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Alder Creek Restoration Project

2017 Monitoring Report Year 2

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Reporting Period	November 1st of the preceding year (2016) through October 31st of the current year (2017).

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 2 Habitat Monitoring Report/Annual Report for the Alder Creek Project

I. OVERVIEW

This report serves as the second (Year 2) 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 (2016) through October 31st of the current year (2017). This report documents the second 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.

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.

E. PERFORMANCE STANDARDS

The performance standards for Year 2 include habitat structure monitoring, installed vegetation monitoring, invasive plant species including reed canarygrass, and photo documentation. The performance standards for Year 2 have been met. As a result of Year 2 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 developing as expected. 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.

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, 2016 to October 31, 2017) is discussed further in the "Habitat Data/ Results" section.

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

At this time no additional corrective or remedial actions are recommended. Invasive species management activities will be ongoing.

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. Water level data loggers should be placed at a minimum of two locations and, if feasible, data should be collected continuously. If continuous monitoring is not possible, an alternative monitoring schedule should be discussed with Trustee Council representatives.

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). 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 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 snorkel surveys or beach seining. Beach seining will only be conducted until juvenile salmonids are captured. Once juvenile salmonids are captured, beach seining will no longer continue. Snorkel surveys may continue through the remainder of the monitoring period, as feasible.

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 1, 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.

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 2 monitoring. See below for details on the monitoring completed in Year 2. A table listing all Year 2 performance standards and monitoring results in included as Appendix 1.

A. MONITORING RESULTS

1. AERIAL PHOTO INTERPRETATION

Aerial photography on the Project was not required in Year 2 (2017). Aerial photography on the Project will continue in Year 3 (2018)

2. PHOTO DOCUMENTATION

A total of 10 permanent photo points were 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 29, 2017 from each photo point. A map of the photo points and corresponding photos can be found in **Figures 4a -4b**. Photo-documentation will continue during Year 3 (2018).

3. HYDROLOGY AND GEOMORPHOLOGY

On-site visual surveys throughout 2017 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 **Figures 5a**).

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 5b**). The water level data for the Reporting Period shows that river elevations in June and July were somewhat lower than average, while the rest of the year fell within the range of average with the exception of a spike in November/December. 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. Channel connections have remained open through 2017 and are not blocked or clogged from sediments or debris.

Wildlands' staff attempted to use a drone to take aerial photos of high water events during the 2017 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 4/3/2017 (see Figure 5c) which was just a few days after the highest water event of 2017. 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 that the entire ACM (20.01 acres) was inundated on 4/3/2017. The information obtained from the satellite photos was compared to the Columbia Slough gauge data for accuracy. The Columbia Slough gauge data (converted to NAVD88) shows an approximate water level of 21.2 feet on 4/3/2017 (the day the aerial was taken) and the high water level of 22.5 on 3/27/17.

4. NATIVE VEGETATION

Emergent Marsh

Vegetation monitoring of the emergent marsh was conducted on September 19, 2017. Although there were no performance standards associated for Year 2, native herbaceous and invasive herbaceous cover is progressing towards the Year 5 performance standard. Native herbaceous cover was observed at 32.16% and invasive herbaceous cover was observed at less than 1% (**Appendix 3**). Vegetation monitoring of the emergent marsh will continue in Year 3 (2018).

Table 4.

Emergent Marsh			
	Year 5 Performance Standard	Measured Yr. 2	Meets Standards?
Native Vegetation	≥30%	32.16%	Yes
Non-Native Vegetation		2.39%	
Invasive Vegetation	≤ 10%	0.11%	Yes
Phalaris arundinacea		0.00%	
Woody Vegetation		0.14%	
Unknown Dead / Plant Debris		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 24-25, 2017. The ACM is currently meeting all associated performance standards for

Year 2. During surveys 1,465 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 8 tree species and 8 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 (**Appendix 4**). Native herbaceous cover (excluding woody species) was observed at 13.91% cover and invasive herbaceous cover (excluding reed canarygrass) was <1% cover (**Appendix 5**). The observed cover requirements meets the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standards. Vegetation monitoring of the ACM will continue during Year 3 (2018).

Table 5.

Riparian Scrub Shrub and Riparian Forest (ACM)			
	Performance Standards Years 2-5	Measured Yr. 2	Meets Standards?
Native Vegetation	≥ 10%	13.91%	Yes
Non-Native Vegetation		16.78%	
Invasive Vegetation	≤ 10%	0.78%	Yes
Invasive Woody Vegetation	≤ 10%	0.00%	Yes
Phalaris arundinacea		0.16%	
Woody Debris		3.13%	
Woody stems / acre	≥ 1200	1465	Yes
Native Woody Species (Scrub-Shrub)	≥ 5	16	Yes
Native Trees (Riparian Forest)	≥ 3	8	Yes
Native Shrubs (Riparian Forest)	≥ 5	8	Yes

Riparian Forest and Cottonwood-Dominated Upland Forest

Vegetation monitoring within the riparian forest and cottonwood-dominated upland forest was conducted on July 24-25, 2017. The riparian forest and cottonwood-dominated upland forest is currently meeting all associated performance standards for Year 2. During surveys 1,633 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 9 tree species and 12 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. Native herbaceous cover (excluding woody species) was observed at 33.77% cover, invasive herbaceous cover (excluding reed canarygrass) was < 1% cover, and invasive shrubs 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 3 (2018).

Table 6.

Riparian Forest and Cottonwood-dominated Upland forest			
	Performance Standards Years 2-5	Measured Yr. 2	Meets Standards?
Native Vegetation	≥ 10%	33.77%	Yes
Non-Native Vegetation		16.60%	
Invasive Herbaceous Vegetation	≤ 10%	0.77%	Yes
Invasive Woody Vegetation	≤ 10%	0.60%	Yes

Phalaris arundinacea		1.40%	
Woody Debris		0.00%	

Woody stems / acre	≥ 1200	1633	Yes
Native Trees	≥ 3	9	Yes
Native Shrubs	≥ 5	12	Yes

Oak-Dominated Upland Forest

Vegetation monitoring within the riparian forest and cottonwood-dominated upland forest was conducted on July 24-25, 2017. The oak-dominated upland forest is currently meeting all associated performance standards for Year 2. During surveys 775 trees per an acre were observed, meeting the minimum of 500 trees per an acre. A total of 6 tree species and 6 shrub species were observed (Appendix 4). This meets the 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 40.5% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover, and invasive shrubs 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 3 (2018).

Table 7.

