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Alder Creek Restoration Project

2020 Monitoring Report Year 5

Wildlands PNW
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WILDLANDS

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Reporting Period	November 1st of the preceding year (2019) through October 31st of the current year (2020).

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

I. OVERVIEW

This report serves as the Year 5 (2020) 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 (2019) through October 31st of the current year (2020). This report documents the fifth 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:	Greg Lohse, Wildlands Pat Stephens, Wildlands Graham Baker, Independent Contractor

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
Upland Forest: Oak dominant	November 2019	1,200 plants/acre	1,200 plants/acre	None

* 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 5 include installed vegetation monitoring, invasive plant species including reed canarygrass, and photo documentation. As a result of Year 5 monitoring, no fish barriers were observed, invasive plant species cover is low with management ongoing, installed vegetation within the emergent marsh, scrub-shrub, and riparian forest habitats continue to progress with good survivorship and recruitment, and the site habitats are continuing to develop. Additional monitoring, not tied to performance standards, was required for some elements. More information is included below in the Habitat Monitoring Requirements and Habitat Monitoring Data/Results sections. See **Appendix 1** for a list of performance standards and the results of monitoring.

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, 2019 to October 31, 2020) is discussed further in the "Habitat Data/ Results" section.

In Year 5, 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. Year 5 monitoring identified that the emergent marsh cover for Year 5 did not meet the performance standard for native vegetation cover. In addition, the riparian forest and cottonwood-Dominant upland forest habitat did not meet the native woody species density performance standard for Year 5. See the following section for further discussion.

Graham Baker, an independent contractor, 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 fulfilling any other management or maintenance needs. See **Appendix 2** for the Maintenance Activity Log.

A replant of the oak-dominant upland forest was conducted in November 2019 to address a significant loss of planted trees and shrubs. The replanted area was a total of 9.6 acres and was planted at a density of 1,200 plants per acre (see **Appendix 6** for a map of the replant area). See Table 3 below for planting densities and species. In 2020, the planted trees and shrubs were irrigated. Irrigation will continue in 2021 starting in June, and will be used in future years, as necessary. During the Year 5 monitoring, the native herbaceous cover in the oak-dominated upland forest had decreased from 38.33% to 15.18% (which is not meeting the Year 5 performance standard of greater than 25% native herbaceous cover); however, this is likely due to the replanting effort done in November 2019 where a significant portion of the habitat was disturbed and subsequently supported non-native herbaceous species (which tend to thrive in disturbed conditions) over native species. While it is Wildlands' intention to perform both chemical and mechanical

control of the non-native species in this habitat, due to the small size of the recently planted trees/shrubs (most between 10 and 20 inches), overspray from chemical control is likely to significantly stress or kill the young plants. Mechanical control is also difficult with trees/shrubs this size, as it is easy to damage young plants. As a result, the main goal for this habitat currently is to continue focusing on establishing the native woody vegetation. As the native woody vegetation becomes more established, chemical and mechanical control of the non-native species will be used to encourage native herbaceous growth and the habitat will be assessed to determine whether or not reseeding is necessary to meet future performance standards. Hand removal of invasive species will continue.

Table 3. Oak-Dominant Upland Forest Replant, 2019

Plant Species		**West Mound (7.5 acres)**	**East Mound (2.1 acres)**
Scientific Name	Common Name		
Alnus rubra	red alder	609	171
Crataegus douglasii	black hawthorn	609	171
Fraxinus latifolia	Oregon ash	1078	302
Mahonia aquifolium	Oregon grape	703	197
Physocarpus capitatus	Pacific ninebark	469	131
Quercus garryana	Oregon white oak	2953	827
Ribes sanguineum	flowering currant	469	131
Rosa pisocarpa	swamp rose	703	197
Symphoricarpos albus	snowberry	1406	394
	Total	8,999	2,521
Total plants installed over 9.6 acres		**11,520**	

G. RECOMMENDATIONS FOR CORRECTIVE OR REMEDIAL ACTIONS

Year 5 monitoring identified that the native herbaceous cover in the Emergent Marsh (identified as 22.15%) did not meet the Year 5 performance standard for native herbaceous cover (greater than 30%). Since the previous year showed native herbaceous cover to be 46.26%, the disparity is likely due in part to the late and long inundation period in Year 5 which could have substantially decreased the growing period for the marsh vegetation. However, looking at the data from Years 1 through 5, the average native herbaceous cover in the emergent marsh is 30.47% which narrowly meets the greater-than-30% cover standard. As emergent marsh is a highly variable habitat subject to fluctuations in water levels and growing periods, it is expected that this habitat will vary from year to year with regards to cover. At this time, no corrective or remedial actions are recommended for this habitat. Due to the natural, significant fluctuations at the site, additional marsh plantings are not likely to yield higher native herbaceous cover. As monitoring continues, we expect the percent cover of native herbaceous vegetation to continue to increase with the expectation that some years will have less cover and some years will have more, but the goal over time is to have a positive trajectory towards meeting the cover standards in future years.

Year 5 monitoring identified that the Riparian Forest and Cottonwood-Dominated Upland Forest habitat did not meet the native woody species density performance standard for Year 5. The density decreased from 1204 per acre in Year 4 to 1017 per acre in Year 5, while the performance standard is 1200 per acre. Since the performance standard changes from density to cover in Year 7, Wildlands will assess the habitat in Year 6 to determine whether or not the site is on a trajectory to meeting the cover performance standard of 50% native woody species in Year 7. If replanting appears necessary to meet the Year 7 cover

standard, Wildlands will coordinate with the Trustees about a possible targeted replant of between 250 and 500 plants within a 2-3 acre area using cuttings from onsite plants currently thriving in the habitat.

The Oak-dominant Upland Forest
No additional corrective or remedial actions are recommended at this time. 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 4. Establishment Period Monitoring Schedule

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

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

A. MONITORING PERIOD AND SCHEDULE

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

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

B. HABITAT MONITORING METHODS

1. AERIAL PHOTOGRAPH INTERPRETATION

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

2. PHOTO DOCUMENTATION

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

3. HYDROLOGY AND GEOMORPHOLOGY

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

surveyed on numerous occasions between 2010 and 2020 by both Wildlands' staff and by licensed surveyors from AKS Engineering and Forestry. The surveyed river elevation data has been compared to the closest published 15-minute interval "gage height" at the USGS Columbia Slough station. It has been found to accurately match with the survey data, with an average difference of less than 0.02 feet. Historic water data from this station can be downloaded and a clear picture of the hydrology of the Project site can be determined. Additionally, a satellite aerial photo corresponding to the high water event for the monitoring year (or as close to the high water event as is available) was obtained for Years 4 and 5. The photos were analyzed to determine the acres of inundation within the ACM at the time of the photo. Two data loggers were installed on the Project site in October 2020 to collect water level data for Years 7 and 10. While there is a high likelihood that the onsite data loggers could be lost or damaged (e.g. being bent or damaged by floating debris during flood events) to the point of compromising accuracy, we will attempt to use this method in Years 7 and 10 rather than rely on satellite imagery availability which is limited by wind, rain, and cloud conditions.

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

4. NATIVE VEGETATION

Riparian Scrub-Shrub, Riparian Forest, and Upland Forest

Monitoring will include:

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

Quantitative monitoring data will be primarily collected using 10x10 meter sample plots along five main baseline transects running more or less north/south across the site (**Figure 3**). Beginning in Year 5, three additional sample plots within the upland forest will be monitored during the monitoring events within the upland forest. The locations of the three additional sample plots have been added to Figure 3.

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

Emergent Marsh

Monitoring of emergent marsh vegetation will be conducted in Years 2, 3, 4, 5, 7, and 10. Monitoring shall include visual surveys of the emergent marsh vegetation. Cover and diversity will be quantified

using a quadrat method. A sampling transect will be run perpendicular to the baseline transect and quadrat data will be collected along the sampling transect. The frequency of sampling quadrats and the size of quadrats will be tailored to best assess this habitat type. The sampling interval and the size of the quadrat will be determined in the field based on pilot sampling data.

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

5. LARGE WOODY DEBRIS

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

6. INVASIVE NON-NATIVE PLANT SPECIES

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

7. FISH MONITORING

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

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

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

8. OTHER WILDLIFE MONITORING

- Bald eagle and osprey monitoring
    - Monitoring will take place in Years 3, 5, 7, and 10, once per week from mid-December through August. Although these surveys are targeting bald eagle, other raptor sightings (including osprey) and behavior will also be recorded.
- Investigate potential bald eagle and osprey nests
    - During site visits, all potential bald eagle and osprey nests will be identified and the location recorded with a GPS. Using binoculars or spotting scopes, the nest will be observed until it can be determined if it is actively being used, and by what type of bird. This information will be recorded and the nest will be documented for future visits.
- Bird assemblages including diversity and abundance
    - Bird monitoring will be completed in Years 2[2], 3, 5, and 10. The point counts will be done on transects established during pre-construction monitoring. These transects will be monitored once a month in April, May, and June.

- Mink
    - Mink usage monitoring will take place along the waterways of the Restoration Project including a 50-foot buffer from each waterway in the spring and summer in Years 3, 5, 7, and 10. Survey methods include camera traps at three locations with scent stations to lure animals into camera view. Searches for tracks, scat, and den sites should also occur in designated areas with potential for mink use and shall be conducted during camera trap data collection and maintenance or at least twice a month. Monitoring should take place for at least 12 weeks of spring/summer.

- Pacific lamprey
    - Lamprey monitoring will be conducted as part of a Harbor-wide monitoring effort done by USFWS staff in accordance with the Lamprey Monitoring Plan developed by the Trustees.

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

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

III. PERFORMANCE STANDARDS

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

Performance standards have been created for the following habitat parameters:

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

A. HYDROLOGY

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

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

B. GEOMORPHIC/STRUCTURAL/HABITAT COMPLEXITY ELEMENTS

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

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

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

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

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

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

Additional performance standards include:

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

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

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

C. VEGETATION

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

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

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

Emergent Marsh

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

Year 5:

Cover:

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

Years 7 and 10:

Cover:

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

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

Riparian Scrub-shrub and Riparian Forest (ACM)

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

Years 2-5:

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

Year 7:

Cover:

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

Year 10:

Cover:

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

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

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

Riparian Forest and Cottonwood-dominated Upland Forest

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

Years 2-5:

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

Year 7:

Cover:

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

Year 10:

Cover:

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

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

Oak-Dominated Upland Forest

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

Years 2-5:

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

Year 7:

Cover:

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

Year 10:

Cover:

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

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

Beaver Herbivory

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

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

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

Invasive Plant Species Management

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

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

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

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

Reed Canarygrass

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

Cover:

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

Zero-Untreated Species

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

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

D. PERMANENT PROTECTION

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

IV. HABITAT MONITORING DATA/RESULTS

The Alder Creek Project has completed Year 4 monitoring. See below for details on the monitoring completed in Year 4. A table listing all Year 4 performance standards and monitoring results is included as Appendix 1.

A. MONITORING RESULTS

1. AERIAL PHOTO INTERPRETATION

Aerial photography on the Project was conducted on July 20, 2020 (**Figure 4**). Aerial photography will continue in Year 6 (2021).

2. PHOTO DOCUMENTATION

A total of 10 permanent photo points was established for the Project to document overall site conditions and provide a basis for year-to-year comparisons. Multiple photos in different directions were taken on August 25, 2020 from each photo point. A map of the photo points and corresponding photos can be found in **Figures 5a-5b**. Photo-documentation will continue during Year 6 (2021).

3. HYDROLOGY AND GEOMORPHOLOGY

On-site visual surveys throughout 2020 indicated that there has not been erosion, washouts, or sedimentation that would significantly change elevations on site. Visual inspections also confirmed that there were no fish passage barriers that could prevent fish from entering or exiting the site.

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

To determine the accuracy of this published data, the river elevation at the Project site has been surveyed on numerous occasions between 2010 and 2020 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. Continuous water level data from the USGS water data station at Columbia Slough was used to document the water levels on the Project site during the Reporting Period (See **Figure 6b**). The water level data for the Reporting Period shows that river elevations in January/early February and again in June were higher than average, river elevations in March and April were somewhat lower than average, and the rest of the year fell generally within the range of average. Because this data is available at any time throughout the year regardless of river level or weather, Wildlands' staff are able to use it to reference the water level and compare it to onsite conditions during field visits.

Frequent site visits have confirmed that constructed side channels and emergent marsh are flooding (i.e., filling and partially draining) in response to fluctuations in the daily tidal regime and seasonal river stages

in the Willamette River and Multnomah Channel, as expected. Channel connections have remained open through 2020 and are not blocked or clogged from sediments or debris.

Wildlands' staff again attempted to use a drone to take aerial photos of high water events during the 2020 monitoring period; however, staff was unable to obtain any useable images due to windy, rainy, and/or cloudy conditions. Satellite imagery was obtained for 10:45am on 5/27/2020 which was just a few days before the high water period of 2020 (**Figure 6c**). While Wildlands' GIS specialist was able to translate the approximate area of inundation captured by the satellite photo to GIS to calculate the approximate acreage of inundation shown on the photo (as requested by the Trustees), it should be noted that this method of using a low-resolution, non-georeferenced satellite aerial photo would yield only the approximate area of inundation for that particular moment in time and does not represent the extent of ACM on the site or the maximum level of inundation during a particular monitoring year. The information obtained from the satellite photo was compared to the Columbia Slough gauge data for accuracy. The aerial photo from 5/27/2020 was taken when water levels were shown at the Columbia Slough gauge to be approximately 14.0' NAVD and the GIS translation of the inundation shown on the aerial photo from 10:45am on 5/27/2020 was approximately 13.104 acres of ACM inundated. The highest water elevation of the 2019-2020 water year occurred on June 3 at 6:00am when the water reached an elevation of approximately 17.0' NAVD.

AKS collected a total of 193 assessment points along elevation 20 in order to measure the active channel margin onsite in Year 5 (2020). The ACM acreage from the as-built drawings was 20.351 acres. The 2020 ACM acreage is 20.168 acres. The difference between the two acreages is 0.183 which represents a 0.90% reduction in ACM area. This is well below the 10% threshold.

In order to determine whether side channel depths have changed more than 20% from the as-built surveys, eight transects crossing the side channels were surveyed. The locations and results of those surveys are shown on **Figures 6d-6l**. The channel depths were measured from the OHWM. Using the average change across the eight transects, the change in side channel depth was 5.13%. This is well below the 20% threshold. Transect L showed the most change at 9% which is the same percent change as 2018, but in a slightly different configuration.

4. NATIVE VEGETATION

Emergent Marsh

Vegetation monitoring of the emergent marsh was conducted on September 17, 2020. The emergent marsh is partially meeting the associated performance standards for invasive herbaceous cover of ≤10% cover with invasive herbaceous cover observed at less than 1% **(Table 5)**. Native emergent cover was observed at 22.15% which is less than the required ≥30% Overall absolute cover for the emergent marsh was observed at 25.63% (**Appendix 3**). During the Year 5 growing season, the emergent marsh habitat saw inundation much later into the growing season which could have affected the emergence of vegetation during the growing season.

Due to the highly dynamic nature of the emergent marsh hydrology, the growing conditions, and the narrow elevational band that supports marsh on Sauvie Island, fluctuations in cover are to be expected from year to year. However, when looking at emergent marsh during Years 2-5 and averaging the cover values across those years, native herbaceous cover was observed at 30.47%, and invasive herbaceous cover was observed at <1%, which meets all the associated Year 5 performance standards (**Table 6**). Vegetation monitoring of the emergent marsh will continue in Year 7 (2022).

Table 5.

Emergent Marsh				
	Yr. 5 Performance Standard	Measured Yr. 5	Meeting Standards?	Measured Yr. 4
Native Vegetation	≥30%	22.15%	No	46.26%
Non-Native Vegetation		3.23%		5.64%
Invasive Vegetation	≤ 10%	0.25%	Yes	0.00%
Woody Vegetation		0.00%		0.06%
Phalaris arundinacea		0.00%		0.00%
Unknown Dead / Plant Debris		0.00%		0.00%

Table 6.

Emergent Marsh Yr. 2 – Yr. 5 Comparison							
	Yr. 5 Performance Standard	Yr. 2 – Yr. 5 Average	Meeting Standards?	Measured Yr. 5	Measure Yr. 4	Measured Yr. 3	Measured Yr. 2
Absolute Cover		34.32%		25.38%	51.96%	21.19%	38.76%
Native Vegetation	≥30%	30.47%	Yes	22.15%	46.26%	19.90%	33.55%
Non-Native Vegetation		2.78%		3.23%	5.64%	1.19%	1.04%
Invasive Vegetation	≤ 10%	0.09%	Yes	0.25%	0.00%	0.00%	0.11%
Woody Vegetation		0.07%		0.00%	0.06%	0.11%	0.11%
Phalaris arundinacea		0.00%		0.00%	0.00%	0.00%	0.00%
Unknown Dead / Plant Debris		0.99%		0.00%	0.00%	0.00%	3.95%

Riparian Scrub-Shrub and Riparian Forest (ACM)

Vegetation monitoring within the riparian scrub-shrub and riparian forest with the ACM on the Project was conducted on July 19-20, 2020. The ACM is currently meeting all associated performance standards for Year 5. During surveys 1,422 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 11 woody species were observed with 4 tree species and 7 shrub species being observed (**Appendix 4)**. This meets the minimum requirements of at least 5 woody species being observed and at least 3 native tree species and 5 native shrub species being observed (**Table 7**). Native herbaceous cover (excluding woody species) was observed at 33.54% cover, invasive herbaceous cover (excluding reed canarygrass) was 4.58% cover, and invasive woody vegetation cover was <1% cover (**Appendix 5**). The observed cover meets the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standards. Vegetation monitoring of the ACM will continue during Year 7 (2022).

Table 7.

