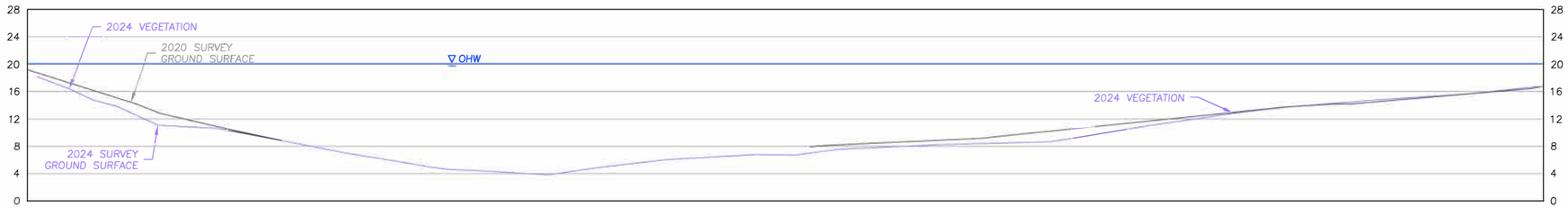
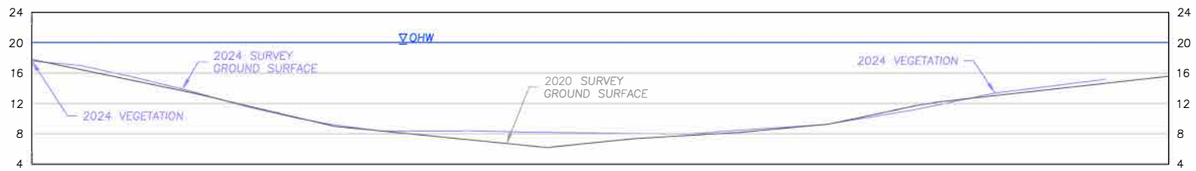
TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2024

BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

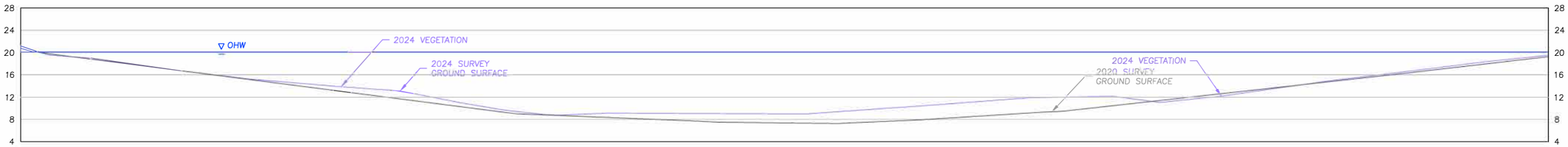
FIGURE
3.6



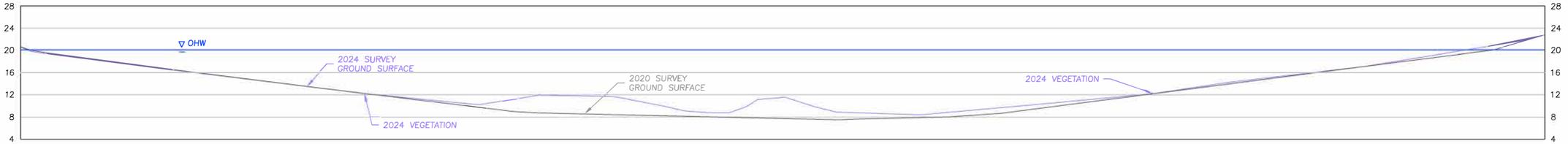
MONITORING SECTION L2 1.0
HORZ SCALE: 1" = 40' VERT: 1" = 20'



MONITORING SECTION M2 1.0
HORZ SCALE: 1" = 40' VERT: 1" = 20'



MONITORING SECTION N2 1.0
SCALE: 1" = 20'



MONITORING SECTION O2 1.0
SCALE: 1" = 20'

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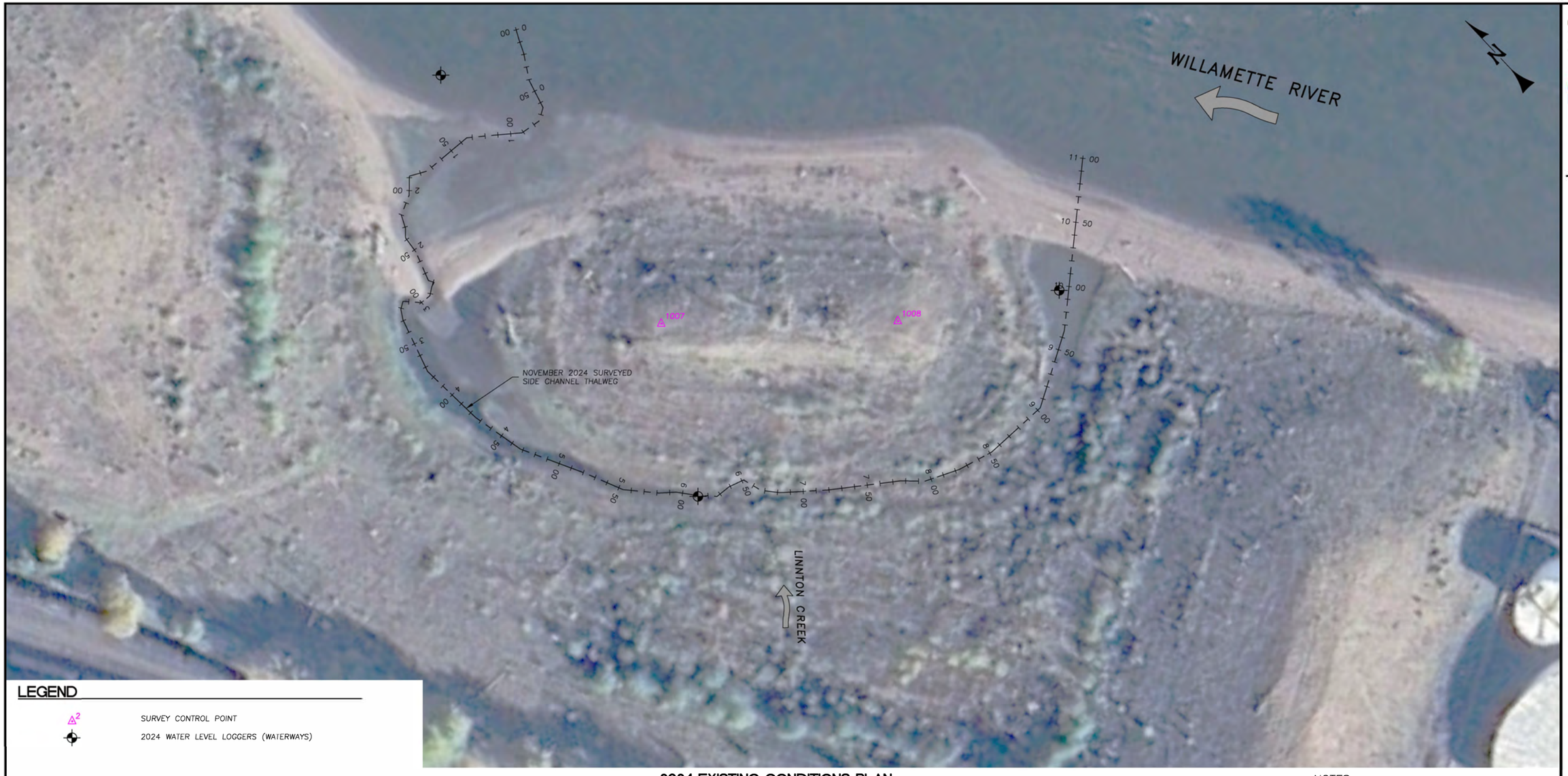
LINNTON MITIGATION PROJECT
TOPOGRAPHIC CROSS SECTION MONITORING PLAN
2024

BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

FIGURE
3.7



LEGEND

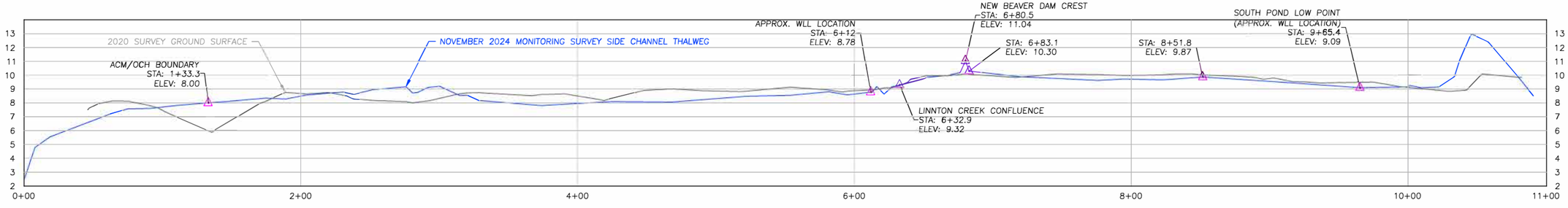
- SURVEY CONTROL POINT
- 2024 WATER LEVEL LOGGERS (WATERWAYS)

2024 EXISTING CONDITIONS PLAN

SCALE: 1" = 80'

NOTES:

1. MONITORING SURVEY COMPLETED BY WATERWAYS ON OCTOBER 2 AND NOVEMBER 26, 2024.



NOVEMBER 2024 SIDE CHANNEL PROFILE

SCALE: H: 1" = 80', V: 1"=8'

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LINNTON MITIGATION PROJECT
TOPOGRAPHIC SURVEY
NOVEMBER 2024

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

0 1"

FIGURE

4.0

ATTACHMENT 3. PHOTOGRAPHS

Photographs 1-4. Photo Monitoring Point 1, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 5-8. Photo Monitoring Point 2, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 9-12. Photo Monitoring Point 3, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 13-16. Photo Monitoring Point 4, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 17-20. Photo Monitoring Point 5, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 21-24. Photo Monitoring Point 6, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 25-28. Photo Monitoring Point 7, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 29-32. Photo Monitoring Point 8, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 33-36. Photo Monitoring Point 9, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 37-40. Photo Monitoring Point 10, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 41-44. Photo Monitoring Point 11, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 45-48. Photo Monitoring Point 12, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 49-52. Photo Monitoring Point 13, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 53-56. Photo Monitoring Point 14, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 57-60. Photo Monitoring Point 15, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 61-64. Photo Monitoring Point 16, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 65-68. Photo Monitoring Point 17, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 69-72. Photo Monitoring Point 18, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 73-76. Photo Monitoring Point 19, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 77-80. Photo Monitoring Point 20, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 81-84. Photo Monitoring Point 21, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 85-88. Photo Monitoring Point 22, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 89-92. Photo Monitoring Point 23, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 93-96. Photo Monitoring Point 24, photos taken July 10, 2024.

View looking north.

View looking south.

View looking east.

View looking west.

Photographs 97-100. Photo Monitoring Point 25, photos taken July 10, 2024.

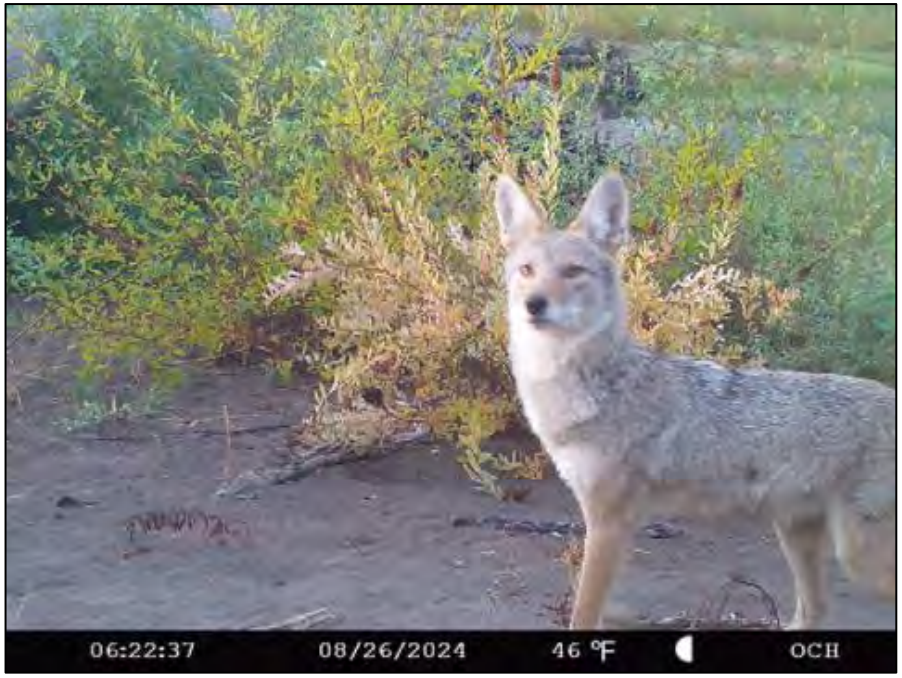
View looking north.

View looking south.

View looking east.

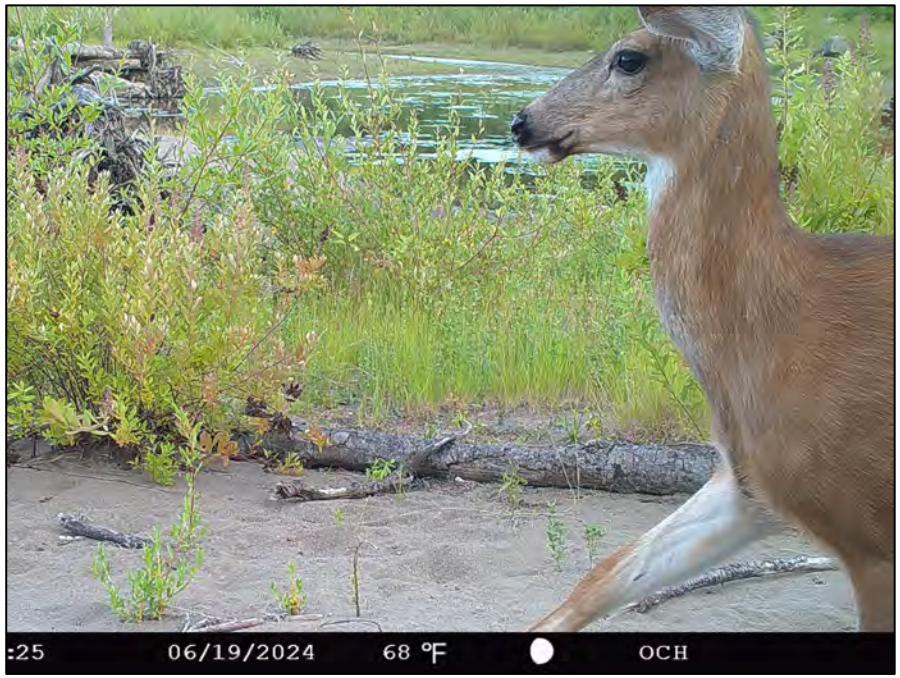
View looking west.

Photographs 101-104. Wildlife captured on wildlife monitoring cameras in 2024.



Photographs 105-108. Wildlife captured on wildlife monitoring cameras in 2024.

Photographs 109-112. Wildlife captured on wildlife monitoring cameras in 2024.



Photographs 113-116. Wildlife captured on wildlife monitoring cameras in 2024.

Photographs 117-120. Wildlife captured on wildlife monitoring cameras in 2024.

Photographs 121-124. Wildlife captured on wildlife monitoring cameras in 2024.

Photographs 125-128. Wildlife captured by phone camera during incidental observations in 2024.

Photograph 125 (left): early evidence of beaver activity in upstream OCH immediately upstream of the Linnton Creek confluence. Photograph taken facing upstream.

Photograph 126 (right): recent (December 2024) beaver activity in same location as photograph 125. Photograph taken facing upstream.

Photographs 129-132. Plants captured on cameras in 2024.

Photographs 133-136. Plants captured on cameras in 2024.

Photographs 137-140. Plants captured on cameras in 2024.

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

Water surface elevation NA

Water surface elevation 9.77 ft

Water surface elevation 9.72 ft

Water surface elevation 9.31 ft

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

Water surface elevation NA

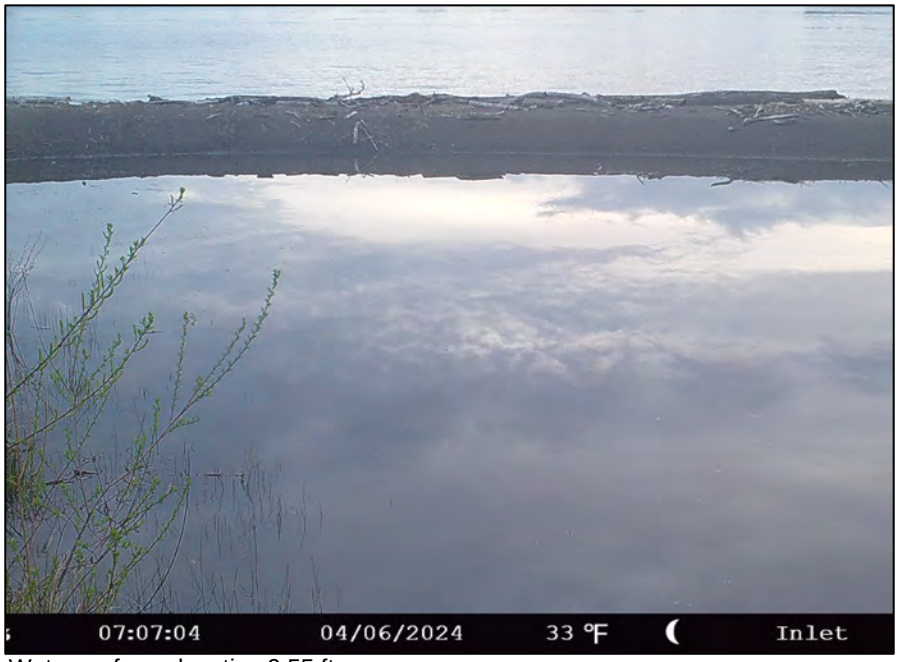
Water surface elevation 9.85 ft

Water surface elevation 10.16 ft

Water surface elevation 9.35 ft

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

Water surface elevation NA



Water surface elevation 9.55 ft

Water surface elevation 9.88 ft

Water surface elevation 9.29 ft

ATTACHMENT 4. VEGETATION MONITORING TABLES

Upland / Riparian Forest Plot - Native Stem Counts

Species	Common Name	Form	Forest Plot																																
			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
Abies grandis	grand fir	tree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Acer circinatum	vine maple	shrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	6	0	0	0	0
Acer macrophyllum	bigleaf maple	tree	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	9	0	0	0	0
Alnus rubra	red alder	tree	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0
Amelanchier alnifolia	serviceberry	shrub	0	0	2	1	0	0	7	0	0	0	0	1	0	0	0	0	0	12	0	0	17	0	0	0	0	0	0	9	0	1	0	2
Arbutus menziesii	Pacific madrone	shrub	1	0	0	1	0	0	1	0	2	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Baccharis pilularis	coyote brush	shrub	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceanothus velutinus	mountain balm	shrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Cornus stolonifera	red osier dogwood	shrub	10	0	0	6	0	0	21	0	0	0	4	0	0	0	0	0	2	0	0	0	0	2	0	20	0	0	0	0	2	1	1	0
Crataegus douglasii	Douglas' hawthorn	tree	2	0	1	8	0	0	3	2	0	0	4	0	6	0	0	9	1	0	1	0	2	0	1	0	0	0	0	1	1	0	0	0
Frangula purshiana	cascara	shrub	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0	1	0	0	0	0	0	0	17	0	0	0	0
Fraxinus latifolia	Oregon ash	tree	0	0	0	0	0	0	1	11	38	0	4	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	13	1	0	0
Holodiscus discolor	oceanspray	shrub	5	0	2	0	2	1	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lonicera involucrata	coast twinberry	shrub	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	4	0	0	0	0	5	3	0	0	0	0	0	0	0	0	0
Mahonia aquifolium	tall Oregon grape	shrub	0	0	0	0	7	0	0	0	1	0	0	0	10	11	0	0	0	3	2	0	5	0	0	0	0	10	0	0	0	0	0	0
Oemleria cerasiformis	Indian plum	shrub	0	0	0	0	5	0	0	0	0	0	0	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Philadelphus lewisii	wild mock orange	shrub	4	0	0	0	0	0	0	0	7	0	0	0	5	1	0	0	0	0	2	1	0	0	0	0	0	6	15	0	0	0	0	0
Pinus ponderosa	yellow pine	tree	0	0	0	0	3	7	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Populus trichocarpa	black cottonwood	tree	18	1	1	1	18	0	38	5	0	8	2	2	0	1	0	1267	3	0	0	0	2	119	234	0	0	16	0	0	2	0	0	0
Prunus emarginata	bitter cherry	tree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1
Prunus virginiana var. demissa	western choke cherry	shrub	0	0	0	0	9	1	0	0	0	0	0	0	2	2	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudotsuga menziesii	Douglas fir	tree	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus garryana	Oregon white oak	tree	0	0	1	0	3	6	0	0	0	0	0	0	1	10	1	0	0	5	1	4	2	0	0	0	2	2	7	2	0	0	0	3
Ribes sanguineum	flowering currant	shrub	0	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rosa nutkana	Nootka rose	shrub	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa pisocarpa	swamp rose	shrub	0	0	0	0	0	0	54	0	0	0	19	0	0	0	0	65	8	0	0	0	1	0	25	2	0	0	0	0	9	0	0	0
Rubus parviflorus	thimbleberry	shrub	3	0	1	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0
Rubus spectabilis	salmonberry	shrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Rubus ursinus	trailing blackberry	shrub	0	0	0	0	11	0	0	0	0	0	0	0	0	4	0	0	0	0	2	2	0	0	0	0	2	5	7	0	0	0	0	0
Salix fluviatilis	Columbia willow	shrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Salix lasiandra (var. lasiandra)	Pacific willow	tree	15	1	0	53	0	0	0	0	0	8	0	0	0	0	0	3	4	0	0	0	0	1	4	2	0	0	0	0	10	2	7	0
Salix prolixa	Mackenzie's willow	shrub	0	0	0	2	0	0	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	3	3	0	0	0	0	2	0	0	0
Salix scouleriana	Scouler willow	tree	0	0	0	17	0	0	4	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	9	1	4	0
Salix sitchensis	Sitka willow	tree	1	2	0	51	0	0	5	5	0	4	1	0	0	0	0	36	7	0	0	0	0	6	22	4	0	0	0	0	40	12	58	0
Sambucus caerulea	blue elderberry	shrub	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sambucus racemosa	red elderberry	shrub	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spiraea douglasii	Douglas spiraea	shrub	0	0	0	1	0	0	0	1	0	6	17	0	0	0	0	23	10	0	21	0	0	1	45	14	0	2	0	0	5	1	0	0
Symphoricarpos albus	common snowberry	shrub	22	2	14	0	0	0	9	14	35	0	5	6	0	12	0	27	3	14	0	1	24	0	0	0	2	0	0	3	1	3	0	0
Thuja plicata	western redcedar	tree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1
Total Stems			**86**	**6**	**26**	**142**	**59**	**21**	**157**	**42**	**84**	**27**	**60**	**10**	**28**	**49**	**9**	**1435**	**42**	**44**	**33**	**8**	**59**	**140**	**338**	**45**	**8**	**44**	**30**	**60**	**94**	**28**	**70**	**8**