Oak-Dominated Upland Forest			
	Performance Standards Years 2-5	Measured Yr. 2	Meets Standards?
Native Herbaceous Vegetation	≥ 25%	40.50%	Yes
Non-Native Vegetation		11.29%	
Invasive Vegetation	≤15%	0.21%	Yes
Invasive Woody Vegetation	≤15%	0.00%	Yes
Phalaris arundinacea		0.50%	
Woody Debris		0.00%	
Trees / Shrubs per acre	≥ 500	775	Yes
Native Tree Species Richness	≥1	6	Yes
Native Shrub species Richness	≥4	6	Yes

5. LARGE WOODY DEBRIS AND OTHER HABITAT FEATURES

Large woody debris monitoring took place on September 21, 2017. A total of 74 pieces of large woody debris were observed on the project in 2017. Of those, 43 were identified as being originally installed LWD and the remaining 31 as being naturally recruited. Currently the Project is exceeding the 80% required LWD retention performance standard for Year 2. Photos of the LWD observed during surveys can be found in **Figure 6**. 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 3 (2018).

6. INVASIVE SPECIES MONITORING

Invasive species monitoring occurred in the spring on May 23, 2017 and in the summer/fall concurrent with vegetation surveys on July 24-25 and September 19, 2017. 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 2017 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). No chemical treatment was used in 2017; however, herbicides along with hand/mechanical removal will likely be used in future years as necessary to control invasive plant species.

During 2017, 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 1 individual of Japanese knotweed were identified (See **Figure 7**). All instances of these species were removed.

Reed Canarygrass

Reed canarygrass was treated aggressively in the years prior to construction. In 2016, 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.

Table 8.

Invasive Plant Species			
	Performance Standards Years 1-5	Measured Yr 2	Meets Standards?
Reed Canarygrass (*Phalaris arundinacea*)	≤ 30%	<1%	Yes
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

7. FISH MONITORING

Fish monitoring was conducted by Staff Biologists from Turnstone Environmental from February 21 through May 30, 2017. During surveys on February 21, 2017 a single juvenile salmonid was captured during beach seining activities. All subsequent surveys were conducted by walking the shoreline, snorkeling, and/or using a GoPro video camera for a video survey. No other salmonids were observed during surveys (**Appendix 6**). Fish monitoring will continue in Year 3 (2018).

8. OTHER WILDLIFE MONITORING

Bald Eagle

Bald eagle monitoring is scheduled to begin in the latter half of December 2017 and continue through August 2018 (comprising the Year 3 monitoring event).

Bird Assemblage Surveys

Bird assemblage monitoring was conducted by Staff Biologist from Turnstone Environmental once a month from April 2017 to June 2017 (**Appendix 6**). Bird assemblage monitoring will continue in Year 3 (2018).

Mink Surveys

Mink surveys are scheduled to begin in 2018 (Year 3).

Lamprey Surveys

Lamprey surveys were conducted by U.S. Fish and Wildlife in 2017.

9. GENERAL INSPECTIONS

Regular site visits were conducted at least once per month in 2017 by Greg Lohse of Wildlands. Wildlands' land management specialists conducted weekly site visits. 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. Future monitoring is expected to demonstrate the diversity and vigor of restored habitats onsite, and to show that the Project is meeting performance standards. 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 2 funding in the amount of $27,291.38 was provided at the end of December 2016.

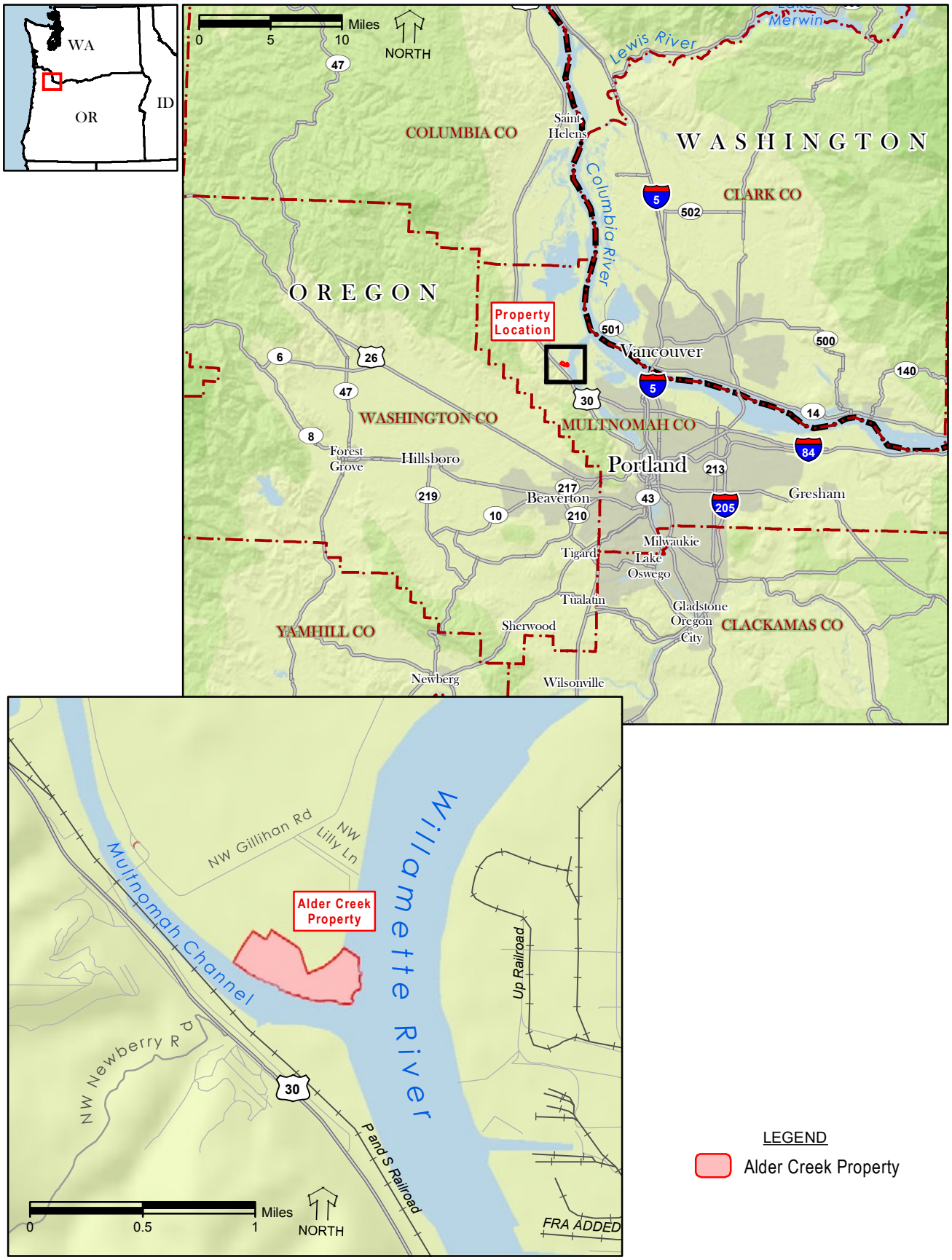
- Lamprey Monitoring Funding – A total of $33,550 for lamprey monitoring funding for Year 2 was provided in two separate payments: $14,790 to The Confederated Tribes of Grand Ronde in November 2017 and $18,760 to US Fish and Wildlife Service in August 2017.

