

RINEARSON NATURAL AREA RESTORATION YEAR 5 (2023) MONITORING REPORT



prepared for
Columbia Restoration Group, LLC

prepared by
 **WATERWAYS**
CONSULTING, INC.

1020 SW Taylor St. Suite 380
Portland, Oregon 97205



9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

June, 2024

Rinearson Natural Area Restoration Monitoring – Cover Sheet

Owner/Permittee: Columbia Restoration Group	Report Prepared By: Waterways Consulting, Inc. and Pacific Habitat Services
City/County: Gladstone/Clackamas County	Report Date: June 14, 2024
Monitoring Year: 5	Planting: Fall 2018
Date Restoration was Completed: Fall 2018	
Date(s) of Data Collection: March through August 2023	

	Performance Standards (required by the HDP)	Fully Met?	Comments/Reason for Shortfall
1	Geomorphic: 100% of installed large wood pieces will be retained downstream of the remnant pond outlet.	Yes	100% of structures were recorded in August 2023. This standard is met.
2	Geomorphic: 80% of placed large wood pieces and structures will be retained upstream of the remnant pond outlet.	Yes	> 80% of structures were recorded in August 2023. This standard is met.
3	Riparian/Upland: 80% of placed terrestrial habitat structures will be retained within upland and riparian areas.	Yes	> 80% of structures were recorded in August 2023. This standard is met.
4	Active Channel Margin: ACM acreage will not decrease by more than 10% compared to as-built drawings.	Yes	ACM acreage has remained within 10% of as-built drawings. This standard is met.
5	Fish Passage: Roughened channel gradient does not exceed 4%; Jump height will not exceed 6 inches.	Yes	The roughened channel slope was surveyed as 2.8% and therefore meets the performance standard of needing to be <4%; No drops in the low flow channel water surface were observed during the monitoring period. Localized flow obstructions do occur at three beaver dams located throughout the project site but ODFW does not consider beaver dams to be barriers to fish movement. This standard is met.
6	Fish Passage: Remnant pond outlet discharged continuously during Year 5 monitoring.	Yes	During the monitoring period Rinearson Creek was perennial and flowed continuously on the surface through the entire project area. This standard is met. This conclusion is based on site observations conducted during each time Waterways staff was on site during the low flow period.
7	Fish Passage: Thalweg downstream of the remnant pond outlet will remain wetted during low water conditions.	Yes	Water flow was low, but water flowed continuously on the surface, downstream of the remnant pond to the Willamette River. Standard met.

8	Hydrology and Hydraulics: Remnant pond outlet will be overtopped by the Willamette River when stage height >14 feet NGVD29 (17.5 feet NAVD88).	Yes	The crest of the beaver dam at the top of the roughened channel (16.85 feet NAVD88) was surveyed in 2023 to be at elevation of 18.06 feet NAVD88. A high-water event was recorded at the Oregon City gage on December 29, 2022 that resulted in a Willamette River water surface elevation of 19.8 feet. Although this event was not recorded at the site because the water level loggers were not installed until April 2023, the as-built surface, which is consistent with the cross-sections measured in 2023, was used to calculate the area of inundation from that event. The results suggest that the remnant pond outlet was overtopped by 1.74 feet and inundated approximately 6.8 acres of the site upstream of the roughened channel.
9	Hydrology and Hydraulics: No less than 8.6 acres of the site will be inundated when stage height on the Willamette River >21.76 feet NGVD29 (25.25 feet, NAVD88).	TBD	No storm event in the 2022-2023 season resulted in the Willamette River reaching 21.76 feet NGVD29 at the USGS gauge. However, we assume that a larger storm event producing an equivalent Willamette River stage near 22 feet NAVD88 at the site would inundate approximately 9.8-acres of the site (which is well above the 8.6-acre minimum) based on the as-built contours that are consistent with the 2023 surveyed cross-section elevations.
10	Emergent Marsh – Native Species Cover: 30% or greater cover by native herbaceous species Y2–5. 50% or greater in Y7; 70% in Y10.	No	Mean native herbaceous cover was 15%; the site is not meeting native cover standards.
11	Emergent Marsh – Invasive Species Cover: Less than or equal to 20% cover by invasive herbaceous species Y2–10.	No	Mean invasive herb cover was 42%, largely due to high cover of reed canarygrass. This standard is not met.
12	Emergent Marsh - Diversity: At least 5 species of herbaceous plants that provide at least 5% cover and are present in at least 10% of the plots.	No	Only 1 native species, soft rush, met the abundance and frequency thresholds.
13	Riparian Forest Restoration – Woody Species Density: At least 1,200 living native stems/ac in Y2–5.	Yes	Density of woody vegetation was 2,037 living native stems per acre and meets the performance standard but is significantly lower than the count in 2019.
14	Riparian Forest Restoration – Invasive Cover: 30% or less cover by invasive herbaceous species Y2–5.	Yes	Mean invasive herb cover was 20%. This standard is met.
15	Riparian Forest Restoration – Shrub Species Richness: At least 5 native shrub species present in Y2–5.	Yes	11 native shrub species were present. This standard is met.
16	Riparian Forest Restoration – Tree Species Richness: At least 3 native tree species present in Y2–5.	Yes	7 native tree species were present, where the most abundant species was black cottonwood. This standard is met.

17	Riparian Forest Enhancement – Invasive Cover: 30% or less cover by invasive herbaceous species Y2–5.	Yes	Mean invasive herb was 19%, within the maximum threshold. This standard is met.
18	Upland/Riparian Forest Invasive – Invasive Cover: 30% or less cover by invasive herbaceous species Y2–5.	Yes	Mean invasive herb was 25%, so the standard is met.

Remedial Work Recommended

 Yes

 No

Refer to the Adaptive Management Section in this report.

	Monitoring Questions	Comments/Conclusions
1.	Are native fish using the restored site? What size salmon and/or lamprey are using the site?	No future seining will be approved by NOAA Fisheries based on concerns about seining ESA-listed species. Environmental eDNA sampling will be conducted by PHS starting in mid-June 2024. A formal scope of work is being approved for review by the Trustees. Time limitations resulted in an initial sampling effort to be conducted the week of June 11 th .
2.	What birds are using the site? Do changes in the bird diversity and abundance indicate habitat improvement?	33 bird species were detected in the 2023 monitoring, as compared to the 32 bird species in 2021 and 27 species observed in 2014. The top five most commonly detected species in 2023, in decreasing order of abundance, were song sparrow, mallard, American crow, American robin, house finch, and Bewick's wren.
3	How much time are eagles spending on-site and vicinity and for which activities (perching, nesting)? Which features (riparian, upland)?	Bald eagles nested on the west bank of the Willamette River across from the site. The project area is part of their territory, and they perch and hunt on site. Perches consist of mature black cottonwood trees located in riparian habitat adjacent to the river. Adult eagles spent a total of 7 hours perching in trees in the northwest corner of the site adjacent to the mouth of Meldrum Bar Channel, 7 minutes flying over the site, and 10 minutes foraging unsuccessfully for ducks and fish in Meldrum Bay. They flew over the site but were not observed perching in the interior of the site. Juvenile / sub-adult eagles spent 4 hours and 53 minutes on site perched in cottonwood trees along the riverbank and 6 minutes foraging unsuccessfully in Meldrum Bay. Bald eagles were observed on site during 26% of the observation time while they were observed in the site vicinity 53% of the observation time. The nesting attempt was a failure, but the adults remained in the vicinity of the nest through the final August survey.

4	Are mink using the site (presence/absence)? Has mink abundance at the site increased?	Mink were not documented on-site during the 2023 monitoring period, and therefore mink abundance has decreased as compared to 2021. While no mink were detected during the monitoring period, three related mesocarnivores in the mustelid family were observed: skunk (<i>Mephitis mephitis</i>), long-tailed weasel (<i>Mustela frenata</i>), and river otter (<i>Lontra canadensis</i>). The presence of mustelids and aquatic mammals indicates that the area is suitable for animals that occupy similar niches and habitats. Prey diversity and availability appears to be the primary factor influencing mink presence, followed by invasive vegetation, as it can degrade available denning and foraging habitat. An adaptive management approach that focuses efforts on native woody vegetation establishment in the emergent wetland habitat area may improve conditions for mink as well as other species including beaver and songbirds.
5	Is water quality (temp, DO, pH, cond.) improving over time?	Water quality data collected in mid-July 2023 are difficult to compare to the April 2021 monitoring, based on the time of year of sampling. The 2023 data show that conditions for water temperature, DO, pH, and conductivity were relatively similar to those measured at the site in previous efforts. The July 2023 data for temperature and pH at some of the monitoring stations do not meet Oregon water quality standards for those parameters, but all stations met the DO standards. DO levels at the Rinearson Creek stations exceed the Oregon standard of a minimum of 6.0 mg/L for cold water aquatic life, except at WQ-9 which may have been an errant measurement.
6	Has the benthic macroinvertebrate community improved (species abundance and diversity/richness)	Total taxa richness dropped in both the emergent marsh and upper control site in 2020 and 2021 but increased in 2023 and upper control site. Total richness declined for 2023 in the engineered riffle and rose slightly compared to 2021 in the remnant pond. Total abundance (relative) increased threefold in 2023 compared to 2021 in the remnant pond. Total abundance increased for 2023 in the emergent marsh and upper control after declining 2020–21. After a marked decline 2020–21 in the engineered riffle, total abundance declined slightly again in 2023. These results may indicate that the project site must be considered within the context of the overall Rinearson Creek watershed, which is highly impacted by an urbanized watershed and a myriad of water quality issues that ultimate limit conditions at the project site.

TABLE OF CONTENTS

1.0	Introduction – Monitoring Overview	1
	1.1 Project Area	1
	1.2 Photo Monitoring	1
2.0	Geomorphic and Structural Habitat Monitoring	1
	2.1 Habitat Structures and Large Woody Debris	1
	2.1.1 Structures below the Remnant Pond Outlet	1
	2.1.2 Structures and Large Woody Debris within the Active Channel Margin (ACM)	1
	2.1.3 Upland Structures	2
	2.1.4 Other Features	2
	2.2 Active Channel Margin (ACM)	2
	2.3 Fish Passage	3
	2.4 Hydrology and Hydraulics	4
3.0	Vegetation Monitoring	6
	3.1 Emergent Marsh (EmMa)	8
	3.2 Riparian Forest RestORation Area (RFR)	9
	3.3 Riparian Forest Enhancement Area (RFE)	10
	3.4 Upland/Riparian Forest Invasive Management Area (URFI)	12
4.0	Fish and Wildlife Monitoring	13
	4.1 Fish Monitoring	13
	4.2 Breeding Birds	13
	4.3 Bald Eagles	14
	4.3.1 Methodology	14
	4.3.2 Results	15
	4.4 Mink	17
5.0	Water Quality Monitoring	20
	5.1 Results	21
	5.2 Temperature	22
	5.3 Dissolved Oxygen (DO)	23
	5.4 pH	24
	5.5 Conductivity	25
6.0	Benthos Monitoring	25
7.0	Adaptive Management	26
	7.1 Emergent Wetland	26
8.0	REFERENCES	28

List of Figures

Figure 1-1: Project Site and Photo Monitoring Map

Figure 1-2: through 1-9: Example Comparison Photos between Years 3 and 5

Figure 2-1: Habitat Structures Monitoring Map

Figure 2-2: Cross-Section Monitoring Map

Figure 2-3: Roughened Channel Long Profile for Year 5 (2023)

Figure 2-4: Waterways water level loggers installed on site.

Figure 2-5: Water Surface Elevations for 2022-2023 (Year 5) High Flow Season

Figure 2-6: Maximum Inundation Map for 2023

Figure 3-1: Vegetation Monitoring Plot Map

Figure 3-2: Example of plot placement in an RFR plot

Figure 4-1: Breeding Bird and Bald Eagle Monitoring Map

Figure 4-2: Nesting bald eagle in study area

Figure 4-3: Bald eagle nest on west side of Willamette River, outside of the study area

Figure 4-4: Mink Monitoring Map

Figure 4-5: long tailed weasels investigating fur snare.

Figure 4-6: River otter emerging from waters with a fish.

Figure 4-7: Skunk investigating fur snare.

Figure 4-8: Beaver smiling for the camera.

Figure 4-9: Nutria

Figure 5-1: Water Quality and Benthic Monitoring Map

Figure 5-2: Water Temperature Monitoring Year 5 (2023)

Figure 5-3: Algae growth in the remnant pond on July 12, 2023

List of Tables

Table 3-1: Vegetation Sample Plot Summary

Table 5-1: Water Quality Monitoring Locations

Table 5-2: Summary of Water Quality Results

List of Appendices

- Appendix A: Photo Monitoring
- Appendix B: Habitat Structures and Large Woody Debris Count Data
- Appendix C: Survey Cross Sections
- Appendix D: Fish Passage Photos
- Appendix E: Vegetation Monitoring Data
- Appendix F: Bird Survey Field Notes and Summary
- Appendix G: Bald Eagle Data Sheets
- Appendix H: Benthic Invertebrate Survey
- Appendix I: Equipment Calibration Certification
- Appendix J: Adaptive Management

1.0 INTRODUCTION – MONITORING OVERVIEW

At the request of the Columbia Restoration Group, Waterways Consulting, Inc. (Waterways) and Pacific Habitat Services (PHS) conducted the Year 5 (2023) monitoring at the Rinearson Natural Area Restoration Project. This monitoring is the third iteration of the efforts included in a 10-year adaptive management and monitoring project. The Rinearson Natural Area Restoration Project construction activities were completed in 2018. The restoration project encompassed aquatic, riparian, wetland, and floodplain enhancement elements. The Portland Harbor Natural Resource Trustee Council developed this project as part of their regional restoration effort in the Lower Willamette River to mitigate industrial contamination of Portland Harbor.

The goal of the following report is to document the monitoring performed, as well as relate the collected data to the as-built conditions and performance standards outlined in the Rinearson Natural Area Habitat Development Plan (HDP) from 2018, and is intended to evaluate restoration success over the 10-year period using benchmark metrics, specific monitoring protocols, and qualitative questions. Years 1 and 2 monitoring in 2019 and 2020, respectively, were completed by Cardno, and Year 3 monitoring was performed by Environmental Science Associates (ESA) in 2021.

1.1 PROJECT AREA

The 33-acre project area is within the Rinearson Natural Area, adjacent to Meldrum Bar Park, in Gladstone, Oregon and consists of Rinearson Creek (a tributary to the Willamette River), a restored floodplain with emergent wetlands and a meandering channel, a remnant pond with an outlet to a roughened channel, Meldrum Bar Channel (which serves as the current primary Rinearson Creek outlet), the historical Rinearson Creek outlet, habitat structures, and upland areas. The site is surrounded by high-density residential development and the developed Meldrum Bar Park which is operated by the City of Gladstone. Rinearson Creek starts at Boardman Wetlands and flows through the highly developed City of Gladstone before reaching the project site; it reaches the Willamette River at river mile 24, downstream of the mouth of the Clackamas River, and flows into Meldrum Bay. **Figure 1-1** shows the project area and the site features.

1.2 PHOTO MONITORING

Permanent photo monitoring points were established during the baseline surveys in 2019, and additional points were included in the Year 3 (2021) monitoring. For Year 5 (2023), the Year 3 points were used with no additional points. The locations of the Year 5 monitoring points are shown in **Figure 1-1**.

Appendix A contains the compilation of the photo monitoring efforts from April 2023 – August 2023. **Figures 1-2 through 1-9** show example comparison photos between monitoring Years 3 and 5.



Legend

- Water Level Loggers 2023
- Permanent Photo Monitoring Points
- Roughened Channel
- Access Trail (Approx.)
- Project Area

Project Site and Photo Monitoring Map

Year 5 Monitoring Report

Rinearson Natural Area
Restoration Project



FIGURE
1-1



Figure 1-2: PP20 (April 20, 2021) looking east into emergent wetland area.



Figure 1-3: PP20 (May 4, 2023) looking east into emergent wetland with meander channel.



Figure 1-4: PP15 (August 11, 2021) looking east into the emergent wetland area.



Figure 1-5: PP15 (July 12, 2023) looking east.



Figure 1-6: PP5 (July 16, 2021) looking east and upstream into the lagoon/historic creek outlet.



Figure 1-7: PP5 (July 12, 2023).



Figure 1-8: PP3 (August 11, 2021) looking upstream at the roughened channel.



Figure 1-9: PP3 (August 21, 2023) looking south and upstream at the roughened channel.

2.0 GEOMORPHIC AND STRUCTURAL HABITAT MONITORING

2.1 HABITAT STRUCTURES AND LARGE WOODY DEBRIS

In-stream and upland habitat structures and large wood structures were installed as part of the restoration project at Rinearson Natural Area to improve fish and wildlife habitat and natural functions. On August 21, 2023, Waterways biologist John Dvorsky assessed the project site to determine the status of each habitat structure. Each structure was located using GPS points that were established during the as-built survey and recorded on the Avenza mapping application. The structures were also characterized based on condition. **Figure 2-1** shows all documented structure locations, and **Table 2-1** in **Appendix B** describes the condition of each structure for Year 5. Due to the growth of vegetation, especially blackberry, several of the habitat structures within the upland area were not accessible at the time of the assessment. It is likely that those structures still exist, are intact, and are functioning properly, given their location in an infrequently inundated area. They were just not accessible without a significant amount of effort to create a pathway through large stands of blackberry. Photos for all structures are also presented in **Appendix B**.

2.1.1 Structures below the Remnant Pond Outlet

The habitat structures below the remnant pond include four large wood structures within the roughened channel. All four structures were still present and functioning at the time of the Year 5 (2023) monitoring effort (structure numbers 20-23 in **Figure 2-1**), and therefore fulfill the HDP requirement that 100% of as-built structures within the roughened channel remain intact.

2.1.2 Structures and Large Woody Debris within the Active Channel Margin (ACM)

The HDP performance standard for structures within the ACM is that 80% of the total pieces placed in aquatic and terrestrial areas upstream of the remnant pond be intact, and 100% of the installed in-stream large wood pieces downstream of the remnant pond be retained and present or naturally recruited. A total of 28 structures are shown in the as-built drawings: 13 floodplain structures, 12 meander channel structures as well as 3 trees tipped into the remnant pond. All structures except one floodplain log structure were identified in the August 2023 assessment, which indicates that more than 80% of the structures were intact and therefore the HDP standard was met.



Legend

- Project Boundary
- ◆ Beaver Dam
- Boulder Cluster
- Boulder Pile
- Boulder and Log Pile
- Debris Pile
- ▲ Floodplain Log Structure
- Log Pile
- ✕ Not Accessible
- + RC Log Structure
- ▲ Recruited Large Wood
- X Single Log Structure
- ★ Snag
- 🌲 Tree Tipped Into Pond

Habitat Structures Monitoring Map

Year 5 Monitoring Report

Rinearson Natural Area
Restoration Project



FIGURE
2-1

2.1.3 Upland Structures

The upland structures throughout the site, based on the as-built plans, include 43 features: 13 debris piles, 11 upland log structures, 8 snags, 7 small rock piles, and 4 large rock piles. Four of the structures in upland areas were inaccessible due to dense vegetation growth (such as blackberry). Therefore, they were labeled as “not accessible” and considered absent for this monitoring effort. However, the total of 39 located upland structures meets the HDP requirement of 80% retention. If blackberry is removed during future vegetation management efforts adjacent to those structures, future monitoring efforts may identify those structures as intact.

2.1.4 Other Features

Three beaver dams were identified during the monitoring efforts for Year 5 (2023). These features are considered temporary, but it is valuable to locate them and gather information for recording any changes in the next monitoring efforts. The first has been established at the upstream end of Meldrum Channel, where it intersects with the flooded lagoon area at the downstream end of the roughened channel. This beaver dam holds approximately 2.5 feet of grade and is about 33 feet long. The second beaver dam (also recorded in Year 3 (2021)) is located at the remnant pond outlet, at the upstream end of the roughened channel, and has a crest elevation of 18.06 feet (NAVD88). This means that, based on the known as-built elevation for the roughened channel of 16.85 feet (NAVD88), the dam is about 15 inches in height, and was observed to hold approximately 1.5 feet of grade. Lastly, the third observed beaver dam is situated near the Rinearson Creek inlet into the project site, at the upstream end of the restored floodplain area. This dam holds approximately 1 foot of grade. Photos of all three beaver dams can be found in **Appendix D**.

Two instances of recruited logs were recorded (noted on Figure 2-1) and appeared to be associated with logs that had fallen from dead trees. These two logs are examples of on-site recruited wood that will continue to enhance the function and ecological integrity of the site.

2.2 ACTIVE CHANNEL MARGIN (ACM)

The baseline ACM for the project is 10.09 acres, which includes area under the OHW elevation of 24.0 feet (NAVD88). In 2019 (the first year of monitoring after the project completion), the ACM consisted of a total of 9.8 acres of the site, and in Year 3 (2021) the ACM was recorded as 9.7 acres. The HDP performance standard requires that the ACM acreage remains within 10% of the as-built drawings. The HDP stipulates that ACM be measured by professional topographical survey in Year 10, with Years 1, 3, 5, and 7 consisting of surveying the permanent channel cross-sections to assess visually and qualitatively if there is evidence of sedimentation or erosion.

On August 21 and 22, 2023, Waterways surveyed 12 cross-sections in approximately the same locations established in 2019, which were also used in the Year 3 monitoring efforts by ESA. Two additional cross-sections (cross-sections 11 and 12 on **Figure 2-2**) were monitored in Year 5 based on the cross-section locations established by the HDP (shown in Figure 8 of the HDP). **Figure 2-2** shows the locations of the monitoring cross-sections and displays all survey points taken for this Year 5 effort. Due to dense vegetation (such as blackberry and willow), several of the established cross-section end point stakes were not found. Therefore, Waterways used known GPS locations to approximate the ends of those cross-sections. Furthermore, some of the sections were not marked in the field with permanent stakes during the as-built survey, and so no end points were present (**Figure 2-2**). Vegetation growth, along with deep water or silt depth, made gathering survey points exactly along the cross-sections difficult.



Cross-Section Monitoring Map

Year 5 Monitoring Report

Rinearson Natural Area
Restoration Project



FIGURE
2-2

Consequently, some of the survey points were not always precisely on the cross-section line, as shown on **Figure 2-2**. These variations do not limit the ability to qualitatively understand the degree to which sedimentation or erosion has affected the site or the ability to calculate the acreage below ACM.

Based on the survey data collected, the total area within the ACM experienced a minor amount of aggradation along the ACM margin, as compared to the baseline ACM of 10.09 acres. The total ACM acreage for Year 5 (2023) is 9.96 acres, which is a change of approximately 1.3% from the baseline ACM, which meets the HDP standard. This difference is likely within the measurement error of the survey and interpolation between cross-sections.

Appendix C presents the cross-section data obtained during the survey and compares them to the as-built ground surface from the record survey performed in 2018.

2.3 FISH PASSAGE

The measurement criteria used for fish passage in this monitoring effort, as outlined in the Habitat Development Plan (HDP), includes the slope of the roughened channel, water availability, and depth in relation to the pond outlet. The overall intent is to ensure that there is little to no change in the condition of the roughened channel and that there is continuous surface flow from the remnant pond to the Willamette River.

Figure 2-3 shows the long profile of the roughened channel that was surveyed by Waterways on August 22, 2023. The surveyed grades, as well as field observations, reveal that there have not been any significant changes, migration, or erosion of the roughened channel. The upstream-most point at the top of the roughened channel (below the beaver dam) was 16.24 feet (NAVD88) and the downstream-most point was measured to be 10.00 feet (NAVD88). The total length of the roughened channel was surveyed to be 222 feet, and therefore the slope of the channel was calculated to be 0.028 or 2.8%. The performance standards identifies that the gradient of the roughened channel must remain less than 4%.

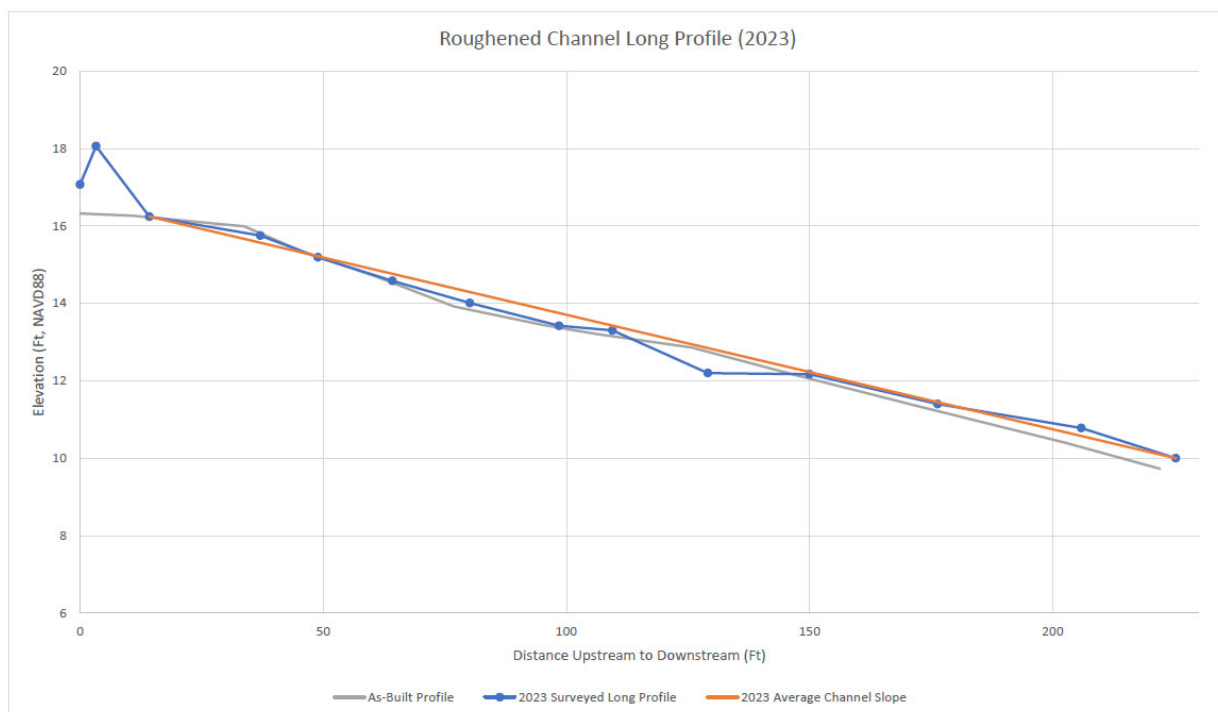


Figure 2-3: Roughened Channel Long Profile for Year 5 (2023)

Three (3) beaver dams have been constructed within the project site since project construction (see **Figure 1-1** for locations). Fish passage professionals, including Oregon Department of Fish and Wildlife staff, do not typically consider beaver dams as impassable barriers to fish, except in extreme circumstances. The HDP requires that continuous surface flow be visually observed in the wetted channel and that a minimum amount of flow is discharged from the remnant pond outlet. During the survey performed by Waterways biologist John Dvorsky on August 21, 2023, the roughened channel was stable with depths at low flow that were adequate to facilitate juvenile fish movement with continuous flow through the entire project area from where Rinearson Creek enters at the upstream end through to the Meldrum Bar alcove. The channel was experiencing flow through and beneath the beaver dam, with visible surface flow along the entire length of the thalweg.

2.4 HYDROLOGY AND HYDRAULICS

The HDP sets a performance standard that no fewer than 8.5 acres of the project site be inundated when the Willamette River exceeds 21.76 feet NGVD29 (25.25 feet NAVD88) at USGS gauge 1420770 at Willamette River Below Falls at Oregon City. This elevation corresponds to a water surface elevation (WSE) in the Willamette River of 22.0 feet NAVD88 at the Rinearson site.

To monitor the water surface elevations at the project site, Waterways deployed two water level loggers on April 4, 2023. These loggers remained on site through the peak snowmelt season and were removed on July 12, 2023. The loggers were located at the remnant pond outlet and at the entrance of Rinearson Creek into the project site (see **Figure 1-1** for the mapped logger positions and **Figure 2-4** for images of the installed loggers).



Figure 2-4: Waterways water level loggers installed on site.

Per the as-built records, the top of the engineered channel was constructed at an elevation of 16.85 feet. Based on the Year 5 (2023) surveyed long profile (**Figure 2-3**) for the roughened channel, and field observations, the roughened channel grade has remained stable. The water surface elevation upstream of the roughened channel is controlled by the roughened channel crest and the beaver dam at the pond outlet, which was surveyed in 2023 to have a crest elevation of 18.06 feet (NAVD88). However, once the Willamette River stage exceeds the elevation of the roughened channel crest, the water surface elevations above the pond outlet are responsive to changes in the Willamette River. This response can be observed in the water surface elevation measurements collected by the loggers and shown in **Figure 2-5**.

The Waterways logger in the upper reach of the project site on Rinearson Creek is also shown in **Figure 2-5**. This logger reported higher water surface elevations than the pond outlet logger, with an average water surface elevation of approximately 21.8 feet (NAVD88). This difference is partially due to the slight slope of the channel, but primarily because of the beaver dam that has formed at the upper portion of the meander channel (see **Figure 2-1**).

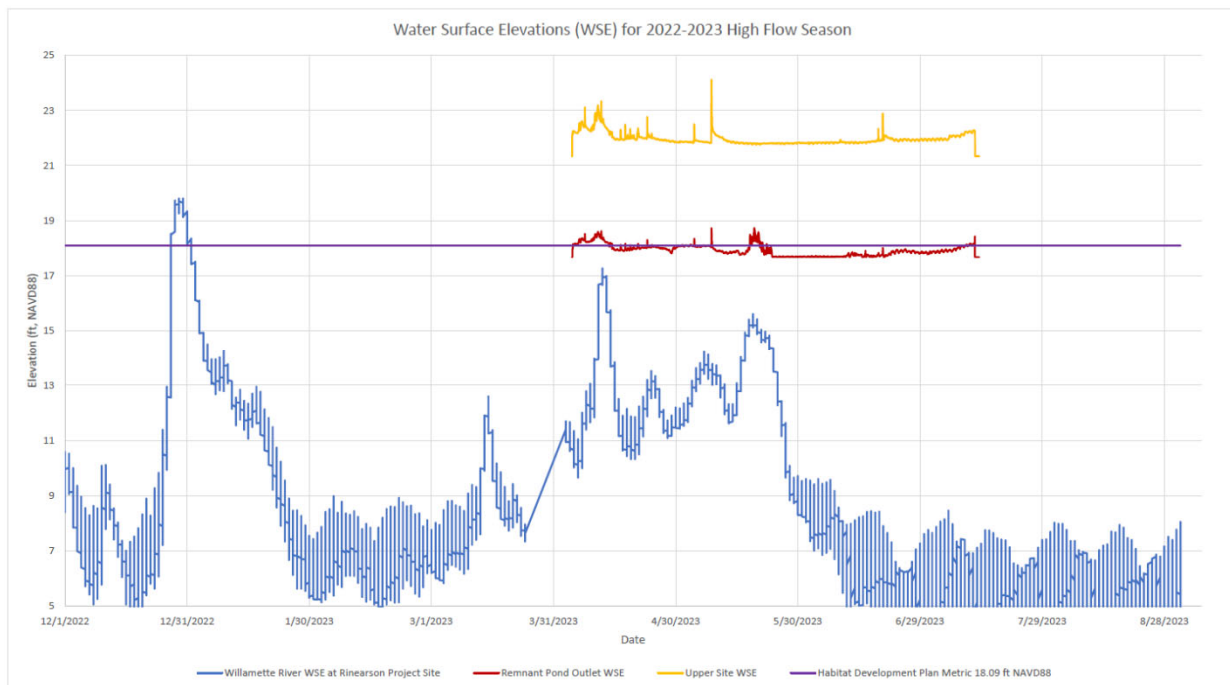


Figure 2-5: Water Surface Elevations for 2022-2023 (Year 5) High Flow Season

A high Willamette River stage on December 29, 2022 (based on the USGS gauge 14207770 for the Willamette River Below Falls at Oregon City) resulted in a maximum water surface elevation of 19.8 feet (NAVD88) in the Willamette River at the Rinearson Site. The elevation of the roughened channel crest is 16.85 feet (NAVD88), and therefore the remnant pond sill was overtopped by 2.95 feet, which inundated approximately 6.8 acres of the site (**Figure 2-6**). Per the performance standards set in the HDP, a minimum of 8.6 acres should be inundated when the Willamette River exceeds 22.0 feet (NAVD88) at the project site. Even though no storm event in the 2022-2023 season resulted in the Willamette River reaching 22 feet (NAVD88), we assume that a larger storm event producing a river stage near 22 feet would inundate approximately 9.8-acres of the site (which is well above the 8.6-acre minimum) based on the as-built contours that are consistent with the 2023 surveyed cross-section elevations. Given the



FIGURE
2-6

Maximum Inundation Map for 2023

Year 5
Monitoring Report
Rinearson Natural Area
Restoration Project

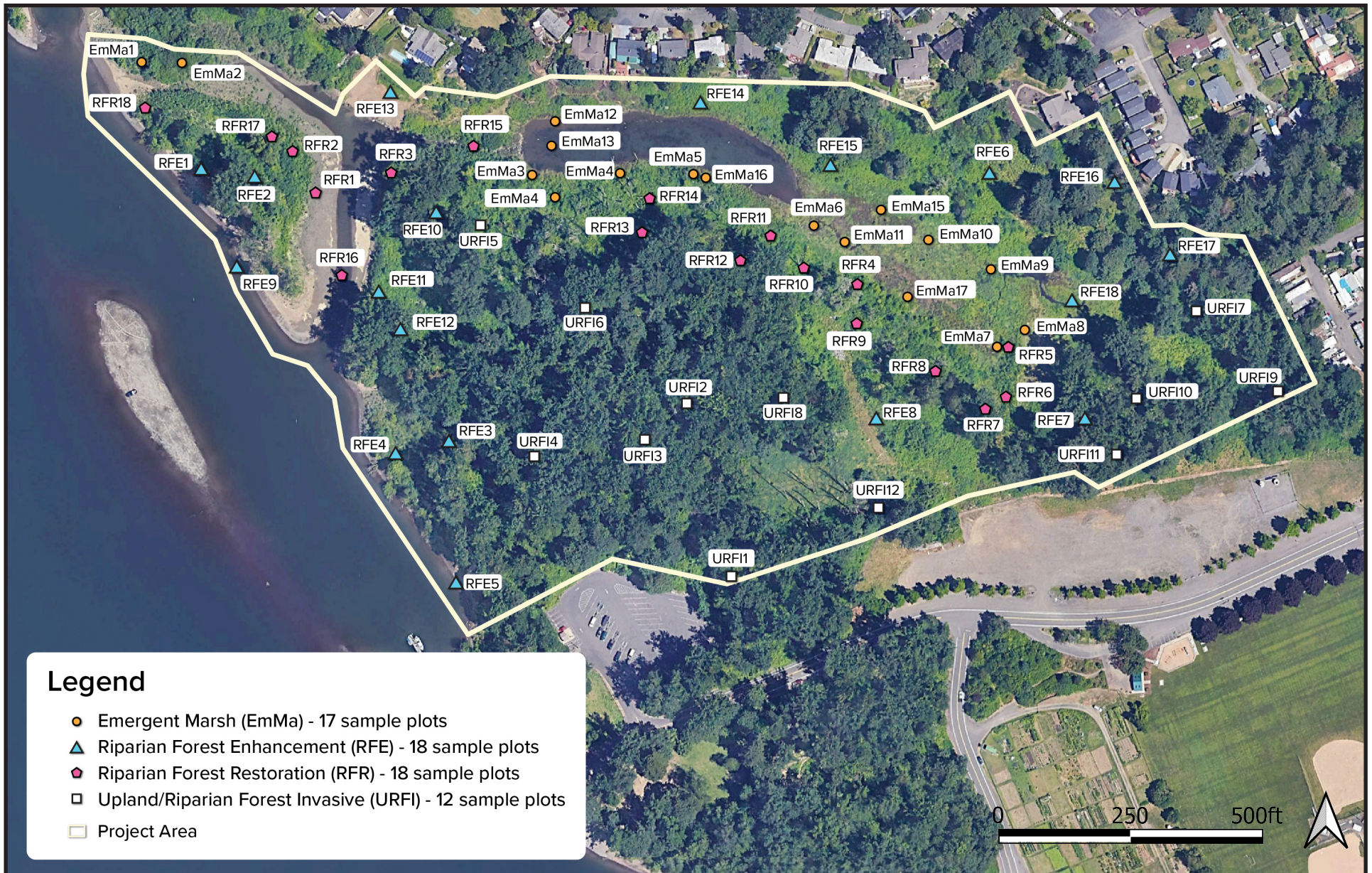


fact that the cross-sections surveyed in 2023 closely matched the as-built condition, and the fact that a complete, updated topographic survey of the site will not be conducted until Year 10, the as-built survey represents the best available data for use in calculating acreages at different reference elevations. Therefore, to calculate the acreage at 19.8 feet NAVD88 (highest Year 5 Willamette stage) and 22 feet NAVD88, planar surfaces representing those elevations were used to intersect the area above the roughened channel, using AutoCAD, and the resulting acreage was computed, producing 6.8 acres and 9.8 acres, respectively.

3.0 VEGETATION MONITORING

The following details the findings of 2023 vegetation monitoring and how these findings meet or do not meet the performance standards of the Rinearson Natural Area Habitat Development Plan (HDP) (Proutt 2018). Vegetation monitoring was conducted by Natural Resource Specialists from Pacific Habitat Services on July 18-19 and August 8-9, 2023.

A total of 65 1-m² quadrat plots were sampled across four different habitat categories: emergent marsh, riparian forest restoration, riparian forest enhancement, and upland/riparian forest invasive. **Table 3-1** shows a detailed count of the plots within each habitat, and **Figure 3-1** shows the locations of all these plots. The criteria for these categories are outlined in the HDP, along with detailed protocol and statistical analysis background. Aside from riparian forest restoration (RFR) sample plots, Quadrat placement was not outlined in detail in previous monitoring reports, nor in the HDP. To attempt to standardize plot placement for subsequent sampling efforts, the following protocol was used for quadrat placement: facing north (or at a bearing of approximately 0°) from the sample point, the “lower left” corner of the quadrat is placed on the plot center. This ensures that the area being monitored will generally remain the same over time. See **Figure 3-2** for an example of this alignment. Following placement, the absolute percent cover of all herbaceous/woody plant and bare ground within the sample plot was estimated and recorded. Bare ground includes bare mineral soil, thatch, and unvegetated water surfaces. RFR plots also include an expanded 2 x 10-m² plot, in which all living woody plants were identified and counted to determine woody plant density. For these specific plots, quadrats will be centered along the sampling sub-transects; quadrat length will be measured with a measuring tape; quadrat length will be measured with a measuring tape facing by facing north (0°) and measuring 10 meters in this direction; quadrat width will be measured by holding a 1-meter dowel along the



FIGURE

3-1

Vegetation Monitoring Plot Map

Year 5
Monitoring Report
Rinearson Natural Area
Restoration Project



transect tape. All living woody native and non-native stems occurring within the quadrat will be identified to species level and counted.



Figure 3-2: Example of plot placement in an RFR plot

Data collected was separated into native, non-native, and invasive categories for both herbaceous and woody plants and analyzed using methods outlined in the HDP and based on DSL’s Routine Monitoring Guidance (DSL 2009), Elzinga et al. (1998), the Trustee Council’s monitoring guidance. Analysis results were then used to determine whether or not performance standards outlined in the HDP were met. The sample mean and 80% confidence interval are presented for each standard. Detailed data of all sample plots can be found in Appendix E. The Year 3 Monitoring Report (ESA 2021) notes that additional sampling points were added for that year. These were added using a randomized grid with the intent to raise the confidence of results from 2020. This change in sample design was indicated to remain permanent, as outlined in an April 5, 2022, note from the Board of Trustees. Additional updates to locations for emergent marsh, riparian forest restoration, and riparian forest enhancement sample points may be beneficial for future sampling, they are outlined in their respective discussions below.