Native Upland / Riparian Forest Statistics	
Total Native Tree Species	14
Total Native Shrub Species	25
Average native stems per forest plot	104
Acre per Plot	0.019
Approximate native stems per forest acre	**5,450**

Scrub-Shrub Plot - Native Stem Counts

			Scrub-Shrub Plot															
Species	**Common Name**	**Form**	**1S**	**2S**	**3S**	**4S**	**5S**	**6S**	**7S**	**8S**	**9S**	**10S**	**11S**	**12S**	**13S**	**14S**	**15S**	**16S**
Alnus rubra	red alder	tree	0	0	5	0	2	2	0	3	0	0	0	0	0	0	0	0
Cornus stolonifera	red osier dogwood	shrub	0	0	0	0	1	0	2	1	1	2	0	0	1	2	1	0
Fraxinus latifolia	Oregon ash	tree	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0
Lonicera involucrata	coast twinberry	shrub	0	1	0	1	0	0	0	0	11	0	0	0	0	0	1	0
Populus trichocarpa	black cottonwood	tree	10	216	184	93	72	280	3	69	10	2	0	2	5	0	1	0
Rosa pisocarpa	swamp rose	shrub	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0
Salix fluviatilis	Columbia willow	shrub	0	91	6	22	4	7	0	4	0	0	0	0	0	0	0	0
Salix hookeriana	Hooker's willow	shrub	0	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0
Salix lasiandra (var. lasiandra)	Pacific willow	tree	4	85	123	121	75	39	22	40	0	0	16	0	5	0	0	2
Salix prolixa	Mackenzie's willow	shrub	0	0	0	1	1	2	5	0	2	0	2	0	2	0	0	0
Salix scouleriana	Scouler willow	tree	0	0	1	0	0	0	5	0	4	0	1	0	5	0	0	0
Salix sitchensis	Sitka willow	tree	4	5	9	6	9	13	50	16	4	2	22	4	17	2	0	13
Spiraea douglasii	Douglas spiraea	shrub	0	4	7	1	23	3	1	2	6	6	1	5	4	33	24	6
Symphoricarpos albus	commonsnowberry	shrub	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	Total Stems		**18**	**402**	**335**	**246**	**190**	**346**	**96**	**136**	**39**	**12**	**42**	**11**	**40**	**38**	**27**	**21**

Native Scrub-Shrub Statistics	
Total Native Tree Species	6
Total Native Shrub Species	8
Average native stems per shrub plot	125
Acre per Plot	0.007
Approximate native stems per shrub acre	**17,866**

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																																							
Achillea millefolium	yarrow	Asteraceae	--	--	FACU			2.5	2.5		15	15	2.5	2.5		15	15	2.5	15	2.5	2.5		2.5		15	2.5				15	2.5	15	2.5					4.6	**59.4**
Acmispon americanus	Spanish clover	Fabaceae	--	--	-			2.5		2.5	2.5			2.5	37.5			15			2.5	15	2.5	37.5	15		2.5	15			15								**5.2**	**43.8**
Agrostis exarata	bentgrass	Poaceae	--	--	FACW	15		15	2.5		2.5	15	37.5	62.5		37.5	37.5	37.5		15	15				15	15	2.5	37.5										**11.3**	**50.0**
Alisma triviale	northern water plantain	Alistamaceae	--	--	OBL																															2.5		0.1	3.1
Azolla filiculoides	misquito fern	Salviniaceae	--	--	OBL																													2.5		15		0.5	6.3
Carex stipata	Sawbeak sedge	Cyperaceae	--	--	-																													2.5				0.1	3.1
Carex unilateralis	one-sided sedge	Cyperaceae	--	--	FACW																													2.5				0.1	3.1
Coreopsis tinctoria	calliopsis	Asteraceae	--	--	FACU										2.5																							0.1	3.1
Danthonia californica	California oatgrass	Poaceae	--	--	FACU*			2.5					2.5					2.5	15	15					15	2.5						2.5						1.8	**25.0**
Deschampsia cespitosa	tufted hairgrass	Poaceae	--	--	FACW					2.5																												0.1	3.1
Deschampsia elongata	hairgrass	Poaceae	--	--	FACW-																			15		2.5												0.5	6.3
Elymus glaucus	blue wildrye	Poaceae	--	--	FACU		2.5	2.5	2.5	15			2.5					15	2.5	15			2.5	15		15				2.5	15	15	2.5					3.9	**46.9**
Epilobium ciliatum	slender willow herb	Onagraceae	--	--	FACW-												2.5							2.5					2.5					2.5	15	2.5		0.9	**18.8**
Equisetum arvense	field horsetail	Equisetaceae	--	--	FAC																															2.5		0.1	3.1
Equisetum hyemale	common scouring rush	Equisetaceae	--	--	FACW	37.5																																1.2	3.1
Festuca occidentalis	western fescue	Poaceae	--	--	-					37.5	15	2.5	2.5					15					15	15							15	15						4.1	**28.1**
Festuca roemeri	Roemer's fescue	Poaceae	--	--	-				15	37.5	37.5	15	37.5	15			15	37.5	62.5	62.5			62.5	15	15					15	62.5	15	37.5					**17.4**	**53.1**
Galium aparine	cleavers	Rubiaceae	--	--	-		2.5																															0.1	3.1
Glyceria X occidentalis	western mannagrass	Poaceae	--	--	OBL																							2.5					2.5					0.2	6.3
Grindelia integrifolia	Puget Sound gumweed	Asteraceae	--	--	FACW						2.5								2.5	2.5				2.5	15	15				37.5								2.4	**21.9**

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		
Heteranthera dubia	grassleaf mudplantain	Pontederiaceae	--	--	-																															2.5		0.1	3.1
Hordeum brachyantherum	meadow barley	Poaceae	--	--	FACW-					2.5																												0.1	3.1
Hydrocotyle ranunculoides	floating pennywort	Araliaceae	--	--	OBL																								37.5									1.2	3.1
Juncus articulatus	jointleaf rush	Juncaceae	--	--	-																															2.5		0.1	3.1
Juncus effusus	soft rush	Juncaceae	--	--	FACW												15												62.5					37.5	15	15		4.5	**15.6**
Leersia oryzoides	rice cutgrass	Poaceae	--	--	OBL																								15									0.5	3.1
Lemna minor	common duckweed	Araceae	--	--	OBL																															2.5		0.1	3.1
Limosella aquatica	mudwort	Scrophulariaceae	--	--	OBL																															2.5		0.1	3.1
Ludwigia palustris	water purslane	Onagraceae	--	--	OBL																																	0.0	0.0
Lupinus polyphyllus	bog lupine	Fabaceae	--	--	FAC+					2.5		15					15		2.5												2.5		62.5					3.1	**18.8**
Lupinus rivularis	stream lupine	Fabaceae	--	--	FACU															2.5																		0.1	3.1
Mimulus guttatus	common monkeyflower	Phrymaceae	--	--	OBL																				2.5														0.1	3.1
Poa secunda	pine bluegrass	Poaceae	--	--	-														2.5		15																		0.5	6.3
Prunella vulgaris	self heal	Lamiaceae	--	--	-														2.5																				0.1	3.1
Scirpus microcarpus	panicled bulrush	Cyperaceae	--	--	OBL																								2.5									0.1	3.1
Invasive																																							
Daucus carota	wild carrot	Apiaceae	C	--	-																									2.5								0.1	3.1
Hypochaeris radicata	spotted cat's ear	Asteraceae	C	--	FACU																2.5	2.5						2.5										0.2	9.4
Lotus corniculatus	bird's foot trefoil	Fabaceae	C	--	FAC											2.5	2.5				2.5									2.5			2.5			15		0.9	**18.8**
Mentha pulegium	pennyroyal	Lamiaceae	C	--	OBL																													2.5				0.1	3.1
Phalaris arundinacea	reed canarygrass	Poaceae	C	--	FACW	2.5	15																															0.5	6.3

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		
Rubus discolor	Himalayan blackberry	Rosaceae	C	B	-																2.5																	0.1	3.1
Non-Native (non-listed)																																							
Agrostis capillaris	colonial bentgrass	Poaceae	D	-	-										15							37.5							2.5									1.7	9.4
Aira caryophyllea	silver hairgrass	Poaceae	--	--	-										2.5										2.5					15								0.6	**9.4**
Bellardia viscosa	yellow glandweed	Orobanchaceae	--	--	-			2.5		2.5			2.5						2.5	2.5	2.5	2.5		2.5	15	2.5					2.5	2.5						1.3	**37.5**
Bromus diandrus	ripgut brome	Poaceae	D	-	-			2.5																														0.1	3.1
Bromus hordeaceus	soft chess	Poaceae	-	-	-																					2.5						2.5						0.2	6.3
Bromus sterilis	poverty brome	Poaceae	-	-	-		15		2.5																													0.5	6.3
Conium maculatium	poison hemlock	Apiaceae	C				2.5																															0.1	3.1
Dysphania ambrosioides	Mexican tea	Amaranthaceae	-	-	-																					2.5								2.5				0.2	6.3
Festuca arundinacea	tall fescue	Poaceae	-	-	FAC-																							15										0.5	3.1
Festuca perennis	perennial ryegrass	Poaceae	D	--	-			2.5															2.5		2.5													0.2	9.4
Geranium dissectum	common wild geranium	Geraniaceae	--	--	-	2.5		2.5																		2.5				2.5		2.5						0.4	**15.6**
Holcus lanatus	common velvetgrass	Poaceae	--	--	-	2.5													2.5	2.5																		0.2	9.4
Lapsana communis	nipplewort	Asteraceae	C	-	-																										2.5							0.1	3.1
Medicago lupulina	black medic	Fabaceae	--	--	FAC				15																													0.5	3.1
Melilotus officinalis	yellow sweetclover	Fabaceae	--	--	FACU				2.5																													0.1	3.1
Plantago lanceolata	ribwort	Plantaginaceae	--	--	FAC																								2.5									0.1	3.1
Plantago major	broadleaf plantain	Plantaginaceae	--	--	FACU+																2.5																	0.1	3.1
Poa palustris	fowl bluegrass	Poaceae	--	--	FAC																			2.5										2.5				0.2	6.3
Rumex acetosella	common sheep sorrel	Polygonaceae	--	--	FACU+														2.5																			0.1	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		
Trees and Shrubs																																							
Abies grandis	grand fir	Pinaceae	--	--	FACU-*																																	0.0	0.0
Acer circinatum	vine maple	Sapindaceae	--	--	FAC-																											2.5						0.1	3.1
Acer macrophyllum	bigleaf maple	Sapindaceae	--	--	FACU																																	0.0	0.0
Alnus rubra	red alder	Betulaceae	--	--	FAC																																	0.0	0.0
Amelanchier alnifolia	serviceberry	Rosaceae	--	--	FACU																																	0.0	0.0
Arbutus menziesii	Pacific madrone	Ericaceae	-	-	UPL																																	0.0	0.0
Baccharis pilularis	coyote brush	Asteraceae	--	--	-			2.5	15																													0.5	6.3
Ceanothus velutinus	mountain balm	Rhamnaceae	-	-	-																									2.5								0.1	3.1
Cornus stolonifera	red osier dogwood	Cornaceae	--	--	FACW	2.5																																0.1	3.1
Crataegus douglasii	Douglas hawthorn	Rosaceae	--	--	FAC																																	0.0	0.0
Frangula purshiana	cascara	Rhamnaceae	-	-	-																					2.5												0.1	3.1
Fraxinus latifolia	Oregon ash	Oleaceae	--	--	FACW									2.5																				15				0.5	6.3
Holodiscus discolor	oceanspray	Rosaceae	--	--	-																																	0.0	0.0
Lonicera involucrata	coast twinberry	Caprifoliaceae	--	--	FAC+*																																	0.0	0.0
Mahonia aquifolium	tall Oregon grape	Berberidaceae	-	-	-					2.5																					2.5							0.2	6.3
Oemleria cerasiformis	Indian plum	Rosaceae	--	--	FACU													2.5																				0.1	3.1
Philadelphus lewisii	wild mock orange	Hydrangeaceae	--	--	-																				2.5							2.5						0.2	6.3
Pinus ponderosa	yellow pine	Pinaceae	--	--	FACU-																																	0.0	0.0
Populus trichocarpa	black cottonwood	Salicaceae	--	--	FAC				2.5												15						15											1.0	9.4
Prunus emarginata	bitter cherry	Rosaceae	--	--	FACU*																																	0.0	0.0
Prunus virginiana var. demissa	western choke cherry	Rosaceae	-	-	FACU																																	0.0	0.0

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		
Pseudotsuga menziesii	Douglas fir	Pinaceae	--	--	FACU*																																	0.0	0.0
Quercus garryana	Oregon oak	Fagaceae	--	--	-						2.5																					2.5						0.2	6.3
Ribes sanguineum	red flowering currant	Grossulariaceae	--	--	-																																	0.0	0.0
Rosa nutkana	Nootka rose	Rosaceae	-	-	FAC																																	0.0	0.0
Rosa pisocarpa	swamp rose	Rosaceae	--	--	FAC							15									2.5							15											1.0	9.4
Rubus parviflorus	thimbleberry	Rosaceae	--	--	FAC-																																	0.0	0.0
Rubus spectabilis	salmonberry	Rosaceae	--	--	FAC+																																	0.0	0.0
Rubus ursinus	trailing blackberry	Rosaceae	--	--	FACU																									2.5								0.1	3.1
Salix fluviatilis	Columbia willow	Salicaceae	--	--	OBL																																	0.0	0.0
Salix lasiandra var. lasiandra	Pacific willow	Salicaceae	-	-	FACW+	15			15						15																					2.5	15		2.0	15.6
Salix prolixa	Mackenzie's willow	Salicaceae	-	-	FACW+				2.5																			2.5						62.5				2.1	**9.4**
Salix scouleriana	Scouler willow	Salicaceae	--	--	FAC																																	0.0	0.0
Salix sitchensis	Sitka willow	Salicaceae	--	--	FACW		2.5		15						15							15												2.5	37.5	15		3.2	**21.9**
Sambucus nigra ssp. Caerulea	blue elderberry	Adoxaceae	-	-	FACU																																	0.0	**0.0**
Sambucus racemosa	red elderberry	Adoxaceae	--	--	FACU																																	0.0	**0.0**
Bare Ground																																							
Bare ground	-	-	-	-	-	62.5	85	62.5	62.5	15	15	62.5	15	15	62.5	37.5	37.5	15	15	15	62.5	62.5	15	15	15	37.5	85	37.5	15	15	15	15	15	62.5	37.5	85		**36.5**	**96.9**

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						**52.5**	**5**	**25**	**22.5**	**100**	**75**	**62.5**	**85**	**82.5**	**40**	**52.5**	**100**	**125**	**105**	**115**	**35**	**15**	**85**	**103**	**92.5**	**52.5**	**5**	**52.5**	**123**	**70**	**113**	**62.5**	**105**	**50**	**30**	**47.5**	**0**	**65.2**	**6.5**
Lower CI (80%)																																				56.9	
Upper CI (80%)																																				73.6	
Cover of Invasive Herbaceous Species						**2.5**	**15**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2.5**	**2.5**	**0**	**0**	**0**	**7.5**	**2.5**	**0**	**0**	**0**	**0**	**0**	**2.5**	**0**	**5**	**0**	**0**	**2.5**	**2.5**	**0**	**15**	**0**	**1.9**	**0.7**
Lower CI (80%)																																				1.0	
Upper CI (80%)																																				2.8	
Cover of Non-Native (Non-Listed) Herbaceous Species						5	17.5	10	20	2.5	0	0	2.5	0	17.5	0	0	0	7.5	5	5	40	2.5	5	20	7.5	2.5	15	2.5	20	5	7.5	0	5	0	0	0	7.0	1.6
Lower CI (80%)																																				5.0	
Upper CI (80%)																																				9.1	
Cover of Native Tree and Shrub Species within Herbaceous Plots						17.5	2.5	2.5	50	2.5	2.5	15	0	2.5	30	0	0	2.5	0	0	20	15	0	0	2.5	2.5	15	17.5	0	2.5	5	5	2.5	80	40	30	0	11.4	3.2
Lower CI (80%)																																				7.3	
Upper CI (80%)																																				15.5	
Cover of Bare Substrate and Moss						62.5	85	62.5	62.5	15	15	62.5	15	15	62.5	37.5	37.5	15	15	15	62.5	62.5	15	15	15	37.5	85	37.5	15	15	15	15	15	62.5	37.5	85	0	36.5	4.6
Lower CI (80%)																																				30.6	
Upper CI (80%)																																				42.3	

