Alder Creek Restoration Project

2018 Monitoring Report Year 3

Wildlands PNW
Portland Harbor Holdings II, LLC
520 SW 6th Avenue, Suite 1210
Portland, OR 97204
503-241-4895
Contact: Julie Mentzer

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WILDLANDS

TABLE OF CONTENTS

I. OVERVIEW 1
A. Responsible Parties 1
B. Purpose 2
C. Location 2
D. Habitat Construction and Planting 2
E. Performance Standards 2
F. Corrective or Maintenance Activities 4
G. Recommendations for Corrective or Remedial Actions 4
II. HABITAT MONITORING REQUIREMENTS 5
A. MONITORING PERIOD AND SCHEDULE 6
B. HABITAT MONITORING METHODS 6
1. Aerial Photograph Interpretation 6
2. Photo Documentation 6
3. Hydrology and Geomorphology 6
4. Native Vegetation 7
5. Large Woody Debris 8
6. Invasive Non-native Plant Species 8
7. Fish Monitoring 8
8. Other Wildlife Monitoring 8
III. PERFORMANCE STANDARDS 10
A. Hydrology 10
B. Geomorphic/Structural/Habitat Complexity Elements 10
C. Vegetation 11
D. Permanent Protection 16
IV. HABITAT MONITORING DATA/RESULTS 17
A. MONITORING RESULTS 17
1. Aerial Photo Interpretation 17
2. Photo Documentation 17
3. Hydrology and Geomorphology 17
4. Native Vegetation 18
5. Large Woody Debris and Other Habitat Features 21
6. Invasive Species Monitoring 21
7. Fish Monitoring 22

8. Other Wildlife Monitoring 22
9. General Inspections 23
V. HABITAT MONITORING CONCLUSIONS 24
VI. FINANCIAL OPERATION 24
A. TRANSFER OF CREDITS AND ENDOWMENT FUND DEPOSITS 24

LIST OF TABLES

Table 1. Proposed Restoration Habitat Types 3
Table 2. Planting Schedule 3
Table 3. Establishment Period Monitoring Schedule 5
Table 4. Emergent Marsh Vegetation Summary 18
Table 5. Riparian Scrub-Shrub and Riparian Forest (ACM) 19
Table 6. Riparian Forest and Cottonwood-Dominated Upland 19
Table 7. Oak-Dominated Upland Forest 20
Table 8. Invasive Plant Species 21

LIST OF FIGURES

Figure 1 – Location
Figure 2 – USGS Quad
Figure 3 – Post-construction Monitoring
Figure 4 – Aerial Photo
Figure 5a-5b – Photo Point Maps and Photos
Figure 6a-6m – Water Level Data
Figure 7 – LWD Photos
Figure 8 – Invasive Species Map
Figure 9a-9b – Bald Eagle Monitoring

LIST OF APPENDICES

Appendix 1 – Performance Standards
Appendix 2 – Maintenance Log
Appendix 3 – Emergent Marsh Quadrat Data
Appendix 4 – Woody Species Plot Data
Appendix 5 – Herbaceous and Invasive Cover Plot Data
Appendix 6 – Fish Monitoring and Bird Assemblage Memo
Appendix 7 – Credit Ledger
Appendix 8 – Revised Monitoring Methods Memorandum

LIST OF DEFINITIONS

Reporting Period	November 1st of the preceding year (2017) through October 31st of the current year (2018).

LIST OF ABBREVIATIONS

ACM	Active Channel Margin
DSAYs	Discounted Service Acre Years
Project	Alder Creek Restoration Project
PRPs	Potentially Responsible Parties
Trustees	Portland Harbor Natural Resource Trustee Council
Report	Year 3 Habitat Monitoring Report/Annual Report for the Alder Creek Project

I. OVERVIEW

This report serves as the third (Year 3) Habitat Monitoring Report/Annual Report ("Report") for the Alder Creek Restoration Project ("Project"). The Alder Creek Restoration Plan was signed by all members of the Portland Harbor Trustee Council by July 2014 and the site was established (e.g., Deed Restriction recorded and financial securities posted) in February 2015. This report will include all the requirements of the Habitat Monitoring Report as detailed in Exhibit B-1, Section 6.4 and 6.4.1. of the Restoration Plan (Plan).

Report Time Period
Per the Plan, the "Reporting Period" is from November 1st of the preceding year (2017) through October 31st of the current year (2018). This report documents the third annual habitat monitoring effort for the Alder Creek Restoration Project.

A. RESPONSIBLE PARTIES

The Alder Creek Restoration Project ("Project") is a site that has been developed for use by potentially responsible parties ("PRPs") and/or the Portland Harbor Trustee Council ("Trustees") to satisfy restoration obligations resulting from the Natural Resource Damages Assessment in Portland Harbor. The Restoration Plan was signed in 2014 by:

- National Oceanic and Atmospheric Administration, acting on behalf of U.S. Department of Commerce
- U.S. Fish and Wildlife Service, acting on behalf of U.S. Department of the Interior
- Oregon Department of Fish and Wildlife, acting on behalf of State of Oregon
- Confederated Tribes of the Grand Ronde Community of Oregon
- Confederated Tribes of Siletz Indians
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Nez Perce Tribe

The eight signatories to the Restoration Plan are collectively referred to as the Trustees. The Project was established (Deed Restriction recorded and financial securities posted) in February 2015. Earthwork related to habitat construction was completed in October 2015. Monitoring years are listed in the methods section below.

People responsible for the monitoring, maintenance, management, and reporting for the Alder Creek Restoration Project include the following:

Restoration Implementer and Property Owner:	Portland Harbor Holdings II, LLC (Wildlands)
Project Biologists:	Greg Lohse, Wildlands Staff Biologists, Turnstone Environmental
Land Management:	Tyler McRae, Wildlands
Report Preparation:	Julie Mentzer, Project Manager, Wildlands Greg Lohse, Project Biologist, Wildlands

B. PURPOSE

The purpose of the Project is to restore, create, and enhance approximately 52.28 acres (Property) on the southern tip of Sauvie Island at the divergence of the Willamette River and Multnomah Channel located in Multnomah County just outside of the City of Portland, Oregon. The Project provides restoration credits in the form of discounted service acre years (DSAYs) that may be used to offset restoration obligations under NRDA.

C. LOCATION

The Restoration Project is located in the northernmost reach of the Portland Harbor Superfund Site on the southern tip of Sauvie Island (see **Figures 1 and 2**). The Sauvie Island Drainage Improvement Company's (SIDIC) levee bisects the Property and separates the Property into two distinct areas. The southeastern portion of the Project (waterward of the SIDIC levee and within the floodplain of the Willamette River) is approximately 32 acres and is bordered by the SIDIC Levee on the north, mostly undeveloped private property to the northeast, the Willamette River to the east, and the Multnomah Channel to the southwest. The northwestern portion of the Project (landward of the SIDIC levee and outside of the active floodplain) is approximately 20 acres and is bordered on the northeast by private rural-residential property, on the east by a utility easement, on the south by the SIDIC Levee, and by the ESCO Landfill to the northwest.

The Project is located within Township 2N, Range 1W, Sections 27, 28, and 34 of the Linnton and Sauvie Island, Oregon 7.5-minute U.S. Geological Survey quadrangle maps, Willamette Meridian, identified by tax lot numbers 700 and 800.

D. HABITAT CONSTRUCTION AND PLANTING

Habitat construction commenced in June 2014. After completing approximately 25% of the site, the remainder of the site was graded to prevent fish stranding in the event of a 100-year event, and the site was buttoned-up for winter. Grading resumed in June 2015 and the earthwork was completed in October 2015. Planting began in the summer of 2015; however, the majority of the plants were installed in spring and summer of 2016, with the final planting effort occurring in November and December of 2016. Table 1 provides a summary of habitat acreages from the 100% design drawings and the final as-built drawings. Table 2 provides the planting dates, planting densities, and any substitutions.

E. PERFORMANCE STANDARDS

The performance standards for Year 3 include habitat structure monitoring, installed vegetation monitoring, wildlife monitoring, invasive plant species including reed canarygrass, and photo documentation. The performance standards for Year 2 have been met. As a result of Year 3 monitoring, no fish barriers were observed, installed large woody debris retention and natural recruitment was met, invasive plant species cover is low with management ongoing, installed vegetation within each habitat continues to progress with good survivorship and recruitment, and the site habitats are continuing to develop. Additional monitoring, not tied to performance standards, was required for some elements. More information is included below in the Habitat Monitoring Requirements and Habitat Monitoring Data/Results sections. See **Appendix 1** for a list of performance standards and the results of monitoring.

Table 1. Proposed Restoration Habitat Types

Habitat Type	Active Channel Margin	Proposed (acres)	As-Built (acres)
Side Channel (off-channel habitat)	No	3.10	3.16
Mudflat or Beach	Yes	3.29	3.46
Vegetated Marsh	Yes	5.57	5.13
Scrub-shrub riparian below the OHWL	Yes	11.15	11.76
Riparian forest within the historic floodplain	No	8.79	8.39
Riparian forest outside the historic floodplain (upland cottonwood-dominant forest)	No	7.05	7.20
Upland Oak-dominant forest	No	13.33	13.18
Total ACM		**20.01**	**20.35**
Total Project Acreage (including ACM)		**52.28**	**52.28**

Table 2. Planting Schedule

Habitat	Date Planted	Density Proposed	Density Planted	Substitutions
Perennial Marsh (created in 2014)	July/August 2015	5,000 plants/acre	5,000 plants/acre	Carex densa substituted for Carex aperta
Scrub-shrub and Riparian; elevation 13 (water level) and above*	February 2016	2,000 plants/acre	2,000 plants/acre	None
Perennial marsh (created in 2015)	July/August 2016	5,000 plants/acre	5,000 plants/acre	Carex densa substituted for Carex aperta
Scrub-shrub (elevations 10 to 13)*	October 2016	2,000 plants/acre	2,000 plants/acre	None
Upland Forest: Cottonwood dominant	December 2016	2,000 plants/acre	2,000 plants/acre	Rubus ursinus substituted for Rubus idaeus
Upland Forest: Oak dominant	December 2016	860 plants/acre	860 plants/acre	Rubus ursinus substituted for Rubus idaeus

* During the February 2016 planting, the water level was at elevation 13 so the scrub-shrub areas between 10 and 13 were planted in October 2016 when the water level was below 10 feet.

F. CORRECTIVE OR MAINTENANCE ACTIVITIES

Activities to control and manage invasive species have been occurring on the site since 2013. Beginning in 2013, in the areas outside of the grading limits, reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*) were the focus of invasive species control/management activities because of their prevalence in these areas. A combination of mowing and supplemental hand removal was used to minimize the cover of these species. During management activities, a significant amount of native trailing blackberry (*Rubus ursinus*) was found in these areas so it was important to distinguish between the two blackberry species and selectively remove only the invasive one. Also, because these areas were outside of the limits of grading, invasive control/management activities were critical to creating a more hospitable environment for native species and to reduce the invasive seed bank immediately adjacent to the created habitats.

After the completion of grading activities in October 2015, ongoing invasive species management activities were conducted to minimize invasive species establishment. Invasive species management during the Reporting Period (November 1, 2017 to October 31, 2018) is discussed further in the "Habitat Data/ Results" section.

See Section G below for a description of soil amendments and the installation of an irrigation system in the oak-dominated upland forest habitat to support the planned replant in 2019.

Greg Lohse, Wildlands, visited the site a minimum of once per month to assess hydrology, topography, trespass, trash, invasive species, native species, erosion, and to conduct general inspections of the site. Tyler McRae of Wildlands was on the site weekly to perform land management and maintenance duties including checking and repairing signs and fencing, assessing and treating invasive species, looking for signs of trespass, collecting and disposing of trash, and checking for any other management or maintenance issues. See **Appendix 2** for the Maintenance Activity Log.

G. RECOMMENDATIONS FOR CORRECTIVE OR REMEDIAL ACTIONS

Invasive species management activities will be ongoing. While the oak-dominated upland forest is meeting Year 3 performance standards, monitoring results indicate that the future density and diversity performance standards may not be met within this habitat in 2019 and beyond without remedial action due to a significant loss of the planted trees and shrubs. Wildlands biologists noted that the die-off could be attributed to the hot, dry summer conditions of 2017; however, it was also suspected that the soil might benefit from amendments. Because of this, soil samples were taken in the habitat in March 2018 to determine what the soil conditions were and if soil amendments were warranted. The testing showed the following deficiencies in the soil: low pH to varying degrees, low calcium, and low sulfur. The agronomist Wildlands was working with suggested the soil would benefit from the addition of lime which would help raise the pH and calcium levels as well as improve the calcium and magnesium ratios. He also suggested a balanced fertilizer. On August 31, 2018 calcitic lime and fertilizer were applied to the oak-dominated upland forest habitat. Native grass seed was also broadcast across the habitat at this time in order to minimize the establishment of invasive species in the newly disturbed soil, retain moisture, and provide shade and cooling to the newly planted trees. Additionally, Wildlands began the installation of the irrigation system by installing the main lines and sublines underground as well as the above-ground distribution lines. The installation of the irrigation system was completed in September 2018. The above actions to address soil condition deficiencies and water availability in the oak-dominated upland forest were taken to support a planned replant of the habitat in November 2019. Wildlands plans to plant approximately 11,500 additional native plantings consisting of red alder (*Alnus rubra*), black hawthorn (*Crataegus douglasii*), Oregon ash (*Fraxinus latfolia*), Oregon grape (*Mahonia aquifolium*), Pacific ninebark (*Physocarpus capitatus*), Oregon white oak (*Quercus garryana*), flowering currant (*Ribes sanguineum*), swamp rose (*Rosa pisocarpa*), and snowberry *(Symphoricarpos albus*) to address future density and diversity requirements.

II. HABITAT MONITORING REQUIREMENTS

Monitoring requirements, including the current year and future years, are provided below. These requirements were taken from the "Habitat Development Plan" of the signed Alder Creek Restoration Plan and included in this report for reference (see Table 3). If monitoring methods differ in any year from those prescribed in the Habitat Development Plan, the change in method and the reason for the change will be detailed in the Habitat Monitoring Data/Results section.

Table 3. Establishment Period Monitoring Schedule

Biological Resource *Component*	**Monitoring Frequency**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
Hydrology & Geomorphology													
Visual Surveys (including LWD retention)	Years 2, 3, 5, 7, 10								**X**				
Topography	Years 1, 3, 5, 7, 10								**X**				
Invasive Plant Species													
Vegetation	Years 1, 2, 3, 4, 5, 7, 10				**X**				**X**				
Native Vegetation													
Riparian Scrub/Shrub, Riparian Forest, Upland Forest	Years 2-5, 7, 10								**X**				
Emergent Marsh	Years 2-5, 7, 10								**X**				
Wildlife													
Fish Surveys	Years 2*, 3, 5, 7, 10		**X**	**X**	**X**	**X**							
Bald Eagle Surveys	Years 3, 5, 7, 10	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**				*I*
Bird Surveys	Years 2*, 3, 5, 10				**X**	**X**	**X**						
Mink Surveys	Years 3, 5, 7, 10					**X**	**X**	**X**					
General Site Monitoring													
Aerial Photographs	Years 1, 3, 5, 7, 10								**X**				
Photo Documentation	Years 1-5, 7, 10								**X**				

* Fish surveys and bird assemblage surveys were scheduled to occur in Year 1 (2016); however, they were delayed until Year 2 (2017). All other scheduled monitoring events will occur as previously scheduled.

A. MONITORING PERIOD AND SCHEDULE

The Project includes numerous habitat monitoring requirements over the initial ten-year interim monitoring period (i.e., Establishment Period), which differ by year (Table 3). The ten-year monitoring period is as follows (listed by reporting year):

Year 1 - 2016
Year 2 – 2017
Year 3 – 2018
Year 4 – 2019
Year 5 – 2020
Year 6 – 2021
Year 7 – 2022
Year 8 – 2023
Year 9 – 2024
Year 10 – 2025

B. HABITAT MONITORING METHODS

1. AERIAL PHOTOGRAPH INTERPRETATION

Aerial photos will be taken during late summer each year that aerial photography is required. This will allow a year to year comparison of the development of planted vegetation, geomorphology, and will allow the tracking of general changes to the Restoration Site that may be difficult to detect during surveys constructed from the ground.

2. PHOTO DOCUMENTATION

Ten permanent photograph locations have been recorded with Global Positioning System (GPS) to illustrate year-to-year progress of the Project. Subsequent photos will be taken from the same location each year photo documentation is required. At these permanent photograph locations, the monitoring biologist will take four direction photos, one in each cardinal direction (N, E, S, W), unless the photo location borders the Project boundary, in which case photos will be taken from all directions that show the Project. These photos will be taken in August or September in each year that photo documentation is required.

3. HYDROLOGY AND GEOMORPHOLOGY

During years 1, 3, 5, 7, and 10, topographic surveys will be completed once a year after the wet season to document changes in site topography and structural habitat features. Topographic surveys will include collecting topographic readings along the 5 pre-selected, permanent monitoring transects. In addition, once a year during years 2, 3, 5, 7, and 10 after the wet season a visual inspection will be made to document any barriers that prevent fish from entering or exiting the site. If a fish barrier is identified, the Trustee Council will be notified within three (3) business days of discovery. Aerial photos of the site will be collected once during late summer during years 1, 3, 5, 7, and 10. Data from the Columbia Slough gauge was used to monitor water elevation levels on the site. The USGS station at Columbia Slough has been determined to accurately and reliably provide a published record of the condition and water levels at the Alder Creek Restoration Site. This station is located approximately 2 miles down-river of the Project site. To determine the accuracy of this published data, the river elevation at the Project site has been

surveyed on numerous occasions between 2010 and 2016 by both Wildlands' staff and by licensed surveyors from AKS Engineering and Forestry. The surveyed river elevation data has been compared to the closest published 15-minute interval "gage height" at the USGS Columbia Slough station. It has been found to accurately match with the survey data, with an average difference of less than 0.02 feet. Historic water data from this station can be downloaded and a clear picture of the hydrology of the Project site can be determined. Additionally, as described in the Revised Monitoring Methods Memorandum included as Appendix 8, a satellite aerial photo corresponding to the high water event for that monitoring year (or as close to the high water event as is available) will be obtained for Years 3, 4, and 5. The photos will be analyzed to determine the acres of inundation within the ACM at the time of the photo. For Years 7 and 10, two data loggers will be installed to collect water level data. While there is a high likelihood that onsite data loggers could be lost or damaged (e.g. being bent or damaged by floating debris during flood events) to the point of compromising accuracy, we will attempt to use this method in Years 7 and 10 rather than rely on satellite imagery availability which is limited by wind, rain, and cloud conditions.

In order to determine if changes of more than 10% in active channel margin (ACM) acreage from the as-built surveys have occurred, the following method will be followed: For Years 3 and 5, additional elevation points will be taken along elevation 20 to determine if the acreage of active channel margin (ACM) has changed by 10% or more. However, as tree and shrub cover increases, surveying along elevation 20 may be increasingly difficult. If dense tree and shrub cover prohibits surveying along elevation 20, visual surveys will be conducted in Years 7 and 10 to record any observed changes. In addition, elevations will be recorded along the original transects to determine if the width of the ACM has changed along the transects.

4. NATIVE VEGETATION

Riparian Scrub-Shrub, Riparian Forest, and Upland Forest

Monitoring will include:

- direct counts of a sub-sample of live installed woody plants,
- direct counts of volunteer plants by species within established sample plots at various locations.
- vegetation cover estimates (herbaceous species only during Years 2-5 and all species thereafter), and
- representative photographs taken from (a minimum of ten) permanent photographic documentation points.