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) or Year 2 (2017).

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.

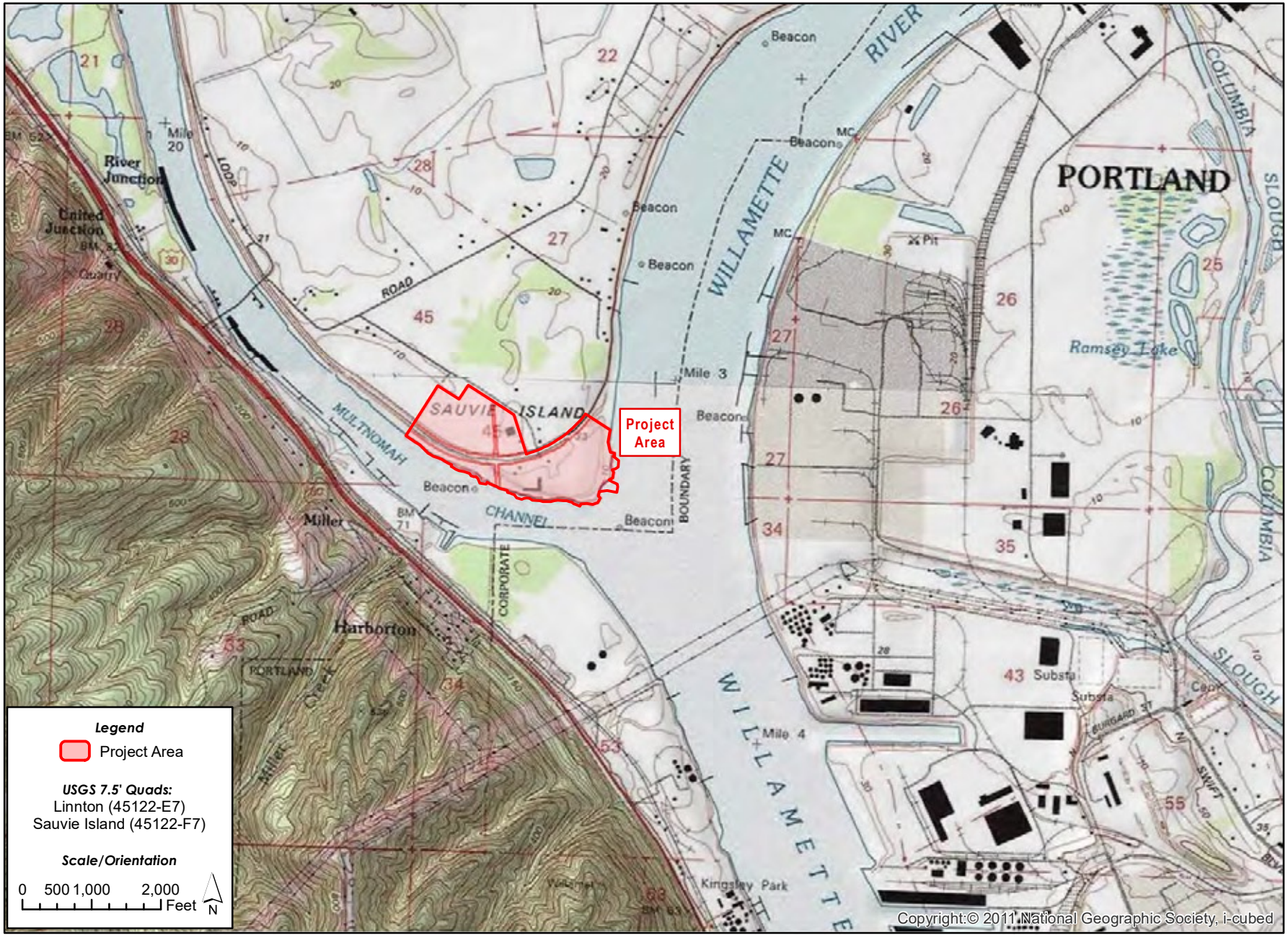
Figures



WILDLANDS

Alder Creek Restoration Project
2017 Monitoring Report

Figure 1
Location Map



WILDLANDS

Alder Creek Restoration Project
2017 Monitoring Report

Figure 2
USGS Quad

WILDLANDS

Alder Creek Restoration Project
2017 Monitoring Report

Figure 3
Post-construction Monitoring

WILDLANDS

Alder Creek Restoration Project
2017 Monitoring Report

Figure 4a
Post-construction Photo Map

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

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West

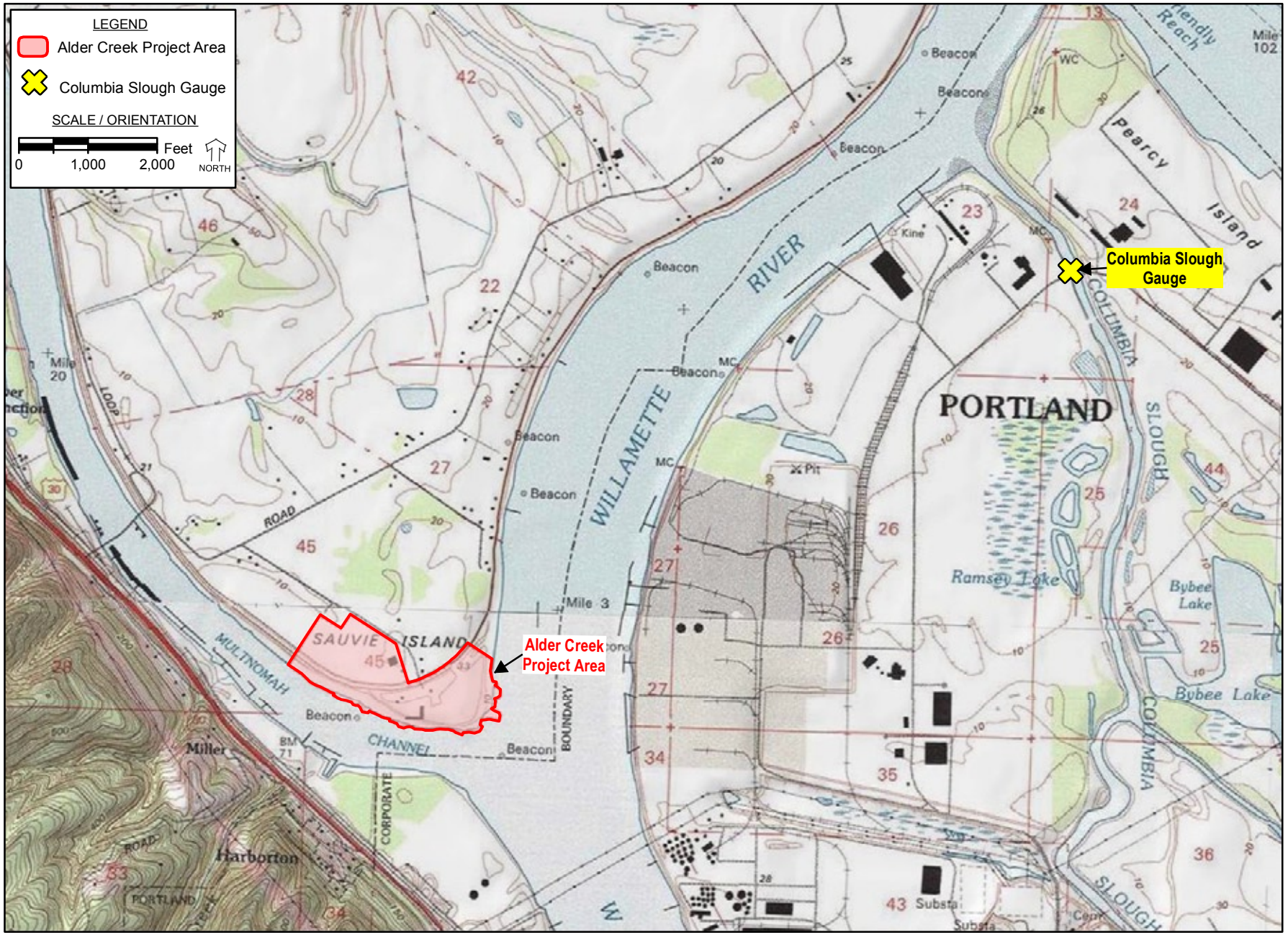
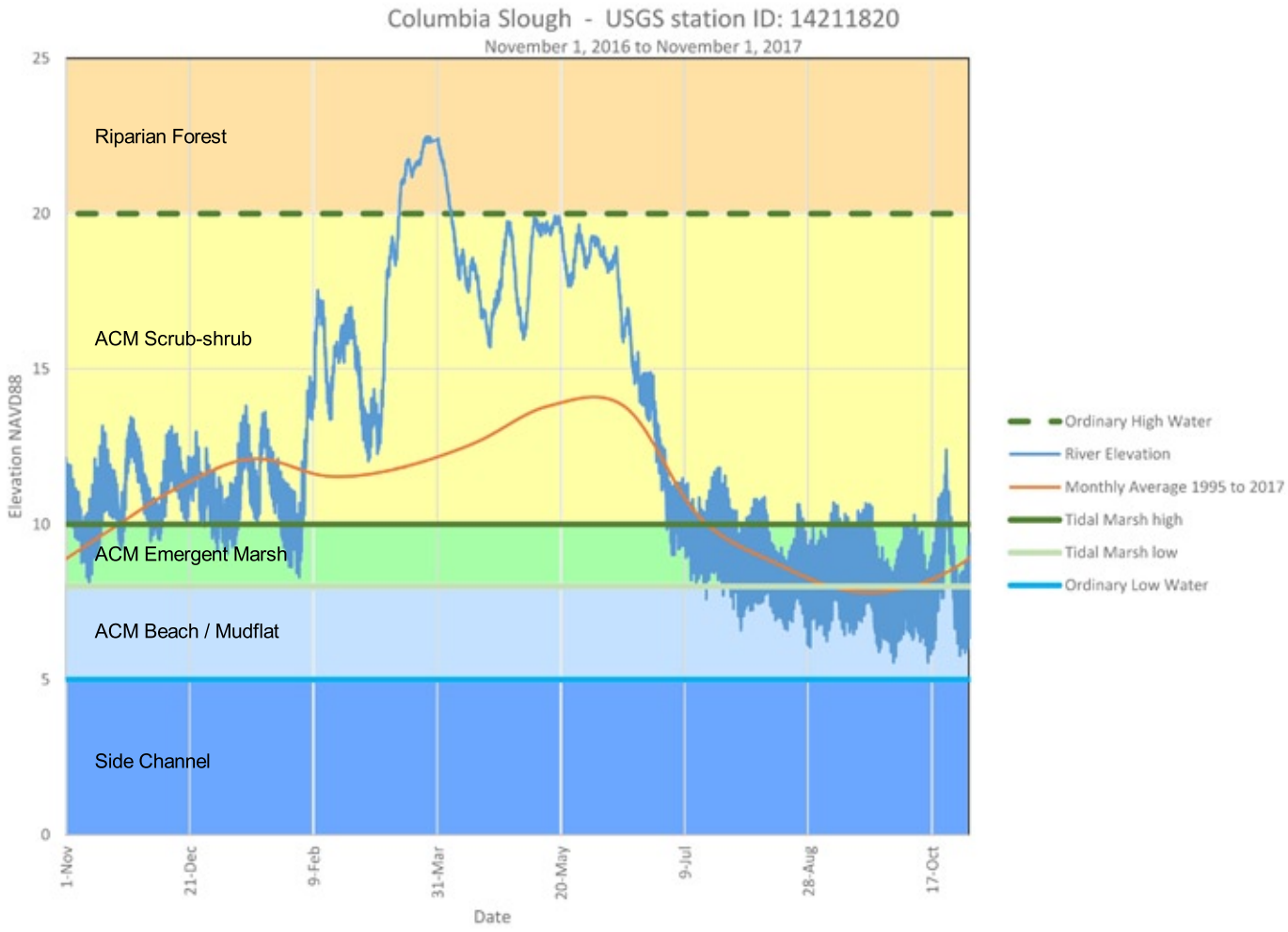


Figure 5a
Columbia Slough Gauge Station Location


Columbia Slough - USGS station ID: 14211820
November 1, 2016 to November 1, 2017
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 2017
Tidal Marsh high
Tidal Marsh low
Ordinary Low Water

WILDLANDS

Alder Creek Restoration Project
2017 Monitoring Report

Figure 5c
Aerial Photo Taken on 04/03/2017

Figure 6
Large Woody Debris


LYSA T
IRPS T
LYSA T
IRPS T
LYSA T
FAPA
X
Willamette River
Multnomah Channel
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

APPENDIX 1

Performance Standards

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2017
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.	**Not Required -** Topographic surveys were not required in Year 2 (2017). Topographic surveys will continue in Year 3 (2018).
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 3 (2018).
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, 2017 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 31 observed on the Project through natural recruitment. Large woody debris monitoring will continue in Year 3 (2018).
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.	**Not Required** - Aerial photography of the site was not required in Year 2 (2017). Aerial photography of the site will continue in Year 3 (2018).
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. This station has been determined to accurately and reliably provide a published record of the conditions and water levels at the Alder Creek site at 15-minute intervals. The results were depicted on Figure 7 of the Year 2 monitoring report.