TABLE 3-1 VEGETATION SAMPLE PLOT SUMMARY

Habitat Type	Number of Plots in 2023
Emergent Marsh (EmMa)	17
Riparian Forest Restoration (RFR)	18
Riparian Forest Enhancement (RFE)	18
Upland/Riparian Forest Invasive (URFI)	12

3.1 EMERGENT MARSH (EMMA)

Performance Standard #10

Native Species: The cover of native species in the herbaceous stratum is 30% or greater for Year 5. In Year 7, the standard increases to 50% or greater and to 70% or greater in Year 10.

Result: The mean herbaceous cover across the Emergent Marsh plots was calculated to be approximately 15% (CI80 = 4-23%; CI = +7.2). The performance standard requiring at least 50% native herbaceous cover is not met. Native vegetation was limited to cleavers (*Galium aparine*), small-fruited bulrush (*Scirpus microcarpus*), cattail (*Typha latifolia*), and soft rush (*Juncus effusus*). Soft rush was the dominant native herbaceous plant observed, averaging nearly 8% across the 17 plots.

If the area is to meet the performance standard for $\geq 70\%$ by year 10, then management will need to be radically more aggressive. The most abundant invasive vegetation within the Emergent Marsh plots is reed canarygrass (*Phalaris arundinacea*), impatiens (*Impatiens capensis*), and Himalayan blackberry (*Rubus armeniacus*). Control of reed canarygrass often requires a multifaceted approach. Firstly, mechanical removal, such as mowing or cutting, can be effective, especially if repeated before the grass sets seed. Herbicide applications can also be used, but year-round ponding conditions in the Emergent Marsh area do present some barriers to safe use. Imazapyr is a non-selective herbicide that is often recommended for use in aquatic or semi-aquatic environments, concentration typically ranges from 0.5% to 1.5% of the total spray solution, depending on the specific target species and environmental conditions. Other herbicides can be used safely in semi-aquatic areas as well; however, a licensed herbicide application professional should be consulted for the best plans for chemical control. Additional seeding of native grasses observed to be growing well in the plots (cattail (*Typha latifolia*), slough sedge (*Carex obnupta*), and soft rush (*Juncus effusus*)) can compete with the aggressive reed canarygrass and may serve to colonize bare patches in the area after control takes place. Finally, reed canarygrass is known to prefer shallower water and less-inundated conditions. Maintaining water levels sufficiently to submerge the grass can hinder its growth but could also have negative impacts on native plants in the ponded areas over time. One or a combination of these treatments would also serve to control impatiens and Himalayan blackberry as well; however, it should be noted that control of Himalayan blackberry should receive multiple mowings with a single season. Some patches, particularly along the south boundary of the pond, were nearly impenetrable and well over 15 feet tall. Prior to any chemical control of these patches, mechanical control via mowing will be the best way to get a foothold in the area and allow for any trees and shrubs within the thicket to have a chance at competition.

Performance Standard #11

Invasive Species: Less than or equal to 20% cover by invasive herbaceous species in Years 2 through 10.

Result: The mean invasive herbaceous cover across the Emergent Marsh plots was found to be approximately 42% (CI80 = 29-56%; CI = +10). This is largely due to the high cover of reed canarygrass, which was determined to cover almost 28% of the area. This aggressively colonizing grass will need to be more heavily managed if performance standards for invasive vegetation are to be met in the future. Additionally, reducing the cover of reed canarygrass and other invasives will increase available habitat for native herbaceous vegetation, which will likely be unable to meet performance standards without increased habitat availability and reduced competition from invasive vegetation. Other invasives present included Canadian thistle (*Cirsium arvense*), teasel (*Dipsacus fullonum*), and impatiens. Impatiens was a distant second to reed canarygrass with around 10% cover, having been found in similar densities across fewer plots.

Himalayan blackberry and butterfly bush (*Buddleja davidii*) are both invasive shrubs observed with Emergent Marsh plots. Together, they were found to have a mean cover of 16% in Emergent Marsh plots. If Himalayan blackberry was excluded from invasive herbaceous vegetation, then the mean invasive vegetation cover would decrease to 29%. Future efforts to aggressively manage the area for invasive shrubs in particular will also be a crucial component of increasing the average cover of native vegetation in these plots.

Performance Standard #12

Diversity: Plant species will include at least five native species of herbaceous plants with 5% cover present in at least 10% of the monitored plots.

Result: This performance standard is not fully met. A total of four native herbaceous plants were sampled in the plots, as outlined under results for Performance Standard #10, falling short of the five required. Of these four, only soft rush met the standard with approximately 8% cover. Of the 17 Emergent Marsh plots, about 40% had native vegetation.

As at least two of the Emergent Marsh plots (12 & 13) were located in areas that are submerged for periods too great to allow for any colonization of vegetation, it is recommended that these plots be relocated elsewhere within the Emergent Marsh area. Plots with vegetation approaching zero do not provide useful data for understanding the composition and community of plants in the area and artificially distort any subsequent analysis. By excluding the ponded area and randomly selecting new plot locations, future analysis is likely to be more accurate to real conditions on site; therefore, it is recommended that these plots be relocated to a new location within this area for all future monitoring.

3.2 RIPARIAN FOREST RESTORATION AREA (RFR)

Performance Standard #13

Woody Vegetation Density: The density of woody vegetation is at least 1,200 living native stems per acre for Years 2–5.

Result: Woody stem density averaged 1,889 living native stems per acre. While this average meets the performance standard requirement of a minimum of 1,200 stems per acre, it is significantly lower than the 5,432 living native stems counted during 2021 (Year 3) monitoring. It is worth noting that this may be inaccurate due to two plots (#14-15) requiring estimation due to thick Himalayan blackberry thickets blocking access to precise plots and subsequent estimation. As discussed in the following performance standard for invasive species cover, Himalayan blackberry is a significant presence in the area and may be a factor in the reduced count for native woody species. Another plot, #16, was also found to have zero living woody stems, likely due to poor placement. This plot is currently in the floodplain of the channel flowing from the project area and experiences significantly high water during much of the fall/winter season. Upslope of this plot and still within the Riparian Forest Restoration area is a dense area of willow and cottonwood. Moving plot #16 toward this area may help to represent the stem count more accurately for future sampling; therefore, it is recommended that this plot be relocated to a new location within this area for all future monitoring.

Performance Standard #14

Invasive Species: The cover of invasive herbaceous species is 30% or less in Years 2 through 5.

Result: During Year 5, the mean invasive cover of the area was 22% (CI80 = 13-30%, CI = +7.5), meeting the performance standard. Mean invasive shrub cover for Year 5 is not required to meet performance

standards, however it is important to note that mean shrub cover is now approximately 20%. Keeping invasive vegetation under control will be crucial in maintaining adequate habitat for native woody and herbaceous species. Invasive herbaceous species present were dominated by impatiens and reed canarygrass, as well as some patches of Canada thistle and tansy ragwort (*Jacobaea vulgaris*). Invasive woody species included one plot with English holly (*Ilex aquifolium*), but was dominated by Himalayan blackberry, which accounted for an average of 10% cover in all RFR plots. As detailed in the above Performance Standard #13, accurate counts of woody stems in RFR plots were severely hindered in two plots due to dense thickets of Himalayan blackberry. Aggressive management of blackberry for the following three years before Year 10 monitoring will be crucial to ensure native woody and herbaceous plants can survive.

Performance Standard #15

Shrub Species Richness: At least five native shrub species present in Years 2 through 5.

Result: Between the 1-m² herbaceous and 20-m² woody plots, eleven shrub species were observed, resulting in the performance standard being met. The most abundant of any species was Douglas' spirea (*Spiraea douglasii*), with an average cover of nearly 5%. Detailed data of other species sampled in the RFR plots can be found in **Appendix E**.

Performance Standard #16

Tree Species Richness: At least three native species present in Years 2 through 5.

Result: Between the 1-m² herbaceous and 20-m² woody plots, at least seven tree species were observed, resulting in the performance standard being met. The most abundant of any species was black cottonwood (*Populus balsamifera* var. *trichocarpa*), with an average cover of nearly 7%.

- Native cover: Cover by native woody species is $\geq 55\%$ by Year 7. By year 10, there should be $\geq 80\%$ cover by native woody species, $\geq 10\%$ cover by native herbaceous species, and $\leq 20\%$ cover invasive vegetation.

Detailed data of other species sampled in the RFR plots can be found in **Appendix E**.

3.3 RIPARIAN FOREST ENHANCEMENT AREA (RFE)

Performance Standard #17

Invasive Species: The cover of invasive herbaceous species is 30% or less in Years 2 through 5.

Result: While this performance standard does not apply to Year 5, analysis was conducted to determine cover of invasive herbaceous species in case the results provided insight to management or overall site health. The mean invasive herbaceous cover was 21% (CI80 = 13-30%; CI = +6.6), down from 20% in Year 3 (2019). Invasive species found in the greatest abundance here include reed canarygrass and impatiens. Detailed data of other species sampled in the RFE plots can be found in **Appendix E**.

Native Cover: Cover by invasive herbaceous species is $\leq 20\%$ and $\leq 10\%$ cover by invasive woody species by Year 7. By year 10, there should be $\leq 20\%$ cover by invasive woody and herbaceous species combined, $\geq 80\%$ cover by native woody species, $\geq 10\%$ cover by native herbaceous species.

Result: While these standards are not required by Year 5, understanding current trends may be helpful for providing adaptive management to ensure these standards can be reached by their respective years. The current native woody species cover is 4%, native herbaceous cover is 3%, and invasive vegetation cover is 31%. It is worth noting that bare ground cover is also nearly 50% in these areas, likely due to control of invasive species. To reach the respective covers required to meet or exceed these

performance standards, management in the form of continued invasive control throughout the growing season, followed by replanting and reseeding between October and February.

As previously mentioned, there is potential for some of these plots to be moved to locations that are more representative of riparian forest conditions—currently, RFE plots 9, 14, and 15 are located in areas may not represent current or future forested areas. Updating these plots may help to provide more accurate data for actual conditions for future monitoring.

The following performance standards A, B, and C for species diversity in the RFE area are not explicitly required, however the results can be helpful in understanding the overall function and health of the area. They are as follows:

Performance Standard A

Herbaceous cover will include at least five native species of herbaceous plants with 5% cover present in at least 10% of the monitored plots.

Result: While 6 native herbaceous species were found in 50% of the plots sampled, average cover was approximately 0.5%, resulting in the performance standard being unmet. Two species were observed in one plot each to have cover greater than 10%—California brome (*Bromus carinatus*) at 13%, and fringecup (*Tellima grandiflora*) with 16%. As mentioned in the results for performance standard #17, invasive species coverage averaged 19%, which likely presents some competition for native species habitat. Furthermore, bare ground and thatch had an average of 50% cover in all RFE plots sampled. The performance standard is only partially met in this case.

Performance Standard B

Shrub cover will include at least five native species with 5% cover present in at least 10% of monitored plots.

Result: The performance standard is partially met, since native shrubs accounted for 7 species in 61% of plots sampled. However, average cover was approximately 3.7%, which does not meet the 5% minimum cover required. Of the 7 species observed, 6 were observed to have at least one plot in which their cover exceeded 10%. Similar to the above findings with native herbaceous cover, this low cover of shrubs is likely partially explained by the high coverage of invasive herbaceous species and bare ground/thatch.

Performance Standard C

Tree cover will include at least three native species with 10% cover present in at least 10% of monitored plots.

Result: The performance standard is partially met with 5 species of trees sampled in 50% of the plots. The average cover was 3.6% however, falling short of the 5% minimum and resulting in the standard not being met. It is worth noting that 4 of the 5 tree species observed each had at least one plot in which their cover exceeded 10%. Most notably, black cottonwood was observed in three separate plots to have cover ranging from 20-90%. Despite this, overall average cover remained low. While the goal of this performance standard, along with the previous shrub diversity standard outlined above, is diversity rather than abundance, it is worth noting that using a total of 18-m² of sampling for tree and shrub cover is not an ideal measure. A greater sample size or larger plot for tree and shrub cover would likely produce a more representative measure that more accurately represents the cover within the RFE area, which was observed to be greater than 5% for both measures.

3.4 UPLAND/RIPARIAN FOREST INVASIVE MANAGEMENT AREA (URFI)

Performance Standard #18

Invasive Species: The cover of invasive herbaceous species is 30% or less in Years 2 through 5.

Result: While this performance standard does not apply to Year 5, analysis was conducted to determine cover of invasive herbaceous species in case the results provided insight to management or overall site health. The mean invasive herbaceous cover was 26% (CI80 = 16-35%; CI = +6.6), slightly up from 24% in Year 3 (2021). Invasive species found in the greatest abundance here included English ivy (*Hedera helix*) and reed canarygrass.

Native cover: Cover by invasive herbaceous species is $\leq 20\%$ and $\leq 10\%$ cover by invasive woody species by Year 7. By year 10, there should be $\leq 20\%$ cover by invasive woody and herbaceous species combined, $\geq 80\%$ cover by native woody species, $\geq 10\%$ cover by native herbaceous species.

Result: While these standards are not required by Year 5, understanding current trends may be helpful for providing adaptive management to ensure these standards can be reached by their respective years. The current native woody species cover is 59%, native herbaceous cover is 6%, and invasive vegetation cover is 42%. Bare ground represents approximately 36% of the groundcover, likely due to control of invasive species. While woody species cover is on track to meet 80% cover by Year 10, native herbaceous species and all invasives will require continued management. To bring up native herbaceous cover and decrease invasive cover, mechanical and chemical control should be used to control invasives during the growing season, followed by reseeding of a native seed mix for a shaded understory between October and February on any bare patches.

No relocation of URFI plots is recommended at this time. Detailed data of other species sampled in the URFI plots can be found in **Appendix E**.

Although the following performance standards D, E, and F for species diversity for the URFI habitat are not identified explicitly in the HDP for the upland/riparian invasive management area, performance standards for native herbaceous species, native shrub species and native tree species. They are as follows:

Performance Standard D

Herbaceous cover will include at least five native species of herbaceous plants with 5% cover present in at least 10% of the monitored plots.

Result: The performance standard is partially met, since native herbaceous plants were observed in 61% of plots sampled. However, only 4 species with an average cover was approximately 3.7% were found, which does not meet the 5 species with 5% minimum cover required. The only herbaceous plant with greater than 5% cover observed in any single plot was manroot (*Marah oregana*), which was observed twice with cover of 20-30%. This is likely due to the high cover of invasive herbaceous plants of approximately 25% and is dominated by reed canarygrass. Non-native herbaceous vegetation on the other hand, only averaged about 1% and does not appear to be out-competing native vegetation.

Performance Standard E

Shrub cover will include at least five native species with 5% cover present in at least 10% of monitored plots.

Result: The performance standard is partially met, since native shrubs accounted for 7 species in 67% of plots sampled. The average cover was approximately 4.1%, which is close but does not meet the 5% minimum cover required. Of the 7 species observed, 6 were observed to have at least one plot in which

their cover exceeded 10%. Most notably, trailing blackberry (*Rubus ursinus*) was observed in three different plots to have cover ranging from 35-76%. While no non-native or invasive trees were sampled, non-native and invasive shrub cover averaged just over 13%, much of it accounted for by Himalayan blackberry. Like elsewhere in Rinearson Natural Area, aggressive control of Himalayan blackberry will be a crucial component to meeting the criteria of the performance standards, as native plants will typically be outcompeted by blackberry if it is allowed to completely colonize the area.

Performance Standard F

Tree cover will include at least three native species with 10% cover present in at least 10% of monitored plots.

Result: The performance standard is not met but comes very close. Three tree species average 9.9% cover and account for 83% of the plots sampled. This is likely due to the abundance of mature trees within the sample area.

4.0 FISH AND WILDLIFE MONITORING

4.1 FISH MONITORING

Past monitoring to document fish presence and abundance was conducted using beach seine and direct observation snorkel methods. In 2020, seining resulted in the capture of 208 fish (eleven different species) with approximately half of all fish captured being juvenile Chinook salmon. One juvenile coho salmon was captured in the remnant pond during the monitoring period. In 2021, seining was not permitted because juvenile salmonids were caught in seine nets during the 2020 surveys, and non-contact methods were recommended. Snorkeling was concluded to be the best non-contact method for sampling native fish; however, no fish species were observed in 2021 during the snorkel surveys due to poor visibility.

In 2023, snorkel surveys were abandoned due to continued poor visibility and seining was again proposed. An application to conduct seining was submitted to NOAA Fisheries but was rejected due to continued concerns about seining ESA-listed species. Lauren Senkyr, Habitat Restoration Specialist with the NOAA Restoration Center, informed the project team that Section 10 permits to conduct seining in the Lower Willamette River are not being issued by NMFS unless the purpose for seining is for robust research. The original ESA authorization for the Rinearson restoration project was under the Army Corps of Engineers' programmatic consultation (SLOPES) and included approval of seining until a single ESA listed fish was handled. As that occurred in 2020, no future seining will be approved.

Environmental DNA (eDNA) sampling will be conducted by Pacific Habitat Services (PHS) in the spring 2024 monitoring effort and for future monitoring years.

4.2 BREEDING BIRDS

Breeding bird surveys were conducted at seven point count stations based on methods outlined in Huff et al. (2000). Seven survey stations were visited in 2023, as in 2021. Refer to **Figure 4-1** for a depiction of the survey station locations. To compare results, detections are presented as birds per station within 50 feet and include adults and juveniles as well as birds flushed between stations and observed as associated flyovers. Auditory or visual detections beyond 50 feet from a point count station were recorded on the data sheets, but not included in the results. Only seven of the 15 baseline stations closest to the revised point count stations were re-analyzed and are used for comparison with current data.

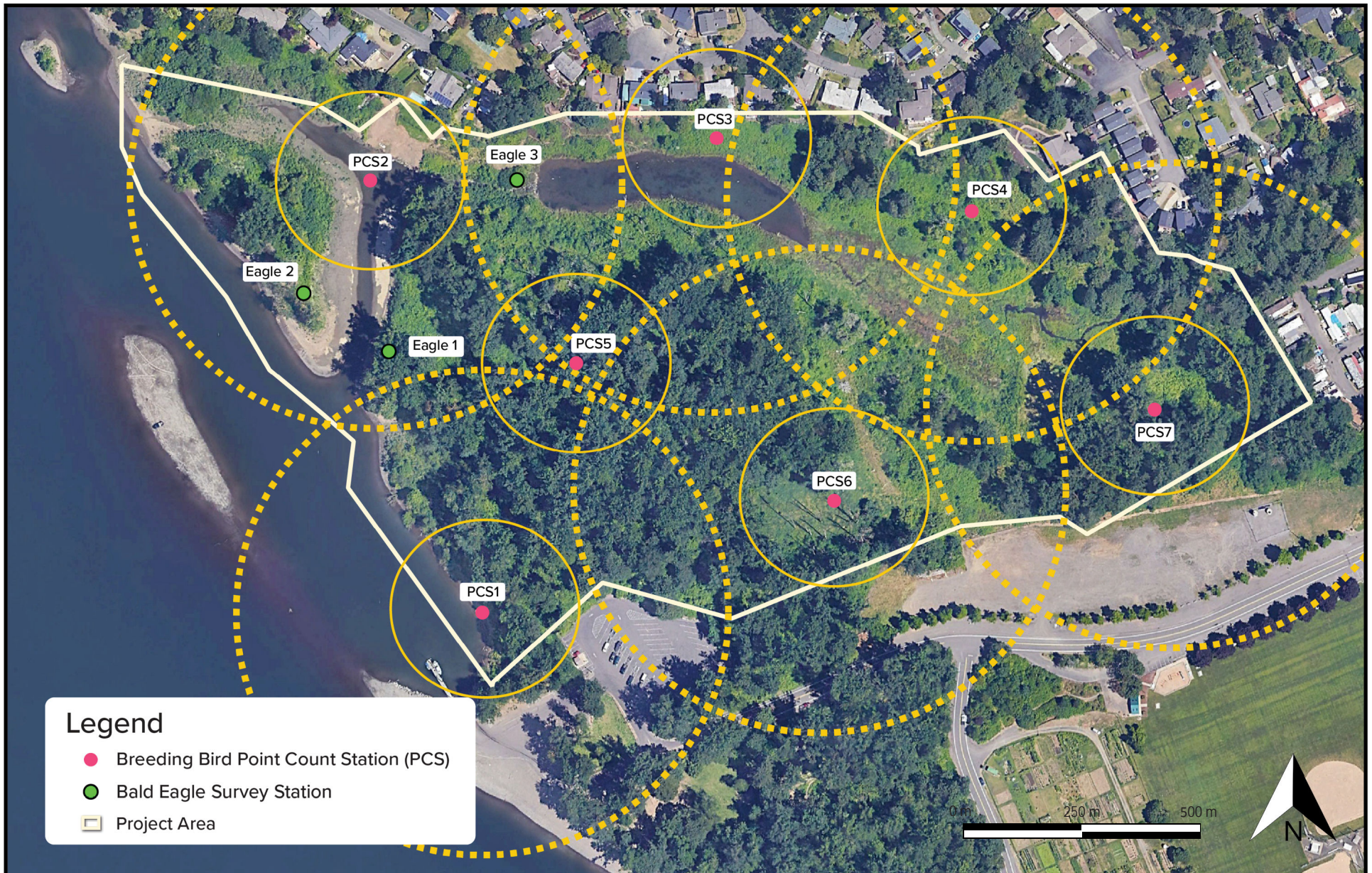


FIGURE
4.1

PERMANENT PHOTO MONITORING POINTS

Year 5
Monitoring Report
Rinearson Natural Area
Restoration Project



A summary table comparing the relative abundance of birds detected in 2023 and 2021 versus 2014 is included in **Appendix F**. A total of forty-two bird species have been recorded during the three years. Thirty-three bird species were detected in 2023, compared to thirty-two in 2021, and twenty-seven in 2014. The top five most commonly detected species in 2023, in decreasing order of abundance, were song sparrow, mallard, American crow, American robin, house finch, and Bewick's wren. In 2021 the top five most commonly detected species were mallard, song sparrow, American crow, spotted towhee, and European starling and cedar waxwing (the latter two tied for fifth most commonly detected), and in 2014, the top five most commonly detected species were song sparrow, spotted towhee, mallard, black-capped chickadee, and Bewick's wren.

Comparison of the number of birds per station between the 2014 baseline and the two monitoring trends shows varying trends, depending on species. Thirteen species showed a continuous increasing trend in the number of birds per station from 2014 to 2021 and 2023. One species, western woodpecker, was detected in 2023 but not in either of the previous monitoring years. Three species were observed in the initial baseline surveys but not during the subsequent monitoring surveys. It's possible that all three of these species (rufous hummingbird, black-throated gray warbler, and Wilson's warbler) were migrants rather than locally nesting species. The same is likely also Townsend's warbler, which was detected in 2021 but not during the baseline survey or the 2023 monitoring effort, as appropriate nesting habitat for this species is not present within the study area. The 2021 monitoring effort report decreases in black-capped chickadees and Bewick's wrens; however, the results of the 2023 monitoring effort showed increases in both species compared to the 2021 results. Species typically associated with ponds, emergent wetlands, and scrub-shrub wetlands (habitats present within the restoration area) that were detected during the 2023 monitoring effort include common yellowthroat, red-winged blackbird, and violet green swallow.

4.3 BALD EAGLES

4.3.1 Methodology

PHS conducted bald eagle surveys at the Rinearson Restoration site from mid-March through August 2023. Initially, surveys were taken from three vantage points in order to cover the entire site. However, once it was determined that the best viewpoint was near the boat ramp, it was used the majority of the time with shorter walks through the site. Surveys were scheduled weekly and alternated between two hours after dawn or two hours before dusk. Inclement weather or other circumstances interfered with scheduling resulting in one missed survey in April and one survey that was interrupted for 10 minutes due to torrential rain and lack of visibility.

PHS ornithologist, Christie Galen, listened, and scanned the area with 8x32 binoculars and 25X-60X zoom spotting scope to detect bald eagles. Bald eagle presence/absence, abundance, behavior, age class, habitat element use, and time of use were recorded. Refer to **Appendix G** for a summary table and bald eagle observation data sheets.



Figure 4-2: Nesting bald eagle in study area

4.3.2 Results

4.3.2.1 Nesting Bald Eagles

Bald eagles have nested on the west bank of the Willamette River across from the site since before the project began. In 2023 they nested approximately 0.33 miles west-northwest of the site in the upper crotch of a black cottonwood tree, see **Figure 4-3**. In mid-March at the beginning of the surveys the female bald eagle was already sitting tall in the nest, and it appeared that the eggs had hatched. For the next few weeks, the adults appeared to be feeding young but due to the distance and lighting it could not be confirmed. Although the adults continued to perch on or near the nest, no fledglings were observed. The nesting attempt failed but the eagles remained in the vicinity through the final August survey.



FIGURE
4.3

Mink Monitoring Map

Year 5
Monitoring Report
Rinearson Natural Area
Restoration Project





Figure 4-3: Bald eagle nest on west side of Willamette River, outside of the study area

4.3.2.2 *Presence/Absence/Abundance*

Twenty-three bald eagle surveys were conducted between mid-March and August 2023. Sixty one percent of surveys (14) resulted in one or more on-site bald eagle sightings. Additionally, bald eagles were observed in the vicinity of the site during 91 percent of surveys (21). Bald eagles were observed on site during 26% of the observation time while they were observed in the site vicinity during 53% of the observation time. A minimum of 3-4 sub-adults and 2 adults were observed on site during surveys.

4.3.2.3 *Site Habitat Elements Used*

Bald eagles were observed perched in the riparian zone or flying over the site and Meldrum Bay. The most frequently used site feature (9 times) was a mature black cottonwood tree with a scraggly dead top located on the south end of the island in the northwest corner of the site. They also showed preference for perching in another mature cottonwood tree (3 times) located opposite the mouth of Meldrum Bar Channel. Adult eagles spent a total of 7 hours perching in trees in the northwest corner of the site adjacent to the mouth of Meldrum Bar Channel, 7 minutes flying over the site, and 10 minutes foraging unsuccessfully for ducks in Meldrum Bay. They flew over the site but were not observed perching in the interior of the site. Juvenile (~2-year-old) eagles spent 4 hours and 53 minutes on site perched in cottonwood trees along the riverbank and 6 minutes foraging unsuccessfully in Meldrum Bay. The adult bald eagles flew between these perches and the off-site nest across the river, as well as other hunting perches on both banks of the river. Both adults and sub-adults hunted from these perches.

4.3.2.4 *Timing and Seasonality*

Of the 14 surveys with on-site bald eagle sightings, approximately half were morning surveys and half were evening surveys. Adult and sub-adult sightings occurred on and off-site throughout the survey period from mid-March through August.

4.3.2.5 *Summary*

Bald eagles nested on the west bank of the Willamette River across from the site. The project area is part of their territory, and they perch and hunt on site. Perches consist of mature black cottonwood trees located in riparian habitat adjacent to the river. Adult eagles spent a total of 7 hours perching in trees in the northwest corner of the site adjacent to the mouth of Meldrum Bar Channel, 7 minutes flying over the site, and 10 minutes foraging unsuccessfully for ducks and fish in Meldrum Bay. They flew over the site but were not observed perching in the interior of the site. Juvenile / sub-adult eagles spent 4 hours and 53 minutes on site perched in cottonwood trees along the riverbank and 6 minutes foraging unsuccessfully in Meldrum Bay. Bald eagles were observed on site during 26% of the observation time while they were observed in the site vicinity 53% of the observation time. The nesting attempt was a failure, but the adults remained in the vicinity of the nest through the final August survey.

4.3.2.6 *Other Species*

American Beaver

On two occasions an American beaver was observed in Meldrum Bay; at dusk on April 21, 2023, it slapped its tail a couple of times while swimming in the bay and at dawn on June 19, 2023, it carried a cottonwood branch and swam to the bank near the boat ramp to eat the leaves off and then walked north along the bank and crawled into some brush.

Birds in Meldrum Bay and Willamette River

Peregrine falcon (4/21), osprey, belted kingfisher, barn swallow, tree swallow, Vaux's swift, mallard, Canada goose, spotted sandpiper, killdeer, Caspian tern, glaucous-winged gull, California gull, purple martin (8/10), common mergansers, hooded merganser (3/15), American crow, turkey vulture, double-crested cormorant, great blue heron, and song sparrow. On July 4, a 3-foot-long dead salmon on Meldrum Bar attracted over 20 turkey vultures, numerous American crows, 1 great blue heron, 1 juvenile bald eagle, and 1 mallard.

On July 4, 2023, a 3-foot dead salmon on bar attracted great blue heron, turkey vulture (~20) and American crow, and a juvenile bald eagle.

4.4 MINK

Mink were selected as target species for wetland monitoring due to their correlation with high quality aquatic environments, as cited in the Rinearson Natural Area Baseline Monitoring Report (Cascade Environmental, 2016). As mesocarnivores that hunt within continuous aquatic habitat, they are typically associated with heterogenous bank canopy and structure, moderate to low bank slopes, and availability of aquatic prey.

PHS monitored Mink from June-August via three monitoring stations, each with a motion-detection camera and fur snare, and visual searches for mink sign in the general area of the monitoring stations. Monitoring stations were visited bi-monthly within the monitoring period to check camera and fur snare conditions, and to reapply attractants to stations. Attractants used included Three Rivers mink scent

applied to the inside of fur snares and anchovy paste applied near the cameras. Previous mink monitoring deployed three camera and snare sites, along with another separate snare site unassociated with a camera. The single snare site was not deployed for 2023 monitoring, as any fur sample captured in the snare would've required lab testing to prove species. This area was still included during searches for signs of mink.

No mink were detected or captured by the camera traps or fur snares during the monitoring period. Camera 1 was placed downslope of the previous monitoring year location, as it was adjacent to a large, embedded root wad and represented high quality aquatic habitat. This camera was later moved upslope to the original monitoring location after high precipitation and spring freshet raised the water levels and temporarily submerged the camera. The upslope location contained large woody structures typically associated with mink habitat, however as the water level dropped throughout the monitoring season this site became quite dry and was less suitable for mink. It is recommended that the camera be mounted elsewhere for the next monitoring year, in a location that is less likely to be impacted by seasonal water levels. Please see **Figure 4-4** for locations of snares and cameras.

While no mink were detected during the monitoring period, three related mesocarnivores in the mustelid family were observed: skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), and river otter (*Lontra canadensis*). **Figures 4-5 through 4-9** show images of these observed species. Aquatic mammals such as beaver (*Castor canadensis*) and nutria (*Myocastor coypus*) were also observed. The presence of mustelids and aquatic mammals indicates that the area is suitable for animals that occupy similar niches and habitats. Prey diversity and availability appears to be the primary factor influencing mink presence (Holland et al. 2019), followed by invasive vegetation, as it can degrade available denning and foraging habitat (Cascade Environmental, 2016). Improvements to water quality and aggressive management of invasive vegetation are likely to increase the quality of habitat for mink and increase the probability of mink observation in the future.



Figure 4-5: long tailed weasels investigating fur snare.



Figure 4-6: River otter emerging from waters with a fish.



Figure 4-7: Skunk investigating fur snare.



Figure 4-8: Beaver smiling for the camera.



Figure 4-9: Nutria

5.0 WATER QUALITY MONITORING

Water quality monitoring was conducted on July 12, 2023, at 11 locations within the project area. Data collected at each station included water temperature, dissolved oxygen, pH, and conductivity. The stations for the 2023 monitoring were approximated based on the monitoring map and station descriptions provided in the Year 3 (2021) monitoring report by ESA. Two additional readings were taken in this effort due to lower water depths in the upper reaches on the day of measuring. **Table 5-1** describes the 2023 water quality monitoring locations that are shown in **Figure 5-1**. Additionally, continuous temperature data was collected by the water level logger instruments from April through July.



Water Quality and Benthic Monitoring Map

Year 5 Monitoring Report

Rinearson Natural Area
Restoration Project



FIGURE
5-1

TABLE 5-1 WATER QUALITY MONITORING LOCATIONS

Monitoring Station ID	Location Description
WQ-1	Willamette River/Meldrum Bay: End of Boat Ramp Dock at Meldrum Bar Park
WQ-2	Willamette River/Meldrum Bay: Confluence of Meldrum Bar Channel and Meldrum Bar Bay
WQ-3	Meldrum Bar Channel – Upper Section, above beaver dam
WQ-4	Engineered Riffle – Lower Section
WQ-5	Engineered Riffle – Middle Section
WQ-6.1	Engineered Riffle – Upper Section, below beaver dam
WQ-6.2	Remnant Pond – Outlet, above beaver dam
WQ-7	Remnant Pond – Middle Section, South Side
WQ-8	Remnant Pond – East End, South Side of channel into pond
WQ-9	Emergent Marsh Channel – Lower Section
WQ-10.1	Emergent Marsh Channel – Upper Section
WQ-10.2	Emergent Marsh Channel – Upper Section, downstream of beaver dam
WQ-11	Upper Rinearson Creek – Downstream of rock cascade, upstream of footbridge

A YSI 556 multi-parameter sonde with handheld display was used to collect the water quality parameters. The water quality meter was calibrated by Pine Equipment, Inc. (from whom the YSI multi-parameter was rented, and a certification of calibration is provided in **Appendix I**) within 24 hours of the field data collection using standards of known values for pH and conductivity, and with known percent saturation for DO. Like the previous Year 1 and Year 3 monitoring efforts, the data were collected beginning with WQ-1 in the Willamette River at the beginning of the day (around 9:30am) and moving upstream to end with WQ-11 in Upper Rinearson Creek by early afternoon (12:40pm). Data collection was aimed for mid-depth in the water column at each monitoring station, where feasible. However, since data was collected in early July, as compared to previous monitoring efforts in April, this was more difficult in some areas due to lower water levels.

The water quality monitoring, per the HDP, is meant to be performed during April of each year. However, during the Spring months of 2023, water levels in the Willamette River were relatively high, limiting access to much of the lower project area. Therefore, monitoring was not performed until early July. Comparisons between certain water quality metrics to previous years are not beneficial in some instances, and these are discussed in the following sections. In future monitoring years if water levels at a particular sampling point are too high, the closest dry ground location adjacent to the sampling point will be used, to the extent feasible.

5.1 RESULTS

Data was collected on July 12, 2023 for water temperature, pH, dissolved oxygen, and conductivity. On the day on the monitoring, the weather conditions were sunny with air temperatures of 57-84 degrees Fahrenheit, or 13.89-28.89 degrees Celsius. The results are shown in **Table 5-2**.

TABLE 5-2
SUMMARY OF WATER QUALITY RESULTS

Station ID	Sample Time	Temperature	pH (S.U.)	Dissolved Oxygen (mg/L)	Conductivity (μS/cm)
WQ-1	9:41 AM	22.9 °C 73.22 °F	7.59	8.02	91.8
WQ-2	10:00 AM	23 °C 73.4 °F	7.57	8.4	93.4
WQ-3	10:19 AM	22.2 °C 71.96 °F	8.73	8.04	188
WQ-4	10:30 AM	22.5 °C 72.5 °F	9.06	9.62	184
WQ-5	10:39 AM	22.6 °C 72.68 °F	9.15	9.03	183.3
WQ-6.1	10:49 AM	23.2 °C 73.76 °F	9.25	14.11	184
WQ-6.2	10:52 AM	22.8 °C 73.04 °F	9.52	18.38	181.7
WQ-7	11:36 AM	23 °C 73.4 °F	9.14	15.34	182
WQ-8	11:54 AM	17.7 °C 63.86 °F	7.42	9.52	186.8
WQ-9	12:06 PM	17.1 °C 62.78 °F	6.97	2.6	186.3
WQ-10.1	12:20 PM	17.4 °C 63.32 °F	7.26	9.19	187
WQ-10.2	12:27 PM	17.2 °C 62.96 °F	7.24	9.24	186.5
WQ-11	12:37 PM	17 °C 62.6 °F	7.58	9.28	184.3

5.2 TEMPERATURE

The data collected for temperature indicate that the monitoring locations located nearest the inlet of Rinearson Creek into the project site and into the emergent marsh area upstream of the remnant pond experience the lowest temperatures (around 17-18 °C), whereas the highest temperatures (approximately 23 °C) were recorded in the remnant pond, upstream of the roughened channel, and in the Willamette River.

In general, the water temperature showed a decreasing trend as the measurements moved upstream of the remnant pond and into Rinearson Creek, as well as a decreasing trend from the remnant pond downstream through the roughened channel before nearing the Willamette River. Since the samples were recorded in July rather than in April, the flows within the project site were lower and the ambient air temperatures were higher. Therefore, no comparison between the sample water temperature can be drawn between Year 5 and Years 1 and 3.

The water level loggers utilized by Waterways for water surface elevation monitoring also record water temperature. The Waterways loggers recorded from April 14, 2023 through July 12, 2023. The recorded water temperatures are displayed in **Figure 5-2**. The Oregon water quality standard for temperature is defined in OAR 340-041-0028 and stipulates that the 7-day-average maximum temperature of a stream identified for salmon and trout rearing and migration use may not exceed 18.0 °C (64.4 °F). The water temperature for the upper site logger (where Rinearson Creek enters the project site) remained well under the 64.4 °F standard. However, the Waterways logger located near the remnant pond outlet had more variable high and low temperatures, with averages above the OAR standard beginning in late April and continuing through the remainder of the period of record.

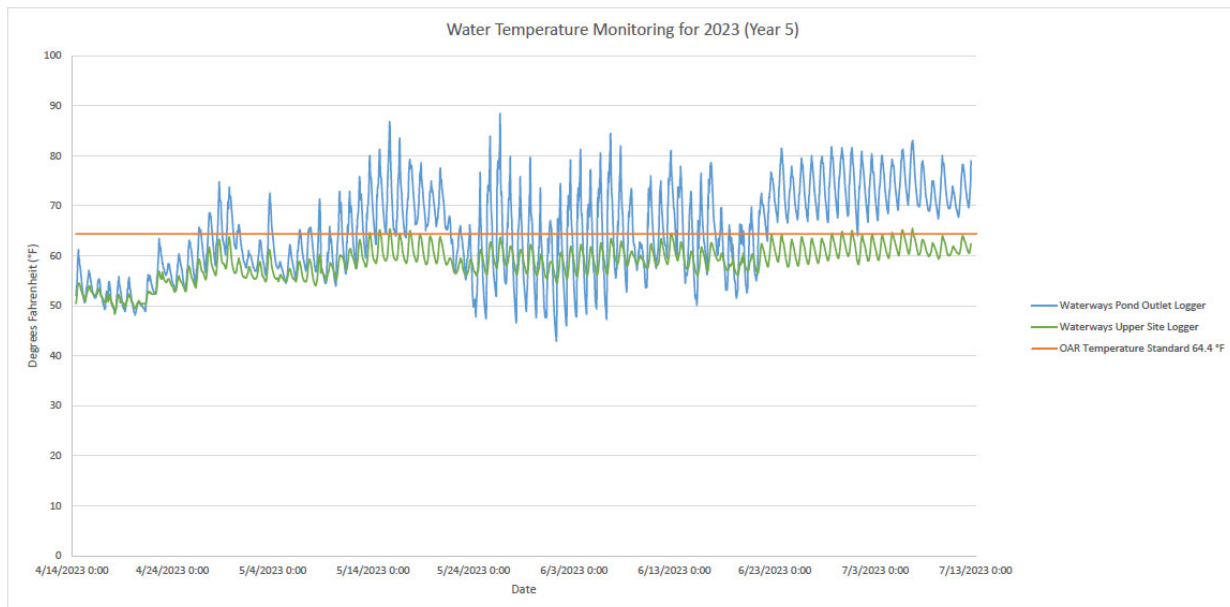


Figure 5-2: Water Temperature Monitoring Year 5 (2023)

5.3 DISSOLVED OXYGEN (DO)

The Oregon water quality standards for dissolved oxygen are outlined in OAR 340-041-0016 and require that DO should not be less than 6.0 mg/L in waters designated for cold water aquatic life. Higher DO standards have been established for waters that are being used by salmon for spawning but it is likely that the Rinearson site is only being utilized by juvenile salmonids for rearing. The DO values measured on July 12, 2023 were well above the minimum needed to meet the water quality standard except for WQ-9, which is located in the lower section of the emergent marsh. Since this value of 2.6 mg/L is significantly lower than the remainder of the data, we assume that this is an errant data point and non-indicative of low oxygen levels in the system.