Quantitative monitoring data will be primarily collected using 10x10 meter sample plots along five main baseline transects running more or less north/south across the site (**Figure 3**).

In each monitoring year, data will be tallied by species and each woody plant will be assessed for plant vigor (i.e., good, fair, poor). Density data will be extrapolated to a per an acre estimate by dividing the total number of trees observed by the amount of surveyed acreage per each habitat. Signs of beaver herbivory will also be noted. The sample plots will also be used to assess cover and diversity for the wooded habitats. Cover classes will be used to determine cover values for each species identified within the plot. The presence and extent of any invasive plant species will be documented throughout the riparian areas during this monitoring.

Emergent Marsh

Monitoring of emergent marsh vegetation will be conducted in Years 2, 3, 4, 5, 7, and 10. Monitoring shall include visual surveys of the emergent marsh vegetation. Cover and diversity will be quantified using a quadrat method. A sampling transect will be run perpendicular to the baseline transect and quadrat data will be collected along the sampling transect. The frequency of sampling quadrats and the size of

quadrats will be tailored to best assess this habitat type. The sampling interval and the size of the quadrat will be determined in the field based on pilot sampling data.

Cover classes will be used to determine cover values for each species identified within the quadrat. Bare soil, rock, wood, or other non-plant cover will also be quantified. The location of the sampling transect will need to be determined in the field because the extent of this habitat type occurs in a fairly narrow belt along the constructed channels. A sampling transect will be run perpendicular to the main baseline transects and quadrat data will be collected along the sampling transect. The frequency of sampling quadrats and the size of quadrats will be tailored to best assess this habitat type and based on pilot sampling data. The extent of existing habitat will then be compared to construction drawings and design goals in order to assess the relative success of management efforts.

5. LARGE WOODY DEBRIS

Large woody material monitoring will be performed in Years 2, 3, 5, 7, and 10 following winter-spring floods to assess overall quality and stability of placed large woody material as well as any natural recruited wood, and to assess their function. Monitoring will consist of visual inspections by foot or by boat.

6. INVASIVE NON-NATIVE PLANT SPECIES

In Years 1 through 5, 7, and 10 invasive vegetation field surveys will be conducted annually during the riparian, marsh, and forest habitat monitoring. During Years 6, 8, and 9, invasive species presence will be noted and mapped during general site assessments, and any necessary treatments will be undertaken depending on the species and its extent. Invasive species are as defined in Section 6.1.8 in the Habitat Development Plan.

7. FISH MONITORING

Fish will be monitored at standard locations to determine the presence of native fish. The monitoring will occur within the newly created channels in Years 2[1], 3, 5, 7, and 10, or until juvenile salmonids are documented on the site. Sampling will take place two times per month from February through May in each monitoring year until juvenile salmonids are documented within the created channels. The timing of fish monitoring is subject to weather and other ecological factors and may change based on field conditions. During fish monitoring, habitat conditions will be recorded, including shade, cover, depth, substrate, and water quality (including water temperature, dissolved oxygen, turbidity). Water quality measurements should be taken where fish monitoring occurs and at locations in the Willamette River and Multnomah Channel adjacent to the Project site. During fish surveys, occurrences of aquatic plants will be noted by species, location, and relative abundance. All potential permits necessary for the authorization of fish sampling will be acquired from the appropriate regulatory agencies. Sampling methods will adhere to all permit conditions.

Monitoring will be conducted using one or more of the following: snorkel surveys, visual shoreline surveys, or underwater surveys using a GoPro camera. Beach seining was used for the first monitoring event, but since a salmonid was captured, beach seining will no longer be conducted.

[1] The Year 1 fish surveys were delayed until Year 2 (2017).

8. OTHER WILDLIFE MONITORING

- Bald eagle and osprey monitoring
    - Monitoring will take place in Years 3, 5, 7, and 10, once per week from mid-December through August. Although these surveys are targeting bald eagle, other raptor sightings (including osprey) and behavior will also be recorded.
- Investigate potential bald eagle and osprey nests
    - During site visits, all potential bald eagle and osprey nests will be identified and the location recorded with a GPS. Using binoculars or spotting scopes, the nest will be observed until it can be determined if it is actively being used, and by what type of bird. This information will be recorded and the nest will be documented for future visits.
- Bird assemblages including diversity and abundance
    - Bird monitoring will be completed in Years 2[2], 3, 5, and 10. The point counts will be done on transects established during pre-construction monitoring. These transects will be monitored once a month in April, May, and June.
- Mink
    - Mink usage monitoring will take place along the waterways of the Restoration Project including a 50-foot buffer from each waterway in the spring and summer in Years 3, 5, 7, and 10. Survey methods include camera traps at three locations with scent stations to lure animals into camera view. Searches for tracks, scat, and den sites should also occur in designated areas with potential for mink use and shall be conducted during camera trap data collection and maintenance or at least twice a month. Monitoring should take place for at least 12 weeks of spring/summer.
- Pacific lamprey
    - Lamprey monitoring will be conducted as part of a Harbor-wide monitoring effort done by USFWS staff in accordance with the Lamprey Monitoring Plan developed by the Trustees.

During monitoring efforts for specific species, any observation or sign of other Target Species will be documented.

[2] Year 1 bird assemblage surveys were delayed until Year 2 (2017).

III. PERFORMANCE STANDARDS

Performance Standards for the Project are below. This information is from the Alder Creek Restoration Plan, Exhibit B-1 (Habitat Development Plan), Section 5.3.

Performance standards have been created for the following habitat parameters:

- Hydrology
- Geomorphic/structural features
- Vegetation
    - Emergent marsh
    - Shrub-scrub and riparian (ACM)
    - Riparian forest and cottonwood-dominated upland forest
    - Oak-dominated upland forest
    - Invasive plant species
- Permanent protection

A. HYDROLOGY

A visual survey will be conducted (on foot or by boat) of the created channels and the connections to the Multnomah Channel and the Willamette River in Years 2, 3, 5, 7, 10. The following performance standards will be used to demonstrate the success of newly created hydrologic connections:

- Constructed side channels and ACM (beach, mudflat, emergent marsh, and riparian scrub-shrub/forest) will flood (i.e., filling and partially or completely draining) in response to fluctuations in the daily tidal regime and seasonal river stages in the Willamette River and Multnomah Channel;
- Connections shall remain open (not blocked or clogged with debris or sediment to the extent that it prevents hydrologic connectivity to the Willamette River and Multnomah Channel; and
- Created and enhanced emergent marsh and riparian wetland areas will remain flooded, ponded, or saturated for a duration of time sufficient to maintain wetland hydrology (i.e. 14 or more consecutive days) or show reliable Group A or B primary wetland hydrology indicators as described in the Regional Supplement to the Corps of Engineers Wetland Delineation manual: Western Mountains, Valleys, and Coast Region (Version 2.0, May 2010).

B. GEOMORPHIC/STRUCTURAL/HABITAT COMPLEXITY ELEMENTS

This performance standard will use topographic surveys, aerial photography, hydrology, and visual site inspections to verify that the total quantity of ACM and side channel habitat is being maintained, that there are no barriers to fish entering or exiting the side channel, and that structural habitat features were installed as designed and are being retained.

A minimum of 24 pieces of large woody debris ("LWD") will be installed within the active channel margin (i.e., along the created channels and within the marsh, mudflat, and scrub-shrub habitats). LWD will be from onsite sources. Performance for LWD will be based on retention of pieces and/or natural recruitment, and the following standards will be used:

Years 2, 3, 5, 7, and 10: woody debris will have an 80 percent retention rate including naturally recruited material.

If the amount of large wood on-site fails to meet performance standards in Years 2, 3, 5, 7 or 10 and if existing conditions and hydraulics will allow the retention of replacement materials, LWD will be installed in the interior channels (and marsh/mudflat where appropriate) to achieve the targeted density.

In the forested areas above the OHWL (non-ACM habitats), habitat complexity elements in the form of debris piles, downed wood/logs, and rock piles will be installed at a minimum of one feature for every one acre (for a total of twenty-nine). Out of the 29 elements, at least one but no more than five will be rock piles. All habitat complexity elements will be created from onsite sources.

A minimum of four snags will be installed on the Project site with at least one installed within the upland habitat behind the levee. The snags will be created from onsite sources.

Additional performance standards include:

- During years 1, 3, 5, 7, 10, topographic surveys will be completed once a year after the wet season to document changes in site topography and structural habitat features.
- Annual inspection to document any fish barriers.
- Aerial photos of the site will be collected once during later summer during years 1, 3, 5, 7, 10.
- Water level data loggers will be placed at a minimum of two locations and continuous data will be collected, as feasible. If determined that continuous monitoring is not feasible, an alternative monitoring schedule will be determined in consultation with the Trustee Council representatives.

The following changes at the site would trigger a project review with Trustee Council representatives to determine what, if any, adaptive management actions are necessary:

- Identification of any fish passage barriers.
- Changes of more than 10% in ACM and side channel habitat acreages from the as-built surveys.
- Changes of more than 20% in side channel depths from the as-built surveys. Channel depths will be measured from the OHWM.

C. VEGETATION

Establishment of native vegetation at the Project is anticipated to result from both active planting and volunteer recruitment. Invasive plant species will be based on the current Oregon Department of Agriculture (ODA) Noxious Weed list and the Portland Plant List (September 2011). Invasive species for the purposes of performance evaluation include the following:

- Reed canarygrass
- Species on the ODA Noxious Weed list
- Species on the Portland Plant List, Rank A and Rank B
- Tree and shrub species on the Portland Plant List, Rank C
- Traveler's joy (*Clematis vitalba*) on the Portland Plant List, Rank C

The most recent versions of the ODA and City of Portland lists will be used. All lists described above will serve as a tool to identify and target species for treatment. Performance standards for native habitats and certain invasive species are described below.

Emergent Marsh

The following performance standards will be used to assess the successful establishment of emergent marsh vegetation:

Year 5:

Cover:

- ≥ 30% native herbaceous
- ≤ 10% invasive herbaceous (excluding reed canarygrass)

Years 7 and 10:

Cover:

- ≥ 40% native herbaceous
- ≤ 10% invasive herbaceous (excluding reed canarygrass)

Emergent marsh monitoring will occur in Years 2, 3, 4, 5, 7, and 10; however, the purpose of the monitoring conducted in Years 2, 3, and 4 is to identify the native and non-native herbaceous cover to gauge whether or not the site appears to be on a trajectory towards meeting the performance standards for Year 5. If the emergent marsh appears to be in jeopardy of not meeting the performance standard for Year 5, adaptive management including herbivory prevention and replanting may be conducted.

Riparian Scrub-shrub and Riparian Forest (ACM)

The following performance standards will be used to assess successful riparian scrub-shrub and riparian forest vegetation establishment.

Years 2-5:

- A minimum of 1,200 native woody stems per acre
- At least 5 native woody species (for Riparian Scrub-Shrub within the ACM)
- At least 3 native tree species and 5 native shrub species (for Riparian Forest within the ACM)
- Cover (during the first 5 years, woody species will be excluded from percent cover):
  - ≥ 10% native herbaceous
  - ≤ 10% invasive herbaceous (excluding reed canarygrass)
  - ≤ 10% invasive shrubs

Year 7:

Cover:

- ≥ 55% native woody species
- ≥ 10% native herbaceous
- ≤ 10% invasive herbaceous (excluding reed canarygrass)
- ≤ 5% invasive shrubs

Year 10:

Cover:

- ≥ 80% native woody species
- ≥ 10% native herbaceous
- ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)

Volunteer recruitment of native shrubs and trees in the riparian scrub-shrub and forest planting areas may be credited towards the density per acre performance standard. If the density rates fall below the required performance standards, the Restoration Implementer will consult with the Trustee Council or its designee(s) regarding the precise plan for replanting. Replanting will be conducted during the appropriate season following monitoring. Beyond Year 5, mortality rates are expected to be minimal given the ideal conditions present at the Project for riparian vegetation, and natural succession of the plant community is

anticipated to direct long-term habitat development. Mortality due to beaver herbivory is addressed below.

Riparian Forest and Cottonwood-dominated Upland Forest

While the riparian forest (which is within the 100-year historic floodplain, above the OHWL, and waterward of the SIDIC levee) and the cottonwood-dominated upland forest (which is outside the 100-year historic floodplain, above the OWHL, and landward of the SIDIC levee) represent two distinct areas on the site, they have been combined for the purposes of performance standards and monitoring. The following performance standards will be used to assess successful vegetation establishment within the riparian forest and cottonwood-dominated upland forest (above the OHWL).

Years 2-5:

- A minimum of 1,200 native woody stems per acre
- At least 3 native tree species and 5 native shrub species
- Cover (during the first 5 years, trees/shrubs will be excluded from percent cover):
  - ≥ 10% native herbaceous
  - ≤ 10% invasive herbaceous (excluding reed canarygrass)

Year 7:

Cover:

- ≥ 50% native woody species
- ≥ 10% native herbaceous
- ≤ 10% invasive herbaceous (excluding reed canarygrass)
- ≤ 5% invasive shrubs

Year 10:

Cover:

- ≥ 80% native woody species
- ≥ 5% native herbaceous
- ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)

Volunteer recruitment of native trees and shrubs in the riparian forest and cottonwood-dominated upland forest planting areas may be credited towards the density per acre performance standard. If the density rates fall below the required performance standards, the Restoration Implementer will consult with the Trustees regarding the precise plan for replanting. Replanting will be conducted during the appropriate season following monitoring. Beyond Year 5, mortality rates are expected to be minimal given the ideal conditions present at the Project for riparian vegetation, and natural succession of the plant community is anticipated to direct long-term habitat development.

Oak-Dominated Upland Forest

The following performance standards will be used to assess successful oak-dominated upland forest vegetation establishment.

Years 2-5:

- A minimum of 500 trees/shrubs per acre
- At least 1 native tree species and 4 native shrub species
- Cover (during the first 5 years, trees/shrubs will be excluded from percent cover):
  - ≥ 25% native herbaceous
  - ≤ 15% invasive herbaceous (excluding reed canarygrass)
  - ≤ 15% invasive shrubs

Year 7:

Cover:

- ≥ 25% native woody species
- ≥ 25% native herbaceous
- ≤ 10% invasive herbaceous (excluding reed canarygrass)
- ≤ 5% invasive shrubs

Year 10:

Cover:

- ≥ 40% native woody species (at least 10% of woody species cover will be provided by oaks)
- ≥ 25% native herbaceous
- ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)

Volunteer recruitment of native trees and shrubs in the oak-dominated upland forest planting areas may be credited towards the density per acre performance standard; however, very little natural recruitment is expected to occur. If the density rates fall below the required performance standards, the Restoration Implementer will consult with the Trustee Council or its designee(s) regarding the precise plan for replanting. Replanting will be conducted during the appropriate season following monitoring. Beyond Year 5, mortality rates are expected to be minimal given the ideal conditions which will be present at the Project for oak-dominated upland forest vegetation, and natural succession of the plant community is anticipated to direct long-term habitat development.

Beaver Herbivory

A total of 10% of the woody plantings are expected to be lost to beaver herbivory (which equals 200 per acre since we are planting 2,000). During woody species density monitoring events, all live stems will be counted. In addition, all beaver-chewed stems resulting in mortality will be counted and documented as such.

If beaver herbivory is causing more than 10% mortality, the Restoration Implementer will notify the Trustee Council or its designee(s). Any beaver-chewed stems (resulting in mortality) beyond the 10% expected to be lost to beaver herbivory will be counted and added to the surviving tree/shrub number. If the resulting density is above 1,200 stems per acre, the performance standard will be considered met for that particular year. However, in order to continue on a trajectory towards meeting cover standards in Year 7, replanting efforts will be conducted in the year following monitoring if less than 1,200 live native woody species per acre were documented. No more than two replanting efforts, specifically in response to beaver herbivory, will be conducted in five years. (Additional replanting efforts may be appropriate if plant mortality from other factors are at fault and those efforts will not be counted toward beaver herbivory replanting efforts.) Generally, these replanting efforts will consist of 25 percent of the original planting density and will be concentrated in the areas of lowest survival, however actual replanting percentages and strategies (e.g., plant species selections, planting configurations, etc.) will depend on the extent of beaver damage and other sources of mortality, and what the Restoration Implementer calculates is necessary to be able to meet future performance standards.

To the extent practicable, species least desirable to beaver will be used in the replanting effort to discourage beaver herbivory. If, after 2 replanting efforts within 5 years, beaver herbivory continues to be a significant problem to the point that the site may not meet the cover standards in Years 7 and 10, the Trustee Council or its designee(s) will be consulted and either beaver trapping (with approval from the Trustee Council or its designee(s)) will be implemented or cover performance standards for Years 7 and 10 will be adapted to accommodate the rate of beaver herbivory occurring on the site.

Invasive Plant Species Management

It is anticipated that invasive species in the marsh habitats will be managed by the establishment and proliferation of native plants following restoration activities. As previously mentioned, invasive species in this Plan are defined as the following: reed canarygrass; species on the ODA Noxious Weed list; species on the Portland Plant List, Rank A and Rank B; tree and shrub species on the Portland Plant List, Rank C; and traveler's joy (*Clematis vitalba*) on the Portland Plant List, Rank C. In the riparian areas and the upland forest, invasive species will be controlled during the Establishment Period. Primary methods of removing or controlling invasive plant species include: hand or mechanical removal and chemical treatment. These management techniques are discussed in detail below.

- **Hand/Mechanical Removal for Invasive Pest Plant Management:** Hand removal, use of small hand powered or handheld equipment (such as a Weed Wrench or a chainsaw), and mechanical methods (use of larger equipment with motors such as a small tractor with a mower or harrow) will be the preferred methods for the removal of invasive pest plant species from the Project. The Trustee Council or its designee(s) does not to be notified if removal will be done by hand, hand-held equipment, mower, or tractor.

- **Herbicides:** In some instances (i.e., extensive, severe, or persistent infestations), it may be necessary to use herbicides to control invasive plant species. All herbicides will be applied according to label instructions and will typically be applied using a low pressure spray. All herbicide applications will be conducted by a licensed pesticide applicator following all label instructions, in compliance with Oregon State laws, and in compliance with the permits and authorizations obtained for the Project. For areas where invasive plants are growing within desirable vegetation, herbicide will be applied using a backpack sprayer with a hood to minimize drift. No applications will be done within fifteen feet of any surface water.

The goal of reed canarygrass control is to keep it from out-competing the woody plantings in order to give the native plantings the competitive advantage. Specific performance standards developed for reed canarygrass and zero-untreated species are detailed below. General invasive species standards are detailed above under each vegetation type.

Reed Canarygrass

Because this species is known to be very difficult to control in wetland habitats and it is uncertain how each habitat type will be affected by colonization of reed canarygrass, performance standards specific to reed canarygrass cover have been developed and pulled out separately, and cover values will be averaged across the Project site.

Cover:

- Years 1-5: ≤ 30% reed canarygrass
- Year 7: ≤ 25% reed canarygrass
- Year 10: ≤ 20% reed canarygrass

Zero-Untreated Species

All individual plants of the following species will be treated within the year in which they are found, during the season that is most effective for control with reasonably aggressive, legal treatment with the goal of complete eradication:

- Japanese knotweed
- Giant knotweed
- Himalayan knotweed
- Yellow flag iris
- Butterfly bush
- Purple loosestrife

D. PERMANENT PROTECTION

Prior to the end of the 10-year Performance Period, the Project will be permanently protected with a conservation easement. In addition, a long-term management and maintenance endowment fund account will be established and funded up to a previously determined target amount. Long-term activities covered by this fund include, but are not limited to, the following: maintenance, monitoring, remediation, management, debris removal if hydrologic function is impaired, and removal of invasive vegetation impairing habitat function.