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2017
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 2017. Reed canarygrass monitoring will continue in Year 3 (2018).
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		**Met** – The entire site was walked to locate any species on the "zero-untreated" list. During Year 2, purple loosestrife, yellow flag iris, and 1 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 2017
Invasive Plant Species		
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 19, 2017. Although there are no performance standards for Year 2, native herbaceous cover and invasive herbaceous cover is currently progressing towards the Year 5 performance standard. Native herbaceous cover was observed at 33.6% and invasive herbaceous cover was observed at less than 1%. Emergent marsh monitoring will continue in Year 3 (2018).
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 24-25, 2017. The ACM is currently meeting all associated performance standards for Year 2. During surveys 1,465 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 8 tree species and 8 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 23.5% cover and invasive herbaceous cover (excluding reed canarygrass) was <1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standards.
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 24-25, 2017. The riparian forest and cottonwood-dominated upland forest is currently meeting all associated performance standards for Year 2. During surveys 1,633 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 9 tree species and 12 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 34.2% cover, invasive herbaceous cover (excluding reed canarygrass) was 1.4% cover, and invasive shrubs 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 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.	**Met**- Monitoring of the oak-dominated upland forest was conducted July 24-25, 2017. The oak-dominated upland forest is currently meeting all associated performance standards for Year 2. During surveys 775 trees per an acre were observed, meeting the minimum of 500 trees per an acre. A total of 6 tree species and 7 shrub species were observed. This meets the 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 40.5% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover , and invasive shrubs was <1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard.

APPENDIX 2

Maintenance Log

Alder Creek

Maintenance Log

Year 2 (2017)

Site Name (Primary Column for internal use)	Site Name	Visited By: (Name/Initials)	Visit Date:	Primary Purpose of Visit	Biological/invasives/habitat observations	Notes	Fencing	Signage	Trash & Trespass	Invasives	Comments
Alder Creek Project	Alder Creek Project	Tyler McRae	03/31/17	Maintenance/land management	Observed 2 river otters on N. end of multnomah channel side of property. Bald eagles, pairs of eagles, and osprey, among other shore and wetland birds were noted as well. Scotch broom, hemlock, and canary grass were primary targets this week	Water level is very high, obscuring most of the lower planting areas. Invasives are growing fast and planted species are leafing out well.	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	04/07/17	Maintenance/land management	Observed bald eagles, osprey, turkey vultures and great blue heron regularly. Invasives on the site are mapped and scotch broom and canary grass were targeted this week		Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	04/14/17	Maintenance/land management	Invasive iris just starting to come up at the site.	Noted bald eagles, osprey, turkey vultures and assorted shore and song birds. Pacific tree frogs are more numerous than previous weeks.	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	04/21/17	Maintenance/land management	New-to-site brassica (barbarea verna?) popping up across site, not a concerning presence	Bald eagles and osprey common	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	05/05/17	Maintenance/land management	Eagles and osprey, a new frog species, blooming scotch broom		Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	05/19/17	Maintenance/land management	Jumping juvenile fish, an abundance of frogs, many eagle and osprey and turkey vulture sightings	Plants are growing at a rapid rate	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	GL	05/23/17	Maintenance/land management		Invasive vegetation manage with Rogelio, Felix and the Tylers	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	06/15/17	Maintenance/Land Management	Invasive daisies blooming across site, invasive grasses flowering, Canada thistle about to bloom	Deer browse becoming a problem: taking steps to discourage browsing	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	GL and TM	06/22/17	Maintenance/Land Management		Went over current and projected work load with TM at Alder creek.	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	06/23/17	Maintenance/Land Management		Trash: removed non-functioning straw wattles. Trespass: man fishing off rocky point in built channels. Invasives: weedeated channel-side of levee, sprayed plantings with deer-browse deterrent, removed daisies	Checked	Checked	Removed (Write in Notes what was removed)	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	07/07/17	Maintenance/Land Management	Chicory and teasel and Queen Anne's lace bolted and bloomed, went through site and removed before they set seed. Quail are increasingly present	General flotsam (large items) picked up in newly exposed shoreline area.	Checked	Checked	Removed (Write in Notes what was removed)	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	07/14/17	Maintenance/Land Management	Tansy ragwort (Senecio jacobea) popping up at edges of site. No large patches, only singular plants. Biocontrol moth (cinnabar moth) present on about half the plants on site.	Swept site for tansy, tansy ragwort, teasel, and other common weeds. Attacking blackberry before it fruits.	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	08/04/17	Maintenance/Land Management	Everything trying to go to seed, loosestrife starting to appear in emergent marsh/riparian area.	Swept N enhanced area with heavy teasel growth, cruised shore for loosestrife			Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	08/11/17	Maintenance/Land Management	Lots of fish in the built channels bringing herons and osprey, hawks active on site.	Swept shore for loosestrife, cut emerging Canary grass, cleaned up N enhanced area and entryway for teasel, tansy, and other nuisance weeds, cut thistle on rocky point			Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	08/18/17	Maintenance/Land Management	Purple Loosestrife emerging in higher frequency along emergent marsh boundary	Hand-pulling purple Loosestrife before it flowers, mowed weedy levee area before it seeded again	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	08/25/17	Maintenance/Land Management		Cut English Hawthorne recruits/resprouts, cut black locust on beach, hand-pulled loosestrife on islands, mowed scrub-shrub area and beach on NW corner	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	09/01/17	Maintenance/Land Management	Marsh plants are growing! Native recruits and invasive species are emerging along with planted species.	Mowed weedy section of levee (far N), cruised shore for loosestrife, mowing lady's-thumb and relatives along built channel	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	09/08/17	Maintenance/Land Management	Sea lion off the shore on the multnomah channel side.	Picked up trash washed up along all beaches. Cruised shorelines for purple loosestrife, nightshade and other weedy species.	Checked	Checked	Removed (Write in Notes what was removed)	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	09/15/17	Maintenance/Land Management		Removed trash from islands and shoreline. Removed common weeds and purple loosestrife along shoreline	Checked	Checked	Removed (Write in Notes what was removed)	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	09/22/17	Maintenance/Land Management	Bald eagles regularly in area again	Removed new vegetative scotch broom growth, swept site for purple loosestrife	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	

Alder Creek

Maintenance Log

Year 2 (2017)