The DO data collected in this monitoring effort displayed measurements with a minimum, outside of the errant measurement of 2.6 mg/L, of 8.02 mg/L at WQ-1 (at the boat launch in Meldrum Bay) and a maximum of 18.38 mg/L at WQ-6.2 (at the remnant pond outlet above the beaver dam). Readings at the remaining stations ranged from 8.04 mg/L to 15.34 mg/L. The Year 3 monitoring efforts also recorded a high dissolved oxygen level in the remnant pond and determined that this was likely due to photosynthetic activity resulting from algae growth and aquatic plants in the pond. Algae and plant life can produce more oxygen than the system can consume. The measurement in the pond in Year 5 was also taken at midday, a time at which photosynthetic activity is likely at its highest. **Figure 5-3** shows a

photo of the remnant pond on the day of monitoring (July 12, 2023), which demonstrates the extent of algae growth in the remnant pond during the warmer months of the year.

In general, the measurements for Year 5 (2023) show similar patterns as Years 1 and 3, other than the values being slightly higher overall due to the date of collection being in the summer rather than spring. As in Years 1 and 3, the DO readings increased moving upstream in the site, and hit their peak in the remnant pond, and then decreased in the emergent marsh and Rinearson Creek inlet to the site.



Figure 5-3: Algae growth in the remnant pond on July 12, 2023

5.4 PH

The pH measurements for Year 5 (2023) indicated values from a low of 7.24 Standard Units (S.U.) at station WQ-10.1 to a high of 9.52 at station WQ-6.2. The pH measurements at the remaining stations were recorded within the range of 7.26 to 9.25 S.U.

These data were slightly elevated as compared to the pH measurements recorded for Year 3, which ranged from 6.8 – 8.3 S.U. This difference is likely caused by the time of year. The ambient air temperature in July is higher than in April, and the water level in Rinearson Creek and the Willamette River are also lower. Both factors cause an increased water temperature, which decreased the solubility of carbon dioxide. Lower levels of carbon dioxide reflect a lower concentration of hydrogen, which can increase pH. Additionally, the larger number of photosynthesizing aquatic plants and algae observed during monitoring release oxygen, which also increased pH in water. Outliers in the data, especially Sites WQ4 through WQ7, may be a result of sediment being stirred up during the sampling, which can be especially acute during low flow summer conditions, or the fact that the water was very shallow, which may impact the sampling equipment.

The Oregon water quality standards for pH in the Willamette Basin are outlined in OAR 340-041-0345 and state that pH values should remain within 6.5 to 8.5 S.U. Six of the 13 pH values measured for Year 5 on July 12, 2023 were above 8.5 S.U. and therefore do not meet the standards. These six

measurements consisted of all stations located between Meldrum Channel (above the lower beaver dam) and the remnant pond (WQ-3 to WQ-7). As discussed, the temperatures due to the timing of the water quality monitoring, paired with aquatic vegetation growth, likely affected the recorded values.

5.5 CONDUCTIVITY

There are no water quality standards for conductivity in Oregon. However, conductivity is valuable to measure for an overall indicator of stream quality. Tracking this variable allows us to note any change in pollution sources either within or entering the project site.

The Year 5 (2023) measurements of conductivity ranged from a low of 91.8 $\mu\text{S}/\text{cm}$ at station WQ-1 to a high of 188 at WQ-3 $\mu\text{S}/\text{cm}$. The readings at the two stations nearest the Willamette River (WQ-1 and WQ-2) shows the lowest values throughout the project site, while the conductivity values were higher and steady throughout the rest of the site (182-188 $\mu\text{S}/\text{cm}$). These data and the patterns they indicate are consistent with those recorded for Years 1 and 3, which ranged from about 100 to 200 $\mu\text{S}/\text{cm}$ (ESA 2022 and Cardno 2020).

6.0 BENTHOS MONITORING

Benthic macroinvertebrates were sampled at four sites in the project area according to methods outlined in the HDP (**Figure 5-1**). Samples were sieved and bottled on site and delivered to Aquatic Biology Associates for analysis. A summary of some of the benthic macroinvertebrate metrics with the most interpretive value are provided below. However, trends from 2020 to 2023 should be approached with caution, as the benthic macroinvertebrate samples were collected in the spring in 2020 and 2021 and at the height of summer in 2023. Refer to **Appendix H** for benthic invertebrate data and results. Future macroinvertebrate sampling will be conducted in spring so that results are standardized and comparable with the 2020 and 2021 data.

Total taxa richness dropped in both the emergent marsh and upper control site in 2020 and 2021 but increased at both sites in 2023. Total richness declined in the engineered riffle and rose slightly compared to 2021 in the remnant pond.

Total abundance (relative) increased threefold compared to 2021 in the remnant pond. Total abundance increased in the emergent marsh and upper control after declining 2020–21. After a marked decline 2020-21 in the engineered riffle, total abundance declined slightly again in 2023.

EPT taxa richness (mayflies, stoneflies, and caddisflies) is a commonly tracked metric for assessing stream samples. EPT taxa richness was very low in all years, with two or fewer taxa in each of the four habitat types.

Life cycle duration: Multivoltine taxa comprise 59–98% of the community at the four habitat types, which is considered high, similar to the results observed in 2020 and 2021. Semivoltine (long-lived) taxa richness is a commonly tracked metric for stream BIBI indices. It varied from 1–5 taxa across all habitats and years. That is comparatively low for both marshes and streams in the Pacific Northwest. Semivoltine taxa richness dropped significantly 2020–21 at the emergent marsh and upper control sites, with drought impacts thought to be the likely cause; the metric increased to scores similar to or exceeding the 2020 scores in 2023.

Taxonomic group composition: Non-insects and the insect order Diptera dominate the four habitat types. Dominance by these two groups is generally considered to reflect low biotic integrity. Percent

mollusks declined significantly in three habitat types in 2021 but increased in 2023. Crustacea are extremely dominated by highly tolerant Caecidotea, Lirceus, and Crangonyx. Crustacea increased in dominance 2020–21 in three habitat types but declined in the engineered riffle in 2023. Chironomidae (midges) were the dominant dipterans present, and many of the midges present were tolerant taxa in the subfamily Chironominae.

Feeding groups: A high percentage of predators is considered desirable in benthic communities. For mid-order streams in the Pacific Northwest, 0–9% predators is low, 10–19% is moderate, and >20% is high. Both the engineered riffle and upper control stream sites show low % predator scores in all three years. The % predator metric decreased from moderate to low between 2020-21 and 2023. Collector dominance was high (>60%) at the engineered riffle in 2020-21 but decreased to 33.5 in 2023. High collector dominance is regarded as a negative sign for biotic integrity in streams. Shredder % is very low in all habitat types and years, which is also a negative sign. Scraper % at the stream sites is generally low (<10%) across all habitats and years, another negative sign.

Biological Condition Gradient (BCG): A team of invertebrate specialists is working with the EPA to develop BCG models for the maritime Pacific Northwest (Stamp et al., 2022, in progress). This will include a model for low gradient, valley streams. Final classification of maritime Pacific Northwest taxa into their attribute type may differ slightly from this analysis, but not by much. Version 1 of the low gradient stream model was applied to the Rinearson Creek data.

Tolerant taxa (IV, V, and VI) make up 78.4–100% of the taxa present across all habitat types/years, and comprise 95.2–100% by abundance. This is extremely high for stream communities, but perhaps not unexpected for the marsh and pond habitats.

Using Version 1 of the low gradient stream BCG model, the engineered riffle and upper control sites are classified as level 5 and 6 (highly disturbed). Note that this model is calibrated on mid-order, perennial, low gradient streams. The stream sites at Rinearson Creek are small streams, and possibly seasonal or intermittent during drought years.

7.0 ADAPTIVE MANAGEMENT

7.1 EMERGENT WETLAND

As designed, the emergent wetland, located upstream of the remnant pond, constitutes an important habitat element in the overall Rinearson Natural Area Restoration. Based on the monitoring results, it is also an area that has consistently fallen short of the required metrics, especially those associated with the development of a native vegetation community, and the associated deficiencies has likely contributed to the absence of indicator mammals such as mink. In addition, the lower section of the emergent wetland, adjacent to the remnant pond, has experienced localized channel erosion and incision.

From an adaptive management perspective, focusing resources in this portion of the project area might be warranted. Based on our observations, the prevalence of reed canary grass and the lack of a native assemblage of woody species within this bottomland floodplain has resulted in a range of ecological limitations. If woody species, such as willow, dogwood, and other shrub-scrub species can get established it is likely that beaver would expand to this area and construct a dam. This would benefit the site by limiting creating channel incision through construction of a series of grade controls (beaver dams) that would backwater the entire emergent wetland area, increase the hydroperiod for

areas outside the channel, and improve conditions for native wetland species. Currently, the conditions are more favorable for reed canary grass establishment because of the more pronounced wetting and drying cycle that occurs due to the localized channel incision. Beaver have constructed dams and ponded water elsewhere on the site where the native woody species have become established. This vegetation provides a source of food, but also cover from predators, for the beaver, which will not use areas that require them to move across open terrain.

Following construction of the project, native woody saplings did recruit to this area and beaver were active in the lower portion of the emergent wetland but reed canary grass outcompeted those species which may have led to abandonment of the beaver dams in those areas due to a lack of building materials and food. The beavers are now restricted to the upper portion of the emergent wetland, the roughened channel, and the lower lagoon area where native woody species have established and are doing well.

Appendix J outlines all treatment completed in 2023 (Year 5) for the project area, and includes spray logs, the Ash Creek Forest Management Statement of Work for vegetation management, and treatment logs divided by month.

8.0 REFERENCES

Cardno. 2020. Rinearson Monitoring Annual Report. Dated December 2020. Prepared for: Columbia Restoration Group, LLC.

Cascade Environmental Working Group. January 2016. Rinearson Natural Area Habitat Development Plan (HDP).

DSL (Department of State Lands). 2009. Routine Monitoring Guidance for Vegetation. September 23, 2009. Interim Review Draft version 1.0.URL:

https://www.oregon.gov/dsl/WW/Documents/dsl_routine_monitoring_guidance.pdf

Holland, A.M., Schauber, E.M., Nielsen, C.K. and Hellgren, E.C. (2019), River otter and mink occupancy dynamics in riparian systems. *Jour. Wild. Mgmt.*, 83: 1552-1564. <https://doi.org/10.1002/jwmg.21745>

Prutt, B. 2018. Rinearson Natural Area Habitat Development Plan. Dated October 5, 2017, updated December 2018. Portland, OR. Rinearson Natural Area, LLC.

Environmental Science Associates. Rinearson Natural Area Restoration Monitoring Report Year 3 (2021). Dated September 2022. Prepared for: Columbia Restoration Group, LLC.

Appendix A

Photo Monitoring

PHOTO MONITORING DOCUMENTATION

All photo monitoring was performed by Waterways from April through August 2023 and documented using the Avenza mapping application.

PP1-C

Date: July 12, 2023



Date: August 21, 2023



PP2-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP3-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP4-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP5-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP7-C

Date: April 3, 2023



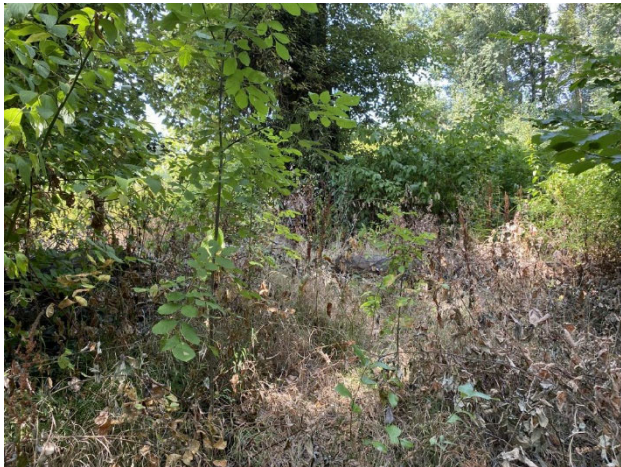
Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP8-C

Date: April 3, 2023



Date: May 4, 2023



Date: August 21, 2023



PP9-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP10-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP11-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP12-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



PP13-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023





Date: August 21, 2023



PP14-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP15-C

Date: April 3, 2023



Date: May 4, 2023





Date: July 12, 2023



Date: August 21, 2023





PP16-C

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP17-320

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP18

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP19-260-90

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



PP20-131

Date: April 3, 2023



Date: May 4, 2023



Date: July 12, 2023



Date: August 21, 2023



Appendix B

Habitat Structures and Large Woody Debris Monitoring

HABITAT STRUCTURE PHOTO AND NOTES DOCUMENTATION

Habitat Structure 1: Debris Pile (Intact)



Habitat Structure 2: Floodplain Log Structure (Intact)

Notes: Consists of a log and a few boulders.



Habitat Structure 3: Log Pile (Intact)

Notes: Consists of multiple large cottonwood logs and is covered in native trailing blackberry.



Habitat Structure 4: Debris Pile (Intact)

Notes: Covered in native trailing blackberry.



Habitat Structure 5: Single Log Structure (Intact)

Notes: Appears to be cottonwood and is covered in ivy and some native vines.



Habitat Structure 6: Single Log Structure (Intact)

Notes: Covered in ivy and other vines.



Habitat Structure 7: Debris Pile (Intact)

Notes: Wood debris pile covered in a mix of native and non-native vines.



Habitat Structure 8: Boulder Pile (Intact)

Notes: Small rock pile.



Habitat Structure 11: Not Accessible (Unknown)

Notes: At site but completely overgrown so could not observe the structure.

Habitat Structure 12: Floodplain Log Structure (Intact)



Habitat Structure 13: Snag (Still Standing)



Habitat Structure 14: Boulder Cluster (Intact)



Habitat Structure 15: Snag (Still Standing)



Habitat Structure 16: Log Pile (Intact)



Habitat Structure 17: Boulder Cluster (Intact)



Habitat Structure 18: Log Pile (Intact)



Habitat Structure 19: Boulder Pile (Intact)



Habitat Structure 20: Roughened Channel (RC) Log Structure (Intact)



Habitat Structure 21: Roughened Channel (RC) Log Structure (Intact)



Habitat Structure 22: Roughened Channel (RC) Log Structure (Intact)



Habitat Structure 23: Roughened Channel (RC) Log Structure (Intact)



Habitat Structure 24: Recruited Large Wood (Intact)



Habitat Structure 24: Recruited Large Wood (Intact)



Habitat Structure 25: Boulder and Log Pile (Intact)



Habitat Structure 26: Log Pile (Intact)



Habitat Structure 27: Log Pile (Intact)



Habitat Structure 28: Snag (Still Standing)

Notes: Large cottonwood that is not completely dead



Habitat Structure 29: Log Pile (Intact)



Habitat Structure 30: Boulder Pile (Intact)

Notes: Includes one floodplain log



Habitat Structure 31: Snag (Still standing)

Notes: Three volunteer snags



Habitat Structure 32: Log Pile (Intact)



Habitat Structure 33: Log Pile (Intact)



Habitat Structure 34: Log Pile (Intact)



Habitat Structure 35: Floodplain Log (Intact)



Habitat Structure 36: Floodplain Log (Intact)



Habitat Structure 37: Log Pile (Intact)



Habitat Structure 38: Log Pile (Intact)



Habitat Structure 39: Not Accessible (Unknown)

Notes: Site found but hidden under vegetation



Habitat Structure 40: Floodplain Log Structure (Intact)



Habitat Structure 41: Recruited Large Wood (Intact)



Habitat Structure 42: Floodplain Log Structure (Intact)



Habitat Structure 43: Floodplain Log Structure (Intact)



Habitat Structure 44: Floodplain Log Structure (Intact)



Habitat Structure 45: Log Pile (Intact)



Habitat Structure 46: Floodplain Log Structure (Intact)



Habitat Structure 47: Floodplain Log Structure (Intact)



Habitat Structure 48: Floodplain Log Structure (Intact)



Habitat Structure 49: Floodplain Log Structure (Intact)



Habitat Structure 50: Floodplain Log Structure (Intact)



Habitat Structure 51: Floodplain Log Structure (Intact)



Habitat Structure 52: Floodplain Log Structure (Intact)



Habitat Structure 53: Floodplain Log Structure (Intact)



Habitat Structure 54: Floodplain Log Structure (Intact)



Habitat Structure 55: Floodplain Log Structure (Not Intact)

Notes: Logs mobilized.



Habitat Structure 56: Floodplain Log Structure (Intact)

Notes: only one log.



Habitat Structure 57: Floodplain Log Structure (Intact)



Habitat Structure 58: Floodplain Log Structure (Intact)



Habitat Structure 59: Floodplain Log Structure (Intact)



Habitat Structure 60: Floodplain Log Structure (Intact)



Habitat Structure 61: Floodplain Log Structure (Intact)



Habitat Structure 62: Floodplain Log Structure (Intact)



Habitat Structure 63: Floodplain Log Structure (Intact)



Habitat Structures 70-72: Tree Tipped into Pond (all three Intact)



**TABLE 2-1
SUMMARY OF HABITAT STRUCTURE MONITORING FOR YEAR 5 (2023)**

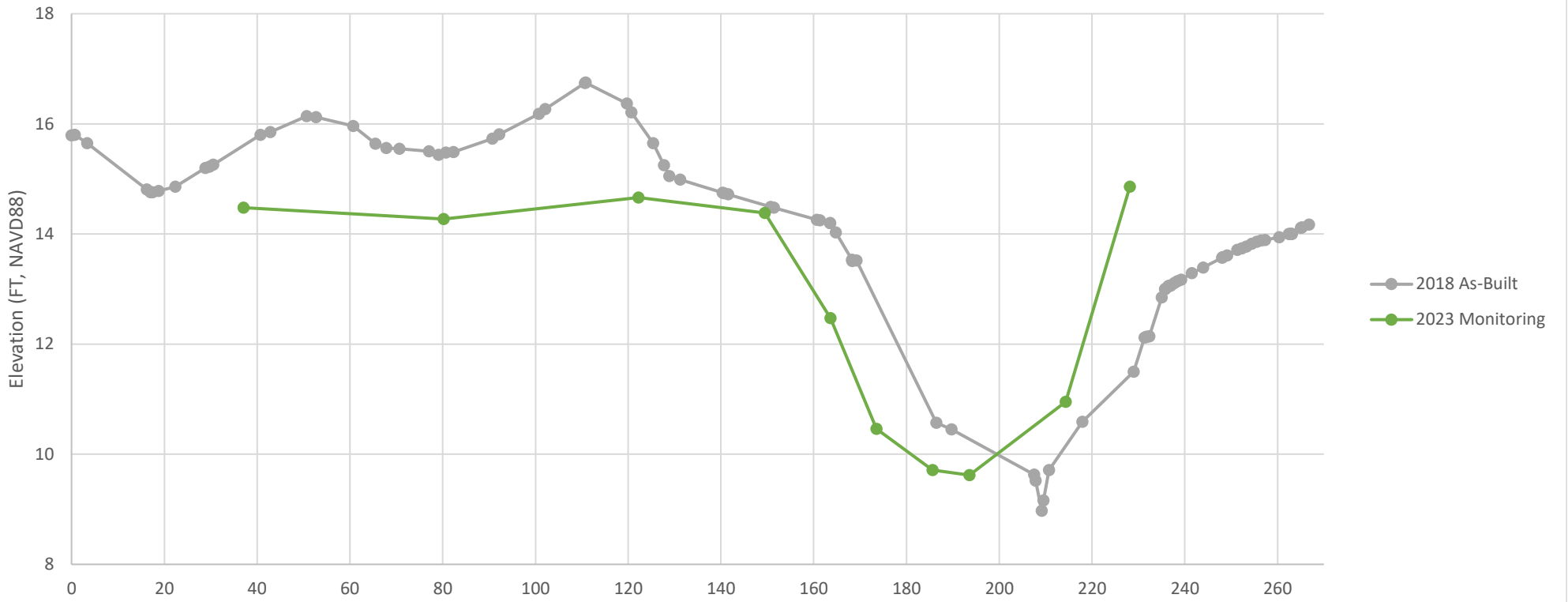
Year 5 Structure ID	Feature Type	Year 5 Condition
1	Debris Pile	Intact
2	Floodplain Log Structure	Intact
3	Log Pile	Intact
4	Debris Pile	Intact
5	Single Log Structure	Intact
6	Single Log Structure	Intact
7	Debris Pile	Intact
8	Boulder Pile	Intact
9	Not Accessible	Unknown
10	Not Accessible	Unknown
11	Not Accessible	Unknown
12	Floodplain Log Structure	Intact
13	Snag	Standing
14	Boulder Cluster	Intact
15	Snag	Standing
16	Log Pile	Intact
17	Boulder Cluster	Intact
18	Log Pile	Intact
19	Boulder Pile	Intact
20	RC Log Structure	Intact
21	RC Log Structure	Intact
22	RC Log Structure	Intact
23	RC Log Structure	Intact
24	Recruited Large Wood	Intact
25	Boulder and Log Pile	Intact
26	Log Pile	Intact
27	Log Pile	Intact
28	Snag	Standing
29	Log Pile	Intact
30	Boulder Pile	Intact
31	Snag	Intact
32	Log Pile	Intact
33	Log Pile	Intact
34	Log Pile	Intact
35	Floodplain Log Structure	Intact
36	Floodplain Log Structure	Intact
37	Log Pile	Intact
38	Log Pile	Intact
39	Not Accessible	Unknown
40	Floodplain Log Structure	Intact
41	Recruited Large Wood	Intact

42	Floodplain Log Structure	Intact
43	Floodplain Log Structure	Intact
44	Floodplain Log Structure	Intact
45	Log Pile	Intact
46	Floodplain Log Structure	Intact
47	Floodplain Log Structure	Intact
48	Floodplain Log Structure	Intact
49	Floodplain Log Structure	Intact
50	Floodplain Log Structure	Intact
51	Floodplain Log Structure	Intact
52	Floodplain Log Structure	Intact
53	Floodplain Log Structure	Intact
54	Floodplain Log Structure	Intact
55	Floodplain Log Structure	Not Intact
56	Floodplain Log Structure	Intact
57	Floodplain Log Structure	Intact
58	Floodplain Log Structure	Intact
59	Floodplain Log Structure	Intact
60	Floodplain Log Structure	Intact
61	Floodplain Log Structure	Intact
62	Floodplain Log Structure	Intact
63	Floodplain Log Structure	Intact
64	Floodplain Log Structure	Not Present
65	Not Accessible	Unknown
66	Not Accessible	Unknown
70	Tree Tipped into Pond	Intact
71	Tree Tipped into Pond	Intact
72	Tree Tipped into Pond	Intact