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		
Native																							
Achillea millefolium	yarrow	Asteraceae	--	--	FACU	0	2.5	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0.3	12.5
Acmispon americanus	Spanish clover	Fabaceae	--	--	-	0	15	0	15	0	62.5	0	2.5	15	0	0	15	0	0	0	0	**7.8**	37.5
Agrostis exarata	bentgrass	Poaceae	--	--	FACW	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0.9	6.3
Azolla mexicana	Mexican mosquito fern	Salviniaceae	-	-	OBL	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Beckmannia syzgachne	sloughgrass	Poaceae	-	-	OBL	0	0	0	0	0	0	0	0	0	0	2.5	37.5	0	0	0	0	2.5	12.5
Bidens cernua	nodding beggar's tick	Asteraceae	--	--	FACW+	0	15	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	1.1	12.5
Bidens frondosa	leafy beggar's tick	Asteraceae	--	--	FACW+	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Carex densa	dense sedge	Cyperaceae	--	--	OBL	0	15	2.5	0	0	0	0	0	0	0	0	15	0	0	0	0	2.0	18.8
Carex obnupta	slough sedge	Cyperaceae	--	--	OBL	0	0	0	0	0	15	0	15	0	0	85	0	15	0	0	0	**8.1**	25.0
Carex pachystachya	thick headed sedge	Cyperaceae	-	-	FAC	0	0	0	0	2.5	0	2.5	0	0	0	0	0	0	0	0	0	0.3	12.5
Carex stipata	Sawbeak sedge	Cyperaceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0.9	6.3
Carex unilateralis	one-sided sedge	Cyperaceae	-	-	FACW	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0.9	6.3
Clinopodium douglasii	Oregon tea	Acanthaceae	--	--	-	0	0	15	2.5	0	0	0	0	0	0	0	0	0	0	0	0	1.1	12.5
Conyza canadensis	horseweed	Asteraceae	-	-	FACU	0	0	0	2.5	0	0	0	2.5	0	0	0	0	0	0	0	0	0.3	12.5
Coreopsis tinctoria	Calliopsis	Asteraceae	-	-	FACU	0	0	0	0	0	0	0	0	0	0	0	37.5	0	15	0	2.5	3.4	18.8
Crassula aquatica	wrinkle-seed pygmyweed	Crassulaceae	-	-	OBL	0	37.5	15	15	2.5	0	0	0	0	0	0	0	0	0	0	0	4.4	25.0
Cyperus bipartitus	shining flatsedge	Cyperaceae	--	--	-	0	0	37.5	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	6.3
Cyperus erythrorhizos	redroot flatsedge	Cyperaceae	--	--	OBL	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Deschampsia cespitosa	tufted hairgrass	Poaceae	--	--	FACW	0	15	2.5	15	0	62.5	0	0	37.5	0	0	15	0	0	0	2.5	**9.4**	43.8
Eleocharis acicularis	needle spikerush	Cyperaceae	-	-	OBL	0	15	2.5	0	15	0	15	0	0	0	0	0	0	0	0	0	3.0	25.0
Eleocharis obtusa	blunt spikesedge	Cyperaceae	-	-	OBL	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0.2	6.3
Eleocharis ovata	ovate spikerush	Cyperaceae	-	-	OBL	0	15	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	12.5
Epilobium ciliatum	Slender willow herb	Onagraceae	--	--	FACW-	0	2.5	15	15	15	0	15	2.5	0	0	2.5	0	2.5	0	0	2.5	4.5	56.3
Equisetum hyemale	common scouring rush	Equisetaceae	--	--	FACW	0	0	2.5	0	15	0	0	0	0	0	0	0	0	0	0	0	1.1	12.5
Equisetum palustre	marsh horsetail	Equisetaceae	-	-	FACW	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Eragrostis hypnoides	teal lovegrass	Poaceae	--	--	OBL	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Eragrostis pectinacea var. pectinacea	purple eragrostis	Poaceae	-	-	FAC	0	0	0	0	0	0	2.5	15	0	0	0	0	0	0	0	0	1.1	12.5
Euphorbia glyptosperma	rib seed sandmat	Euphorbiaceae	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0.2	6.3
Festuca occidentalis	western fescue	Poaceae	--	--	-	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Festuca roemeri	Roemer's fescue	Poaceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0.9	6.3
Gnaphalium palustre	marsh cudweed	Asteraceae	--	--	FAC+	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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		
Hydrocotyle ranunculoides	floating pennywort	Araliaceae	--	--	OBL	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0.9	6.3
Juncus acuminatus	sharp-fruited rush	Juncaceae	--	--	OBL	0	0	15	0	0	0	0	2.5	0	0	0	0	0	0	0	0	1.1	12.5
Juncus articulatus	jointleaf rush	Juncaceae	--	--	-	0	0	2.5	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	12.5
Juncus bufonius	toad rush	Juncaceae	--	--	FACW	0	0	15	0	0	0	0	2.5	0	0	0	0	0	0	0	0	1.1	12.5
Juncus effusus	soft rush	Juncaceae	--	--	FACW	0	0	2.5	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0.3	12.5
Juncus ensifolius	sword-leaved rush	Juncaceae	--	--	FACW	0	0	0	0	2.5	0	0	15	0	0	0	0	0	0	0	0	1.1	12.5
Juncus oxymeris	pointed rush	Juncaceae	-	-	FACW+	0	2.5	0	2.5	15	0	0	0	0	0	0	0	0	0	0	0	1.3	18.8
Juncus patens	common rush	Juncaceae	--	--	FACW	0	0	2.5	0	37.5	0	37.5	0	15	0	0	0	0	0	0	0	**5.8**	25.0
Juncus tenuis	slender rush	Juncaceae	--	--	FACW-	0	2.5	2.5	2.5	0	0	2.5	2.5	0	0	2.5	0	0	0	0	0	0.9	37.5
Leersia oryzoides	rice cutgrass	Poaceae	--	--	OBL	0	0	2.5	0	15	0	0	0	0	0	15	15	0	0	0	2.5	3.1	31.3
Limosella aquatica	mudwort	Scrophulariaceae	--	--	OBL	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Lindernia dubia	false pimpernel	Linderniaceae	--	--	OBL	0	15	2.5	2.5	2.5	0	0	2.5	0	0	0	0	0	0	0	0	1.6	31.3
Ludwigia palustris	water purslane	Onagraceae	--	--	OBL	0	0	0	0	0	0	2.5	0	0	0	15	0	0	0	0	0	1.1	12.5
Lycopus americanus	cut-leaved bugleweed	Lamiaceae	--	--	OBL	0	2.5	15	0	2.5	2.5	15	0	0	0	15	0	0	0	0	0	3.3	37.5
Mentha arvensis	field ment	Lamiaceae	--	--	FACW-	0	2.5	0	2.5	0	0	0	2.5	0	0	0	15	2.5	2.5	0	2.5	1.9	43.8
Panicum capillare	witch grass	Poaceae	--	--	FACU+	0	15	15	2.5	2.5	0	0	0	0	0	0	0	0	0	0	0	2.2	25.0
Persicaria punctata	dotted smartweed	Polygonaceae	--	--	-	0	2.5	2.5	2.5	0	0	0	0	0	0	2.5	0	0	0	0	0	0.6	25.0
Pseudognaphalium stramineum	cotton batting cudweed	Asteraceae	--	--	-	0	2.5	2.5	15	2.5	0	0	2.5	0	0	0	0	0	0	0	2.5	1.7	37.5
Sagittaria latifolia	broadleaf arrowhead	Alistamaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0.2	6.3
Scirpus microcarpus	panicled bulrush	Cyperaceae	--	--	OBL	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0.9	6.3
Scutellaria lateriflora	mad-dog skullcap	Lamiaceae	--	--	FACW	0	2.5	2.5	0	0	0	2.5	0	0	0	2.5	0	0	0	0	0	0.6	25.0
Stachys cooleyae	hedge-nettle	Lamiaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0.2	6.3
Typha latifolia	broad-leaf cattail	Typhaceae	-	-	OBL	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0.9	6.3
Invasive																							
Iris pseudacorus	yellow flag iris	Iridaceae	B	B	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Lactuca serriola	Prickly lettuce	Asteraceae	C	--	FACU	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Lotus corniculatus	bird's foot trefoil	Fabaceae	C	--	FAC	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0.2	6.3
Lythrum portula	water purslane	Lythraceae	B	--	NI	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Non-native (non-listed)																							
Agrostis capillaris	colonial bentgrass	Poaceae	D	-	-	0	0	0	0	0	0	0	0	37.5	0	0	0	0	62.5	0	0	**6.3**	12.5
Agrostis stolonifera	creeping bentgrass	Poaceae	D	-	FAC*	0	15	0	0	0	15	0	2.5	0	0	2.5	15	2.5	15	2.5	15	**5.3**	56.3
Digitaria ischaemum	smooth crabgrass	Poaceae	-	-	FACU	0	15	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	1.1	12.5
Dysphania ambrosioides	Mexican tea	Amaranthaceae	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0.2	6.3
Echinochloa crus-galli	barnyard grass	Poaceae	-	-	-	0	0	2.5	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	12.5

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		
Euphorbia maculata	spotted spurge	Euphorbiaceae	--	--	UPL	0	2.5	2.5	2.5	0	2.5	0	2.5	0	0	0	0	0	0	0	0	0.8	31.3
Gnaphalium uliginosum	marsh cudweed	Asteraceae	-	-	-	0	2.5	2.5	2.5	2.5	0	0	15	0	0	0	0	2.5	0	0	2.5	1.9	43.8
Hieracium sp.	hawkweed	Asteraceae	--	--	-	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0.9	6.3
Holcus lanatus	common velvetgrass	Poaceae	--	--	-	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Melilotus albus	white sweetclover	Fabaceae	--	--	-	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Panicum dichotomiflorum	fall panicgrass	Poaceae	--	--	FACW	0	15	2.5	0	2.5	0	0	0	0	0	0	0	0	0	0	0	1.3	18.8
Persicaria maculosa	spotted lady's thumb	Polygonaceae	--	--	FACW	0	15	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	12.5
Plantago major	broadleaf plantain	Plantaginaceae	--	--	FACU+	0	15	15	15	2.5	15	0	15	2.5	0	0	15	0	0	0	0	**5.9**	50.0
Rumex crispus	curled dock	Polygonaceae	--	--	FAC+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0.2	6.3
Trees and Shrubs																							
Cornus stolonifera	red osier dogwood	Cornaceae	--	--	FACW	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	15	0	1.1	12.5
Lonicera involucrata	coast twinberry	Caprifoliaceae	--	--	FAC+*	0	0	0	0	0	0	0	0	37.5	0	0	0	0	0	0	0	2.3	6.3
Populus trichocarpa	black cottonwood	Salicaceae	--	--	FAC	0	0	2.5	2.5	0	15	0	2.5	15	0	0	0	0	0	0	0	2.3	31.3
Salix fluviatilis	Columbia willow	Salicaceae	--	--	OBL	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	6.3
Salix hookeriana	Hooker's willow	Salicaceae	-	-	FACW	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.2	6.3
Salix lasiandra var. lasiandra	Pacific willow	Salicaceae	-	-	FACW+	37.5	15	2.5	2.5	2.5	2.5	15	0	0	0	0	0	0	0	0	0	4.8	43.8
Salix scouleriana	Scouler willow	Salicaceae	--	--	FAC	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0.9	6.3
Salix sitchensis	Sitka willow	Salicaceae	--	--	FACW	62.5	0	0	15	0	0	15	62.5	0	0	37.5	0	62.5	0	0	37.5	**18.3**	43.8
Spiraea douglasii	Douglas spiraea	Rosaceae	--	--	FACW	0	0	2.5	0	15	0	0	0	0	0	0	0	0	62.5	15	15	**6.9**	31.3
Bare Ground																							
Bare Ground			-	-	-	85	37.5	37.5	15	37.5	37.5	37.5	62.5	15	0	37.5	15	85	15	97.5	62.5	**42.3**	93.8

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**	**185**	**182.5**	**105**	**135**	**145**	**140**	**70**	**85**	**0**	**145**	**165**	**20**	**17.5**	**2.5**	**47.5**	**90.3**	**17.1**
		Lower CI (80%)																				68.4	
		Upper CI (80%)																				112.2	
		Cover of Invasive Herbaceous Species				**0**	**2.5**	**2.5**	**0**	**2.5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2.5**	**0**	**0**	**0**	**0.6**	0.3
		Lower CI (80%)																				0.3	
		Upper CI (80%)																				1.0	
		Non-Native (Non-Listed) Herbaceous Species				0	80	27.5	27.5	10	32.5	0	35	55	0	2.5	30	5	77.5	2.5	22.5	25.5	6.6
		Lower CI (80%)																				17.0	
		Upper CI (80%)																				33.9	
		Cover of Native Tree and Shrub Species within Herbaceous Plots				100	30	7.5	22.5	20	17.5	45	65	52.5	0	37.5	0	62.5	62.5	30	52.5	37.8	6.8
		Lower CI (80%)																				29.1	
		Upper CI (80%)																				46.6	
		Cover of Bare Substrate and Moss				85	37.5	37.5	15	37.5	37.5	37.5	62.5	15	0	37.5	15	85	15	97.5	62.5	42.3	7.2
		Lower CI (80%)																				33.1	
		Upper CI (80%)																				51.6	
		Weighted Prevalence Index All Strata				6.3	2.8	3.8	3.6	3.1	4.1	2.7	4.4	3.8		2.3	2.8	6.7	3.9	15.9	5.6	4.8	

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																													
Achillea millefolium	yarrow	Asteraceae	-	-	FACU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0.1	4.3
Amaranthus sp.	amaranth	Amaranthaceae	-	-	-	0	2.5	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	8.7
Bidens cernua	nodding beggar's tick	Asteraceae	--	--	FACW+	0	0	0	0	0	15	0	0	0	0	0	0	37.5	15	37.5	15	0	37.5	15	2.5	2.5	2.5	0	**7.8**	43.5
Bidens frondosa	leafy beggar's tick	Asteraceae	-	-	FACW+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0.1	**4.3**
Clinopodium douglasii	Oregon tea	Acanthaceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	2.5	0	0	0	0	0	0	0	0	0.2	8.7
Crassula aquatica	wrinkle-seed pygmyweed	Crassulaceae	-	-	OBL	0	0	0	0	0	37.5	0	0	0	0	15	0	2.5	62.5	15	15	0	2.5	2.5	2.5	0	0	0	**6.7**	39.1
Cyperus bipartitus	shining flatsedge	Cyperaceae	-	-	-	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0.2	**8.7**
Cyperus erythrorhizos	redroot flatsedge	Cyperaceae	--	--	OBL	0	0	0	0	0	2.5	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	37.5	1.8	13.0
Cyperus sp.	flatsedge	Cyperaceae	--	--	-	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	4.3
Cyperus squarrosus	awned flatsedge	Cyperaceae	--	--	-	0	0	0	0	0	0	0	0	0	0	2.5	0	15	2.5	0	0	0	0	0	0	0	0	0	0.9	**13.0**
Eleocharis acicularis	needle spikerush	Cyperaceae	--	--	OBL	0	0	0	0	0	2.5	0	0	0	0	2.5	2.5	15	15	0	2.5	0	2.5	0	2.5	2.5	15	0	2.7	43.5
Eleocharis macrostachya	creeping spikerush	Cyperaceae	-	-	OBL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0.7	4.3
Eleocharis obtusa	blunt spikesedge	Cyperaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	15	62.5	0	0	0	0	0	0	0	0	0	2.5	3.5	13.0
Eleocharis ovata	ovate spikerush	Cyperaceae	--	--	OBL	0	0	0	0	0	15	0	0	0	15	37.5	2.5	0	62.5	62.5	37.5	0	62.5	62.5	62.5	97.5	15	0	**23.2**	52.2
Eleocharis palustris	creeping spikerush	Cyperaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	2.5	0	2.5	0	0	0	0	0	0	0	0	0	0.2	8.7
Elodea canadensis	common waterweed	Hydrocharitaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	62.5	0	0	0	0	0	0	0	0	0	0	0	2.7	4.3
Elodea nuttallii	Nuttall's waterweed	Hydrocharitaceae	--	--	OBL	0	0	0	0	0	0	85	37.5	62.5	37.5	0	0	0	0	0	0	0	0	0	0	0	0	0	**9.7**	17.4
Epilobium ciliatum	Slender willow herb	Onagraceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0.1	4.3
Eragrostis hypnoides	teal lovegrass	Poaceae	--	--	OBL	0	0	0	0	0	2.5	0	0	0	0	2.5	0	0	0	0	2.5	0	2.5	0	0	0	0	0	0.4	17.4
Gnaphalium palustre	marsh cudweed	Asteraceae	--	--	FAC+	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0.2	8.7
Hydrocotyle ranunculoides	floating pennywort	Araliaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0.1	4.3
Juncus acuminatus	sharp-fruited rush	Juncaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	37.5	37.5	2.5	0	0	0	0	0	0	3.5	**17.4**
Juncus articulatus	jointleaf rush	Juncaceae	--	--	-	0	0	0	0	0	2.5	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0.2	**8.7**
Juncus bufonius	toad rush	Juncaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0.1	4.3
Juncus ensifolius	sword-leaved rush	Juncaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	15	0	0	0	0.8	8.7
Juncus oxymeris	pointed rush	Juncaceae	--	--	FACW+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	15	0	0	0	0	0	0.8	8.7
Juncus tenuis	slender rush	Juncaceae	--	--	FACW-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15	15	0	0	0	0	0	0	2.0	13.0
Leersia oryzoides	rice cutgrass	Poaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	15	2.5	0	15	37.5	0	37.5	62.5	37.5	15	85	2.5	**13.5**	43.5
Limosella aquatica	mudwort	Scrophulariaceae	--	--	OBL	0	0	0	0	0	15	0	0	0	0	15	2.5	0	0	2.5	0	0	0	0	0	0	0	0	1.5	17.4
Lindernia dubia	false pimpernel	Linderniaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	15	0	15	2.5	15	15	0	2.5	15	2.5	0	15	0	4.2	39.1
Ludwigia palustris	water purslane	Onagraceae	--	--	OBL	0	0	0	0	0	37.5	0	0	0	15	37.5	15	62.5	2.5	0	0	0	0	2.5	2.5	2.5	37.5	37.5	**11.0**	47.8
Lycopus americanus	cut-leaved bugleweed	Lamiaceae	--	--	OBL	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	2.5	2.5	0	2.5	0	0	0	0	0	0.4	17.4
Mentha arvensis	field ment	Lamiaceae	--	--	FACW-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	2.5	15	0	0	0	0	0	0	0.9	13.0
Mollugo verticillata	carpetweed	Molluginaceae	--	--	FAC	0	2.5	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	8.7
Montia fontana	water chickweed	Montiaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0.1	4.3

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		
Myriophyllum verticillatum	whorled watermilfoil	Haloragaceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0.1	4.3
Navarretia intertexta	needle-leaf navarretia	Polemoniaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0.1	4.3
Persicaria hydropiperoides	water pepper	Polygonaceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0.7	4.3
Persicaria punctata	dotted smartweed	Polygonaceae	--	--	-	0	0	0	0	0	37.5	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	1.7	8.7
Pseudognaphalium stramineum	cotton batting cudweed	Asteraceae	--	--	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	2.5	0	0	0	0	0	0	0.2	8.7
Sagittaria latifolia	broadleaf arrowhead	Alistamaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	2.5	37.5	0	2.5	37.5	0	3.6	21.7
Scutellaria lateriflora	mad-dog skullcap	Lamiaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	15	2.5	0	2.5	0	0	0	0	0	1.0	17.4
Typha angustifolia	narrow-leaf cattail	Typhaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0.1	4.3
Typha latifolia	broad-leaf cattail	Typhaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4.3
Invasive																														
Lythrum portula	water purslane	Lythraceae	B	--	NI	0	0	0	0	0	2.5	0	0	0	0	2.5	0	15	0	0	0	0	0	0	0	0	0	0	0.9	13.0
Non-native (non-listed)																														
Agrostis stolonifera	creeping bentgrass	Poaceae	D	-	FAC*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0.7	4.3
Gnaphalium uliginosum	marsh cudweed	Asteraceae	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	2.5	15	0	0	0	0	0	0	0.9	13.0
Myriophyllum spicatum	Eurasian watermilfoil	Haloragaceae	C	-	OBL	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4.3
Panicum dichotomiflorum	fall panicgrass	Poaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0.1	4.3
Persicaria maculosa	spotted lady's thumb	Polygonaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	2.5	0	0	0	0	0	0	0	0.2	8.7
Plantago major	broadleaf plantain	Plantaginaceae	--	--	FACU+	0	0	0	0	0	2.5	0	0	0	0	0	2.5	0	0	2.5	15	15	0	0	0	0	0	0	1.6	21.7
Trees and Shrubs																														
Populus trichocarpa	black cottonwood	Salicaceae	--	--	FAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0.1	4.3
Salix fluviatilis	Columbia willow	Salicaceae	--	--	OBL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0.1	4.3
Salix lasiandra var. lasiandra	Pacific willow	Salicaceae	-	-	FACW+	0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	4.3
Salix sitchensis	Sitka willow	Salicaceae	--	--	FACW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62.5	0	0	0	0	0	0	2.7	4.3
Bare ground	-	-	-	-	-	97.5	97.5	97.5	97.5	97.5	97.5	15	85	15	37.5	37.5	15	15	15	15	15	85	15	37.5	37.5	0	15	62.5	**47.9**	95.7

*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																											Habitat Average	SE
Cover of Native Herbaceous						**0**	**5**	**0**	**0**	**0**	**183**	**85**	**37.5**	**62.5**	**67.5**	**148**	**120**	**215**	**188**	**228**	**198**	**45**	**173**	**197.5**	**142.5**	**125**	**207.5**	**82.5**	**109.0**	**16.7**
Lower CI (80%)																											87.6	
Upper CI (80%)																											130.5	
Cover of Invasive Herbaceous Species						**0**	**0**	**0**	**0**	**0**	**2.5**	**0**	**0**	**0**	**0**	**2.5**	**0**	**15**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.9**	0.7
Lower CI (80%)																											0.0	
Upper CI (80%)																											1.7	
Cover of Non-Native (Non-Listed) Herbaceous Species						0	17.5	0	0	0	7.5	15	0	0	0	0	2.5	0	0	10	25	45	2.5	0	0	0	2.5	0	5.5	2.3
Lower CI (80%)																											2.6	
Upper CI (80%)																											8.5	
Cover of Native Tree and Shrub Species within Herbaceous Plots						0	0	0	0	0	2.5	0	0	0	0	0	0	0	0	2.5	2.5	62.5	0	0	0	0	0	0	3.0	2.7
Lower CI (80%)																											-0.4	
Upper CI (80%)																											6.5	
Cover of Bare Substrate and Moss						97.5	97.5	97.5	97.5	97.5	97.5	15	85	15	37.5	37.5	15	15	15	15	15	85	15	37.5	37.5	0	15	62.5	47.9	7.7
Lower CI (80%)																											38.0	
Upper CI (80%)																											57.8	
Weighted Prevalence Index All Strata							16.2				3.7	1.5	7.8	1.7	2.7	1.8	1.5	1.6	1.7	1.4	1.6	3.0	1.6	1.6	1.9	1.0	1.3	3.4	**3.0**	

ATTACHMENT 5. WEEKLY AVERAGE WATER TEMPERATURES

Week:	Willamette River	Side Channel	South Pond	Linnton Creek:
1	46.33	NA	NA	45.23
2	44.35	NA	NA	44.02
3	39.43	NA	NA	37.65
4	44.71	NA	NA	44.41
5	48.46	NA	NA	47.16
6	46.35	NA	NA	44.93
7	45.62	NA	NA	43.70
8	46.36	NA	NA	44.93
9	46.68	NA	NA	44.55
10	43.89	NA	NA	43.17
11	46.51	NA	NA	45.11
12	50.38	49.27	57.87	47.67
13	49.74	47.72	54.94	NA
14	50.86	47.47	57.41	NA
15	51.37	50.04	57.51	NA
16	54.75	49.90	61.68	NA
17	55.67	51.73	60.72	NA
18	53.95	50.04	58.42	NA
19	51.98	52.25	56.78	NA
20	60.17	56.84	63.96	NA
21	60.35	56.35	59.78	NA
22	60.03	57.93	63.47	NA
23	61.26	61.74	63.54	NA
24	64.84	63.58	68.45	NA
25	66.81	63.59	70.75	NA
26	68.24	65.49	72.93	NA
27	71.41	68.59	75.39	NA
28	74.66	71.70	78.94	NA
29	76.95	71.89	79.44	NA
30	75.37	68.55	76.00	60.95
31	74.26	68.45	76.85	62.89
32	74.43	69.09	77.86	62.96
33	74.44	67.18	73.94	62.38
34	72.27	64.80	70.45	61.78
35	71.10	64.57	72.92	61.10
36	70.56	66.23	84.94	63.40
37	70.29	64.52	NA	62.04
38	67.54	61.15	NA	59.77
39	65.04	61.98	65.60	60.87
40	63.91	57.26	61.03	57.49
41	NA	56.78	61.73	57.54
42	NA	56.75	58.36	57.64
43	NA	53.92	54.78	54.95
44	NA	52.74	52.59	52.35
45	NA	50.69	50.53	51.93