Site Name (Primary Column for internal use)	Site Name	Visited By: (Name/Initials)	Visit Date:	Primary Purpose of Visit	Biological/invasives/habitat observations	Notes	Fencing	Signage	Trash & Trespass	Invasives	Comments
Alder Creek Project	Alder Creek Project	Tyler McRae	09/29/17	Maintenance/Land Management	Beaver browse on islands and shoreline. From the tracks and teeth mark size it looks like beaver and not nutria	Cruised islands for loosestrife, cruised mounds for scotch broom and other species	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	10/06/17	Maintenance/Land Management		Sprayed anti-browse cayenne pepper mix on islands, cruised islands for invasive species. Mowed scotch broom fall growth on levee	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	11/03/17	Maintenance/Land Management	Bald eagles on site	Cruised site for late-growing scotch broom	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	11/09/17	Maintenance/Land Management	Otters on multnomah channel side.	Removed trash from shoreline, removed late-blooming weeds from shoreline (nightshade, other common field weeds).	Checked	Checked	Removed (Write in Notes what was removed)	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	11/17/17	Maintenance/Land Management		Removed trash from channel side beach. Pulled scotch broom and cruised for late-season weeds	Checked	Checked	Removed (Write in Notes what was removed)	Treated/Removed (Write in Notes what was treated/removed)	
Alder Creek Project	Alder Creek Project	Tyler McRae	11/22/17	Maintenance/Land Management		Put up trail cameras recording time lapse (1 per day) of water in the channels	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	12/01/17	Maintenance/Land Management	Eagles above and on site	Put bio bags and extra straw wattles on area where heavy rainfall is eroding a small runnel.	Checked	Checked	Checked	Checked	
Alder Creek Project	Alder Creek Project	Tyler McRae	12/08/17	Maintenance/Land Management		A few fall scotch broom individuals next to the dike on the NW end	Checked	Checked	Checked	Treated/Removed (Write in Notes what was treated/removed)	

APPENDIX 3

Emergent Marsh Quadrat Data

Alder Creek NRDA Bank
2017 (Year 2)
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
Absolute Cover	30%	5%	2%	1%	25%	85%	40%	75%	95%	85%	2%	2%	5%	35%	60%	75%	90%	95%	7%	25%	2%	5%	10%	15%	95%
Native Herbaceous																									
Bidens cernua								<1%		<1%						2%	2%								
Carex obnupta																									14%
Carex sp																				0%					
Cyperus strigosus					<1%	<1%	<1%	<1%	<1%	3%				<1%	7%										3%
Eleocharis obtusa	7%	2%	<1%		3%	10%	6%	9%	13%	13%					7%	26%	11%	3%					2%	<1%	14%
Eleocharis palustris					1%		1%					2%	4%										4%	9%	
Eleocharis sp																						1%			
Elodea nuttali			<1%		3%			0%					1%									1%		0%	
Epilobium sp															<1%										
Gylceria sp.										<1%				5%	19%			1%	1%	<1%					<1%
Hypericum sp.					3%	10%	6%	9%		13%															
Ludwigia palustris	12%	2%	2%		14%	58%	26%	53%	76%	55%	2%			13%	19%	44%	64%	88%	6%	10%	<1%	1%	2%	5%	60%
Polygonum amphibious						2%			<1%	<1%				1%	<1%	<1%	<1%								
Rumex sp														<1%											
Sagittaria latifolia	12%																								
Native Woody																									
Salix fluviatillis		<1%																		1%					
Spiraea douglasii															1%										
Cirsium sp.															<1%					0%					
Convolvus sp.														<1%	<1%										
Echinochloa crus-galli														<1%	<1%	<1%									
Mentha pulegium														<1%											
Polygonum aviculare														13%	1%										
Polygonum hydropiper					1%	2%		2%		<1%				1%	1%		11%	3%		4%					3%
Polygonum persicaria						2%										2%				10%			1%		
Solanum sp														1%											<1%
Spergula sp.									3%						1%										
Invasive Herbaceous																									
Ludwigia peploides																		1%							
Lythrum salicaria														<1%											
Myriophyllum aquaticum																								<1%	
Phalaris aquatica		<1%				<1%								<1%		<1%	<1%								
Unknown dead/plant debris																									
Unknown dead/plant debris				1%																	2%	3%			

APPENDIX 4

Woody Species Plot Data

Alder Creek NRDA Bank
2017 (Year 2)
Woody Species
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	1	0	0	2	0	4	0	1	2	2	0	1	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Alnus rubra	Red Alder	0	2	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	5	1	0	1	0	0	2	1	0	0	0	0	0	0	0	2	0	2	0	1	0
Cornus sericea	Redoiser Dogwood	0	0	0	4	1	0	0	0	6	0	0	0	0	0	0	0	1	0	0	1	2	0	5	0	0	0	2	6	0	17	12	0	0	0	0	0	0	0
Corylus cornuta	Beaked Hazel	0	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	2	2	0	0	0	1	0	0	0	0	0	0	0	0	5	0
Crataegus douglasii	Black Hawthron	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraxinus latifolia	Oregon Ash	2	2	1	10	4	2	0	1	1	2	1	3	1	1	3	5	5	8	9	5	2	9	1	11	4	1	5	2	0	0	9	22	19	16	0	8	3	4
Mahonia aquifolium	Tall Oregon Grape	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	0	0	0	0	0	0	0	0	0	0	0
Mahonia nervosa	Dwarf Oregon Grape	0	0	0	0	0	0	0	2	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 Crapapple	0	0	0	0	2	0	0	0	0	0	2	1	0	6	8	1	0	4	2	5	0	3	3	2	9	0	4	1	0	0	0	1	5	1	0	1	6	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	0	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	5	0	0	0	5	0	0	0	0	16	22	1	13	24	19	22	14	11	0	0	0	2	0	0	31	7	1	4	1	0	18	4	1	0
Quercus garryana	Oregon White Oak	0	2	0	2	0	0	5	2	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribes divaricatum	Gooseberry	0	8	0	0	0	0	0	0	2	5	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
Rosa gymnocarpa	Baldhip Rose	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	6	0	0	0	0	4	0	4	1	0	0	0	0
Rosa pisocarpa	Swamp Rose	0	0	0	0	1	0	0	0	0	0	0	0	0	8	1	0	1	1	1	4	4	3	1	3	0	4	0	7	0	0	0	0	13	1	7	2	5	4
Rubus parviflorus	Thimbleberry	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Rubus spectabilis	Salmonberry	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	0	0	0	0
Rubus ursinus	Trailing Blackberry	30	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	10	0	0	0	0	0	60	0	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	2	3	1	0	20	0	0	0	1	10	15	10	0	0	0	0
Salix lucida ssp lasiandra	Pacific Willow	0	0	2	0	0	49	0	1	4	0	0	0	1	0	0	0	4	1	3	3	3	0	12	3	1	16	2	2	0	0	3	1	2	5	5	14	6	5
Salix scouleriance	Scouler Willow	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	1	4	1	8	3	3	3	0	4	1	4	1	7	0	5	1	11
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	0	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	1	0	0	0	0	0	0	0	2	2	0	5	0	0	0	5	0	0	6	0	0	0	1
Symphoricarpos albus	Snowberry	150	12	0	0	0	2	1	7	1	5	2	2	0	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 5