IV. HABITAT MONITORING DATA/RESULTS

The Alder Creek Project has completed Year 3 monitoring. See below for details on the monitoring completed in Year 3. A table listing all Year 3 performance standards and monitoring results is included as Appendix 1.

A. MONITORING RESULTS

1. AERIAL PHOTO INTERPRETATION

Aerial photography on the Project was conducted on September 21, 2018 (**Figure 4**). Aerial photography will continue in Year 5 (2020).

2. PHOTO DOCUMENTATION

A total of 10 permanent photo points was established for the Project to document overall site conditions and provide a basis for year-to-year comparisons. Multiple photos in different directions were taken on September 17, 2018 from each photo point. A map of the photo points and corresponding photos can be found in **Figures 5a-5b**. Photo-documentation will continue during Year 4 (2019).

3. HYDROLOGY AND GEOMORPHOLOGY

On-site visual surveys throughout 2018 indicated that there has not been erosion, washouts, or sedimentation that would significantly change elevations on site. Visual inspections also confirmed that there were no fish passage barriers that could prevent fish from entering or exiting the site.

Wildlands commonly utilizes NOAA and USGS water data stations to reference river elevations and hydrologic conditions on project sites. The USGS station at Columbia Slough (USGS 14211820 COLUMBIA SLOUGH AT PORTLAND, OR) has been determined to accurately and reliably provide a published record of the conditions and water levels at the Alder Creek Restoration Project. This station is located approximately 2 miles down-river of the Project site (see **Figure 6a**).

To determine the accuracy of this published data, the river elevation at the Project site has been surveyed on numerous occasions between 2010 and 2016 by both Wildlands' staff and by licensed surveyors from AKS Engineering and Forestry. The surveyed river elevation data has been compared to the closest published 15-minute interval "gage height" at the USGS Columbia Slough station. It has been found to accurately match with the survey data, with an average difference of less than 0.02 feet. Historic water data from this station can be downloaded and a clear picture of the hydrology of the Project site can be determined. The Columbia Slough gauge provides an excellent representation of water elevations at Alder Creek.

In order to use data loggers on the Project site, the data loggers would be deployed during low water (e.g., September or October) and not retrieved until the following year. Retrieving the data logger during high water conditions (late-fall through early summer) would be too dangerous. While the data logger battery could be expected to last throughout the high water season, there is a high likelihood that an onsite data logger would be damaged during high water (e.g. being bent or damaged) to the point of compromising accuracy. The use of water level data loggers on the Project site would not provide any additional data, would likely provide less accurate data, would be underwater for a significant portion of the year making data collection infeasible during that time period, and have a high likelihood of being damaged. For these

reasons, water level data loggers were not installed on the Project site. However, continuous water level data from the USGS water data station at Columbia Slough was used to document the water levels on the Project site during the Reporting Period (See **Figure 6b**). The water level data for the Reporting Period shows that river elevations in April and May were higher than average, while the rest of the year fell generally within the range of average. Because this data is available at any time throughout the year regardless of river level or weather, Wildlands' staff are able to use it to reference the water level and compare it to onsite conditions during field visits.

Frequent site visits have confirmed that constructed side channels and emergent marsh are flooding (i.e., filling and partially draining) in response to fluctuations in the daily tidal regime and seasonal river stages in the Willamette River and Multnomah Channel, as expected (**Figures 6c-6f**). Channel connections have remained open through 2018 and are not blocked or clogged from sediments or debris.

AKS collected a total of 117 elevation points along elevation 20 in order to measure the active channel margin onsite in Year 3 (2018). The ACM acreage from the as-built drawings was 20.351 acres. The 2018 ACM acreage is 20.233 acres. The difference between the two acreages is 0.118 which represents a 0.58% reduction in ACM area. This is well below the 10% threshold.

In order to determine whether side channel depths have changed more than 20% from the as-built surveys, eight transects crossing the side channels were surveyed. The locations and results of those surveys are shown on **Figures 6d-6l**. The channel depths were measured from the OHWM. Using the average change across the eight transects, the change in side channel depth was 3.6%. This is well below the 20% threshold. Transect L showed the most change at 9%; however, it appears that the side channel in this area has shifted slightly since there are points that are deeper as well as points that are shallower.

Wildlands' staff attempted to use a drone to take aerial photos of high water events during the 2018 monitoring period; however, the drone is unable to be used in windy or rainy conditions. Additionally, if there is significant cloud cover, aerial photos cannot be taken. As a result, Wildlands was unable to capture an aerial photo of the site during a high water event; however, a satellite photo was available for 5/22/2018 which was within a few days of the highest water event of 2018 (**Figure 6m**). The water level captured by the satellite photo was translated to GIS to calculate the acres of inundation when the photo was taken. The photo shows approximately 20 acres of ACM inundated on 5/22/2018. The information obtained from the satellite photos was compared to the Columbia Slough gauge data for accuracy. The Columbia Slough gauge data (converted to NAVD 88) shows an approximate water level of 20 feet on 5/22/2018 (the day the aerial was taken), and the high water level of 20.7 on 5/17/18.

4. NATIVE VEGETATION

Emergent Marsh

Vegetation monitoring of the emergent marsh was conducted on September 21, 2018. Native herbaceous cover was observed at 12.51% and no invasive herbaceous species were observed within the monitoring quadrats (**Appendix 3**). While there are no performance standards associated with Year 3, monitoring identified a decline in native vegetation in the marsh from Year 2 to Year 3. While fluctuations in native cover within the emergent marsh are expected to occur as this habitat is highly dependent on water levels and amount of inundation during the growing season, there were some extreme conditions in 2017 and 2018 that likely adversely affected the marsh plants including the following:

- There were more days between March and June 2017 when the river was above elevation 17 NAVD than in any other year on record at the Columbia Slough gauge (installed in October 1995)

- August 2017 was the hottest August on record
- Summer 2018 was the hottest summer on record

Vegetation monitoring of the emergent marsh will continue in Year 4 (2019).

Table 4.

Emergent Marsh				
	Yr. 5 Performance Standard	Measured Yr. 3	Meeting Yr. 3 Standards?	Measured Yr. 2
Native Vegetation	≥30%	12.51%	N/A	32.61%
Non-Native Vegetation		8.57%		2.39%
Invasive Vegetation	≤ 10%	0.00%	Yes	0.11%
Phalaris arundinacea		0.00%		0.00%
Woody Vegetation		0.11%		0.14%
Unknown Dead / Plant Debris		0.00%		3.95%

Riparian Scrub-Shrub and Riparian Forest (ACM)

Vegetation monitoring within the riparian scrub-shrub and riparian forest with the ACM on the Project was conducted on July 22-23, 2018. The ACM is currently meeting all associated performance standards for Year 3. During surveys 1,212 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 16 woody species were observed with 7 tree species and 9 shrub species being observed (**Appendix 4**. This meets the minimum requirements of at least 5 woody species being observed and at least 3 native tree species and 5 native shrub species being observed (**Table 5**). Native herbaceous cover (excluding woody species) was observed at 20.44% cover, invasive herbaceous cover (excluding reed canarygrass) was 4.62% cover, and invasive woody vegetation cover was <1% cover (**Appendix 5**). The observed cover meets the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standards. Vegetation monitoring of the ACM will continue during Year 4 (2019).

Table 5

Riparian Scrub Shrub and Riparian Forest (ACM)				
	Performance Standards Years 2-5	Measured Yr. 3	Meeting Standards?	Measured Yr. 2
Native Vegetation	≥ 10%	20.44%	Yes	13.91%
Non-Native Vegetation		20.70%		6.31%
Invasive Vegetation	≤ 10%	4.62%	Yes	0.78%
Invasive Woody Vegetation	≤ 10%	0.00%	Yes	0.00%
Phalaris arundinacea		1.35%		0.16%
Woody Debris		0.00%		3.13%
Woody stems / acre	≥ 1200	1212	Yes	1465.00
Native Woody Species (Scrub-Shrub)	≥ 5	16	Yes[1]	16.00
Native Trees (Riparian Forest)	≥ 3	7	Yes[1]	8*
Native Shrubs (Riparian Forest)	≥ 5	9	Yes[1]	8*

1The riparian scrub shrub and riparian forest habitats within the ACM are monitored and reported on as one habitat.

Riparian Forest and Cottonwood-Dominated Upland Forest

Vegetation monitoring within the riparian forest and cottonwood-dominated upland forest was conducted on July 22-23, 2018. The riparian forest and cottonwood-dominated upland forest is currently meeting all associated performance standards for Year 3. During surveys 1,250 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 7 tree species and 9 shrub species were observed (Appendix 4). This meets the minimum requirement of at least 3 native tree species and 5 native shrub species being observed (**Table 6)**. Native herbaceous cover (excluding woody species) was observed at 34.69% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover, and invasive woody vegetation cover was < 1% cover (Appendix 5). The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard. Vegetation monitoring of the riparian scrub-shrub and cottonwood-dominated upland forest will continue in Year 4 (2019).

Table 6.

Riparian Forest and Cottonwood-dominated Upland forest				
	Performance Standards Years 2-5	Measured Yr. 3	Meets Standards?	Measured Yr. 2
Native Vegetation	≥ 10%	34.69%	Yes	33.77%
Non-Native Vegetation	≥ 10%	22.71%	Yes	16.60%
Invasive Herbaceous Vegetation	≤ 10%	0.67%	Yes	0.77%
Invasive Woody Vegetation	≤ 10%	0.11%	Yes	0.60%
Phalaris arundinacea		0.49%		1.40%
Woody Debris		0.00%		0.00%
Woody stems / acre	≥ 1200	1250	Yes	1633
Native Trees Species	≥ 3	7	Yes	9
Native Shrubs Species	≥ 5	9	Yes	12

Oak-Dominated Upland Forest

Vegetation monitoring within the oak-dominated upland forest was conducted on July 22-23, 2018. The oak-dominated upland forest is currently meeting all but one associated performance standards for Year 2. During surveys 503 trees per an acre were observed, meeting the minimum of 500 trees per an acre. A total of 4 tree species and 3 shrub species were observed (Appendix 4). This does not meet the minimum requirement of at least 1 native tree species and 4 native shrub species being observed (**Table 7)**; however, because a total of 7 native tree/shrub species were documented within this habitat, we ask that the diversity standard be considered met. Native herbaceous cover (excluding woody species) was observed at 44.75% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover, and invasive woody vegetation were <1% cover (Appendix 5). The observed cover meets the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard. Vegetation monitoring of the oak-dominated upland forest will continue in Year 4 (2019).

While the oak-dominated upland forest is currently meeting most of the performance standards, the

monitoring results indicate that the future density and diversity performance standards may not be met within the oak-dominated forest in 2019 and beyond without remedial action. During the summer of 2018, an irrigation system was installed in the oak-dominated upland forest in preparation of a remedial planting event planned for November 2019. Wildlands will plant approximately 11,500 additional native plantings consisting of red alder (*Alnus rubra*), black hawthorn (*Crataegus douglasii*), Oregon ash (*Fraxinus latfolia*), Oregon grape (*Mahonia aquifolium*), Oregon white oak (*Quercus garryana*), flowering currant (*Ribes sanguineum*), swamp rose (*Rosa pisocarpa*), and snowberry *(Symphoricarpos albus*) to address future density and diversity requirements.

Table 7

Oak-Dominated Upland Forest				
	Performance Standards Years 2-5	Measured Yr. 3	Meets Standards?	Measured Yr. 2
Native Herbaceous Vegetation	≥ 25%	44.75%	Yes	40.50%
Non-Native Vegetation		27.25%		11.29%
Invasive Vegetation	≤15%	0.00%	Yes	0.21%
Invasive Woody Vegetation	≤15%	0.00%	Yes	0.00%
Phalaris arundinacea		0.15%		0.50%
Woody Debris		0.00%		0.00%
Trees / Shrubs per acre	≥ 500	503	Yes	775
Native Tree Species Richness	≥1	4	Yes	6
Native Shrub species Richness	≥4	3	No	6

5. LARGE WOODY DEBRIS AND OTHER HABITAT FEATURES

Large woody debris monitoring took place on September 21, 2018. A total of 68 pieces of large woody debris were observed on the project in 2018. Of those, 43 were identified as being originally installed LWD and the remaining 25 as being naturally recruited. Currently the Project is exceeding the 80% required LWD retention performance standard for Year 3. Photos of the LWD observed during surveys can be found in **Figure 7**. The remaining habitat complexity features of downed wood, debris piles, and rock piles all remain in good condition. Monitoring of the large woody debris and other habitat complexity features will continue in Year 5 (2020).

6. INVASIVE SPECIES MONITORING

Invasive species monitoring occurred in the spring on April 23, 2018 and in the summer/fall concurrent with vegetation surveys on July 22-23 and September 21, 2018. The results of the fall survey can be found in Appendix 5. During the invasive species assessment in the spring, many of the ACM plots were inundated and growth across the rest of the habitats was minimal.

Wildlands' Land Management staff maintained a constant presence on the Project during 2018 visiting the site weekly to assess the site for invasive plant species and treat them (either by hand pulling, digging, mowing, or weed whacking) as necessary. In Years 2, 3, 4, 5, 7, and 10, the invasive plant surveys will be done during the riparian, marsh, and forest habitat monitoring using the 38 permanent plots.

The main method of treatment for invasive plant species on the Project site was hand/mechanical removal which is defined as hand pulling, use of small hand powered or handheld equipment (such as a Weed Wrench or a chainsaw), and mechanical methods (use of larger equipment with motors such as a small tractor with a mower or harrow). Herbicide applications took place on June 22, 2018. Herbicide applications along with hand/mechanical removal will continue to be used in future years as necessary to control invasive plant species.

During 2018, Wildlands' biologists visited the Project weekly to look for presence of "zero-untreated species". No giant knotweed, Himalayan knotweed, or butterfly bush was observed on the Project site. A small amount of purple loosestrife, yellow flag iris, and 3 individuals of Japanese knotweed were identified (See **Figure 8**). All instances of these species were removed (**Table 8**).

Table 8

Invasive Plant Species				
	Performance Standards Years 1-5	Measured Yr. 3	Meets Standards?	Measured Yr. 2
Reed Canarygrass (*Phalaris arundinacea*)	≤ 30%	<1%	Yes	<1%
All individual target species (Japanese knotweed, giant hogweed, Himalayan knotweed, yellow flag iris, butterfly bush, purple loosestrife)		Purple loosestrife, yellow flag iris, Japanese knotweed observed on site. All treated.	Yes	Purple loosestrife, yellow flag iris, Japanese knotweed observed on site. All treated.

Reed Canarygrass

Reed canarygrass was treated aggressively in the years prior to construction. In 2018, thirty-eight permanent plots along predetermined sub-transects were assessed for invasive species cover including reed canarygrass. The reed canarygrass absolute cover values at each plot were added together and averaged over the site for a total reed canarygrass cover of less than 1.0% (see Appendix 5). Over the next few years, the reed canarygrass cover may increase in certain areas; however, chemical and mechanical treatment of reed canarygrass will continue in order to keep it from out-competing the woody plantings until they can become established.

7. FISH MONITORING

Fish monitoring was conducted by Staff Biologists from Turnstone Environmental from February 23 through May 31, 2018. Surveys were conducted by walking the shoreline with a GoPro and/or utilizing a GoPro from a stationary location. No salmonids were observed during surveys (**Appendix 6**). Fish monitoring will continue in Year 5 (2018).

8. OTHER WILDLIFE MONITORING

Bald Eagle

Bald Eagle monitoring was conducted from December 15, 2017 through August 31, 2018. Surveys were conducted weekly for a total of 2 hours between dawn and dusk. All surveys were conducted on foot combing both fixed-point and continuous walking methods.

During 2018, 66 total bald eagle sightings and 190 total other raptor species sightings were recorded.

Observations for bald eagles was generally higher in the earlier part of the survey season while other raptor species sightings were higher in the later part of the season (**Figure 9a**). Bald eagle observations were more likely to occur in the late morning, while other raptor species sightings were higher in the late morning/early afternoon. (**Figure 9b**). Bald eagle monitoring will continue in Year 5 (2020).

Bird Assemblage Surveys

Bird assemblage monitoring was conducted by Staff Biologists from Turnstone Environmental once a month from April 2018 to June 2018 (**Appendix 6**). Bird assemblage monitoring will continue in Year 5 (2020).

Mink Surveys

Mink surveys through camera trapping were conducted from May 1 through July 31, 2018 at 3 camera trapping locations. No mink were observed on at camera trapping locations during the survey period. Other wildlife species observed included black-tailed deer (*Odocoileus hemionus*), possum (*Didelphis virginiana*), Western Canada goose (*Branta* canadensis) and coyote (*Canis latrans*). Mink surveys will continue in Year 5 (2020).

Lamprey Surveys

Lamprey surveys were conducted by U.S. Fish and Wildlife in 2018.

9. GENERAL INSPECTIONS

Regular site visits were conducted at least once per month in 2018 by Wildlands' biologists and land management specialists. These site visits were for a variety of purposes including monitoring, invasive species management, trash removal, sign installation and maintenance, and other maintenance and management tasks. Please see the Maintenance Activity Log in **Appendix 2** for further information. While there have been a few cases of trespass from both the river and the access road, no trespass damage was observed. On several occasions, small boat craft including kayaks and canoes have been observed in the created channels. Trash and other non-natural debris that floats in when water levels are high are periodically collected and disposed of by Wildlands' staff during site visits.

V. HABITAT MONITORING CONCLUSIONS

Habitat establishment at the Project site is proceeding well and the site is on-target to achieve ecological restoration objectives. While the oak-dominated upland forest monitoring indicates that future performance standards may not be met, planned remedial actions described in Section G of this report will likely ensure the performance standards continue to be met in this habitat. Future monitoring is expected to demonstrate the diversity and vigor of restored habitats onsite, and to show that the Project is meeting performance standards (See Appendix 1). Installed woody vegetation and native herbaceous cover is continuing to develop. Early invasive species control has reduced infestations in enhanced areas and ongoing invasive species control will continue over the site.

VI. FINANCIAL OPERATION

- Construction Security – The Performance Bond #22BSBCN8032 in the amount of $2,757,472.00 was posted on January 28, 2015 and provided to the National Oceanic and Atmospheric Administration. Following approval of the as-built drawings, NOAA prepared a letter on January 31, 2017 asking the bonding company to release the bond. The bond was released in February of 2017.

- Interim Management and Contingency Security – An irrevocable Letter of Credit in the amount of $457,288 was issued on January 26, 2015 and is still in place.

- Trustee Council Oversight Funding –Year 3 funding in the amount of $27,866.83 was provided on February 25, 2018.