46	NA	50.38	50.72	50.20
47	NA	47.99	48.97	47.62
48	NA	47.67	50.00	47.61

ATTACHMENT 6. FLORA AND FAUNA SPECIES LIST

Scientific Name	Common Name	Family	Origin	Form	PPL Native	PPL Noxious Rank	ODA Rank	OR Wetland Status
Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Acer circinatum	vine maple	Sapindaceae	native	shrub	Y	--	--	FAC-
Acer macrophyllum	bigleaf maple	Sapindaceae	native	tree	Y	--	--	FACU
Achillea millefolium	yarrow	Asteraceae	native	perennial forb	Y	--	--	FACU
Acmispon americanus	Spanish clover	Fabaceae	native	annual forb	Y (var)	--	--	-
Acmispon parviflorus	Spanish clover	Fabaceae	native	perennial forb	Y	--	--	-
Adiantum jordanii	maiden hair fern	Pteridaceae	native	perennial fern	No	--	--	-
Agrostis capillaris	colonial bentgrass	Poaceae	non-native	perennial grass	No	D	-	-
Agrostis exarata	bentgrass	Poaceae	native	perennial grass	Y	--	--	FACW
Agrostis scabra	rough hairgrass	Poaceae	native	perennial grass	Y	-	-	FAC
Agrostis sp.	bentgrass	Poaceae	0	grass	No	--	--	-
Agrostis stolonifera	creeping bentgrass	Poaceae	non-native	perennial grass	No	D	-	FAC*
Aira caryophyllea	silver hairgrass	Poaceae	non-native	annual grass	No	--	--	-
Alisma lanceolatum	lanceleaf water plantain	Alistamaceae	non-native	aquatic forb	No	--	--	OBL
Alisma triviale	northern water plantain	Alistamaceae	native	aquatic forb	No	--	--	OBL
Alliaria petiolata	garlic mustard	Brassicaceae	invasive	forb	No	B	B	NI
Alnus rhombifolia	white alder	Betulaceae	native	tree	No	--	--	FACW
Alnus rubra	red alder	Betulaceae	native	tree	Y	--	--	FAC
Amaranthus sp.	amaranth	Amaranthaceae	native	perennial herb	No	-	-	-
Amelanchier alnifolia	serviceberry	Rosaceae	native	shrub	Y	--	--	FACU
Anagallis arvensis	scarlet pimpernel	Primulaceae	non-native	forb	No	--	--	-
Arbutus menziesii	Pacific madrone	Ericaceae	native	shrub	Y	-	-	UPL
Arctium lappa	greater burdock	Asteraceae	non-native	biennial forb	No	--	--	-
Azolla filiculoides	mosquito fern	Salviniaceae	native	aquatic forb	Y	--	--	OBL
Azolla mexicana	Mexican mosquito fern	Salviniaceae	native	aquatic forb	No	-	-	OBL
Baccharis pilularis	coyote brush	Asteraceae	native	shrub	No	--	--	-
Bare ground	Bare ground	-	Bare ground	bare ground	No	-	-	-
Beckmannia syzigachne	sloughgrass	Poaceae	native	perennial grass	Y	-	-	OBL
Bellardia viscosa	yellow glandweed	Orobanchaceae	non-native	annual forb	No	--	--	-
Bidens cernua	nodding beggar's tick	Asteraceae	native	forb	Y	-	-	FACW+
Bidens frondosa	leafy beggar's tick	Asteraceae	native	forb	Y	-	-	FACW+
Bromus diandrus	ripgut brome	Poaceae	non-native	annual grass	Y	D	-	-

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Bromus hordeaceus	soft chess	Poaceae	non-native	annual grass	No	-	-	-
Bromus sp.	brome	Poaceae	non-native	annual grass	No	-	-	-
Bromus sterilis	poverty brome	Poaceae	non-native	annual grass	No	-	-	-
Bromus tectorum	cheatgrass	Poaceae	invasive	annual grass	No	C	-	-
Buddleja davidii	butterfly bush	Scrophulariaceae	invasive	shrub	No	B	B	-
Callitriche sp.	water starwort	Plantaginaceae	native	aquatic forb	-	-	-	OBL
Calocedrus decurrens	Incense cedar	Cupressaceae	native	tree	Y	--	--	-
Calystegia sp.	bindweed	Convulvulaceae	non-native	perennial forb	No	--	--	-
Camassia quamash	small camas	Liliaceae	native	forb	Y	-	-	-
Cardamine flexuosa	wavy bittercress	Brassicaceae	non-native	forb	No	--	--	-
Cardamine pensylvanica	Pennsylvania bittercress	Brassicaceae	native	aquatic forb	Y	-	-	FACW
Cardamine sp.	bittercress	Brassicaceae	non-native	forb	0	--	--	-
Carex aperta	Columbia sedge	Cyperaceae	native	perennial grasslike herb	Y	--	--	FACW
Carex cusickii	Cusick's sedge	Cyperaceae	native	perennial grasslike herb	Y	--	--	OBL
Carex densa	dense sedge	Cyperaceae	native	perennial grasslike herb	Y	--	--	OBL
Carex obnupta	slough sedge	Cyperaceae	native	perennial grasslike herb	Y	--	--	OBL
Carex pachystachya	thick headed sedge	Cyperaceae	native	perennial grasslike herb	No	--	--	FAC
Carex scoparia	pointed broom sedge	Cyperaceae	native	perennial grasslike herb	0	-	-	-
Carex stipata	Sawbeak sedge	Cyperaceae	native	perennial forb	Y	--	--	-
Carex unilateralis	one-sided sedge	Cyperaceae	native	perennial grasslike herb	Y	--	--	FACW
Ceanothus sanguineus	Oregon tea tree	Rhamnaceae	native	shrub	Y	-	-	-
Ceanothus velutinus	mountain balm	Rhamnaceae	native	shrub	Y	-	-	-
Centaurium erythraeea	common centaury	Gentianaceae	non-native	forb	No	--	--	-
Cerastium glomeratum	sticky mouse ear chickweed	Caryophyllaceae	non-native	forb	0	0	0	-
Chamaenerion angustifolium	fireweed	Onagraceae	native	perennial forb	Y	-	-	FACU+
Chenopodium album	common lamb's-quarters	Chenopodiaceae	non-native	annual forb	No	--	--	FAC
Chondrilla juncea	skeletonweed	Asteraceae	invasive	forb	No	B	B	-
Circaea alpina	enchanter's nightshade	Onagraceae	native	forb	Y	-	-	-
Cirsium arvense	creeping thistle	Asteraceae	invasive	annual forb	No	C	B	FACU+

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Cirsium vulgare	bull thistle	Asteraceae	invasive	annual forb	No	C	B	FACU
Clarkia amoena	farewell to Spring	Onagraceae	native	forb	Y	--	--	-
Claytonia sibirica	candy flower	Montiaceae	native	forb	Y	-	-	FAC+
Clinopodium douglasii	Oregon tea	Acanthaceae	native	perennial herb	No	-	-	-
Conium maculatum	poison hemlock	Apiaceae	non-native	forb	No	C	B	FAC
Conyza canadensis	horseweed	Asteraceae	native	annual forb	No	-	-	FACU
Coreopsis tinctoria	Calliopsis	Asteraceae	native	annual forb	atkinsonian	--	--	FACU
Cornus nuttallii	mountain dogwood	Cornaceae	native	deciduous tree	Y	--	--	-
Cornus stolonifera	red osier dogwood	Cornaceae	native	shrub	Y	--	--	FACW
Crassula aquatica	wrinkle-seed pygmyweed	Crassulaceae	native	forb	Y	-	-	OBL
Crataegus douglasii	Douglas' hawthorn	Rosaceae	native	tree	Y	--	--	FAC
Crataegus monogyna	English hawthorn	Rosaceae	invasive	tree	No	C	B	FACU+
Cryptantha intermedia	clearwater cryptantha	Boraginaceae	native	forb	Y	--	--	-
Cyperus bipartitus	shining flatsedge	Cyperaceae	native	grasslike herb	No	-	-	-
Cyperus erythrorhizos	redroot flatsedge	Cyperaceae	native	perennial grasslike herb	Y	--	--	OBL
Cyperus sp.	flatsedge	Cyperaceae	native	grasslike herb	0	--	--	-
Cyperus squarrosus	awned flatsedge	Cyperaceae	native	grasslike herb	Y	-	-	-
Cytisus scoparius	Scotch broom	Fabaceae	invasive	shrub	No	C	B	-
Danthonia californica	California oatgrass	Poaceae	native	perennial grass	Y	--	--	FACU*
Daucus carota	wild carrot	Apiaceae	invasive	annual forb	No	C	--	-
Delphinium trolliifolium	Columbian Larkspur	Ranunculaceae	native	forb	No	--	--	-
Deschampsia cespitosa	tufted hairgrass	Poaceae	native	perennial grass	Y	--	--	FACW
Deschampsia elongata	hairgrass	Poaceae	native	perennial grass	Y	--	--	FACW-
Digitaria ischaemum	smooth crabgrass	Poaceae	non-native	perennial grass	No	-	-	FACU
Dipsacus laciniatus	wild teasel	Caprifoliaceae	invasive	biennial forb	No	-	B	-
Distichlis spicata	alkaline grass	Poaceae	native	perennial grass	No	-	-	FACW
Downingia elegans	Californian lobelia	Campanulaceae	native	aquatic forb	Y	--	--	OBL
Dysphania ambrosioides	Mexican tea	Amaranthaceae	non-native	forb	No	-	-	-
Echinochloa crus-galli	barnyard grass	Poaceae	non-native	annual grass	No	-	-	-
Echinops sphaerocephalus	glandular globe-thistle	Asteraceae	non-native	forb	No	--	--	-
Eleocharis acicularis	needle spikerush	Cyperaceae	native	aquatic forb	Y	-	-	OBL
Eleocharis macrostachya	creeping spikerush	Cyperaceae	native	aquatic forb	No	-	-	OBL
Eleocharis obtusa	blunt spikesedge	Cyperaceae	native	aquatic forb	Y	-	-	OBL

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Eleocharis ovata	ovate spikerush	Cyperaceae	native	aquatic forb	No	-	-	OBL
Eleocharis palustris	creeping spikerush	Cyperaceae	native	aquatic forb	Y	--	--	OBL
Elodea canadensis	common waterweed	Hydrocharitaceae	native	aquatic forb	No	--	--	OBL
Elodea nuttallii	Nuttall's waterweed	Hydrocharitaceae	native	aquatic forb	No	-	-	OBL
Elymus elymoides	bottlebrush	Poaceae	native	perennial grass	No	--	--	-
Elymus glaucus	blue wildrye	Poaceae	native	perennial grass	Y ssp	--	--	FACU
Elymus trachycaulus	bluebunch wheatgrass	Poaceae	native	perennial grass	Y	--	--	-
Elymus triticoides	beardless lyme grass	Poaceae	native	perennial grass	No	--	--	-
Epilobium brachycarpum	tall willowherb	Onagraceae	native	forb	No	--	--	UPL
Epilobium ciliatum	Slender willow herb	Onagraceae	native	aquatic forb	Y (var)	--	--	FACW-
Epilobium densiflorum	dense-flowered willow herb	Onagraceae	native	perennial forb	0	-	-	-
Epilobium minutum	little willowforb	Onagraceae	native	annual forb	No	--	--	-
Equisetum arvense	field horsetail	Equisetaceae	native	perennial forb	Y	--	--	FAC
Equisetum hyemale	common scouring rush	Equisetaceae	native	perennial forb	Y	--	--	FACW
Equisetum palustre	marsh horsetail	Equisetaceae	native	perennial forb	No	-	-	FACW
Eragrostis hypnoides	teal lovegrass	Poaceae	native	perennial grass	No	--	--	OBL
pectinacea	purple eragrostis	Poaceae	native	annual grass	No	-	-	FAC
Eriophyllum lanatum	Oregon sunshine	Asteraceae	native	annual forb	Yes	-	-	-
Erythranthe guttata	yellow monkeyflower	Phrymaceae	native	perennial forb	No	--	--	OBL
Erythranthe moschata	musk monkeyflower	Phrymaceae	native	forb	No	--	--	OBL
Eschscholzia californica	California poppy	Papaveraceae	native	perennial forb	Y	--	--	-
Euphorbia glyptosperma	rib seed sandmat	Euphorbiaceae	native	forb	No	-	-	-
Euphorbia maculata	spotted spurge	Euphorbiaceae	non-native	forb	No	--	--	UPL
Euphorbia prostrata	prostrate spurge	Euphorbiaceae	non-native	forb	No	-	-	--
Euthamia occidentalis	western goldenrod	Asteraceae	native	forb	No	-	-	FACW*
Festuca arundinacea	tall fescue	Poaceae	non-native	perennial grass	No	-	-	FAC-
Festuca idahoensis	blue fescue	Poaceae	native	perennial grass	No	--	--	FACU
Festuca occidentalis	western fescue	Poaceae	native	perennial grass	Y	--	--	-
Festuca perennis	perennial ryegrass	Poaceae	non-native	perennial grass	Y	D	--	-
Festuca roemeri	Roemer's fescue	Poaceae	native	perennial bunchgrass	Y	--	--	-
Frangula purshiana	cascara	Rhamnaceae	native	shrub	Y	-	-	-
Fraxinus latifolia	Oregon ash	Oleaceae	native	tree	Y	--	--	FACW
Galium aparine	cleavers	Rubiaceae	native	forb	Y	--	--	-

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Galium trifidum	three-petal bedstraw	Rubiaceae	native	forb	Y	--	--	-
Geranium dissectum	common wild geranium	Geraniaceae	non-native	annual forb	No	--	--	-
Geranium lucidum	shiny geranium	Geraniaceae	invasive	annual forb	No	C	B	-
Geranium oreganum	western Geranium	Geraniaceae	native	forb	No	--	--	-
Geranium purpurum	little-robin	Geriaceae	non-native	annual forb	No	--	--	-
Geum macrophyllum	large-leaved geum	Rosaceae	native	forb	Y	--	--	FACW-*
Gilia capitata	bluehead gilia	Polemoniaceae	native	forb	Y	--	--	-
Glyceria elata	tall mannagrass	Poaceae	native	bunchgrass	Y	--	--	FACW+
Glyceria x occidentalis	western mannagrass	Poaceae	native	bunchgrass	Y	-	-	OBL
Gnaphalium palustre	marsh cudweed	Asteraceae	native	forb	Y	--	--	FAC+
Gnaphalium uliginosum	marsh cudweed	Asteraceae	non-native	forb	No	-	-	-
Grindelia integrifolia	Puget Sound gumweed	Asteraceae	native	forb	Y	--	--	FACW
Helenium autumnale	common sneezeweed	Asteraceae	native	forb	No	-	-	FACW
Helminthotheca echoides	bristly ox tongue	Asteraceae	non-native	forb	No	-	-	-
Heteranthera dubia	grassleaf mudplantain	Pontederiaceae	native	perennial forb	No	-	-	-
Hieracium sp.	hawkweed	Asteraceae	non-native	forb	0	--	--	-
Hirschfeldia incana	shortpod mustard	Brassicaceae	non-native	forb	No	--	--	-
Holcus lanatus	common velvetgrass	Poaceae	non-native	perennial grass	No	--	--	-
Holodiscus discolor	oceanspray	Rosaceae	native	shrub	Y	--	--	-
Honckenya peploides	sea purslane	Caryophyllaceae	native	perennial forb	No	--	--	-
Hordeum brachyantherum	meadow barley	Poaceae	native	perennial grass	Y	--	--	FACW-
Hydrocotyle ranunculoides	floating pennywort	Araliaceae	native	aquatic forb	No	-	--	OBL
Hypericum perforatum	St. John's wort	Hypericaceae	non-native	forb	No	C	B	-
Hypochaeris radicata	spotted cat's ear	Asteraceae	invasive	forb	Yes	C	--	FACU
Impatiens capensis	spotted jewelweed	Balsaminaceae	invasive	aquatic forb	No	C	--	FACW
Iris pseudacorus	yellow flag iris	Iridaceae	invasive	aquatic forb	No	B	B	0
Isoetes howellii	Howell's quillwort	Isoetaceae	native	aquatic forb	No	-	-	OBL
Juncus acuminatus	sharp-fruited rush	Juncaceae	native	herb	Y	--	--	OBL
Juncus articulatus	jointleaf rush	Juncaceae	native	perennial forb	Y	-	-	-
articulatus	jointed rush	Juncaceae	native	grasslike herb	No	--	--	OBL
Juncus bufonius	toad rush	Juncaceae	native	herb	Y	--	--	FACW
Juncus effusus	soft rush	Juncaceae	native	herb	No	-	-	FACW
Juncus ensifolius	sword-leaved rush	Juncaceae	native	herb	Y	--	--	FACW
Juncus oxymeris	pointed rush	Juncaceae	native	herb	Yes	-	-	FACW+

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Juncus patens	common rush	Juncaceae	native	herb	Y	--	--	FACW
Juncus sp.	rush	Juncaceae	native	grasslike herb	No	--	--	-
Juncus tenuis	slender rush	Juncaceae	native	herb	Y	--	--	FACW-
Kickxia elatine	sharp-leaved fluellen	Plantaginaceae	non-native	forb	No	-	-	UPL
Lactuca serriola	Prickly lettuce	Asteraceae	invasive	annual forb	No	C	--	FACU
Lapsana communis	nipplewort	Asteraceae	non-native	annual forb	No	C	-	-
Lathyrus latifolius	broad-leaved sweet pea	Fabaceae	non-native	perennial vine	No	W	B	-
Leersia oryzoides	rice cutgrass	Poaceae	native	perennial grass	Y	--	--	OBL
Lemna minor	common duckweed	Araceae	native	aquatic forb	Y	--	--	OBL
Lepidium virginicum	least pepperwort	Brassicaceae	native	forb	No	-	-	FACU
Limosella aquatica	mudwort	Scrophulariaceae	native	aquatic forb	Y	--	--	OBL
Lindernia dubia	false pimpernel	Linderniaceae	native	aquatic forb	Y	--	--	OBL
Lonicera involucrata	coast twinberry	Caprifoliaceae	native	shrub	Y	--	--	FAC+*
Lotus corniculatus	bird's foot trefoil	Fabaceae	invasive	perennial forb	No	C	--	FAC
Ludwigia hexapetala	Six petal water primrose	Onagraceae	invasive	perennial forb	No	A	B	-
Ludwigia palustris	water purslane	Onagraceae	native	aquatic forb	Y	--	--	OBL
Ludwigia peploides	Marsh purslane	Onagraceae	invasive	perennial forb	No	-	B	-
Lupinus bicolor	miniature lupine	Fabaceae	native	annual forb	Y	--	--	-
Lupinus polyphyllus	bog lupine (large-leaved lupine)	Fabaceae	native	perennial forb	Y	--	--	FAC+
Lupinus rivularis	stream lupine	Fabaceae	native	perennial forb	Y	--	--	FACU
Lycopus americanus	cut-leaved bugleweed	Lamiaceae	native	aquatic forb	Y	--	--	OBL
Lycopus europaeus	European water-horehound	Lamiaceae	non-native	perennial forb	No	--	--	-
Lycopus uniflorus	northern bugleweed	Lamiaceae	native	aquatic forb	Y	--	--	OBL
Lysimachia nummularia	creeping jenny	Primulaceae	non-native	forb	No	W	-	-
Lythrum portula	water purslane	Lythraceae	invasive	perennial forb	No	B	--	OBL
Lythrum salicaria	purple loosestrife	Lythraceae	invasive	aquatic forb	No	B	B	FACW+
Mahonia aquifolium	tall Oregon grape	Berberidaceae	native	shrub	Y	-	-	-
Malus fusca	western crabapple	Rosaceae	native	tree	Y	--	--	FACW
Malva sylvestris	common mallow	Malvaceae	non-native	perennial forb	No	--	--	-
Malvella leprosa	alkali mallow	Malvaceae	native	perennial forb	No	--	--	FACU
Marchantia polymorpha	common liverwort	Marchantiaceae	native	liverwort	No	-	-	FACW
Matricaria discoidea	pineappleweed	Asteraceae	non-native	forb	No	--	--	-
Matricaria recutita	German chamomile	Asteraceae	non-native	annual forb	No	--	--	-
Medicago lupulina	black medic	Fabaceae	non-native	forb	No	--	--	FAC