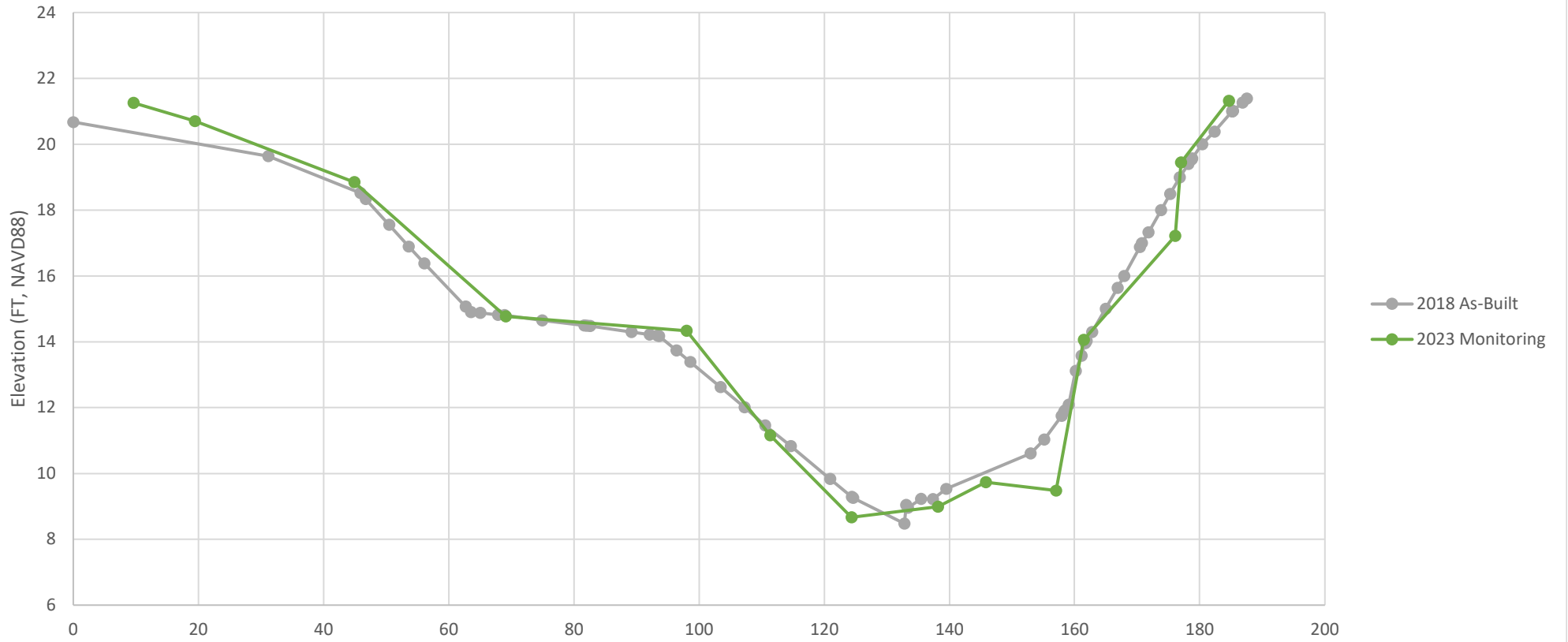
Appendix C

Survey Cross Sections

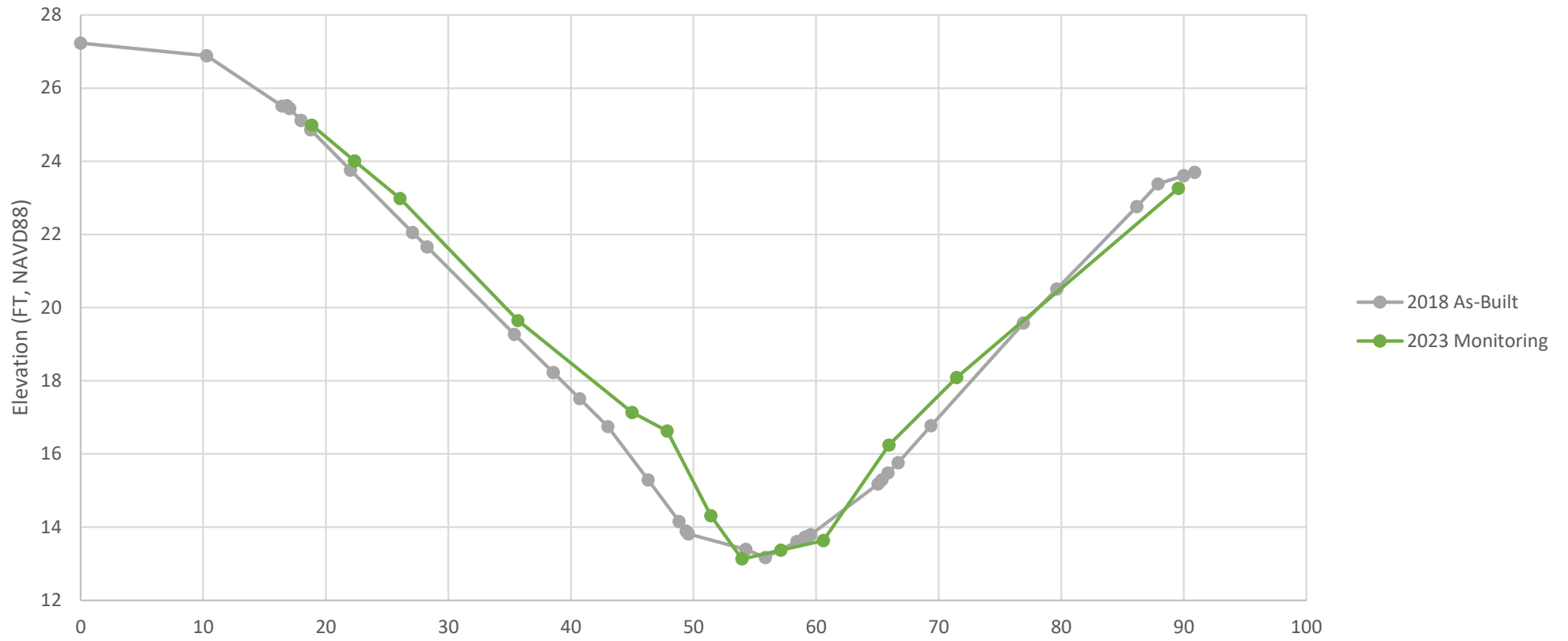
Rinearson Monitoring Section 1



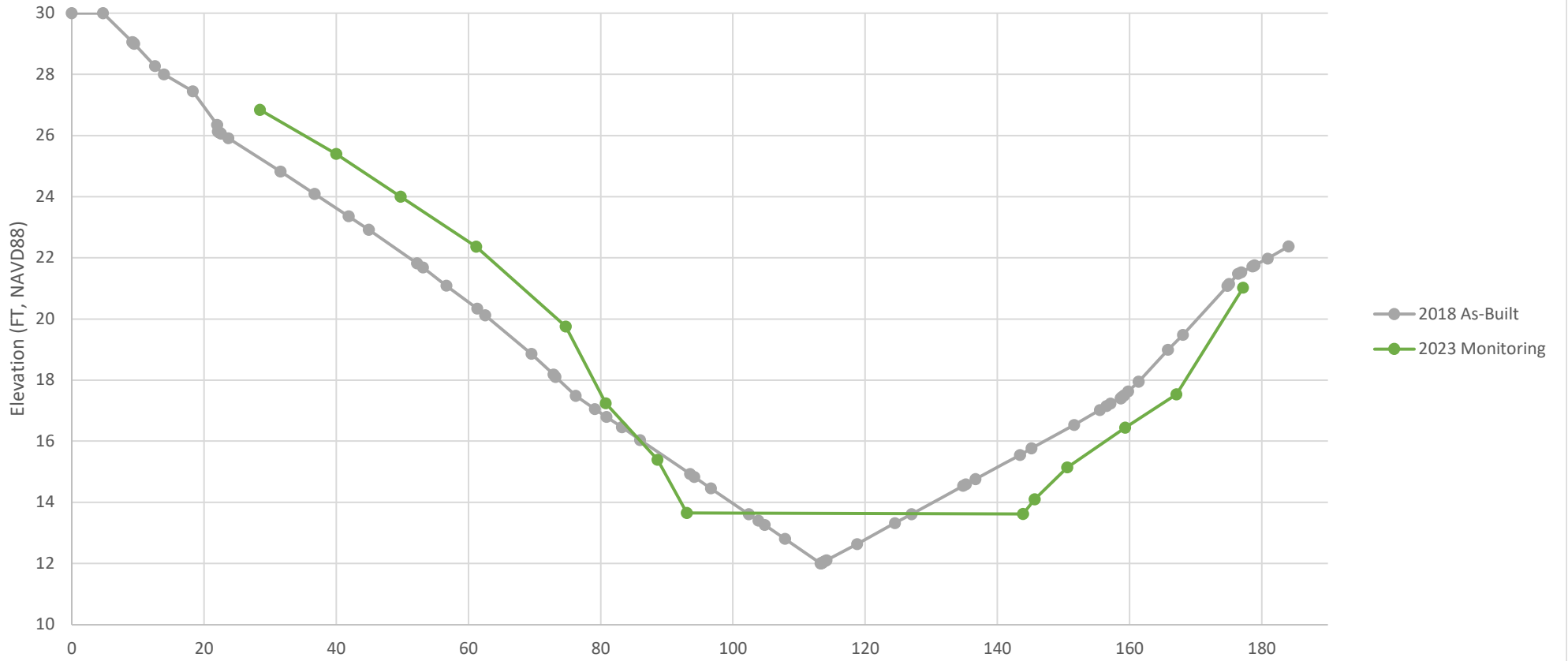
Rinearson Monitoring Section 2



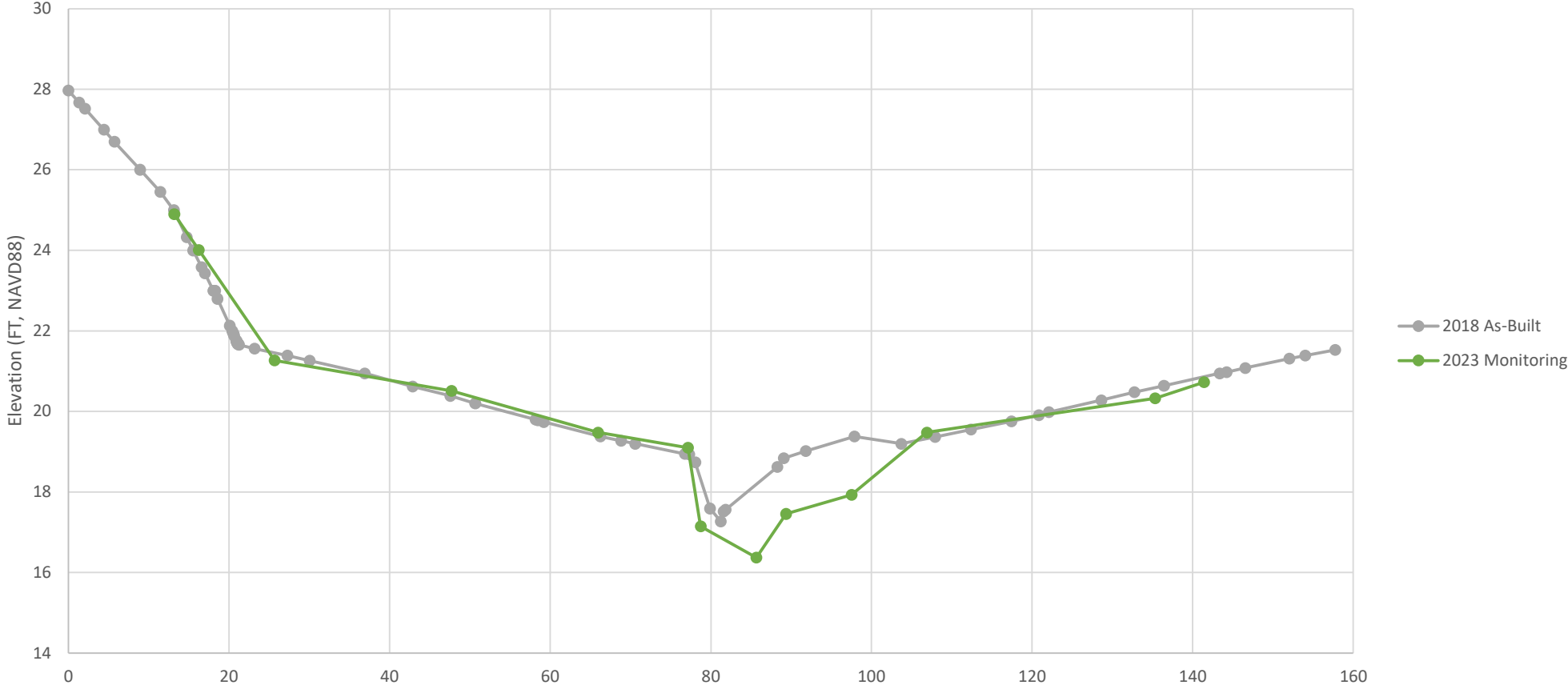
Rinearson Monitoring Section 3



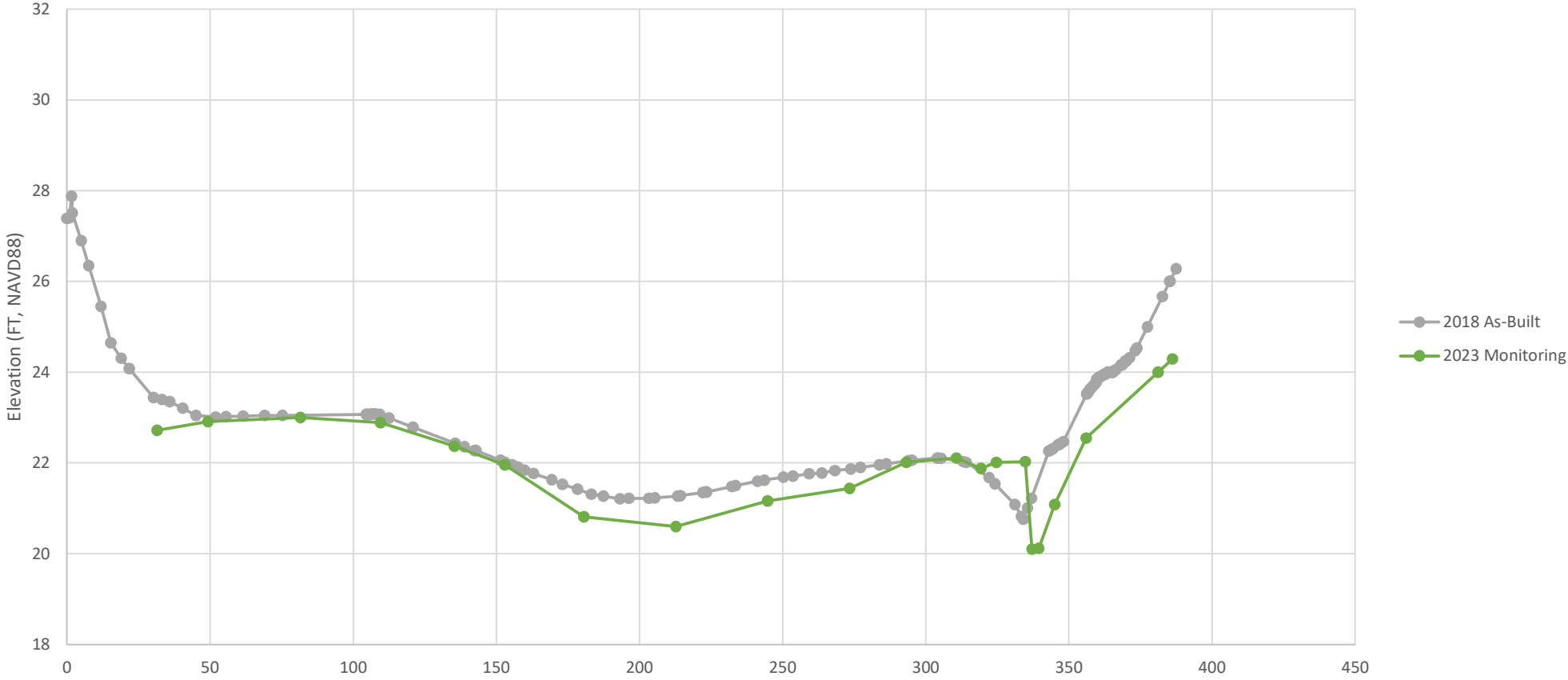
Rinearson Monitoring Section 4



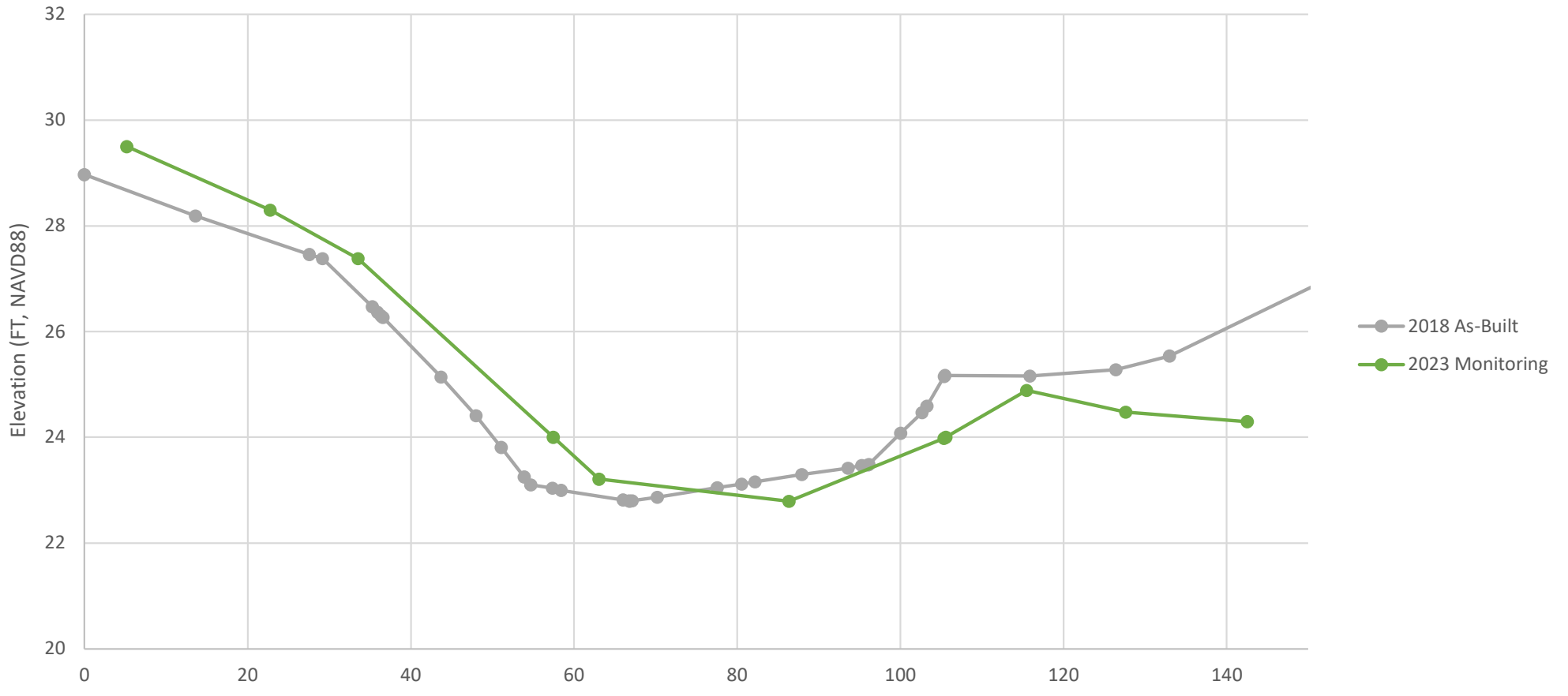
Rinearson Monitoring Section 5



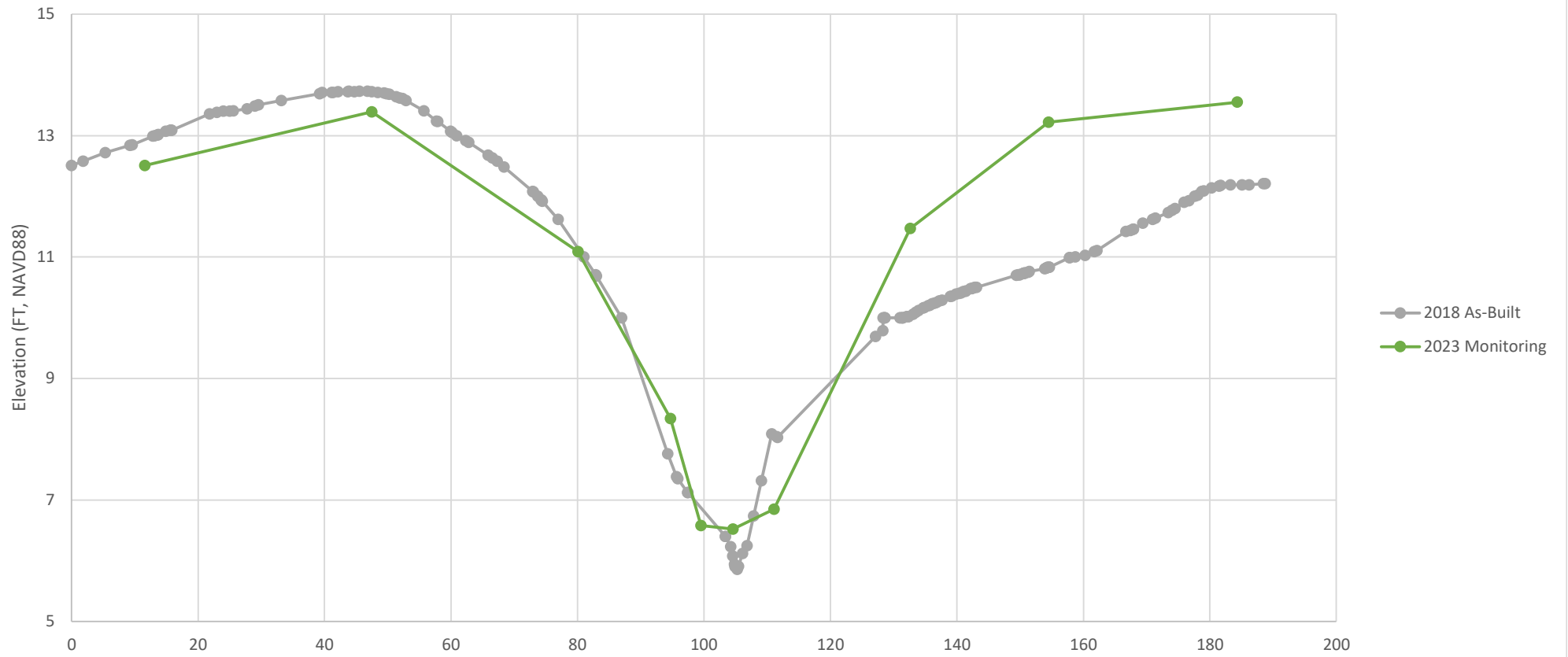
Rinearson Monitoring Section 6



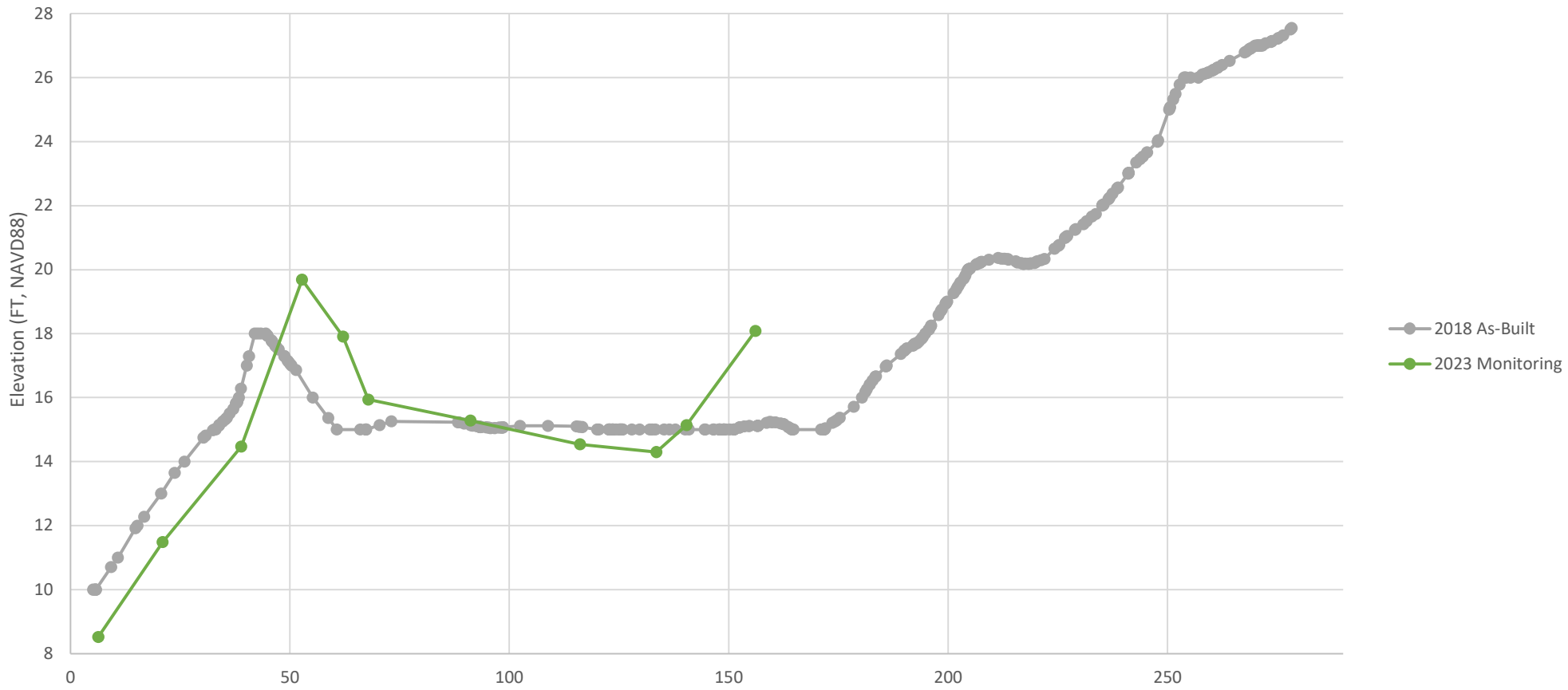
Rinearson Monitoring Section 7



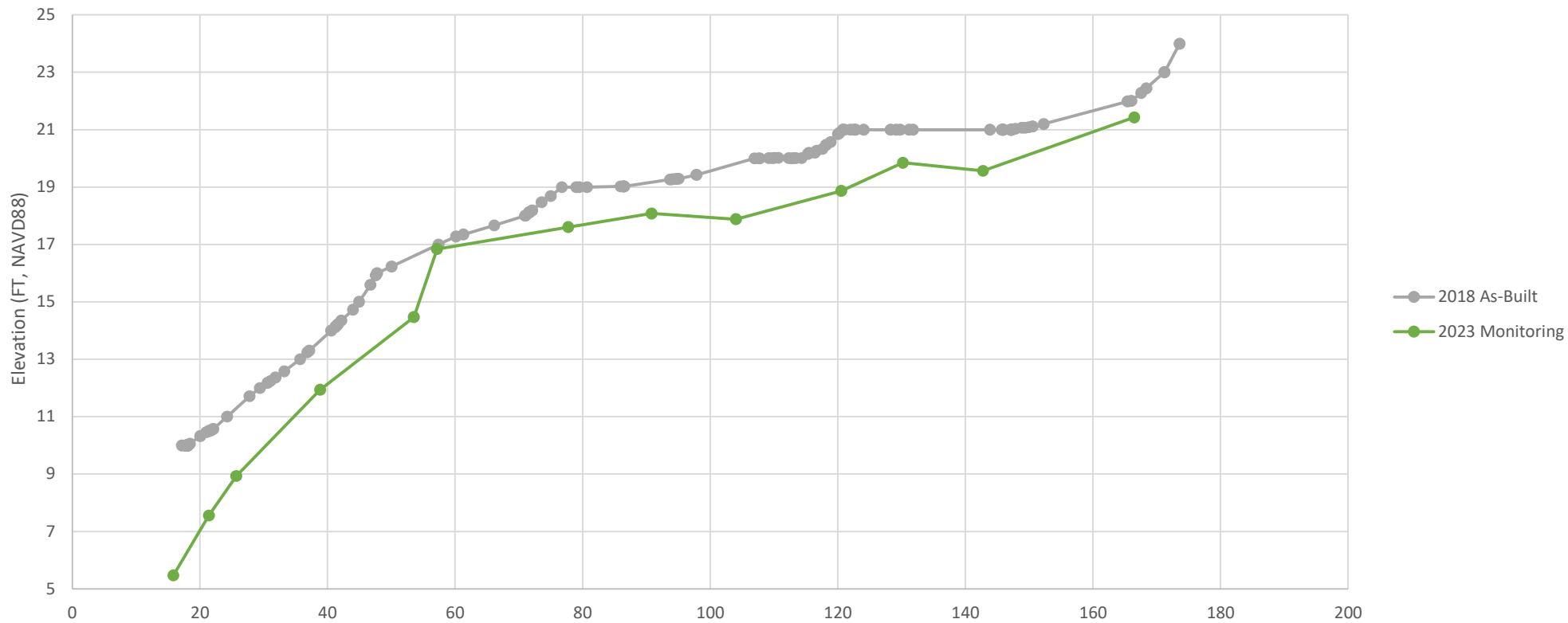
Rinearson Monitoring Section 8



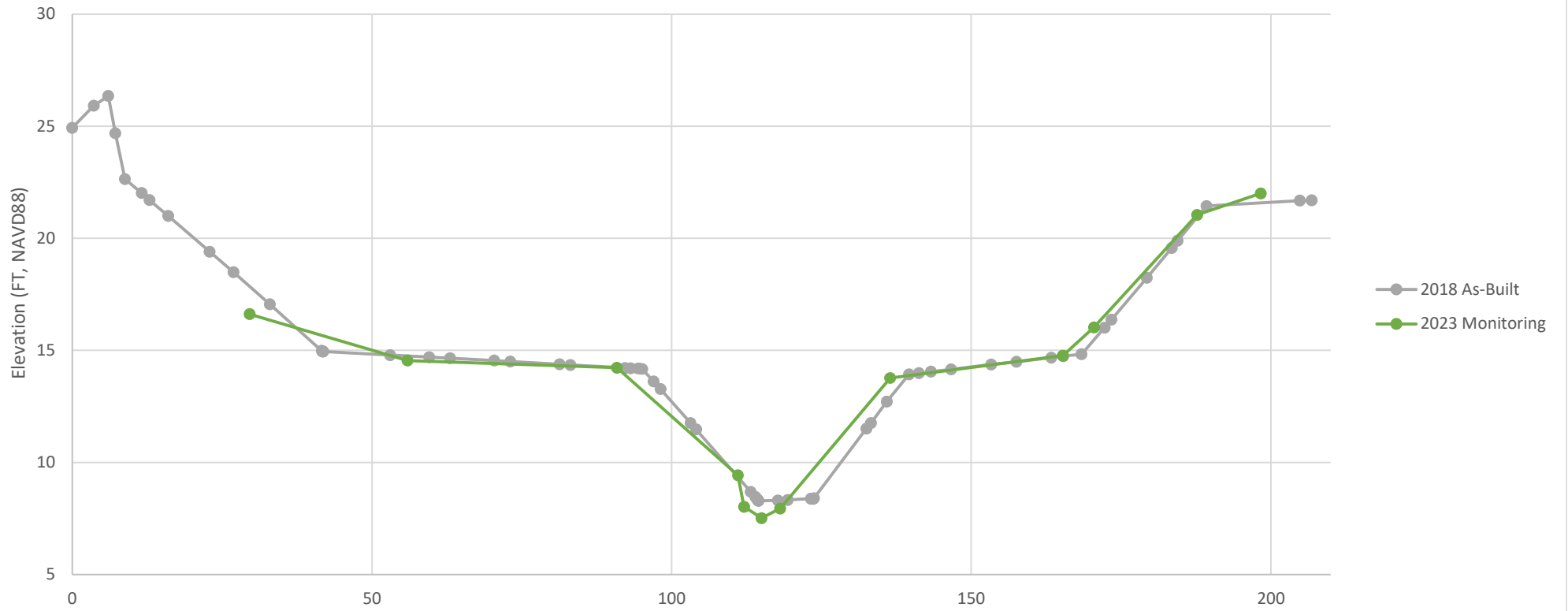
Rinearson Monitoring Section 9



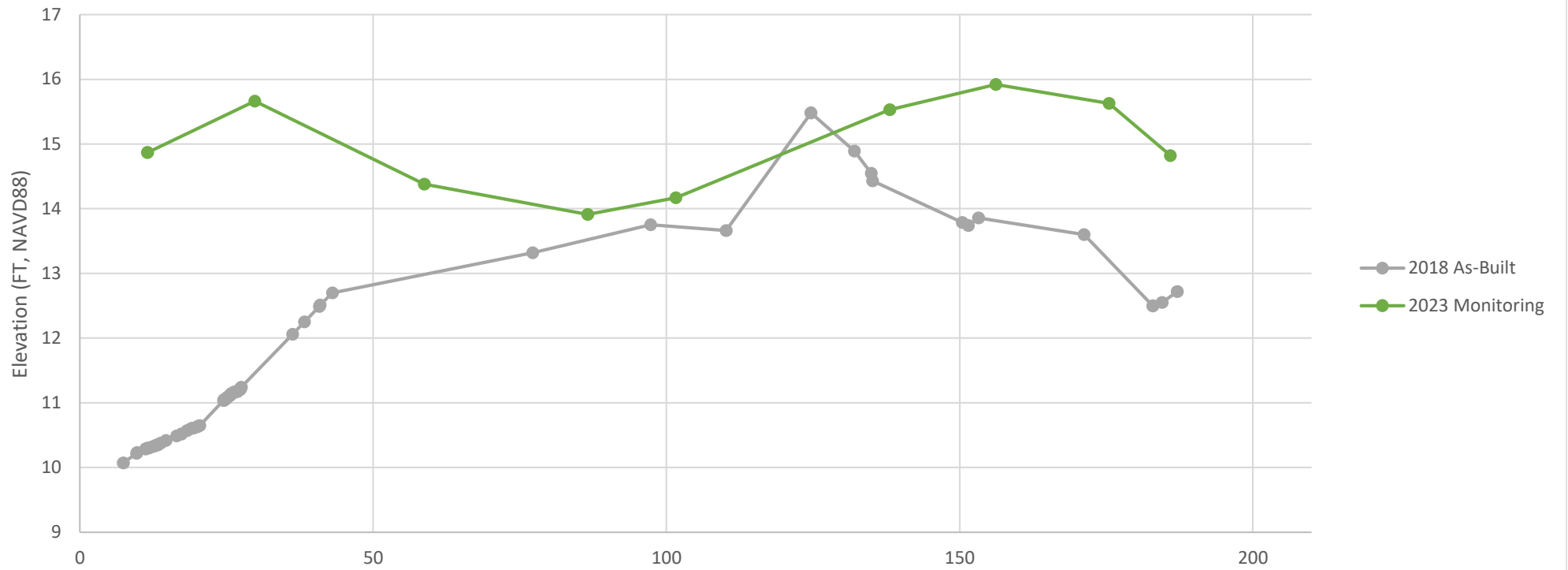
Rinearson Monitoring Section 10



Rinearson Monitoring Section 11



Rinearson Monitoring Section 12



Appendix D

Fish Passage Photos

FISH PASSAGE PHOTO AND NOTES DOCUMENTATION

Meldrum Channel Beaver Dam: Holds approximately 2.5 feet of grade, maintains flooded lagoon upstream, is mostly inundated at summer high tide, and is not considered a fish barrier.



Roughened Channel (RC): RC is stable with depths at low flow adequate to facilitate fish movement. There are no stability issues observed. The reach is vegetating well with a canopy of primarily willow with some cottonwood growth. There are very little to no nonnatives.



Remnant Pond Outlet Beaver Dam: Located at the top of the RC. Holds approximately 1.5 feet of grade. The formation of this beaver dam was anticipated at the design phase, and the dam is not considered a fish barrier.



Emergent Wetland and Upper Creek Beaver Dam: Holds approximately 1 foot of grade. The dam is not considered a fish barrier.



Appendix E

Vegetation Monitoring Data

(Digital Appendix)

Species	URF11	URF12	URF13	URF14	URF15	URF16	URF17	URF18	URF9	URF10	URF11	URF12						
Native Herbaceous Species																		
<i>species-latin name</i>																		
<i>Epilobium ciliatum</i> (=E. watsonii)	0	0	2	0	0	0	0	0	0	0	0	0	0.17					
<i>Galium aparine</i>	0	0	0	0	1	0	0	0	0	4	2	1	0.67					
<i>Marah oregana</i>	20	0	30	0	0	0	0	0	0	0	2	0	4.33					
<i>Polystichum munitum</i>	0	9	0	0	0	0	0	0	0	0	0	0	0.75					
Invasive Herbaceous Species																		
<i>species-latin name</i>																		
<i>Buddleja davidii</i>	0	0	0	0	0	0	0	0	40	0	0	0	3.33					
<i>Cirsium arvense</i>	0	0	12	0	0	0	0	0	1	10	0	0	1.92					
<i>Hedera helix</i>	0	1	0	0	0	6	0	30	0	0	60	0	8.08					
<i>Impatiens capensis</i>	0	0	4	0	0	0	0	0	0	0	0	10	1.17					
<i>Phalaris arundinacea</i>	2	0	0	0	0	0	25	0	25	80	0	0	11.00					
Non-Native Herbaceous Species																		
<i>species-latin name</i>																		
<i>Clematis ligusticifolia</i>	12	0	0	0	0	0	0	0	0	0	0	0	1.00					
<i>Geranium robertianum</i>	10	0	0	0	0	0	0	6	0	0	0	0	1.33					
<i>Geum urbanum</i>	0	0	0	0	0	0	0	2	0	0	0	0	0.17					
<i>Lapsana communis</i>	5	0	0	0	0	0	0	2	0	0	3	0	0.83					
<i>Solanum dulcamara</i>	0	0	0	0	0	12	0	0	0	10	0	0	1.83					
Native Tree Species																		
<i>species-latin name</i>																		
<i>Acer macrophyllum</i>	20	0	25	95	0	0	0	0	0	0	0	30	14.17					
<i>Fraxinus latifolia</i>	0	0	0	0	0	0	30	0	0	0	0	0	2.50					
<i>Populus balsamifera trichocarpa</i>	0	15	0	55	0	5	0	18	0	15	50	0	13.17					
Native Shrub Species																		
<i>species-latin name</i>																		
<i>Cornus sericea</i>	0	0	0	0	0	0	0	8	0	0	0	0	0.67					
<i>Corylus cornuta</i>	0	55	0	0	10	0	0	8	0	0	8	0	6.75					
<i>Holodiscus discolor</i>	0	0	0	0	0	0	0	0	0	0	10	0	0.83					
<i>Physocarpus capitatus</i>	0	0	0	0	0	0	0	0	40	0	0	0	3.33					
<i>Rubus parviflorus</i>	0	0	0	0	0	0	28	0	0	0	0	0	2.33					
<i>Rubus ursinus</i>	0	48	0	76	0	35	0	8	0	0	0	0	13.92					
<i>Symphoricarpos albus</i>	0	0	0	0	0	5	0	0	0	0	5	0	0.83					
Invasive Shrub Species																		
<i>species-latin name</i>																		
<i>Ilex aquifolium</i>	0	0	0	0	0	0	0	20	0	0	0	0	1.67					
<i>Rubus armeniacus</i>	0	0	10	0	15	5	35	0	0	0	1	75	11.75					
Bare Substrate																		
<i>thatch/bare ground</i>	55	55	45	24	0	65	15	50	75	3	32	20	36.58					
Routine Performance Standards																		
	URF11	URF12	URF13	URF14	URF15	URF16	URF17	URF18	URF9	URF10	URF11	URF12	Habitat Average	Standard Error	Standard Met?	Percentage with Native Veg	Number of Native Sp.	
Cover of Invasive Herbaceous Species	2	1	16	0	0	6	25	30	66	90	60	10	25.50	8.8	YES			
Lower CI (80%)													14.24					
Upper CI (80%)													36.76					
Cover of Non-Native Herbaceous Species	5	0	0	0	0	2	0	2	0	2	1	0	1.03	0.5	N/A			
Lower CI (80%)																		
Upper CI (80%)																		
Cover of Invasive Shrubs and Trees	0	0	10	0	15	5	35	20	0	0	1	75	13.42	6	N/A			
Lower CI (80%)													5.19					
Upper CI (80%)													21.65					
Native Herb. Sp. Diversity (>5 sp, >=5% cover, >=10% plots)	5	2	8	0	0	0	0	0	0	1	1	0	1.48	0.7	NO	58%	4	
Native Shrub Sp. Diversity (>5 sp, >=5% cover, >=10% plots)	0	15	0	11	1	6	4	3	6	0	3	0	4.10	1.3	NO	67%	7	
Native Tree Sp. Diversity (>5 sp, >=5% cover, >=10% plots)	7	5	8	50	0	2	10	6	0	5	17	10	9.94	3.9	NO	83%	3	

Species	Origin (N, NN, I)	Wetland Status (1 - 5)	EMM1	EMM2	EMM3	EMM4	EMM5	EMM6	EMM7	EMM8	EMM9	EMM10	EMM11	EMM12	EMM13	EMM14	EMM15	EMM16	EMM17	Habitat Average				
Native Herbaceous Species																								
<i>species-latin name</i>																								
<i>Galium aparine</i>	N	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.06			
<i>Juncus effusus</i>	N	2	0	0	0	0	0	85	45	0	0	1	1	0	0	0	2	0	0	0	7.88			
<i>Scirpus microcarpus</i>	N	1	0	0	0	0	0	8	0	0	10	0	0	0	0	0	0	0	10	0	1.65			
<i>Typha latifolia</i>	N	2	0	0	0	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	4.12			
Invasive Herbaceous Species																								
<i>species-latin name</i>																								
<i>Cirsium arvense</i>	I	4	0	0	0	15	4	0	0	0	0	0	0	0	0	0	0	0	5	0	1.41			
<i>Dipsacus fullonum (D. sylvestris)</i>	I	3	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.47			
<i>Impatiens capensis</i>	I	4	25	0	0	15	0	0	25	0	1	5	0	15	0	0	6	0	80	0	10.12			
<i>Phalaris arundinacea</i>	I	2	0	0	6	0	90	8	40	0	15	95	99	0	0	5	92	10	10	0	27.65			
Non-Native Herbaceous Species																								
<i>species-latin name</i>																								
<i>Chicorium intybus</i>	NN	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0.12			
<i>Holcus lanatus</i>	NN	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0.18			
<i>Hypochaeris radicata</i>	NN	3	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0.47			
<i>Iris pseudacorus</i>	NN	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0.29			
<i>Leucanthemum vulgare</i>	NN	4	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0.29			
<i>Lotus corniculatus</i>	NN	3	0	0	10	0	0	0	0	5	0	0	0	45	0	0	0	0	0	0	3.53			
<i>Taraxacum officinale</i>	NN	3	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0.29			
<i>Trifolium repens</i>	NN	3	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0.88			
<i>Vulpia myuros</i>	NN	4	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	1.47			
Native Shrub and Tree Species																								
<i>species-latin name</i>																								
<i>Alnus rubra</i>	N	3	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.47			
<i>Lonicera involucrata</i>	N	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	2.35			
<i>Rubus ursinus</i>	N	4	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	40	0	0	2.71			
<i>Sambucus racemosa</i>	N	4	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	2.35			
<i>Salix sitchensis</i>	N	2	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	2.06			
<i>Salix sp.</i>	N	3	0	93	20	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.71			
<i>Symphoricarpos albus</i>	N	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0.12			
Invasive Shrub and Tree Species																								
<i>species-latin name</i>																								
<i>Buddleja davidii</i>	I	4	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0.47			
<i>Rubus armeniacus</i>	I	4	5	0	0	70	0	0	0	0	0	0	0	35	0	95	0	50	0	0	15.00			
Bare Substrate																								
<i>water</i>			0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	5.88			
<i>thatch/bare ground</i>			70	100	0	0	0	0	1	25	5	0	0	0	0	0	0	0	0	0	11.82			
Native Shrub and Tree Count																								
<i>species-latin name</i>																								
Routine Performance Standards			EMM1	EMM2	EMM3	EMM4	EMM5	EMM6	EMM7	EMM8	EMM9	EMM10	EMM11	EMM12	EMM13	EMM14	EMM15	EMM16	EMM17	Habitat Average	Standard Error	Standard Met?	Percentage with Native Veg	Number of Native Sp.
Cover of Native Herbaceous Species (>=30%)			0	0	0	0	0	93	45	0	80	1	1	0	0	2	0	11	15	7.6	NO			
Lower CI (80%)																			4.84					
Upper CI (80%)																			24.29					
Cover of Invasive Herbaceous Species (<=20%)			25	0	14	30	94	8	65	0	16	100	99	15		5	98	10	95	42	10	NO		
Lower CI (80%)																				28.91				
Upper CI (80%)																				55.34				
Cover of Non-Native Herbaceous Species			0	0	10	0	0	0	0	66	0	0	0	50		2	0	0	0	8	5	N/A		
Lower CI (80%)																				1.62				
Upper CI (80%)																				14.38				
Cover of Invasive Shrubs and Trees (<=10%)			5	0	0	70	0	0	0	0	0	0	0	35		103	0	50	0	16	8	N/A		
Lower CI (80%)																				6.32				
Upper CI (80%)																				26.55				
Native Herb. Sp. Diversity (>5 sp. >=5% cover, >=10% plots)			0	0	0	0	0	93	45	0	80	1	1	0	0	0	2	0	11	14	7.2	NO	41.2%	4
Lower CI (80%)																				4.51				
Upper CI (80%)																				22.91				

Species	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12
---------	------	------	------	------	------	------	------	------	------	-------	-------	-------

Native Herbaceous Species

<i>species-latin name</i>	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	
<i>Epilobium ciliatum (=E. watsonii)</i>	0	0	2	0	0	0	0	0	0	0	0	0	0.17
<i>Galium aparine</i>	0	0	0	0	1	0	0	0	0	4	2	1	0.67
<i>Marah oregana</i>	20	0	30	0	0	0	0	0	0	0	2	0	4.33
<i>Polystichum munitum</i>	0	9	0	0	0	0	0	0	0	0	0	0	0.75

Invasive Herbaceous Species

<i>species-latin name</i>	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	
<i>Buddleja davidii</i>	0	0	0	0	0	0	0	0	40	0	0	0	3.33
<i>Cirsium arvense</i>	0	0	12	0	0	0	0	0	1	10	0	0	1.92
<i>Hedera helix</i>	0	1	0	0	0	6	0	30	0	0	60	0	8.08
<i>Impatiens capensis</i>	0	0	4	0	0	0	0	0	0	0	0	10	1.17
<i>Phalaris arundinacea</i>	2	0	0	0	0	0	25	0	25	80	0	0	11.00

Non-Native Herbaceous Species

<i>species-latin name</i>	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	
<i>Clematis ligusticifolia</i>	12	0	0	0	0	0	0	0	0	0	0	0	1.00
<i>Geranium robertianum</i>	10	0	0	0	0	0	0	6	0	0	0	0	1.33
<i>Geum urbanum</i>	0	0	0	0	0	0	0	2	0	0	0	0	0.17
<i>Lapsana communis</i>	5	0	0	0	0	0	0	2	0	0	3	0	0.83
<i>Solanum dulcamara</i>	0	0	0	0	0	12	0	0	0	10	0	0	1.83

Native Tree Species

<i>species-latin name</i>	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	
<i>Acer macrophyllum</i>	20	0	25	95	0	0	0	0	0	0	0	30	14.17
<i>Fraxinus latifolia</i>	0	0	0	0	0	0	30	0	0	0	0	0	2.50
<i>Populus balsamifera trichocarpa</i>	0	15	0	55	0	5	0	18	0	15	50	0	13.17

Native Shrub Species

<i>species-latin name</i>	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	
<i>Cornus sericea</i>	0	0	0	0	0	0	0	8	0	0	0	0	0.67
<i>Corylus cornuta</i>	0	55	0	0	10	0	0	8	0	0	8	0	6.75
<i>Holodiscus discolor</i>	0	0	0	0	0	0	0	0	0	0	10	0	0.83
<i>Physocarpus capitatus</i>	0	0	0	0	0	0	0	0	40	0	0	0	3.33
<i>Rubus parviflorus</i>	0	0	0	0	0	0	28	0	0	0	0	0	2.33
<i>Rubus ursinus</i>	0	48	0	76	0	35	0	8	0	0	0	0	13.92
<i>Symphoricarpos albus</i>	0	0	0	0	0	5	0	0	0	0	5	0	0.83

Invasive Shrub Species

<i>species-latin name</i>	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	
<i>Ilex aquifolium</i>	0	0	0	0	0	0	0	20	0	0	0	0	1.67
<i>Rubus armeniacus</i>	0	0	10	0	15	5	35	0	0	0	1	75	11.75

Bare Substrate

<i>thatch/bare ground</i>	55	55	45	24	0	65	15	50	75	3	32	20	36.58
---------------------------	----	----	----	----	---	----	----	----	----	---	----	----	-------

Routine Performance Standards	URF1	URF2	URF3	URF4	URF5	URF6	URF7	URF8	URF9	URF10	URF11	URF12	Habitat Average	Standard Error	Standard Met?	Percentage with Native Veg	Number of Native Sp.
Cover of Invasive Herbaceous Species	2	1	16	0	0	6	25	30	66	90	60	10	25.50	8.8	YES		
Lower CI (80%)													14.24				
Upper CI (80%)													36.76				
Cover of Non-Native Herbaceous Species	5	0	0	0	0	2	0	2	0	2	1	0	1.03	0.5	N/A		
Lower CI (80%)																	
Upper CI (80%)																	
Cover of Invasive Shrubs and Trees	0	0	10	0	15	5	35	20	0	0	1	75	13.42	6	N/A		
Lower CI (80%)													5.19				
Upper CI (80%)													21.65				
Native Herb. Sp. Diversity (>5 sp, >=5% cover, >=10% plots)	5	2	8	0	0	0	0	0	0	1	1	0	1.48	0.7	NO	58%	4
Native Shrub Sp. Diversity (>5 sp, >=5% cover, >=10% plots)	0	15	0	11	1	6	4	3	6	0	3	0	4.10	1.3	NO	67%	7
Native Tree Sp. Diversity (>5 sp, >=5% cover, >=10% plots)	7	5	8	50	0	2	10	6	0	5	17	10	9.94	3.9	NO	83%	3

Appendix F

Bird Survey Field Notes and Summary

Avian Point Count Data Sheet			
DATE: <u>5/24/23</u>		OBSERVER: <u>C. Turner</u>	
SITE: <u>Rinearson</u>		START TIME: <u>05:45</u>	END TIME: <u>07:27</u>
CLD: <10% 10-50% <u>50-90%</u> >90% Drizzle	WIND (Beaufort Scale): <u>0</u> 1 2 3		
SITE FIELD NOTES: _____ _____ _____			

STN #	START TIME	SPP. CODE	TYPICAL DETECTION				FLYOVERS				J U V CNT	F L U S H CNT	FIELD NOTES
			0 to 50m		> 50m		ASSOC.		IND.				
			0-3 MIN	3-5 MIN	0-3 MIN	3-5 MIN	0-3 MIN	3-5 MIN	0-3 MIN	3-5 MIN			
3	07:06	MALL										6	
		WODU											
		NOFL											
		VGSW											
		WBNU											
		CASJ											
		SOSP											
		HOFI											
		ANHU											
		GBHE											
		CEDW											
		AMCR											
		BCCH											
		RWBL											
2	07:22	MALL											
		EUST											
		VGSW											
		HOFI											
		AMCR											
		AMBO											

Species Name	Birds per Station (2023)	Birds per Station (2021)	Birds per Station (2014) ¹	Change from Baseline	Habitat Type	
					Riparian	Upland
American Crow	1.14	1.05	0.47	(+)	X	X
American Goldfinch	0.10	0	0.38	(-)	X	X
American Robin	1.24	0.43	0.38	(+)	X	X
Anna's Hummingbird	0.33	0.19	0	(+)	X	X
Bald Eagle	0.05	0.10	0	(+)	X	X
Bewick's Wren	0.81	0.19	0.52	(+)	X	X
Black-capped Chickadee	0.38	0.19	0.71	(-)	X	X
Black-headed Grosbeak	0.33	0.24	0.28	(+)	X	X
Black-throated Gray Warbler	0	0	0.05	(-)	X	X
Brown Creeper	0.10	0.29	0.29	(-)	X	X
Brown-headed Cowbird	0.05	0	0.19	(-)	X	
Bushtit	0.05	0	0.09	(-)	X	X
California Scrub-Jay	0.71	0.19	0	(+)	X	X
Cedar Waxwing	0.38	0.62	0.28	(+)	X	
Common Yellowthroat	0.19	0.10	0	(+)	X	
Dark-eyed Junco	0.19	0.10	0	(+)	X	X
Downy Woodpecker	0.24	0.38	0.14	(+)	X	X
European Starling	0.71	0.62	0	(+)	X	X
Great Blue Heron	0.24	0.29	0.23	(+)	X	
Glaucous Gull	0	0.10	0	0	X	
House Finch	0.90	0.38	0.05	(+)	X	
Mallard	1.52	3.71	1.33	(+)	X	
Muscovy Duck	0	0.05	0	0	X	
Northern Flicker	0.52	0.29	0.05	(+)	X	
Osprey	0.14	0.10	0.05	(+)	X	
Red-breasted Sapsucker	0.10	0.10	0.05	(+)	X	X
Red-winged Blackbird	0.19	0	0.23	(-)	X	
Rufous Hummingbird	0	0	0.05	(-)	X	
Song Sparrow	1.81	1.38	2.05	(-)	X	X
Spotted Towhee	0.62	0.81	1.38	(-)	X	X
Steller's Jay	0.52	0.14	0	(+)	X	X
Swainson's Thrush	0.14	0	0.05	(+)	X	X
Townsend's Warbler	0	0.05	0	0	X	X
Turkey Vulture	0	0.05	0	0	X	
Vaux's Swift	0.10	0.10	0	(+)	X	
Violet-green Swallow	0.48	0.10	0	(+)	X	
Western Wood-Pewee	0.14	0	0	(+)	X	X
White-breasted Nuthatch	0.38	0.29	0.19	(+)	X	X
Willow Flycatcher	0	0.05	0.19	(-)	X	X
Wilson's Warbler	0	0	0.14	(-)	X	
Wood Duck	0.10	0	0.05	(+)	X	
Yellow Warbler	0	0.05	0	0	X	

Notes: 1. Baseline data were re-analyzed using seven plots rather than the original fifteen plots.