Riparian Scrub Shrub and Riparian Forest (ACM)				
	Performance Standards Years 2-5	Measured Yr. 5	Meeting Standards?	Measured Yr. 4
Native Vegetation	≥ 10%	33.54%	Yes	32.22%
Non-Native Vegetation		12.68%		11.24%

Invasive Vegetation	≤ 10%	4.58%	Yes	1.27%
Invasive Woody Vegetation	≤ 10%	0.00%	Yes	1.00%
Phalaris arundinacea		2.73%		1.14%
Woody Debris		0.00%		0.00%

Woody plants / acre	≥ 1200	1422	Yes	1209
Native Woody Species (Scrub-Shrub)	≥ 5	11	Yes[1]	12
Native Trees (Riparian Forest)	≥ 3	4	Yes[1]	5
Native Shrubs (Riparian Forest)	≥ 5	7	Yes[1]	7

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

Riparian Forest and Cottonwood-Dominated Upland Forest

Vegetation monitoring within the riparian forest and cottonwood-dominated upland forest was conducted on July 19-20, 2020. The riparian forest and cottonwood-dominated upland forest is partially meeting the associated performance standards for Year 4. During surveys 1,017 trees per an acre were observed which does not meet the minimum of 1,200 trees per an acre. A total of 6 tree species and 7 shrub species were observed (Appendix 4). This meets the minimum requirement of at least 3 native tree species and 5 native shrub species being observed (**Table 8)**. Native herbaceous cover (excluding woody species) was observed at 16.10% cover, invasive herbaceous cover (excluding reed canarygrass) was 4.16% cover, and invasive woody vegetation cover was < 1% cover (Appendix 5). The observed cover requirements meet the ≥10% native herbaceous cover and ≤10% invasive herbaceous cover performance standards. Vegetation monitoring of the riparian scrub-shrub and cottonwood-dominated upland forest will continue in Year 7 (2022).

Table 8.

Riparian Forest and Cottonwood-dominated Upland forest				
	Performance Standards Years 2-5	Measured Yr. 5	Meets Standards?	Measured Yr. 4
Native Vegetation	≥ 10%	16.10%	Yes	28.12%
Non-Native Vegetation		39.91%		13.82%
Invasive Herbaceous Vegetation	≤ 10%	4.16%	Yes	0.93%
Phalaris arundinacea		2.38%		2.12%
Woody Debris		0.00%		0.00%
Woody plants / acre	≥ 1200	1017	No	1204
Native Trees Species	≥ 3	6	Yes	8
Native Shrubs Species	≥ 5	7	Yes	7

Oak-Dominated Upland Forest

Vegetation monitoring within the oak-dominated upland forest was conducted on July 19-20, 2020. The oak-dominated upland is partially meeting the vegetation cover and tree species richness performance standards. The oak-dominated upland forest is meeting the tree/shrub density or the shrub species richness performance standards for Year 5. During surveys 733 trees per an acre were observed, which meets the

minimum of 500 trees per an acre. A total of 5 tree species and 7 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 (**Table 8**). Native herbaceous cover (excluding woody species) was observed at 15.18% cover, invasive herbaceous cover (excluding reed canarygrass) was <1% cover, and invasive woody vegetation was <1% cover (Appendix 5). The observed cover does not meet the ≥25% native herbaceous cover but meets the ≤15% invasive herbaceous, and ≤15% invasive shrubs performance standard. Vegetation monitoring of the oak-dominated upland forest will continue in Year 7 (2022).

As anticipated in 2018, the oak-dominated upland forest required remedial actions in order to ensure the habitat continues on a trajectory to meeting future performance standards. A replant of the area was completed in November 2019 as described above in section I.F. Details of the actions taken to prepare the habitat for the replant were included in the 2018 monitoring report. In 2020, three additional monitoring plots, plots 39-41, were established within the oak-dominated upland forest to provide additional monitoring insight into the habitat (Figure 3).

Table 8

Oak-Dominated Upland Forest				
	Performance Standards Years 2-5	Measured Yr. 5	Meets Standards?	Measured Yr. 4
Native Herbaceous Vegetation	≥ 25%	15.18%	No	38.33%
Non-Native Vegetation		54.83%		22.02%
Invasive Vegetation	≤15%	0.46%	Yes	0.21%
Invasive Woody Vegetation	≤15%	0.00%	Yes	0.00%
Phalaris arundinacea		0.03%		0.15%
Woody Debris		0.00%		0.00%
Trees / Shrubs per acre	≥ 500	733	Yes	116
Native Tree Species Richness	≥1	5	Yes	4
Native Shrub species Richness	≥4	7	Yes	0

5. LARGE WOODY DEBRIS AND OTHER HABITAT FEATURES

Large woody debris monitoring took place on September 18, 2020. A total of 65 pieces of large woody debris were observed on the project in 2020. Of those, 43 were identified as being originally installed LWD and the remaining 22 as being naturally recruited. Currently the Project is exceeding the 80% required LWD retention performance standard for Year 5. Photos of the LWD observed during surveys can be found in Figure 7. The remaining habitat complexity features of downed wood, debris piles, and rock piles all remain in good condition. Monitoring of the large woody debris and other habitat complexity features will continue in Year 7 (2022).

6. INVASIVE SPECIES MONITORING

Invasive species monitoring occurred in the spring on April 23 and April 26, 2020 and in the summer/fall concurrent with vegetation surveys on July 19-20 and September 17, 2020. 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 2020 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 41 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). Hand/mechanical removal along with herbicide applications will continue to be used in future years as necessary to control invasive plant species.

During 2020, 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 and yellow flag iris were identified (See **Figure 7**). All instances of these species were removed (**Table 9**).

Reed Canarygrass

Reed canarygrass was treated aggressively in the years prior to construction. In 2020, forty-one 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 1.94% (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 9

Invasive Plant Species

	Performance Standards Years 1-5	Measured Yr. 5	Meets Standards?	Measured Yr. 4
Reed Canarygrass (*Phalaris arundinacea*)	≤ 30%	1.94%	Yes	1.34%
All individual target species (Japanese knotweed, giant hogweed, Himalayan knotweed, yellow flag iris, butterfly bush, purple loosestrife)		Purple loosestrife and yellow flag iris observed onsite. All treated.	Yes	Purple loosestrife, yellow flag iris, Japanese knotweed observed on site. All treated.

7. FISH MONITORING

Biologists from Turnstone Environmental Consultants (Turnstone) conducted fish monitoring on eight occasions between February and May 2020. Juvenile salmonids were observed on several occasions along with minnows and other unidentified species. Less than ideal visibility during visual surveys yielded low levels of fish observation and hindered species identification, though the number of observations has increased since adopting stationary GoPro video stations rather than roving shoreline camera surveys. Details on the eight fish monitoring visits can be found in the Alder Creek Wildlife Monitoring Report by Turnstone in Appendix 7.

8. OTHER WILDLIFE MONITORING

Bald Eagle

During the 2019-2020 survey period, 38 total eagle surveys were conducted. A total of 46 bald eagle sightings and 120 raptor sightings were recorded over the 38 visits. Other raptor species observed included osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), merlin (*Falco columbarius*), and rough-legged hawk (*Buteo lagopus*). Turkey vultures (*Cathartes aura*) were also observed during many of the visits but are not included in the official raptor counts. Additional details and charts are included in the Alder Creek Wildlife Monitoring Report by Turnstone in Appendix 7. During a single survey, the highest number of eagle individuals observed was three: two adults and one juvenile. Eagles were observed on site, either flying over or perched, for 52 percent of all observations. Eagles were generally observed flying over the site or channel but were occasionally observed perching in the cottonwood trees near the shore. Raptors were regularly observed perching and hunting throughout the site and the restored channels. No active raptor nests were observed on or near the site. Eagles were observed most often during the early nesting period of January through March, while raptor activity levels varied throughout the entire survey season.

Bird Assemblage Surveys

Surveys were conducted on April 17, May 15, and June 19, 2020. Details and a summary table of the data collected is located in the report in Appendix 7. The average total number of species detected over the three visits was 36 and the average total number of individuals was 201. The most abundant species overall were Savannah sparrow (*Passerculus sandwichensis*), European starling (*Sturnus vulgaris*), barn swallow (*Hirundo rustica*), common yellowthroat (*Geothlypis trichas*), and red-winged blackbird (*Agelaius phoeniceus*). The average proportion of nonnative individuals overall was eight percent (Figure 3), and included three species: European starling, house sparrow (*Passer domesticus*), and Eurasian-collared dove (*Streptopelia decaocto*). Two sensitive species, purple martin (*Progne subis*) and willow flycatcher (*Empidonax traillii brewsteri*) were detected during surveys; both species are listed by the State of Oregon as a Species of Concern.

Mink Surveys

Mink surveys through camera trapping were conducted from April 26 through August 25, 2020. A photo of a mink was captured by Camera 1 on May 26 (see photo below). No mink were observed at the other two camera trapping locations during the survey period. Additionally, during an eagle survey on July 13, a biologist from Turnstone Environmental observed mink tracks along the shoreline. Other wildlife species included black-tailed deer (*Odocoileus hemionus*), racoon (*Procyon lotor*), brush rabbit (*Sylvilagus bachmani*), great egret (*Ardea alba*), Western Canada goose (*Branta* canadensis) and coyote (*Canis latrans*). Mink surveys will continue in Year 7 (2022).

Lamprey Surveys

Lamprey surveys were conducted by U.S. Fish and Wildlife in 2020.

9. GENERAL INSPECTIONS

Regular site visits were conducted at least once per month in 2020 by Wildlands' biologists, land management specialists, and independent contractors. 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 majority of performance standards continue to be met; however, monitoring in 2020 identified a few performance standards that are currently not being met. The 2020 monitoring showed that the marsh habitat was not meeting the 30% native herbaceous performance standard with 22.15% native herbaceous cover documented; however, the disparity is likely due in part to the late and long inundation period in Year 5 which could have substantially decreased the growing period for the marsh vegetation. Reviewing the data from Years 1 through 5, the average native herbaceous cover in the emergent marsh is 30.47% which narrowly meets the greater-than-30% cover standard. Significant fluctuations in water levels and growing periods from year to year in emergent marsh habitat will likely result in continued fluctuations in cover; however, the native plants are present and established so cover of native herbaceous marsh vegetation is expected to increase over time. At this time, no corrective or remedial actions are recommended for this habitat as they are not likely to yield higher native herbaceous cover.

Monitoring in 2020 identified 1,017 native woody stems per acre within the riparian forest and cottonwood-dominant upland forest which is not meeting the density standard of at least 1,200 native woody stems per acre. As these native woody species increase in size, the cover they provide is also expected to increase. As a result, the Year 7 performance standards for native woody species are measured in cover, not density. In Year 6 (2021), Wildlands will conduct an additional density count in 2021 to determine native woody stems per acre and assess cover to determine whether the habitat seems to be on a trajectory to meet the Year 7 native woody cover standard of 50% native woody species.

During the Year 5 monitoring of the oak-dominant upland forest, the native herbaceous cover had decreased from 38.33% to 15.18% (which is not meeting the Year 5 performance standard of greater than 25% native herbaceous cover); however, this is likely due to the replanting effort done in November 2019 where a significant portion of the habitat was disturbed and subsequently supported non-native herbaceous species (which tend to thrive in disturbed conditions) over native species. While it is Wildlands' intention to perform both chemical and mechanical control of the non-native species in this habitat to encourage native herbaceous plant establishment, due to the small size of the recently planted trees/shrubs, these activities pose a high risk of damaging or killing the young plants. As a result, Wildlands will continue the management and irrigation of this area to establish the native woody vegetation and implement chemical and/or mechanical control of non-native species once the risk of damaging the young plants has decreased to an acceptable level. Once chemical and/or mechanical controls can be used without significant risk to the young trees/shrubs, the habitat will be assessed to determine whether reseeding is necessary to meet future performance standards. Hand removal of invasive species will continue.

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 6 funding in the amount of $12,364.99 was provided on November 20, 2020.

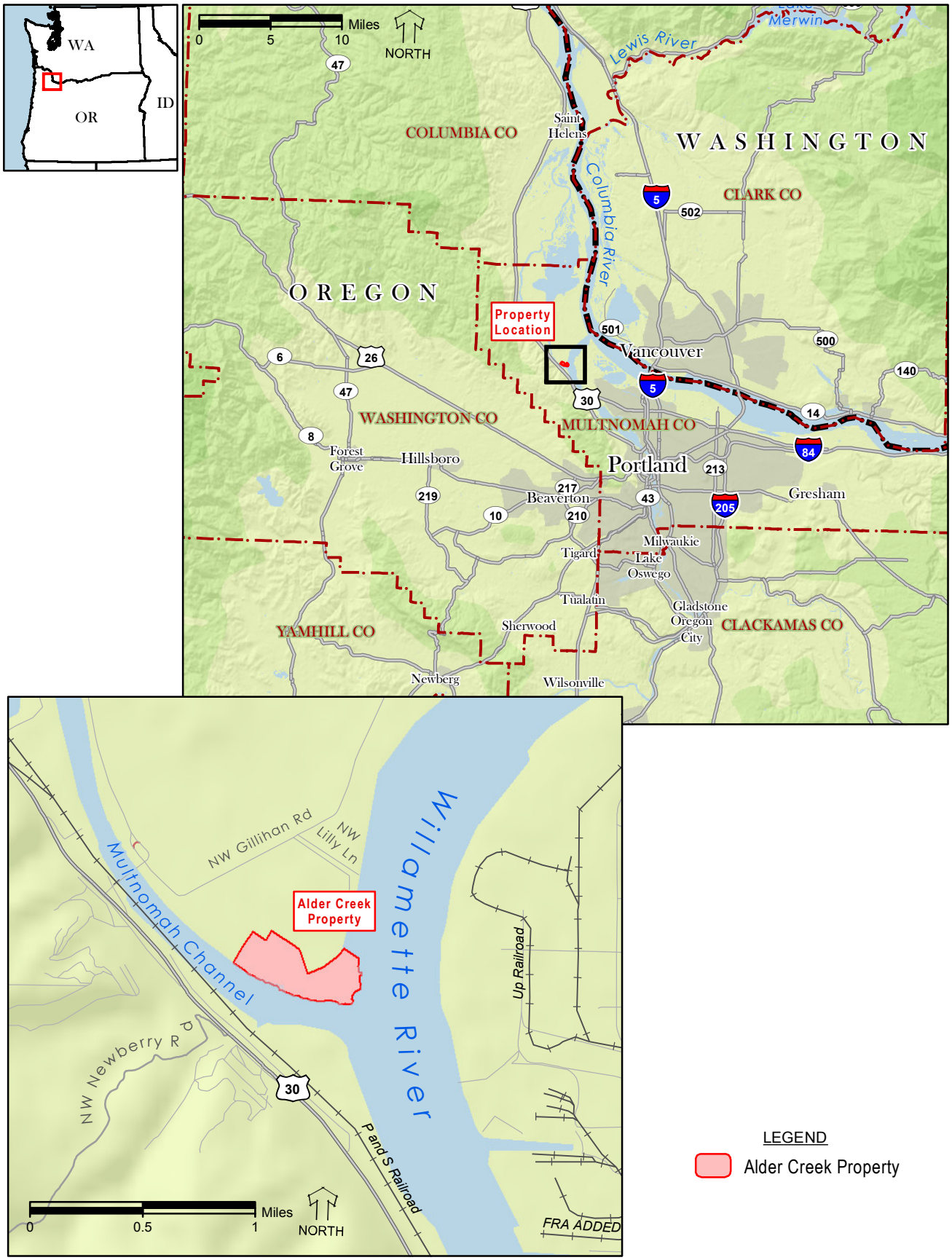
- Lamprey Monitoring Funding – A total of $32,922.40 for lamprey monitoring funding for Year 5 was provided in two separate payments: $12,422.40 to The Confederated Tribes of Grand Ronde and $20,500 to US Fish and Wildlife Service.

A. TRANSFER OF CREDITS AND ENDOWMENT FUND DEPOSITS

A copy of the Credit Ledger documenting Credit sales through December 2020 is included in Appendix 8. 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. The second release of credits occurred on December 1, 2017 and a partial third release of credits occurred on August 27, 2020. No credits were sold in Years 1 through 5 (2016-2020).

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.