Herbaceous and Invasive Cover Plot Data

Alder Creek Mitigation Bank
2018 (Year 2)
Absolute Cover
Plot Data

	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
	11%	41%	83%	63%	54%	48%	80%	37%	74%	51%	81%	31%	50%	68%	79%	78%	37%	57%	44%	39%	44%	34%	32%	19%	47%	43%	41%	29%	44%	77%	30%	55%	48%	51%	52%	20%	43%	23%
Native Herbaceous																																						
Acmispon parviflorus		20%	50%		15%	15%	60%	15%	5%	20%	65%	15%		12%	55%	50%	15%	25%	15%	12%		20%		5%								1%					5%	
Agrostis sp.		2%	2%				5%																															
Agrostis stolonifera				20%		10%		4%	2%	5%	3%			23%	10%	10%		10%	6%	7%																			
Aira sp.	1%	2%	1%						2%	5%	2%					15%					7%											1%						
Alopecurs sp.														1%				5%																				
Alopecurus saccatus	2%	3%		10%		5%		3%											5%	5%									12%						1%		10%	
Bromus sitchensis						2%																																
Carex sp.																									1%													
Crepsis sp.																					1%																	
Cyperus sp.																											3%								1%			
Deschampsia caespitosa																		5%	6%	7%																	1%	
Elymus sp.							2%			3%					5%		10%												15%									
Equisetum arevensis					1%																									1%								
Euphorbia maculata																																25%						
Glycyrrhiza lepidota																																				1%		
Gnaphalium sp																										1%									2%			
Juncus balticus						5%																																
Juncus bufonius												5%																										
Juncus sp.										1%																												
Ludwigia sp.						2%							1%									10%	4%	20%	20%	15%	25%			7%			35%	5%	1%			
Madia sativa			1%	5%									1%																									
Mentha arvensis																									2%					5%								
Oenothera biennis																													1%									
Rumex occidentalis	2%		1%			1%				1%				2%							3%								1%			4%	1%			2%		
Sonchus oleraceus																																			1%			
Typha latifolia						3%																																
Urtica dioica								3%																					3%									
Native Woody																																						
Cornus sericea																														35%								
Populus trichocarpa																														15%								
Rubus ursinus																													7%	1%					35%			
Salix scouleriana																														15%								
Non-Native																																						
Abutilon theophrasti																										1%												
Agoseris sp.																					1%																	
Alismia plantago aquatica														2%																								
Anthemis cotula	1%			1%	10%			5%						1%																								
Arctium minus																									1%	2%												
Brassica sp.																										1%							1%	3%				
Bromus tectorum				3%								1%		5%	20%	4%					12%																	
Cardaria draba														1%							15%				5%			2%			1%							5%

Cynodon dactlyon																																			1%		
Cytisus scoparius															1%	1%						1%															2%	
Daucus carota				1%									1%				1%				1%								1%						1%		5%	
Dipsacus fullonum			1%				1%		1%	1%			1%	1%							1%																	
Echinochloa crus-galli																										7%												
Filago sp.									1%				1%								1%					1%												1%
Holcus lanatus																2%	2%												1%		1%	7%	12%	7%	5%	1%	1%	
Lamium purpureum													5%											3%	1%	3%		1%			3%	10%	4%			2%		5%
Leucanthemum vulgare			1%																																		10%	
Lolium perenne				20%																																		
Lotus corniculatus		12%	10%		10%	5%	10%	15%		15%	10%	10%	12%	10%	3%		7%	12%	12%	7%	3%	10%		5%														
Matricaria descoidea																																5%	2%					
Parentucellia viscosa																																					5%	
Phalaris aqauitica					2%						1%																											
Polygonum aviculare																									12%						10%		20%			10%		
Polypogon monspeliensis				3%																																		
Portulaca oleracea																								1%			3%	1%						5%				2%
Rubus discolor					3%				3%				20%																		1%							3%
Rumex sp.					3%																																	
Senecio sp.																									5%	5%					1%	1%	2%					2%
Senecio sylvaticus									15%																	2%												
Senecio vulgaris									17%																													
Solanum dulcamara																																	1%					
Tanacetum vulgare					7%								1%								1%													1%		1%	3%	
Taraxacum officinale									17%																													
Verbascum thapsus									1%																				1%									
Xanthium strumarium																							2%	1%							1%				1%			2%
Invasive Herbaceous																																						
Cirsium arvense					1%		1%		2%				1%																2%				1%					
Cirsium sp.																										1%						1%						2%
Cirsium vulgare																	1%																				1%	
Conium maculatum																																					1%	
Convolvulus arvensis													1%																			1%	4%			1%		
Custcuta sp.																																	1%			1%		
Hieraciuam caespitosum					2%																																	
Invasive Woody																																						
Crataegus monogyna	5%																																					
Reed Canarygrass																																						
Phalaris arundinacea		2%	16%				2%								1%		1%				1%	3%													1%			1%
Woody Debris																																						
Woody Debris																							20%				20%			10%								

APPENDIX 6

Fish Monitoring

&

Bird Assemblage Memo

2017 Avian & Fish Monitoring for the Alder Creek Restoration Project

PREPARED FOR: Wildlands

PREPARED BY: Turnstone Environmental Consultants, Inc.

DATE: January 24, 2018

Introduction

Wildlands retained the services of Turnstone Environmental Consultants, Inc. (Turnstone) to conduct fish and wildlife monitoring in 2017 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 manager, Jeff Reams, worked with biologists Daphne (Swope) Day, Sarah McCord, Devin Sahl, and Russ Namitz to complete the 2017 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. Monitoring was conducted using beach seining until juvenile salmonids are captured, which occurred on the first visit. For the following visits, a combination of visual survey methodologies was utilized. Over most of these visits, biologists conducted boat-based and/or visual shoreline surveys combined with underwater video recording (GoPro). One visit was conducted using snorkel surveys combined with underwater video recording, but due to low visibility snorkel surveys were discontinued. 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 28, May 19, and June 21 of 2017. The most abundant species overall were barn swallow (*Hirundo rustica*), cliff swallow (*Petrochelidon pyrrhonota*), American goldfinch (*Spinus tristis*), American robin (*Turdus migratorius*), and European starling (*Sturnus vulgaris*, Figure 1)[1]. The average total number of species detected over the three visits was 36 and the average total number of individuals was 244[2] (Figure 2). The average proportion of nonnative individuals overall was four percent (Figures 3 and 4).