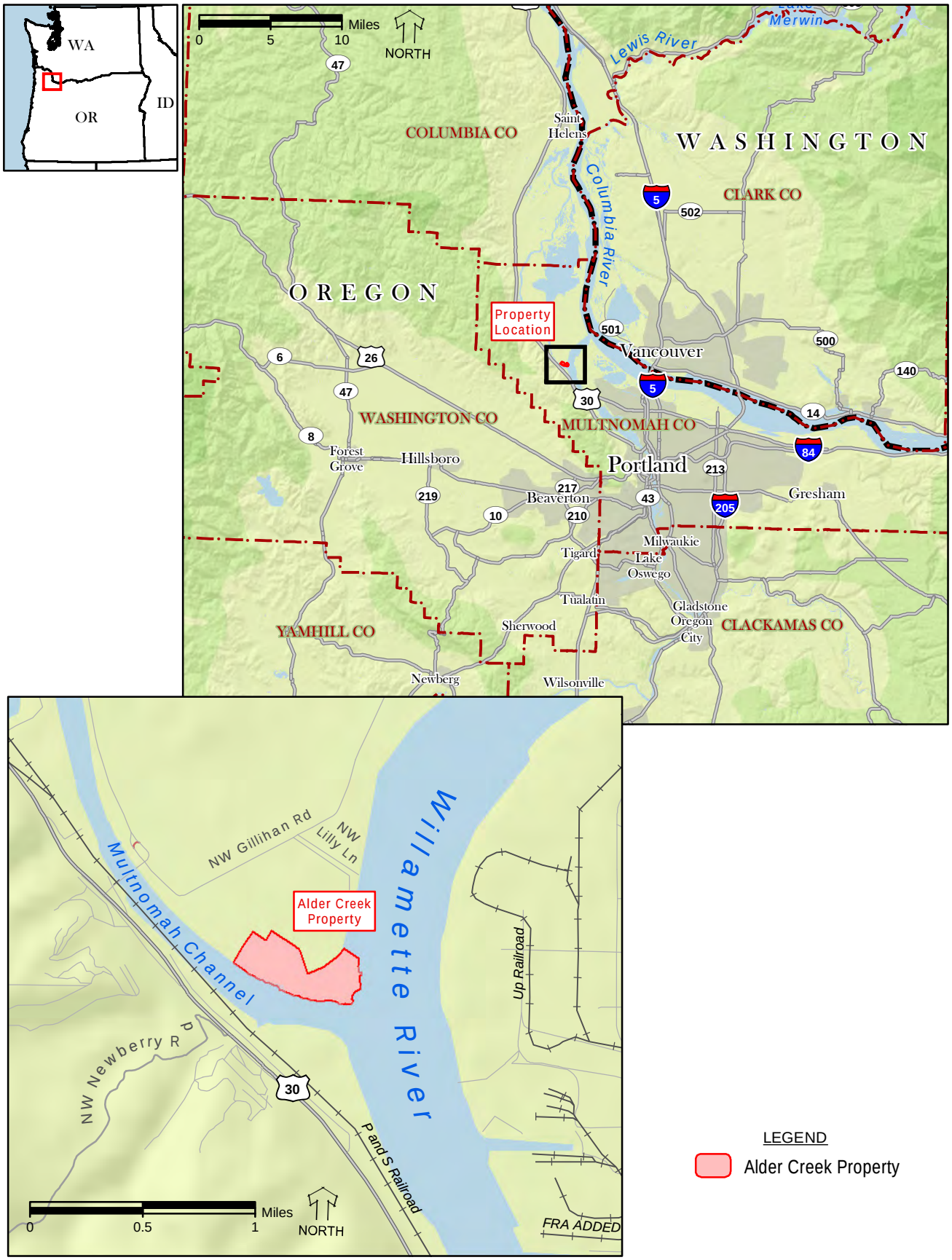
- Lamprey Monitoring Funding – A total of $32,487.80 for lamprey monitoring funding for Year 3 was provided in two separate payments: $13,164.80 to The Confederated Tribes of Grand Ronde and $19,323 to US Fish and Wildlife Service in November 2018.

A. TRANSFER OF CREDITS AND ENDOWMENT FUND DEPOSITS

A copy of the Credit Ledger documenting Credit sales through December 2016 is included in **Appendix 7**. Following the first release of credits on February 25, 2015, there was one credit sale of 35 credits to the City of Portland on March 23, 2015; however, these credits have not yet been used in a settlement or consent decree. No credits were sold in Year 1 (2016), Year 2 (2017), or Year 3 (2018).

The endowment amount corresponding to the sale in 2015, $30,170, has been set aside for the endowment fund for the Project. The required endowment principal in the Alder Creek Restoration Plan is $323,250 and is funded by credits sales with $862 of each credit sold going towards the endowment until it is fully funded. A total of $293,080 of the endowment principal remains to be funded.

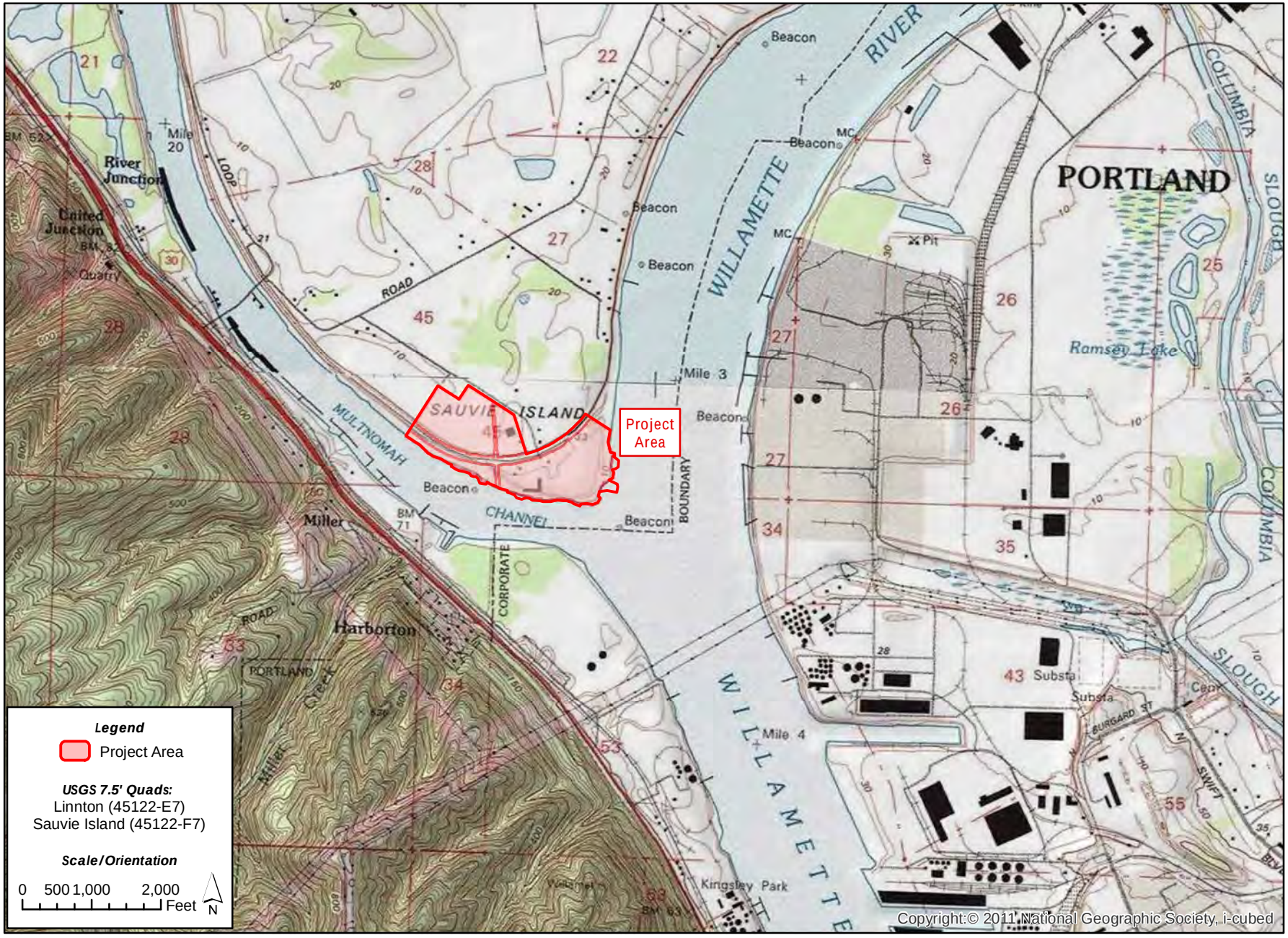
Figures



WILDLANDS

Alder Creek Restoration Project
2018 Monitoring Report

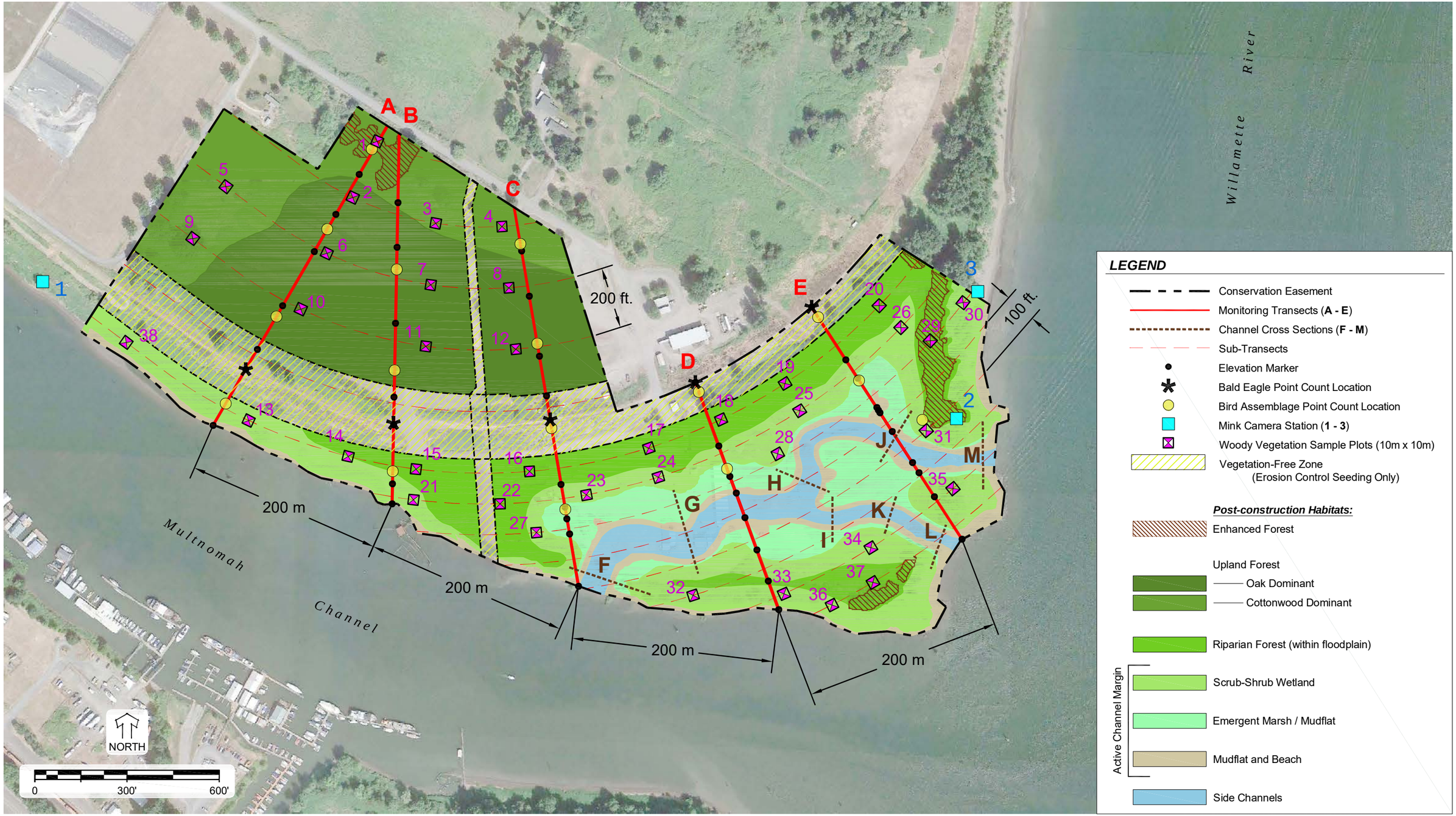
Figure 1
Location Map



WILDLANDS

Alder Creek Restoration Project
2018 Monitoring Report

Figure 2
USGS Quad


A
B
C
D
E
F
G
H
I
J
K
L
M
1
2
3
200 ft.
100 ft.
200 m
200 m
200 m
200 m
Willamette River
Multnomah Channel
NORTH
0
300'
600'
LEGEND
Conservation Easement
Monitoring Transects (A - E)
Channel Cross Sections (F - M)
Sub-Transects
Elevation Marker
Bald Eagle Point Count Location
Bird Assemblage Point Count Location
Mink Camera Station (1 - 3)
Woody Vegetation Sample Plots (10m x 10m)
Vegetation-Free Zone
(Erosion Control Seeding Only)
Post-construction Habitats:
Enhanced Forest
Upland Forest
Oak Dominant
Cottonwood Dominant
Riparian Forest (within floodplain)
Active Channel Margin
Scrub-Shrub Wetland
Emergent Marsh / Mudflat
Mudflat and Beach
Side Channels

WILDLANDS

Alder Creek Restoration Project
2018 Monitoring Report

Figure 4
Aerial Photo

WILDLANDS

Alder Creek Restoration Project
2018 Monitoring Report

Figure 5a
Photo Location Map

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

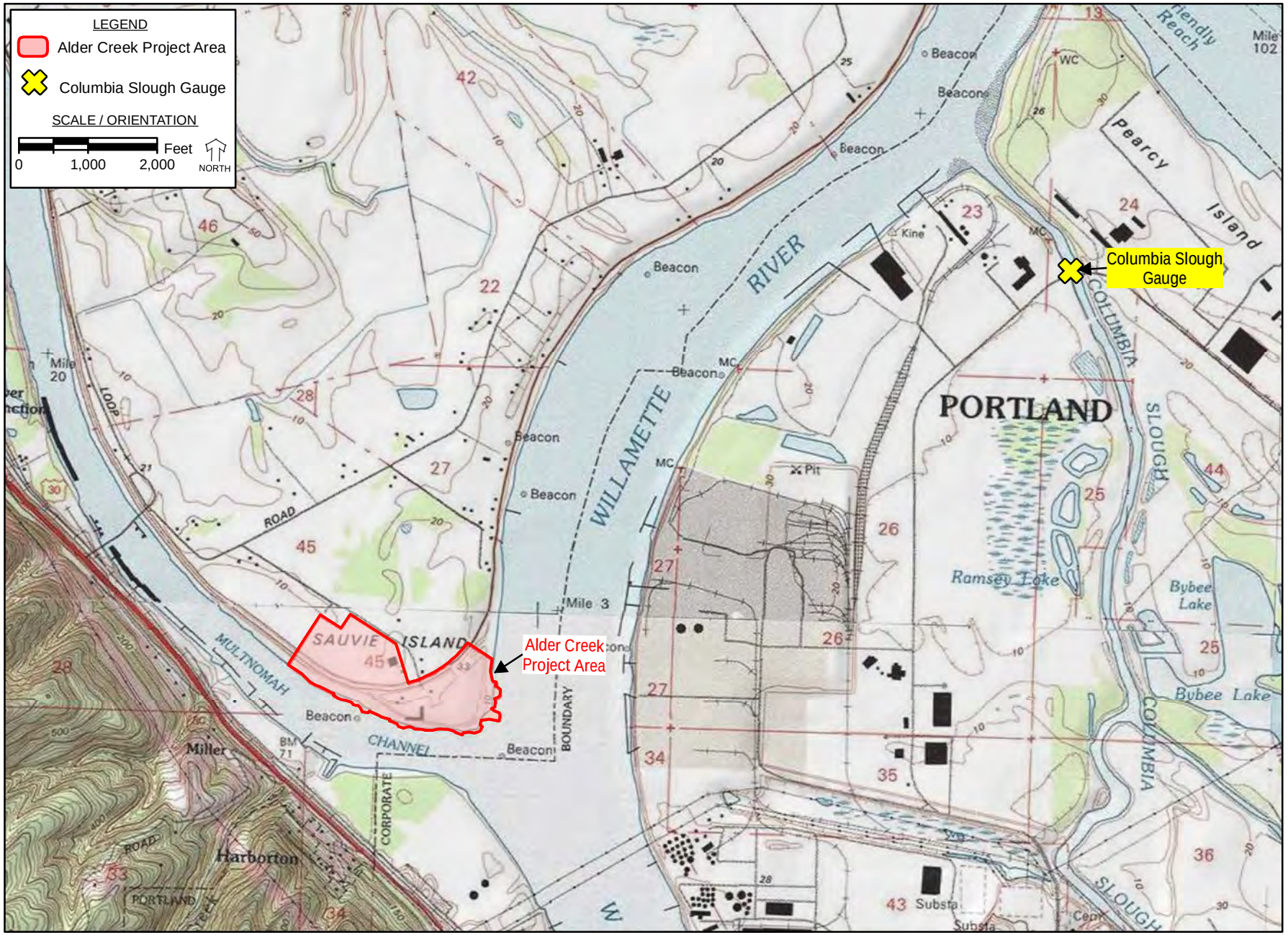
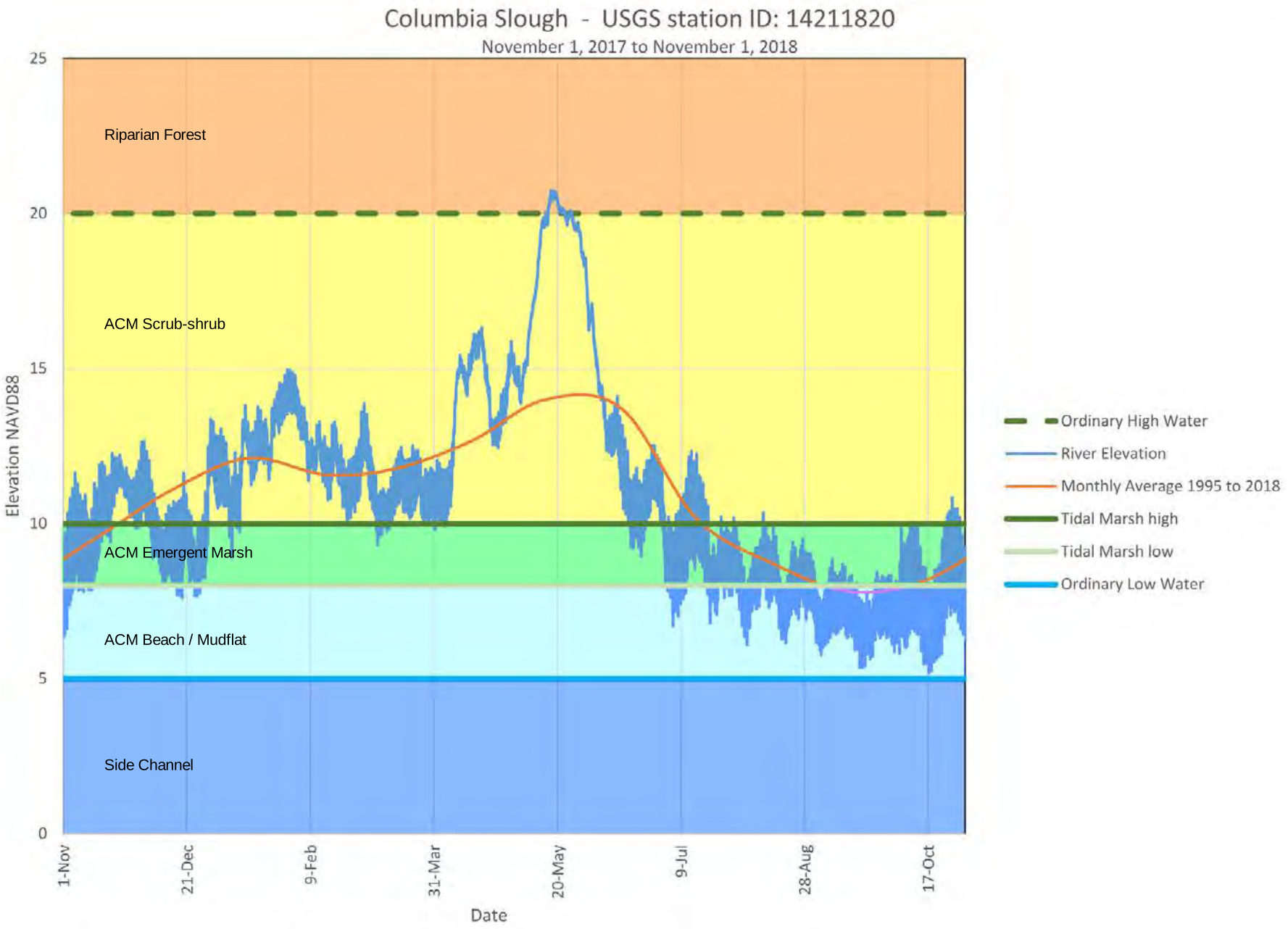
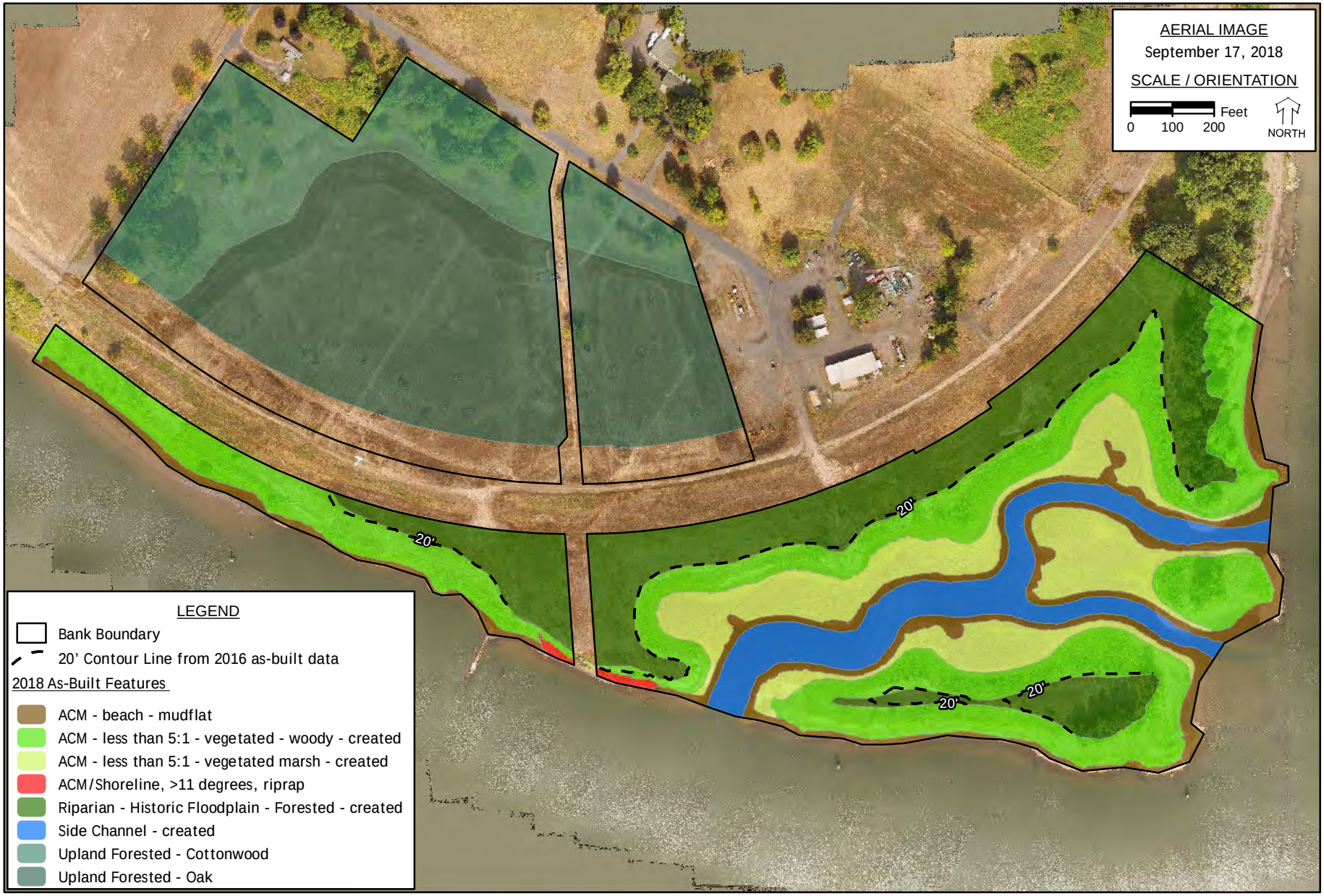