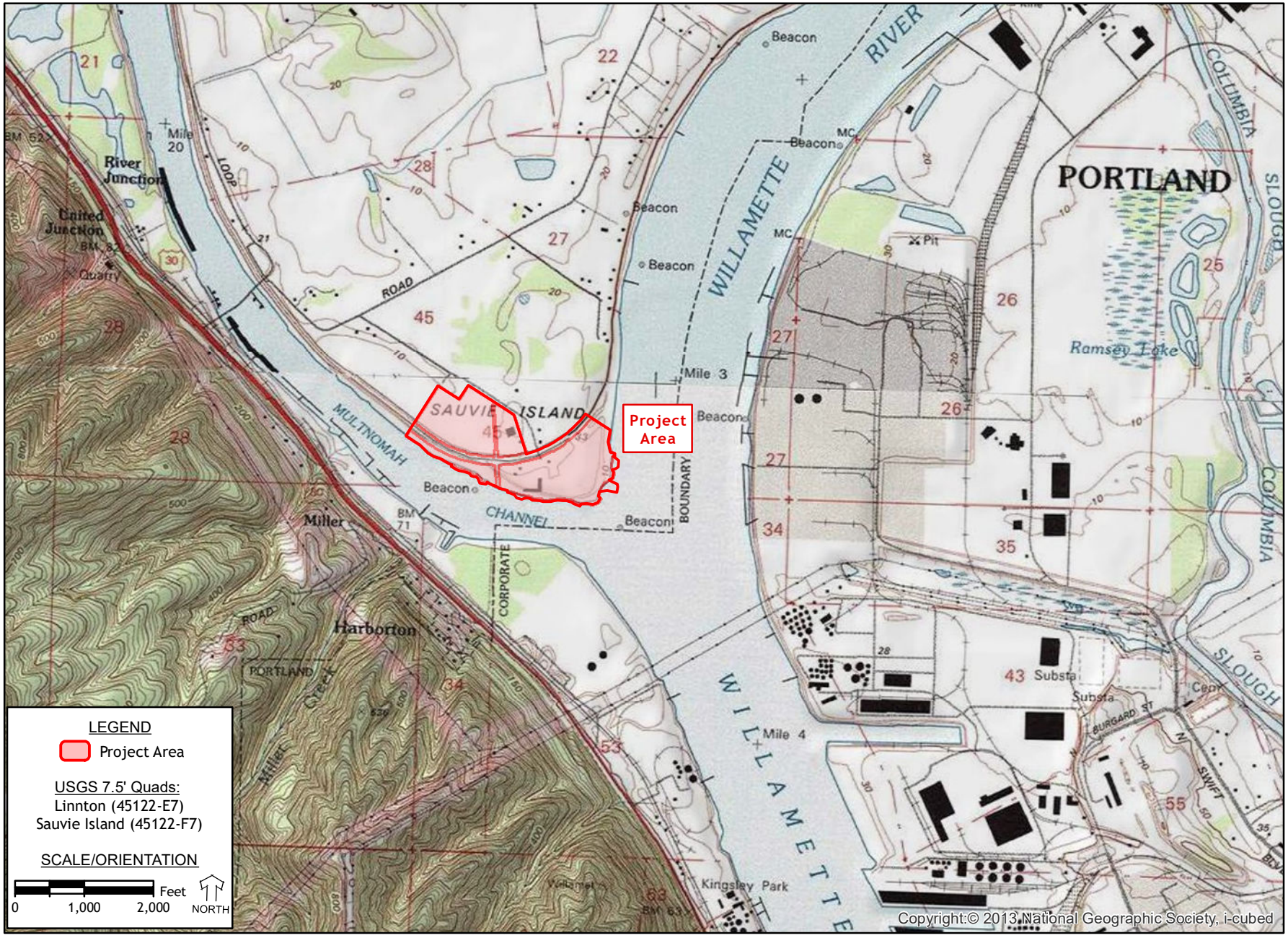
Figures



WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

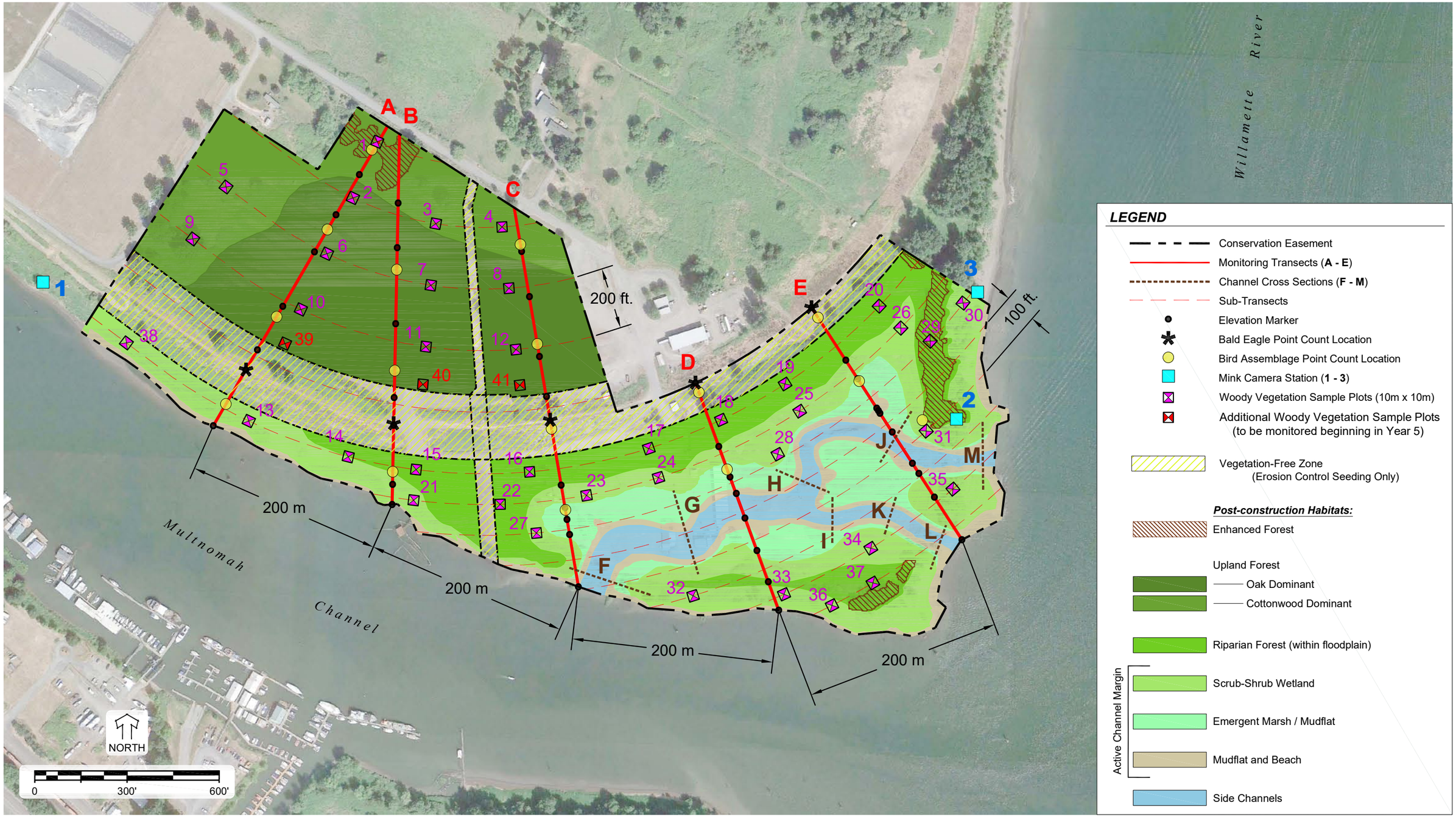
Figure 1
Location Map



WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

Figure 2
USGS Quad



WILDLANDS

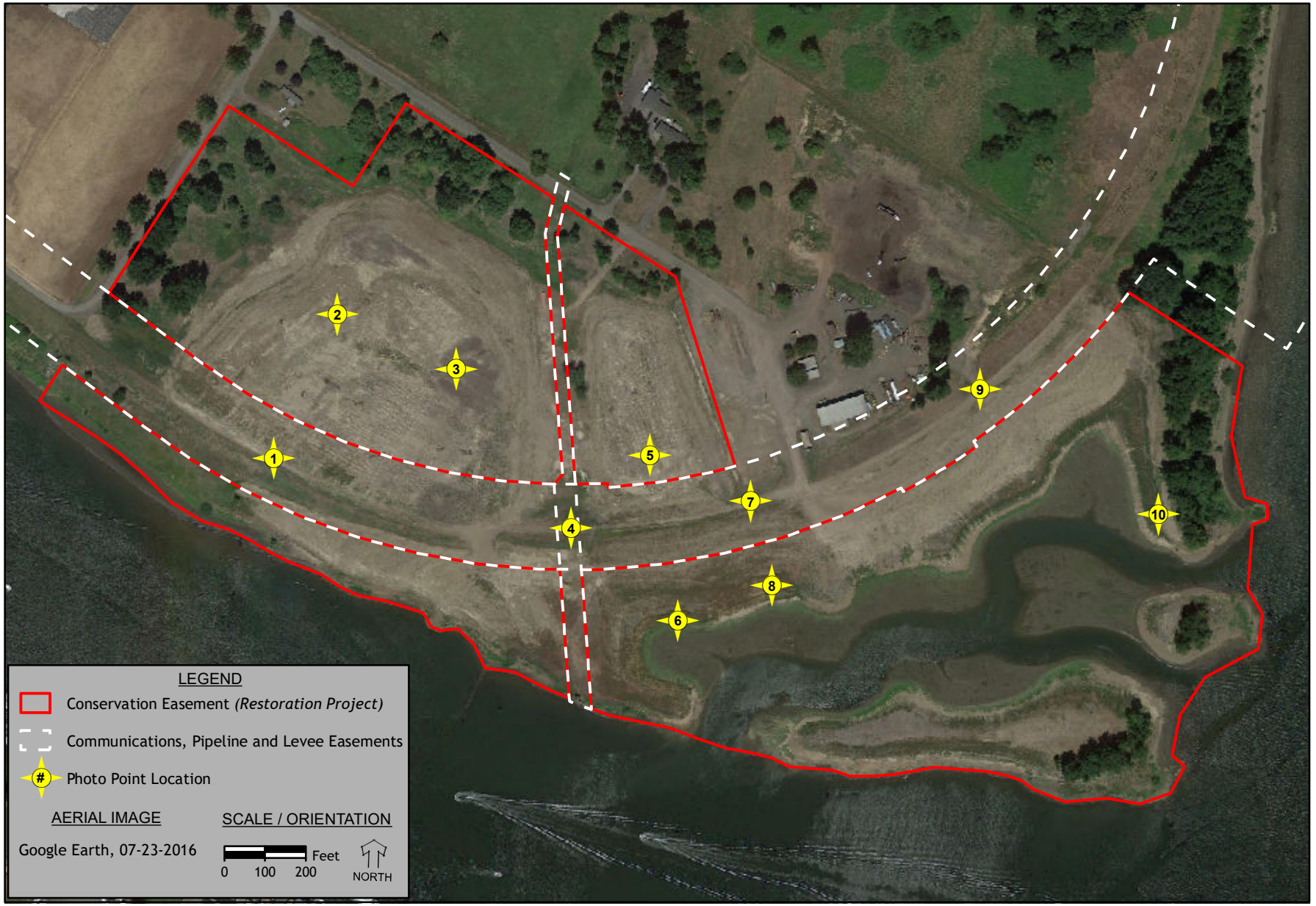
Alder Creek Restoration Project
2020 Monitoring Report