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Medicago polymorpha	toothed medic	Fabaceae	non-native	forb	No	--	--	-
Melilotus albus	white sweetclover	Fabaceae	non-native	forb	No	--	--	-
Melilotus officinalis	yellow sweetclover	Fabaceae	non-native	annual forb	No	W	or W in monitoring	FACU
Mentha arvensis	field ment	Lamiaceae	native	perennial forb	Y	-	-	FACW-
Mentha pulegium	pennyroyal	Lamiaceae	invasive	aquatic forb	No	C	--	OBL
Mimulus guttatus	common monkeyflower	Phrymaceae	native	forb	Y	-	-	OBL
Mollugo verticillata	carpetweed	Molluginaceae	native	forb	No	-	-	FAC
Montia fontana	water chickweed	Montiaceae	native	aquatic forb	Y	--	--	OBL
Myriophyllum spicatum	Eurasian watermilfoil	Haloragaceae	non-native	aquatic forb	No	C	-	OBL
Myriophyllum verticillatum	whorled watermilfoil	Haloragaceae	native	aquatic forb	No	-	-	-
Nasturtium sp.	watercress	Brassicaceae	non-native	forb	No	-	-	OBL
Navarretia intertexta	needle-leaf navarretia	Polemoniaceae	native	aquatic forb	Yes	-	-	FACW
Nemophila maculata	fivespot	Boraginaceae	native	forb	0	--	--	-
Oemleria cerasiformis	Indian plum	Rosaceae	native	shrub	Y	--	--	FACU
Oenanthe sarmentosa	water parsley	Apiaceae	native	aquatic forb	Y	--	--	OBL
Oenothera biennis	evening primrose	Onagraceae	native	forb	Y	-	-	-
Panicum capillare	witch grass	Poaceae	native	annual grass	Y	-	-	FACU+
Panicum dichotomiflorum	fall panicgrass	Poaceae	non-native	perennial grass	No	--	--	FACW
Persicaria amphibia	longroot smartweed	Polygonaceae	native	aquatic forb	Y	--	--	OBL
Persicaria hydropiperoides	water pepper	Polygonaceae	native	aquatic forb	No	--	--	-
Persicaria lapathifolia	dock-leaf smartweed	Polygonaceae	native	forb	No	--	--	-
Persicaria maculosa	spotted lady's thumb	Polygonaceae	non-native	aquatic forb	No	--	--	FACW
Persicaria punctata	dotted smartweed	Polygonaceae	native	aquatic forb	No	-	-	-
Phacelia tanacetifolia	lacy phacelia	Boraginaceae	native	annual forb	No	--	--	-
Phalaris arundinacea	reed canarygrass	Poaceae	invasive	perennial grass	No	C	--	FACW
Philadelphus lewisii	wild mock orange	Hydrangeaceae	native	shrub	Y	--	--	-
Physcomitrium pyriforme	moss3	Funariaceae	native	moss	No	-	-	-
Physocarpus capitatus	ninebark	Rosaceae	native	shrub	Y	--	--	FACW-
Phytolaca americana	pokeweed	Phytolaccaceae	invasive	shrub	No	A	-	NI
Pinus ponderosa	yellow pine	Pinaceae	native	tree	Y (var)	--	--	FACU-
Plagiobothrys nothofulvus	rusty popcornflower	Boraginaceae	native	annual forb	No	--	--	FAC
Plagiobothrys scouleri	Scouler's popcornflower	Boraginaceae	native	aquatic forb	No	--	--	FACW
Plantago lanceolata	ribwort	Plantaginaceae	non-native	perennial forb	No	--	--	FAC
Plantago major	broadleaf plantain	Plantaginaceae	non-native	forb	No	--	--	FACU+

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Poa palustris	fowl bluegrass	Poaceae	non-native	perennial grass	No	--	--	FAC
Poa secunda	pine bluegrass	Poaceae	native	perennial grass	Y	--	--	-
Polygonum aviculare	doorweed	Polygonaceae	native	aquatic forb	Y	-	-	-
Polygonum paronychia	beach knotweed	Polygonaceae	native	shrub	No	-	-	-
Polypogon monspeliensis	rabbitsfoot grass	Poaceae	non-native	annual grass	No	--	--	FACW
Polystichum munitum	western sword fern	Dryopteridaceae	native	perennial fern	Y	--	--	FACU
Populus trichocarpa	black cottonwood	Salicaceae	native	tree	Y ssp	--	--	FAC
Portulaca oleracea	common purslane	Portulacaceae	non-native	annual forb	No	-	-	FAC
Potamogeton crispus	curly-leaf pondweed	Potamogetonaceae	invasive	aquatic herb	No	C	-	OBL
Potentilla gracilis	slender cinquefoil	Rosaceae	native	forb	Y var	--	--	FAC
Poteridium occidentale	annual burnet	Rosaceae	native	forb	Y	--	--	-
Prunella vulgaris	self heal	Lamiaceae	native	perennial forb	Y	--	--	-
Prunus emarginata	bitter cherry	Rosaceae	native	tree	Y	--	--	FACU*
Prunus virginiana var. demissa	western choke cherry	Rosaceae	native	shrub	Y	-	-	FACU
Pseudognaphalium stramineum	cotton batting cudweed	Asteraceae	native	forb	No	-	-	-
Pseudotaxiphyllum elegans	moss4	Plagiotheciaceae	native	moss	No	-	-	-
Pseudotsuga menziesii	Douglas fir	Pinaceae	native	tree	Y	--	--	FACU*
Quercus garryana	Oregon oak	Fagaceae	native	tree	Y	--	--	-
Ranunculus muricatus	creeping buttercup	Ranunculaceae	non-native	aquatic forb	No	--	--	FACW
Ranunculus sceleratus	cursed buttercup	Ranunculaceae	native	aquatic forb	0	-	-	OBL
(Fallopia sachalinensis)	giant knotweed	Polygonaceae	non-native	forb	No	-	-	-
Ribes sanguineum	flowering currant	Grossulariaceae	native	shrub	Y	--	--	-
Rorippa palustris	bog yellowcress	Brassicaceae	native	aquatic forb	No	-	-	OBL
Rorippa sylvestris	creeping yellowcress	Brassicaceae	invasive	aquatic forb	No	-	B	OBL
Rosa nutkana	Nootka rose	Rosaceae	native	shrub	Y	-	-	FAC
Rosa pisocarpa	swamp rose	Rosaceae	native	shrub	Y	--	--	FAC
Rubus discolor	Himalayan blackberry	Rosaceae	invasive	shrub	No	C	B	-
Rubus leucodermis	blackcap raspberry	Rosaceae	native	shrub	Y	--	--	-
Rubus parviflorus	thimbleberry	Rosaceae	native	shrub	Y	--	--	FAC-
Rubus spectabilis	salmonberry	Rosaceae	native	shrub	Y	--	--	FAC+
Rubus ursinus	trailing blackberry	Rosaceae	native	shrub	Y	--	--	FACU
Rumex acetosella	common sheep sorrel	Polygonaceae	non-native	perennial forb	No	--	--	FACU+
Rumex crispus	curled dock	Polygonaceae	non-native	forb	No	--	--	FAC+
Rumex obtusifolius	bitter dock	Polygonaceae	non-native	perennial forb	No	-	-	FAC

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Rumex salicifolius	willow dock	Polygonaceae	native	aquatic forb	No	--	--	FACW
Sagina procumbens	bird-eye pearlwort	Caryophyllaceae	non-native	aquatic forb	No	--	--	FAC
Sagittaria latifolia	broadleaf arrowhead	Alistamaceae	native	aquatic forb	Y	--	--	OBL
Salix exigua var. columbiana	Columbia River willow	Salicaceae	native	tree	Y	--	--	OBL
Salix fluviatilis	Columbia willow	Salicaceae	native	shrub	No	--	--	OBL
Salix hookeriana	Hooker's willow	Salicaceae	native	shrub	Y	-	-	FACW
Salix lasiandra var. lasiandra	Pacific willow	Salicaceae	native	tree	Y	-	-	FACW+
Salix prolixa	Mackenzie's willow	Salicaceae	native	shrub	Y	-	-	FACW+
Salix scouleriana	Scouler willow	Salicaceae	native	tree	Y	--	--	FAC
Salix sitchensis	Sitka willow	Salicaceae	native	tree	Y	--	--	FACW
Sambucus nigra ssp. caerulea	blue elderberry	Adoxaceae	native	shrub	Y (SSP)	-	-	FACU
Sambucus racemosa	red elderberry	Adoxaceae	native	shrub	Y (SSP)	--	--	FACU
tabernaemontani	soft-stemmed bulrush	Cyperaceae	native	aquatic forb	No	--	--	OBL
Scirpus microcarpus	panicled bulrush	Cyperaceae	native	aquatic forb	Y	--	--	OBL
Scutellaria lateriflora	mad-dog skullcap	Lamiaceae	native	aquatic forb	No	-	-	FACW
Sedum album	white stonecrop	Crassulaceae	native	perennial forb	No	--	--	-
Sisyrinchium idahoense	blue-eyed Grass	Iridaceae	native	perennial forb	No	--	--	FACW
Solanum dulcamara	bittersweet nightshade	Solanaceae	non-native	shrub	No	C	-	FAC+
Solidago canadensis	California goldenrod	Asteraceae	native	forb	No	--	--	FACU
Sparganium emersum	simplestem bur-reed	Typhaceae	native	aquatic forb	Yes	--	--	OBL
Sphagnum sp.	Sphagnum moss (moss2)	Sphagnaceae	native	moss	No	-	-	-
Spiraea douglasii	Douglas spiraea	Rosaceae	native	shrub	Y	--	--	FACW
Stachys cooleyae	hedge-nettle	Lamiaceae	native	forb	Y	--	--	FACW
Symphoricarpos albus	common snowberry	Caprifoliaceae	native	shrub	Y	--	--	FACU
Symphyotrichum subspicatum	Douglas aster	Asteraceae	native	forb	Y	-	-	-
Tanacetum vulgare	tansy	Asteraceae	invasive	perennial forb	No	C	--	NI
Taxacum officinale	common dandelion	Asteraceae	non-native	perennial forb	No	-	-	-
Thuja plicata	western redcedar	Cupressaceae	native	tree	Y	--	--	FAC
Tolmiea menziesii	Piggyback Plant	Saxifragaceae	native	forb	Y	--	--	FAC*
Tortula (truncata)	moss1	Pottiaceae	native	moss	No	-	-	-
Trifolium arvense	rabbitsfoot clover	Fabaceae	invasive	forb	No	C	--	-
Trifolium campestre	hop trefoil	Fabaceae	non-native	annual forb	No	--	--	-
Trifolium dubium	lesser trefoil	Fabaceae	non-native	annual forb	No	--	--	UPL
Trifolium hirtum	rose clover	Fabaceae	non-native	annual forb	No	--	--	-

Abies grandis	grand fir	Pinaceae	native	tree	Y	--	--	FACU-*
Trifolium hybridum	Alsike clover	Fabaceae	non-native	annual forb	No	W	or W in monitoring	FAC
Trifolium incarnatum	crimson clover	Fabaceae	non-native	annual forb	No	--	--	-
Trifolium pratense	red clover	Fabaceae	invasive	forb	No	C	--	FACU
Trifolium repens	white clover	Fabaceae	invasive	forb	No	C	--	FAC*
Trifolium sp.	clover	Fabaceae	non-native	forb	No	-	--	-
Tsuga heterophylla	western hemlock	Pinaceae	native	tree	Y	-	-	-
Typha angustifolia	narrow-leaf cattail	Typhaceae	native	aquatic forb	Y	-	-	OBL
Typha latifolia	broad-leaf cattail	Typhaceae	native	aquatic forb	Y	-	-	OBL
Unknown chenopod	0	Amaranthaceae	0	forb	0	--	--	-
Unknown grass	grass	Poaceae	0	grass	0	--	--	-
Urtica dioica	stinging nettle	Urticaceae	native	forb	No	--	--	FAC+
Verbascum blattaria	moth mullein	Scrophulariaceae	invasive	biennial forb	No	C	--	UPL
Verbascum thapsus	great mullein	Scrophulariaceae	invasive	biennial forb	No	C	-	-
Veronica americana	American brooklime	Plantaginaceae	native	forb	Y	--	--	OBL
Veronica anagallis-aquatica	water speedwell	Plantaginaceae	non-native	aquatic forb	No	--	--	OBL
Veronica peregrina	American speedwell	Plantaginaceae	native	aquatic forb	No	--	--	OBL
peregrina	purselane speedwell	Plantaginaceae	non-native	aquatic forb	No	--	--	OBL
Viburnum ellipticum	Oregon viburnum	Adoxaceae	native	shrub	Y	--	--	-
Vicia hirsuta	hairy vetch	Fabaceae	non-native	forb	No	--	--	-
Vicia sativa	common vetch	Fabaceae	non-native	annual forb	No	D	or W in monitoring	UPL
Vicia tetrasperma	slender vetch	Fabaceae	non-native	annual forb	No	--	--	-
Vicia villosa var. villosa	hairy vetch	Fabaceae	non-native	annual forb	No	C	--	-
Vulpia myuros	[Festuca] rat-tail six-weeks grass	Poaceae	non-native	annual grass	No	--	--	FAC
Xanthium strumarium	rough cocklebur	Asteraceae	native	perennial forb	No	--	--	FAC

Scientific Name	Common Name
Birds	
Actitis mascularius	spotted sandpiper
Agelaius phoeniceus	red-winged blackbird
Anas platyrhynchos	mallard
Aphelocoma californica	western scrub jay
Ardea herodias	great blue heron
Astur cooperii	Cooper's hawk
Bombycilla cedrorum	Cedar waxwing
Branta canadensis	Canada goose
Bubo virginianus	great horned owl
Buteo jamaicensis	Red-tailed hawk
Butorides virescens	green heron
Calipepla californica	California quail
Calypte anna	Anna's hummingbird
Cardellina pusilla	Wilson's warbler
Cathartes aura	turkey vulture
Chaetura vauxi	Vaux's swift
Charadrius vociferus	killdeer
Colaptes auratus	Northern flicker
Contopus sordidulus	western wood-pewee
Corvus brachyrhynchos	American Crow
Corvus corax	common raven
Cyanocitta stelleri	Stellar's jay
Falco peregrinus	peregrine falcon
Falco sparverius	American kestrel
Geothlypis trichas	common yellowthroat
Haemorhous mexicanus	house finch
Haliaeetus leucocephalus	bald eagle
Hirundo rustica	barn swallow
Junco hyemalis	dark-eyed junco
Leiothlypis celata	orange-crowned warbler
Megaceryle alcyon	belted kingfisher
Melospiza melodia	song sparrow
Mergus merganser	common merganser
Molothrus ater	brown-headed cowbird
Pandion haliaetus	osprey
Passer domesticus	house sparrow
Passerculus sandwichensis	savannah sparrow
Petrochelidon pyrrhonota	cliff swallow
Picoides pubescens	downy woodpecker
Pipilo maculatus	spotted towhee

Piranga ludoviciana	western tanager
Podilymbus podiceps	pied-billed grebe
Poecile atricapillus	black-capped chickadee
Porgne subis	purple martin
Regulus calendula	ruby-crowned kinglet
Sayornis nigricans	black phoebe
Setophaga petechia	yellow warbler
Spinus psaltria	Lesser goldfinch
Spinus tristis	American goldfinch
Stelgidopteryx serripennis	northern rough-winged swallow
Streptopelia decaocto	Eurasian collared dove
Sturnus vulgaris	European starling
Tachycineta bicolor	tree swallow
Tachycineta thalassina	violet-green swallow
Thryomanes bewickii	Bewick's wren
Turdus migratorius	American robin
Tyrannus verticalis	western kingbird
Tyto alba	barn owl
Zenaida macroura	mourning dove
Zonotrichia leucophrys	white-crowned sparrow
Fishes	
Acipenser transmontanus	white sturgeon
Acrochelius alutaceus	chiselmouth
Cottus sp.	sculpin
Fundulus diaphanus	banded killifish
Gambusia affinis	mosquitofish
Gasterosteus aculeatus	threespine stickleback
Micropterus dolomieu	smallmouth bass
Misgurnus anguilicaudatus	oriental weatherfish
Mylocheilus caurinus	peamouth
Oncorhynchus tshawytscha	Chinook salmon
Ptychocheilus oregonensis	Northern pikeminnow
Rhinichthys sp.	dace
Mammals	
Canis latrans	coyote
Castor canadensis	American beaver
Lontra canadensis	river otter
Mephitis mephitis	striped skunk
Mustela frenata	long-tailed weasel
Myodes californicus	western red-backed vole
Odocoileus hemionus	black-tailed deer
Peromyscus maniculatus	American deer mouse

Phoca vitulina	harbor seal
Procyon lotor	raccoon
Spermophilus beecheyi	California ground squirrel
Zalophus californianus	California sea lion
Herptiles	
-	Unknown turtle
Lithobates catesbeianus	bullfrog
Pseudacris regilla	Pacific chorus frog
Scleoporus occidentalis	western fence lizard
Thamnophis atratus hydrophilus	Oregon garter snake
Thamnophis sirtalis concinnus	red-spotted garter snake

ATTACHMENT 7. FISH MONITORING REPORT

LINNTON MILL RESTORATION PROJECT

YEAR 5 FISH MONITORING REPORT

LINNTON MILL RESTORATION PROJECT

YEAR 5 FISH MONITORING REPORT

NOVEMBER 2024

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Cascade Environmental Group, LLC. Project Name: Linnton Mill Restoration Project – Year 5 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 plan was to monitor 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 continued to create challenges to monitoring that should inform future monitoring efforts. A more effective means of surveying the site would be to use seines due to the high level of turbidity that is routinely encountered when surveyors arrive on site to conduct sampling.

2 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. Once fully restored, the property will provide critical off-channel habitat for juvenile salmonids in the Willamette River and be home to over 80,000 native trees and shrubs. The site will also provide upland and riverine habitat to many native birds and animals. Linnton Creek, which flows from Forest Park, provides important cold-water inflow to the habitat.

3 METHODS

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 conducted the snorkel survey while the other documented results. Seines were not used as a method of sampling due to the risk of

collecting more than one salmonid in a net set. This continues to create 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 even more challenging during the 2024 sampling season as flows and turbidity in the Willamette River dictated when snorkeling and underwater video would be effective means of viewing fish underwater. There were no opportunities on scheduled monitoring days to effectively view underwater in February and March. Prolonged high turbidity in February followed by low flows in March prevented us from conducting any monitoring in those months. Water temperatures in the Willamette River (see Table x) were >13^{0}C when we sampled in April, and they remained stable through May but increased to >18^{0}C in June when the last monitoring events occurred.

4 RESULTS

4/26/2024

The water temperature in the Willamette River was 56.1^{0}F and ranged between 54^{0}F (Linnton Creek confluence) and 56^{0}F (south ponded area of side channel) within the side channel at the time of the survey. The sky was cloudy throughout the survey. Water clarity (Figure 1.) had significantly improved from February and May but still was not ideal for snorkel survey efforts as the snorkeler could only see about 2-3 feet in front of their dive mask. Fish seen underwater were not identified due to low water clarity. Small schools of what appeared to be native minnows were seen along the shoreline in shallow water <12" deep. Underwater video quality was poor due to turbidity level, and no fish were seen on video recordings.

- 50-100 unidentified minnows viewed from shoreline along the channel margins
- Adult salmonid (post spawn steelhead?) seen in the side channel

<u>Snorkel</u>

- 30-40 unidentified fish near the Linnton Creek confluence

Figure 1. View looking upstream toward Linnton Creek. Water clarity was good in lower 1/3 of the side channel but became limited as we moved up the side channel

5/10/2024

The water temperature in the Willamette River at the time of survey had cooled from the previous survey in the end of May to 52.4^{0}F clear s. Water temperature in the side channel remained cool with a temperature of 52.6^{0}F at Linnton and 56.6^{0}F in the ponded area. The sky was clear throughout the survey effort. Over 1" of rain fell on May 5th leading to concern that flows and turbidity would be too high, but surprisingly, it was clear enough to see fish along the shoreline (native minnows) and underwater by the snorkeler. Unfortunately, as we progressed up the side channel, water clarity quickly lowered to the point that it was difficult to see more than 1- 2 feet underwater. It appears that water in the upper end of the side channel remains turbid regardless of conditions in the channel downstream of Linnton Creek as we were not able to see effectively once we passed and moved upstream. Most fish were seen near the mouth of Linnton Creek where cool, clear water combines with complex habitat in the form of a gravel/cobble bed, an undercut bank, and overhead cover.

- 50-100 unidentified minnows along the channel margins downstream of Linnton
- One dead adult salmonid found along the shoreline of the side channel (appeared to be the same fish seen two weeks prior).

<u>Snorkel</u>

- 2 juvenile salmonids (likely Chinook) at mouth of Linnton
- 15 stickleback
- 40 unidentified minnows

Figure 2. View looking upstream toward Linnton Creek. Water clarity continued to be good in lower 1/3 of the side channel. Water level was higher than 4/26 leading to all wood interacting with water

Figure 3. View looking toward mouth of Linnton Creek (gravel deposition). Water is clearer to the right (downstream) of the confluence due to influence of clear flow from Linnton Creek.

Figure 4. View of channel upstream of Linnton Creek. Turbid water often limits the opportunity to see more than 2 feet underwater.

Figure 5. View under large wood structure at the upper end of the channel. Aquatic vegetation growth and algae create challenges for the snorkeler to access complex habitats and around log jams.

5/24/2024

The water temperature was 59.5^{0}F in the Willamette River, 58.7^{0}F in the south ponded area, and 60.2^{0}F at the mouth of Linnton Creek at the time of survey. Rain fell again prior to the survey (0.4" on 5/22) and conditions turned out to be poor in all areas of the side channel except for downstream of Linnton Creek where visibility was limited to about 2-feet. We conducted video monitoring followed by snorkeling with most fish being seen by the snorkeler near the mouth of Linnton Creek.

Snorkel

- 2 juvenile Chinook (1 mortality on bank upstream of Linnton Creek)
- 200 juvenile minnows (including pikeminnow, peamouth, chiselmouth, dace and juvenile smallmouth bass/banded killifish)
- 20 stickleback
- 15 sculpin

Video camera

- 40-50 unidentified minnows and one potential salmonid (parr marks not clear indicator)

6/13/2024

The Willamette River warmed up to 65.6^{0}F leading to a reduction in the quality of rearing conditions in the mainstem river channel. The water temperature in the south ponded area had warmed to 65.9^{0}F which exceeds the criteria established by Oregon DEQ for rearing juvenile salmonids. Side channel temperatures downstream of Linnton Creek remained cool and was even cooler than two weeks prior at 58.5^{0}F. This continued to be the primary area where fish were seen but other areas with structure along the bank also contained fish (both native and non-native). Boat traffic in the Willamette River was heavy with boat wakes from sport and commercial traffic creating conditions that increased turbidity and reduced visibility in the lower portion of the channel downstream of Linnton Creek. Two juvenile Chinook were documented on video recording downstream of Linnton Creek beneath the large wood structure on the left bank.