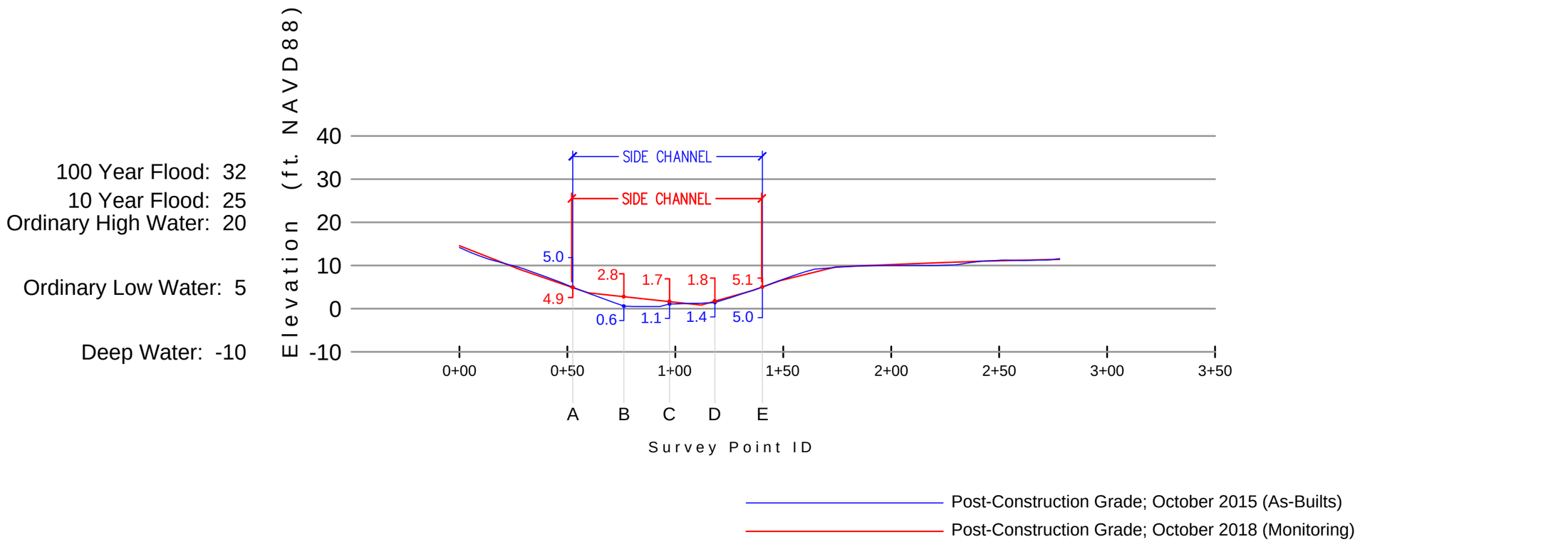
Figure 6a
Columbia Slough Gauge Station Location


Columbia Slough - USGS station ID: 14211820
November 1, 2017 to November 1, 2018
Riparian Forest
ACM Scrub-shrub
ACM Emergent Marsh
ACM Beach / Mudflat
Side Channel
Elevation NAVD88
25
20
15
10
5
0
1-Nov
21-Dec
9-Feb
31-Mar
20-May
9-Jul
28-Aug
17-Oct
Date
Ordinary High Water
River Elevation
Monthly Average 1995 to 2018
Tidal Marsh high
Tidal Marsh low
Ordinary Low Water


AERIAL IMAGE
September 17, 2018
SCALE / ORIENTATION
0
100
200
Feet
NORTH
20'
20'
20'
20'
LEGEND
Bank Boundary
20' Contour Line from 2016 as-built data
2018 As-Built Features
ACM - beach - mudflat
ACM - less than 5:1 - vegetated - woody - created
ACM - less than 5:1 - vegetated marsh - created
ACM/Shoreline, >11 degrees, riprap
Riparian - Historic Floodplain - Forested - created
Side Channel - created
Upland Forested - Cottonwood
Upland Forested - Oak

N
100
0
40
80
100
F
G
H
I
J
K
L
M
© 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS
bing

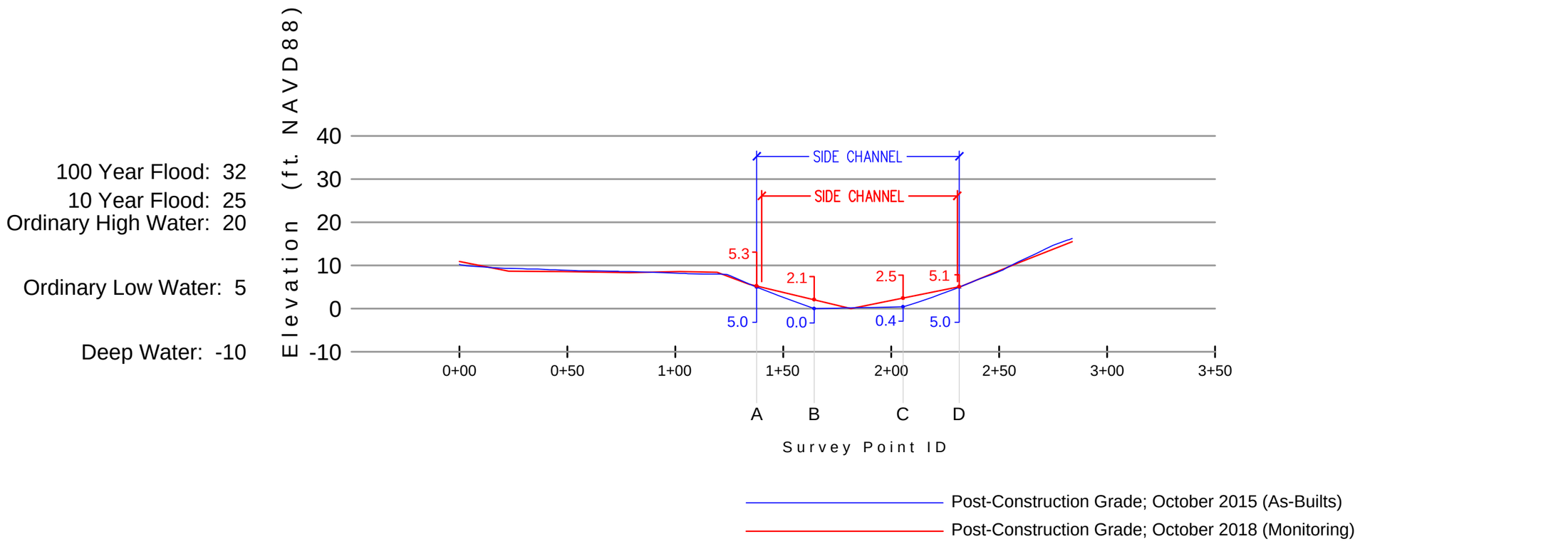
Cross Section F									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	4.9	-0.1	15.0	15.1	(15.1/15.0) =	101%	|101 -100| =	1%
B	0.6	2.8	+2.2	19.4	17.2	(17.2/19.4) =	89%	|89 -100| =	11%
C	1.1	1.7	+0.6	18.9	18.3	(18.3/18.9) =	97%	|97 -100| =	3%
D	1.4	1.8	+0.4	18.6	18.2	(18.2/18.6) =	98%	|98 -100| =	2%
E	5.0	5.1	+0.1	15.0	14.9	(14.9/15.0) =	99%	|99 -100| =	1%
		Average Distance:	0.7					Average:	4%



F Cross Section F

WILDLANDS

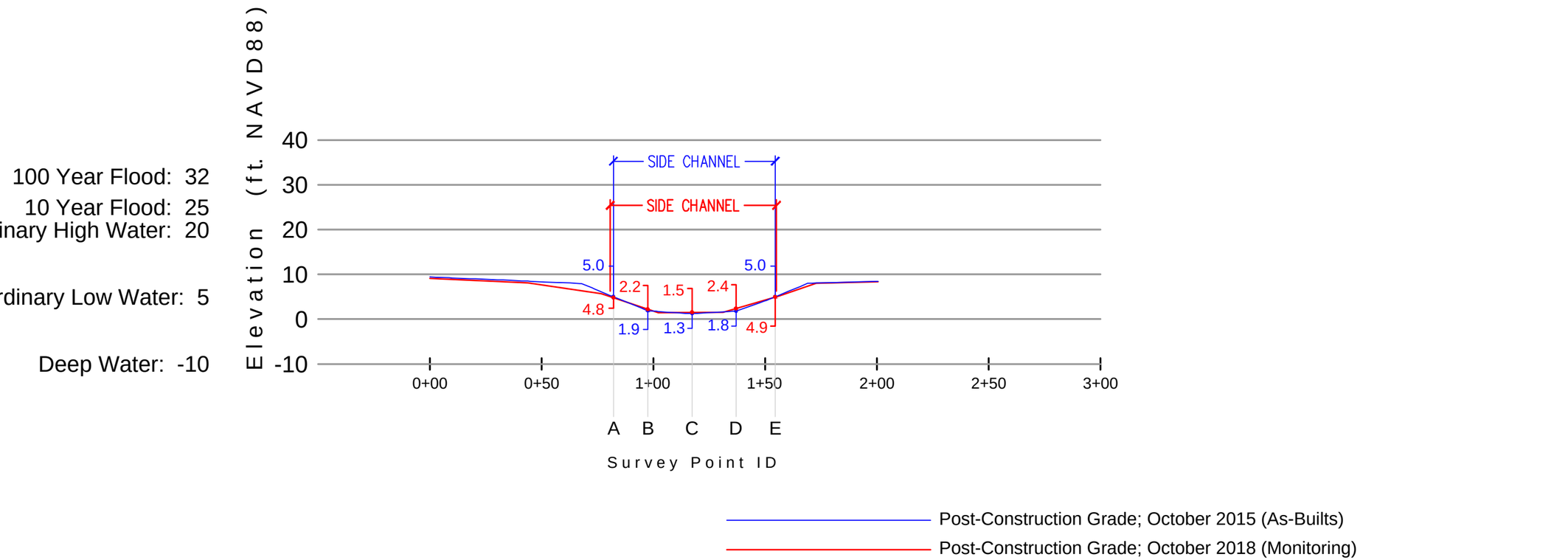
Cross Section G									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	5.3	+0.3	15.0	14.7	(14.7/15.0) =	98%	|98 -100| =	2%
B	0.0	2.1	+2.1	20.0	17.9	(17.9/20.0) =	90%	|90 -100| =	10%
C	0.4	2.5	+2.1	19.6	17.5	(19.6/17.5) =	112%	|112 -100| =	12%
D	5.0	5.1	+0.1	15.0	14.9	(14.9/14.6) =	102%	|102 -100| =	2%
		Average Distance:	1.2					Average:	7%



G Cross Section G

WILDLANDS

Cross Section H									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	4.8	-0.2	15.0	15.2	(15.2/15.0) =	101%	|101 -100| =	1%
B	1.9	2.2	+0.3	18.1	17.8	(17.8/18.1) =	98%	|98 -100| =	2%
C	1.3	1.5	+0.2	18.7	18.5	(18.5/18.7) =	99%	|99 -100| =	1%
D	1.8	2.4	+0.6	18.2	17.6	(17.6/18.2) =	97%	|97 -100| =	3%
E	5.0	4.9	-0.1	15.0	15.1	(15.1/15.0) =	101%	|101 -100| =	1%
		Average Distance:	0.3					Average:	2%



H Cross Section H

Cross Section I									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	5.3	+0.3	15.0	14.7	(14.7/15.0) =	98%	|98 -100| =	2%
B	1.3	1.4	+0.1	18.7	18.6	(18.6/18.7) =	99%	|99 -100| =	1%
C	5.0	4.7	-0.3	15.0	15.3	(15.3/15.0) =	102%	|102 -100| =	2%
		Average Distance:	0.2					Average:	2%

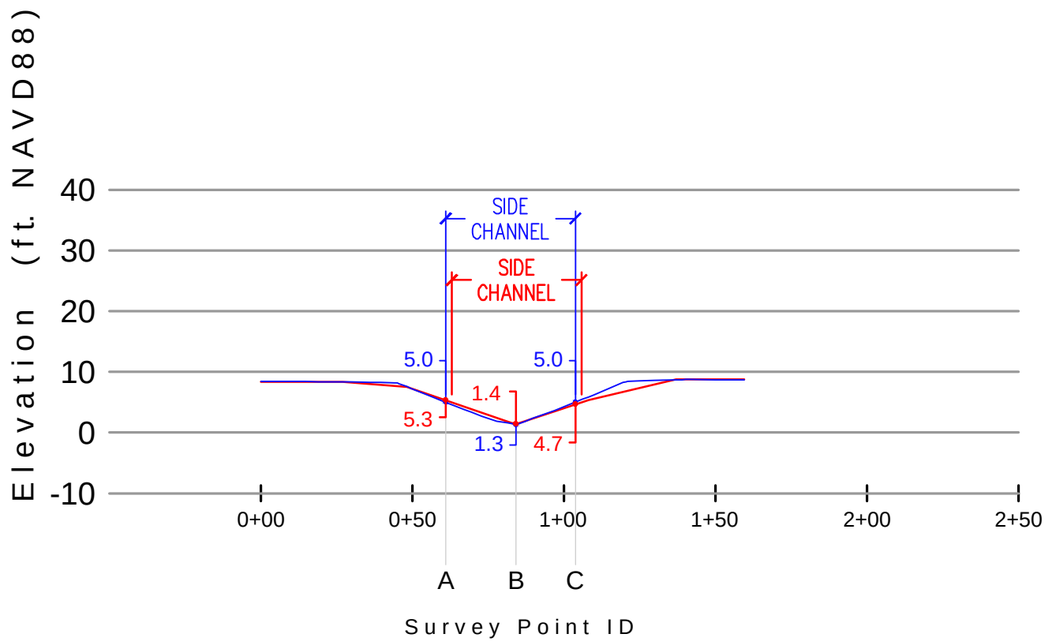
100 Year Flood: 32

10 Year Flood: 25

Ordinary High Water: 20

Ordinary Low Water: 5

Deep Water: -10



Post-Construction Grade; October 2015 (As-Builts)

Post-Construction Grade; October 2018 (Monitoring)

0 50' 100'