Appendix G

Bald Eagle Data Sheets

(Digital Appendix)

Table 1. Bald Eagle Surveys - Rinearson Year 5 Monitoring Report

Date	Dawn/Dusk	On-site	On-site Minutes	On-site Habitat	Time and Behavior on-site (off-site)	Off-site	Off-site Minutes	Survey Minutes
3/15/2023	Morning	2 Ad	7	Water	flushed ducks and flew over site: 5 min; sub-adult followed: 2 min (flew to west bank)	0	0	120
3/27/2023	Dawn	0	0		(1 Ad sitting tall inside nest: 35 min)	1 Ad	35	135
3/30/2023	Dusk	2 Ad	14	Riparian	2 Ad soared together over site 3 times: 14 min (on/near nest; possibly feeding young: 110 min)	2 Ad	110	120
4/14/2023	Dawn	1 Ad	43	Riparian	1 Ad perched in dead-topped cottonwood on S end of island: 43 min (1 Ad in/near nest: 120 min)	1 Ad	120	120
4/21/2023	Dusk	0	0		(1-2 Ad perched in/near nest: 95 min; 2 Ad perched in DF tree: 8 min)	2 Ad	103	135
4/25/2023	Dawn	0	0		(1-2 Ad perched in/near nest: 125 min)	2 Ad	125	125
5/1/2023	Dusk	2 Ad	117	Riparian	1 Ad perched in dead-topped cottonwood on S end of island; when it flew to nest Ad 2 took its place: 117 min (1 Ad in/near nest: 120 min; 1 juv perched 130 min)	1 Ad, 1 2y	130	130
5/10/2023	Dawn	0	0		(1 Ad perched in nest: 97 min; 1-2 Ad perched in vicinity of nest throughout 135 min survey)	2 Ad	135	135
5/19/2023	Dusk	1 Ad	2	Riparian	1 Ad flew over site: 2 min (2 Ad perched in nest, feeding chick, or perched near nest: 100 min)	2 Ad	100	120
5/27/2023	Dawn	0	0		(1 Ad perched in / near nest: 32 min; 1 Ad flying in vicinity: 7 min)	1 Ad	39	120
6/2/2023	Dusk	1 2y	64	Riparian	1 2 year-old perched atop dead-topped cottonwood on island (2 Ad perched on/near nest: 43 min+)	2 Ad	43	120
6/5/2023	Dawn	1 2y	100	Riparian	1 2 year-old perched in mid-canopy of cottonwood on island 96 min; foraged for ducks in bay: 4 min (1 Ad perched near nest: 5 min; 1 juv perched downstream 20 min)	1 Ad, 1 2y	25	120
6/10/2023	Dusk	1 2y	52	Riparian	1 2 year-old foraging in bay: 2min; and perched atop snaggy cottonwood on island: 50 min (2 Ad in/near nest: 22 min; 3 juv flying over river: 20 min)	2 Ad, 3 2y	42	125
6/19/2023	Dawn	1 Ad	99	Riparian	1 Ad perched in cottonwood on island: 99 min (1 Ad in/near nest: 12 min; 3 juv on river: 3 min)	1 Ad, 3 2y	18	120
6/25/2023	Dusk	0	0		(1 2y over river: 1 min; 1 Ad on nest: 67 min)	1 Ad, 1 2y	68	120
7/4/2023	Dawn	1 Ad, 1 2y	56	Riparian	1 Ad flew over site: 1 min; 1 2y perched in cottonwood on island: 55 min (1 Ad & 1 2y flew over river: 3 min)	1 Ad, 1 2y	3	120
7/10/2023	Dusk	0	0		(1 Ad on nest; could not confirm young: 39 min)	1 Ad	39	120
7/19/2023	Dawn	1 Ad, 2 2y	113	Riparian	1 Ad perched in cottonwood at mouth of Meldrum channel: 85 min; 2 juv perched in BCW on island and flew over site: 28 min (2 Ad perched in/near nest 34 min)	2 Ad	34	120
7/28/2023	Dusk	0	0		(2 Ad in/near nest: 115 min; 1-2 Ad flying over river: 5 min)	2 Ad	120	120
8/4/2023	Dawn	0	0			0	0	120
8/10/2023	Dusk	2 Ad	57	Riparian	1 Ad perched in BCW on island; 1 Ad perched in BCW at Meldrum channel mouth 55 min; 1 attempt to catch duck: 2 min (2 Ad perched in/near nest: 67 min)	2 Ad	67	120
8/23/2023	Dawn	1 Ad	11	Riparian	1 Ad perched in BCW on island: 11 min (1 Ad perched 78 min; foraging attempt 1 min)	2 Ad	79	120
8/29/2023	Dusk	1 Ad	1	Water	1 Ad foraging attempt in Meldrum Bay: 1 min (1 Ad perched off site: 63 min; flew over river: 3 min)	1 Ad	66	120
Total			736			Total	1501	2825
% of Total Survey Minutes			26.05%			% of Total Survey Minutes	53.13%	

Date: 5/1/2023	57 degrees	Start: 18:10	Other Observations: Status of heron rookery - 1 of 25 nests visible due to BCW leaf growth Abundance / species of birds in Meldrum Bay and vicinity: 2 Canada geese (~20 foraging upper field), 14 mallards, 4 great blue heron, song sparrow, hairy woodpecker, 1 osprey, American robin, European starling, house finch, Bewick's wren 9 American crow (4 harassing BE), spotted towhee																																																								
Name: C Galen	23 boats fishing island flooded; overcast	End: 20:20 2 hrs 10 min																																																									
Observations:			<table border="1"> <thead> <tr> <th>On-site Summary:</th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td>117</td> <td>2</td> <td>switched places</td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>117</td> <td></td> <td></td> </tr> <tr> <th>Vicinity Summary:</th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> <tr> <td>Adult bald eagle perching</td> <td>4</td> <td>1-2</td> <td>S. of nest</td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td>139</td> <td>1-2</td> <td>switched places</td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td>130</td> <td>1</td> <td>perched in BCW</td> </tr> <tr> <td>Total</td> <td>273 min (130 min of survey)</td> <td></td> <td></td> </tr> </tbody> </table>	On-site Summary:	# Min.	# Eagles	Notes	Adult bald eagle perching	117	2	switched places	Adult bald eagle foraging				Adult bald eagle nesting				Adult bald eagle: other				Juvenile bald eagle				Total	117			Vicinity Summary:	# Min.	# Eagles	Notes	Adult bald eagle perching	4	1-2	S. of nest	Adult bald eagle foraging				Adult bald eagle nesting	139	1-2	switched places	Adult bald eagle: other				Juvenile bald eagle	130	1	perched in BCW	Total	273 min (130 min of survey)		
On-site Summary:	# Min.	# Eagles		Notes																																																							
Adult bald eagle perching	117	2		switched places																																																							
Adult bald eagle foraging																																																											
Adult bald eagle nesting																																																											
Adult bald eagle: other																																																											
Juvenile bald eagle																																																											
Total	117																																																										
Vicinity Summary:	# Min.	# Eagles		Notes																																																							
Adult bald eagle perching	4	1-2		S. of nest																																																							
Adult bald eagle foraging																																																											
Adult bald eagle nesting	139	1-2		switched places																																																							
Adult bald eagle: other																																																											
Juvenile bald eagle	130	1	perched in BCW																																																								
Total	273 min (130 min of survey)																																																										
Time	Age*	Notes																																																									
18:10--19:29	A1	feeding young/eating 4 min; sitting in nest																																																									
18:10--19:20	A2	perched on site in dead topped black cottonwood; sang 18:55 when osprey flew close by																																																									
18:10-20:20	juv	1-2 year old; perched in BCW south end of parking lot; flew to W bank																																																									
19:20-20:13	A2	A2 flew to nest, feeding young/eating/fixing nest until 19:39; perched on branch down stream of nest;																																																									
20:13-20:15	A2	flew to BCW snag on-site; perched in same spot (center top)																																																									
19:29-20:14	A1	flew to dead topped black cottonwood on site; perched left side																																																									
20:14-20:19	A1	flew to nest; feeding young/eating																																																									
20:15-20:17	A2	flew to nest; feeding young/eating																																																									
20:17-20:20	A2	flew south to DF tree above trident snag upstream of nest																																																									
20:19-20:20	A1	joined A2; then flew back to nest																																																									
Note: too dark to see after 20:20; sunset at 20:17																																																											
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset																																																											

Date: 6/2/2023 75 degrees Name: C Galen 15+ boats fishing island present, sunny Start: 19:00 End: 21:00			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 32 Canada geese, 20 mallards, 9 American crows, 3 turkey vultures, song sparrow, American robin, cedar waxwing, red-breasted sapsucker, Bewick's wren, house finch, red-winged blackbird, black-capped chickadee, brown creeper, spotted towhee, tree swallow, glaucous-winged gull, California gull																																																
Observations: <table border="1"> <thead> <tr> <th>Time</th> <th>Age*</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>19:00-19:32</td> <td>A1</td> <td>Perched in dead branches of cottonwood below and to the right of nest; flew down towards river and lost due to sun</td> </tr> <tr> <td>19:36-20:40</td> <td>Juv</td> <td>1-2 year old perched atop cottonwood on site on island dive-bombed by American crows</td> </tr> <tr> <td>20:49--20:51</td> <td>A1</td> <td>Perched on nest; then flew to branch to the left and near nest</td> </tr> <tr> <td>20:51-21:00</td> <td>A1</td> <td>Perched near nest</td> </tr> <tr> <td>20:56-21:00</td> <td>A2</td> <td>Perched with A1 adjacent to nest</td> </tr> </tbody> </table>			Time	Age*	Notes	19:00-19:32	A1	Perched in dead branches of cottonwood below and to the right of nest; flew down towards river and lost due to sun	19:36-20:40	Juv	1-2 year old perched atop cottonwood on site on island dive-bombed by American crows	20:49--20:51	A1	Perched on nest; then flew to branch to the left and near nest	20:51-21:00	A1	Perched near nest	20:56-21:00	A2	Perched with A1 adjacent to nest	On-site Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td>64</td> <td>1</td> <td>perched atop dead br. facing river</td> </tr> <tr> <td>Total</td> <td>64</td> <td></td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging				Adult bald eagle nesting				Adult bald eagle: other				Juvenile bald eagle	64	1	perched atop dead br. facing river	Total	64		
Time	Age*	Notes																																																	
19:00-19:32	A1	Perched in dead branches of cottonwood below and to the right of nest; flew down towards river and lost due to sun																																																	
19:36-20:40	Juv	1-2 year old perched atop cottonwood on site on island dive-bombed by American crows																																																	
20:49--20:51	A1	Perched on nest; then flew to branch to the left and near nest																																																	
20:51-21:00	A1	Perched near nest																																																	
20:56-21:00	A2	Perched with A1 adjacent to nest																																																	
	# Min.	# Eagles	Notes																																																
Adult bald eagle perching																																																			
Adult bald eagle foraging																																																			
Adult bald eagle nesting																																																			
Adult bald eagle: other																																																			
Juvenile bald eagle	64	1	perched atop dead br. facing river																																																
Total	64																																																		
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs sun behind west bank hill 20:10			Vicinity Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td>most likely longer sun in eyes and difficult to see until 20:10</td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td>43</td> <td>2</td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>43+</td> <td></td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching			most likely longer sun in eyes and difficult to see until 20:10	Adult bald eagle foraging				Adult bald eagle nesting	43	2		Adult bald eagle: other				Juvenile bald eagle				Total	43+																				
	# Min.	# Eagles	Notes																																																
Adult bald eagle perching			most likely longer sun in eyes and difficult to see until 20:10																																																
Adult bald eagle foraging																																																			
Adult bald eagle nesting	43	2																																																	
Adult bald eagle: other																																																			
Juvenile bald eagle																																																			
Total	43+																																																		

<p>Date: 8/4/2023 63 degrees F; 50% clear Name: C Galen River below boulder; island showing</p> <p>Start: 5:45 End: 7:45</p> <p>Observations: NO BALD EAGLES OBSERVED</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Time</th> <th style="width: 15%;">Age*</th> <th style="width: 70%;">Notes</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs</p>	Time	Age*	Notes				<p>Other Observations:</p> <p>Abundance / species of birds in Meldrum Bay and vicinity: 20 Canada geese, 50 mallards, 20 American crow, 1 osprey, 2 turkey vultures (perched) 3 great blue heron (1 on site), California gull, double-crested cormorant, downy/hairy woodpecker, black-capped chickadee, Vaux's swift, and glaucous-winged gull.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">On-site Summary:</th> <th style="width: 10%;">0</th> <th style="width: 10%;"># Min.</th> <th style="width: 10%;"># Eagles</th> <th style="width: 10%;">Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Adult bald eagle foraging</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Adult bald eagle nesting</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Adult bald eagle: other</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Juvenile bald eagle</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td style="text-align: right;">Total</td> <td> </td> <td>0</td> <td> </td> <td> </td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Vicinity Summary:</th> <th style="width: 10%;">0</th> <th style="width: 10%;"># Min.</th> <th style="width: 10%;"># Eagles</th> <th style="width: 10%;">Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Adult bald eagle foraging</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Adult bald eagle nesting</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Adult bald eagle: other</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Juvenile bald eagle</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td style="text-align: right;">Total</td> <td> </td> <td>0</td> <td> </td> <td> </td> </tr> </tbody> </table>	On-site Summary:	0	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total		0			Vicinity Summary:	0	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total		0		
Time	Age*	Notes																																																																											
On-site Summary:	0	# Min.	# Eagles	Notes																																																																									
Adult bald eagle perching																																																																													
Adult bald eagle foraging																																																																													
Adult bald eagle nesting																																																																													
Adult bald eagle: other																																																																													
Juvenile bald eagle																																																																													
Total		0																																																																											
Vicinity Summary:	0	# Min.	# Eagles	Notes																																																																									
Adult bald eagle perching																																																																													
Adult bald eagle foraging																																																																													
Adult bald eagle nesting																																																																													
Adult bald eagle: other																																																																													
Juvenile bald eagle																																																																													
Total		0																																																																											

Date: 7/4/2023 59 degrees F; 100% clear			Start: 5:20		
Name: C Galen River below boulder; island showing			End: 7:20		
Observations:					
Time	Age*	Notes			
5:30-5:31	Ad1	Flew up stream; over trees on west bank and out of sight			
5:31-5:32	Ad2	Flew over on site cottonwood; downstream and out of sight			
6:00-6:01	Ad1	Flew over river; downstream and out of sight			
6:01-6:02	Juv	Flew downstream and then upstream over west bank.			
6:25-7:20	Juv	Perched in cottonwood on site, on island; 1.5-2 years old			
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs					
Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 10 Canada geese, 20 mallards, 12 American crow, 1 osprey, 20 turkey vultures (perched) 2 great blue heron (on site), belted kingfisher, spotted towhee, Swainson's thrush, song sparrow, black-capped chickadee, Vaux's swift, tree swallow, and glaucous-winged gull. 3' dead salmon on gravel riverbank attracted great blue heron, turkey vultures, and crow. the gbh was possessive and pecked at 2 of the 8 vultures but didn't scare them away.					
On-site Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting				
	Adult bald eagle: other	1	1	flew over site	
	Juvenile bald eagle	55	1	perched	
	Total	56	2		
Vicinity Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting				
	Adult bald eagle: other	2	2	flew over river	
	Juvenile bald eagle	1	1		
	Total	3	3		

Date: 6/5/2023 52 degrees F; clear Start: 5:30 Name: C Galen River below boulder; island showing End: 7:30 6 fishing boats (shad; no salmon)			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 6 (+4 chicks) mallards, 12 American crow, 1 osprey, 3 great blue heron (fly overs), belted kingfisher, spotted towhee, yellow warbler, American robin, spotted sandpiper, tree swallow.																																																						
Observations: <table border="1"> <thead> <tr> <th>Time</th> <th>Age*</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>5:30-5:35</td> <td>A</td> <td>On branch to the left of nest; then flew upriver and over east bank</td> </tr> <tr> <td>5:30-5:45</td> <td>Juv (2y)</td> <td>Perched on site; midway up left cottonwood on island</td> </tr> <tr> <td>5:45-5:47</td> <td>Juv (2y)</td> <td>Flew down river</td> </tr> <tr> <td>5:47-6:05</td> <td>Juv (2y)</td> <td>Perched downstream off site in cottonwood</td> </tr> <tr> <td>6:05-6:41</td> <td>Juv (2y)</td> <td>Perched on site; midway up left cottonwood on island</td> </tr> <tr> <td>6:41-6:45</td> <td>Juv (2y)</td> <td>Hunting over bay; diving at female mallard and 4 chicks but no meal; crows chased and continued to harass after eagle perched</td> </tr> <tr> <td>6:45-7:30</td> <td>Juv (2y)</td> <td>Perched on site; midway up left cottonwood on island</td> </tr> </tbody> </table>			Time	Age*	Notes	5:30-5:35	A	On branch to the left of nest; then flew upriver and over east bank	5:30-5:45	Juv (2y)	Perched on site; midway up left cottonwood on island	5:45-5:47	Juv (2y)	Flew down river	5:47-6:05	Juv (2y)	Perched downstream off site in cottonwood	6:05-6:41	Juv (2y)	Perched on site; midway up left cottonwood on island	6:41-6:45	Juv (2y)	Hunting over bay; diving at female mallard and 4 chicks but no meal; crows chased and continued to harass after eagle perched	6:45-7:30	Juv (2y)	Perched on site; midway up left cottonwood on island	On-site Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td>100</td> <td>1</td> <td>foraging 4 min</td> </tr> <tr> <td>Total</td> <td>100</td> <td></td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging				Adult bald eagle nesting				Adult bald eagle: other				Juvenile bald eagle	100	1	foraging 4 min	Total	100		
Time	Age*	Notes																																																							
5:30-5:35	A	On branch to the left of nest; then flew upriver and over east bank																																																							
5:30-5:45	Juv (2y)	Perched on site; midway up left cottonwood on island																																																							
5:45-5:47	Juv (2y)	Flew down river																																																							
5:47-6:05	Juv (2y)	Perched downstream off site in cottonwood																																																							
6:05-6:41	Juv (2y)	Perched on site; midway up left cottonwood on island																																																							
6:41-6:45	Juv (2y)	Hunting over bay; diving at female mallard and 4 chicks but no meal; crows chased and continued to harass after eagle perched																																																							
6:45-7:30	Juv (2y)	Perched on site; midway up left cottonwood on island																																																							
	# Min.	# Eagles	Notes																																																						
Adult bald eagle perching																																																									
Adult bald eagle foraging																																																									
Adult bald eagle nesting																																																									
Adult bald eagle: other																																																									
Juvenile bald eagle	100	1	foraging 4 min																																																						
Total	100																																																								
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs			Vicinity Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td>5</td> <td>1</td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td>20</td> <td>1</td> <td></td> </tr> <tr> <td>Total</td> <td>25</td> <td></td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging				Adult bald eagle nesting	5	1		Adult bald eagle: other				Juvenile bald eagle	20	1		Total	25																										
	# Min.	# Eagles	Notes																																																						
Adult bald eagle perching																																																									
Adult bald eagle foraging																																																									
Adult bald eagle nesting	5	1																																																							
Adult bald eagle: other																																																									
Juvenile bald eagle	20	1																																																							
Total	25																																																								

Date: 8/10/2023 77 degrees F; 100% clear Name: C Galen River low; long dry peninsula Sun below west bank trees at 19:52			Start: 18:50 End: 20:50																																																																								
Observations: <table border="1"> <thead> <tr> <th>Time</th> <th>Age*</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>18:50-19:54</td> <td>2Ad</td> <td>2 Ad perched in nest tree or in nest</td> </tr> <tr> <td>19:54-20:49</td> <td>Ad1</td> <td>Flew to site; perched on black cottonwood on island</td> </tr> <tr> <td>19:54-19:56</td> <td>Ad2</td> <td>Perched in nest</td> </tr> <tr> <td>19:56-19:58</td> <td>Ad2</td> <td>Flew to Meldrum Bay; attempted to catch duck.</td> </tr> <tr> <td>19:58-20:49</td> <td>Ad2</td> <td>Perched in cottonwood on mainland across from island</td> </tr> <tr> <td>20:49-20:50</td> <td>2Ad</td> <td>2 Ad perched in nest.</td> </tr> </tbody> </table> <p>1 osprey dive-bombed eagles perched on site ~ 6-8 times and then left; eagles unbothered site very noisy with jet skis (4) and motor boats (2)</p> <p>NOTE: surveyed from boat ramp and peninsula</p>			Time	Age*	Notes	18:50-19:54	2Ad	2 Ad perched in nest tree or in nest	19:54-20:49	Ad1	Flew to site; perched on black cottonwood on island	19:54-19:56	Ad2	Perched in nest	19:56-19:58	Ad2	Flew to Meldrum Bay; attempted to catch duck.	19:58-20:49	Ad2	Perched in cottonwood on mainland across from island	20:49-20:50	2Ad	2 Ad perched in nest.	Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 25 Canada geese, 25 mallards, 25 American crow, 1 osprey, 2 glaucous-winged gulls 5 turkey vultures, 2 great blue heron, 1 song sparrow, 2 Vaux's swift, & 5 purple martin																																																			
Time	Age*	Notes																																																																									
18:50-19:54	2Ad	2 Ad perched in nest tree or in nest																																																																									
19:54-20:49	Ad1	Flew to site; perched on black cottonwood on island																																																																									
19:54-19:56	Ad2	Perched in nest																																																																									
19:56-19:58	Ad2	Flew to Meldrum Bay; attempted to catch duck.																																																																									
19:58-20:49	Ad2	Perched in cottonwood on mainland across from island																																																																									
20:49-20:50	2Ad	2 Ad perched in nest.																																																																									
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs			<table border="1"> <thead> <tr> <th colspan="2">On-site Summary:</th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td>55</td> <td>2</td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td>2</td> <td>1</td> <td>lame attempt</td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Total</td> <td>57</td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Vicinity Summary:</th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td>67</td> <td>2</td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Total</td> <td>67</td> <td></td> <td></td> </tr> </tbody> </table>			On-site Summary:		# Min.	# Eagles	Notes	Adult bald eagle perching		55	2		Adult bald eagle foraging		2	1	lame attempt	Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle						Total	57			Vicinity Summary:		# Min.	# Eagles	Notes	Adult bald eagle perching		67	2		Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle						Total	67		
On-site Summary:		# Min.	# Eagles	Notes																																																																							
Adult bald eagle perching		55	2																																																																								
Adult bald eagle foraging		2	1	lame attempt																																																																							
Adult bald eagle nesting																																																																											
Adult bald eagle: other																																																																											
Juvenile bald eagle																																																																											
	Total	57																																																																									
Vicinity Summary:		# Min.	# Eagles	Notes																																																																							
Adult bald eagle perching		67	2																																																																								
Adult bald eagle foraging																																																																											
Adult bald eagle nesting																																																																											
Adult bald eagle: other																																																																											
Juvenile bald eagle																																																																											
	Total	67																																																																									

Date:	6/10/2023	71 degrees F; clear	Start:	18:55	Other Observations:
Name:	C Galen	River low; long dry peninsula No island; easy to drive to tip	End:	21:00	
Observations:	Sun blinding until after 20:38				Abundance / species of birds in Meldrum Bay and vicinity: 75 Canada geese w/43 chicks, 50 mallards w/12 chicks, 25 American crow, 1 osprey, 2 red-tailed hawk, 3 turkey vultures, 3 great blue heron (1 on bank), American robin, killdeer, glaucous-winged gull, spotted towhee, black-capped chickadee, tree swallow. song sparrow, European starling, lesser goldfinch, American goldfinch, killdeer, brown creeper?
Time	Age*	Notes			
19:00-19:02	Juv1	Flew up and down river out of site; viewed from south point			
19:20-19:50	Juv1	Perched on site; near top of dead branches of cottonwood on island			
19:50-19:52	Juv1	Flew down river; heard adult sing but couldn't locate			
19:52-19:57	Juv1	Perched on site in same site cottonwood in mid-canopy			
19:57-19:58	Juv. 1&2	Flew up river together and over fir trees on west bank			
20:06-20:10	3 Juv	Flew upstream and above fir trees on west bank			
20:18-20:20	Juv1	Foraging or ducks/ducklings over bay at boat ramp			
20:18-20:33	Juv1	Perched on site; midway up left cottonwood on island			
20:33-20:38	2 Juv	Flew upsteam; out of site			
20:38-20:50	Ad	Perched above nest			
20:50-21:00	2 Ad	Perched in nest; bobbing; billing			
20:54-20:58	2 Juv	Flew upstream over river and fir trees			
NOTE: began survey at BE point 3 in NW corner of site; then went to boat ramp					
Protocol:					
Dawn surveys: Start 15 min before sunrise, 2 hrs					
Dusk surveys: Start 2 hours before sunset, 2 hrs					
On-site Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting				
	Adult bald eagle: other				
	Juvenile bald eagle	52	1	perched in BCW on island	
	Total	52		Foraging in bay (2 min)	
Vicinity Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting	22	1-2	in/near nest	
	Adult bald eagle: other				
	Juvenile bald eagle	20	1-3	flying over river	
	Total	42			

Date: 5/10/2023 44 degrees; clear skies Start: 5:50 Name: Very High River level; covers rx End: 8:05			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 9 Canada geese + 3 downy geese (in N side meadow), 10 mallards (+4 ducklings) 2 great blue heron (+6 fly overs), song sparrow, American robin, American crow downy woodpecker, killdeer																																																							
Observations: <table border="1"> <thead> <tr> <th>Time</th> <th>Age*</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>5:50-6:00</td> <td>A1, A2</td> <td>perched in DF behind trident-topped tree left of nest</td> </tr> <tr> <td>6:00-6:10</td> <td>A1, A2</td> <td>flew downstream together; out of sight</td> </tr> <tr> <td>6:10-7:47</td> <td>A1</td> <td>flew back to nest; appeared to feed young; and sat in nest</td> </tr> <tr> <td>6:10-8:05</td> <td>A2</td> <td>flew to tallest DF left of nest; perched</td> </tr> <tr> <td>7:47-8:05</td> <td>A1</td> <td>flew to tallest DF left of nest; perched near A2</td> </tr> </tbody> </table>			Time	Age*	Notes	5:50-6:00	A1, A2	perched in DF behind trident-topped tree left of nest	6:00-6:10	A1, A2	flew downstream together; out of sight	6:10-7:47	A1	flew back to nest; appeared to feed young; and sat in nest	6:10-8:05	A2	flew to tallest DF left of nest; perched	7:47-8:05	A1	flew to tallest DF left of nest; perched near A2	On-site Summary: <table border="1"> <thead> <tr> <th></th> <th>0</th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>0</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				0	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total	0			
Time	Age*	Notes																																																								
5:50-6:00	A1, A2	perched in DF behind trident-topped tree left of nest																																																								
6:00-6:10	A1, A2	flew downstream together; out of sight																																																								
6:10-7:47	A1	flew back to nest; appeared to feed young; and sat in nest																																																								
6:10-8:05	A2	flew to tallest DF left of nest; perched																																																								
7:47-8:05	A1	flew to tallest DF left of nest; perched near A2																																																								
	0	# Min.	# Eagles	Notes																																																						
Adult bald eagle perching																																																										
Adult bald eagle foraging																																																										
Adult bald eagle nesting																																																										
Adult bald eagle: other																																																										
Juvenile bald eagle																																																										
Total	0																																																									
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs			Vicinity Summary: <table border="1"> <thead> <tr> <th></th> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td>135</td> <td></td> <td>1-2</td> <td>in/near nest</td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>135</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting	135		1-2	in/near nest	Adult bald eagle: other					Juvenile bald eagle					Total	135																					
		# Min.	# Eagles	Notes																																																						
Adult bald eagle perching																																																										
Adult bald eagle foraging																																																										
Adult bald eagle nesting	135		1-2	in/near nest																																																						
Adult bald eagle: other																																																										
Juvenile bald eagle																																																										
Total	135																																																									

Date: 4/14/2023		Start: 6:20 AM		Other Observations: River high and muddy; no island showing Temp.: 38-42 deg. F. Status of heron rookery - about 25 nests
Name: C. Galen		End: 8:20 AM		
Observations:				
Time	Age*	Notes		
6:20-8:20	A1	Ad sitting low on nest and appears to be feeding young.		
6:20- 6:30	A2	Ad sitting on branch in nest tree below nest; flew but lost sight		
6:57-7:40	A2	Ad perched on site atop tallest BCW tree on island opp. Nest; faced Willamette River		
7:40-8:08	A2	Ad flew up river; perched in mid-canopy below Heronry		
Protocol: Best observation from boat ramp Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs				
Abundance / species of birds in Meldrum Bay and vicinity: 7 Canada geese, 8 mallards, 6 great blue heron, 4 d-c cormorants, 2 turkey vultures 3 American crow, 2 song sparrow, 2 northern flicker, black-capped chickadee, spotted towhee, gc sparrow, downy woodpecker, house finch, red-winged blackbird, European starling, American goldfinch, Hairy woodpecker, fox sparrow, rc kinglet				
On-site Summary:				
		# Min.	# Eagles	Notes
	Adult bald eagle perching	43	1	
	Adult bald eagle foraging			
	Adult bald eagle nesting			
	Adult bald eagle: other			
	Juvenile bald eagle			
	Total	43		
Vicinity Summary:				
		# Min.	# Eagles	Notes
	Adult bald eagle perching			
	Adult bald eagle foraging			
	Adult bald eagle nesting	120	2	in/near nest
	Adult bald eagle: other			
	Juvenile bald eagle			
	Total	120		

Date:	3/15/2023	Page:	1	Other Observations:	
Name:	C. Galen	Start:	8:30	Status of heron rookery - about 25 nests	
		End:	10:30		
Observations:				Abundance / species of birds in Meldrum Bay and vicinity:	
Time	Age*	Notes		Canada goose, mallard, hooded merganser, common merganser, belted kingfisher,	
9:55-10:00	A	Flew into site from River towards pond; flushed ducks but didn't appear to catch any and flew across river after 5 minutes		red-tailed hawk, glaucous-winged gull, song sparrow, golden-crowned sparrow,	
10:00-10:02	sub-A	4 year old BE flew out from pond with A; likely had been perched out of sight and lkely on-site		Bewick's wren, red-winged blackbird, white-breasted nuthatch, black-capped chickadee,	
				Norther flicker, house finch, and European starling	
Note: toured site between 8:30-9:45				On-site Summary:	
					# Min. # Eagles Notes
				Adult bald eagle perching	
				Adult bald eagle foraging	7 2 flushed ducks
				Adult bald eagle nesting	
				Adult bald eagle: other	
				Juvenile bald eagle	
Protocol:				Vicinity Summary:	
Dawn surveys: Start 15 min before sunrise, 2 hrs					# Min. # Eagles Notes
Dusk surveys: Start 2 hours before sunset, 2 hrs				Adult bald eagle perching	5 2 flew across river; lost in trees
				Adult bald eagle foraging	
				Adult bald eagle nesting	
				Adult bald eagle: other	
				Juvenile bald eagle	

Date: 7/19/2023 63 degrees F; 100% clear Name: C Galen River below boulder; island showing Start: 5:30 End: 7:30			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 40 Canada geese, 45 mallards, 12 American crow, 1 osprey, 2 turkey vultures (perched) 4 great blue heron (on site), belted kingfisher, spotted towhee, song sparrow, tree swallow, black-headed grosbeak, black-capped chickadee, Vaux's swift, and 4 glaucous-winged gull, house finch, and American goldfinch.		
Observations:			On-site Summary:		
Time	Age*	Notes		# Min.	# Eagles
5:30-5:37	2Ad	Perched in nest	Adult bald eagle perching	85	1
5:30-5:56	Juv	Perched in cottonwood on site, on island; 2 year old	Adult bald eagle foraging		
5:37-5:56	Ad1	Perched in nest	Adult bald eagle nesting		
5:37-5:38	Ad2	Flew downstream and out of sight	Adult bald eagle: other		
5:57-5:58	2Juv	Flew together over island on site	Juvenile bald eagle	28	1-2
6:01-6:02	Juv	Landed in cottonwood on island, then flew upstream.	Total	113	
6:03-6:04	Juv2	Flew upstream over river			
6:05-7:30	Ad	Perched in tall westernmost cottonwood on east bank of outlet			
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs			Vicinity Summary:		
			Adult bald eagle perching		
			Adult bald eagle foraging		
			Adult bald eagle nesting	33	1-2
			Adult bald eagle: other	1	1
			Juvenile bald eagle		
			Total	34	
					Notes
					perched and preening
					perched & flew over site
					flew over river

Date: 6/19/2023 48 degrees F; 100% overcast			Start: 5:15		
Name: C Galen River below boulder; island showing			End: 7:15		
0 fishing boats; beaver eating cottonwood leaves at edge of bay; beaver walked beneath thicket after ~30 min					
Observations:					
Time	Age*	Notes			
5:15-5:27	Ad1	On branch to the left of nest; then flew to trident tree			
5:23-5:24	2 Juv	1 fying over river upstream; 1 flying over river downstream			
5:27-5:29	Ad1	Perched in trident tree; flew south out of site			
5:30-6:14	Ad2	Perched in cottonwood on island; not visible right away; heard song			
6:14-6:17	Ad2	Flew downstream and upstream and back to perch on site			
6:17-7:03	Ad2	Perched in cottonwood on site, on island			
6:23-6:25	Juv3	Perched on beach across river; mobbed by crows; flew upstream			
7:03-7:06	Ad2	Flew to trident tree and perched			
7:06-7:15	Ad2	Flew low over river and perched on site in island cottonwood tree			
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs					
Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 15 Canada geese, 13 mallards (+6 chicks), 3 American crow, 2 osprey, 3 great blue heron (FO), belted kingfisher, spotted towhee, yellow warbler, American robin, Swainson's thrush black-headed grosbeak, song sparrow, Bewick's wren, tree swallow, glaucous-winged gull, Caspian tern, northern flicker, and brown creeper.					
On-site Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching	99	1		
	Adult bald eagle foraging				
	Adult bald eagle nesting				
	Adult bald eagle: other				
	Juvenile bald eagle				
	Total	99	1		
Vicinity Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting	12	1	in/near nest	
	Adult bald eagle: other	3	1	flew over river	
	Juvenile bald eagle	3	3		
	Total	18	5		

Date: 5/19/2023	83 degrees; clear skies	Start: 18:30	Other Observations:			
Name: C Galen	Highest river level yet; up ramp to base of highest rocks	End: 20:30	Abundance / species of birds in Meldrum Bay and vicinity: 8 Canada geese, 12 adult mallards with 6 chicks, 1 turkey vulture, 2 American crows, 2 glaucous-winged gulls, 2 great blue heron, spotted towhee, song sparrow			
Observations:	*Sun is blinding; difficult to see in nest until 20:03					
Time	Age*	Notes				
18:48-18:50	A1	Adult flew over site				
18:50-20:09	A1	Adult perched below and to Right of nest in branches of snag				
20:09-20:11	A1	Adult flew to angled branch left of nest; flew behind trees				
20:11-20:22	A2	landed on nest; feeding young; 1 young visible (small and downy)				
20:19-20:28	A1	landed on branch near nest; flew out of sight behind trees				
20:22-20:27	A2	flew to and perched in maple tree south of nest				
20:27-20:30	A2	flew to nest				
Protocol:			On-site Summary:			
Dawn surveys: Start 15 min before sunrise, 2 hrs			# Min.	# Eagles	Notes	
Dusk surveys: Start 2 hours before sunset			Adult bald eagle perching			
			Adult bald eagle foraging			
			Adult bald eagle nesting			
			Adult bald eagle: other	2	1 flew over site	
			Juvenile bald eagle			
			Total	2		
			Vicinity Summary:	# Min.	# Eagles	Notes
			Adult bald eagle perching			
			Adult bald eagle foraging			
			Adult bald eagle nesting	100	1-2 perched in/near nest	
			Adult bald eagle: other			
			Juvenile bald eagle			
			Total	100	2 in/nearnest	

Date:	4/21/2023	53-58 deg F.	Start:	18:00	Other Observations: Status of heron rookery - about 25 nests
Name:	C Galen	high tide	End:	20:15	
Observations:					
Time	Age*	Notes			
18:00-18:34	A1	Sitting in nest; head, neck, back visible; flew W. out of sight			
18:39-18:47	A1, A2	2 Adults perched atop DF NE of nest; Tallest tree to east			
18:47	A2	1 Adult flew downstream out of sight; fisher said chased osprey			
18:47-19:39	A1	A1 flew to nest fed young 2x (5 min each); sat in nest			
19:39-19:41	A1, A2	2 adults on nest rim; A1 flew off; A2 perched on branch near nest			
19:41-19:48	A2	A2 remained by nest; flew upriver out of sight			
Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 2 Canada geese, 12 mallards, 2 osprey, 2 peregrine falcons, 1-2 red-tailed hawks, 3 great blue heron, 1 glaucous-winged gull, 1 Herring gull?, northern flicker, song sparrow double-crested cormorant, American crow, hairy woodpecker, American robin, American goldfinch, lesser goldfinch, spotted towhee, black-capped chickadee, ruby-crowned kinglet red-winged blackbird, and turkey vulture. 1 Beaver swimming and slapping tail in bay.					
On-site Summary:					
			# Min.	# Eagles	Notes
		Adult bald eagle perching			
		Adult bald eagle foraging			
		Adult bald eagle nesting			
		Adult bald eagle: other			
		Juvenile bald eagle			
		Total	0		
Vicinity Summary:					
			# Min.	# Eagles	Notes
		Adult bald eagle perching	8	2	in tall DF
		Adult bald eagle foraging			
		Adult bald eagle nesting	95	1-2	
		Adult bald eagle: other			
		Juvenile bald eagle			
		Total	103		
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs					

Date: 8/23/2023		55 degrees F; 100% overcast		Start: 6:10	
Name: C Galen		River low; bar long and dry		End: 8:10	
Observations:					
Time	Age*	Notes			
6:10-6:21	Ad1	Perched on site in cottonwood on riverside of island.			
6:21-6:29	Ad1	Flew downstream when osprey bombed twice; perched off site.			
6:29-7:35	Ad2	Perched in cottonwood on west bank			
7:35-7:36	Ad2	Foraged over river; no catch			
7:36-7:40	Ad2	Perched in cottonwood on west bank; flew out of site			
Protocol:					
Dawn surveys: Start 15 min before sunrise, 2 hrs					
Dusk surveys: Start 2 hours before sunset, 2 hrs					
Other Observations:					
Abundance / species of birds in Meldrum Bay and vicinity: 40 Canada geese, 40 mallards, 50 American crow, 2 osprey, 16 turkey vultures (10 perched) 1 great blue heron on site, California gull, glaucous-winged gull, double-crested cormorant, hairy woodpecker, black-capped chickadee, Vaux's swift, barn swallow, tree swallow, belted kingfisher, and 2 spotted sandpiper.					
On-site Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching	11	1	Perched in BCW on island	
	Adult bald eagle foraging				
	Adult bald eagle nesting				
	Adult bald eagle: other				
	Juvenile bald eagle				
	Total	11			
Vicinity Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching	78	1		
	Adult bald eagle foraging	1	1		
	Adult bald eagle nesting				
	Adult bald eagle: other				
	Juvenile bald eagle				
	Total	79			