Figure 3
Post-construction Monitoring

WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

Figure 4
2020 Aerial Photo



WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

Figure 5a
Photo Location Map

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

West

North

East

South

Photo Not Available

West

North

East

South

West

North

East

South

Photo Not Available

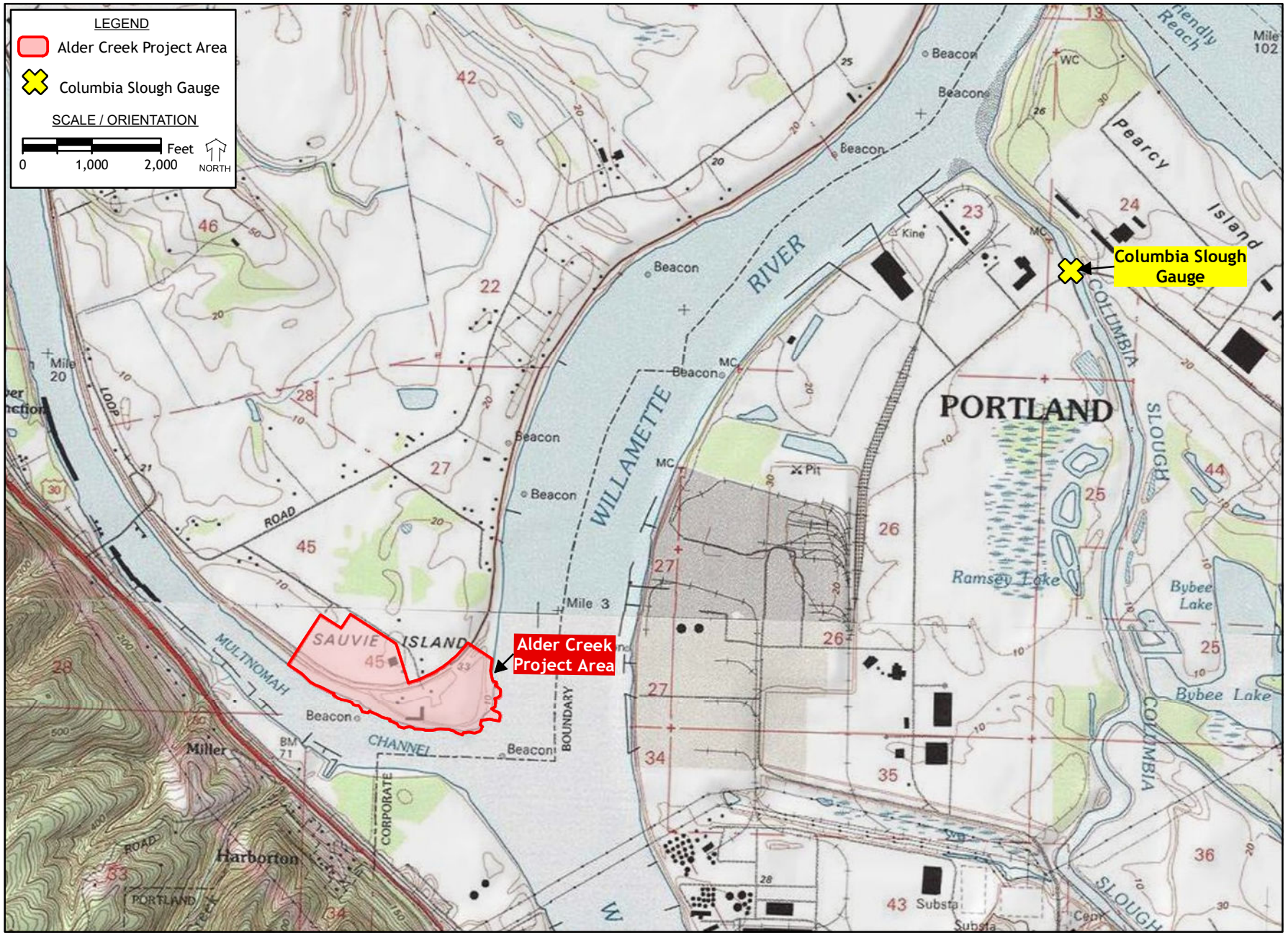
West

North

East

South

West



WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

Figure 6a
Columbia Slough Gauge Station Location

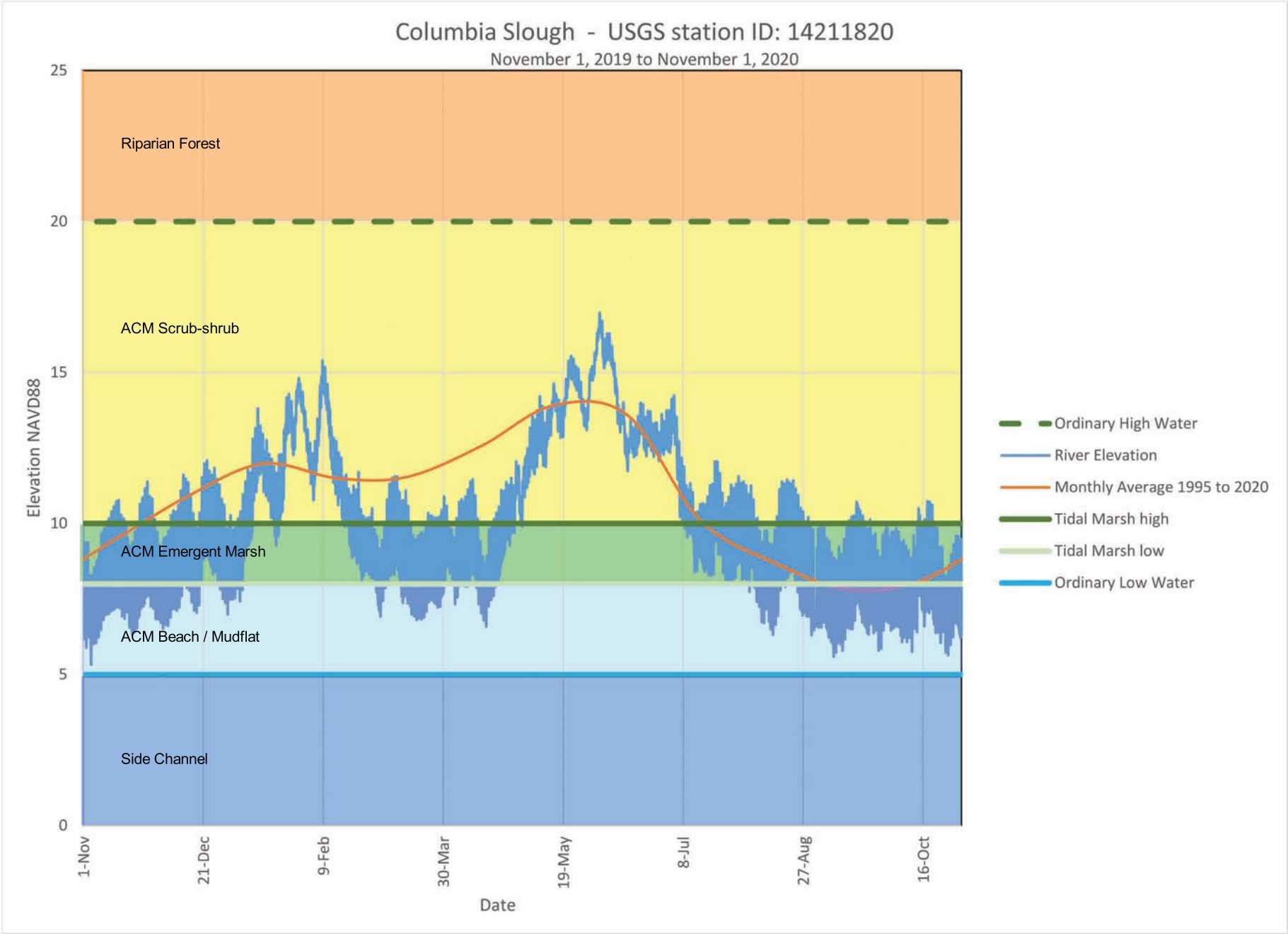
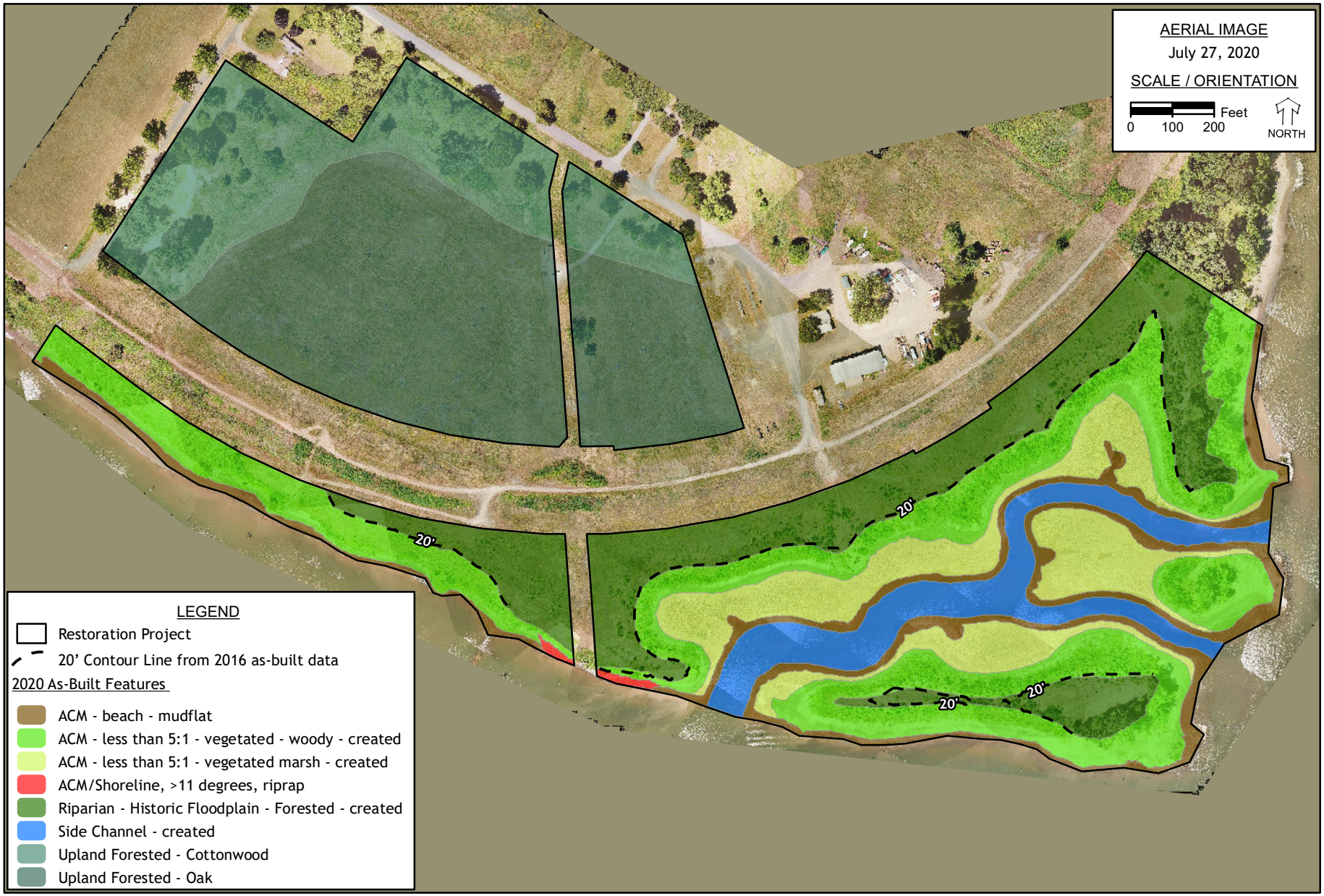
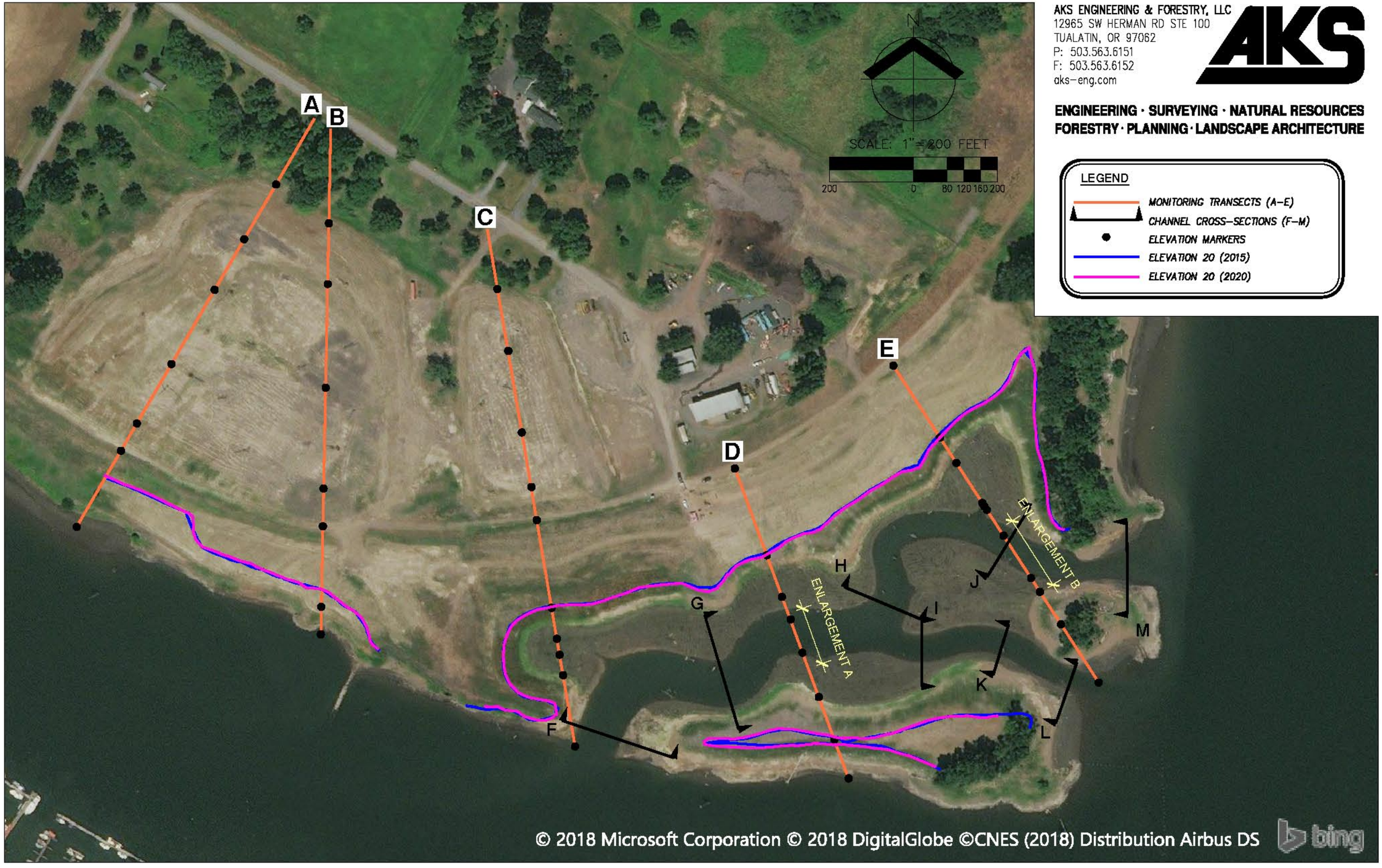


Figure 6b
Water Level Data


AERIAL IMAGE
July 27, 2020
SCALE / ORIENTATION
0 100 200 Feet
NORTH
20'
20'
20'
20'
LEGEND
Restoration Project
20' Contour Line from 2016 as-built data
2020 As-Built Features
ACM - beach - mudflat
ACM - less than 5:1 - vegetated - woody - created
ACM - less than 5:1 - vegetated marsh - created
ACM/Shoreline, >11 degrees, riprap
Riparian - Historic Floodplain - Forested - created
Side Channel - created
Upland Forested - Cottonwood
Upland Forested - Oak



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aks-eng.com

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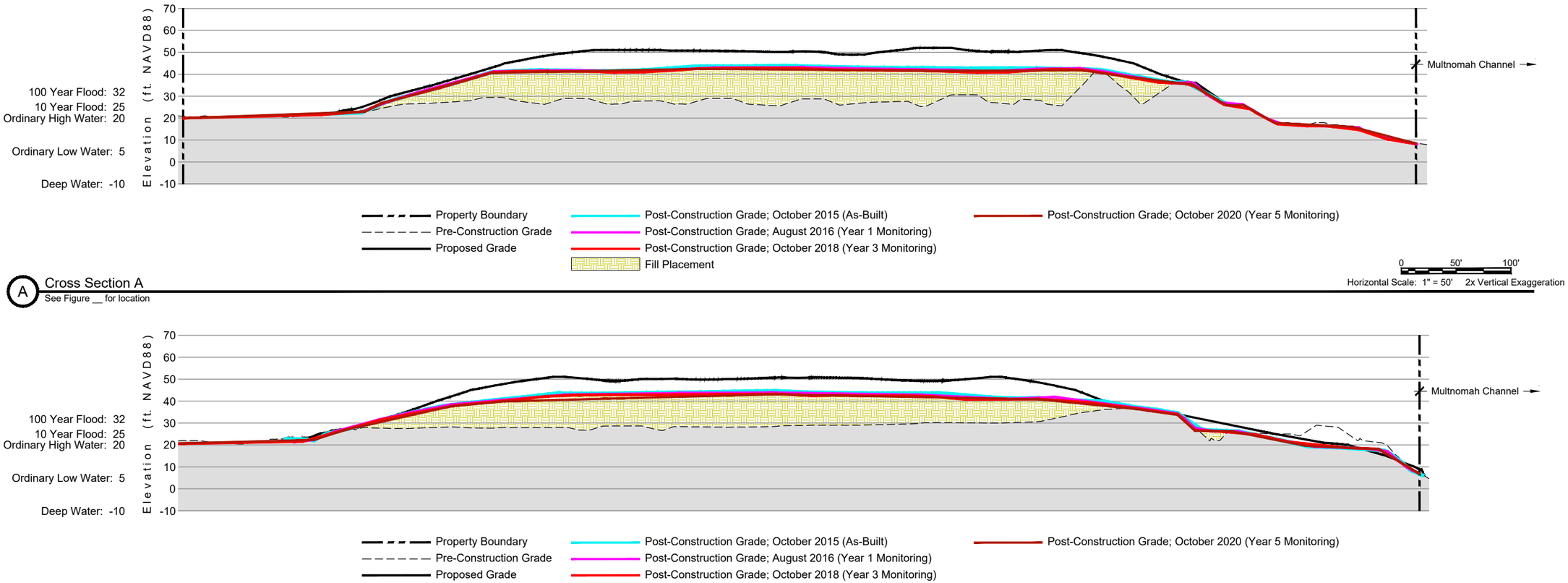
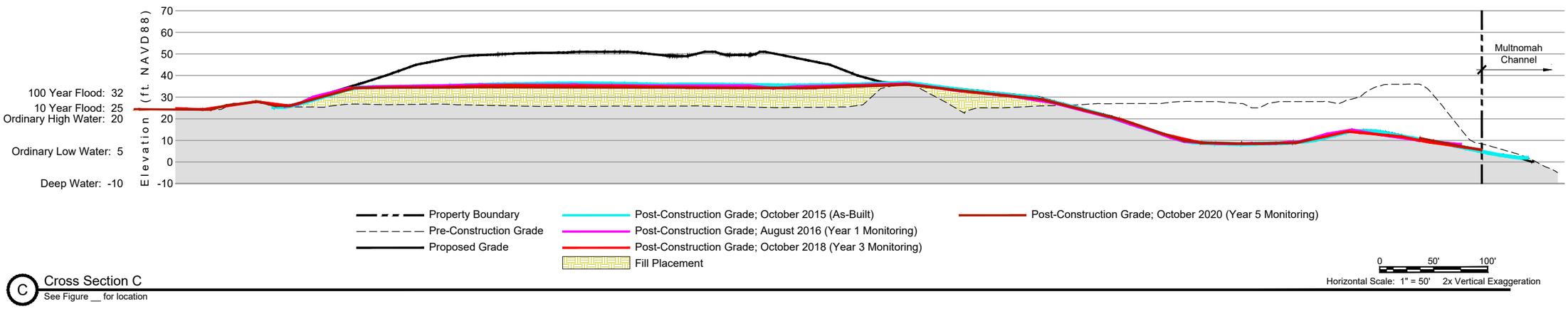
ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

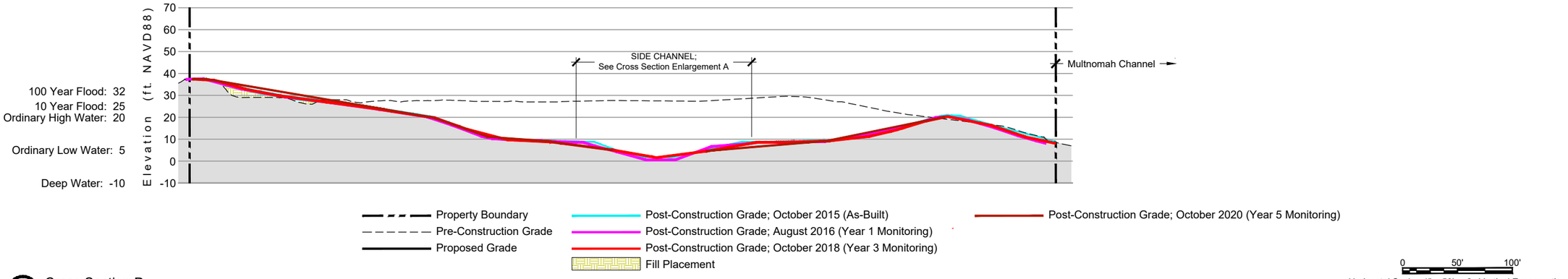


A Cross Section A
See Figure __ for location

B Cross Section B
See Figure __ for location



C Cross Section C
See Figure __ for location

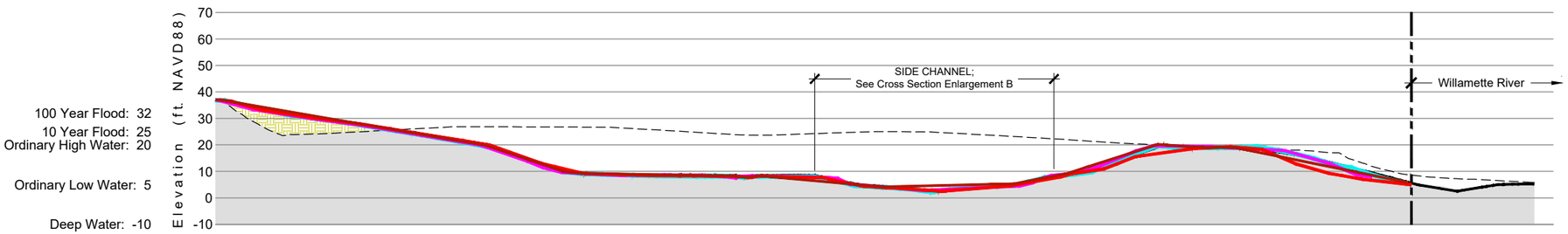


D Cross Section D

See Figure __ for location

0 50' 100'

Horizontal Scale: 1" = 50' 2x Vertical Exaggeration



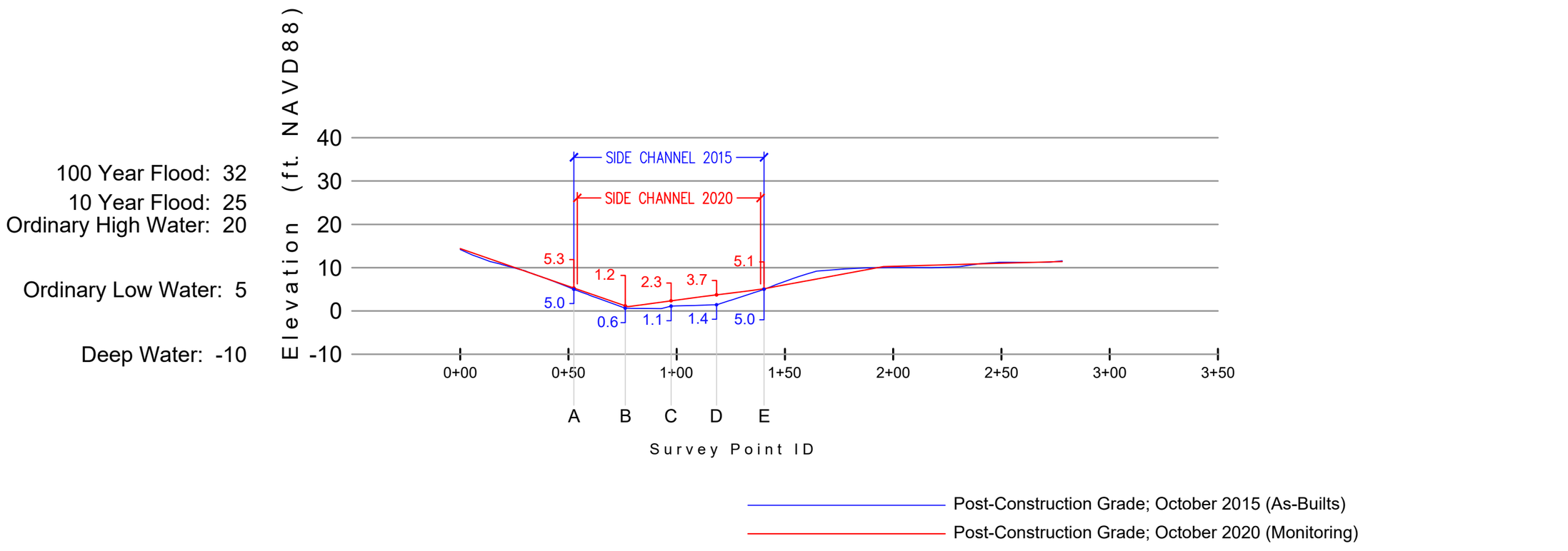
E Cross Section E

See Figure __ for location

0 50' 100'