2x Vertical Exaggeration

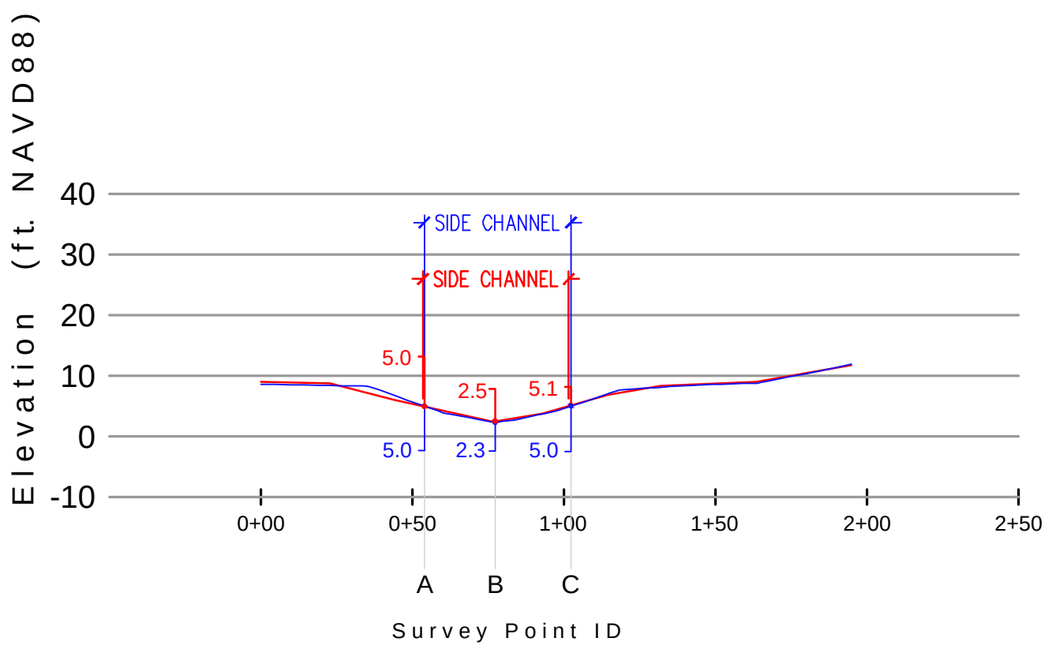
I Cross Section I

Cross Section J									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	5.0	0.0	15.0	15.0	(15.0/15.0) =	100%	|100 -100| =	0%
B	2.3	2.5	+0.2	17.7	17.5	(17.5/17.7) =	99%	|99 -100| =	1%
C	5.0	5.1	+0.1	15.0	14.9	(14.9/15.0) =	99%	|99 -100| =	1%
		Average Distance:	0.1					Average:	1%

100 Year Flood: 32
10 Year Flood: 25
Ordinary High Water: 20

Ordinary Low Water: 5

Deep Water: -10



Post-Construction Grade; October 2015 (As-Builts)

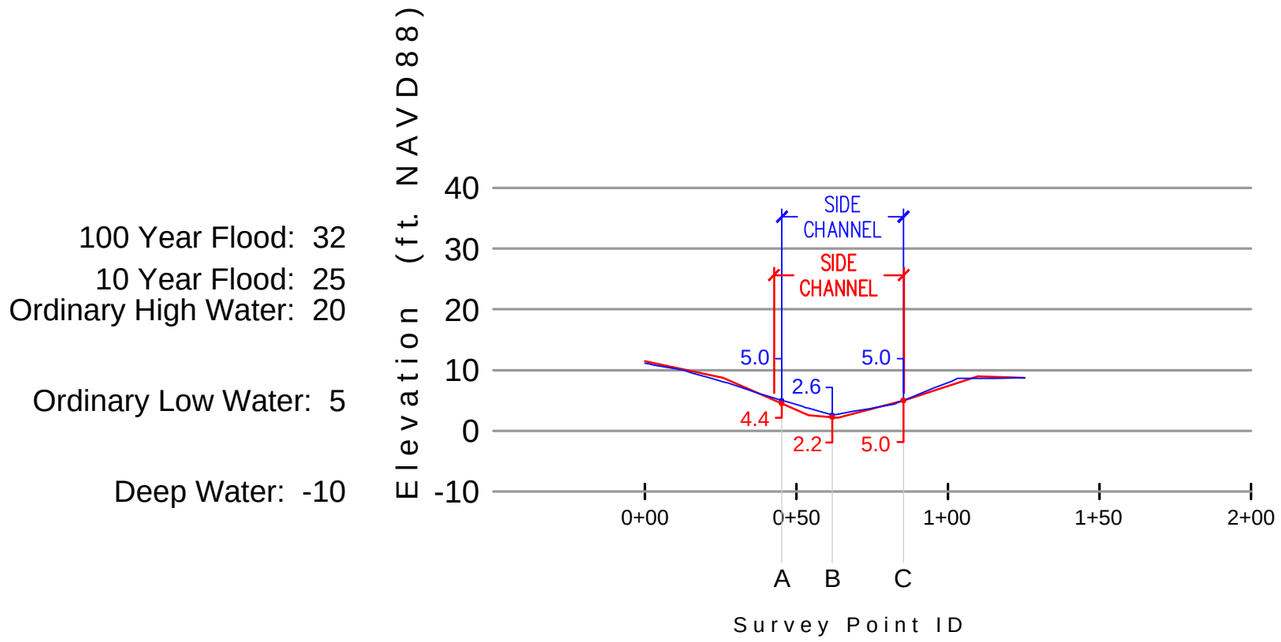
Post-Construction Grade; October 2018 (Monitoring)

0 50' 100'

2x Vertical Exaggeration

J Cross Section J

Cross Section K									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	4.4	-0.6	15.0	15.6	(15.6/15.0) =	104%	|104 -100| =	4%
B	2.6	2.2	-0.4	17.4	17.8	(17.8/17.4) =	102%	|102 -100| =	2%
C	5.0	5.0	0.0	15.0	15.0	(15.0/15.0) =	100%	|100 -100| =	0%
		Average Distance:	0.3					Average:	2%



Post-Construction Grade; October 2015 (As-Builts)

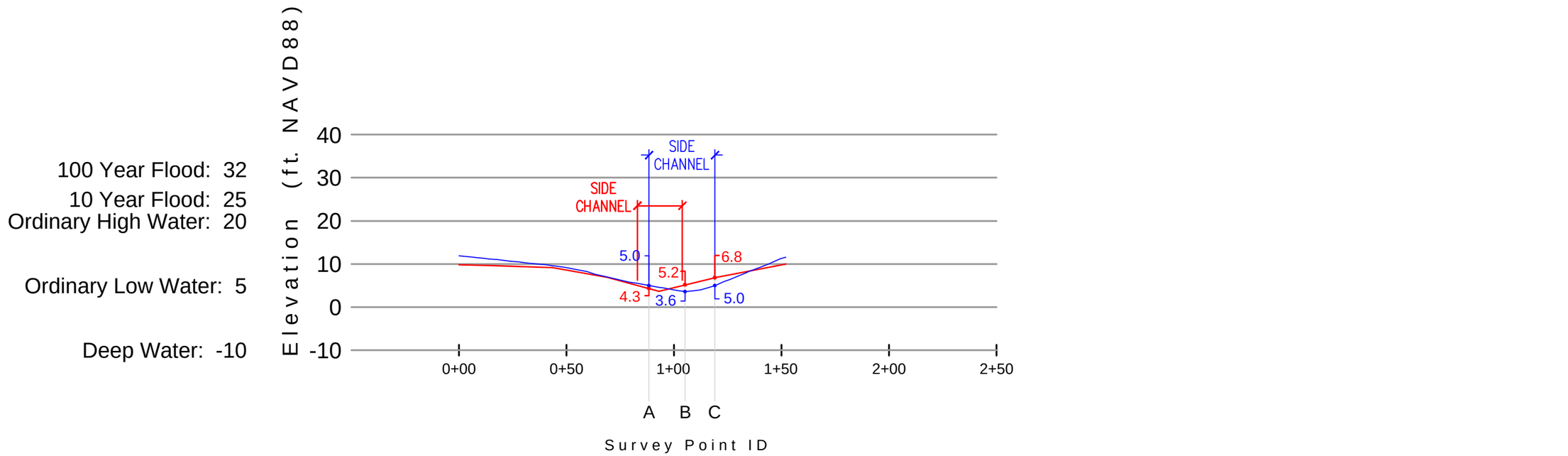
Post-Construction Grade; October 2018 (Monitoring)

0 50' 100'

2x Vertical Exaggeration

K Cross Section K

Cross Section L									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	4.3	-0.7	15.0	15.7	(15.7/15.0) =	105%	|105 -100| =	5%
B	3.6	5.2	+1.6	16.4	14.8	(14.8/16.4) =	90%	|90 -100| =	10%
C	5.0	6.8	+1.8	15.0	13.2	(13.2/15.0) =	88%	|88 -100| =	12%
		Average Distance:	1.4					Average:	9%

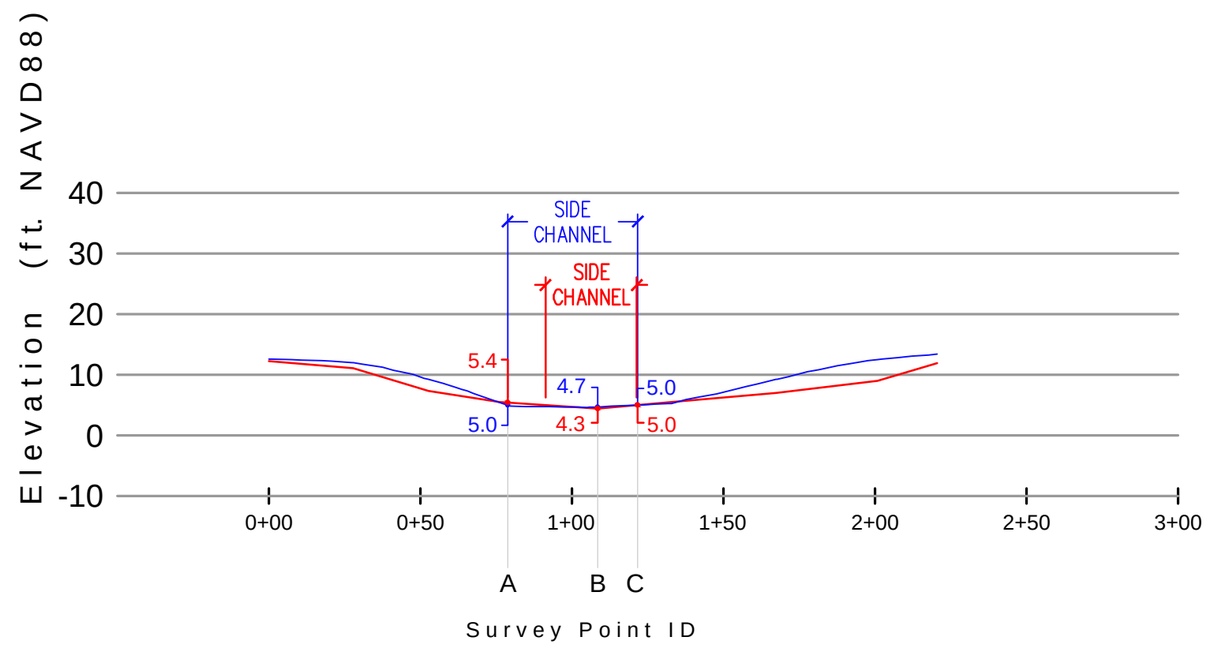


L Cross Section L

WILDLANDS

Cross Section M									
Survey Point ID	Elevation: October 2015	Elevation: October 2018	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2018 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2018		Absolute Percent Change Relative to OHW 2015 to 2018	
A	5.0	5.4	+0.4	15.0	14.6	(14.6/15.0) =	97%	|97 -100| =	3%
B	4.7	4.3	-0.4	15.3	15.7	(15.7/15.3) =	103%	|103 -100| =	3%
C	5.0	5.0	0.0	15.0	15.0	(15.0/15.0) =	100%	|100 -100| =	0%
		Average Distance:	0.3					Average:	2%

100 Year Flood: 32
10 Year Flood: 25
Ordinary High Water: 20
Ordinary Low Water: 5
Deep Water: -10



Post-Construction Grade; October 2015 (As-Builts)
Post-Construction Grade; October 2018 (Monitoring)

0 50' 100'
2x Vertical Exaggeration

M Cross Section M

WILDLANDS

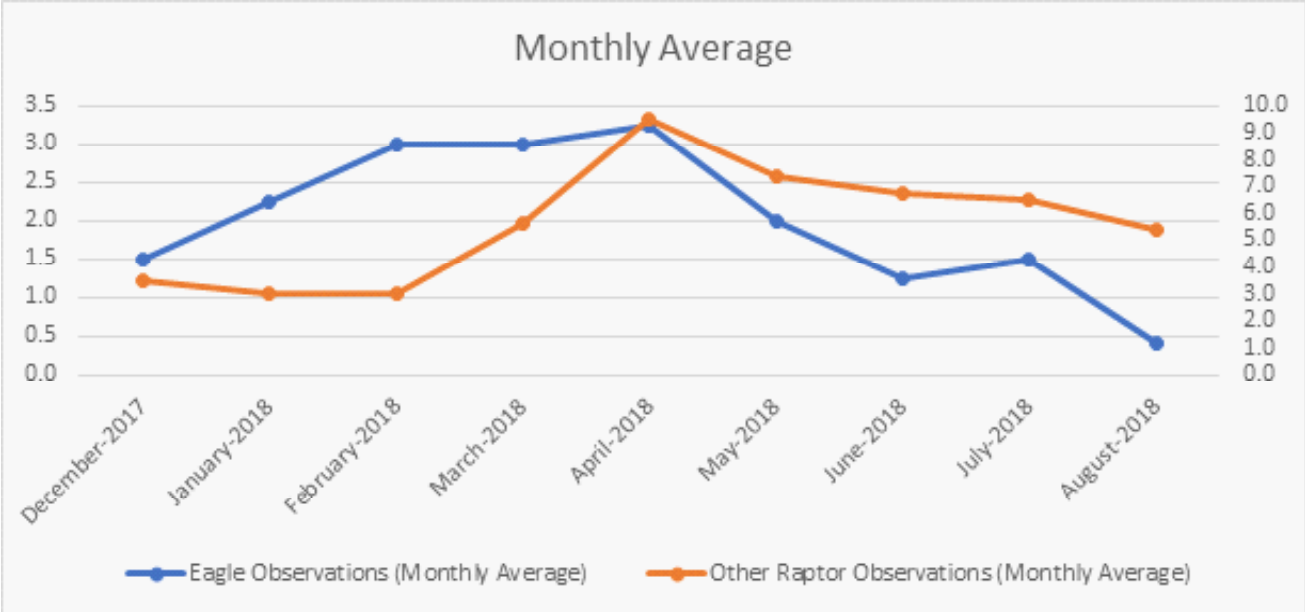
Alder Creek Restoration Project
2018 Monitoring Report

Figure 6m
Aerial Photo Taken on 05/22/2018

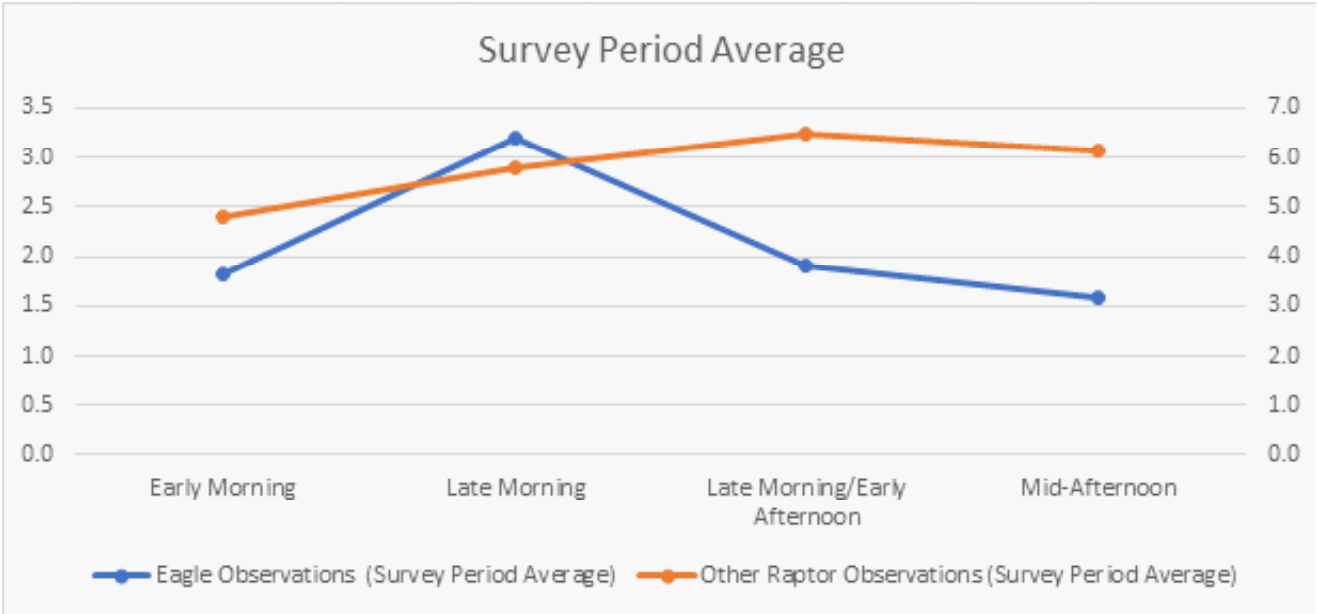
Figure 7
Large Woody Debris

Willamette River
Multnomah Channel
IRPS T
LYSA T
IRPS T
LYSA T
FAPA
3 individuals
NORTH
0
300'
600'
LEGEND
Conservation Easement
Levee and Pipeline Easements
FAPA Falloppia japonica (Knotweed)
IRPS Iris pseudocorus (Yellow Flag Iris)
LYSA Lythrum salicaria (Purple Loosestrife)
T Trace Cover
X Individual

Mean black eagle and other raptor observations, by month.



Mean bald eagle and other raptor observations, by time of day.[1]



[1] Early Morning= 6:00 A.M. to 9:00 A.M., Late Morning= 9:00A.M. to 10:45 A.M., Late Morning/Early Afternoon= 10:45 A.M. to 2:15 P.M., Mid-Afternoon= 2:15 P.M. to 5:30 P.M.