Snorkel

- 100-150 juvenile minnows (including pikeminnow, peamouth, chiselmouth, dace) and juvenile bass/killifish
- 13 stickleback
- 5 sculpin

Video

- 2 juvenile Chinook (see Linnton_6-13Chinook.mp4)
- 2 smallmouth bass (~8”) in upper ponded area underneath wood structure

Figure 6. Photo showing turbid water that enters the site with boat wakes that create extensive inflow/outflow in the lower 1/3 of the side channel

6/25/2024

The Willamette River warmed slightly from the previous monitoring event two weeks prior but the temperature in the south ponded area had increased to 69.1^{0}F. Salmonids will seek cooler water when daily temperature maximum exceeds 70^{0}F particularly, when they can't access cooler refuge water nearby. The water temperature in the side channel downstream of Linnton Creek remained below 65^{0}F (63.6^{0}F).

Snorkel

- >300 juvenile minnows (including pikeminnow, peamouth, chiselmouth, dace) and juvenile bass/killifish

Figure 7. Conditions in June proved to be better than early in the season due to clarity of water that allowed for effective underwater viewing.

5 DISCUSSION

Juvenile salmonids, native minnows, and non-native fish species were identified during surveys conducted in the spring of 2024 at the Linnton Mill Restoration site. Juvenile salmonids (Chinook) were documented on two occasions, in May and early June. The fish observed in May and June were sub-yearling juveniles approximately 60-80 mm in length. These juvenile fish would be expected to spend another 10-12 months rearing prior to emigration to the ocean during the spring of 2025.

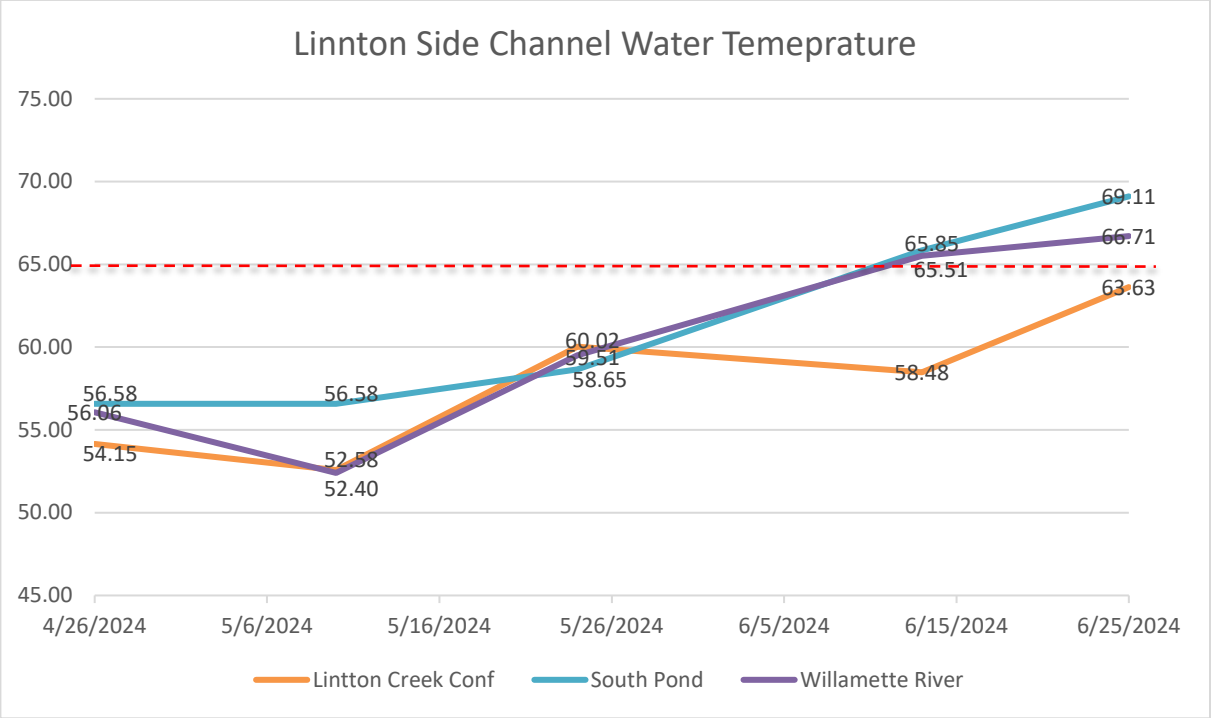
The water temperature in the Linnton side channel remained cool downstream of the confluence with Linnton Creek as sampling progressed into June (Figure 8). This area also represented the

highest concentration of fish documented during snorkel surveys from each sampling event. As water temperature climbed in the Willamette River and upper ponded area of the side channel, temperatures remained cool enough near Linnton Creek for salmonids to benefit from rearing there as opposed to warmer conditions in less complex habitats.

A significant portion of the site continues to be a challenge to survey effectively due to prolonged turbid water conditions and water levels that dictate methods that would be more effective at collecting target fish species. Snorkel conditions were very limited most of the season and did not allow effective underwater viewing until early May and June when a large portion of the fish seen were non-native species. 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.

Forecasting conditions that provided water clarity good enough for underwater observations continued to prove challenging. Boat traffic in the Willamette River, including sport fishers and commercial ships, regularly create wakes that flood in and out of the side channel. This leads to turbid water conditions that are difficult to predict and avoid as it severely limits survey effectiveness and quality. In future monitoring years, it is recommended the monitoring plan allows for flexibility 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. In general, turbidity is too high for effective snorkel or underwater video from November to April.

Figure 8. Oregon Department of Environmental Quality Aquatic Use Subcategory Criterion - Salmon and Trout Rearing and Migration (64.4^{0}F)



6 RECOMMENDATIONS

1) Consider use of seines for sampling when naturally high suspended sediments create challenges for underwater viewing
    - Allows for more frequent sampling since conditions will be less of an influence on effectiveness of sampling activities
    - Allows for sampling late fall through early spring when salmonids are most likely to be using the site
    - Reduces safety risk for snorkelers who may be exposed to very cold water and air temperatures from November to March
2) Investigate ways to expand benefits of complex habitat near the mouth of Linnton Creek.
    - Habitat complexity in the area provided by gravel/cobble substrate, undercut banks, and overhead cover provided by large wood and riparian vegetation.

- Cool water influence from Linnton Creek creates refugia from warm temperatures in the Willamette River and south ponded area of the side channel.

3) Determine if water quality conditions (i.e., high water temperature and low dissolved oxygen) in the upper ponded area are limiting distribution of native fish species upstream of Linnton Creek
    - It is challenging to see fish in the upper ponded area due to extensive aquatic vegetation and algal growth
    - Non-native fish were regularly documented in the upstream ponded area including 2 smallmouth bass (~8")
4) Consider planting additional willow and other native vegetation that will provide more dense cover along the shoreline downstream of Linnton Creek. Vegetation around the mouth of Linnton is thicker, possibly due to influence from the creek during drier summer months.

ATTACHMENT 8. BREEDING BIRD MONITORING REPORT

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
Telephone number: (503) 570-0800

TECHNICAL MEMORANDUM

Date: **December 10, 2024**

To: **Kate Allan, Associate**
Will Ohlenforst, Associate
RestorCap
337 17th Street, Suite 200
Oakland, CA 94612

From: **Christie Galen, Senior Ecologist**

Re: **Breeding Bird Surveys at the Linnton Mill Restoration Project – Year 5**
PHS # 7998

PROJECT BACKGROUND

Pacific Habitat Services, Inc. (PHS) was contracted by RestorCap to conduct breeding bird surveys at the Linnton Mill Restoration Project for Year 5 of a 10-year monitoring effort. The site is located on the south bank of the Willamette River in Linnton, Oregon and is designed to provide high quality habitat for fish and wildlife impacted by hazardous releases in the Portland Harbor Superfund site. Restoration activities were completed in 2020, and include off-channel wetland, riparian, upland and active channel margin (river beach) habitats. The purpose of the surveys is to document breeding bird abundance and habitat use of the restoration area and evaluate restoration success.

SURVEY METHODOLOGY

Bird monitoring occurred three times during the spring breeding season in May and June 2024 following established protocols. Surveys were conducted along five transects that were established during pre-construction monitoring (Figure 1). The transects are spaced approximately 100 meters apart, running perpendicular to the river, and across all restoration habitat types (i.e. shoreline, off-channel, wetland, upland). Point count surveys occurred every 50 meters along transects for a minimum of five minutes at each sample point. When high water elevations prevented access to sample points, counts were conducted as close to the sample point as practicable. All species heard or observed within 50 meters of the sample point or flushed between points were recorded. Visual or auditory detections beyond 50 meters from a sample point were not included in the results. Avian behavior and use of habitat features were also recorded. Behaviors included fly overs, perching, singing, and foraging; habitat use elements included plantings, installed snags, log/boulder piles. Additional bird sightings were recorded during bald eagle surveys and are referenced in this report.

RESULTS

Christie Galen, PHS, conducted three surveys on May 9, June 5, and June 25, 2024. Each survey began at dawn and included 15 point count stations along the five established transects. A species list of all birds detected during each survey and their relative abundance is provided in Table 1. A summary table comparing the relative abundance of birds detected since the onset of monitoring in 2020 is provided in Table 2. Since different observers monitored bird activity each year, there might be discrepancies in data collection (i.e. misidentification of bird species, interpretation of data collection methodology); however, general trends are still evident.

A total of 62 bird species have been observed on site in the past five years including 46 during breeding bird surveys and an additional 16 species during bald eagle surveys. During breeding bird surveys, 34 species were detected in 2024, compared to 32 species in 2023, and 16 in 2020 (Table 2). The increase in species diversity directly reflects habitat improvements associated with site restoration. The site provides improved cover, nesting opportunities, food resources (e.g. seeds, insects), and accessible refreshment.

The most commonly detected species in 2024 included swallows (barn (*Hirundo rustica*), cliff (*Petrochelidon pyrrhonota*), violet-green (*Tachycineta thalassina*)), Vaux's swift (*Chaetura vauxi*), Canada goose (*Branta canadensis*), white-crowned sparrow (*Zonotrichi leucophrys*), and European starling (*Sturnus vulgaris*). Barn and cliff swallows occurred on site prior to site restoration and likely nested in the eaves of the buildings that were present at that time. Although they do not nest on site now, they forage above the site with other swallows and Vaux's swifts. Canada geese were also present on site prior to restoration and continue to use the site for rearing young and loafing; two adult geese and six goslings were observed foraging in the off-river channel often concealed by adjacent willow cover. White-crowned sparrows inhabit site uplands and utilize the snags, log piles, and plantings for territorial singing and the log piles and grasslands for nesting. European starlings forage throughout the site and nested in a woodpecker cavity in an installed snag.

Sixteen species were confirmed nesting and/or rearing young on site in 2024 based on their behavior (i.e. territorial song, alarm calls, food carrying) and/or nest detection during breeding bird and bald eagle surveys. These species are listed in the following table with the behavior displayed detailed below.

Common Name	Species
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
Anna's hummingbird	*Calypte anna*
California Quail	*Callipepla californica*
California scrub-jay	*Aphelocoma californica*
Canada Goose	*Branta canadensis*
European Starling	*Sturnus vulgaris*
Killdeer	*Charadrius vociferus*

Common Name	Species
Mourning dove	*Zeneaida macroura*
Northern Flicker	*Colaptes auratus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Savannah sparrow	*Passerculus sandwichensis*
Song Sparrow	*Melospiza melodia*
Spotted Sandpiper	*Actitis macularius*
White-crowned Sparrow	*Zonotrichi leucophrys*

- An American robin with a barely flighted juvenile foraged on and around log piles and vegetation at the edge of off-river channel
- An American kestrel pair with one juvenile perched in on-site snags
- Anna's hummingbirds conducted courtship display
- California quail sounded alarm calls

- A California scrub-jay family perched in young red alder trees, snags, and log piles and foraged nearby
- Canada geese and goslings swam in the off-river channel, foraged for food in the adjacent wetlands, and loafed on the beach
- Killdeer and spotted sandpiper family groups foraged along the river and channel shorelines
- A mourning dove family foraged on the ground and perched together on the island snag
- A northern flicker pair with four juveniles perched on an installed snag and foraged on site
- A juvenile red-tailed hawk begged for food from an installed snag while an adult hunted from another nearby snag
- Red-winged blackbirds and song sparrows carried food to young in the shrubby wetlands
- Savannah sparrows and white-crowned sparrows carried food into wood piles and/or grasslands in uplands
- European starlings nested in a woodpecker cavity in one of the installed snags by the fencerow as mentioned earlier)

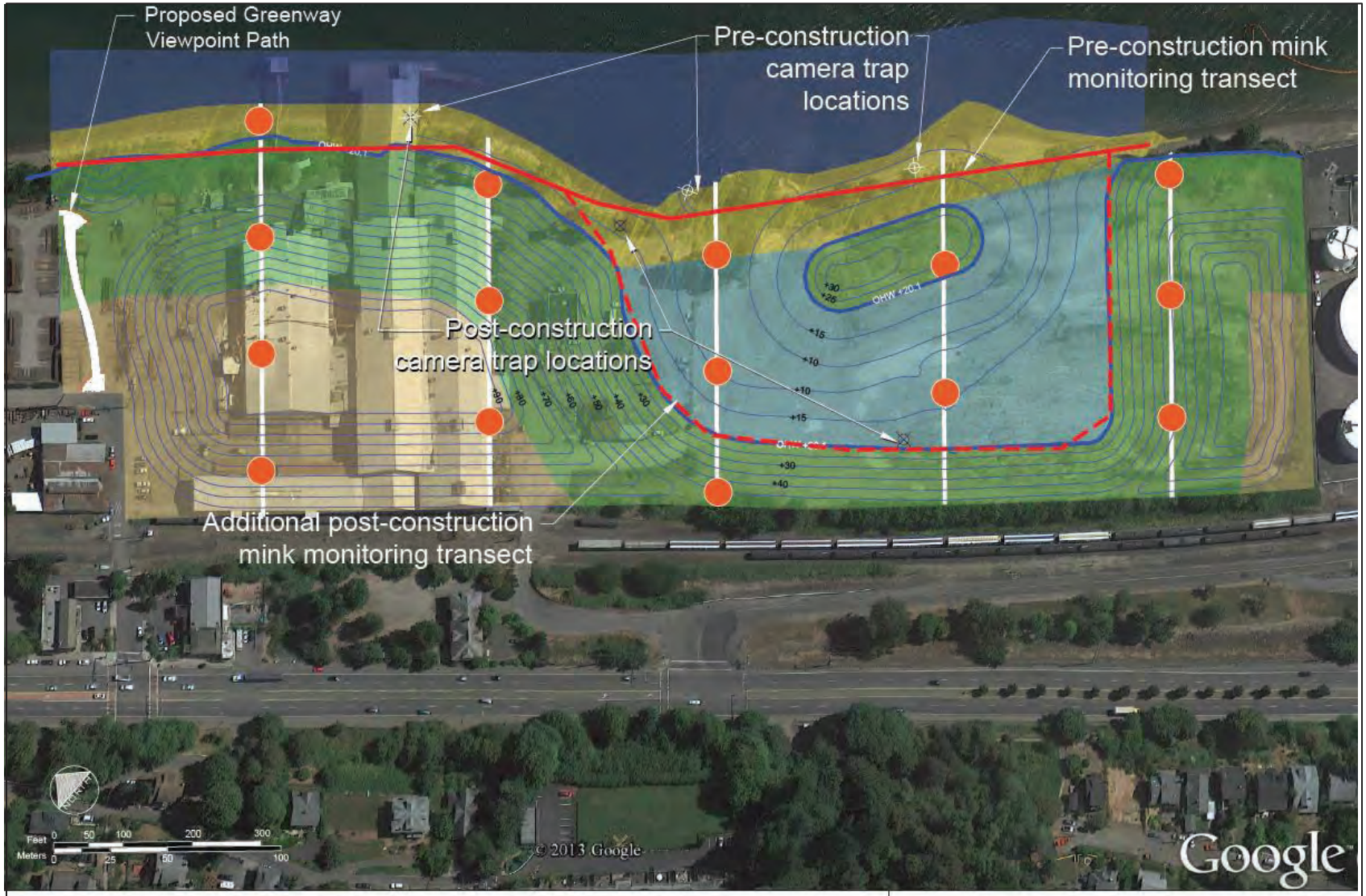
As mentioned in the Project Methodology Section, a variety of avian species utilized the habitat elements installed by the project. Habitat element use was noted in both breeding bird and bald eagle surveys (Table 3).White-crowned sparrows sang from upland log piles and snags, and from tree and shrub plantings; they foraged on grass and forb seeds planted by the project, and nested in log piles. Belted kingfisher (*Megaceryle alcyoon*), bald eagle (*Haliaeetus leucocephalus*), and red-winged blackbirds perched on snags in and adjacent to the channel. Belted kingfishers fished from these perches and carried food off site. American crow (*Corvus brachyrhynchos*), American kestrel, brown-headed cowbird (*Molothrus ater*), California scrub-jay, European starling, mourning dove, northern flicker, red-tailed hawk, and white-crowned sparrow perched on snags in the uplands. A pair of mallards (*Anas platyrhynchos*) also investigated potential nest locations in log piles and rock piles, but no further nesting activity was detected.

The restoration site also attracts and supports occasional visitors with food and refreshment. Some of these species include lazuli bunting (*Passerina amoena*), ruby-crowned kinglet (*Corthylio calendula*), Wilson's warbler (*Cardellina pusilla*), yellow warbler (*Setophaga petechia*), yellow-rumped warbler (*Setophaga coronata*), western kingbird (*Tyrannus verticalis*), western tanager (*Piranga ludoviciana*), and western wood pewee (*Contopus sordidulus*).

SUMMARY

During Year 1 monitoring at the Linnton Mill Restoration Project, the most common use of the site was by water-associated birds foraging along the shore of the river and in the off-channel habitat. By 2024 (Year 5), the site supported increased avian species richness and utilization. The native plantings of trees, shrubs, and groundcover provide food (i.e. seeds, berries, insects), cover and nesting opportunities. The off-channel wetland provides access to refreshment with protective cover. The site attracts a variety of resident and migratory species and is expected to continue to support them. It has become an oasis in an urban industrial area.

Attachments: Figure 1 – Avian Monitoring Transects
Table 1 – Avian Monitoring Summary 2024
Table 2 – Avian Species Relative Abundance 2020-2024
Table 3 – Avian Species Use of Habitat and Habitat Elements 2024



Shallow Water
ACM
Off-Channel
Riparian
Upland
Mink monitoring transect
Mink camera trap location, typ.
Bird sampling location, typ.

Wildlife Monitoring

Grette Associates LLC
ENVIRONMENTAL CONSULTANTS

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

Wildlife Monitoring Plan
Linnton Mill Restoration Site

FIGURE
1

Table 1. Species List of All Birds Detected During Surveys and their Relative Abundance

Common Name	Latin Name	Survey Dates			Total Count	Relative Abundance
		5/9/24	6/5/24	6/25/24		
American crow	*Corvus brachyrhynchos*	5	1	1	**7**	2.2%
American goldfinch	*Spinus tristis*	2	3	1	**6**	1.9%
American robin	*Turdus migratorius*	1	1	1	**3**	0.9%
Anna's hummingbird	*Calypte anna*	0	1	0	**1**	0.3%
Bald eagle	*Haliaeetus leucocephalus*	1	4	1	**6**	1.9%
Barn swallow	*Hirundo rustica*	3	4	19	**26**	8.2%
Belted kingfisher	*Megaceryle alcyoon*	1	0	2	**3**	0.9%
Black-capped Chickadee	*Poecile atricapillus*	0	0	2	**2**	0.6%
Brown-headed Cowbird	*Molothrus ater*	1	0	0	**1**	0.3%
California Quail	*Calipipla californica*	1	0	0	**1**	0.3%
California scrub-jay	*Aphelocoma californica*	2	3	1	**6**	1.9%
Canada Goose	*Branta canadensis*	10	13	0	**23**	7.2%
Cedar Waxwing	*Bombycilla cedrorum*	0	0	2	**2**	0.6%
Cliff swallow	*Petrochelidon pyrrhonota*	2	15	27	**44**	13.8%
Common merganser	*Mergus merganser*	5	0	0	**5**	1.6%
Cooper's hawk	*Astur cooperii*	0	1	0	**1**	0.3%
European Starling	*Sturnus vulgaris*	5	10	13	**28**	8.8%
House Finch	*Haemorhousus mexicanus*	1	0	4	**5**	1.6%
House Sparrow	*Passer domestius*	0	4	1	**5**	1.6%
Killdeer	*Charadrius viciferus*	1	3	2	**6**	1.9%
Lesser goldfinch	*Spinus psaltria*	0	2	0	**2**	0.6%
Mallard	*Anas platyrhynchos*	2	1	0	**3**	0.9%
Mourning dove	*Zenaida macroura*	3	0	1	**4**	1.3%
Northern Flicker	*Colaptes auratus*	2	0	2	**4**	1.3%
Orange-crowned Warbler	*Leiothlypis celata*	1	0	0	**1**	0.3%
Osprey	*Pandion haliaetus*	0	1	1	**2**	0.6%
Red-tailed hawk	*Buteo jamaicensis*	0	0	3	**3**	0.9%
Red-winged Blackbird	*Agelaius phoeniceus*	4	4	0	**8**	2.5%
Song Sparrow	*Melospiza melodia*	1	3	4	**8**	2.5%
Spotted Sandpiper	*Actitis macularius*	2	5	3	**10**	3.1%
Tree swallow	*Tachycineta bicolor*	3	1	0	**4**	1.3%
Vaux's Swift	*Chaetura vauxi*	4	11	9	**24**	7.5%
Violet-green Swallow	*Tachycineta thalassina*	6	5	15	**26**	8.2%
White-crowned Sparrow	*Zonotrichi leucophrys*	10	18	11	**39**	12.2%
	Totals	**79**	**114**	**126**	**319**	**100.0%**

Table 2. Avian Species Relative Abundance (%) in 2020, 2022, 2023, and 2024 (Years 1, 3, 4, and 5)