Date: 4/25/2023 42 degrees Name: C Galen 25 boats fishing; ramp busy island mostly flooded Start: 5:55 End: 8:00			Other Observations: Status of heron rookery - about 25 nests Abundance / species of birds in Meldrum Bay and vicinity: 10 Canada geese, 4 mallards, 2 American crow, 4 great blue heron, 1 DC cormorant, 1 belted kingfisher, 1 osprey (perched above boat ramp), song sparrow, downy woodpecker northern flicker, spotted towhee, ruby-crowned kinglet, American goldfinch, Amer. Robin black capped chickadee, and house finch.		
Observations:			On-site Summary:		
Time	Age*	Notes		# Min.	# Eagles
5:55-6:10	2A (A1, A2)	A1 in nest; A2 perched on branch left of nest		0	
6:10-6:13	A1, A2	A1 & A2 flew down river			
6:13-7:32	A1	flew back to nest			
?-7:32	A2	perched in trident topped tree to the left of nest tree			
7:32-7:44	A1, A2	flew upriver together and perched in tallest evergreen tree on west bank; preening			
7:44-8:00	A1	flew to nest and remained in nest until end			
7:44-8:00	A2	remained perched in tall tree			
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs			Adult bald eagle perching Adult bald eagle foraging Adult bald eagle nesting Adult bald eagle: other Juvenile bald eagle Total 0 bald eagles on site		
			Vicinity Summary:		
				# Min.	# Eagles
				80	1
				110	1
			Total	125	Perched in/near nest

Date: 6/25/2023 79 degrees F; clear Name: C Galen River low; long dry peninsula No island; easy to drive to tip Start: 18:50 End: 20:50			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 18 Canada geese w/6 young, 20 mallards w/3 chicks, 20 American crow, 1 osprey, 2 tree swallows, 3 turkey vultures, 3 great blue heron (1 on bank), 1 glaucous-winged gull																																					
Observations: Sun blindng until 20:28; 8 jet skis, 1 kayak, 1 paddleboard, 4 motor																																								
Time	Age*	Notes																																						
19:03-19:04	Juv1	Off-site downstream; Flew from fir trees and down river out of site																																						
19:23-20:30	Ad1	Perched on nest; flew downstream																																						
			On-site Summary: <table border="0"> <tr> <td></td> <td>0</td> <td># Min.</td> <td># Eagles</td> <td>Notes</td> </tr> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>0</td> <td></td> <td></td> <td></td> </tr> </table>				0	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total	0			
	0	# Min.	# Eagles	Notes																																				
Adult bald eagle perching																																								
Adult bald eagle foraging																																								
Adult bald eagle nesting																																								
Adult bald eagle: other																																								
Juvenile bald eagle																																								
Total	0																																							
			Vicinity Summary: <table border="0"> <tr> <td></td> <td></td> <td># Min.</td> <td># Eagles</td> <td>Notes</td> </tr> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td>67</td> <td></td> <td>1</td> <td>perched in nest</td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td>1</td> <td></td> <td>1</td> <td></td> </tr> <tr> <td>Total</td> <td>68</td> <td></td> <td></td> <td></td> </tr> </table>					# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting	67		1	perched in nest	Adult bald eagle: other					Juvenile bald eagle	1		1		Total	68			
		# Min.	# Eagles	Notes																																				
Adult bald eagle perching																																								
Adult bald eagle foraging																																								
Adult bald eagle nesting	67		1	perched in nest																																				
Adult bald eagle: other																																								
Juvenile bald eagle	1		1																																					
Total	68																																							
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs																																								

<p>Date: 3/27/2023</p> <p>Name: C. Galen</p> <p>Observations:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Time</th> <th style="text-align: left;">Age*</th> <th style="text-align: left;">Notes</th> </tr> </thead> <tbody> <tr> <td>9:10-9:45</td> <td>1 Ad</td> <td>Off-site on nest; sitting tall; likely eggs hatched</td> </tr> </tbody> </table> <p>Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs</p>	Time	Age*	Notes	9:10-9:45	1 Ad	Off-site on nest; sitting tall; likely eggs hatched	<p>Start: 7:30</p> <p>End: 9:45</p> <p>Other Observations: Status of heron rookery - about 25 nests</p> <p>Abundance / species of birds in Meldrum Bay and vicinity: 4 Canada geese, 14 mallard, 4 common merganser, 1 double-crested cormorant 1 red-tailed hawk, 6 American crow, 4 great blue hron, 2 ring-necked duck (in pond), 1 Bewick's wren, 4 American robin, 4 song sparrow, 3 spotted towhee, 1 Northern flicker, 4 red-breasted sapsuckers, and 4 black-capped chickadees.</p> <p>On-site Summary:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: right;">0</th> <th style="text-align: right;"># Min.</th> <th style="text-align: right;"># Eagles</th> <th style="text-align: left;">Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">Total</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Vicinity Summary:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: right;">35</th> <th style="text-align: right;"># Min.</th> <th style="text-align: right;"># Eagles</th> <th style="text-align: left;">Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">Total</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		0	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total						35	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total				
Time	Age*	Notes																																																																											
9:10-9:45	1 Ad	Off-site on nest; sitting tall; likely eggs hatched																																																																											
	0	# Min.	# Eagles	Notes																																																																									
Adult bald eagle perching																																																																													
Adult bald eagle foraging																																																																													
Adult bald eagle nesting																																																																													
Adult bald eagle: other																																																																													
Juvenile bald eagle																																																																													
Total																																																																													
	35	# Min.	# Eagles	Notes																																																																									
Adult bald eagle perching																																																																													
Adult bald eagle foraging																																																																													
Adult bald eagle nesting																																																																													
Adult bald eagle: other																																																																													
Juvenile bald eagle																																																																													
Total																																																																													

Date: 5/27/2023 57 degrees F; clear/overcast			Start: 5:30		
Name: C Galen River high w/ no island showing			End: 7:30		
Observations:					
Time	Age*	Notes			
5:30-5:38	A	On nest and branch to the right of nest			
5:38-5:40	A	Flew down river behind fir trees on east bank			
6:30-6:47	A	On nest; feeding young and perching			
6:47-6:50	A	Flew up river; circled; landed in dead branches in medium-sized tree upstream from nest			
6:50-6:52	A	Flew down river behind Douglas fir trees on east bank			
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset					
Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 12 Canada geese, 11 mallards, 2 American crow, 1 great blue heron (6 fly overs), yellow warbler, spotted towhee, song sparrow, hairy woodpecker, cedar waxwing, American goldfinch, house finch, black-capped chickadee, western tanager, 2 turkey vulture brown creeper, American robin, western wood pewee, Pacific slope lycatcher, spotted sandpiper, belted kingfisher, dark-eyed junco, northern flicker					
On-site Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting				
	Adult bald eagle: other				
	Juvenile bald eagle				
	Total	0			
Vicinity Summary:					
		# Min.	# Eagles	Notes	
	Adult bald eagle perching				
	Adult bald eagle foraging				
	Adult bald eagle nesting	25	1	on nest	
	Adult bald eagle: other	7	1	flew in area	
	Juvenile bald eagle				
	Total	32			

Date: 7/28/2023 82 degrees F; 100% clear Start: 18:45 Name: C Galen River low; long dry peninsula End: 20:45 Sun below west bank trees at 20:00			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 31 Canada geese, 30 mallards, 90 American crow, 2 osprey, 2 glaucous-winged gulls 2 turkey vultures, 2 great blue heron, 1 spotted towhee, and 1 Vaux's swift																																																																			
Observations: <table border="1"> <thead> <tr> <th>Time</th> <th>Age*</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>18:45-19:16</td> <td>Ad1</td> <td>Perched in tree adjacent to nest and 1/2 way down to the river.</td> </tr> <tr> <td>19:16-20:03</td> <td>Ad1</td> <td>Flew to nest; moved sticks and preened in nest.</td> </tr> <tr> <td>20:03-20:05</td> <td>Ad1</td> <td>Flew upstream and back to nest.</td> </tr> <tr> <td>20:05-20:10</td> <td>Ad2</td> <td>Perched below left side of nest tree; did not see arrival.</td> </tr> <tr> <td>20:10-20:25</td> <td>2Ad</td> <td>Perched in nest.</td> </tr> <tr> <td>20:25-20:27</td> <td>Ad 1or2</td> <td>Flew upstream and back to nest.</td> </tr> <tr> <td>20:27-20:42</td> <td>2Ad</td> <td>Perched in nest.</td> </tr> <tr> <td>20:42-20:43</td> <td>Ad 1or2</td> <td>Flew upstream and back to nest.</td> </tr> <tr> <td>20:43-20:45</td> <td>2Ad</td> <td>Perched in nest.</td> </tr> </tbody> </table>			Time	Age*	Notes	18:45-19:16	Ad1	Perched in tree adjacent to nest and 1/2 way down to the river.	19:16-20:03	Ad1	Flew to nest; moved sticks and preened in nest.	20:03-20:05	Ad1	Flew upstream and back to nest.	20:05-20:10	Ad2	Perched below left side of nest tree; did not see arrival.	20:10-20:25	2Ad	Perched in nest.	20:25-20:27	Ad 1or2	Flew upstream and back to nest.	20:27-20:42	2Ad	Perched in nest.	20:42-20:43	Ad 1or2	Flew upstream and back to nest.	20:43-20:45	2Ad	Perched in nest.	On-site Summary: <table border="1"> <thead> <tr> <th></th> <th>0</th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>0</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				0	# Min.	# Eagles	Notes	Adult bald eagle perching					Adult bald eagle foraging					Adult bald eagle nesting					Adult bald eagle: other					Juvenile bald eagle					Total	0			
Time	Age*	Notes																																																																				
18:45-19:16	Ad1	Perched in tree adjacent to nest and 1/2 way down to the river.																																																																				
19:16-20:03	Ad1	Flew to nest; moved sticks and preened in nest.																																																																				
20:03-20:05	Ad1	Flew upstream and back to nest.																																																																				
20:05-20:10	Ad2	Perched below left side of nest tree; did not see arrival.																																																																				
20:10-20:25	2Ad	Perched in nest.																																																																				
20:25-20:27	Ad 1or2	Flew upstream and back to nest.																																																																				
20:27-20:42	2Ad	Perched in nest.																																																																				
20:42-20:43	Ad 1or2	Flew upstream and back to nest.																																																																				
20:43-20:45	2Ad	Perched in nest.																																																																				
	0	# Min.	# Eagles	Notes																																																																		
Adult bald eagle perching																																																																						
Adult bald eagle foraging																																																																						
Adult bald eagle nesting																																																																						
Adult bald eagle: other																																																																						
Juvenile bald eagle																																																																						
Total	0																																																																					
NOTE: surveyed from boat ramp and peninsula Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs			Vicinity Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td>115</td> <td>1-2</td> <td>on/near nest; no young</td> </tr> <tr> <td>Adult bald eagle: other</td> <td>5</td> <td>1</td> <td>flew over river</td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>120</td> <td>1-2</td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging				Adult bald eagle nesting	115	1-2	on/near nest; no young	Adult bald eagle: other	5	1	flew over river	Juvenile bald eagle				Total	120	1-2																																						
	# Min.	# Eagles	Notes																																																																			
Adult bald eagle perching																																																																						
Adult bald eagle foraging																																																																						
Adult bald eagle nesting	115	1-2	on/near nest; no young																																																																			
Adult bald eagle: other	5	1	flew over river																																																																			
Juvenile bald eagle																																																																						
Total	120	1-2																																																																				

Date: 8/29/2023 70 deg. F; 0-10% clear; light-heavy rain Start: 18:10 Name: C Galen River covering bar low spot until 18:25 End: 20:10 Heavy rain 10 min. 18:20-18:30			Other Observations: Abundance / species of birds in Meldrum Bay and vicinity: 6 Canada geese, 41 mallards, 15 American crow, 2 osprey, 1 glaucous-winged gulls 3 turkey vultures, 1 great blue heron, and black-capped chickadee																																																						
Observations: <table border="1"> <thead> <tr> <th>Time</th> <th>Age*</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>18:40-19:02</td> <td>Ad</td> <td>Ad perched in trident tree south of nest tree</td> </tr> <tr> <td>19:02-19:32</td> <td>Ad</td> <td>Flew to east bank north of site and perched on black cottonwood</td> </tr> <tr> <td>19:32-19:33</td> <td>Ad</td> <td>Ad flew over river</td> </tr> <tr> <td>19:33-19:38</td> <td>Ad</td> <td>Ad perched back in the same cottonwood tree</td> </tr> <tr> <td>19:38-19:39</td> <td>Ad</td> <td>Ad flew over M Bay with talons down; assumed foraging attempt</td> </tr> <tr> <td>19:39-19:45</td> <td>Ad</td> <td>Ad perched in same cottonwood tree north of site</td> </tr> <tr> <td>19:45-19:47</td> <td>Ad</td> <td>Ad flew upstream and out of site</td> </tr> </tbody> </table>			Time	Age*	Notes	18:40-19:02	Ad	Ad perched in trident tree south of nest tree	19:02-19:32	Ad	Flew to east bank north of site and perched on black cottonwood	19:32-19:33	Ad	Ad flew over river	19:33-19:38	Ad	Ad perched back in the same cottonwood tree	19:38-19:39	Ad	Ad flew over M Bay with talons down; assumed foraging attempt	19:39-19:45	Ad	Ad perched in same cottonwood tree north of site	19:45-19:47	Ad	Ad flew upstream and out of site	On-site Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td>1</td> <td>1</td> <td>attempt; in bay</td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>1</td> <td></td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging	1	1	attempt; in bay	Adult bald eagle nesting				Adult bald eagle: other				Juvenile bald eagle				Total	1		
Time	Age*	Notes																																																							
18:40-19:02	Ad	Ad perched in trident tree south of nest tree																																																							
19:02-19:32	Ad	Flew to east bank north of site and perched on black cottonwood																																																							
19:32-19:33	Ad	Ad flew over river																																																							
19:33-19:38	Ad	Ad perched back in the same cottonwood tree																																																							
19:38-19:39	Ad	Ad flew over M Bay with talons down; assumed foraging attempt																																																							
19:39-19:45	Ad	Ad perched in same cottonwood tree north of site																																																							
19:45-19:47	Ad	Ad flew upstream and out of site																																																							
	# Min.	# Eagles	Notes																																																						
Adult bald eagle perching																																																									
Adult bald eagle foraging	1	1	attempt; in bay																																																						
Adult bald eagle nesting																																																									
Adult bald eagle: other																																																									
Juvenile bald eagle																																																									
Total	1																																																								
1 osprey dive-bombed eagle 2 times and then left; eagle unbothered site fairly quiet: no jet skis, 3 motor boats, and 1 kayak lots of small fish (salmon smolts?) jumping			Vicinity Summary: <table border="1"> <thead> <tr> <th></th> <th># Min.</th> <th># Eagles</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td>63</td> <td>1</td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td>3</td> <td>1</td> <td>Flew over/up river</td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>66</td> <td></td> <td></td> </tr> </tbody> </table>				# Min.	# Eagles	Notes	Adult bald eagle perching	63	1		Adult bald eagle foraging				Adult bald eagle nesting				Adult bald eagle: other	3	1	Flew over/up river	Juvenile bald eagle				Total	66																										
	# Min.	# Eagles	Notes																																																						
Adult bald eagle perching	63	1																																																							
Adult bald eagle foraging																																																									
Adult bald eagle nesting																																																									
Adult bald eagle: other	3	1	Flew over/up river																																																						
Juvenile bald eagle																																																									
Total	66																																																								
Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs																																																									

Date: 3/30/2023	52 degrees F.	Start: 17:10	Other Observations:		Temp: 52-48 degrees F.
Name: C. Galen		End: 19:10	Status of heron rookery - about 25 nests		sunny and overcast but wind chill cold
Observations Viewed from boat ramp as it has best visibility of entire site			Abundance / species of birds in Meldrum Bay and vicinity: 2 Canada geese, 12 mallards, 26 American crow, song sparrow, northern flicker, 5 great blue herons, 3 turkey vultures		
Time	Age*	Notes	On-site Summary:		
17:10-17:20	A1	sitting on nest in BCW tree on the west side of WR opp. Site.	# Min.	# Eagles	Notes
17:20-17:26	2A	A1 left nest and circled over site with another adult (A2)			
17:26-17:35	A2	on nest & rim; likely feeding young as head down and bobbing			
17:35-18:15	A2	perched on branch near nest			
17:45-17:49	A1	soared above site flushing crows south upriver flushing GBH			
18:15-18:19	A1	soared above site flushing crows; flying to nest			
18:19-19:10	A1	feeding young for 5 minutes; then sitting low in nest.			
			Adult bald eagle perching		
			Adult bald eagle foraging		
			Adult bald eagle nesting		
			Adult bald eagle: other	14	1-2 soaring over site
			Juvenile bald eagle		
			Total	14	
			Vicinity Summary:		
			# Min.	# Eagles	Notes
			Adult bald eagle perching		
			Adult bald eagle foraging		
			Adult bald eagle nesting	110	2 nesting; taking turns
			Adult bald eagle: other		
			Juvenile bald eagle		
			Total	110	
Protocol:					
Dawn surveys: Start 15 min before sunrise, 2 hrs					
Dusk surveys: Start 2 hours before sunset, 2 hrs					

<p>Date: 7/10/2023 64 degrees F; 95% overcast</p> <p>Name: C Galen River low; long dry peninsula No island; easy to drive to tip</p> <p>Start: 19:00</p> <p>End: 21:00</p> <p>Observations:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Time</th> <th style="text-align: left;">Age*</th> <th style="text-align: left;">Notes</th> </tr> </thead> <tbody> <tr> <td>19:00-19:39</td> <td>Ad</td> <td>Sitting on nest; still can't see young for sure</td> </tr> <tr> <td>19:39-21:00</td> <td>Ad</td> <td>Flew downstream and out of site</td> </tr> </tbody> </table> <p>NOTE: surveyed from boat ramp and peninsula</p> <p>Protocol: Dawn surveys: Start 15 min before sunrise, 2 hrs Dusk surveys: Start 2 hours before sunset, 2 hrs</p>	Time	Age*	Notes	19:00-19:39	Ad	Sitting on nest; still can't see young for sure	19:39-21:00	Ad	Flew downstream and out of site	<p>Other Observations:</p> <p>Abundance / species of birds in Meldrum Bay and vicinity: 39 Canada geese, 25 mallards, 23 American crow, 2 osprey, 2 glaucous-winged gulls 4 turkey vultures, 3 great blue heron (1 in tree), 1 belted kingfisher, 8 tree swallows 2 Vaux's swifts, song sparrow, American goldfinch</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">On-site Summary:</th> <th style="text-align: center;"># Min.</th> <th style="text-align: center;"># Eagles</th> <th style="text-align: left;">Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">Total</td> <td style="text-align: center;">0</td> <td></td> <td></td> </tr> </tbody> </table> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Vicinity Summary:</th> <th style="text-align: center;"># Min.</th> <th style="text-align: center;"># Eagles</th> <th style="text-align: left;">Notes</th> </tr> </thead> <tbody> <tr> <td>Adult bald eagle perching</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle foraging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Adult bald eagle nesting</td> <td style="text-align: center;">39</td> <td style="text-align: center;">1</td> <td>on nest;</td> </tr> <tr> <td>Adult bald eagle: other</td> <td></td> <td></td> <td>could not confirm young</td> </tr> <tr> <td>Juvenile bald eagle</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">Total</td> <td style="text-align: center;">39</td> <td style="text-align: center;">1</td> <td></td> </tr> </tbody> </table>	On-site Summary:	# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging				Adult bald eagle nesting				Adult bald eagle: other				Juvenile bald eagle				Total	0			Vicinity Summary:	# Min.	# Eagles	Notes	Adult bald eagle perching				Adult bald eagle foraging				Adult bald eagle nesting	39	1	on nest;	Adult bald eagle: other			could not confirm young	Juvenile bald eagle				Total	39	1	
Time	Age*	Notes																																																																
19:00-19:39	Ad	Sitting on nest; still can't see young for sure																																																																
19:39-21:00	Ad	Flew downstream and out of site																																																																
On-site Summary:	# Min.	# Eagles	Notes																																																															
Adult bald eagle perching																																																																		
Adult bald eagle foraging																																																																		
Adult bald eagle nesting																																																																		
Adult bald eagle: other																																																																		
Juvenile bald eagle																																																																		
Total	0																																																																	
Vicinity Summary:	# Min.	# Eagles	Notes																																																															
Adult bald eagle perching																																																																		
Adult bald eagle foraging																																																																		
Adult bald eagle nesting	39	1	on nest;																																																															
Adult bald eagle: other			could not confirm young																																																															
Juvenile bald eagle																																																																		
Total	39	1																																																																

Appendix H

Benthic Invertebrate Survey

(Digital Appendix)



Aquatic Biology Associates, Inc
3490 NW Deer Run Street
Corvallis, OR 97330
aquaticbio.com

Robert Wisseman, Senior Scientist
541-740-1568
bob@aquaticbio.com

Sheet Explanations

- This explanation is included as a reference for the conventions used in the data analysis.
- Refer to the "Documentation" sheet for specifics about the project.
- Short descriptions will be written at the top of metrics and summary sheets where clarification is needed.
- Bolded titles in this document correspond to sheet names. The exact sheet names may differ based on the type of analysis performed, whether or not replicates were present, and whether or not biomass was calculated.

Documentation

- Includes project information, client and laboratory contact information, overview of specifications, notes on missing or empty samples, and any irregularities encountered.
- Scroll down to the bottom of this page to see the date and time the analysis was run.

Metrics

- Provides an overview of relevant sample descriptors broken down by site.
- If replicates are present in the data, then this sheet will use the mean values for a given site calculated from the total number of replicates present for that site.
- A replicate is considered present if it is listed as empty, in which case it will be included in the mean calculations as zeros for all taxa.
- A replicate that is missing, decayed, or otherwise damaged will be omitted from the mean calculations.

(Mean) Summary Sheets:

- Named with "Mean" if replicates are present in the data set.
- Provides summaries of all the taxa found at each site.
- The rules for calculating the means are the same as those for the metrics sheet.

Mean abundance or Abundance

- Abundances are converted to a full sample basis (if subsampled) and to a standard area or volume unless otherwise specified. Refer to the bolded header line at the top of the sheet for the units used to express abundances.
- For benthic analysis, the abundances will be expressed as per m².
- For drift analysis, the abundances will be expressed as per 100 m³ of water filtered.

Mean percent abundance or Percent abundance

- Summarizes the percentage of each taxa in the sample based on the abundance of the taxa.

Mean biomass or Biomass

- Biomass is calculated via length-weight regression of the form (dry mass in mg) = a*(body length in mm)^b.
- To verify the coefficients used for this particular analysis, see the "Traits" sheet columns "a" and "b".
- See the "Documentation" sheet for details on the length measurements.
- Biomass values are expressed in milligrams (mg) on a full sample basis (if subsampled) and converted to a standard area or volume unless otherwise specified. Refer to the bolded header line at the top of the sheet for the units used to express biomass.
- For benthic analysis, the biomass values are expressed as (mg) per m².
- For drift analysis, the biomass values are expressed as (mg) per 100 m³ water filtered.

Mean percent biomass or Percent biomass

- Summarizes the percentage of each taxon in the sample based on the biomass of the taxa.

If the data set includes replicates:

Replicate metrics

- Provides an overview of relevant sample descriptors broken down by site and replicate.
- Any site for which the entire column below the sample identification is blank represents a sample that was empty. It is included here for reference and to facilitate the checking of the mean calculations.

Replicate Summary Sheets:

- Included when replicates are present in the data set, except for the case of Diet analyses.
- Provides summaries of all the taxa found at each site broken down by the individual replicates.
- If a column is entirely blank below the site identification, then it represents a sample that was empty. It is included here for reference and to facilitate the checking of the mean calculations.
- Sheets are otherwise the same as the Summary Sheets listed above.

Replicate abundance

Replicate percent abundance

Replicate biomass

Replicate percent biomass

Long output

- Provides a format that is easier to import to a database than the summary sheets.
- The "Abundance" column here may represent a raw count, an abundance per m² in the case of a benthic analysis, or an abundance per 100 m³ water filtered in the case of a diet analysis. See the summary sheets for details.
- The "Biomass" column (if present) is reported in the same manner as the abundance (raw, per m², or per 100 m³) in milligrams (mg). See the summary sheets for details.
- No rounding is performed on this sheet other than the number of decimals Excel maintains.

Long mean output

- Virtually identical to the "Long output" sheet with the values reported being mean values for the site across all the replicates.
- "MeanAbun" is the mean abundance, and "MeanBiom" is the mean biomass value reported in the same manner as in "Long output". The standard deviations are included for both of these values.

Traits

- Provides a snapshot of the coded life-history traits that were used to calculate the metrics for all of the taxa present in the data set.
- The "a" and "b" columns are the coefficients used to calculate biomass. See the explanation above for the "Mean Biomass" sheet for further details.

Metric explanation

- Provides a more detailed description of what each metric is calculating.

Record file

- This is the raw data as it was entered.
- Of note is the "Incidental" column (if present). Taxa marked "incidental" on this sheet will be omitted entirely from the analysis (these taxa will not appear on any other sheet in the file other than the "Taxa notes" sheet). Taxa marked "large/rare" will be included in the analysis and are treated specially in the calculation of the total biomass (on the metrics sheets) - total biomass is given both with and without these taxa due to their propensity to dominate the sample biomass.
- Also of note is the "Unique" column (if present) indicating whether a taxa that was identified at a higher classification level is believed to represent a taxa that is already listed in the sample. If a taxa is marked as not unique (N), then it is not counted in any of the richness metrics.
- The STE column stands for Standard Taxonomic Effort. This column will have a code entered that describes why a taxa was not identified to the standard taxonomic effort, e.g. if it was identified to family when the STE is genus.

Taxa notes

- Lists taxa identified in the sample that are excluded from the analysis (incidental taxa).
- Lists taxa identified to a higher classification level than the standard specification because of the specimen condition that are not believed to be unique from other taxa identified in the sample.
- This sheet may not be present for all data sets.

Additional notes

- Other documentation that may not have fit elsewhere.



Aquatic Biology Associates, Inc
3490 NW Deer Run Street
Corvallis, OR 97330
aquaticbio.com

Robert Wisseman, Senior Scientist
541-740-1568
bob@aquaticbio.com

Client

Client contact

Columbia Restoration Group, Portland, OR

Evan Ocheltree, Evan@ColumbiaRestorationGroup.com

Project

Project location

near

Project objectives

Rinearson Creek Restoration Monitoring

Medrum Bar Park, Rinearson Creek Natural Area, Clackamas County, in Gladstone, confluence Willamette River, 45.37958 N, -122.61722 W, <10 m elevation.

Restoration project as wetland mitigation for Portland Harbor plan.

Start of a 10 year monitoring project.

Laboratory

Contact

Robert Wisseman

General taxonomy

bobwisseman@mac.com

James DiGiulio

Chironomidae taxonomy

digulio@peak.org

Jon Lee

Mite taxonomy

jlee@humboldt1.com

Sampling protocol

Sampling gear

D-frame net

Mesh size

500 micron

Square area sampled

8 square feet

Habitat sampled

Includes engineered riffle, low gradient stream below remnant beaver pond, beaver pond, and emergent wetland. Pond and wetland samples are more semi-quantitative.

2023 area sampled was more qualitative

Laboratory protocol

Mesh size

500 micron

Subsampling target count

500 organism minimum

Subsampling device

Caton tray

Sorting efficacy

95+%

Taxa abundances

converted to a full sample and 1 square meter basis

Identification protocol

Standard taxonomic effort

PNAMP level 2

Chironomidae (midges)

genus/species group

Oligochaeta (segmented worms)

class Oligochaeta

Acari (mites)

genus

Life stages:

U unknown (for non-insects)

L larvae

LE Larval exuvia

P pupae

PE pupal exuvia

A adult

E egg

Biomass determination

Published length weight regressions used to calculate biomass.

Length of all macroinvertebrates measured to nearest 0.5 mm if individual <5 mm, or nearest 1 mm if > 5 mm.

Reported as the biomass corresponding to the taxa abundances (see laboratory protocol above).

Data analysis

Standard taxonomic effort (STE)

Version 2 ABA

Taxa traits (e.g. feeding group, etc.)

Version 2 ABA (see "Traits" tab in this output for documentation)

Programmed in R by Adam and Robert Wisseman

Version 2 of ABA STE and taxa traits is a draft version still under development.

Abundances converted to a standard full sample (if subsampled) and one square meter basis.

Date run:

'2023-10-16

Analysis program in developmental phase.

Abundances and biomass (mg) converted to a standard full sample (if subsampled) and one square meter basis.

metrics thought to have the most interpretive value are highlighted in red

Waterbody	Rinearson Creek beaver pond 2020-05-19	Rinearson Creek beaver pond 2021-05-04	Rinearson Creek beaver pond 2023-08-16	Rinearson Creek emergent marsh 2020-05-19	Rinearson Creek emergent marsh 2021-05-04	Rinearson Creek emergent marsh 2023-08-16	Rinearson Creek engineered riffle 2020-05-19	Rinearson Creek engineered riffle 2021-05-04	Rinearson Creek engineered riffle 2023-08-16	Rinearson Creek upper control 2020-05-19	Rinearson Creek upper control 2021-05-04	Rinearson Creek upper control 2023-08-16
CA % Tolerant individuals	41.73	27.55	50.97	47.72	47.29	62.86	10.2	26.16	6.406	58.55	23.47	55.87
CA weighted tolerance value	7.24	6.28	6.73	6.56	6.29	7.1	6.24	6.18	6.15	6.89	4.6	6.94
CA % Predators	12.52	30.38	15.64	12.08	17.51	5.905	4.332	5.629	7.473	7.466	7.653	10.8
CA % Collector-gatherers	67.74	38.9	50.19	56.44	81.61	66.86	18.03	75.5	29.72	93.1	88.78	52.82
CA % Filterers	0.931	26.04	2.317	13.27	0.8757	11.62	64.29	8.113	6.228	1.965	2.041	19.01
CA % Scrapers	0.9631	1.836	4.633	11.29	0	11.62	1.531	8.609	0.1779	2.554	0.5102	7.981
CA % Shredders	1.786	0	0	3.564	0	0	0.3401	0.1656	1.779	3.34	0	0.4695
BIOTIC CONDITION INDEX												
CTQa-Community Tolerance Quotient actual	97.5	104.62	100.06	101.7	108	104.77	104.4	103.64	100.86	101.09	105.6	106.18
CTQd-Community Tolerance Quotient dominance	102.37	107.19	99.38	103.93	108	104.98	104.86	105.81	104.18	103.88	107.53	107.8
BIOLOGICAL CONDITION GRADIENT (BCG) ATTRIBUTES												
TAXA RICHNESS												
Attribute 1 taxa richness	0	0	0	0	0	0	0	0	0	0	0	0
Attribute 2 taxa richness	0	0	0	0	0	0	0	0	0	0	0	0
Intermediate sensitive taxa (III)	0	1	0	2	0	2	0	1	0	2	0	3
Intermediate tolerant taxa (IV)	22	18	22	32	9	24	21	25	17	24	11	23
Tolerant native taxa (V)	11	11	9	11	5	11	8	7	6	6	4	7
Tolerant non-native taxa (VI)	0	0	0	1	0	1	0	0	0	1	0	1
Unknown attribute taxa richness	3	2	3	1	0	1	1	0	0	0	0	0
% TAXA RICHNESS BY ATTRIBUTE OF TOTAL RICHNESS												
Attribute 1 % of total taxa richness	0	0	0	0	0	0	0	0	0	0	0	0
Attribute 2 % of total taxa richness	0	0	0	0	0	0	0	0	0	0	0	0
Attribute 3 % of total taxa richness	0	3.03	0	4.255	0	5	0	2.941	0	5.882	0	8.571
Attribute 4 % of total taxa richness	57.89	54.55	62.86	68.09	60	60	67.74	73.53	70.83	70.59	68.75	65.71
Attribute 5 % of total taxa richness	28.95	33.33	25.71	23.4	33.33	27.5	25.81	20.59	25	17.65	25	20
Attribute 6 % of total taxa richness	0	0	0	2.128	0	2.5	0	0	0	2.941	0	2.857
Unknown attribute % of total taxa richness	7.895	6.061	8.571	2.128	0	2.5	3.226	0	0	0	0	0
ABUNDANCE												
Attribute 1 abundance	0	0	0	0	0	0	0	0	0	0	0	0
Attribute 2 abundance	0	0	0	0	0	0	0	0	0	0	0	0
Attribute 3 abundance	0	15.6	0	6.38	0	8	0	89.32	0	11.26	0	6
Attribute 4 abundance	1019.51	655.28	2118	637.53	520.52	468	9932.58	788.49	1113.99	754.53	207.13	266
Attribute 5 abundance	583.73	475.86	748.36	363.39	247.48	528	502.01	982.54	83.07	1129.92	56.49	152
Attribute 6 abundance	0	0	0	48.75	0	26	0	0	0	15.02	0	2
Unknown attribute abundance	72.63	21.45	79.72	19.13	0	20	107.57	0	0	0	0	0
PERCENTAGE BY ABUNDANCE												
% Attribute 1 by abundance	0	0	0	0	0	0	0	0	0	0	0	0
% Attribute 2 by abundance	0	0	0	0	0	0	0	0	0	0	0	0
Intermediate sensitive taxa (III)	0	1.336	0	0.5941	0	0.7619	0	4.801	0	0.5894	0	1.408
Intermediate tolerant taxa (IV)	60.83	56.09	57.92	59.41	67.78	44.57	94.22	42.38	93.06	39.49	78.57	62.44
Tolerant native taxa (V)	34.83	40.73	20.46	33.86	32.22	50.29	4.762	52.81	6.94	59.14	21.43	35.68
Tolerant non-native taxa (VI)	0	0	0	4.355	0	2.476	0	0	0	0.7859	0	0.4695
% Unknown attribute by abundance	4.334	1.836	21.62	1.782	0	1.905	1.02	0	0	0	0	0
METALS TOLERANCE INDEX												
Metals Tolerance Index (HBI)	6.56	4.1	3.54	3.95	5.01	4.53	6.38	4.68	4.96	4.35	3.7	4.09
% of taxa utilized in index calculation	44.74	60.61	42.86	51.06	66.67	62.5	54.84	52.94	37.5	58.82	68.75	48.57
% of individuals utilized in index calculation	59.71	71.29	34.56	71.49	75.13	64.57	22.11	52.81	77.4	79.17	95.41	69.25

Waterbody	Site	Date	Taxon	Stage	Insect	Origin	Higher classification	Order	Family	Common name	Abundance
Rinearson Creek	upper control	2023-08-16	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	1
Rinearson Creek	upper control	2023-08-16	Cryptochironomus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	1
Rinearson Creek	upper control	2023-08-16	Paratendipes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	11
Rinearson Creek	upper control	2023-08-16	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	38
Rinearson Creek	upper control	2023-08-16	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	4
Rinearson Creek	upper control	2023-08-16	Paratanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	2
Rinearson Creek	upper control	2023-08-16	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	1
Rinearson Creek	upper control	2023-08-16	Tanytarsus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	2
Rinearson Creek	upper control	2023-08-16	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthoclaadiinae	midges	2
Rinearson Creek	upper control	2023-08-16	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthoclaadiinae	midges	3
Rinearson Creek	upper control	2023-08-16	Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthoclaadiinae	midges	4
Rinearson Creek	upper control	2023-08-16	Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthoclaadiinae	midges	1
Rinearson Creek	upper control	2023-08-16	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthoclaadiinae	midges	1
Rinearson Creek	upper control	2023-08-16	Odontomesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Prodiamesinae	midges	4
Rinearson Creek	upper control	2023-08-16	Ablabesmyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	2
Rinearson Creek	upper control	2023-08-16	Procladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	11
Rinearson Creek	upper control	2023-08-16	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	18
Rinearson Creek	upper control	2023-08-16	Hygrobates	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	1
Rinearson Creek	upper control	2023-08-16	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	4
Rinearson Creek	upper control	2023-08-16	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	1
Rinearson Creek	upper control	2023-08-16	Sphaeriidae	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	77
Rinearson Creek	upper control	2023-08-16	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	2
Rinearson Creek	upper control	2023-08-16	Crangonyx	U	non-insect	Aquatic	Crustacea: Amphipoda	x	Crangonyctidae	scuds	10
Rinearson Creek	upper control	2023-08-16	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	55
Rinearson Creek	upper control	2023-08-16	Fluminicola	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Hydrobiidae	snails	10
Rinearson Creek	upper control	2023-08-16	Lymnaeidae	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Lymnaeidae	snails	1
Rinearson Creek	upper control	2023-08-16	Juga	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Pleuroceridae	snails	21
Rinearson Creek	upper control	2023-08-16	Potamopyrgus antipodarum	U	non-insect	Aquatic	Mollusca: Gastropoda	x	uncertain status	snails	2

Explanation of metrics

Subsample count (raw)
Subsample correction factor to full sample
Area correction factor to square meter

All abundances and biomass converted to a full sample and 1 square meter basis.

Total count of subsample prior to correction factors being applied for subsampling and conversion to a 1 square meter basis.
Multiplier to convert subsample abundances to a full sample basis, e.g. if 1/2 the sample was sorted, then the subsample correction is X2.
Converts abundances of full sample to a 1 square meter basis, e.g. if 8 square feet was sampled, then the conversion to 1 square meter is X1.345

SUMMARY METRICS

Total taxa richness
Total abundance
Total biomass (mg)
Large/rare biomass (mg)
Total biomass without large/rare (mg)
EPT taxa
Hilsenhoff Biotic Index (WY DEQ version)

Total count of unique taxa in sample.
Total abundance in sample converted to a full sample and 1 square meter basis.
Total biomass in full sample adjusted to a 1 square meter basis as calculated by length/mass regressions.
Biomass from taxa marked as "large/rare" in the "Incidental" column. These taxa may dominate the sample biomass.
Total biomass - large/rare biomass
Taxa in the insect orders Ephemeroptera+Plecoptera+Trichoptera, or mayflies+stoneflies+caddisflies.

$$HBI = \sum_{i=1}^S \frac{n_i \cdot a_i}{N}$$

S is the number of taxa present.
N is the total sample abundance.
n_i is the abundance of the i-th taxa.
a_i is the WY HBI index value (can be found on the Traits sheet). An index of 11 indicates a taxa that is discarded from the calculation.

DOMINANCE AND DIVERSITY

Dominant taxa
Subdominant taxa
Shannon-Weaver Diversity (loge)

Metrics that examine how dominated the community is by a single or few taxa.
The most numerous taxon.
The second most numerous taxon.
Information theory index that examines how evenly abundance is allocated among the taxa present in the community.

$$H' = - \sum_{i=1}^S \frac{n_i}{N} \ln \left(\frac{n_i}{N} \right)$$

S is the number of taxa present.
N is the total sample abundance.
n_i is the abundance of the i-th taxa.

Shannon-Weaver Diversity (log2)
Shannon Evenness Index

$$E = H' / \ln(S)$$

Where H' and S are defined above.

TOLERANT AND INTOLERANT TAXA

Total tolerant taxa
Highly tolerant taxa
Moderately tolerant taxa
Total intolerant taxa
Highly intolerant taxa
Moderately Intolerant taxa

Based on habitat association and best professional judgement (Wiseman unpublished). Water temperature and dissolved oxygen are the dominant environmental factors.
Sum of the moderately and highly tolerant taxa. Taxa found frequently in habitats with warm water temperature and low dissolved oxygen. Eurythermal.
Taxa highly tolerant of warm water and very low dissolved oxygen. Found often in stagnant and highly eutrophic habitat.
Taxa moderately tolerant of warm water and low dissolved oxygen.
Sum of moderately intolerant and highly intolerant taxa. Cool and cold water biota found in habitats with high dissolved oxygen.
Taxa generally found in habitats with year-round cold water temperatures and very high dissolved oxygen. Indicative of bull trout zone. Cold water biota, cold stenotherms.
Taxa generally found in cool water habitats, cold to cool water eurythermal. Indicative of general salmonid zone.