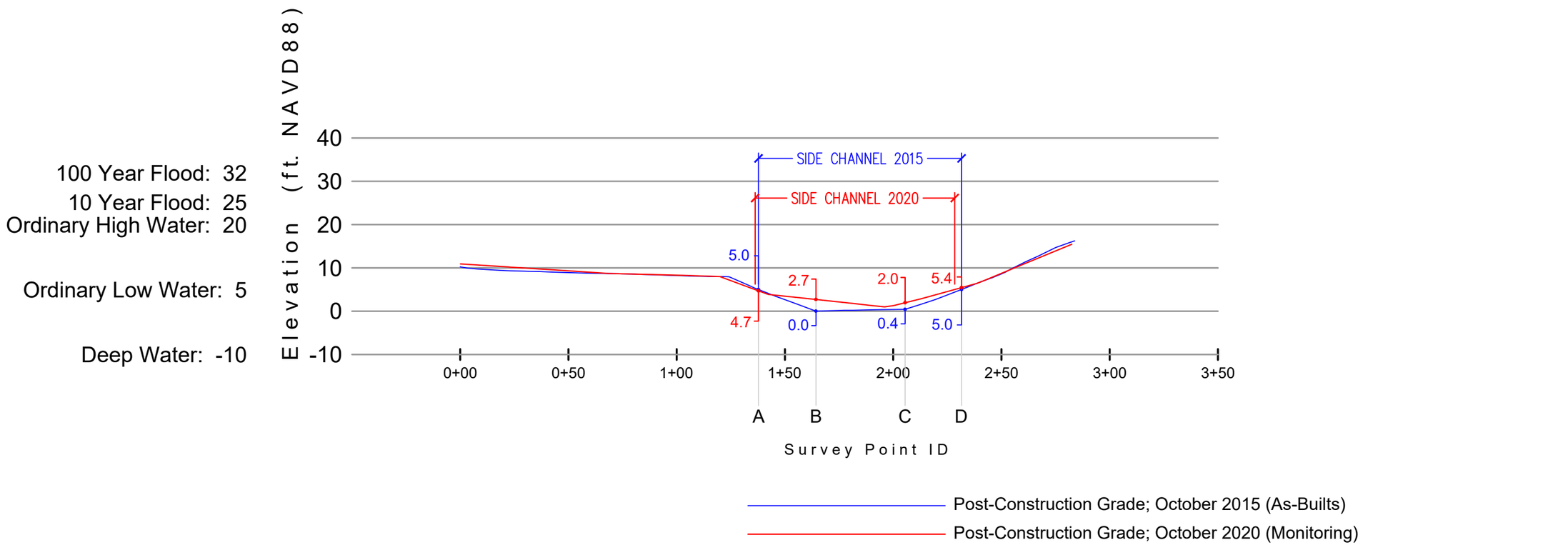
Horizontal Scale: 1" = 50' 2x Vertical Exaggeration

Cross Section F									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	5.3	+0.3	15.0	14.7	(14.7/15.0) =	98%	|98 -100| =	2%
B	0.6	1.2	+0.6	19.4	18.8	(18.8/19.4) =	97%	|97 -100| =	3%
C	1.1	2.3	+1.2	18.9	17.7	(17.7/18.9) =	94%	|94 -100| =	6%
D	1.4	3.7	+2.3	18.6	16.3	(16.3/18.6) =	88%	|88 -100| =	12%
E	5.0	5.1	+0.1	15.0	14.9	(14.9/15.0) =	99%	|99 -100| =	1%
		Average Distance:	0.9					Average:	5%



F Cross Section F

Cross Section G									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	4.7	-0.3	15.0	15.3	(15.3/15.0) =	102%	|102 -100| =	2%
B	0.0	2.7	+2.7	20.0	17.3	(17.3/20.0) =	87%	|87 -100| =	13%
C	0.4	2.0	+1.6	19.6	18.0	(18.0/19.6) =	92%	|92 -100| =	8%
D	5.0	5.4	+0.4	15.0	14.6	(14.6/15.0) =	97%	|97 -100| =	3%
		Average Distance:	1.3					Average:	7%

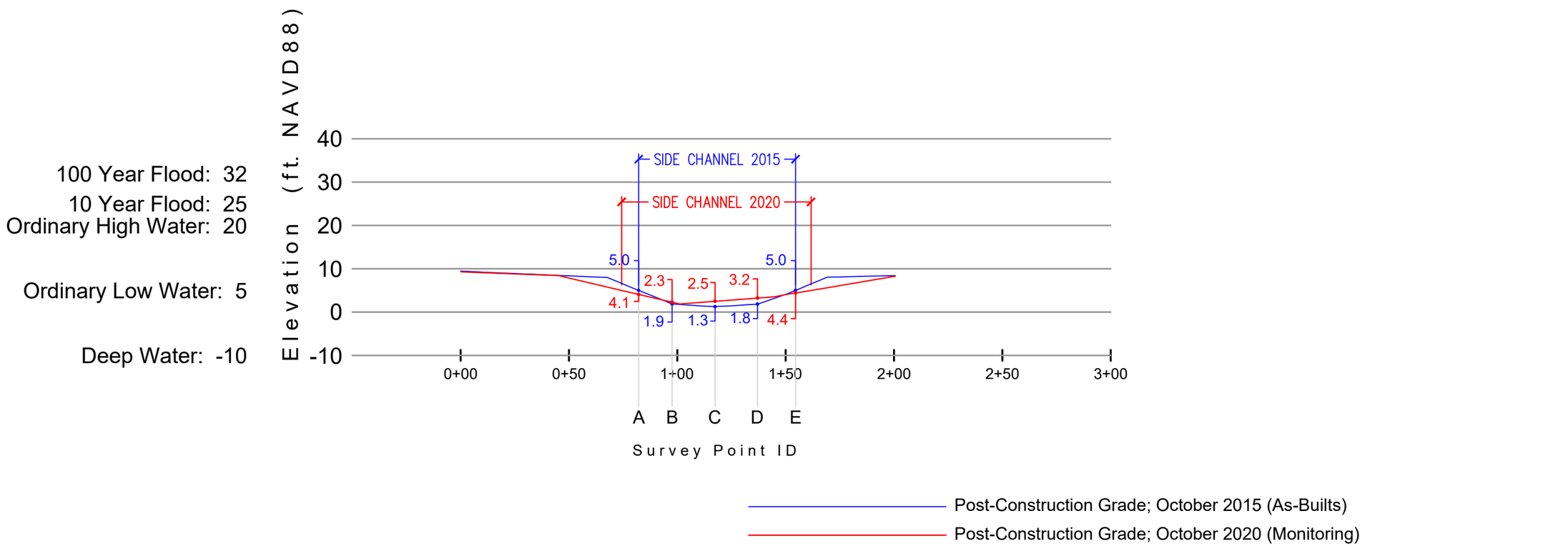


0 50' 100'

2x Vertical Exaggeration

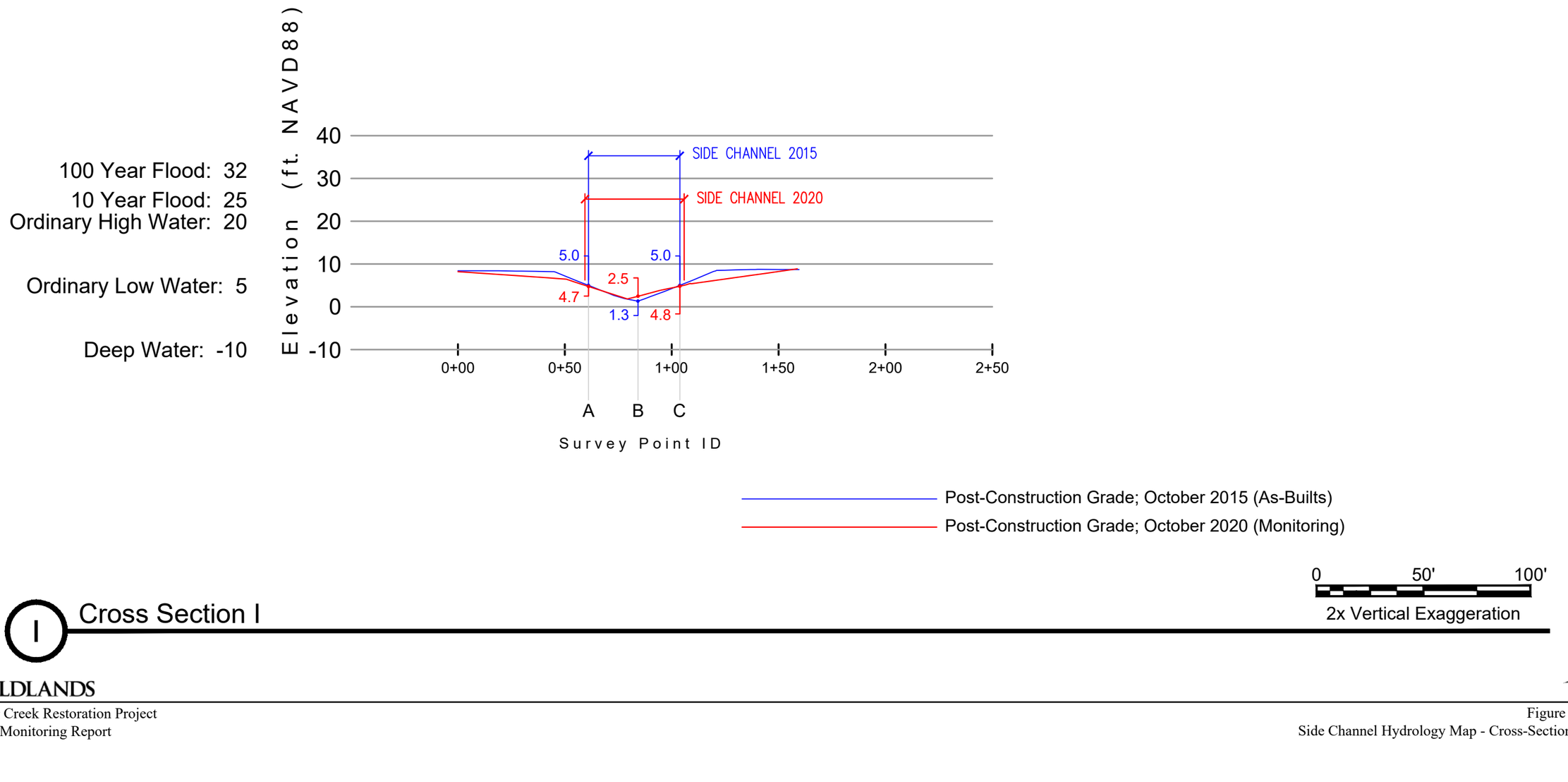
G Cross Section G

Cross Section H									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	4.1	-0.9	15.0	15.9	(15.9/15.0) =	106%	|106 -100| =	6%
B	1.9	2.3	+0.4	18.1	17.7	(17.7/18.1) =	98%	|98 -100| =	2%
C	1.3	2.5	+1.2	18.7	17.5	(17.5/18.7) =	94%	|94 -100| =	6%
D	1.8	3.2	+1.4	18.2	16.8	(16.8/18.2) =	92%	|92 -100| =	8%
E	5.0	4.4	-0.6	15.0	15.6	(15.6/15.0) =	104%	|104 -100| =	6%
		Average Distance:	0.9					Average:	6%



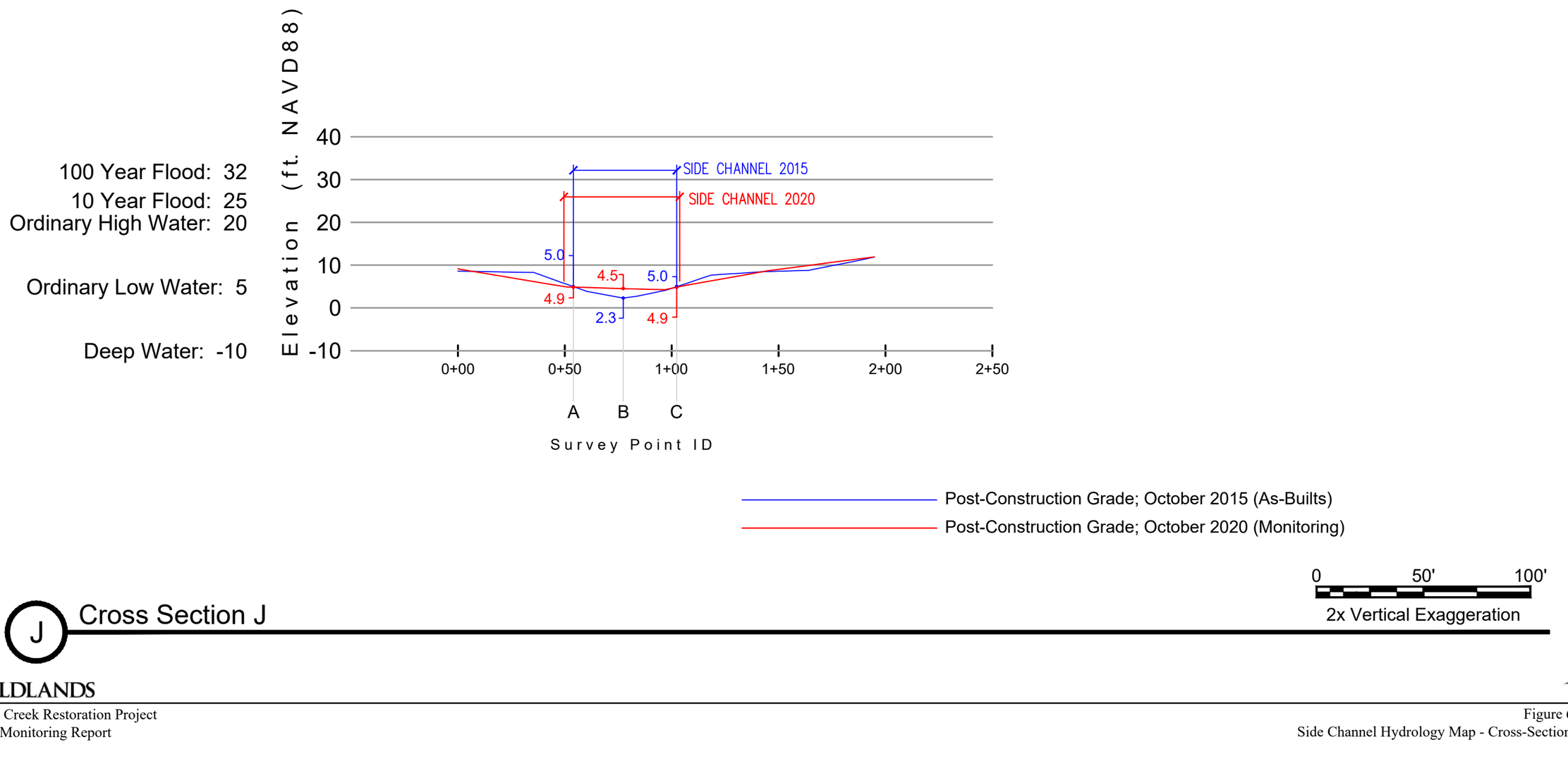
H Cross Section H

Cross Section I									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	4.7	-0.3	15.0	15.3	(15.3/15.0) =	102%	|102 -100| =	2%
B	1.3	2.5	+1.2	18.7	17.5	(17.5/18.7) =	94%	|94 -100| =	6%
C	5.0	4.8	-0.2	15.0	15.2	(15.2/15.0) =	101%	|101 -100| =	1%
		Average Distance:	0.6					Average:	3%



I Cross Section I

Cross Section J									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	4.9	-0.1	15.0	15.1	(15.1/15.0) =	100%	|100 -100| =	0%
B	2.3	4.5	+2.2	17.7	15.5	(15.5/17.7) =	88%	|88 -100| =	12%
C	5.0	4.9	-0.1	15.0	15.1	(15.1/15.0) =	100%	|100 -100| =	0%
		Average Distance:	0.8					Average:	4%



J Cross Section J

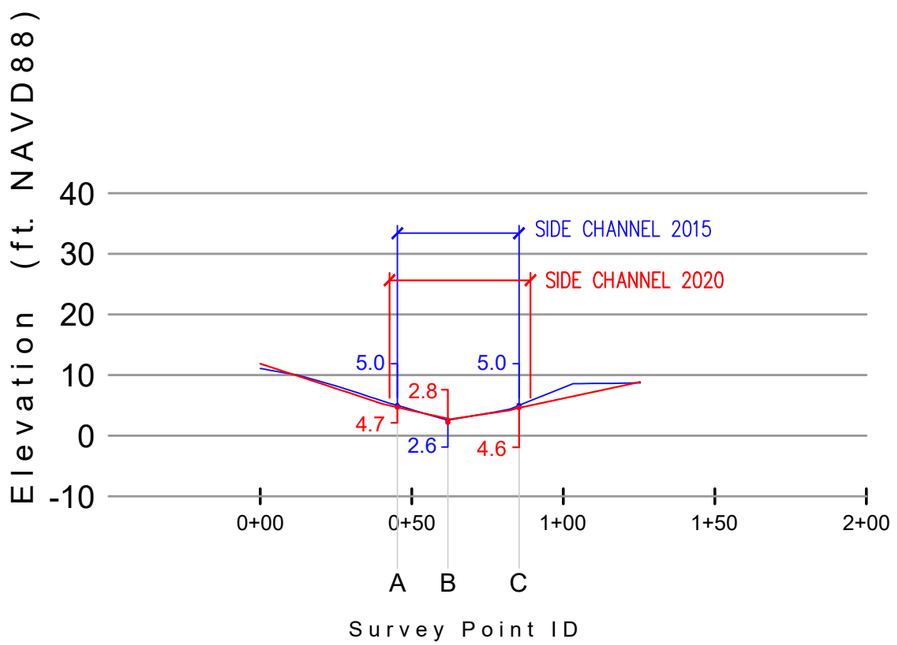
WILDLANDS

Cross Section K									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	4.7	-0.3	15.0	15.3	(15.3/15.0) =	102%	|102 -100| =	2%
B	2.6	2.8	+0.2	17.4	17.2	(17.2/17.4) =	99%	|99 -100| =	1%
C	5.0	4.6	-0.4	15.0	15.4	(15.4/15.0) =	103%	|103 -100| =	3%
		Average Distance:	0.3					Average:	2%