Common Name	Species Name	% (2024)	% (2023)	% (2022)	% (2020)	Change from Baseline
American crow	*Corvus brachyrhynchos*	2.2	0.8	0	1.9	(+)
American goldfinch	*Spinus tristis*	1.9	1.5	0	0	(+)
American kestrel	*Falco sparverius*	0	0.4	1.8	0	0
American robin	*Turdus migratorius*	0.9	0.8	0.9	0	(+)
Anna's hummingbird	*Calypte anna*	0.3	0	0	0	(+)
Bald eagle	*Haliaeetus leucocephalus*	1.9	1.1	0.9	0	(+)
Barn swallow	*Hirundo rustica*	8.2	6.8	4.4	2.9	(+)
Belted kingfisher	*Megaceryle alcyon*	0.9	0	1.8	0	(+)
Bewick's wren	*Thryomanes bewickii*	0	0	0	0.5	(-)
Black-capped chickadee	*Poecile atricapillus*	0.6	0	0.9	0	(+)
Brown-headed cowbird	*Molothrus ater*	0.3	0.8	0	0	(+)
California quail	*Aphelocoma californica*	0.3	0	0.9	0	(+)
California scrub-jay	*Aphelocoma californica*	1.9	0.4	0	0	(+)
Canada goose	*Branta canadensis*	7.2	5.3	9.7	51.7	(-)
Cedar waxwing	*Bombycilla cedrorum*	0.6	0	0.9	0	(+)
Cliff swallow	*Petrochelidon pyrrhonota*	13.8	7.5	0	0	(+)
Common merganser	*Mergus merganser*	1.6	0	0	0	(+)
Common raven	*Corvus corax*	0	0.4	0	0	0
Common yellowthroat	*Geothlypis trichas*	0	0.8	0	0	0
Cooper's hawk	*Astur cooperii*	0.3	0	0	0	(+)
Double-crested cormorant	*Nannopterum auritum*	0	0	0.9	0	0
European starling	*Sturnus vulgaris*	8.8	33.5	0.9	1.0	(+)
Great blue heron	*Ardea herodias*	0	0	1.8	0	0
House finch	*Haemorhousus mexicanus*	1.6	1.1	0	0	(+)
House sparrow	*Passer domesticus*	1.6	2.3	0.9	0	(+)
House wren	*Troglodytes aedon*	0	0	0	3.4	(-)
Killdeer	*Charadrius vociferus*	1.9	2.3	2.7	19.3	(-)
Least sandpiper	*Calidris minutilla*	0	0	0	1.0	(-)
Lesser goldfinch	*Spinus psaltria*	0.6	1.9	0	0	(+)
Mallard	*Anas platyrhynchos*	0.9	0	4.4	1.9	(-)
Mourning dove	*Zenaida macroura*	1.3	0.4	0	0	(+)
Northern flicker	*Colaptes auratus*	1.3	1.9	0.9	0	(+)
N Rough-winged swallow	*Stelgidopteryx serripennis*	0	0.4	0	0	0
Orange-crowned warbler	*Leiothlypis celata*	0.3	0	0	0	(+)
Osprey	*Pandion haliaetus*	0.6	1.9	0.9	1.9	(-)
Purple martin	*Progne subis*	0	1.5	0	0	0
Red-tailed hawk	*Buteo jamaicensis*	0.9	1.1	1.8	0	(+)
Red-winged blackbird	*Agelaius phoeniceus*	2.5	0.8	1.8	0	(+)
Song sparrow	*Melospiza melodia*	2.5	4.5	3.5	0	(+)
Sparrow spp.		0	0	0	4.8	species
Spotted sandpiper	*Actitis macularius*	3.1	1.5	4.4	1.0	(+)
Swallow spp.		0	0	0	5.3	species
Tree swallow	*Tachycineta bicolor*	1.3	0.8	0	0.5	(+)
Turkey vulture	*Cathartes aura*	0	0.8	0	0.5	(-)
Vaux's swift	*Chaetura vauxi*	7.5	0.4	26.5	0	(+)
Violet-green swallow	*Tachycineta thalassina*	8.2	7.9	17.7	0	(+)
White-crowned sparrow	*Zonotrichi leucophrys*	12.2	9.8	8.8	1.9	(+)
Wilson's warbler	*Cardellina pusilla*	0	0.4	0.9	0	0
Total number of Species detected		**34**	**32**	**25**	**16**	(+)

Note: 2020 sparrows/swallows misidentified and lumped into Sparrow spp. and Swallow spp. in Table 2; 2022 incidental sightings collected during Bald Eagle Surveys; 2023 data included 2 surveys (June and July) rather than 3 surveys.

Table 3. Avian Use of Habitat and Habitat Elements Observed at Linnton Mill Restoration Site in 2024

*species noted during bald eagle surveys

Common Name	Scientific Name	Nest on/ near site	Habitat Elements	Resoration Habitat
American Crow	*Corvus brachyrhynchos*		Snag, Log pile	All
American Goldfinch	*Spinus tristis*			Uplands, Island
American Kestrel*	*Falco sparverius*	X	Snag	Uplands, Island
American Robin	*Turdus migratorius*	X	Snag, Log pile	Uplands Island, Fencerow
Anna's Hummingbird	*Calypte anna*	X		All
Bald Eagle	*Haliaeetus leucocephalus*		Snag	Uplands,Wetland, Island
Barn Swallow	*Hirundo rustica*			Forage over site, Mudflat
Belted-kingfisher	*Megaceryle alcyon*		Snag, Log pile	Wetland, Island, Channel
Bewick's Wren*	*Thryomanes bewickii*			Fencerow
Black-capped Chickadee	*Poecile atricapillus*			Fencerow
Brown-headed Cowbird	*Molothrus ater*		Snag	Fencerow
California Quail	*Callipepla californica*	X		Upland, Wetland
California Scrub Jay	*Aphelocoma californica*		Snag, Log pile	Uplands, Island and Fencerow
Canada Goose	*Branta canadensis*	X		Uplands, Wetland, Channel
Cedar Waxwing	*Bombycilla cedrorum*			Fencerow, Upland
Cliff Swallow	*Petrochelidon pyrrhonota*			Forage over site, Mudflat
Common Merganser	*Mergus merganser*			Wetland
Common Yellowthroat	*Geothlypis trichas*			Wetland
Dark-eyed Junco (Oregon)*	*Junco hyemalis*			Fencerow
Double-crested Cormorant*	*Phalacrocorax auritus*			Wetland
Downy Woodpecker*	*Picoides pubescens*		Snag	Fencerow, Upland
Eurasian Collared Dove*	*Streptopelia decaocto*			Fencerow, Upland
European Starling	*Sturnus vulgaris*	X	Snag (nest), Log pile	All
Great-blue Heron*	*Ardea herodias*			Wetland, Shoreline
House Finch	*Haemorhousus mexicanus*			Fencerow, Upland
House Sparrow	*Passer domesticus*			Fencerow
Killdeer	*Charadrius vociferus*	X	Log pile	Uplands, Wetland, Riparian, Shore

Common Name	Scientific Name	Nest on/ near site	Habitat Elements	Resoration Habitat
Lazuli Bunting*	*Passerina amoena*			Upland
Lesser Goldfinch	*Spinus psaltria*			Uplands, Fencerow
Mallard	*Anas platyrhynchos*		Log pile	Wetland, Channel
Mourning Dove	*Zenaida macroura*	X	Snag, Powerline	Uplands, Fencerow, Island
Northern Flicker	*Colaptes auratus*	X	Snag	Uplands, Fencerow
Northern Harrier*	*Circus hudsonius*			Upland, Wetland
N. Rough-winged Swallow*	*Stelgidopteryx serripennis*			Forage over shoreline
Orange-crowned warbler	*Vermivora celata*			Fencerow, Upland, Wetland
Osprey	*Pandion haliaetus*			Fly-over
Peregrine falcon*	*Falco peregrinus*			Fly-over
Purple martin*	*Progne subis*			Fly-over
Red-tailed Hawk	*Buteo jamaicensis*		Snag	Uplands, Island, Fencerow
Red-winged Blackbird	*Agelaius phoeniceus*	X	Snag	Island
Savannah Sparrow*	*Passerculus sandwichensis*			Uplands
Song Sparrow	*Melospiza melodia*	X		Uplands, Wetlands, Fencerow
Spotted Sandpiper	*Actitis macularius*	X	Log pile	Wetland, Shoreline
Spotted Towhee*	*Pipilo maculatus*			Fencerow, Upland
Tree Swallow	*Tachycineta bicolor*			Forage over site
Turkey Vulture*	*Cathartes aura*			Upland
Vaux's Swift	*Chaetura vauxi*			Forage over site
Violet-green Swallow	*Tachycineta thalassina*			Forage over site
Western Wood-Pewee*	*Contopus sordidulus*			Fencerow
White-crowned Sparrow	*Zonotrichia leucophrys*	X	Snag, Log pile	Uplands
Wilson's snipe*	*Gallinago delicata*			Wetland
Wilson's warbler*	*Cardellina pusilla*			Wetland
Yellow-rumped Warbler*	*Setophaga coronata*			Wetland
Yellow Warbler	*Setophaga petechia*			Wetland

ATTACHMENT 9. BALD EAGLE MONITORING REPORT

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
Telephone number: (503) 570-0800

TECHNICAL MEMORANDUM

Date: **December 10, 2024**

To: **Kate Allan, Associate**
Will Ohlenforst, Associate
RestorCap
337 17th Street, Suite 200
Oakland, CA 94612

From: **Carole Hallett, Ornithologist**

Re: **Bald Eagle Surveys at the Linnton Mill Restoration**
PHS Project No. 7418

PROJECT BACKGROUND

Pacific Habitat Services, Inc. (PHS) was contracted by RestorCap to conduct bald eagle (*Haliaeetus leucocephalus*) surveys at the Linnton Mill Restoration Project for Year 5 of a 10-year monitoring effort. The site is located along the Willamette River in the Linnton neighborhood of Portland, Oregon. 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 the surveys is to document bald eagle use of the restoration area and record incidental sightings of other vertebrate species.

SURVEY METHODOLOGY

Surveys were scheduled weekly through August 2024 and included two hours of observations, either just after dawn or just before dusk. When inclement weather or other circumstances interfered with scheduling, the missed survey was conducted as soon as possible. Observations were conducted from one or more vantage points that were selected during monitoring in year three (2022). Because there is no single non-intrusive vantage point that allows observation of the entire site three vantage points: North, South and Mid were used (Figure 1).

Observers listened, scanned the area with 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).

RESULTS

Bald Eagle (BAEA)

Presence/Absence/Abundance

Carole Hallett, Pacific Habitat Services, Inc (PHS) assisted by Christie Galen, PHS, conducted twenty-eight surveys of the Linnton site between February 16 and August 29, 2024. One or more Bald Eagles (BAEA) were seen on-site during 7 of the surveys (25%) (Table 1). A minimum of two adults, one sub-adult, and one fledgling BAEA were seen on-site during surveys, including the resident Linnton adults, one offspring, and at least one sub-adult.

Additionally, BAEA were observed in the vicinity during 18 of the surveys (64%) (Table 1). These included at minimum the resident pair of adults and one offspring, at least one sub-adult, and a second pair of adults that roosted and perhaps nested on the slope about three quarters of a mile north from the Linnton nest grove (Figure 2).

Habitat elements used

The most frequently used feature (5 times) was the clump of deciduous trees (N. trees) located on the riverbank at the NE corner of the site (Figure 1). These trees were used for perching by a minimum of two adults, one sub-adult and one fledgling BAEA. BAEA flew between the N. trees, hunting perches across the river, and the nest grove on the forested slope above Linnton. On one occasion an adult was seen flying to these trees to gather branches and carry them back to the nest grove (Figure 2) (Table 1). At least one adult and one fledgling BAEA used the log jumble, pilings and snags on the island for perching and hunting (2 times), and the stout riverside snags on the northeast slope for perching, hunting and eating (Figure 1). The South tree that was the most often used perch in 2022 was not used during surveys this year.

Timing and seasonality

Of the 7 surveys with on-site BAEA sightings, 4 were morning surveys and 3 were evening surveys. Surveys began in mid-February, approximately 8 weeks later than in Year 3. BAEA were active in the vicinity throughout the survey period. The first on-site adult BAEA was recorded on March 14, 2024, when an adult was seen gathering sticks from the N. trees. The fledgling from the resident pair was recorded on-site on August 8, 2024, twelve days later than the 2022 fledgling was first seen on-site. Only one BAEA was seen on or off site after August 8, 2024 (Table 1).

Nesting bald eagles

A pair of BAEA occupied the same nesting area that was used in 2022, located on the forested ridge approximately 0.3 miles west-northwest of the site (Figure 2). They were seen multiple times perched on that slope and flying to a spot just out of view beyond the 2022 nest, including once carrying food and twice carrying nest material. The exact location of the nest was not determined despite repeated observations outside the 2 hour/week survey period. In addition to using live trees, snags and pilings on-site, these adult BAEA flew over and past the site, and hunted from light poles, trees and railings across the river to the east. A begging hatch-year BAEA was perched on-site on the island snag and north upland riverside snags on August 8, 2024. It then flew to join an adult BAEA across the river. Based on this and the behavior of the adults on previous surveys, egg laying and incubation is estimated to have started in early mid-March, hatching in early May and fledging in mid-late July. Given the 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

Other than the resident Linnton pair and one offspring, at least one sub-adult bald eagle was seen on-site one time each in February, April and early June: each time in or near the N. trees. Off-site, one or more sub-adult BAEA was seen perched or flying in the vicinity, and a second pair of adult BAEA perched on transmission towers well north of the site.

Other Species

American Beaver

On two occasions a beaver was observed. Once swimming into the off-channel waterway to browse on willows and other vegetation, and once swimming past the site in the river (Table 1).

Other bird species

Other species of birds were incidentally sighted during the bald eagle surveys. These are included PHS's Technical Memorandum for Breeding Bird Surveys at the Linnton Mill Restoration Project – Year 5 in Table 3.

SUMMARY

The Linnton Mill restoration site was used by a local pair of breeding adults and their offspring, and one or more sub-adult BAEA. Live remnant trees near the river at the north end of the site received the most BAEA use. BAEA use of the site is expected to continue and may increase as trees on the restoration site become better established. Snags and pilings were also used for perching. If these fall, the remnant live trees will become more essential. The island snag was used by a resident hatch year (HY) in both 2022 and 2024. Retention of this feature is desirable. This year, the fledgling perched there and watched baby ground squirrels sunning on the rocks below.

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. A vantage point on the south upland (South point) gave the best overall view; however, a nearby cottonwood tree (S. tree), the only tree in this area, was a favored perch for BAEA, Red-tailed Hawks and other birds during BAEA surveys in 2022. To avoid disturbing any raptors found perched in that tree, or on snags and pilings in the middle of the site upon arrival, two alternate vantage points (North and Mid) were established in 2022 (Figure 1). While on-site vegetation and BAEA perch selection has changed since 2022, each of these observation points was useful on a given survey.

The North observation point offered views of the south upland, island, out over the river and much of the riparian area, but it had limited cover and required shifting position – and creating a disturbance - to see towards the top of the north upland and the BAEA nest grove on the slope beyond. This point offered big clear views but was the least unobtrusive of the three. The Mid observation point gave excellent cover, and it was sometimes possible to sneak in and observe without disturbing activity on the island snags, S. tree and vicinity but since our surveys in 2022 the vegetation in the restored area has grown tall enough that it partially obscures the view of the wetland, the island, and the south upland.

As the views from each of the three observation points are partially obscured by the topography of the site, to compensate for the restricted views of the north trees, several of the riverside snags on the north upland, the east facing slopes and much of the river beach (areas that could be expected to be used by BAEA for hunting/perching), were viewed by scanning from the paved walkway at the north end of the site at the start of a survey, and/or by walking along the river or up and over the north upland on the way out following a survey. No BAEA were seen on the walk throughs, but BAEA and other raptors were spotted on the riverside snags when scanning from the paved walkway.

Attachments:

Figure 1 - Site Boundary, Vantage Points, and On-site Bald Eagle Locations
Figure 2 - Off-site Nest Grove, Roost sites, and Perches
Table 1 - Bald Eagle Surveys Linnton Mill Restoration Site February – August 2024

Project #7418
12/10/2024

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
GoogleEarth, 2022

FIGURE
1

Project #7418
12/10/2024

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
GoogleEarth, 2022

FIGURE
2

Table 1 Bald Eagle Surveys Linnton Mill Restoration Site 2/16/24 - 8/29/24

Date	BAEA on-site	Location	Time and Behavior on-site (off-site)	BAEA off-site
2/16/24	1 Sub-adult	N. trees	07:50: 1 Adult standing in 2022 nest 08:10: 1 Adult and 1 Sub-adult fly past site and cross river 08:45: 2 Adult and sub-adult circle over nest grove 09:10: Sub-adult appeared to land in N. Trees, out of view	2 Adult, 1 Sub-adult
2/22/24	0	n/a	16:15: #1 Adult male perched across river by car lot 16:30: #2 Adult female and #3 Adult male perched on transmission towers further north 16:47: #2 Adult female flew out of sight 17:00: #4 sub-adult (third year (TY)) flies past site 17:08: #5 Adult female flies over site joined by #1 Adult male from car lot and they flew to roost on Linnton slope 17:53: #2 Adult female returns to tower 17:58: #2 Adult female and #3 Adult male fly to roost on slope further north	4 Adults, 1 Sub-adult (TY) Resident Linnton pair, neighboring pair from farther north, and unknown TY
2/26/24	0	n/a	No BAEA seen	0
3/4/24	0	n/a	No BAEA seen	0
3/14/24	1 Ad	N. trees	09:15-09:25: Adult bumped a Red tailed Hawk (RTHA) from riverside snag, N. upland, then flew to N. trees, broke a branch from N. tree and carried it out of view on Linnton slope.	1 Adult
3/19/24	0	n/a	No BAEA seen	0
3/30/24	0	n/a	17:05: 1 Adult perched across river on light pole 18:15: Adult flew from light pole out of view behind north upland at roost time	1 Adult
4/5/2024	0	n/a	17:45: 1 Adult flew over site west to east then turned north out of view behind N. upland 18:40: Adult on light pole across the river 19:47: Adult flies from light pole out of view down river	1 Adult
4/13/24	0	n/a	08:39: 1 Adult male perched across river 09:35: 1 sub-adult perched same area as Adult	1 Adult, 1 Sub-adult

Date	BAEA on-site	Location	Time and Behavior on-site (off-site)	BAEA off-site
4/22/24	1 Sub-adult	vicinity of N. trees	17:40: 1 Adult flies over site and perches in 2022 nest grove, it was eyeing me as if flew over 19:04: 1 Sub-adult flies from vicinity of N. trees to perch in tree across the river, 2 Adults perched across the river)	3 Adult, 1 sub-adult
4/27/24	1 Ad	island piling	18:00-18:18: 1 Adult perched on piling by island, hunting; 18:18 flies upriver out of view 18:21: Adult, possibly same bird, flies low across the site and out of view on Linnton slope	1 Adult
5/1/24	0	n/a	no BAEA seen	0
5/8/24	0	n/a	No BAEA seen; Beaver swims past site, tail slap slap, river shore	0
5/15/24	0	n/a	No BAEA seen	0
5/23/24	1 Ad	N. trees	06:10: 1 Adult perched in N. tree flushed by me as I approached from outside the fence to check riverside snags. It landed again in N. tree when I moved away to enter site through the gate 07:25: Adult flies from vicinity of N. trees to out of view on Linnton slope; beaver in off river channel	1 Adult
5/30/24	0	n/a	06:00-07:06: Adult perched on Linnton slope then flew across river 07:50-0800: Adult heard in vicinity and later seen perched on Linnton slope near old nest	1 Adult
6/5/24	1 Sub-adult (Second Year (SY))	N. trees	5:30-5:35: Adult pair flew over site one upstream one to Linnton slope 5:35-06:00: Adult perched in various trees in forest; until no longer in view 7:10-7:25: Sub-adult flew over site and perched in black cottonwood near NE corner.	2 Adult, 1 Sub-adult
6/16/24	0	n/a	06:55: 1 Sub-adult (SY) perched on Linnton slope 08:45: 1 Adult perched on Linnton slope where SY seen earlier	1 Adult, 1 Sub-adult (SY)
6/27/24		n/a	07:08: Adult carries vegetation toward out of view location on Linnton slope; a second Adult is perched on slope watching 07:37: 1 Sub-adult (SY) flies over river, chases Osprey 08:10: Adult remains perched on Linnton slope	2 Adult, 1 Sub-adult (SY)
7/3/24	0	n/a	06:45: 1 Adult carrying food flies out of sight toward presumed nest on Linnton slope	1 Adult

Date	BAEA on-site	Location	Time and Behavior on-site (off-site)	BAEA off-site
7/12/24	0	n/a	06:25-06:58: 1 Adult circles low and close to Linnton slope, flew out of sight behind slope in usual spot, then perched on face of slope 06:58: Adult flew across river and perched	1 Adult
7/17/24	0	n/a	06:35-08:19: 1 Adult perched on Linnton slope then flew toward river	1 Adult
7/25/24	0	n/a	08:20: 1 Adult circles close to Linnton slope then out of view behind trees 08:22: Adult perched in snag on Linnton slope	1 Adult
7/31/24	0	n/a	06:30-07:38: 1 Adult on utility pole near tracks just north of site, 1 Adult on transmission tower across river.	2 Adult
8/8/24	1 HY	Island and riverside snags	18:55: hear hatch year (HY) BAEA begging then see it land on island snag. A fledgling flicker is in top of snag, juvenile California ground squirrels in rockpile below snag. 19:20: HY preening, NOFL preening, ground squirrels are gone. Coyote pup hunts along edge of island and squirrels give alarm calls, HY BAEA watches. 19:34: HY flies to riverside snag on north upland 20:04: HY flies across river to join perched adult 20:14: Adult flies out of view up river 20:18: HY is gone	1 Adult, 1 fledgling
8/16/24	0	n/a	No BAEA seen	0
8/19/24	0	n/a	No BAEA seen	0
8/29/24	0	n/a	17:30-18:22: 1 Adult perched in Douglas fir on Linnton slope then flies across river to roost	1 Adult