APPENDIX 1

Performance Standards

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
Geomorphic/Structural/Habitat Complexity Elements		
Topographic Surveys During years 1, 3, 5, 7, 10, topographic surveys will be completed once a year after the wet season to document changes in site topography and structural habitat features. The following changes would trigger a project review to determine what, if any, adaptive management actions are necessary: • Changes of more than 10% in ACM and side channel habitat acreages from the as-built surveys. • Changes of more than 20% in side channel depths from the as-built surveys.	Topographic surveys will include collecting topographic readings along the 5 pre-selected, permanent monitoring transects. Channel depths will be measured from the OHWM.	**Met -** Topographic surveys were conducted from (DATE) to (Date), 2018. Topographic surveys will continue in Year 5 (2020).
Fish Barriers Annual inspection to document any fish barriers.	After the wet season a visual inspection will be made to document any barriers that prevent fish from entering or exiting the site. If a fish barrier is identified, the Trustee Council will be notified within three (3) business days of discovery.	**Met -** Several visual inspections by walking along the shoreline and by boat were used to determine there were no fish barriers in the created channels. Annual inspections will continue in Year 4 (2019).
Large Woody Debris During years 2,3,5,7 and 10, large woody debris will have an 80 percent retention rate including naturally recruited material. If the existing conditions and hydraulics will allow the retention of replacement materials, LWD will be installed in the interior channels (and marsh/mudflat where appropriate) to achieve the targeted density	After the wet season, a visual inspection will be made to document any changes to the installed large woody debris and any occurrences of natural recruitment.	**Met** – On September 21, 2018 a visual inspection survey was conducted, and large woody debris retention rate was observed to be well above the required 80 percent including natural recruitment. Of the originally installed 48 LWD, 43 remain with an additional 25 observed on the Project through natural recruitment. Large woody debris monitoring will continue in Year 5 (2020).
Aerial Photography Aerial photos of the site will be collected once during later summer during years 1, 3, 5, 7, 10.	The aerial photos were included in the Year 1 (2016) monitoring report.	**Met** - Aerial photography of the site was conducted on September 21, 2018.. Aerial photography of the site will continue in Year 5 (2020)

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
	Geomorphic/Structural/Habitat Complexity Elements	
Hydrology Water level data loggers will be placed at a minimum of two locations and continuous data will be collected, as feasible. If determined that continuous monitoring is not feasible, an alternative monitoring schedule will be determined in consultation with the Trustee Council representatives.		For reasons stated in Section IV.A.3, Wildlands used the USGS station at Columbia Slough which is located approximately 2 miles downriver of the Project site. (see Figure 6b).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
	Invasive Plant Species	
Reed Canarygrass • Years 1-5: ≤ 30% reed canarygrass • Years 7: ≤ 25% reed canarygrass • Years 20: ≤ 20% reed canarygrass	In Years 2, 3, 4, 5, 7, and 10 reed canarygrass cover will be assessed at each plot and be kept separate from other native and invasive species cover analyses. The reed canarygrass cover values at each plot will be added together and averaged over the site to evaluate the reed canarygrass performance standard. The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Met** – Average cover of reed canarygrass within the 38 plots was less than 1.00%. Reed canarygrass assessments were conducted during the spring and later summer of 2018. Reed canarygrass monitoring will continue in Year 4 (2019).
treated within the year in which they are found, during the season that is most effective for control with reasonably aggressive, legal treatment with the goal of complete eradication: • Japanese knotweed • Giant knotweed • Himalayan knotweed • Yellow flag iris • Butterfly bush • Purple loosestrife		**Met** – The entire site was walked to locate any species on the "zero-untreated" list. During Year 3, purple loosestrife, yellow flag iris, and 3 individual of Japanese knotweed were detected on the site (see Figure 8 for general locations). All instances of these species were treated. No Himalayan knotweed, giant knotweed, or butterfly bush was found.

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
	Installed Vegetation	
Emergent Marsh Year 5: • ≥ 30% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) Years 7 and 10: • ≥ 40% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass)	In Years 2,3,4,5,7, and 10, cover and diversity will be quantified using a quadrat method. However, the purpose of the monitoring conducted in Years 2, 3, and 4 is to identify the native and non-native herbaceous cover to gauge whether or not the site appears to be on a trajectory towards meeting the performance standards for Year 5. If the emergent marsh appears to be in jeopardy of not meeting the performance standard for Year 5, adaptive management including herbivory prevention and replanting may be conducted. A sampling transect will be run perpendicular to the baseline transect and quadrat data will be collected along the sampling transect. The frequency of sampling quadrats and the size of quadrats will be tailored to best assess this habitat type. The sampling interval and the size of the quadrat will be determined in the field based on pilot sampling data.	**Met**- Monitoring of the emergent marsh was conducted on September 21, 2018. Although there are no performance standards for Year 3, native herbaceous cover and invasive herbaceous cover is currently progressing towards the Year 5 performance standard. Native herbaceous cover was observed at 19.90% and invasive herbaceous cover was observed at < 1% cover. Emergent marsh monitoring will continue in Year 4 (2019).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
	Installed Vegetation	
Riparian Scrub-Shrub and Riparian Forest (ACM) Years 2-5: • A minimum of 1,200 native woody stems per acre • At least 5 native woody species (for Riparian Scrub-Shrub within the ACM) • At least 3 native tree species and 5 native shrub species (for Riparian Forest within the ACM) • Cover (during the first 5 years, woody species will be excluded from percent cover): o ≥ 10% native herbaceous o ≤ 10% invasive herbaceous (excluding reed canarygrass) o ≤ 10% invasive shrubs Year 7: • ≥ 55% native woody species • ≥ 10% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) • ≤ 5% invasive shrubs Year 10: • ≥ 80% native woody species • ≥ 10% native herbaceous • ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)	In Years 2, 3, 4, 5, 7, and 10 native woody plantings and vegetative cover will be assessed at each plot within the riparian scrub-shrub and riparian forest (ACM). The native woody plantings and vegetative cover values at each plot will be added together and averaged over the habitat to evaluate the native vegetative performance standards . The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Met**- Monitoring of the riparian scrub-shrub and riparian forest (ACM) was conducted on July 22-23, 2018. The ACM is currently meeting all associated performance standards for Year 3. During surveys 1,212 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 16 woody species were observed with 7 tree species and 9 shrub species being observed. This meets the minimum requirements of at least 5 woody species being observed and at least 3 native tree species and 5 native shrub species being observed. Native herbaceous cover (excluding woody species) was observed at 39.63% cover, invasive herbaceous cover (excluding reed canarygrass) was 4.62% cover, and invasive woody vegetation was <1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive woody performance standards. Riparian scrub-shrub and riparian forest (ACM) monitoring will continue in Year 4 (2019).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
	Installed Vegetation	
Riparian Forest and Cottonwood-Dominated Upland Forest Years 2-5: • A minimum of 1,200 native woody stems per acre • At least 3 native tree species and 5 native shrub species • Cover (during the first 5 years, trees/shrubs will be excluded from percent cover): o ≥ 10% native herbaceous o ≤ 10% invasive herbaceous (excluding reed canarygrass) Year 7: • ≥ 50% native woody species • ≥ 10% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) • ≤ 5% invasive shrubs Year 10: • ≥ 80% native woody species • ≥ 5% native herbaceous • ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)	In Years 2, 3, 4, 5, 7, and 10 native woody plantings and vegetative cover will be assessed at each plot within the riparian forest and cottonwood-dominated upland forest. The native woody plantings and vegetative cover values at each plot will be added together and averaged over the habitat to evaluate the native vegetative performance standards . The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Met**- Monitoring of the riparian forest and cottonwood-dominated upland forest was conducted July 22-23, 2018. The riparian forest and cottonwood-dominated upland forest is currently meeting all associated performance standards for Year 3. During surveys 1,250 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 7 tree species and 9 shrub species were observed. This meets the minimum requirement of at least 3 native tree species and 5 native shrub species being observed. Native herbaceous cover (excluding woody species) was observed at 35.52% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover, and invasive woody vegetation was < 1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard. Riparian forest and cottonwood-dominated upland forest monitoring will continue in Year 4 (2019).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2018
	Installed Vegetation	
Oak-Dominated Upland Forest Years 2-5: • A minimum of 500 trees/shrubs per acre • At least 1 native tree species and 4 native shrub species • Cover (during the first 5 years, trees/shrubs will be excluded from percent cover): o ≥ 25% native herbaceous o ≤ 15% invasive herbaceous (excluding reed canarygrass) o ≤ 15% invasive shrubs Year 7: • ≥ 25% native woody species • ≥ 25% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) • ≤ 5% invasive shrubs Year 10: • ≥ 40% native woody species (at least 10% of woody species cover will be provided by oaks) • ≥ 25% native herbaceous • ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)	In Years 2, 3, 4, 5, 7, and 10 native woody plantings and vegetative cover will be assessed at each plot within the oak-dominated upland forest. The native woody plantings and vegetative cover values at each plot will be added together and averaged over the habitat to evaluate the native vegetative performance standards . The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Partially Met**- Monitoring of the oak-dominated upland forest was conducted July 22-23, 2018. The oak-dominated upland forest is currently meeting all but one of the associated performance standards for Year 3. During surveys 503 trees per an acre were observed, meeting the minimum of 500 trees per an acre. A total of 4 tree species and 3 shrub species were observed. This does not meet minimum requirement of at least 1 native tree species and 4 native shrub species being observed. Native herbaceous cover (excluding woody species) was observed at 44.75% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover , and invasive woody vegetation was <1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard. Oak-dominated upland forest monitoring will continue in Year 4 (2019).

APPENDIX 2

Maintenance Log

Alder Creek NRDA Bank 2018
(Year 3) Maintenance Log

Visit Date:	Visited By: (Name/Initials)	Primary Purpose of Visit	Fencing	Signage	Trash & Trespass	Invasives
01/12/18	Tyler McRae	Maintenance/Land Management	Checked	First-time Installed	Checked	Checked
01/18/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
02/01/18	Tyler McRae	Biological Monitoring	Checked	Checked	Checked	Checked
02/16/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
03/09/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
03/16/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
03/19/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
03/19/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
03/30/18	Greg Lohse	General Inspection			Checked	Checked
04/03/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
04/20/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
04/20/18	Tyler McRae	Biological Monitoring				
05/07/18	Tyler McRae	Biological Monitoring	Checked	Checked	Checked	Checked
05/18/18	Tyler McRae	Biological Monitoring	Checked	Checked	Checked	Checked
05/24/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
05/28/18	Tyler McRae	Biological Monitoring	Checked	Checked	Checked	Checked
05/31/18	Greg Lohse	Biological inspection				Checked
06/08/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
06/11/18	Tyler McRae	Biological Monitoring	Checked	Checked	Checked	Checked
06/22/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
06/29/18	Greg Lohse	Maintenance/Land Management				
07/06/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)
07/13/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
07/22/18	Greg Lohse	Biological Monitoring				
07/23/18	Greg Lohse	Biological Monitoring				Checked
07/25/18	Greg Lohse	General Inspection				
08/10/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
08/17/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
08/23/18	Tyler McRae	Maintenance/Land Management	Checked	Checked	Checked	Checked
08/31/18	Greg Lohse	Maintenance/Land Management				
09/21/18	Greg Lohse	Biological Monitoring			Checked	Checked
10/15/18	Greg Lohse	General Inspection		Checked	Checked	Checked
12/02/18	Greg Lohse	General Inspection		Checked	Checked	Checked

APPENDIX 3

Emergent Marsh Quadrat Data

Alder Creek NRDA Bank
2018 (Year 3)
Emergent Marsh
Quadrat Data

Plant Species		Absolute Cover by species by Quadrat																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	Absolute Cover	90%	0%	0%	1%	25%	10%	20%	25%	90%	30%	5%	0%	1%	10%	25%	45%	30%	0%	35%	0%	7%	0%	2%	10%	0%	90%
Native Herbaceous																											
	Bidens cerna	13%																									
	Calitryche heterphylla																			<1%							
	Carex densa																			<1%							
	Carex obnupta					2%		3%	1%	25%							19%	14%		13%							13%
	Carex sp																<1%	<1%									
	Eleocharis obtusa																	3%									
	Eleocharis palustris										9%				2%		19%										
	Elodea nuttali											<1%								<1%				2%			
	Epilobium sp	3%																									
	Glyceria sp	55%												1%		12%	1%	1%									
	Ludwigia palustris														4%	1%	1%	8%		21%		5%					74%
Native Woody																											
	Salix fluviatillis																	1%									
	Salix lucida	3%																									
Non-Native																											
	Mentha pulegim	13%														1%											
	Polgonum aviculare	3%				13%	10%	15%	21%	55%	21%	5%				1%									10%		
	Polygonum hydropiper				1%			3%		10%					4%	12%	5%			1%		2%			<1%		3%
	Polygonum persicaria	<1%				10%			4%		<1%							3%									

APPENDIX 4

Woody Species Plot Data

Alder Creek NRDA Bank
2018 (Year 3)
Woody Stems
Plot Data

		Number of Woody Stems by species by Plot																																				
Species Name	**Common Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
Acer macrophyllum	Big Leaf Maple	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Alnus rubra	Red Alder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Cornus sericea	Redosier Dogwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	0	0	0	0	4	0	6	5	0	0	0	0	0	0	0
Corylus cornuta	Beaked Hazel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crataegus douglasii	Black Hawthorn	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Fraxinus latifolia	Oregon Ash	2	0	0	2	4	0	0	0	3	2	0	1	1	1	4	7	2	7	5	1	1	2	1	7	2	0	5	3	0	0	9	10	10	10	0	10	3	1
Mahonia aquifolium	Tall Oregon Grape	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mahonia nervosa	Dwarf Oregon-grape	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malus fusca	Western Crabapple	0	0	0	0	1	0	0	0	5	0	0	0	0	0	2	2	0	1	0	1	0	1	0	1	0	0	1	2	0	0	0	0	0	0	0	1	3	0
Oemleria cerasiformis	Indian Plum/Osoberry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physocarpus capitatus	Pacific Ninebark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Populus balsamifera ssp. Trichocarpa	Black Cottonwood	0	0	1	0	8	0	0	0	10	0	0	0	0	8	19	0	12	8	8	11	18	6	0	3	0	0	3	0	14	0	6	6	0	0	10	14	2	0
Quercus garryana	Oregon White Oak	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribes divaricatum	Gooseberry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa gymnocarpa	Baldhip Rose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Rosa pisocarpa	Swamp Rose	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	6	0	6	1	0	1	0	0
Rubus parviflorus	Thimbleberry	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Rubus spectabilis	Salmonberry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Rubus ursinus	Trailing Blackberry	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	24	0	0	0	0	90	1	0	0
Salix fluviatillis/exigua	Sandbar Willow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	10	3	11	4	0	0	15	0	0	0	0	0	0	0
Salix lucida ssp lasiandra	Pacific Willow	0	0	1	0	0	67	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	4	3	1	28	3	0	0	1	12	0	1	2	0	0	2	0
Salix scouleriance	Scouler Willow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	3	0	0	2	1	8	0	6	0	0	0	1	2	3	4	0	2	1	1
Sambucus racemora	Red Elderberry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Spirea douglassi	Douglas' Spirea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	2	0	7	8	0	0	9	0	0	4	0	0	0	7
Symphoricarpos albus	Snowberry	175	0	0	0	0	0	2	1	1	1	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

APPENDIX 5

Herbaceous and Invasive Cover Plot Data

Alder Creek NRDA Bank
2018 (Year 3)
Absolute Cover
Plot Data

Plant Species	Absolute Cover by species by Plot																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Absolute Cover	80%	70%	75%	65%	85%	55%	65%	80%	80%	90%	75%	70%	55%	20%	70%	70%	60%	65%	60%	70%	60%	35%	50%	40%	90%	75%	60%	25%	85%	80%	45%	70%	85%	95%	75%	45%	35%	65%
Native Herbaceous																																						
Achillea millefolium																	< 1%												< 1%									
Acmispon parviflorus		46%	27%			23%	25%	23%	19%	37%	20%	56%		5%	23%					43%	6%													< 1%			1%	
Agrostis exarata			1%	30%				< 1%						9%	9%	10%	2%	10%	8%	2%	16%						6%		27%		1%						1%	
Agrostis sp.									19%																2%													
Alopecurus geniculatus		2%			2%										23%		2%	2%	0%							2%												
Bidens cernua													8%								6%		15%		23%	2%	6%				< 1%	2%	2%					16%
Carex obnupta																									< 1%		1%											
Deschampsia cespitosa		8%	6%			5%	15%			22%			8%		2%	10%		2%			1%						1%											
Elymus sp.										2%																												
Elymus triticoides		8%		7%				2%	7%			2%			9%	25%	9%	10%	8%	10%		1%	< 1%						27%								10%	
Epilobium ciliatum																										< 1%					1%		< 1%		2%			
Epilobium sp.																< 1%																< 1%		< 1%				
Glycyrrhiza lepidota																															< 1%					1%		< 1%
Gnaphilium palustre																																				1%		1%
Hordeum brachyantherum	2%			7%	11%			2%		< 1%			< 1%			2%	< 1%	< 1%	2%	10%		1%				< 1%	1%		27%							4%	
Impatiens noli-tangere																										2%						< 1%		12%	9%			
Juncus effusus						5%				2%						10%																						
Ludwigia palustris																							< 1%	1%	2%	27%		3%			8%	2%	2%	66%		10%		
Ludwigia sp																											1%							2%				
Madia glomerata			16%	1%		5%	1%									< 1%		< 1%																		4%	
Mentha arvensis																																		2%				
Myosotis laxa																							6%				1%											
Polystichum munitum	< 1%																																					
Rumex occidentalis																															1%	8%	8%	< 1%		1%		< 1%
Trifolium variegatum					< 1%																																	
Typha latifolia						1%																																
Urtica dioica	< 1%					< 1%			1%																										2%			
Native Woody																																						
Cornus sericea																														50%								
Populus trichocarpa															2%									4%												1%		
Rubus ursinus	11%								< 1%																				< 1%	30%				52%			
Salix exuiga													2%	< 1%						< 1%	16%		6%	4%	23%		16%	3%			8%	< 1%	8%	12%		1%		6%
Salix lucida																								1%														
Scouler willow																									9%		6%											
Spiraea douglasii																											16%											1%
Symphoricarpos albus	61%																																					
Non-Native																																						
Aira caryophyllea	2%	2%	< 1%	1%	28%		6%		19%								9%					< 1%									< 1%							
Alisma plantago-aquatica													< 1%																									
Anthemis cotula																										< 1%						20%	8%			< 1%	10%	
Aveena sp.				1%						< 1%																			< 1%									
Cynodon dactylon													< 1%																							4%		
Cyperus sp.													< 1%								1%																	
Daucus carota				7%																									< 1%								4%	

Alder Creek NRDA Bank
2018 (Year 3)
Absolute Cover
Plot Data

Plant Species	Absolute Cover by species by Plot																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Absolute Cover	80%	70%	75%	65%	85%	55%	65%	80%	80%	90%	75%	70%	55%	20%	70%	70%	60%	65%	60%	70%	60%	35%	50%	40%	90%	75%	60%	25%	85%	80%	45%	70%	85%	95%	75%	45%	35%	65%
Dipsacus fullonum					2%		< 1%		1%	< 1%				< 1%																								
Festuca perennis		2%		1%			1%			9%	2%	2%					2%					9%																
Holcus lanatus		2%	1%	1%		14%				9%	20%	< 1%				2%	< 1%																				
Lamium purpureum																	0%																				1%
Leontodon taraxacoides				1%	0%																																
Leucanthemum vulgare	0%			1%	0%				1%																												< 1%
Lotus corniculatus		2%	16%	< 1%	11%	1%	15%	53%		9%	33%	10%		5%	2%	10%	24%	41%	43%	2%	1%	15%																
Matricaria discoidea																																						< 1%
Mentha pulgium					< 1%				< 1%				2%								1%		15%	11%	2%	27%		3%			8%	20%	19%			10%		16%
Plantago lanceolata				1%																			1%	1%							< 1%							6%
Plantago sp.													2%												0%													
Polygonum aviculare																					6%																	
Polygonum hydropiper																							6%	11%	23%			16%			8%	8%	19%			17%		
Polygonum persicaria																					1%																	
Rumex sp.										< 1%			0%	< 1%							1%			1%	2%				< 1%					< 1%				
Senecio sylvaticus										< 1%																												
Senecio vulgaris									1%								< 1%					< 1%																< 1%
Tanacetum vulgare					28%				7%																												1%	
Trifolium arvensis																	9%			2%		9%																
Verbascum thapsus									0%																												< 1%	
Vulpia sp.			< 1%																																			
Xanthium strumarium																								4%	2%	11%					8%	2%						
Invasive Herbaceous																																						
Abutilon theophrasti																					< 1%			< 1%														
Amorpha fruticosa													< 1%																							< 1%		
Cirsium arvense																										< 1%			< 1%									
Cirsium sp.					2%				0%																< 1%													< 1%
Cirsium vulgare																	0%																				< 1%	
Convolvulus arvensis													< 1%								< 1%		< 1%	1%	< 1%						1%	8%	19%			1%		1%
Hypericum perforatum																																					1%	
Linaria vulgaris																													< 1%								< 1%	
Lythrum salicaria																											< 1%											
Phalaris aquatica																																			< 1%			
Rubus armeniacus	2%		0%	1%					1%				32%														1%		< 1%		< 1%		< 1%					6%
Reed Canarygrass																																						
Phalaris arundinacea	< 1%	< 1%	< 1%	< 1%			< 1%			< 1%	< 1%		1.5%												< 1%	2.1%			< 1%	< 1%			1.5%		9.2%			6.5%
Invasive Woody																																						
Crataegus monogyna	0%																																					
Cytisus scoparius				< 1%																									< 1%								1%	

APPENDIX 6

Fish Monitoring

&

Bird Assemblage Memo

2018 Avian & Fish Monitoring for the Alder Creek Restoration Project

PREPARED FOR: Wildlands

PREPARED BY: Turnstone Environmental Consultants, Inc.