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

Ordinary Low Water: 5

Deep Water: -10



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

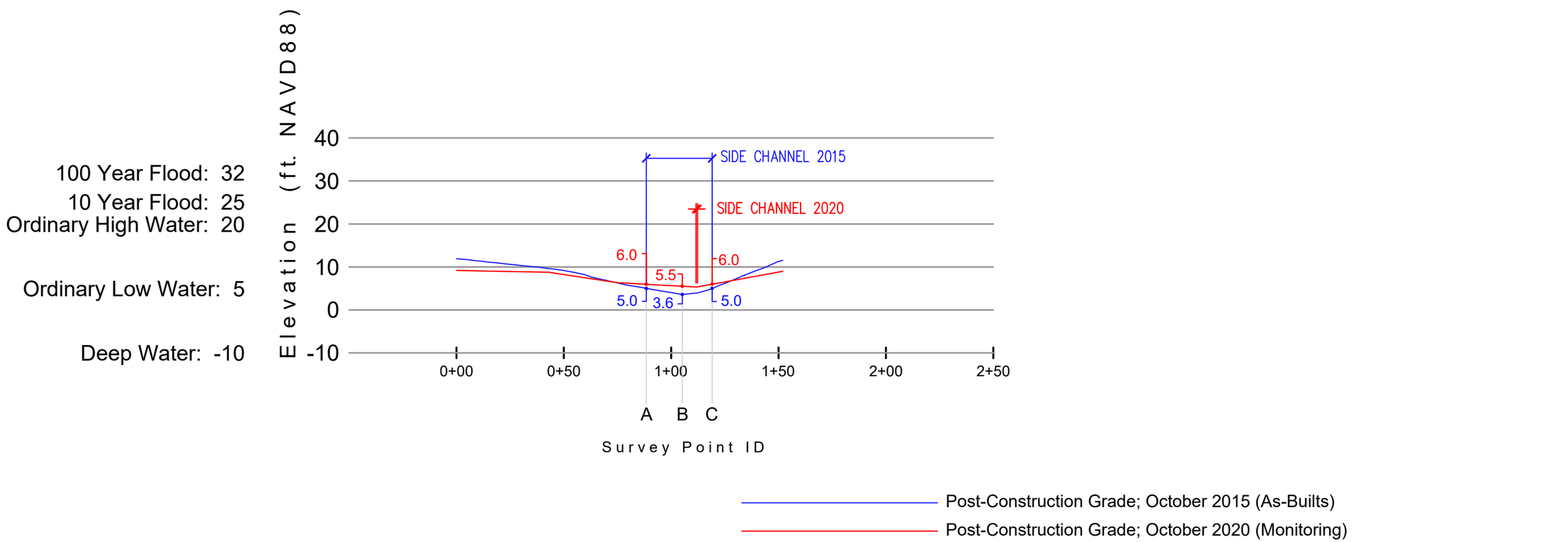
Post-Construction Grade; October 2020 (Monitoring)

0 50' 100'

2x Vertical Exaggeration

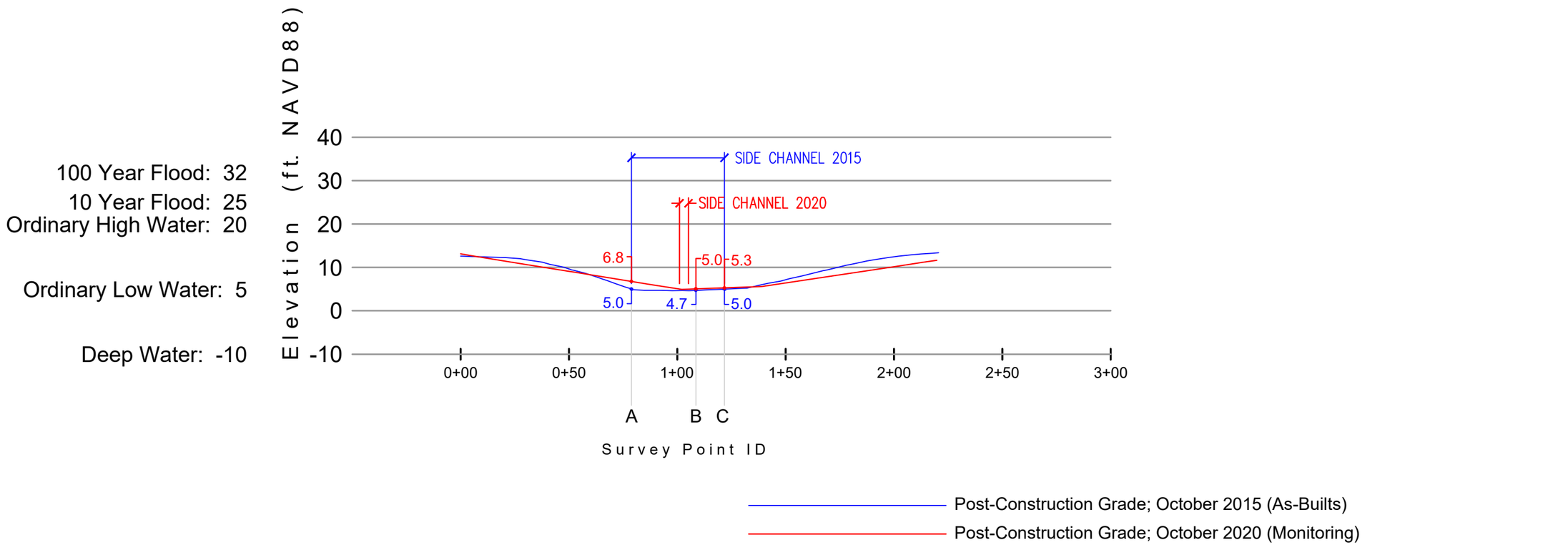
K Cross Section K

Cross Section L									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	6.0	+1.0	15.0	14.0	(14.0/15.0) =	93%	|93 -100| =	7%
B	3.6	5.5	+1.9	16.4	14.5	(14.5/16.4) =	88%	|88 -100| =	12%
C	5.0	6.0	+1.0	15.0	14.0	(14.0/15.0) =	93%	|93 -100| =	7%
		Average Distance:	1.3					Average:	9%



L Cross Section L

Cross Section M									
Survey Point ID	Elevation: October 2015	Elevation: October 2020	Elevation Change	Depth October 2015 relative to OHW (elevation 20.0)	Depth October 2020 relative to OHW (elevation 20.0)	Percent Change Relative to OHW 2015 to 2020		Absolute Percent Change Relative to OHW 2015 to 2020	
A	5.0	6.8	+1.8	15.0	13.2	(13.2/15.0) =	88%	|88 -100| =	12%
B	4.7	5.0	+0.3	15.3	15.0	(15.0/15.3) =	98%	|98 -100| =	2%
C	5.0	5.3	+0.3	15.0	14.7	(14.7/15.0) =	98%	|98 -100| =	2%
		Average Distance:	0.8					Average:	5%

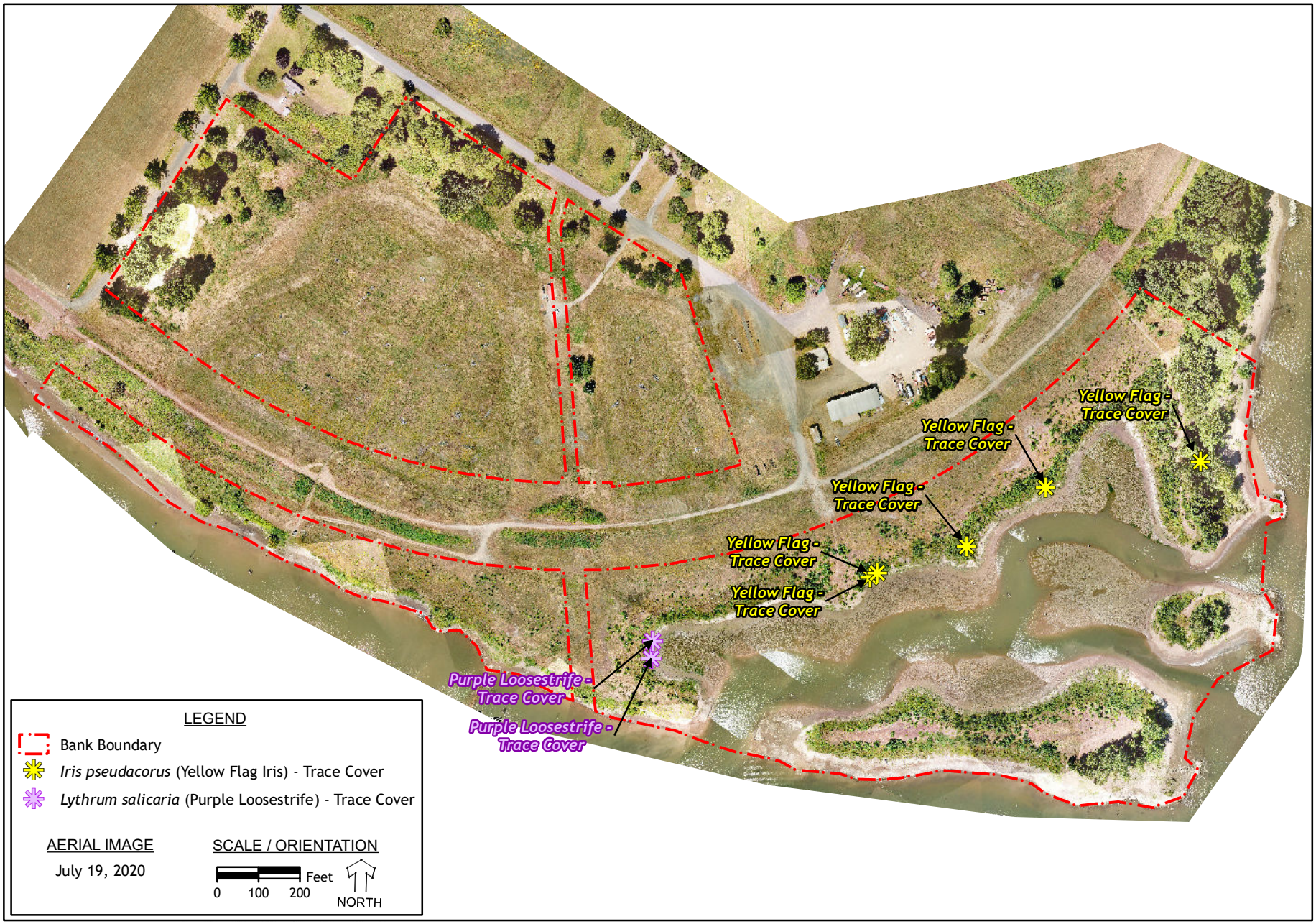


M Cross Section M

WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

Figure 6m
Aerial Photo Taken on 05/27/2020



WILDLANDS

Alder Creek Restoration Project
2020 Monitoring Report

Figure 8
Invasive Species Map

APPENDIX 1

Performance Standards

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2020
	Installed Vegetation	
Emergent Marsh Year 5: • ≥ 30% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) Years 7 and 10: • ≥ 40% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass)	In Years 2,3,4,5,7, and 10, cover and diversity will be quantified using a quadrat method. However, the purpose of the monitoring conducted in Years 2, 3, and 4 is to identify the native and non-native herbaceous cover to gauge whether or not the site appears to be on a trajectory towards meeting the performance standards for Year 5. If the emergent marsh appears to be in jeopardy of not meeting the performance standard for Year 5, adaptive management including herbivory prevention and replanting may be conducted. A sampling transect will be run perpendicular to the baseline transect and quadrat data will be collected along the sampling transect. The frequency of sampling quadrats and the size of quadrats will be tailored to best assess this habitat type. The sampling interval and the size of the quadrat will be determined in the field based on pilot sampling data	**Partially Met**- Monitoring of the emergent marsh was conducted on September 17, 2020. Average absolute cover across the 26 monitoring quadrats was observed at 25.63, native herbaceous cover was observed at 22.15%, and invasive herbaceous cover was observed at <1% cover in Year 5. This does not meet the performance standard of≥30% herbaceous cover but does meet the the performance standard of ≤10% invasive herbaceous cover. However, when averaging the Years 2-5 absolute cover values, average absolute cover was observed at 34.39%, native herbaceous cover was observed at 30.46% and invasive herbaceous cover was observed at less than 1%. Emergent marsh monitoring will continue in Year 7 **(**2022**)**.

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2020
	Installed Vegetation	
Riparian Scrub-Shrub and Riparian Forest (ACM) Years 2-5: • A minimum of 1,200 native woody stems per acre • At least 5 native woody species (for Riparian Scrub-Shrub within the ACM) • At least 3 native tree species and 5 native shrub species (for Riparian Forest within the ACM) • Cover (during the first 5 years, woody species will be excluded from percent cover): o ≥ 10% native herbaceous o ≤ 10% invasive herbaceous (excluding reed canarygrass) o ≤ 10% invasive shrubs Year 7: • ≥ 55% native woody species • ≥ 10% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) • ≤ 5% invasive shrubs Year 10: • ≥ 80% native woody species • ≥ 10% native herbaceous • ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)	In Years 2, 3, 4, 5, 7, and 10 native woody plantings and vegetative cover will be assessed at each plot within the riparian scrub-shrub and riparian forest (ACM). The native woody plantings and vegetative cover values at each plot will be added together and averaged over the habitat to evaluate the native vegetative performance standards . The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Met**- Monitoring of the riparian scrub-shrub and riparian forest (ACM) was conducted on July 19-20, 2020. The ACM is currently meeting all associated performance standards for Year 5. During surveys 1,422 trees per an acre were observed, meeting the minimum of 1,200 trees per an acre. A total of 11 woody species were observed with 4 tree species and 7 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 33.54% cover, invasive herbaceous cover (excluding reed canarygrass) was 4.58% cover, and invasive woody vegetation was <1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive woody performance standards. Riparian scrub-shrub and riparian forest (ACM) monitoring will continue in Year 7 (2022).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2020
	Installed Vegetation	
Riparian Forest and Cottonwood-Dominated Upland Forest Years 2-5: • A minimum of 1,200 native woody stems per acre • At least 3 native tree species and 5 native shrub species • Cover (during the first 5 years, trees/shrubs will be excluded from percent cover): o ≥ 10% native herbaceous o ≤ 10% invasive herbaceous (excluding reed canarygrass) Year 7: • ≥ 50% native woody species • ≥ 10% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) • ≤ 5% invasive shrubs Year 10: • ≥ 80% native woody species • ≥ 5% native herbaceous • ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)	In Years 2, 3, 4, 5, 7, and 10 native woody plantings and vegetative cover will be assessed at each plot within the riparian forest and cottonwood-dominated upland forest. The native woody plantings and vegetative cover values at each plot will be added together and averaged over the habitat to evaluate the native vegetative performance standards . The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Partially Met**- Monitoring of the riparian forest and cottonwood-dominated upland forest was conducted July 19-20, 2020. The riparian forest and cottonwood-dominated upland forest is partially meeting the associated performance standards for Year 5. During surveys 1,017 trees per an acre were observed, not meeting the minimum of 1,200 trees per an acre. A total of 6 tree species and 7 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 16.10% cover, invasive herbaceous cover (excluding reed canarygrass) was 4.16% cover, and invasive woody vegetation was < 1% cover. The observed cover requirements meet the ≥10% native herbaceous cover, ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard. Riparian forest and cottonwood-dominated upland forest monitoring will continue in Year 7 (2022).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2020
	Installed Vegetation	
Oak-Dominated Upland Forest Years 2-5: • A minimum of 500 trees/shrubs per acre • At least 1 native tree species and 4 native shrub species • Cover (during the first 5 years, trees/shrubs will be excluded from percent cover): o ≥ 25% native herbaceous o ≤ 15% invasive herbaceous (excluding reed canarygrass) o ≤ 15% invasive shrubs Year 7: • ≥ 25% native woody species • ≥ 25% native herbaceous • ≤ 10% invasive herbaceous (excluding reed canarygrass) • ≤ 5% invasive shrubs Year 10: • ≥ 40% native woody species (at least 10% of woody species cover will be provided by oaks) • ≥ 25% native herbaceous • ≤ 5% invasive herbaceous and shrubs (excluding reed canarygrass)	In Years 2, 3, 4, 5, 7, and 10 native woody plantings and vegetative cover will be assessed at each plot within the oak-dominated upland forest. The native woody plantings and vegetative cover values at each plot will be added together and averaged over the habitat to evaluate the native vegetative performance standards . The 38 permanent vegetation plots were established in Year 1 and marked at each of the four corners.	**Partially Met**- Monitoring of the oak-dominated upland forest was conducted July 19-20, 2020. During surveys 733 trees per an acre were observed, which does meet the minimum of 500 trees per an acre. A total of 5 tree species and 7 shrub species were observed. This does meet minimum requirement of at least 1 native tree species and 4 native shrub species being observed. Native herbaceous cover (excluding woody species) was observed at 15.18% cover (which does not meet the Year 5 performance standard), invasive herbaceous cover (excluding reed canarygrass) was <1% cover, and invasive woody vegetation was <1% cover. The observed cover requirements does not meet the ≥25% native herbaceous cover but does meet ≤10% invasive herbaceous, and ≤10% invasive shrubs performance standard. Oak-dominated upland forest monitoring will continue in Year 7 (2020).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2020
	Invasive Plant Species	
Reed Canarygrass • Years 1-5: ≤ 30% reed canarygrass • Years 7: ≤ 25% reed canarygrass • Years 10: ≤ 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 41 plots was 1.94%. Reed canarygrass assessments were conducted during the spring and later summer of 2020. Reed canarygrass monitoring will continue in Year 7 (2022).
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		**Met** – The entire site was walked to locate any species on the "zero-untreated" list. During Year 5, trace cover of purple loosestrife and yellow flag iris were detected on site (see Figure 7 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 2020
	Geomorphic/Structural/Habitat Complexity Elements	
Topographic Surveys During years 1, 3, 5, 7, 10, topographic surveys will be completed once a year after the wet season to document changes in site topography and structural habitat features. The following changes would trigger a project review to determine what, if any, adaptive management actions are necessary: • Changes of more than 10% in ACM and side channel habitat acreages from the as-built surveys. • Changes of more than 20% in side channel depths from the as-built surveys.	Topographic surveys will include collecting topographic readings along the 5 pre-selected, permanent monitoring transects. Channel depths will be measured from the OHWM.	**Met** - Topographic surveys were conducted from October 6 and October 7, 2020. Changes to the ACM acreage and side channel habitat acreage were well below 10%. Changes in side channel depths were well below 20%. Topographic surveys will continue in Year 7 (2022).
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 7 (2022).
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 18, 2020 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 22 observed on the Project through natural recruitment. Large woody debris monitoring will continue in Year 7 (2022).
Aerial Photography Aerial photos of the site will be collected once during later summer during years 1, 3, 5, 7, 10.	The aerial photos were included in the Year 1 (2016) monitoring report.	**Met** - Aerial photography of the site was conducted on July 19, 2020. Aerial photography of the site will continue in Year 7 (2022).