VOLTINISM (length of life cycle)

Semivoltine (> 1 year life cycle)
Univoltine (1 year life cycle)
Multivoltine (< 1 year life cycle)

Modified from Poff et al. 2006
Taxa where a significant proportion of individuals require more than one year to complete their life cycle.
Taxa where most individuals exhibit a one year life cycle.
Taxa where a significant proportion of the population has more than one generation a year.

GROWTH AND DEVELOPMENT

Fast seasonal life cycle
Slow seasonal life cycle
Nonseasonal life cycle

Modified from Poff et al. 2006
Taxa that grow and mature over a few months or a single season.
Taxa where growth and maturation extends over several seasons.
Taxa that exhibit asynchronous seasonal development, with multiple life stages present during most of the year.

OCCURRENCE IN DRIFT

Rare in drift
Common in drift
Abundant in drift

Modified from Poff et al. 2006
Found rarely in stream drift. Drift occurs during catastrophic events (e.g. floods).
Found commonly in stream drift.
Dominant in stream drift, behavioral drifters.

SIZE AT MATURITY

Small size at maturity
Medium size at maturity
Large size at maturity

Modified from Poff et al. 2006
<9 mm long at maturity
9-16 mm long at maturity
> 16 mm long at maturity

RHEOPHILY AND HABITAT AFFINITY

Depositional only
Depositional and erosional
Erosional

Modified from Poff et al. 2006
Occurs primarily in lentic habitats, stream pools and alcoves, or low gradient slowly flowing streams.
Stream taxa found in both pools and riffles, though usually in protected pockets in riffles.
Stream taxa associated with moderate to fast water current.

THERMAL PREFERENCE

Cold stenothermal and cool eurythermal
Cool/warm eurythermal
Warm eurythermal

Modified from Poff et al. 2006

NON-INSECT AND INSECT ORDERS

Non-insect invertebrates
Ephemeroptera (mayflies)

Hydroids, vermiform taxa, mollusks, crustaceans and mites.

Explanation of metrics

All abundances and biomass converted to a full sample and 1 square meter basis.

Odonata (damself- and dragonflies)	
Plecoptera (stoneflies)	
Hemiptera (true bugs)	
Megaloptera (alderflies and hellgramites)	
Trichoptera (caddisflies)	
Lepidoptera (moths)	
Coleoptera (beetles)	
Diptera (total)(true flies)	Inclusive of the Chironomidae.
Chironomidae (true flies- midges)	Dominant and ubiquitous aquatic dipteran family.
INDICATOR TAXA	
Mollusca (snails and bivalves) taxa	
Crustacea taxa	Benthic taxa include Ostracoda, Amphipoda, Isopoda, Decapoda, and the Chydoridae (Cladocera), but not water column associated microcrustaceans (e.g. Daphnidae and Copepoda)
Baetidae (mayfly) taxa	Common, ubiquitous and diverse family of minnow-like mayflies.
Ephemerellidae (mayfly) taxa	Common, ubiquitous and diverse family of mayflies with most taxa associated with cool-cold montane rivers. Many taxa intolerant.
Heptageniidae (mayfly) taxa	Common, ubiquitous and diverse family of mayflies. Rheophilic, scraper mayflies found over a broad longitudinal range in montane and foothill rivers and streams.
Nemouridae (stonefly) taxa	Common, ubiquitous, and diverse family of stoneflies. Broadly distributed along river systems with peak diversity in small, forested streams.
Rhyacophilidae (caddisfly) taxa	Common, ubiquitous and very diverse family of caddisflies. Primarily predators. Broadly distributed along river systems with peak diversity in small to mid-size, cool/cold montane streams.
Hydropsychidae (caddisfly) taxa	Common, ubiquitous, and diverse family of net spinning caddisflies.
Elmidae (riffle beetle) taxa	Common, ubiquitous, and diverse family of aquatic beetles.
FEEDING GROUPS	Functional feeding groups based on the mechanism by which taxa feed. Modified from Merritt et al. 2008.
Predator taxa	Taxa that are primarily predators, consuming living animal tissue by engulfing prey or piercing prey tissues and sucking fluids. Excluding parasites.
Parasite taxa	External parasites of invertebrates (e.g. Acari or mites), or internal parasites (e.g. Nematoda or roundworms).
Collector-gatherer taxa	Utilize mouthparts and other structures to "gather" fine particulate organic matter (FPOM) that is mostly detritus but may include algae, bacteria, small animals, etc.
Collector-filterer taxa	Utilize nets, mothparts or other structures to capture and consume FPOM suspended in the water column. FPOM may include algae, bacteria, small animals, etc.
Collector (total) taxa	Sum of the collector-gatherer and collector-filterer.
Piercer herbivore taxa	Also called Macrophyte piercers. Pierce living tissue of aquatic macrophytes and suck fluids, e.g. some Hydroptilidae.
Macrophyte herbivore taxa	Chewers and miners of living macrophytes. Considered a subclass of shredders in Merritt et al. 2008.
Shredder taxa	Consume (chew) coarse particulate organic matter (CPOM) such as decaying leaves and wood.
Scraper taxa	"Scrape" periphyton (attached algae) and associated material from hard surfaces.
Omnivore taxa	Taxa exhibiting multiple feeding mechanisms (above), with no one mechanism clearly dominant.
Unknown taxa	No information available on how and what taxon feeds on.
HABIT	Mode of existence.
Skater taxa	Adapted for "skating" on the water surface. Generally excluded from benthic data sets.
Planktonic taxa	Inhabit the water column in lentic water or slow moving streams. Generally excluded from benthic data sets.
Diver taxa	Swim in the water column and along the benthos, but return to the water surface to obtain oxygen. Generally excluded from benthic data sets.
Swimmer taxa	Exhibit fishlike swimming in lotic or lentic waters, but return to the benthos between bursts of swimming. Included in benthic data sets.
Clinger taxa	Taxa that have behavioral (e.g. net spinners) or morphological adaptations (e.g. claws) to attach to hard substrates in faster water current.
Sprawler taxa	Found on the surface of fine sediments or floating leaves of macrophytes.
Climber taxa	Found on leaves and stems of aquatic macrophytes or submerged branches and roots.
Burrower taxa	Burrow into fine sediments or tunnel into plant stems, leaves or roots (miners)
Unknowns taxa	Not able to classify as above.
STATE OF CALIFORNIA DESIGNATIONS	Traits coding according to CAMLnet January 27, 2003. List of California macroinvertebrate taxa and standard taxonomic effort.
CA % Sensitive EPT	Ephemeroptera, Plecoptera and Trichoptera with California Tolerance Value (CTV) of 0-2 on a 0-10 scaling.
CA % Intolerant individuals	All invertebrates with a CTV of 0-2 on a 0-10 scaling.
CA % Tolerant individuals	All invertebrates with a CTV of 8-10 on a 0-10 scaling.
CA weighted tolerance value	Calculates the Hilsenhoff Biotic Index using the California Tolerance Values (CTV)
CA % Predators	Primary designation of predator as classed by CA.
CA % Collector-gatherers	Primary designation of gatherer as classed by collector-gatherer by CA.
CA % Filterers	Primary designation of filterer as classed by collector-filterer by CA.
CA % Scrapers	Primary designation of scraper as classed by CA.
CA % Shredders	Primary designation of shredder as classed by CA.
BIOTIC CONDITION INDEX	
CTQa- Community Tolerance Quotient actual	
$CTQa = \sum_{i=1}^S \frac{TQ_i}{S}$	S is the number of taxa. TQ_i is the BCI TV (tolerance value) from the Traits sheet. A BCI TV of 110 indicates a taxa that is excluded from the calculation.
CTQd-Community Tolerance Quotient dominance	
$CTQd = \sum_{i=1}^S (TQ_i \cdot \log(n_i)) / \sum_{i=1}^S \log(n_i)$	TQ_i and S as above. n_i is the abundance of taxa i.
SIZE CLASS	
0-2.75 mm abundance	

Explanation of metrics

3-4.75 mm abundance
5-6.75 mm abundance
7-8.75 mm abundance
9-10.75 mm abundance
11-15 mm abundance
16-20 mm abundance
>20 mm abundance
0-2.75 mm biomass (mg)
3-4.75 mm biomass (mg)
5-6.75 mm biomass (mg)
7-8.75 mm biomass (mg)
9-10.75 mm biomass (mg)
11-15 mm biomass (mg)
16-20 mm biomass (mg)
>20 mm biomass (mg)

All abundances and biomass converted to a full sample and 1 square meter basis.

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	upper control	5/19/2020	Oligochaeta	U	34	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Erpobdella	U	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Sphaeriidae	U	8	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Ferrissia	U	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Menetus	U	5	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Potamopyrgus antipodarum	U	4	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Crangonyx	U	24	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Caecidotea	U	272	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Pacifastacus	U	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Baetis	L	9	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Lepidostoma	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Lara	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Clinocera	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Neoplata	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Ceratopogoninae	L	8	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Simulium	L	2	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Tipula	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Chironomidae	P	12	2.791	2.791	1.345	N	no	
Rinearson Creek	upper control	5/19/2020	Alotanypus	L	4	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Brillia	L	14	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Chironomus	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Corynoneura	L	2	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Cryptochironomus	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Eukiefferiella claripennis group	L	6	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Heterotrissocladius marcidus group	L	2	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Limnophyes	L	3	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Micropsectra	L	34	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Parametricnemus	L	2	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Phaenopsectra	L	3	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Polypedilum	L	1	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Procladius	L	2	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Prodiamesa	L	16	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Thienemannimyia complex	L	20	2.791	2.791	1.345	Y	no	
Rinearson Creek	upper control	5/19/2020	Tvetenia bavarica group	L	12	2.791	2.791	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Oligochaeta	U	6	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Erpobdella	U	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Sphaeriidae	U	3	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Lymnaeidae	U	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Physella	U	5	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Gyraulus	U	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Chydoridae	U	6	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Crangonyx	U	10	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Caecidotea	U	2	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Pacifastacus	U	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Sperchon	U	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Baetis	L	5	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Cheumatopsyche	L	7	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Hydroptila	L	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Ceratopogoninae	L	6	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Ceratopogoninae	P	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Simulium	L	358	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Tipula	L	2	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Chironomidae	P	8	13.33	13.33	1.345	N	no	
Rinearson Creek	engineered riffle	5/19/2020	Corynoneura	L	2	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Cricotopus	L	57	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Cryptochironomus	L	1	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Eukiefferiella claripennis group	L	41	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Micropsectra	L	3	13.33	13.33	1.345	Y	no	
Rinearson Creek	engineered riffle	5/19/2020	Parametricnemus	L	1	13.33	13.33	1.345	Y	no	

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	engineered riffle	5/19/2020	Paratanytarsus	L	3	13.33	1.345	Y		no	
Rinearson Creek	engineered riffle	5/19/2020	Phaenopsectra	L	2	13.33	1.345	Y		no	
Rinearson Creek	engineered riffle	5/19/2020	Polypedilum	L	21	13.33	1.345	Y		no	
Rinearson Creek	engineered riffle	5/19/2020	Psectrocladius	L	5	13.33	1.345	Y		no	
Rinearson Creek	engineered riffle	5/19/2020	Rheotanytarsus	L	7	13.33	1.345	Y		no	
Rinearson Creek	engineered riffle	5/19/2020	Thienemannimyia complex	L	19	13.33	1.345	Y		no	
Rinearson Creek	engineered riffle	5/19/2020	Tvetenia bavarica group	L	1	13.33	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Oligochaeta	U	113	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Erpobdella	U	4	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Chydoridae	U	4	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Crangonyx	U	9	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Caecidotea	U	3	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Aeshnidae	L	1	2	1.345	Y	early instar	no	
Rinearson Creek	beaver pond	5/19/2020	Callibaetis	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Notonecta	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Corixidae	L	11	2	1.345	N		no	
Rinearson Creek	beaver pond	5/19/2020	Cenocorixa	A	11	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Hydrophilidae	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Dytiscidae	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Peltodytes	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Peltodytes	A	2	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Dolichopodidae	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Ceratopogoninae	L	16	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Ceratopogoninae	P	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Psychodini	L	1	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Simulium	L	13	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Tipula	L	9	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Chironomidae	P	21	2	1.345	N		no	
Rinearson Creek	beaver pond	5/19/2020	Brillia	L	2	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Chironomus	L	142	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Corynoneura	L	2	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Cricotopus	L	85	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Cryptochironomus	L	22	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Endochironomus	L	11	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Eukiefferiella claripennis group	L	4	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Limnophyes	L	2	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Paratanytarsus	L	4	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Phaenopsectra	L	6	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Polypedilum	L	6	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Procladius	L	20	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Prodiamesa	L	2	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Psectrocladius	L	28	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Pseudosmittia	L	9	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Psectrotanytus	L	6	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Rheotanytarsus	L	2	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Tanytarsus	L	41	2	1.345	Y		no	
Rinearson Creek	beaver pond	5/19/2020	Thienemannimyia complex	L	4	2	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Nemata	U	19	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Oligochaeta	U	15	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Erpobdella	U	7	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Sphaeriidae	U	57	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Lymnaeidae	U	6	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Physella	U	7	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Juga	U	2	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Fluminicola	U	10	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Crangonyx	U	20	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Caecidotea	U	118	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Lirceus	U	1	1.58	1.345	Y		no	
Rinearson Creek	emergent marsh	5/19/2020	Potamopyrgus antipodarum	U	22	1.58	1.345	Y		no	

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	emergent marsh	5/19/2020	Baetis	L	4		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Coenagrion/Enallagma	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Corixidae	L	9		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Dytiscidae	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Peltodytes	A	3		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Neoplasta	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Tipuloidea	P	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Ceratopogoninae	L	2		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Dixella	L	5		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Clinocera	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Tipula	L	4		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Alotanypus	L	7		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Brillia	L	14		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Chironomus	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Corynoneura	L	4		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Cricotopus	L	9		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Cryptochironomus	L	3		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Dicrotendipes	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Eukiefferiella claripennis group	L	3		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Heterotrissocladius marcidus group	L	2		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Limnophyes	L	4		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Micropsectra	L	36		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Odontomesa	L	6		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Paratanytarsus	L	9		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Paratendipes	L	2		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Phaenopsectra	L	10		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Polypedilum	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Procladius	L	4		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Prodiamesa	L	53		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Psectrocladius	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Psectrotanypus	L	7		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Smittia	L	2		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Tanytarsus	L	1		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Thienemannimyia complex	L	8		1.58	1.345	Y	no	
Rinearson Creek	emergent marsh	5/19/2020	Tvetenia bavarica group	L	1		1.58	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Oligochaeta	U	8		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Helobdella stagnalis complex	U	15		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Sphaeriidae	U	2		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Physella	U	3		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Musculium	U	2		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Ostracoda	U	6		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Lirceus	U	4		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Crangonyx	U	86		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Caecidotea	U	35		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Trombidiformes	U	6		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Chydoridae	U	2		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Erpobdella	U	5		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Libellulidae	L	1		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Coenagrion/Enallagma	L	1		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Callibaetis	L	1		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Corixidae	L	9		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Ceratopogoninae	L	66		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Ceratopogoninae	P	1		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Chironomidae	P	38		1.45	1.345	N	no	
Rinearson Creek	beaver pond	5/4/2021	Alotanypus	L	4		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Chironomus	L	11		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Cladopelma	L	2		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Cricotopus	L	4		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Cryptochironomus	L	70		1.45	1.345	Y	no	

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	beaver pond	5/4/2021	Dicrotendipes	L	4		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Odontomesa	L	10		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Orthocladius	L	8		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Paratanytarsus	L	27		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Paratendipes	L	4		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Phaenopsectra	L	8		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Polypedilum	L	8		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Procladius	L	13		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Prodiamesa	L	10		1.45	1.345	Y	no	
Rinearson Creek	beaver pond	5/4/2021	Tanytarsus	L	125		1.45	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Nemata	U	1		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Oligochaeta	U	2		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Erpobdella	U	3		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Crangonyx	U	20		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Caecidotea	U	144		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Lirceus	U	10		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Ceratopogoninae	L	5		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Chironomidae	P	13		1	1.345	N	no	
Rinearson Creek	emergent marsh	5/4/2021	Alotanytus	L	91		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Chironomus	L	7		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Cricotopus	L	10		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Micropsectra	L	3		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Paratendipes	L	106		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Prodiamesa	L	151		1	1.345	Y	no	
Rinearson Creek	emergent marsh	5/4/2021	Tanytarsus	L	5		1	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Trepaxonemata	U	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Nemata	U	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Oligochaeta	U	17		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Helobdella stagnalis complex	U	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Erpobdella	U	1		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Ostracoda	U	1		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Lirceus	U	7		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Crangonyx	U	173		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Caecidotea	U	89		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Pacifastacus	U	1		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Trombidiformes	U	4		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Libellulidae	L	1		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Baetis tricaudatus complex	L	5		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Cheumatopsyche	L	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Ceratopogoninae	L	10		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Simulium	L	5		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Simulium	P	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Tipula	L	1		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Chironomidae	P	26		2.29	1.345	N	no	
Rinearson Creek	engineered riffle	5/4/2021	Alotanytus	L	3		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Chironomus	L	45		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Cricotopus	L	19		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Eukiefferiella claripennis group	L	11		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Limnophyes	L	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Micropsectra	L	29		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Nanocladius	L	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Odontomesa	L	3		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Orthocladius	L	29		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Parachironomus	L	2		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Paratanytarsus	L	21		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Phaenopsectra	L	52		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Prodiamesa	L	7		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Tanytarsus	L	19		2.29	1.345	Y	no	
Rinearson Creek	engineered riffle	5/4/2021	Thienemannimyia complex	L	7		2.29	1.345	Y	no	

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	engineered riffle	5/4/2021	Tvetenia bavarica group	L	2		2.29	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Oligochaeta	U	3		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Sphaeriidae	U	2		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Erpobdella	U	2		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Crangonyx	U	1		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Caecidotea	U	37		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Baetis tricaudatus complex	L	1		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Ceratopogoninae	L	5		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Chironomidae	P	1		1	1.345	N	no	
Rinearson Creek	upper control	5/4/2021	Alotanypus	L	8		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Chironomus	L	2		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Micropsectra	L	1		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Paratendipes	L	3		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Phaenopsectra	L	1		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Polypedilum	L	2		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Prodiamesa	L	125		1	1.345	Y	no	
Rinearson Creek	upper control	5/4/2021	Tanytarsus	L	2		1	1.345	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Trepaxonemata	U	2		2.13	1	Y	no	sample 1 for 2023
Rinearson Creek	engineered riffle	8/16/2023	Nemata	U	3		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Oligochaeta	U	30		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Prostoma	U	4		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Sphaeriidae	U	11		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Physella	U	1		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Crangonyx	U	12		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Caecidotea	U	15		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Sperchon	U	2		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Argia	L	9		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Coenagrion/Enallagma	L	3		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Cheumatopsyche	L	4		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Hydroptila	L	3		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Dicranomyia	L	9		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Ceratopogoninae	L	7		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Neoplasta	L	1		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Simulium	L	15		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Tipula	L	1		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Chironomidae	P	33		2.13	1	N	no	
Rinearson Creek	engineered riffle	8/16/2023	Cricotopus	L	74		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Nanocladius	L	3		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Polypedilum	L	304		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Rheotanytarsus	L	5		2.13	1	Y	no	
Rinearson Creek	engineered riffle	8/16/2023	Thienemannimyia complex	L	11		2.13	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Trepaxonemata	U	11		7.06	1	Y	no	sample 2 for 2023
Rinearson Creek	beaver pond	8/16/2023	Nemata	U	2		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Oligochaeta	U	99		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Sphaeriidae	U	4		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Lymnaeidae	U	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Physella	U	22		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Gyraulus	U	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Ostracoda	U	12		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Chydoridae	U	8		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Hyalella	U	65		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Trombidiformes	U	2		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Sperchon	U	2		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Oribatida	U	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Coenagrion/Enallagma	L	28		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Aeshnidae	L	13		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Callibaetis	L	24		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Libellulidae	L	4		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Corixidae	L	103		7.06	1	Y	no	

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	beaver pond	8/16/2023	Abedus	L	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Oxyethira	L	3		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Hydrophilidae	L	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Peltodytes	L	9		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Peltodytes	A	14		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Ceratopogoninae	L	10		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Chironomidae	P	1		7.06	1	N	no	
Rinearson Creek	beaver pond	8/16/2023	Ablabesmyia	L	4		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Corynoneura	L	3		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Endochironomus	L	3		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Nanocladius	L	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Paratanytarsus	L	7		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Polypedilum	L	9		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Procladius	L	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Psectrocladius	L	2		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Pseudochironomus	L	45		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Tanytarsus	L	1		7.06	1	Y	no	
Rinearson Creek	beaver pond	8/16/2023	Thienemannimyia complex	L	1		7.06	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Trepaxonemata	U	7		2	1	Y	no	sample 3 for 2023
Rinearson Creek	emergent marsh	8/16/2023	Nemata	U	5		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Oligochaeta	U	22		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Sphaeriidae	U	28		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Lymnaeidae	U	2		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Physella	U	7		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Gyraulus	U	2		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Juga	U	2		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Fluminicola	U	33		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Crangonyx	U	21		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Caecidotea	U	204		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Hyalella	U	5		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Potamopyrgus antipodarum	U	13		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Coenagrion/Enallagma	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Callibaetis	L	5		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Corixidae	L	10		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Peltodytes	L	9		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Ceratopogoninae	L	2		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Dixella	L	4		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Chironomidae	P	7		2	1	N	no	
Rinearson Creek	emergent marsh	8/16/2023	Ablabesmyia	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Alotanypus	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Chironomus	L	3		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Corynoneura	L	8		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Cricotopus	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Cryptochironomus	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Eukiefferiella claripennis group	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Heterotrissocladius marcidus group	L	3		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Limnophyes	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Micropsectra	L	2		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Odontomesa	L	24		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Orthocladius	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Paratanytarsus	L	32		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Paratendipes	L	39		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Phaenopsectra	L	2		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Polypedilum	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Procladius	L	9		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Pseudochironomus	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Tanytarsus	L	1		2	1	Y	no	
Rinearson Creek	emergent marsh	8/16/2023	Thienemannimyia complex	L	4		2	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Trepaxonemata	U	1		1	1	Y	no	

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	upper control	8/16/2023	Nemata	U	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Oligochaeta	U	55		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Helobdella stagnalis complex	U	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Sphaeriidae	U	77		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Lymnaeidae	U	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Juga	U	21		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Potamopyrgus antipodarum	U	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Crangonyx	U	10		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Caecidotea	U	127		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Sperchonopsis	U	4		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Hygrobates	U	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Fluminicola	U	10		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Coenagrion/Enallagma	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Ceratopogoninae	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Dixella	L	3		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Hemerodromia	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Neoplasta	L	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Chironomidae	P	1		1	1	N	no	
Rinearson Creek	upper control	8/16/2023	Ablabesmyia	L	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Brillia	L	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Corynoneura	L	3		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Cryptochironomus	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Heterotrissocladius marcidus group	L	4		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Limnophyes	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Micropsectra	L	4		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Odontomesa	L	4		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Orthocladius	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Paratanytarsus	L	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Paratendipes	L	11		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Polypedilum	L	38		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Procladius	L	11		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Stempellinella	L	1		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Tanytarsus	L	2		1	1	Y	no	
Rinearson Creek	upper control	8/16/2023	Thienemannimyia complex	L	18		1	1	Y	no	

These samples were poorly preserved

Sphaeriidae

Lymnaeidae

Asellidae

Baetis

Cenocorixa

2023 sampling notes

Left town for the AFS fisheries meeting in Michigan before getting some notes to you about the sampling locations. Headed back to Corvallis on Thursday.

Sample 1: Slow flowing stream like constriction of Rinearson Cr. east the mouth to the Willamette river. Perhaps 2 cfs while we were there. Small boulder material (must be non native rock material armoring the reach with very little fines. Rocks were moved to try to find some smaller substrate underneath for standard disturbance kick net sampling. Some larger rocks were scrubbed to collect more individuals for the sample. Minimal gradient.

Sample 2: Edge of ponded section. Fine silt and lots of filamentous algae. Bottom was disturbed and sweep sampled. Edge habitat just 1/2m away was also sampled. Had overhanging grassy herbaceous foliage. Spent long time removing fine silt from sample.

and 3. Constriction at upper end of pond. Incised channel (5ft) with lots of overhanging herbaceous foliage. Slow water movement, soft bottom. about 2 feet deep

Sample 4. Farthest upstream. Sample collected under 100% shade canopy. Incised Stream was about 8 ft wetted width and 2-5 inches deep with a slow glide like habitat. Substrate was silt and lots of allochthonous woody debris and detritus from steep banks on either side

Hope this helps a bit.

Gregg

most specimens with shells partially decalcified. Many juveniles. Most are Placidium, but Musculium also present, so roll ID up to family level

Mostly juveniles, some Galba & Pseudouacinae columella

Almost all seen are Caecidotea, but there was one large (though damaged) specimen that differed significantly in appearance from Caecidotea and appears to be Lirceus. This may be the first record for the Willamette Valley.

Rhithron Associates reports Lirceus from the Puget Lowlands and believes they are probably introduced from eastern North America.

Specimens damaged because of poor preservation. Color pattern variable. No apparent setae on antennal scapes, but they may have been rubbed off. Pronotum with kidney shaped dark markings. Color pattern varies from B. bicadatus complex to closer to B. flavistris complex. Cerci broken off, so can't look for dark bands. Roll up to Baetis until better preserved late-instar specimens are available.

tentative identification

Incidental taxa rejected from the analysis. Large/rare taxa treated specially for total biomass. Non-unique taxa omitted from richness metrics.

Waterbody	Site	Date	Taxon	Stage	Abundance	Subsample.correction.factor	Area.correction.factor	Unique	STE	Incidental	Comments
Rinearson Creek	upper control	05/19/2020 00:00:00	Chironomidae	P	12	2.791	1.345	N		no	
Rinearson Creek	engineered riffle	05/19/2020 00:00:00	Chironomidae	P	8	13.33	1.345	N		no	
Rinearson Creek	beaver pond	05/19/2020 00:00:00	Aeshnidae	L	1	2	1.345	Y	early instar	no	
Rinearson Creek	beaver pond	05/19/2020 00:00:00	Corixidae	L	11	2	1.345	N		no	
Rinearson Creek	beaver pond	05/19/2020 00:00:00	Chironomidae	P	21	2	1.345	N		no	
Rinearson Creek	beaver pond	05/04/2021 00:00:00	Chironomidae	P	38	1.45	1.345	N		no	
Rinearson Creek	emergent marsh	05/04/2021 00:00:00	Chironomidae	P	13	1	1.345	N		no	
Rinearson Creek	engineered riffle	05/04/2021 00:00:00	Chironomidae	P	26	2.29	1.345	N		no	
Rinearson Creek	upper control	05/04/2021 00:00:00	Chironomidae	P	1	1	1.345	N		no	
Rinearson Creek	engineered riffle	08/16/2023 00:00:00	Trepaxonemata	U	2	2.13	1	Y		no	sample 1 for 2023
Rinearson Creek	engineered riffle	08/16/2023 00:00:00	Chironomidae	P	33	2.13	1	N		no	
Rinearson Creek	beaver pond	08/16/2023 00:00:00	Trepaxonemata	U	11	7.06	1	Y		no	sample 2 for 2023
Rinearson Creek	beaver pond	08/16/2023 00:00:00	Chironomidae	P	1	7.06	1	N		no	
Rinearson Creek	emergent marsh	08/16/2023 00:00:00	Trepaxonemata	U	7	2	1	Y		no	sample 3 for 2023
Rinearson Creek	emergent marsh	08/16/2023 00:00:00	Chironomidae	P	7	2	1	N		no	
Rinearson Creek	upper control	08/16/2023 00:00:00	Chironomidae	P	1	1	1	N		no	

Appendix I

Equipment Calibration Certificate

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 43887
Description YSI Pro Plus
Calibrated 7/10/2023 1:19:26PM

Manufacturer YSI
Model Number Professional Plus
Serial Number/ Lot 18J103055
Number
Location Seattle
Department

State Certified
Status Pass
Temp °C 21
Humidity % 42

Calibration Specifications

Group # 1				Range Acc % 0.0000			
Group Name PH				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
7.00 / 7.00	PH	7.00	PH	7.02	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	4.00	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.05	10.00	0.00%	Pass
Group # 2				Range Acc % 0.0000			
Group Name Conductivity				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.000			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
1.413 / 1.413	ms/cm	1.413	ms/cm	1.323	1.413	0.00%	Pass
Group # 3				Range Acc % 0.0000			
Group Name Redox (ORP)				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
240.00 / 240.00	mv	240.00	mv	245.00	240.00	0.00%	Pass
Group # 4				Range Acc % 0.0000			
Group Name Dissolved Oxygen Span				Reading Acc % 3.0000			
Stated Accy Pct of Reading				Plus/Minus 0.00			
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>
100.00 / 100.00	%	100.00	%	102.80	100.00	0.00%	Pass

INSTRUMENT CALIBRATION REPORT



Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 43887
Description YSI Pro Plus
Calibrated 7/10/2023 1:19:26PM

Manufacturer YSI
Model Number Professional Plus
Serial Number/ Lot Number 18J103055
Location Seattle
Department

State Certified
Status Pass
Temp °C 21
Humidity % 42

Calibration Specifications

				Range Acc %				
				Reading Acc %				
				Plus/Minus				
<u>Nom In Val / In Val</u>	<u>In Type</u>	<u>Out Val</u>	<u>Out Type</u>	<u>Fnd As</u>	<u>Lft As</u>	<u>Dev%</u>	<u>Pass/Fail</u>	
Group # 1				0.0000				
Group Name PH				3.0000				
Stated Accy Pct of Reading				0.00				
7.00 / 7.00	PH	7.00	PH	7.02	7.00	0.00%	Pass	
4.00 / 4.00	PH	4.00	PH	4.00	4.00	0.00%	Pass	
10.00 / 10.00	PH	10.00	PH	10.05	10.00	0.00%	Pass	
Group # 2				0.0000				
Group Name Conductivity				3.0000				
Stated Accy Pct of Reading				0.00				
1.413 / 1.413	ms/cm	1.413	ms/cm	1.323	1.413	0.00%	Pass	
Group # 3				0.0000				
Group Name Redox (ORP)				3.0000				
Stated Accy Pct of Reading				0.00				
240.00 / 240.00	mv	240.00	mv	245.00	240.00	0.00%	Pass	
Group # 4				0.0000				
Group Name Dissolved Oxygen Span				3.0000				
Stated Accy Pct of Reading				0.00				
100.00 / 100.00	%	100.00	%	102.80	100.00	0.00%	Pass	



INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

3225 South 116th St.
Building 1 Suite 181
Tukwila, WA 98168
425-285-9102

Pine Environmental Services, Inc.

Instrument ID 43887
Description YSI Pro Plus
Calibrated 7/10/2023 1:19:26PM

Test Instruments Used During the Calibration				(As Of Cal Entry Date)	
Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date
SEA COND 1413 09/23	Conductivity solution 1.413 μ S/cm	AquaPhoenix Scientific	31986	2GI642	9/30/2023
SEA ORP 240 3GB560	SEA ORP 240	AquaPhoenix Scientific	32001	3GB560	11/30/2023
SEA PH10 1GL764	pH 10 Buffer Solution	AquaPhoenix Scientific	32034	1GL764	12/31/2023
SEA PH4 2GG184	pH 4 Buffer Solution	AquaPhoenix Scientific	32017	2GG184	7/31/2024
SEA PH7 1GI1017	pH 7 Buffer Solution	AquaPhoenix Scientific	32025	1GI1017	9/30/2023

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Dzung Pham

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

Appendix J

Adaptive Management

Rinearson Natural Area Invasive Weed Treatments 2023



December 2022/ January 2023

- *Site Treatment* – Winter spot/ broadcast spray of full 36 acres on site.
- *Invasive Targets* – Himalayan blackberry, English ivy, Thistles.
- *Herbicide prescriptions* – 2% Garlon3a (Triclopyr), 2% AquaNeat (Glyphosate), 1% Competitor (Surfactant); 2% Garlon3a (Triclopyr), 4% AquaNeat (Glyphosate), 2% Competitor (Surfactant)
- *Habitat Management* – broadcast sprayed, brush cut, and removed debris from turtle nesting habitat areas.

June 2023

- *Site Treatment* – brush cut through brambles of previously sprayed Himalayan Blackberry to create access throughout site.
- *Invasive Targets* – Himalayan Blackberry.
- *Habitat Management* – brush cut and removed debris from turtle nesting habitat areas.

July 2023

- *Site Treatment* – Summer spot/ broadcast spray of full 36 acres on site.
- *Invasive Targets* – Himalayan blackberry, Dune tansy, Tansy ragwort, Common teasel, Thistles, Yellow flag iris, English ivy, Reed canary grass, Pennyroyal.
- *Herbicide prescriptions* – 2% Garlon3a (Triclopyr), 2% AquaNeat (Glyphosate), 1% Competitor (Surfactant); 4% AquaNeat (Glyphosate), 2% Competitor (Surfactant); 1% Imazapyr, 1% Competitor.
- *Habitat Management* – broadcast sprayed weed regrowth of turtle nesting habitat areas.

August 2023

- *Site Treatment* – Late Summer spot/ broadcast spray of North 10 acres of site
- *Invasive Targets* – Pennyroyal, Yellow flag iris, Purple loosestrife, Dune tansy, Tansy ragwort, Common teasel, Thistles.
- *Herbicide prescriptions* – 2% Garlon3a (Triclopyr), 2% AquaNeat (Glyphosate), 1% Competitor (Surfactant); 4% AquaNeat (Glyphosate), 2% Competitor (Surfactant); 1% Imazapyr, 1% Competitor.
- *Habitat Management* –brush cut and removed debris from new turtle nesting habitat area.

October 2023

- *Site Treatment* – Fall spot/ broadcast spray of South 26 acres of site.
- *Invasive Targets* – Himalayan blackberry, Yellow flag iris, Knotweed, Reed canary grass, Poison hemlock, Dune tansy, Tansy ragwort, Common teasel, Canada Thistle, Bull Thistle.
- *Herbicide prescriptions* – 2% Garlon3a (Triclopyr), 2% AquaNeat (Glyphosate), 1% Competitor (Surfactant); 4% AquaNeat (Glyphosate), 2% Competitor (Surfactant).
- *Habitat Management* – more finely brush cut and removed debris from new turtle nesting habitat area; separated rocks in seasonal stream connection for fish passage. (Before and After Photos in Exhibit B)

November 2023 (spray log attached):

- *Site Treatment* – Cut down and stump treated non-native Birch trees; follow up spot spray in select areas of site.
- *Invasive Targets* – Common teasel, Thistles, Himalayan Blackberry, Ivy, Knotweed, Birch.
- *Herbicide prescriptions* – 2% Garlon3a (Triclopyr), 2% AquaNeat (Glyphosate), 1% Competitor (Surfactant).

EXHIBIT A
Photo Logs
Invasive Treatments
April





June





August









EXHIBIT B

Roughened Channel

Before



After:



Ash Creek Forest Management, LLC
 2796 SE 73rd Ave. Hillsboro, OR 97123
 Phone: (503) 624-0357
 Fax: (503) 620-1701
www.ashcreekforestry.com



Nick Lewis
nlewis@ashcreekforestry.com
 415-994-7054

Evan Ocheltree & Gary Howard
 Columbia Restoration Group

Rinearson Natural Area - Scope of Work 2024

Date	Task	Number	Unit	Cost/unit	Total Cost	Notes
Winter 2024	Container Plant Purchase	50	each	\$12.00	\$600.00	Purchase cost of large native container plants.
Winter 2024	Container Plant Install	50	each	\$7.50	\$375.00	Install native container plants to provide native buffer for turtle habitat areas and path between them.
Winter 2024	Hourly Cutting	120	hour	\$65.00	\$7,800.00	Cut down and clear brush and dead blackberry canes surrounding natives for release and better access throughout site.
Winter 2024	Container Plant: Purchase	1,200	each	\$5.00	\$6,000.00	Purchase cost of 1-gallon native herbaceous container plants for emergent marsh.
Winter 2024	Container Plant: Install	1,200	each	\$4.00	\$4,800.00	Install cost of 1-gallon native herbaceous container plants in emergent marsh
Winter 2024	Hourly Cut Stump	80	hour	\$68.00	\$5,440.00	Cut stump and treat weedy trees throughout site including laurel, holly, hawthorne, and tree of heaven. This will also include tree ivy.
Winter 2024	Hourly Spray	40	hour	\$68.00	\$2,720.00	Spot spray Ivy visible under natives and Himalayan Blackberry tangled in natives during Winter when native plants are void of
Spring 2024	Hourly Spray	160	hour	\$68.00	\$10,880.00	Spot spray throughout site.
Summer 2024	Hourly Spray	160	hour	\$68.00	\$10,880.00	Spot spray throughout site.
Fall 2024	Hourly Spray	160	hour	\$68.00	\$10,880.00	Spot spray throughout site.
Ongoing	Hourly Labor	50	hour	\$63.00	\$3,150.00	Mow, rake and clear out turtle habitat areas at desired times throughout the year.
Ongoing	Materials	1	LS	\$3,000.00	\$3,000.00	Estimated cost of herbicide.
Ongoing	Project Management	35	hour	\$125.00	\$4,375.00	Professional services including site meetings, site walks, client/ trustee coordination and communication, treatment planning, and logistics.
Total:					\$70,900.00	

HOA Border - Scope of Work 2024

Date	Task	Number	Unit	Cost/unit	Total Cost	Notes
Winter 2024	Hourly Spray	24	hour	\$68.00	\$1,632.00	Spot spray Himalayan Blackberry between natural area and HOA.
Winter 2024	Hourly Cutting	50	hour	\$65.00	\$3,250.00	Cut down all sprayed blackberry between natural area and HOA.
Summer 2024	Hourly Spray	12	hour	\$68.00	\$816.00	Spray resprouts of Himalayan Blackberry between natural area and HOA.
Ongoing	Materials	1	LS	\$500.00	\$500.00	Estimated cost of herbicide.
Ongoing	Project Management	5	hour	\$125.00	\$625.00	Professional services including site meetings, site walks, client/ trustee coordination and communication, treatment planning, and logistics.
Total:					\$6,823.00	

* Ash Creek Forest Management, LLC (Ash Creek) brings professional expertise to the development of project scopes, schedules and budgets. Recipient agrees that this document is Ash Creek's protected work product. As such, the information herein may not be altered, shared or reproduced, nor used on any other project or for any other purposes, except as specifically authorized in writing by Ash Creek prior to such use.