DATE: December, 2018

Introduction

Wildlands retained the services of Turnstone Environmental Consultants, Inc. (Turnstone) to conduct fish and wildlife monitoring in 2018 for the Alder Creek Restoration Project. Turnstone conducted (1) fish monitoring to document the presence of juvenile salmonids within the created side channels, and (2) bird assemblage monitoring to document species occurrences, proportionate species abundances, species richness, and changes over time.

Survey Methods

Turnstone project principal-in-charge, Jeff Reams, and project manager/lead biologist, Daphne Day, worked with biologists Jordan Gomes and Jacob Taylor to complete all monitoring activities.

Point Count Surveys

Biologists conducted surveys at point locations established by Wildlands once per month in April, May and June, following the survey guidelines outlined by Huff, et al (2000). At times, some established stations were underwater due to tide conditions; in these cases, the biologist surveyed as close to the station as possible. Surveys were conducted between sunrise and 10:00 A.M. and only under favorable conditions; if high winds, heavy rain, or other environmental conditions resulted in poor bird detectability then the survey would be postponed. All birds detected during the five-minute survey at each station were recorded; if possible, adult and juvenile birds were identified and recorded separately. Individuals were counted only once even if seen or heard at multiple stations. Detections of birds were categorized according to the following specifications:

Typical detection 0 to 50 m:	Birds up to top of vegetation/canopy, <50 m from the station center point
Typical detection >50 m:	Birds up to top of vegetation or canopy, >50 m from the station center point
Fly-over associated:	Birds above top of vegetation or canopy, but in observer's judgment are associated with the local habitat
Fly-over independent:	Birds above top of vegetation or canopy, and in observer's judgment are unassociated with the local habitat

Fish Monitoring

Monitoring was conducted at standard locations within the newly created channels two times per month from February through May. Specific monitoring days were scheduled to account for weather and other ecological factors and were rescheduled as necessary based on field conditions. Biologists conducted visual shoreline surveys combined with underwater video recording (GoPro). During monitoring, habitat conditions were recorded, including any aquatic plants (species, location, and relative abundance), shade, cover, depth, substrate, and water quality (including water temperature, dissolved oxygen, turbidity). Water quality measurements were taken where fish monitoring occurred and at locations in the Willamette River and Multnomah Channel adjacent to the Project site.

Results

Point Count Surveys

Surveys were conducted on April 19, May 21, and June 22 of 2018. The most abundant species overall were cliff swallow (*Petrochelidon pyrrhonota*), savannah sparrow (*Passerculus sandwichensis*), barn swallow (*Hirundo rustica*) and tree swallow (*Tachycineta bicolor*, Figure 1)[1]. The average total number of species detected over the three visits was 45 and the average total number of individuals was 224[2] (Figure 2). The average proportion of nonnative individuals overall was three percent (Figures 3 and 4).

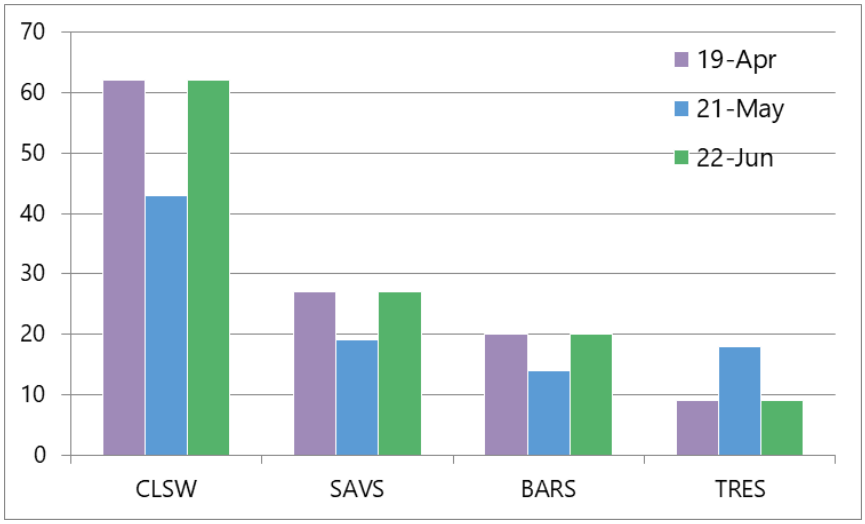


Figure 1. Top species counted in point count surveys, by total overall abundance

[1] Excluding Canada goose, which was only detected in independent flyover observations.
[2] Summaries include both typical and flyover detections.

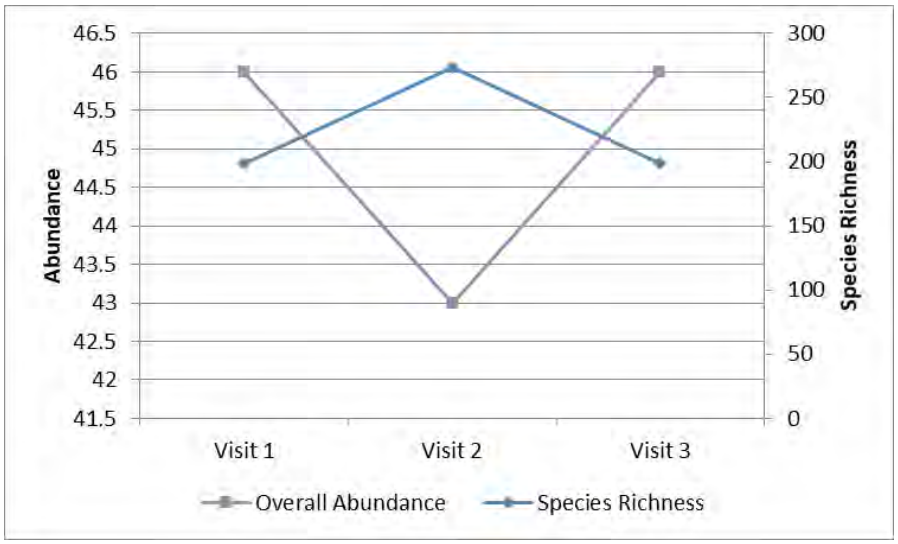


Figure 2. Species Abundance and Species Richness, by visit

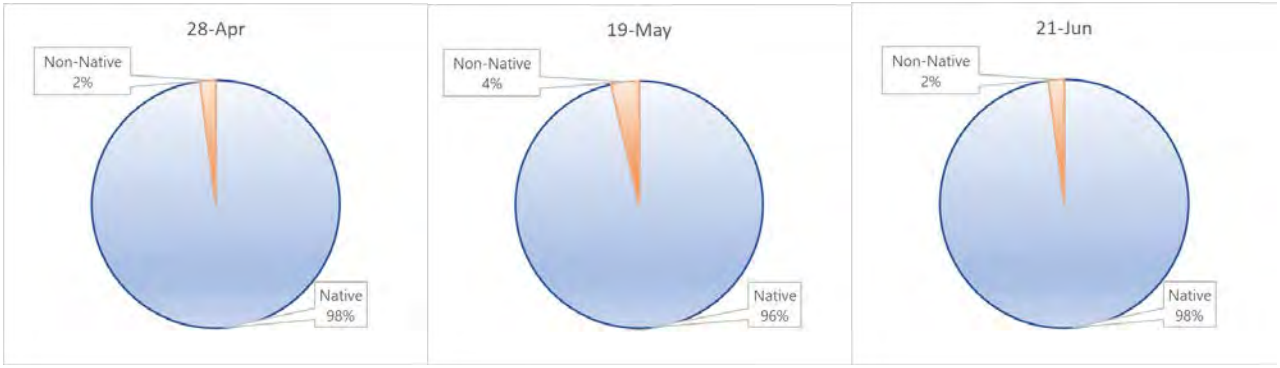


Figure 3. Percentage of native and non-native species by visit

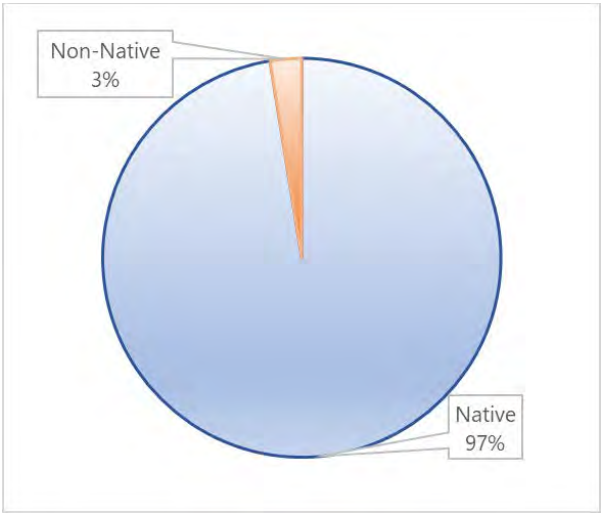


Figure 4. Percentage of native and non-native species over all visits

Fish Monitoring

Details on the eight fish monitoring visits are outlined in Table 1 below. No juvenile salmonids were observed. Other species observed include largescale sucker (*Catostomus macrocheilus*), bluegill (*Lepomis macrochirus*) and a variety of other small fry. Poor visibility during visual surveys, due to high turbidity levels typical for this time of year, yielded low levels of fish observation and hindered species identification; however, detection rates did increase considerably when the GoPro camera was placed in a stationary location rather than being handled by the surveyor during the visual shoreline survey.

Table 1. Fish Monitoring Details by Visit

Date	Methodology	Underwater Visibility	Average Turbidity (NTU)[3]	Juvenile Salmonid Observation(s)	Other Species Observed
2/23	Shoreline w/ Roving GoPro	Poor	21.0	No	None
2/28		Very Poor	95.14	No	None
3/20		Very Poor	35.8	No	None
3/29		Very Poor	39.0	No	None
4/23		Poor	23.3	No	None
4/30	Shoreline w/ Stationary GoPro	Moderate	12.3	No	Largescale sucker, Unknown1
5/21		Moderate	11.2	No	Bluegill, Unknown2
5/31		Moderate	16.5	No	Unknown1/3/4/5

Unknown1 = Largescale sucker or dace species (Cyprinidae family)
Unknown2 = Banded killifish (*Fundulus diaphanus*) or mosquitofish (*Gambusia affinis*)
Unknown3 = Likely dace species, difficult to ID from dorsal perspective. Not a salmonid.
Unknown4 = Difficult to ID from dorsal perspective. Not a salmonid.
Unknown5 = Not a salmonid. Possible killifish

References

Huff, Mark H.; Bettinger, Kelly A.; Ferguson, Howard L.; Brown, Martin J.; Altman, Bob. 2000. A habitat-based point-count protocol for terrestrial birds, emphasizing Washington and Oregon. Gen. Tech. Rep. PNW- GTR-501. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 39 p.

[3] Average turbidity of all measurements on site and adjacent to the site.

APPENDIX 7

Credit Ledger

ALDER CREEK RESTORATION PROJECT
CREDIT INVENTORY LEDGER

Date of Transaction	Alder Creek Contract No.	Credit Purchaser Name Address Phone Number Contact	Reference Number (if applicable)	734.2 Total DSAYs Authorized[1]			Accepted for use in a Settlement? Y/N	Endowment Amount
				# Released for Sale	# Sold and Debited[2]	# Remaining for Sale		
2/25/2015	n/a	15% Initial Credit Release (Deed Restriction & Securities)	n/a	112.45		112.45	n/a	$ -
3/23/2015	ACRP-15-01	City of Portland 1221 SW Fourth Ave., Room 430 Portland, OR 97204 Jan Betz, (503) 823-4047	n/a		35.00	77.45	N	$ 30,170.00
12/1/2017	n/a	35% Second Credit Release (As-Built Drawings)	n/a	255.01			n/a	$ -
		Total Number of Credits Credited/Debited		367.46	35.00			
		Total Number of Remaining Credits Available for Sale				**332.46**		**$ 30,170.00**

[1]A modified total of 734.2 DSAYs are subject to the Credit Release Schedule (Exhibit E of the Restoration Plan)

[2]Any mitigation requirement specified as an acreage amount shall be deducted from the available Credits/DSAYs at a ratio of 1 acre = 14.34 Credits/DSAYs.

APPENDIX 8

Revised Monitoring Methods Memorandum

WILDLANDS
310 SW 4th Avenue, Suite 830
Portland, OR 97204
(503) 241-4895
www.wildlandsinc.com

MEMORANDUM

TO:	FROM:
Portland Harbor Trustees	Julie Mentzer
CONTACT:	PROJECT NAME:
Megan Callahan Grant, NOAA Megan Hilgart, NOAA Lauren Senkyr, NOAA	Alder Creek NRDA Bank
RE:	DATE:
Revised Monitoring Methods	February 6, 2020

All,

The following are proposed changes to monitoring methods for the Alder Creek NRDA Bank based on the comments provided.

- In order to determine if changes of more than 10% in active channel margin (ACM) acreage from the as-built surveys have occurred, we propose the following method: For Years 3 and 5, additional elevation points will be taken along elevation 20 to determine if the acreage of active channel margin (ACM) has changed by 10% or more. However, as tree and shrub cover increases, surveying along elevation 20 may be increasingly difficult. If dense tree and shrub cover prohibits surveying along elevation 20, visual surveys will be conducted in Years 7 and 10 to record any observed changes. In addition, elevations will be recorded along the original transects to determine if the width of the ACM has changed along the transects.
- In order to determine whether changes of more than 20% in side channel depths from the as-built surveys have occurred and whether changes of more than 10% in side channel acreage has occurred, we propose to take elevations along additional cross sections across the side channels and at the mouths of the connections. See attached map for proposed cross section locations.
- Wildlands anticipated using a drone to capture aerial photos of the site during high flow/high water for years 2017 and on; however, after several attempts it became clear that because drones are not able to be used in windy or rainy conditions and aerial photos of the site cannot be captured in cloudy conditions, the likelihood of capturing photos of high water conditions by drone are very low. In addition, there is no way to know (until after the year is over) whether a particular high water event is the highest water event of the year. Similarly, satellite photo coverage can be quite sparse during high water events for the same reasons; however, satellite photos were available either during the high water events or within a few days of the event for years 2017, 2018, and 2019 to show the water levels during that specific event. While it is unlikely that aerial photos taken at the moment of highest flow/highest tide can be obtained, the photo corresponding nearest to the date of the high water event for that year will be used and the water level that is captured by the photo will be translated to GIS to calculate the acres of inundation when the photo was taken. The information obtained from the satellite photos will be compared to the Columbia Slough gauge data for accuracy. This will be done for Years 2 (2017), 3 (2018), 4 (2019), and 5 (2020).

- In order to monitor water elevation levels on the site, we have been using the Columbia Slough gauge data in place of installing data loggers on the site. The USGS station at Columbia Slough has been determined to accurately and reliably provide a published record of the conditions and water levels at the Alder Creek Restoration Project. This station is located approximately 2 miles down-river of the Project site. To determine the accuracy of this published data, the river elevation at the Project site has been surveyed on numerous occasions between 2010 and 2016 by both Wildlands' staff and by licensed surveyors from AKS Engineering and Forestry. The surveyed river elevation data has been compared to the closest published 15-minute interval "gage height" at the USGS Columbia Slough station. It has been found to accurately match with the survey data, with an average difference of less than 0.02 feet. Historic water data from this station can be downloaded and a clear picture of the hydrology of the Project site can be determined. The Columbia Slough gauge provides an excellent representation of water elevations at Alder Creek. In order to use data loggers on the Project site, the data loggers would need to be deployed during low water (e.g., September or October) and not retrieved until the following year. Retrieving the data loggers during high water conditions (late-fall through early summer) would be too dangerous. While the data logger battery could be expected to last throughout the high water season, there is a high likelihood that an onsite data logger would be damaged during high water (e.g. being bent or from floating debris during flood events) to the point of compromising accuracy. For these reasons, water level data loggers were not installed on the Project site. Data from the USGS water data station at Columbia Slough was used to document the water levels on the Project site during 2016, 2017, 2018, and 2019 and will be used in 2020 along with satellite photos. Because this data is available at any time throughout the year regardless of river level or weather, Wildlands' staff can use it to reference the water level and compare it to onsite conditions during field visits.
- Due to the issues encountered with taking aerial photos by drone or obtaining satellite photos of high flow/high water (as discussed above), Wildlands proposes to install two data loggers onsite in October 2020 when water levels are expected to be the lowest of the year. While there remains a high likelihood that onsite data loggers could be lost or damaged during high water to the point of compromising accuracy, Wildlands is willing to try this method in 2020 and beyond rather than rely on satellite imagery which encounters similar issues as drone photos with regards to wind, rain, and cloud conditions. The monitoring reports for years 7 and 10 will include information collected from the data loggers (assuming they were not lost or damaged) during that year and Columbia Slough gauge data in place of aerial photos during high water.
- For vegetation monitoring, an absolute percent cover value for each species documented in a plot will be provided. (i.e., providing an absolute percent cover value for each species documented in a plot, instead of using the relevé method/cover classes).

- Alternative fish monitoring methods: Wildlands spoke with Paul Ketcham of the City of Portland several times regarding the potential to participate in the City's ongoing fish survey efforts. Unfortunately, after much discussion, it was determined that in order to add Alder Creek to the City's fish monitoring efforts, the City would need Wildlands to obtain a separate Section 10 permit from NOAA and USFWS for any fish monitoring with potential to harm fish. Other alternative methods were discussed with our consultant, but it was determined that the high level of turbidity in the water makes any type of visual survey unlikely to yield significant results. As a result, Wildlands proposes to continue with visual and GoPro surveys conducted from the shoreline, but to discontinue snorkel and boat surveys since these methods result in additional turbidity which further decrease the visibility on the site.
- Wildlands will input each year's monitoring data into the Trustee Council's database by December 31 of the following year.

Please let me know if you have any questions or comments on the revised methodologies described above. Unless the Trustee Council has further comments, these are the monitoring methods that Wildlands will use in future monitoring years.

Thank you,
Julie Mentzer