Performance Standard	Documentation/Monitoring Method	Monitoring Result 2020
	Geomorphic/Structural/Habitat Complexity Elements	
Hydrology Water level data loggers will be placed at a minimum of two locations and continuous data will be collected, as feasible. If determined that continuous monitoring is not feasible, an alternative monitoring schedule will be determined in consultation with the Trustee Council representatives.	Hydrology data is collected by reviewing data from the nearby Columbia Slough Gauge, survey data taken on the site, and topographic assessment points taken along elevation 20. For monitoring in Years 7 and 10, information collected via water level data loggers (assuming they remain in place and functional) will also be assessed.	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. A satellite photo from May 27, 2020 (Figure 6m) was assessed for information regarding the inundation level at the time of the photograph. On October29, 2020, Wildlands installed 2 water level data loggers and one barometer to collect continuous water level data in anticipation of the monitoirng for Years 7 and 10.

APPENDIX 2

Maintenance Log

Alder Creek NRDA Bank
2020 (Year 5)
Maintenance Log

Visit Date:	Visited By: (Name/Initials)	Primary Purpose of Visit	Fencing	Signage	Trash & Trespass	Invasives
11/23/2020	Greg Lohse	Maintenance/Land Management	Checked	Checked	Checked	Checked
10/29/2020	Bill Roper	Biological Monitoring	Checked	Checked	Checked	Checked
9/17/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked
8/28/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked
8/28/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
8/21/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Removed	Treated/Removed
8/13/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
8/7/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
7/31/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Removed	Treated/Removed
7/29/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Checked
7/24/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
7/23/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked
7/20/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked
7/19/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked
7/19/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked
7/17/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Checked
7/10/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
7/2/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
6/26/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
6/25/2020	Greg Lohse	Biological Inspection	Checked	Checked	Checked	Checked
6/19/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Removed	Treated/Removed
6/12/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
6/5/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
6/2/2020	Pat Stephens	Maintenance/Land Management	Checked	Checked	Checked	Checked
5/29/2020	Graham Baker	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
5/28/2020	Greg Lohse	Maintenance/Land Management	Checked	Checked	Checked	Checked
5/14/2020	Pat Stephens	Maintenance/Land Management	Checked	Checked	Checked	Treated/Removed
4/26/2020	Greg Lohse	Biological Monitoring	Checked	Checked	Checked	Checked

Alder Creek NRDA Bank
2020 (Year 5)
Maintenance Log

Visit Date:	Visited By: (Name/Initials)	Primary Purpose of Visit	Fencing	Signage	Trash & Trespass	Invasives
4/23/2020	Greg Lohse	Biological Inspection	Checked	Checked	Checked	Checked
1/28/2020	Greg Lohse	Biological Inspection	Checked	Checked	Checked	Checked
1/25/2020	Greg Lohse	Maintenance/Land Management	Checked	Checked	Checked	Checked

APPENDIX 3

Emergent Marsh Quadrat Data

Alder Creek NRDA Bank
2020 (Year 5)
Emergent Marsh
Quadrat Data

	Absolute Cover by species by Quadrat																									
Plant Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Absolute Cover	75	35	4	2	5	40	10	35	80	65	15	2	1	2	15	50	50	45	60	5	15	0	3	3	3	40
Native Herbaceous																										
Bidens cernua																2%										
Callitriche heterophylla						1%	1%	<1%									<1%		<1%		<1%					<1%
Carex densa																<1%			<1%							
Carex obnupta															5%	8%	1%									
Cyperus strigosus									<1%																	
Eleocharis obtusa	27%					6%			2%	21%							<1%	2%								1%
Eleocharis palustris	2%	13%				6%	3%	17%	28%	8%	7%		1%				14%	8%	1%		2%		2%	3%		14%
Elodea nuttallii																				1%						
Lindernia dubia									<1%										18%							
Ludwigia palustris	44%	21%	4%	2%	5%	26%	5%	17%	47%	35%	7%			2%	5%	<1%	23%	34%	30%		8%		2%			23%
Polygonum hydropiperoides								1%							<1%						2%				3%	
Non-Native																										
Echinochloa crus-galli																										1%
Gyceria sp.															5%	32%			1%							
Mentha pulegium									2%										1%							
Polygonum hydropiper	<1%	1%								<1%							6%		7%		2%					
Polygonum persicaria	2%							1%								8%	6%	2%								
Invasive Herbaceous																										
Myriophyllum aquaticum			<1%								<1%	2%								4%	<1%					

APPENDIX 4

Woody Species Plot Data

Alder Creek NRDA Bank
2020 (Year 5)
Absolute Cover
Plot Data

Plant Species	Absolute Cover by species by Plot																																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Absolute Cover	65	75	70	65	75	50	55	60	50	65	65	55	35	20	45	40	40	45	45	45	55	30	45	45	80	50	50	35	75	95	55	65	85	90	65	45	35	65			
Native Herbaceous																																									
Achillea millefolium																			<1%																						
Acmispon parviflorus		7%					2%	7%		2%		2%		27%	15%	2%			2%		21%					11%													2%		1%
Agoseris grandiflora					1%								2%							1%											<1%										
Agrostis exarata	<1%														1%	9%		8%	27%	15%		6%					2%										9%				
Agrostis sp														16%																											
Alopecurus saccatus																9%																									
Anaphalis margaritacea									<1%																																
Bidens cernua																							21%		9%	45%		2%		2%	29%	38%	3%	19%	11%	2%		23%			
Bromus carinatus		1%						<1%		2%			2%				<1%					<1%																	<1%		
Bromus sitchensis																						1%																		<1%	
Bromus sp																													2%												<1%
Carex obnupta																							<1%													2%					
Chamerion angustifolium																																									<1%
Conyza canadensis													<1%							3%			5%	7%	23%		2%	45%			29%			32%		43%		<1%			
Deschampsia cespitosa		7%			19%		8%	<1%	33%	2%	2%	2%							2%																						
Epilobium ciliatum					1%	2%										<1%					8%					11%	12%					9%		19%		2%					
Equisetum hyemale																														2%											
Festuca occidentalis												<1%																													<1%
Fraxinus latifolia					1%												<1%											2%					3%	8%		2%					
Glycyrrhiza lepidota																															2%							<1%			
Gnaphalium palustre																					<1%																				
Impatiens noli-tangere	<1%																								2%																
Juncus effusus		1%				9%				8%						2%																									
Juncus tenuis					1%	2%																																	2%		
Madia glomerata		7%	2%	1%		9%		17%		8%	8%					9%		8%													2%					2%				10%	18%
Poa palustris				1%																																					
Polystichum munitum	<1%																																								
Rumex occidentalis																							<1%								<1%	2%									
Salix lasiandra						2%																				11%	2%	2%													
Typha latifolia						<1%																																			
Vicia americana		1%	2%						<1%																																
Xanthium strumarium																										<1%															
Native Woody																																									
Cornus sericea																														40%											
Crataegus douglasii					1%				<1%																																
Mahonia aquifolium					1%				<1%																																
Populus trichocarpa					1%										15%		8%	2%			2%		5%	7%	23%		12%		10%	24%	11%	9%		2%	11%						
Rosa pisocarpa																																	14%								
Rubus ursinus	2%								<1%																				26%	10%					61%						
Salix fluviatilis																								7%																	
Salix scouleriana																							1%	7%	23%		12%	11%				9%	35%	8%		2%					
Spiraea douglasii																							1%			2%	12%	2%													
Symphoricarpos albus	34%																				2%								2%												
Non-Native																																									
Agrostis gigantea		1%	11%				8%		13%					7%	1%			<1%		15%	8%											<1%		2%						<1%	

Alder Creek NRDA Bank
2020 (Year 5)
Absolute Cover
Plot Data

Plant Species	Absolute Cover by species by Plot																																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Aira caryophyllea							2%																																	2%	1%
Alisma plantago-aquatica				7%									8%										1%																		
Alopecurus pratensis	2%			7%				28%				23%		16%	6%			8%	11%																						18%
Brassica sp.																										<1%						<1%									
Cichorium intybus							<1%																																		
Daucus carota				1%																																	2%				
Dipsacus fullonum			<1%		1%		<1%		<1%	2%			2%	1%																	<1%					<1%					
Festuca sp																																2%									
Geranium dissectum																																	<1%								
Holcus lanatus		19%	29%	29%	48%	22%	20%	1%		21%	32%	2%				39%						1%															9%	2%	34%	26%	1%
Lactuca serriola		<1%		<1%					<1%				2%	<1%	1%																										
Lolium perenne		7%		7%			2%	7%	3%	8%	2%				15%	<1%		2%											2%										2%	2%	1%
Lotus corniculatus		19%		1%	4%	22%	20%	7%			19%	23%	8%			2%	46%	35%	27%	39%		16%	5%	19%	9%	2%	30%	11%	<1%			9%	14%	<1%		2%		9%	20%	10%	1%
Mentha pulegium													2%								<1%			1%							2%		3%			2%					
Parentucellia viscosa		1%	<1%	<1%		9%	8%	1%		21%	8%	9%	8%	<1%	1%	2%	2%	2%	11%	3%	2%	1%										<1%					2%		8%	10%	18%
Rumex crispus	<1%	<1%		<1%										<1%						1%																					
Senecio vulgaris									3%																																
Tanacetum vulgare		<1%			1%	<1%				<1%	<1%		<1%	1%		<1%		<1%		1%	<1%								<1%				3%			10%	9%			<1%	<1%
Trifolium arvense				18%				1%				9%	2%				8%	8%				27%															24%			2%	1%
Trifolium dubium																																							2%		
Verbascum thapsus									3%												21%																				
Vulpia sp.																			<1%										<1%								2%			<1%	1%
Invasive Herbaceous																																									
Cirsium arvense			2%	<1%	1%				13%																2%	2%			<1%			<1%	3%		<1%			2%			
Cirsium vulgare						<1%	2%					<1%				<1%		<1%																					2%	<1%	
Conium maculatum			<1%												<1%						<1%												<1%								
Convolvulus arvensis																								<1%								2%						<1%			
Cytisus scoparius				<1%																																	2%				
Hypericum perforatum															<1%																										
Iris pseudacorus																									<1%																
Leucanthemum vulgare		<1%			1%				<1%																																
Lythrum salicaria																											<1%														
Rubus armeniacus	20%		2%		4%				3%		<1%		34%							3%		1%							10%	2%	2%		3%			10%		9%			
Reed Canarygrass																																									
Phalaris arundinacea	<1%		29%		4%		<1%		3%				2%								<1%				<1%	<1%									2%	<1%		39%			
Invasive Woody																																									
Crataegus monogyna	2%				1%				<1%																																
Cytisus scoparius				<1%																																	<1%				

APPENDIX 5

Herbaceous and Invasive Cover Plot Data

Alder Creek Mitigation Bank
2020 (Year 5)
Woody Plants
Plot Data

		Number of Woody Plants by Species by Plot																																						
		Oak Dominated Upland Forest										Riparian and Cotton Dominated Upland Forest															Riparian Scrub Shrub/Forest (ACM)															
Species Name	**Common Name**	**2**	**6**	**7**	**8**	**10**	**11**	**12**	**39**	**40**	**41**	**1**	**3**	**4**	**5**	**9**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**22**	**29**	**37**	**13**	**21**	**23**	**24**	**25**	**26**	**27**	**28**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**38**
Acer macrophyllum	Big Leaf Maple	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alnus rubra	Red Alder	0	2	0	0	3	4	3	5	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sericea	Redosier Dogwood	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	16	0	0	0	0	0	0	0
Corylus cornuta	Beaked Hazel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crataegus douglasii	Black Hawthorn	0	1	1	0	2	4	3	1	1	3	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraxinus latifolia	Oregon Ash	0	0	0	0	2	2	1	4	3	0	3	0	5	2	3	0	3	7	3	7	5	4	2	0	4	1	1	1	5	4	0	2	7	0	3	4	8	16	0	5	1
Mahonia aquifolium	Tall Oregon Grape	0	1	0	1	1	2	0	2	1	1	0	0	0	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
Mahonia nervosa	Dwarf Oregon-grape	0	0	0	1	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malus fusca	Western Crabapple	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	0	0	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	0	0	0
Physocarpus capitatus	Pacific Ninebark	0	0	0	4	0	3	1	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	5	0	0	2	2	0	6	0	0	0	0	0	0	0
Populus balsamifera ssp. Trichocarpa	Black Cottonwood	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	9	17	0	12	8	6	6	2	16	4	3	11	3	0	10	13	10	6	5	13	5	10	8	10	7	0
Quercus garryana	Oregon White Oak	0	2	0	3	2	5	6	4	3	10	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
Ribes divaricatum	Gooseberry	0	0	0	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	0	0	0	0	0	0	0	0	0	0
Rosa gymnocarpa	Baldhip Rose	0	2	0	1	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rosa pisocarpa	Swamp Rose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	3	0	0	0	7	0	0	0	0	0	9	0	0	9	0
Rubus parviflorus	Thimbleberry	1	2	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	0	0	0	0	0
Rubus spectabilis	Salmonberry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus ursinus	Trailing Blackberry	0	0	0	0	0	0	0	0	0	0	60	0	0	0	2	2	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	11	0	0	0	0	80	2	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	0	0	0	0	0	0	8	0	0	5	0	0	0	10	16	0	0	15	0
Salix lucida ssp lasiandra	Pacific Willow	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5	7	3	13	4	6	0	0	0	7	6	4	0	2
Salix scouleriance	Scouler Willow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	0	6	5	10	0	8	14	0	7	14	3	6	0	4	15
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	0	0	0
Spirea douglassi	Douglas' Spirea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	10	0	2	8	5	0	0	0	0	0	0	0	2
Symphoricarpos albus	Snowberry	0	2	0	1	4	5	6	6	4	7	100	0	0	0	0	0	1	0	0	0	0	1	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 6

2019 Oak-Dominated Upland Replant Area


West Mound
East Mound
Multnomah Channel
LEGEND
Bank Boundary
Replant Area
AERIAL IMAGE
May 08, 2019
SCALE / ORIENTATION
Feet
0 100 200
NORTH

APPENDIX 7

Turnstone 2020 Report

Alder Creek Wildlife Monitoring Surveys

Photo: Daphne Day

TURNSTONE
ENVIRONMENTAL CONSULTANTS

***2019-2020* Report:**

Fish & Wildlife Monitoring Surveys

for the Alder Creek Restoration Project

Sauvie Island
Multnomah County, Oregon

Submitted to:
Portland Harbor Holdings II, LLC
520 SW 6th Avenue, Suite 1210
Portland, OR 97204

Submitted by:
Turnstone Environmental Consultants, Inc.
PO Box 83362
Portland, OR 97283

Date:
January 21, 2021

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INTRODUCTION

Portland Harbor Holdings II, LLC. (PHH) retained the services of Turnstone Environmental Consultants, Inc. (Turnstone) to perform post-restoration (Year 5) monitoring surveys on Sauvie Island in Portland, Oregon in support of the Alder Creek Restoration Project (Project). Surveys were conducted for bird assemblages, bald eagles (*Haliaeetus leucocephalus*) and other raptors, and juvenile salmonids located within and adjacent to the survey area.

PROJECT OVERVIEW

Survey Area

The survey area is located in the Portland Harbor, at the southernmost tip of Sauvie Island where the confluence of Multnomah Channel and the Willamette River occurs (Figure 1). Formerly a 64-acre sawmill complex before restoration activities took place, the area now includes restored side channels, roughly nine acres of improved beaches, mudflats, and marsh habitat, 27 acres of riparian habitat, and 13 acres of oak woodland habitat with several large snags.

Figure 1. Survey Area, including eagle and point count locations

Statement of Work

Bird Assemblages

Bird assemblage surveys were conducted as an effective way to gather information about habitat function. Turnstone conducted on-site point counts along transects in order to characterize bird species composition representative of post-restoration habitats for comparison with baseline pre-construction

site conditions on the site. The data will be used to document species occurrences, proportionate species abundances, species richness, and how bird assemblages change over time. Per the monitoring plan, surveys take place in Years 1, 3, 5, and 10.

Eagle Surveys
Bald eagle surveys were conducted to obtain bald eagle presence/absence and behavior (if present). The objective is to document any changes in bald eagle use or behavior at the site over time. Per the monitoring plan, weekly breeding season surveys take place in Years 1, 3, 5, 7, and 10. Although these surveys are targeting bald eagle, other raptor sightings (including osprey) and behavior will also be recorded.