ATTACHMENT 10. CREDIT LEDGER

Linnton Water Credits - Credit Ledger

RESTORCAP
Connecting Capital with Nature

12/29/2024

Credit Type	Max Approved	Credits Released to Date		Credits Currently Available		Credits Sold to Date	
		NRDA	404 Approved	NRDA	404 Approved	NRDA	404 Approved
NRD Only	148.91	147.81		47.19		100.62	
Dual-Purpose Riverine	216.10	52.35	105.18	50.34	103.17	2.01	2.01
Dual-Purpose Palustrine	137.50	52.34	66.92	52.34	66.92	0	0
Total	**502.51**	**252.5**	**172.1**	**149.87**	**170.09**	**102.63**	**2.01**

Date	Transaction Type (Release/ Sale/ Deduction)	Credit Type	Serial No.	Purchaser Credit Need (404/NRD/Cut Fill)	Purchaser / Permittee	Purchaser Address / Phone	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)	NRD	-	-	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	NRD	-	-	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)	No-net-fill	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	NRD	Port of Portland	-	0.6		
10/20/2021	Sale	NRD-Only	LWC-NRD-100.35 through LWC-NRD-100.45	No-net-fill	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

Linnton Water Credits - Credit Ledger

RESTORCAP
Connecting Capital with Nature

Date	Transaction Type (Release/ Sale/ Deduction)	Credit Type	Serial No.	Purchaser Credit Need (404/NRD/Cut Fill)	Purchaser / Permittee	Purchaser Address / Phone	Credit Reduced	Credit Add	Notes
9/30/2021	Adjustment	Dual-Purpose Riverine	-	-	-	-	43.22		Adjustment used to account for dual approval ledger calculation
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	404	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	No-net-fill	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	No-net-fill	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	404	Philips 66 Company		0.01		DSL Permit #63706, Portland Terminal Maintenance Project, 10 square feet of fill
9/10/2024	Release	Dual-Purpose Riverine	LWC-Riverine-043.22 through LWC-Riverine-105.18	-	-	-		61.96	Letter from DSL and Army Corps authorizing release of additional 28.67% of 404 credits, proportional to the total approved value of each (101.38 total, of which 61.96 are Riverine)
9/10/2024	Adjustment	Dual-Purpose Riverine	-	-	-	-	61.96		
9/10/2024	Release	Dual-Purpose Palustrine	LWC-Palustrine-027.51 through LWC-Palustrine-066.92	-	-	-		39.42	Letter from DSL and Army Corps authorizing release of additional 28.67% of 404 credits, proportional to the total approved value of each (101.38 total, of which 39.42 are Palustrine)
9/10/2024	Adjustment	Dual-Purpose Palustrine	-	-	-	-	39.42		
10/25/2024	Sale	NRD-Only	LWC-NRD-100.59 through LWC-NRD-100.62	No-net-fill	City of Portland, Bureau of Environmental Services		0.03		Sale of flood storage volume for City of Portland Bureau of Environmental Services project which requires only a zoning permit. Land use review reference is LU 24-043767 RR. Check cleared on 10/25/24.

ATTACHMENT 11. WATER SURFACE ELEVATIONS

Chart 1. 2024 Water surface elevations in the OCH, immediately downstream of the Linnton Creek confluence ("Side Channel") and in the upstream OCH near the berm ("South Island")

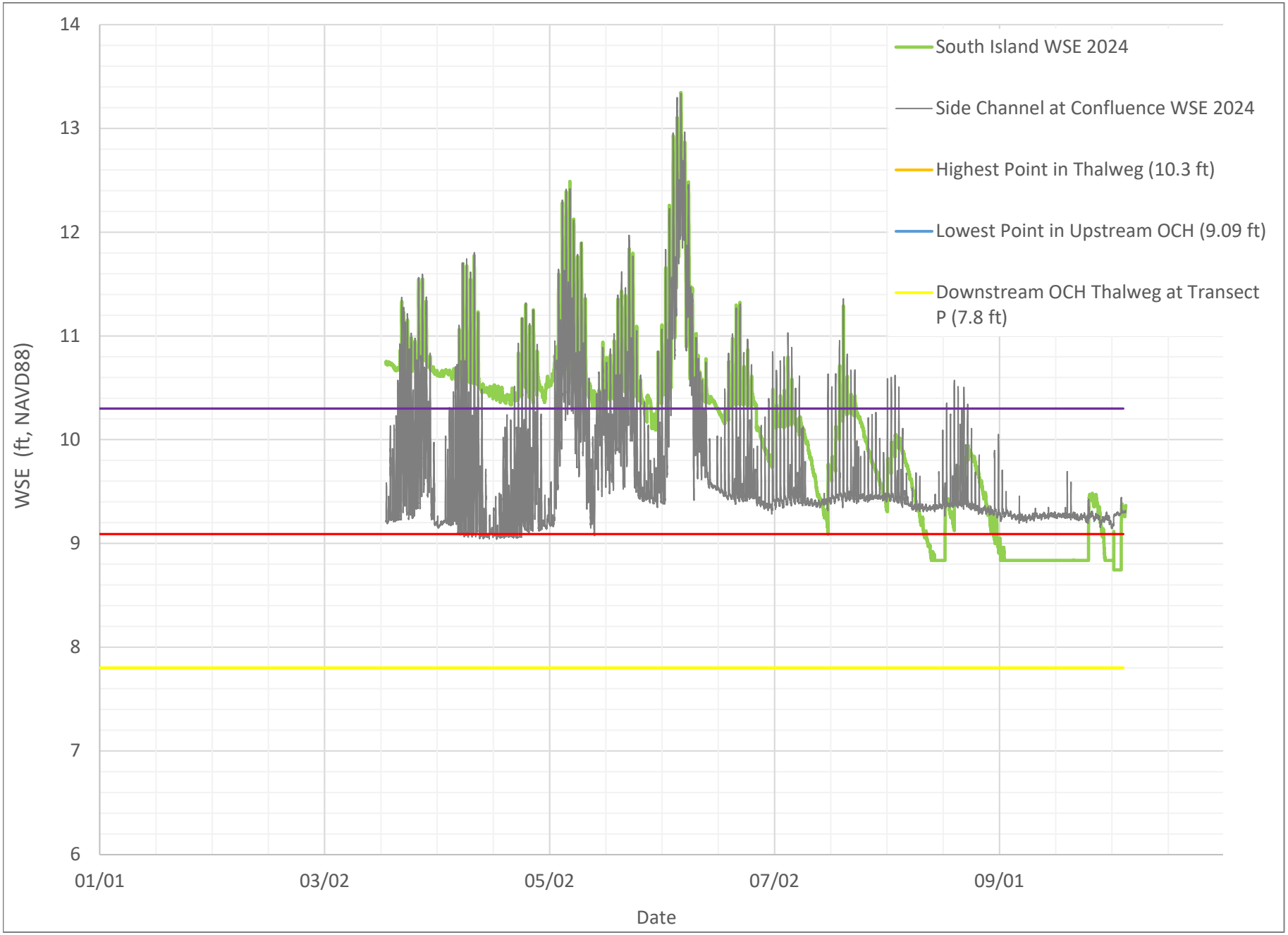


Chart 2. Comparison of water surface elevations from the probe in the upstream OCH ("South Pond") from 2022 - 2024

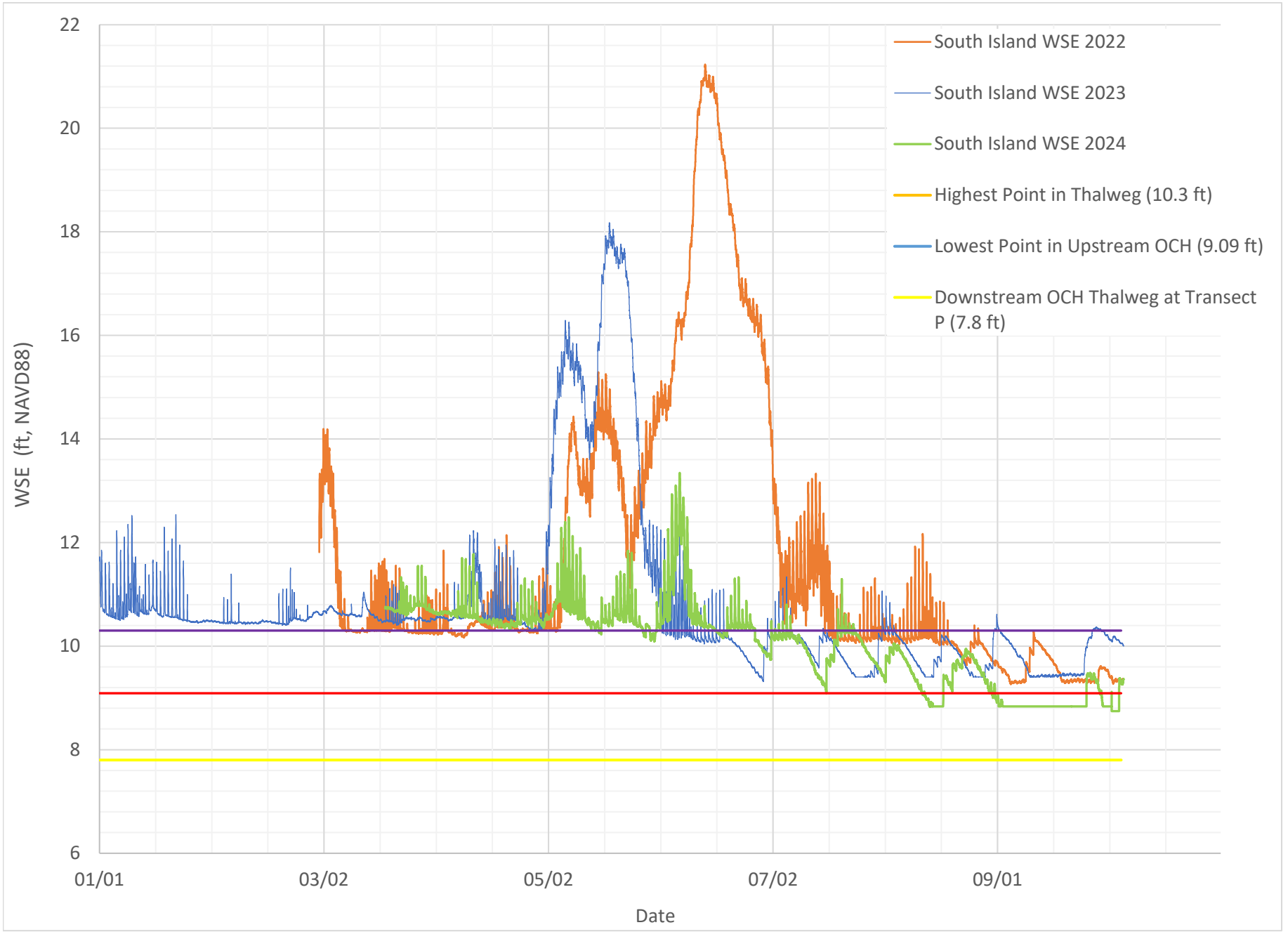
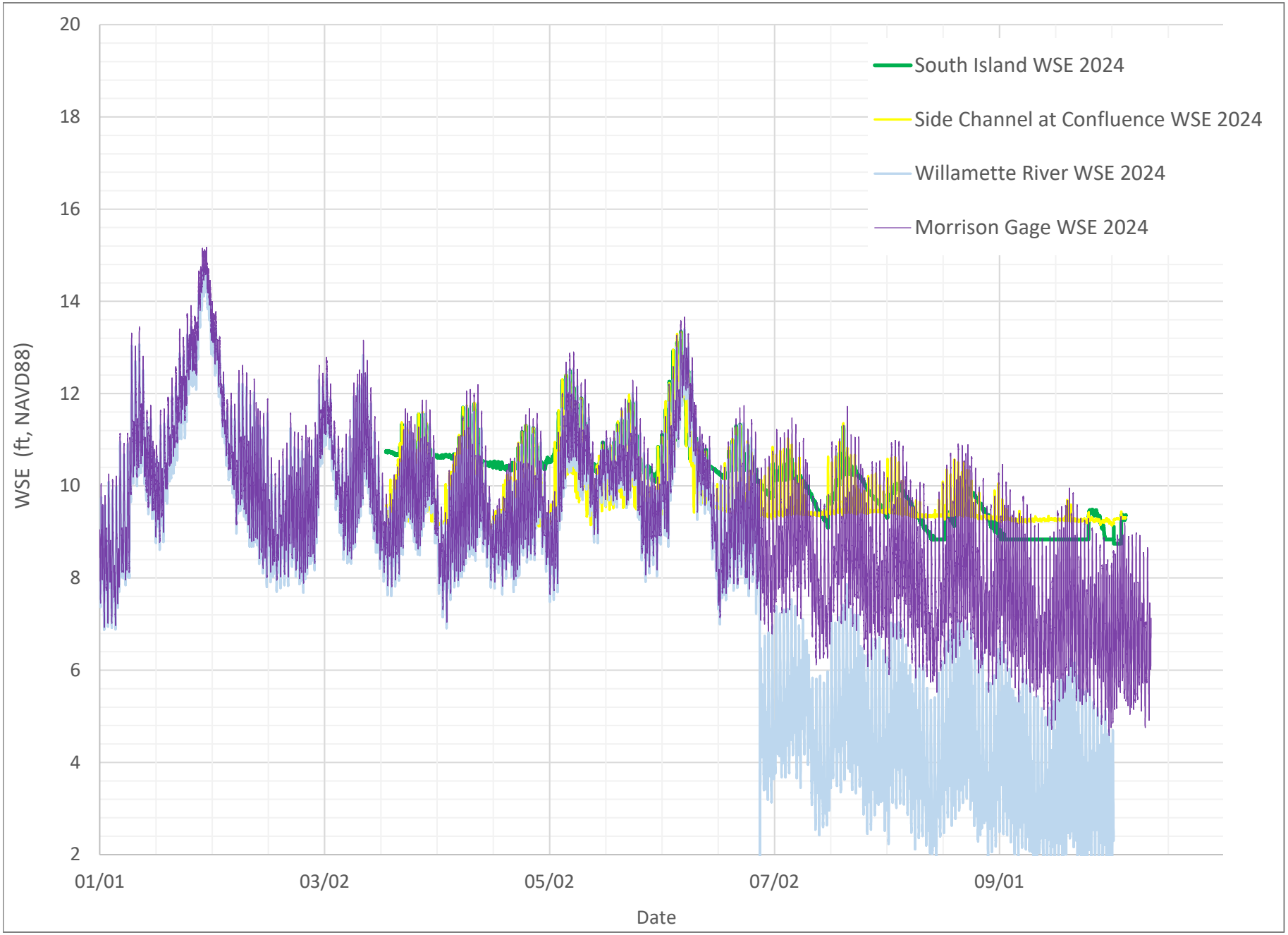


Chart 3. Water surface elevations in the OCH, Willamette River directly outside the OCH, and the Morrison Street Bridge gage, 2024.



ATTACHMENT 12. DIGITAL ELEVATION MODEL ANALYSIS

NOTES:

1. UTILITIES SHOWN ARE NOT SHOWN. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
2. FIELD WORK WAS CONDUCTED OCTOBER 17, 18, AND 31. DRONE FLIGHT WAS CONDUCTED OCTOBER 17, 2024.
3. THE BASIS OF BEARINGS IS A LOCAL DATUM PLANE DERIVED FROM STATE PLANE OREGON NORTH 3601 NAD83(2011)EPOCH: 2010.0000 BY MULTIPLYING BY A PROJECT MEAN GROUND COMBINED SCALE FACTOR OF 1.0000738362 AT A CENTRAL PROJECT POINT WITH INTERNATIONAL FOOT STATE PLANE GRID COORDINATES N712271.719 E7617769.871 AND A MERIDIAN CONVERGENCE ANGLE OF -1°37'09". STATE PLANE COORDINATES WERE DERIVED FROM GPS OBSERVATIONS USING THE TRIMBLE VRS NOW NETWORK. DISTANCES SHOWN ARE INTERNATIONAL FOOT GROUND VALUES.
4. VERTICAL DATUM: ELEVATIONS ARE BASED ON NGS BENCHMARK NO. 49. LOCATED ON THE EAST SIDE OF THE COLUMBIA RIVER, SOUTH OF THE SPOKANE, PORTLAND, SEATTLE RAIL WAY BRIDGE, 10 FEET SOUTH OF CENTERLINE OF TRACK. ELEVATION = 51.84 FEET (NAVD 88).
5. CONTOUR INTERVAL IS 1.00 FOOT.
6. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. PROPERTY LINES SHOWN ARE PER GIS ARE APPROXIMATE. BOUNDARIES SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.

LEGEND

EXISTING GROUND CONTOUR (1 FT)

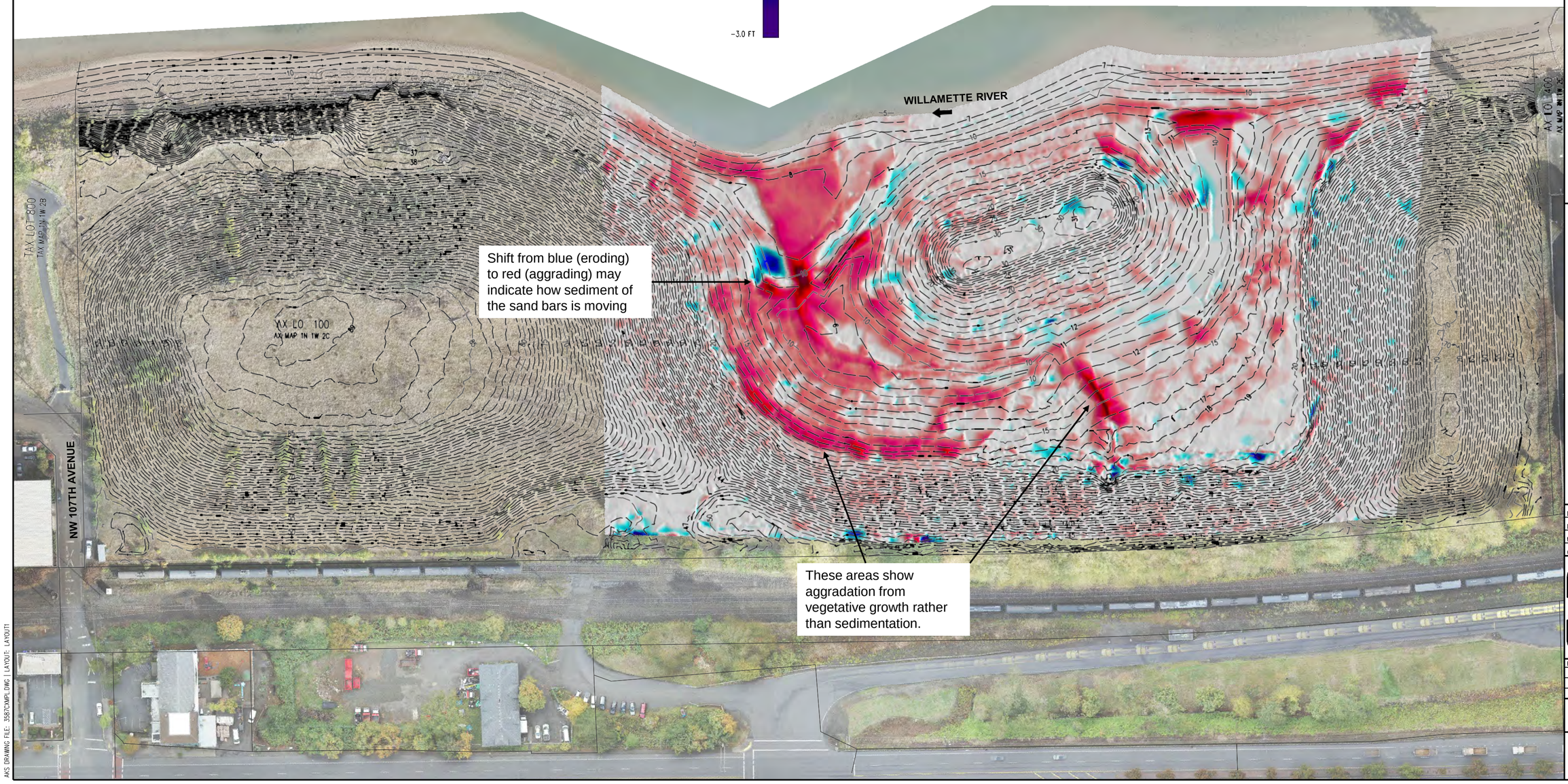
EXISTING GROUND CONTOUR (5 FT) — 350

GIS PROPERTY LINE

SCALE: 1"=60 FEET

60 0 12 30 60

3.0 FT
2.0 FT
1.0 FT
0 FT
-1.0 FT
-2.0 FT
-3.0 FT



AKS ENGINEERING & FORESTRY, LLC
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WWW.AKS-ENG.COM

ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

LINTON PROPERTY RESTORCAP

PORTLAND OREGON

TAX LOT 100 MULTNOMAH COUNTY TAX MAP 1N 1W 2C

EXISTING CONDITIONS PLAN

DESIGNED BY:
DRAWN BY: MSD
MANAGED BY: MSD
CHECKED BY: NSW
DATE: 12/30/2024

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JANUARY 9, 2007
NICK WHITE
70652LS
RENEWS: 6/30/26

REVISIONS

JOB NUMBER 3587

SHEET 1

AKS DRAWING FILE: 3587COMPL.DWG | LAYOUT: LAYOUT1