** Rates and Prices guaranteed for 30 days after bid submission.

PROJECT: Rinearson						
CLIENT: Colombia Restoration Group			CATEGORY (highlight one):		Forestry	Aquatics
ADDRESS: 19 Meldrum Bar Park Rd, Gladstone, OR 97027						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 1/10/2023		TIME IN: 8:00 A.M.		TIME OUT: 12:00 P.M.		TOTAL ACRES: 10.88
Targets		Prescription (oz/ac or v/v%)			Equipment & Application Method	
A. Himalayan Blackberry		A. 2% Garlon, 2% AquaNeat, 1% Competitor, 0.5% Hi-Light			A. Backpack, Spot Spray	
B.		B.			B.	
C.		C.			C.	
D.		D.			D.	
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)			Water (gal or oz)	
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		190			71 gal	
Triclopyr						
Vastlan · EPA Reg #62719-687					ACFM	
Garlon 3A · EPA Reg #62719-37		190				
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
Surfactants/ Adjuvants						
Competitor		95			ACFM	
Class Act						
Hasten						
Colorant						
Hi-Light Blue Dye		47			ACFM	
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
8:00 AM	Cloudy	69%	43	9	0	NE
10:00 AM	Cloudy	64%	46	10	0	NE
12:00 AM	Cloudy	58%	51	11	0	ENE
CERTIFIED LICENSED APPLICATOR:				CERTIFIED LICENSED APPLICATOR NO.:		
Lauren Smith				AG-L1081083CPA		

DATE: 01/11/2023		PROJECT: Rinearson			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Abbey Schole	AG-L1081486IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Adriana Pinalto	AG-L1082303IST				
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Armand Tirado	AG-L1076206IST	AG-L1079568CPA		Forest	
Bethany Luth	AG-L1082379IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Claire Newell	AG-L1083171IST				
Coleman Krohn	AG-L1076007IST	AG-L1079092CPA	105150	Forest, Aquatic	
Cooper Clarke	AG-L1082002IST				
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Elise Snortum	AG-L1081833IST				
Ella Brinkman	AG-L1081485IST	AG-L1084135CPA		Forest	
Emily Hayden	AG-L1083815IST				
Erik Saastamo	AG-L1080198IST			Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Gabriel Donaldson	AG-L1082095IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081486IST	AG-L1083844CPA		Forest	
Jamison Holcombe	AG-L1074818IST	AG-L1077020CPA		Forest	
Jenifer Nugent	AG-L1076963IST	AG-L1079230CPA		Forest	
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Josh Schmuhl	AG-L1073343IST				
Kaleigh Andreoni	AG-L1078162IST	AG-L1080433CPA		Forest	
Kelly Gaughan	AG-L1082967IST	AG-L1083843CPA		Forest	
Kobe Rossi	AG-L1083168IST				
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST				X
Llew Whipps	AG-L1073649IST	AG-L1075847CPA	105034	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mark Dickison	AG-L1079023IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA		Forest	
Nate McMullen	AG-L1079207IST	AG-L1080914CPA	105149	Forest, Aquatic	
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Rachel Viera	AG-L1079880IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Samantha Marcotte	AG-L1083339IST				
Saul Garcia	AG-L1082953IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST				
Tiana Zlotoff	AG-L1082049IST				
Trevor Burrows	AG-L1082674IST				
Tyler Csolkovits	AG-L1084026IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST				
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Will Matthews	AG-L1083727IST				
Zach Bergonzine	AG-L1084018IST				
Zach Lopez	AG-L1052858IST				
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson						
CLIENT: Columbia Restoration Group			CATEGORY (highlight one):		Forestry	Aquatics
ADDRESS: 19 Meldrum Bar Park Rd, Gladstone, OR 97027						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 01/11/2023		TIME IN: 8:00 A.M.		TIME OUT: 3:15 P.M.		TOTAL ACRES: 3.86
Targets		Prescription (oz/ac or v/v%)		Equipment & Application Method		Acres
A. Himalayan Blackberry		A. 2% Garlon, 2% AquaNeat, 1% Competitor, 0.5% Hi-Light		A. Backpack, Spot Spray		A. 3.86
B.		B.		B.		B.
C.		C.		C.		C.
D.		D.		D.		D.
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)		Water (gal or oz)		Purchased by:
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		48		18 gal		ACFM
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		48				ACFM
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
Surfactants/ Adjuvants						
Competitor		24				ACFM
Class Act						
Hasten						
Colorant						
Hi-Light Blue Dye		12				ACFM
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
8:00 AM	Mostly cloudy	73%	44	15	0	ESE
12:00 PM	Cloudy	37%	48	16	0	ESE
3:00 PM	Mostly cloudy	68%	47	12	0	ESE
CERTIFIED LICENSED APPLICATOR:				CERTIFIED LICENSED APPLICATOR NO.:		
Jenifer Nugent				AG-L1079256CPA		

DATE: 1/12/2023		PROJECT: Rinearson Natural Area			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Abbey Schole	AG-L1081486IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Adriana Pianalto	AG-L1082303IST				
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA			
Armand Tirado	AG-L1076206IST	AG-L1079568CPA			
Bethany Luth	AG-L1082379IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Carlos Estrada	AG-L1080870IST				
Claire Newell	AG-L1083171IST				
Coleman Krohn	AG-L1076007IST	AG-L1079092CPA	105150	Forest, Aquatic	
Cooper Clarke	AG-L1082002IST				
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Elise Snortum	AG-L1081833IST				
Ella Brinkman	AG-L1081485IST				
Emily Hayden	AG-L1083815IST				
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA			
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Gabriel Donaldson	AG-L1082095IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jamison Holcombe	AG-L1074818IST	AG-L1077020CPA		Forest	
Jenah Alseth	AG-L1083190IST				
Jenifer Nugent	AG-L1076963IST	AG-L1079256CPA			
Jill Tamborello	AG-L1074236IST				
Josh Schmuhl	AG-L1073343IST				
Kaleigh Andreoni	AG-L1078162IST	AG-L1080433CPA		Forest	
Kelly Gaughn	AG-L1082967IST	AG-L1083843CPA		Forest	
Kobe Rossi	AG-L1083168IST				
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST				
Llew Whipps	AG-L1073649IST	AG-L1075847CPA	105034	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mark Dickison	AG-L1079023IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA			
Nate McMullen	AG-L1079207IST	AG-L1080914CPA	105149	Forest, Aquatic	
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Rachel Viera	AG-L1079880IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ryan Queen	AG-L1083030IST				
Samantha Marcotte	AG-L1083359IST				
Saul Garcia	AG-L1082953IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST				
Tiana Zlotoff	AG-L1082049IST				
Trevor Burrows	AG-L1082674IST				
Tyler Csolkovits	AG-L1084026IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	

Vince Wagner	AG-L1083493IST				
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Will Matthews	AG-L1083727IST				
Zach Bergonzine	AG-L1084018IST				
Zach Lopez	AG-L1052858IST				
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson Natural Area						
CLIENT: Colombia Restoration Group			CATEGORY (highlight one):		Forestry	Aquatics
ADDRESS: 19 Meldrum Bar Park Rd, Gladstone, OR 97027						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 1/12/2023		TIME IN: 12:30 P.M.		TIME OUT: 3:45 P.M.		TOTAL ACRES: 0.8
Targets		Prescription (oz/ac or v/v%)		Equipment & Application Method		Acres
A. Himalayan Blackberry		A. 2% AquaNeat, 2% Garlon, 1% Competitor, 0.5% Hi-Light		A. Backpack, Spot Spray		A. 0.8
B. English Ivy		B. 4% AquaNeat, 2% Garlon, 2% Competitor, 0.5% Hi-Light		B. Backpack, Spot Spray		B. 0.8
C.		C.		C.		C.
D.		D.		D.		D.
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)		Water (gal or oz)		Purchased by:
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		80		28.5 gal		ACFM
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		76				ACFM
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
Surfactants/ Adjuvants						
Competitor		22				ACFM
Class Act						
Hasten						
Colorant						
Hi-Light Blue Dye		10				ACFM
WEATHER CONDITIONS						
Time	Conditions	Humidity (%)	Temperature (°F)	(mph)	(mph)	Wind Direction
12:00 PM	Cloudy	76	44	2	0	SSW
1:00 PM	Cloudy	75	44	4	0	S
2:00 PM	Cloudy	74	45	2	0	SSW
CERTIFIED LICENSED APPLICATOR:						
Aissa Bennett				AG-L1076653CPA		

DATE: 1/23/2023		PROJECT: Rinearson Natural Area			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Abbey Schole	AG-L1081486IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Adriana Pinalto	AG-L1082303IST				
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Armand Tirado	AG-L1076206IST	AG-L1079568CPA		Forest	
Bethany Luth	AG-L1082379IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Cailin Warner					
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Claire Newell	AG-L1083171IST				
Coleman Krohn	AG-L1076007IST	AG-L1079092CPA	105150	Forest, Aquatic	
Cooper Clarke	AG-L1082002IST				
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Elise Snortum	AG-L1081833IST				
Ella Brinkman	AG-L1081485IST	AG-L1084135CPA		Forest	
Emily Hayden	AG-L1083815IST				
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Gabriel Donaldson	AG-L1082095IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jamison Holcombe	AG-L1074818IST	AG-L1077020CPA		Forest	
Jenifer Nugent	AG-L1076963IST	AG-L1079256CPA		Forest	
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Josh Schmuhl	AG-L1073343IST				
Kaleigh Andreoni	AG-L1078162IST	AG-L1080433CPA		Forest	
Kelly Gaughan	AG-L1082967IST	AG-L1083843CPA		Forest	
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA			
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA			
Llew Whipps	AG-L1073649IST	AG-L1075847CPA	105034	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mark Dickison	AG-L1079023IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA		Forest	
Nate McMullen	AG-L1079207IST	AG-L1080914CPA	105149	Forest, Aquatic	
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Rachel Viera	AG-L1079880IST	AG-L1084178CPA			
Ricardo Peralta	AG-L1084270IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Samantha Marcotte	AG-L1083359IST				
Saul Garcia	AG-L1082953IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST				
Tiana Zlotoff	AG-L1082049IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA			
Tyler Csolkovits	AG-L1084026IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST				
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Will Matthews	AG-L1083727IST				
Zach Bergonzine	AG-L1084018IST				
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson Natural Area						
CLIENT: Columbia Restoration Group			CATEGORY (highlight one):		Forestry	Aquatics
ADDRESS: (45.377674, -122.615357)						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 1/23/2023		TIME IN: 8:00 A.M.		TIME OUT: 4:00 P.M.		TOTAL ACRES: 6.4
Targets		Prescription (oz/ac or v/v%)		Equipment & Application Method		Acres
A. Himalayan Blackberry		A. 2% Garlon, 2% AquaNeat, 1% Competitor, 0.5% Hi-Light		A. Backpack, Spot Spray		A. 6.4
B.		B.		B.		B.
C.		C.		C.		C.
D.		D.		D.		D.
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)		Water (gal or oz)		Purchased by:
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		164		61.5 gal		ACFM
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		164				ACFM
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
Surfactants/ Adjuvants						
Competitor		82				ACFM
Class Act						
Hasten						
Colorant						
Hi-Light Blue Dye		41				ACFM
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
8:00 AM	Clear	90%	37	3	0	E
11:00 AM	Clear	83%	42	3	0	NNE
1:00 PM	Clear	70%	46	4	0	NW
CERTIFIED LICENSED APPLICATOR:				CERTIFIED LICENSED APPLICATOR NO.:		
Trevor Burrows				AG-L1084398CPA		

DATE: 7/3/2023		PROJECT: Rinearson			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Aaron Fry	AG-L1086316IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Alex Maitland	AG-L1086710IST				
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Bethany Luth	AG-L1082379IST				
Bethany Morrow	AG-L1086748IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Camille Oster	AG-L1085533IST				
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Catherine Luecht	AG-L1086006IST				
Charly Yocius	AG-L1087065IST				
Coleman Krohn	AG-L1086040IST	AG-L1079092CPA	105150	Forest, Aquatic	
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Dion Brannan	AG-L1087066IST				
Edward Benkhin	AG-L1086713IST				
Elise Snortum	AG-L1081833IST				
Ellie Winter	AG-L1086747IST				
Emily Martin	AG-L1061041IST	AG-L1064107CPA		Forest	
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Emily Stewart	AG-L1086314IST				
Gavin Stockwell	AG-L1086226IST				
Greg Muller	AG-L1086712IST				
Hanna Horton	AG-L1086715IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jack Delaney	AG-L1086968IST				
Jessica Riccardi	AG-L1086970IST				
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Katelyn Kompara	AG-L1085915IST				
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA		Forest, Aquatic	
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA	106759	Forest, Aquatic	
Llew Whipps	AG-L1073649IST	AG-L1075847CPA	105034	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mallory Mitsui	AG-L1086102IST				
Madison Smith	AG-L1086749IST				
Mark Dickison	AG-L1079023IST				
Mathew Lipski	AG-L1087020IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA	106342	Forest, Aquatic	
Megan Greene	AG-L1086317IST				
Michael Briggs	AG-L1086597IST				
Miguel Madden	AG-L1086600IST				
Mille Isbell	AG-L1087021IST				
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Ricardo Peralta	AG-L1084270IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ruby Gunter	AG-L1086709IST				
Samantha Marcotte	AG-L1083359IST				
Scott Smethurst	AG-L1086440IST				
Spencer Hansen	AG-L1041281IST				

Spencer Page	AG-L1083169IST	AG-L1084646CPA		Forest	
Tiana Zlotoff	AG-L1082049IST	AG-L1085924CPA		Forest	
Tom Hauser	AG-L1086596IST				
Tomasz Cunha	AG-L1086595IST				
Tova Broadbent	AG-L1086714IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA		Forest	
Tyler Csolkovits	AG-L1084026IST				
Valentin Mitsui	AG-L1085741IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST				
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson						
CLIENT: Columbia Restoration Group			CATEGORY (highlight one):		Forestry	Aquatics
ADDRESS: 45.3778358,-123.6124366						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 7/3/2023		TIME IN: 6:30 am		TIME OUT: 3:00 pm		TOTAL ACRES: 4.18
Targets		Prescription (oz/ac or v/v%)			Equipment & Application Method	
A. Yellow Flag Iris		A. 4% Aquaneat, 1% Competitor, 0.5% Hi-Light			A. Spray pack	
B. Reed Canary Grass		B. 2% Aquaneat, 1% Competitor, 0.5% Hi-Light			B. Spray pack	
C.		C.			C.	
D.		D.			D.	
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)			Water (gal or oz)	
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		88			30g	
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37						
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
Surfactants/ Adjuvants						
Competitor		40			30 g	
Class Act						
Hasten						
Colorant						
Hi-Light Blue Dye		20			30 g	
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
7:00 AM	Sunny	55%	58	0	0	ENE
10:00 AM	Sunny	45%	69	4	0	NW
1:00 PM	Sunny	25%	79	7	0	NW
CERTIFIED LICENSED APPLICATOR:				CERTIFIED LICENSED APPLICATOR NO.:		
Evan Stewart				AG-L1073266CPA		

PROJECT: Rinearson						
CLIENT: Columbia Restoration Group			CATEGORY (highlight one):		Forestry	Aquatics
ADDRESS: (45.3778358, -123.6124366)						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 7/3/2023		TIME IN: 6:30 AM		TIME OUT: 3:00 pm		ACRES: 9.44
Targets		Prescription (oz/ac or v/v%)		Equipment/Application (Pack/Spot, etc.)		Acres
A. Himalayan blackberry, thistle, teasel, tansy		A. 2% Garlon, 2% Aquaneat, 1% Competitor, 0.5 Hi-Light		A. Spray pack		A. 9.44
B.		B.		B.		B.
C.		C.		C.		C.
D.		D.		D.		D.
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)		Water (gal or oz)		Purchased by:
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		168		63 gal		ACFM
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		168		63 gal		ACFM
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
2% Garlon/ 2% Rodeo						
Surfactants/ Adjuvants						
Competitor		84		63 gal		ACFM
Class Act						
Colorant						
Hi-Light Blue Dye		42		63 gal		ACFM
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
7:00 AM	Sunny	55%	58	0	0	NW
10:00 AM	Sunny	45%	69	4	0	NW
1:00 PM	Sunny	25%	79	7	0	NW
CERTIFIED LICENSED APPLICATOR:				CERTIFIED LICENSED APPLICATOR NO.:		
Evan Stewart				AG-L1073266CPA		

DATE: 7/5/2023		PROJECT: Rinearson			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Aaron Fry	AG-L1086316IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Alex Maitland	AG-L1086710IST				
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Bethany Luth	AG-L1082379IST				
Bethany Morrow	AG-L1086748IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Camille Oster	AG-L1085533IST				
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Catherine Luecht	AG-L1086006IST				
Charly Yocius	AG-L1087065IST				
Coleman Krohn	AG-L1086040IST	AG-L1079092CPA	105150	Forest, Aquatic	
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Dion Brannan	AG-L1087066IST				
Edward Benkhin	AG-L1086713IST				
Elise Snortum	AG-L1081833IST				
Ellie Winter	AG-L1086747IST				
Emily Martin	AG-L1061041IST	AG-L1064107CPA		Forest	
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Emily Stewart	AG-L1086314IST				
Gavin Stockwell	AG-L1086226IST				
Greg Muller	AG-L1086712IST				
Hanna Horton	AG-L1086715IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jack Delaney	AG-L1086968IST				
Jessica Riccardi	AG-L1086970IST				
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Katelyn Kompara	AG-L1085915IST				
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA		Forest, Aquatic	
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA	106759	Forest, Aquatic	X
Llew Whipps	AG-L1073649IST	AG-L1075847CPA	105034	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mallory Mitsui	AG-L1086102IST				
Madison Smith	AG-L1086749IST				
Mark Dickison	AG-L1079023IST				
Mathew Lipski	AG-L1087020IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA	106342	Forest, Aquatic	
Megan Greene	AG-L1086317IST				
Michael Briggs	AG-L1086597IST				
Miguel Madden	AG-L1086600IST				
Mille Isbell	AG-L1087021IST				
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Ricardo Peralta	AG-L1084270IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ruby Gunter	AG-L1086709IST				
Samantha Marcotte	AG-L1083359IST				
Scott Smethurst	AG-L1086440IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST	AG-L1084646CPA		Forest	
Tiana Zlotoff	AG-L1082049IST	AG-L1085924CPA		Forest	
Tom Hauser	AG-L1086596IST				
Tomasz Cunha	AG-L1086595IST				
Tova Broadbent	AG-L1086714IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA		Forest	
Tyler Csolkovits	AG-L1084026IST				

Valentin Mitsui	AG-L1085741IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST				
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson						
CLIENT: Columbia Restoration Group		CATEGORY (highlight one):		Forestry		Aquatics
Address: 45.3778358, -122.6124366						
TREATMENT TYPE (highlight one):		Site Prep	Establishment	Stewardship		
DATE: 7/5/2023		TIME IN: 6:00 A.M.		TIME OUT: 1:00 P.M.		TOTAL ACRES: 6.46
Targets		Prescription (oz/ac or v/v%)		Equipment/Application (Pack/Spot, etc.)		Acres
A. Yellow Flag Iris		A. 4% Aquaneat, 1% Competitor, 0.5% Hi-Light		A. Backpack, Spot Spray		A.3
B. Himalayan Blackberry, Teasel, Tansy Ragwort, Canada Thistle, Bull thistle		B. 2% Garlon, 2% Aquaneat, 1% Competitor, 0.5% Hi-Light		B. Backpack, Spot Spray		B. 3.46
C.		C.		C.		C.
D.		D.		D.		D.
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)		Water (gal or oz)		Purchased by:
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		216		72 gal		ACFM
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		168				ACFM
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Mixed Herbicides						
Surfactants/ Adjuvants						
Competitor		96				ACFM
Class Act						
Colorant						
Hi-Light Blue Dye		48				ACFM
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
8:00 AM	Sunny	53%	69	2	0	NE
10:00 AM	Sunny	37%	77	5	0	NNW
12:00 PM	Sunny	29%	85	5	0	NNW
CERTIFIED LICENSED APPLICATOR:				CERTIFIED LICENSED APPLICATOR NO.:		
Erik Saastamo				AG-L1083719CPA		

Rinearson		7/17/2023			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Aaron Fry	AG-L1086316IST				
Abigail Mortensen	AG-L1087265IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Alex Maitland	AG-L1086710IST				
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Bethany Luth	AG-L1082379IST				
Bethany Morrow	AG-L1086748IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Camille Oster	AG-L1085533IST				
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Catherine Luecht	AG-L1086006IST				
Charly Yocius	AG-L1087065IST				
Coleman Krohn	AG-L1086040IST	AG-L1079092CPA	105150	Forest, Aquatic	
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Dion Brannan	AG-L1087066IST				
Edward Benkhin	AG-L1086713IST				
Elise Snortum	AG-L1081833IST	AG-L1087294CPA		Forest	
Ellie Winter	AG-L1086747IST				
Emily Martin	AG-L1061041IST	AG-L1064107CPA		Forest	
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Emily Stewart	AG-L1086314IST				
Emma Ortiz	AG-L1087197IST				
Ethan Yarish	AG-L1087487IST				
Greg Muller	AG-L1086712IST				
Hanna Horton	AG-L1086715IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jack Delaney	AG-L1086968IST				
Jessica Riccardi	AG-L1086970IST				
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Katelyn Kompara	AG-L1085915IST				
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA		Forest, Aquatic	
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA	106759	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mallory Mitsui	AG-L1086102IST				
Madison Smith	AG-L1086749IST				
Malia Moritz	AG-L1086969IST				
Mark Dickison	AG-L1079023IST				
Mathew Lipski	AG-L1087020IST				
Matthew DeCosta	AG-L1087195IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA	106342	Forest, Aquatic	
Megan Greene	AG-L1086317IST				
Michael Briggs	AG-L1086597IST				
Mille Isbell	AG-L1087021IST				
Mychal Hellie	AG-L1087317IST				
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Ricardo Peralta	AG-L1084270IST				
Rick Pedersen	AG-L1087194IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ruby Gunter	AG-L1086709IST				
Samantha Marcotte	AG-L1083359IST	AG-L1087215CPA		Forest	
Scott Smethurst	AG-L1086440IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST	AG-L1084646CPA		Forest	
Tom Hauser	AG-L1086596IST				
Tomasz Cunha	AG-L1086595IST				
Tova Broadbent	AG-L1086714IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA		Forest, Aquatic	
Tyler Csolkovits	AG-L1084026IST				
Valentin Mitsui	AG-L1085741IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST	AG-L1087222CPA		Forest	
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Will Matthews	AG-L1083727IST				
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson		CATEGORY		TREATMENT TYPE		
CLIENT: Columbia Restoration Group		Forestry	Aquatics	Site Prep	Establishment	Stewardship
ADDRESS: 45.3774476, -122.6151989						
DATE: 7/17/2023						
TIME IN: 6:30 A.M.						
TIME OUT: 2:30 P.M.						
					TOTAL ACRES:	10.38
Prescription (oz/ac or v/v%)		Targets		Equipment & Method	Acres	
A.	2% Garlon, 2% Aquaneat, 1% Competitor, 0.5% Hi-Light	Himalayan Blackberry, Thistle, Teasel		Backpack, Spot Spray	7.36	
B.	2% Garlon, 4% Aquaneat, 2% Competitor, 0.5% Hi-Light	English Ivy		Backpack, Spot Spray	3.02	
C.						
D.						
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)	Water (gal or oz)	Purchased by:		
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		216	54	ACFM		
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		144		ACFM		
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Milestone · EPA Reg #62719-519						
Poast · EPA Reg #7969-58						
Surfactants/ Adjuvants						
Competitor		108		ACFM		
Class Act						
Hasten						
Colorant						
Hi-Light Blue Dye		36		ACFM		
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
6:30 AM	Cloudy	72	62	0	0	SE
11:00 AM	Cloudy	55	70	5	0	WSW
2:00 PM	Partly Cloudy	47	73	5	0	NW
CERTIFIED LICENSED APPLICATOR:			CERTIFIED LICENSED APPLICATOR NO.:			
Spencer Page			AG-L1084646CPA			

Rinearson		7/18/2023			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Aaron Fry	AG-L1086316IST				
Abigail Mortensen	AG-L1087265IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Alex Maitland	AG-L1086710IST				
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Bethany Luth	AG-L1082379IST				
Bethany Morrow	AG-L1086748IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Camille Oster	AG-L1085533IST				
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Catherine Luecht	AG-L1086006IST				
Charly Yocius	AG-L1087065IST				
Coleman Krohn	AG-L1086040IST	AG-L1079092CPA	105150	Forest, Aquatic	
Crosby Buchstaber	AG-L1083172IST				
David Chiang	AG-L1054240IST				
Dion Brannan	AG-L1087066IST				
Edward Benkhin	AG-L1086713IST				
Elise Snortum	AG-L1081833IST	AG-L1087294CPA		Forest	
Ellie Winter	AG-L1086747IST				
Emily Martin	AG-L1061041IST	AG-L1064107CPA		Forest	
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Emily Stewart	AG-L1086314IST				
Emma Ortiz	AG-L1087197IST				
Ethan Yarish	AG-L1087487IST				
Greg Muller	AG-L1086712IST				
Hanna Horton	AG-L1086715IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jack Delaney	AG-L1086968IST				
Jessica Riccardi	AG-L1086970IST				
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Katelyn Kompara	AG-L1085915IST				
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA		Forest, Aquatic	
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA	106759	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mallory Mitsui	AG-L1086102IST				
Madison Smith	AG-L1086749IST				
Malia Moritz	AG-L1086969IST				
Mark Dickison	AG-L1079023IST				
Mathew Lipski	AG-L1087020IST				
Matthew DeCosta	AG-L1087195IST				
Max Osofsky	AG-L1080639IST	AG-L1082476CPA	106342	Forest, Aquatic	
Megan Greene	AG-L1086317IST				
Michael Briggs	AG-L1086597IST				
Mille Isbell	AG-L1087021IST				
Mychal Hellie	AG-L1087317IST				
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	

Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Ricardo Peralta	AG-L1084270IST				
Rick Pedersen	AG-L1087194IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ruby Gunter	AG-L1086709IST				
Samantha Marcotte	AG-L1083359IST	AG-L1087215CPA		Forest	
Scott Smethurst	AG-L1086440IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST	AG-L1084646CPA		Forest	
Tom Hauser	AG-L1086596IST				
Tomasz Cunha	AG-L1086595IST				
Tova Broadbent	AG-L1086714IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA		Forest, Aquatic	
Tyler Csolkovits	AG-L1084026IST				
Valentin Mitsui	AG-L1085741IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST	AG-L1087222CPA		Forest	
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Will Matthews	AG-L1083727IST				
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson		CATEGORY		TREATMENT TYPE		
CLIENT: Columbia Restoration Group		Forestry	Aquatics	Site Prep	Establishment	Stewardship
ADDRESS: 45.378249, -122.616308						
DATE: 7/18/2023						
TIME IN: 6:30 A.M.						
TIME OUT: 2:30 P.M.						
					TOTAL ACRES:	10.75
Prescription (oz/ac or v/v%)		Targets		Equipment & Method	Acres	
A.	2% Garlon, 2% Aquaneat, 1% Competitor, 0.5% Hi-Light	Himalayan Blackberry, Teasel, Tansy, Thistle, Reed Canary Grass, Pennyroyal		Backpack, Spot Spray	5.92	
B.	2% Garlon, 4% Aquaneat, 1% Competitor, 0.5% Hi-Light	English Ivy, Yellow Flag Iris		Backpack, Spot Spray	4.83	
C.						
D.						
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)	Water (gal or oz)		Purchased by:	
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		168	54 gal		ACFM	
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		136			ACFM	
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Milestone · EPA Reg #62719-519						
Poast · EPA Reg #7969-58						
Surfactants/ Adjuvants						
Competitor		72			ACFM	
Class Act						
Hasten						
Colorant						
Hi-Light Blue dye		34			ACFM	
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
6:30 AM	Sunny	80%	56	4	0	NW
11:00 AM	Sunny	53%	71	8	0	NNW
2:00 PM	Sunny	36%	81	11	4	NW
CERTIFIED LICENSED APPLICATOR:			CERTIFIED LICENSED APPLICATOR NO.:			
Spencer Page			AG-L1084646CPA			

Rinearson		8/7/2023			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Aaron Fry	AG-L1086316IST				
Abigail Mortensen	AG-L1087265IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Alex Maitland	AG-L1086710IST				
Ana Perez	AG-L1087321IST				
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Aspen Scott-Lewis	AG-L1087551IST				
Bethany Luth	AG-L1082379IST				
Bethany Morrow	AG-L1086748IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Camille Oster	AG-L1085533IST				
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Catherine Luecht	AG-L1086006IST				
Charly Yocius	AG-L1087065IST				
Coleman Krohn	AG-L1086040IST	AG-L1079092CPA	105150	Forest, Aquatic	
Corina Hajj	AG-L1087686IST				
David Chiang	AG-L1054240IST				
Dion Brannan	AG-L1087066IST				
Edward Benkhin	AG-L1086713IST				
Elise Snortum	AG-L1081833IST	AG-L1087294CPA		Forest	
Ellie Winter	AG-L1086747IST				
Emily Martin	AG-L1061041IST	AG-L1064107CPA		Forest	
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Emily Stewart	AG-L1086314IST				
Emma Ortiz	AG-L1087197IST				
Fiona O'Loughlin	AG-L1087196IST				
Greg Muller	AG-L1086712IST				
Gryston Fonseca	AG-L1087320IST				
Hanna Horton	AG-L1086715IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jack Delaney	AG-L1086968IST				
Jessica Riccardi	AG-L1086970IST				
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Kara Atiyeh	AG-L1087323IST				
Katelyn Kompara	AG-L1085915IST				
Kathryn Pierce	AG-L1087831IST				
Kenneth Jones	AG-L1087683IST				
Kita Hastings	AG-L1087318IST				
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA		Forest, Aquatic	
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA	106759	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mallory Mitsui	AG-L1086102IST				
Madison Smith	AG-L1086749IST				
Malia Moritz	AG-L1086969IST				
Mark Dickison	AG-L1079023IST				
Mathew Lipski	AG-L1087020IST				
Matthew DeCosta	AG-L1087195IST				

Max Osofsky	AG-L1080639IST	AG-L1082476CPA	106342	Forest, Aquatic	
Michael Briggs	AG-L1086597IST				
Michael Weatherford	AG-L1087687IST				
Mille Isbell	AG-L1087021IST				
MJ Mirho	AG-L1087319IST				
Morgan Seitzer	AG-L1087550IST				
Mychal Hellie	AG-L1087317IST				
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Ricardo Peralta	AG-L1084270IST				
Rick Pedersen	AG-L1087194IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ruby Gunter	AG-L1086709IST				
Samantha Marcotte	AG-L1083359IST	AG-L1087215CPA		Forest	
Scott Smethurst	AG-L1086440IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST	AG-L1084646CPA		Forest	
Tom Hauser	AG-L1086596IST				
Tomasz Cunha	AG-L1086595IST				
Tennyson Schill	AG-L1087682IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA		Forest, Aquatic	
Tyler Csolkovits	AG-L1084026IST				
Tyler Nagel	AG-L1087322IST				
Valentin Mitsui	AG-L1085741IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST	AG-L1087222CPA		Forest	
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson		CATEGORY		TREATMENT TYPE		
CLIENT: Columbia Restoration Group		Forestry	Aquatics	Site Prep	Establishment	Stewardship
ADDRESS: 45.380558, -122.615179						
DATE: 8/7/2023						
TIME IN: 7:00 AM						
TIME OUT: 10:30 AM						
Prescription (oz/ac or v/v%)		Targets		TOTAL ACRES:	6.51	
				Equipment & Method	Acres	
A.	2% Garlon, 2% Aquaneat, 1% Competitor, 0.5% Hi-Light	Himalayan Blackberry, Teasel, Tansy, Thistle, Reed Canary Grass, Pennyroyal, Purple Loosestrife		Backpack, Spot Spray	6.09	
B.	4% Aquaneat, 1% Competitor, 0.5% Hi-Light	Yellow Flag Iris		Backpack, Spot Spray	0.42	
C.						
D.						
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)	Water (gal or oz)		Purchased by:	
Rodeo · EPA Reg #62719-324						
AquaNeat · EPA Reg #228-365		54	17.25 gal		ACFM	
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		38			ACFM	
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24						
Milestone · EPA Reg #62719-519						
Poast · EPA Reg #7969-58						
Surfactants/ Adjuvants						
Competitor		19			ACFM	
Class Act						
Hasten						
Colorant						
Hi-Light Blue dye		11.5			ACFM	
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
7:00 AM	Cloudy	81%	65	2	0	NE
9:00 AM	Cloudy	73%	68	6	0	NNW
10:00 AM	Cloudy	67%	69	5	0	NNW
CERTIFIED LICENSED APPLICATOR:			CERTIFIED LICENSED APPLICATOR NO.:			
Vince Wagner			AG-L1087222CPA			

Rinearson		8/14/2023			
Applicators	Applicator IST #	CPA License #	Washington CPO	Categories	On Site ONLY?
Aaron Fry	AG-L1086316IST				
Abigail Mortensen	AG-L1087265IST				
Addison Dillon	AG-L1082187IST	AG-L1083125CPA	104418	Forest, Aquatic	
Aissa Bennett	AG-L1074697IST	AG-L1076653CPA	103167	Forest, Aquatic	
Alex Maitland	AG-L1086710IST				
Ana Perez	AG-L1087321IST				
Andrew Robinson	AG-L1080655IST	AG-L1082758CPA		Forest	
Aspen Scott-Lewis	AG-L1087551IST				
Bethany Luth	AG-L1082379IST				
Bethany Morrow	AG-L1086748IST				
Brad Burke	AG-L1052766IST	AG-L1071184CPA		Forest	
Bryant Young	AG-L1040738IST	AG-L1046535CPA		Forest	
Camille Oster	AG-L1085533IST				
Carlos Estrada	AG-L1080870IST	AG-L1084136CPA		Forest	
Catherine Luecht	AG-L1086006IST				
Charly Yocius	AG-L1087065IST				
Coleman Krohn	AG-L1086040IST	AG-L1079092CPA	105150	Forest, Aquatic	
Corina Hajj	AG-L1087686IST				
David Chiang	AG-L1054240IST				
Dion Brannan	AG-L1087066IST				
Edward Benkhin	AG-L1086713IST				
Elise Snortum	AG-L1081833IST	AG-L1087294CPA		Forest	
Ellie Winter	AG-L1086747IST				
Emily Martin	AG-L1061041IST	AG-L1064107CPA		Forest	
Erik Saastamo	AG-L1080198IST	AG-L1083719CPA		Forest	
Evan Stewart	AG-L1070504IST	AG-L1073266CPA		Forest	
Emily Stewart	AG-L1086314IST				
Emma Ortiz	AG-L1087197IST				
Fiona O'Loughlin	AG-L1087196IST				
Greg Muller	AG-L1086712IST				
Gryston Fonseca	AG-L1087320IST				
Hanna Horton	AG-L1086715IST				
Heather Cashmore	AG-L1063458IST	AG-L1064755CPA		Forest	
Ian Christie	AG-L1071763IST	AG-L1050813CPA	102752	Forest, Aquatic	
Isabella Lopez-Dion	AG-L1081480IST	AG-L1083844CPA		Forest	
Jack Delaney	AG-L1086968IST				
Jessica Riccardi	AG-L1086970IST				
Jill Tamborello	AG-L1074236IST	AG-L1084134CPA		Forest	
Kara Atiyeh	AG-L1087323IST				
Katelyn Kompara	AG-L1085915IST				
Kathryn Pierce	AG-L1087831IST				
Kenneth Jones	AG-L1087683IST				
Kita Hastings	AG-L1087318IST				
Kobe Rossi	AG-L1083168IST	AG-L1084397CPA		Forest, Aquatic	
Kyle Peterson	AG-L1074677IST	AG-L1077904CPA	104877	Forest, Aquatic	
Kyle Sorensen	AG-L1063597IST	AG-L1065011CPA	102274	Forest, Aquatic	
Lauren Smith	AG-L1079006IST	AG-L1081083CPA	106759	Forest, Aquatic	
Mackenzie Lovelace	AG-L1074676IST	AG-L1076427CPA	103061	Forest, Aquatic	
Mallory Mitsui	AG-L1086102IST				
Madison Smith	AG-L1086749IST				
Malia Moritz	AG-L1086969IST				
Mark Dickison	AG-L1079023IST				
Mathew Lipski	AG-L1087020IST				
Matthew DeCosta	AG-L1087195IST				

Max Osofsky	AG-L1080639IST	AG-L1082476CPA	106342	Forest, Aquatic	
Michael Briggs	AG-L1086597IST				
Michael Weatherford	AG-L1087687IST				
Mille Isbell	AG-L1087021IST				
MJ Mirho	AG-L1087319IST				
Morgan Seitzer	AG-L1087550IST				
Mychal Hellie	AG-L1087317IST				
Nick Crosby	AG-L1082952IST	AG-L1083823CPA		Forest	
Nick Lewis	AG-L1045857IST	AG-L1049790CPA		Forest	
Owen Phinney	AG-L1059333IST	AG-L1063122CPA	100928	Forest, Aquatic	
Ricardo Peralta	AG-L1084270IST	AG-L1087705CPA		Forest	
Rick Pedersen	AG-L1087194IST				
Rio Hybert-Zack	AG-L1055229IST	AG-L1069212CPA		Forest	
Ruby Gunter	AG-L1086709IST				
Samantha Marcotte	AG-L1083359IST	AG-L1087215CPA		Forest	
Scott Smethurst	AG-L1086440IST				
Spencer Hansen	AG-L1041281IST				
Spencer Page	AG-L1083169IST	AG-L1084646CPA		Forest	
Tennyson Schill	AG-L1087682IST				
Tom Hauser	AG-L1086596IST				
Tomasz Cunha	AG-L1086595IST				
Trevor Burrows	AG-L1082674IST	AG-L1084398CPA		Forest, Aquatic	
Tyler Csolkovits	AG-L1084026IST				
Tyler Fizek	AG-L1087685IST				
Tyler Nagel	AG-L1087322IST				
Valentin Mitsui	AG-L1085741IST				
Vaughn Monaghan	AG-L1070401IST	AG-L1071976CPA		Forest	
Vince Wagner	AG-L1083493IST	AG-L1087222CPA		Forest	
Will Dyer	AG-L1083592IST	AG-L1083801CPA		Forest	
Zach Vande Slunt	AG-L1055689IST	AG-L1061383CPA	100807	Forest, Aquatic	

PROJECT: Rinearson		CATEGORY		TREATMENT TYPE		
CLIENT: Columbia Restoration Group		Forestry	Aquatics	Site Prep	Establishment	Stewardship
ADDRESS: 45.380558, -122.615179						
DATE: 8/14/2023						
TIME IN: 5:30 AM						
TIME OUT: 11:00 AM						
				TOTAL ACRES:	3.02	
Prescription (oz/ac or v/v%)		Targets		Equipment & Method	Acres	
A.	1% Imazapyr, 1% Rodeo, 1% Hasten, 0.5% Hi-Light	Purple Loosestrife, Pennyroyal, Yellowflag Iris		Backpack, Spot Spray	3.02	
B.	2% Garlon, 2% Hasten, 0.5% Hi-Light	Pennyroyal		Backpack, Spot Spray	3.02	
C.						
D.						
HERBICIDE INVENTORY						
Glyphosate		Herbicide Amount (oz)	Water (gal or oz)		Purchased by:	
Rodeo · EPA Reg #62719-324		10	34.5 gal		ACFM	
AquaNeat · EPA Reg #228-365						
Triclopyr						
Vastlan · EPA Reg #62719-687						
Garlon 3A · EPA Reg #62719-37		72			ACFM	
Other Herbicides						
Transline · EPA Reg #62719-259						
Imazapyr 4 SL · Reg# 81927-24		10			ACFM	
Milestone · EPA Reg #62719-519						
Poast · EPA Reg #7969-58						
Surfactants/ Adjuvants						
Competitor						
Class Act						
Hasten		82			ACFM	
Colorant						
Hi-Light Blue dye		23			ACFM	
WEATHER CONDITIONS						
Time	Conditions	Relative Humidity (%)	Temperature (°F)	Wind Speed - High (mph)	Wind Speed - Low (mph)	Wind Direction
6:00 AM	Sunny	65%	69	2	0	N
8:00 AM	Sunny	61%	73	2	0	N
10:00 AM	Sunny	44%	80	8	0	NW
CERTIFIED LICENSED APPLICATOR:			CERTIFIED LICENSED APPLICATOR NO.:			
Max Osofsky			AG-L1082476CPA			