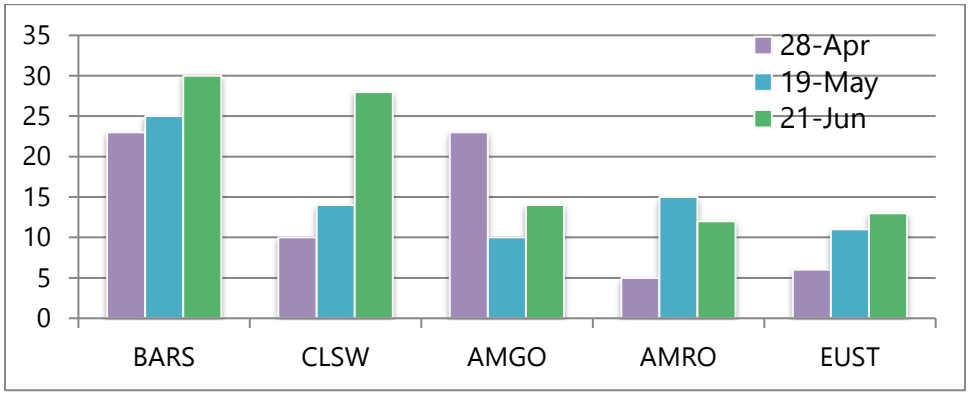


Figure 1. Top species counted in point count surveys, by total overall abundance

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

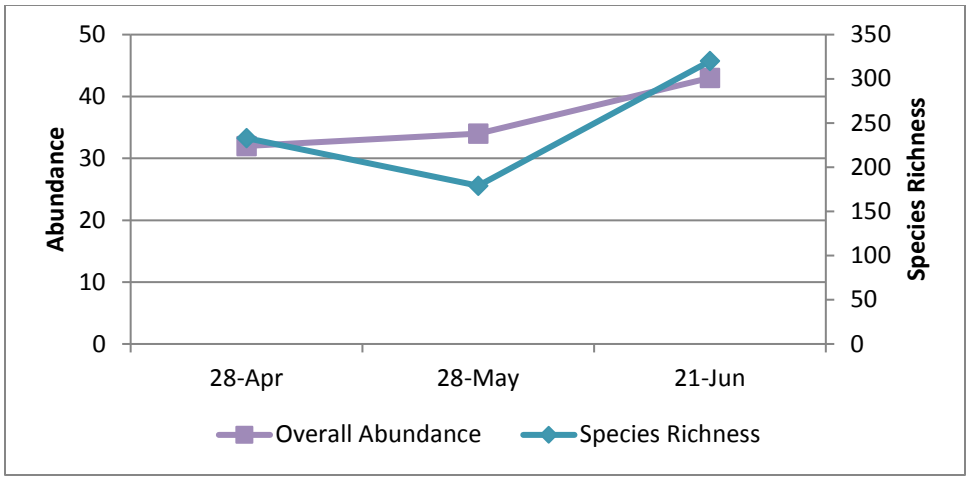


Figure 2. Species Abundance and Species Richness, by visit

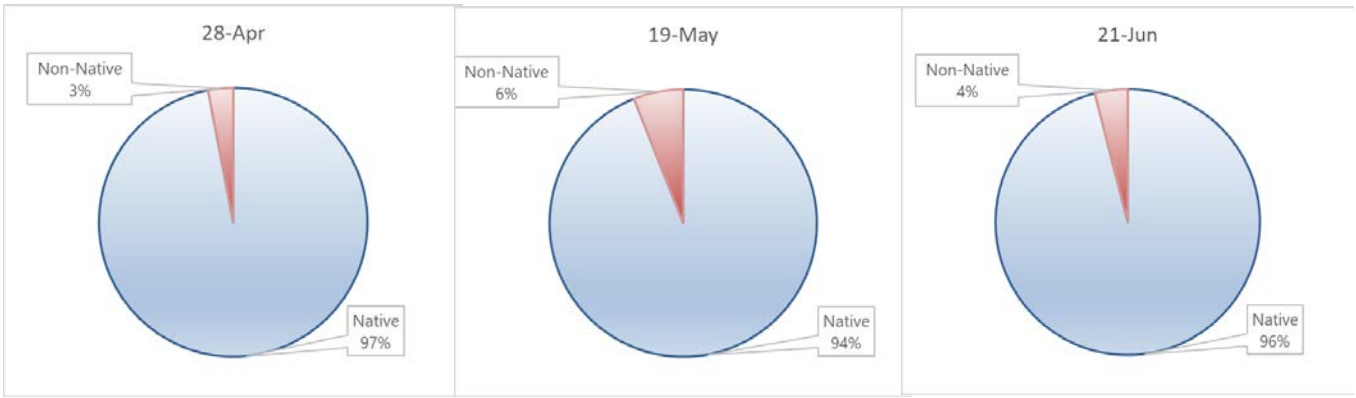


Figure 3. Percentage of native and non-native species by visit

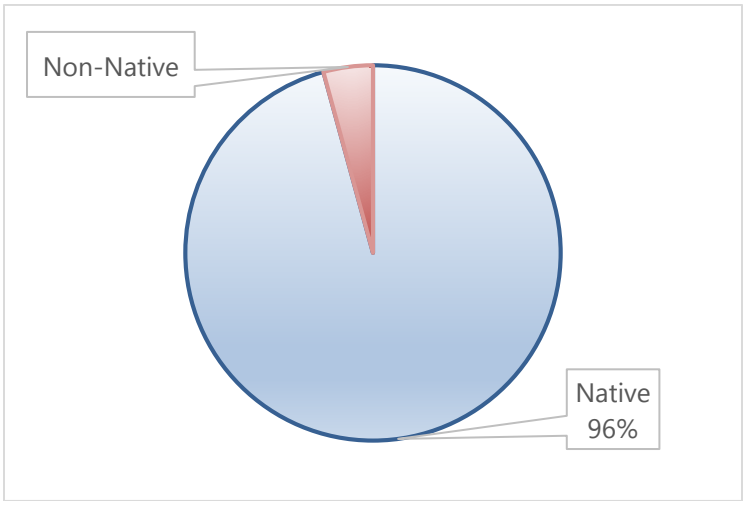


Figure 4. Percentage of native and non-native species over all visits

Fish Monitoring

Details on the eight fish monitoring visits are outlined in Table 1 below. One juvenile salmonid, a Coho (*Oncorhynchus kisutch*), was recorded during the first seining visit. Banded killifish (*Fundulus diaphanous*) were also recorded during the seining survey and while dipnetting for aquatic plants during the second visit. Poor visibility during visual surveys, due to high turbidity levels typical for this time of year, yielded low levels of fish observation.

Table 1. Fish Monitoring Details by Visit

Date	Methodology	Underwater Visibility	Average Turbidity (NTU)[3]	Juvenile Salmonid Observation(s)	Other Species Observed
2/21	Seine and boat w/ GoPro	Very Poor	62.9	Yes; 1 Coho	9 Killifish
2/27	Shoreline w/ GoPro	Very Poor	94.8	No	1 Killifish[4]
3/10	Snorkel and Shoreline w/ GoPro	Very Poor	66.3	No	None
3/27	Shoreline w/ GoPro	Poor	30.5	No	None
4/21	Shoreline w/ GoPro	Poor	31.4	No	None
4/28	Shoreline	Poor	29	No	None
5/10	Shoreline w/ GoPro	Poor to Moderate	13.3	No	1 Unknown
5/30	Shoreline/Boat w/ GoPro	Poor	18.9	No	None

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.
[4] Incidental observation while dipnetting for aquatic plants at 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.