Fish Monitoring
Turnstone conducted fish monitoring to document the presence of native fish, specifically juvenile salmonids, within the created side channels. Per the monitoring plan, surveys take place in Years 1, 3, 5, 7, and 10. Due to visibility and safety issues, underwater video (GoPro) monitoring, in combination with visual shoreline surveys, is used as a substitute for the snorkel surveys outlined in the original monitoring plan.

METHODOLOGY

Surveys were conducted from December 2019 to August 2020 by qualified personnel. Turnstone Project Manager, Jeff Reams, and Lead Biologist, Daphne Day, worked with Steven Mitchell, Graeme Riggins, and Jordan Gomes to complete the post-restoration monitoring surveys. Professional resumes for project personnel are located in Appendix A. During monitoring efforts for specific species, any observation or sign of other Target Species was documented.

Bird Assemblages

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 at initial station detected 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 biologist's judgment are associated with the local habitat
Fly-over independent:	birds above top of vegetation or canopy, and in biologist's judgment are unassociated with the local habitat

Eagle Surveys

Turnstone and Wildlands biologists conducted raptor monitoring surveys at vantage point(s) with the best visibility for observing bald eagle use at the project site. Each survey was conducted for a total of two hours, varying between dawn and dusk and other daylight hours. Surveys were conducted along the prescribed survey route, including ten minutes at each of the five monitoring stations. Surveys were performed once per week December 2019 through August 2020. Behavioral characteristics were recorded when possible for all observations. During site visits, biologists looked for any potential bald eagle or osprey nests.

Fish Monitoring

Monitoring was conducted at standard locations within the newly created channels two times per month from February through May of 2020. Specific monitoring days were scheduled to account for weather and other ecological factors and were rescheduled as necessary based on field conditions. Biologists conducted visual shoreline surveys combined with stationary underwater video recording (GoPro). During monitoring, habitat conditions were recorded, including any aquatic plants (species, location, and relative abundance), shade, cover, depth, substrate, and water quality (including water temperature, dissolved oxygen, turbidity). Water quality measurements were taken where fish monitoring occurred and at locations in the Willamette River and Multnomah Channel adjacent to the Project site.

RESULTS

Bird Assemblages

Surveys were conducted on April 17, May 15, and June 19 of 2020. A summary table of the data collected is located in Appendix B. The average total number of species detected over the three visits was 36 and the average total number of individuals was 201[1] (Figure 2). The most abundant species overall were Savannah sparrow (*Passerculus sandwichensis*), European starling (*Sturnus vulgaris*), barn swallow (*Hirundo rustica*), common yellowthroat (*Geothlypis trichas*), and red-winged blackbird (*Agelaius phoeniceus*). The average proportion of nonnative individuals overall was eight percent (Figure 3), and included three species: European starling, house sparrow (*Passer domesticus*), and Eurasian-collared dove (*Streptopelia decaocto*). Two sensitive species, purple martin (*Progne subis*) and willow flycatcher (*Empidonax traillii brewsteri*) were detected during surveys; both species are listed by the State of Oregon as a Species of Concern.

[1] Summaries include both typical and flyover detections.

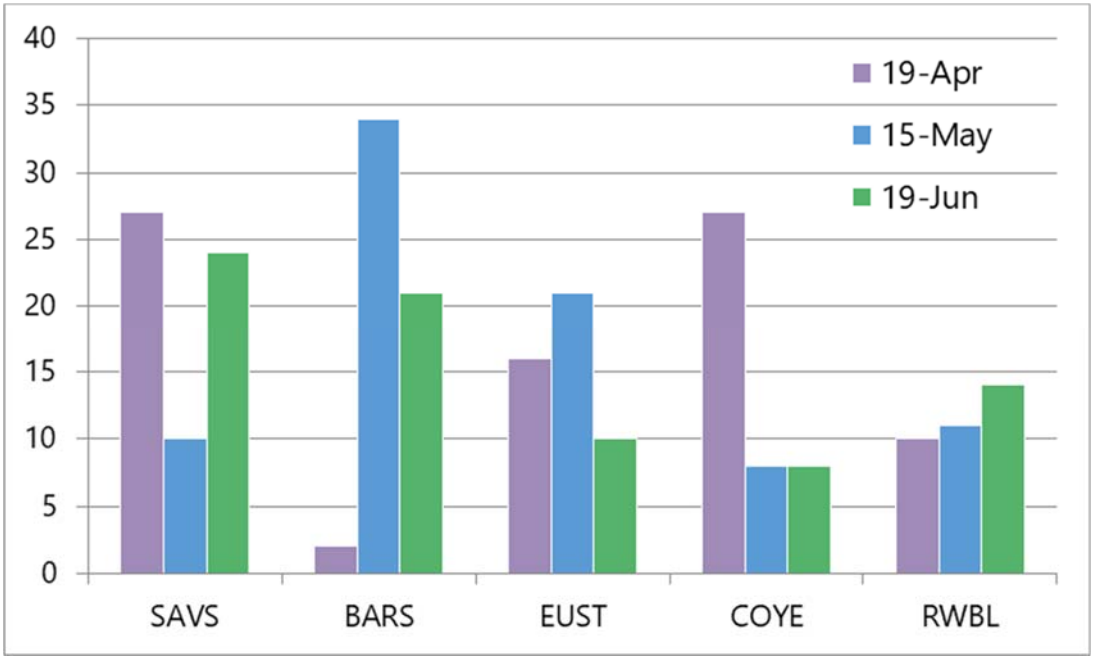

Figure 2. Top species counted in point count surveys, by total overall abundance

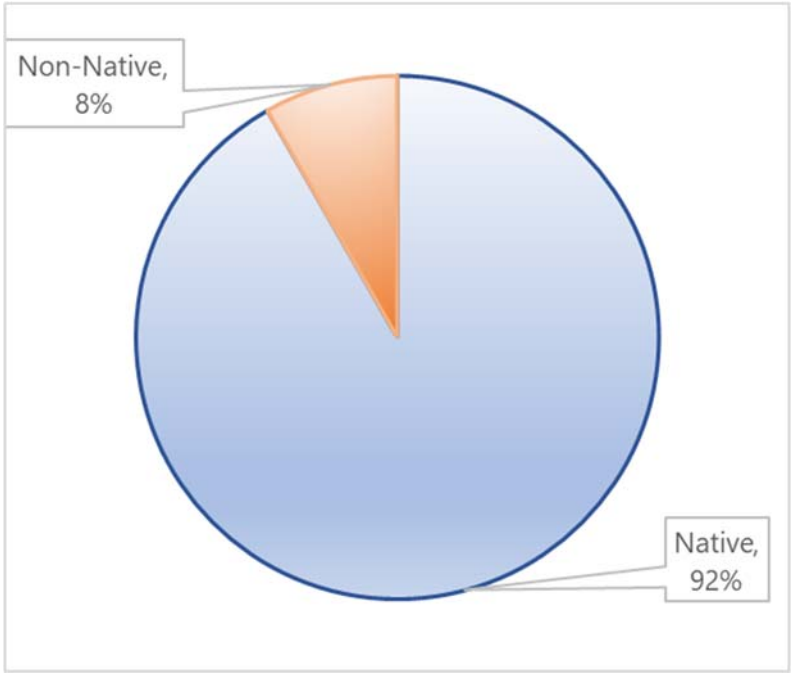

Figure 3. Percentage of native and nonnative species over all visits

Eagle Surveys

During the 2019-2020 survey period, 38 total eagle surveys were conducted. A total of 46 bald eagle sightings and 120 raptor sightings were recorded over the 38 visits. Other raptor species observed included osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), merlin (*Falco columbarius*), and rough-legged hawk (*Buteo lagopus*). Turkey vultures (*Cathartes aura*) were also observed during many of the visits, but are not included in the official raptor counts. The spatial distribution of eagle observations recorded throughout the season is displayed in Figure 4. During a single survey, the highest number of eagle individuals observed was three – two adults and one juvenile. Eagles were observed on site, either flying over or perched, for 52 percent of all observations. Eagles were generally observed flying over the site or channel, but were occasionally observed perching in the cottonwood trees near the shore. Raptors were regularly observed perching and hunting throughout the site and the restored channels. No active raptor nests were observed on or near the site. Eagles were observed most often during the early nesting period of January through March, while raptor activity levels varied throughout the entire survey season (Figures 5, 6).

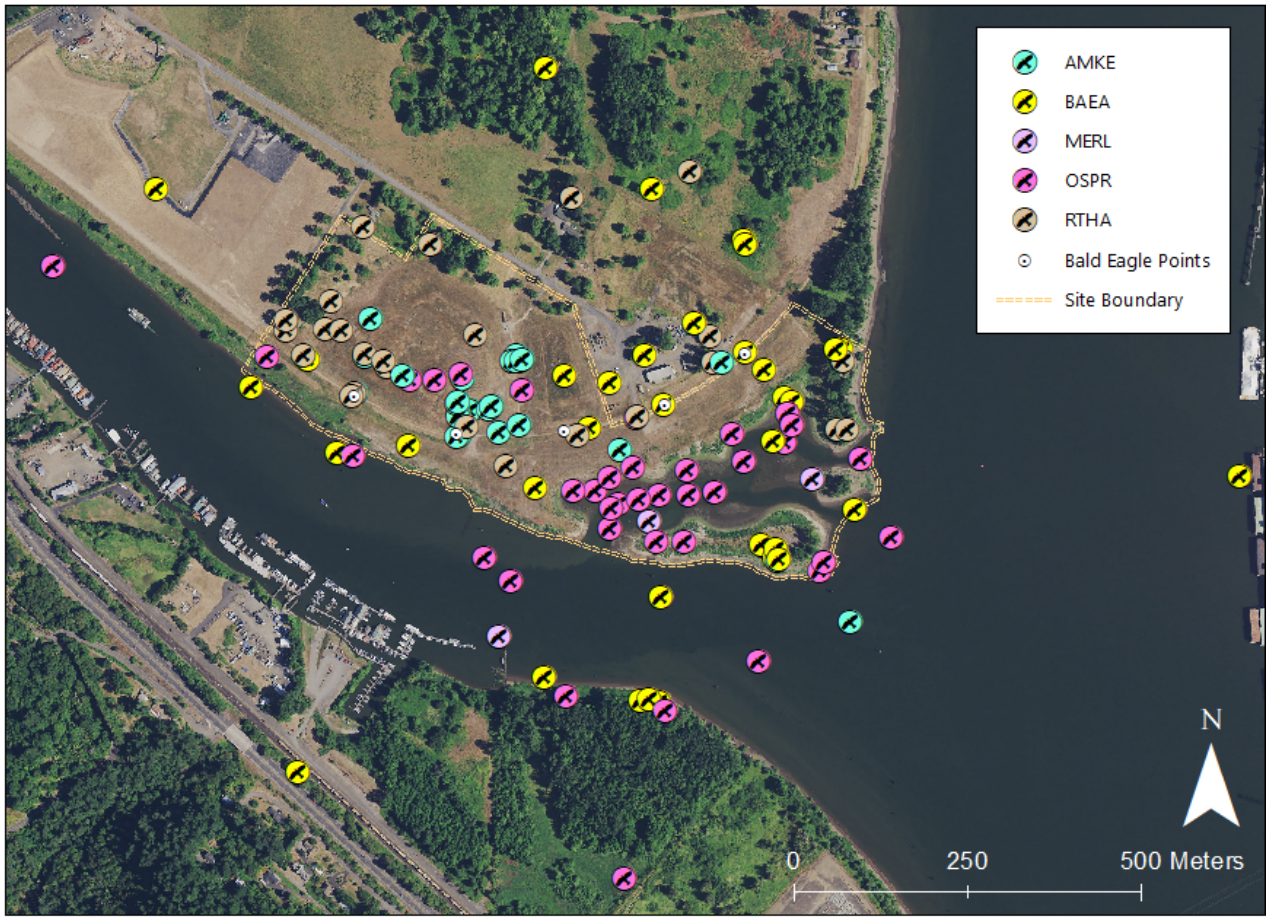

Figure 4. Estimated locations of eagle observations, May through August

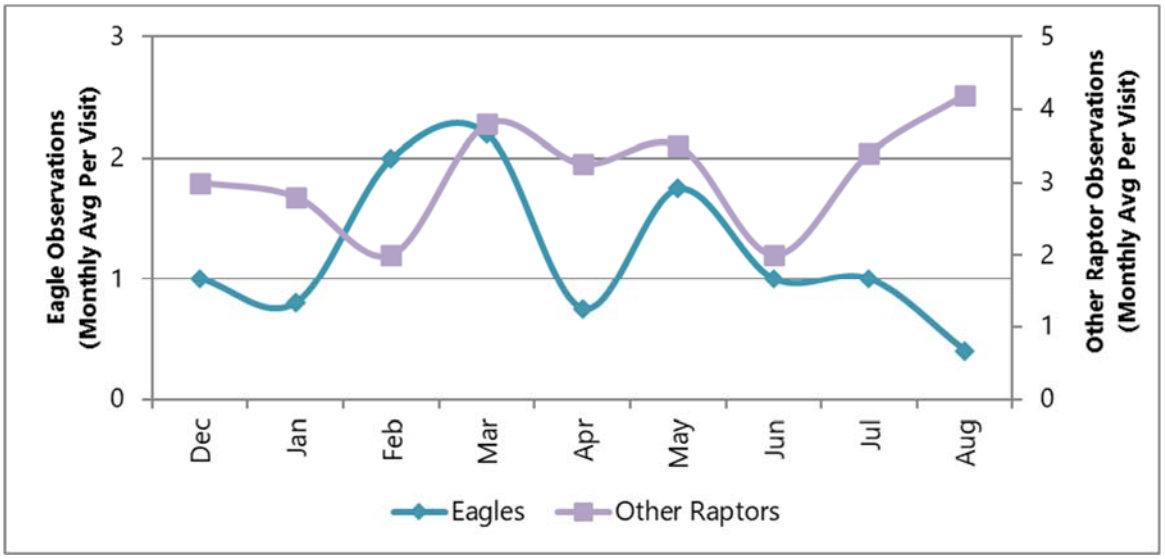

Figure 5. Mean bald eagle and other raptor observations, December 2019-August 2020, by month[2]

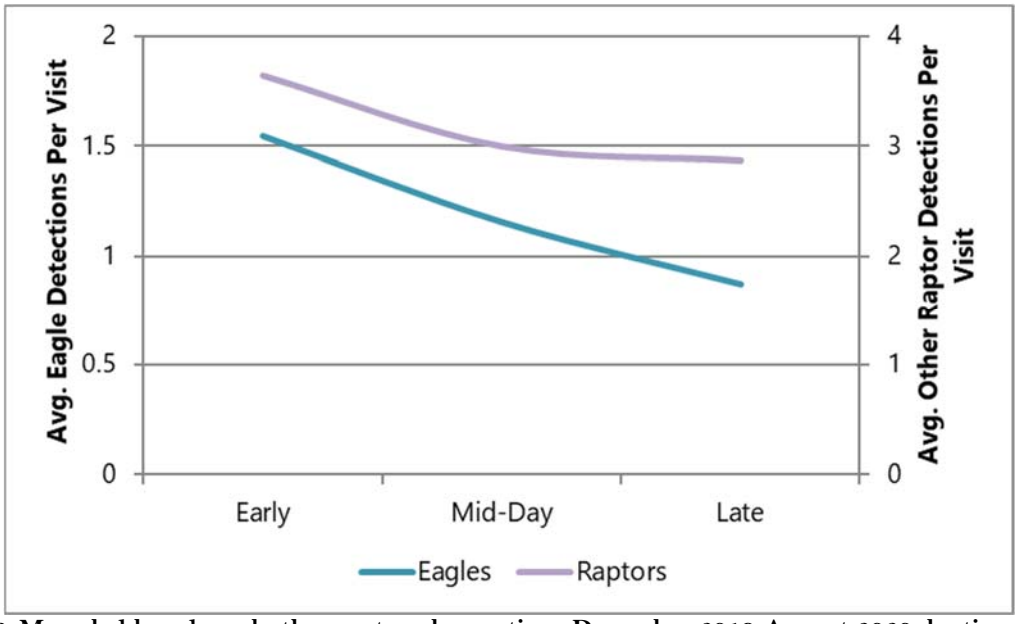

Figure 6. Mean bald eagle and other raptor observations December 2019-August 2020, by time of day[2,3]

Fish Monitoring

Details on the eight fish monitoring visits are outlined in Table 1 below. Juvenile salmonids were observed on several occasions (Figure 7), along with minnows and other unidentified species. Less than ideal visibility during visual surveys yielded low levels of fish observation and hindered species identification, though the number of observations has increased since adopting stationary GoPro video stations rather than roving shoreline camera surveys.

[2] Number of other raptor observations does not include turkey vulture sightings.

[3] Early = state time before 10 am; Mid-Day = start between 10am-2:59pm, Late = start time 3pm or later

Table 1. Fish Monitoring Details by Visit

Date	Underwater Visibility	Average Turbidity (NTU)[4]	Juvenile Salmonid Observation(s)	Other Species Observed
2/12	Moderate	12.0	No	Unk1, Minnow (likely Chiselmouth)
2/26	Moderate	9.53	No	Minnow, Unk1, Unk2
3/20	Moderate	5.32	Possible	Unk1, Unk2, Unk3
3/30	Moderate	3.90	No	None
4/09	Moderate	9.10	Yes*	None
4/30	Good	3.82	No	None
5/19	Moderate	5.01	Yes**	None
5/27	Moderate	4.78	Possible	None

*Likely Chinook Unk1 = Not indicative of salmonid Unk2 = Not identifiable from video
**Likely Coho Unk3 = Possible salmonid, unknown age

Figure 7. Screen Capture of Underwater Video Depicting Juvenile Salmonids on May 19, 2020

Mink Monitoring

Although Turnstone was not contracted to conduct the mink camera and sign surveys outlined in the monitoring plan, a Turnstone biologist did observe mink tracks along the shore during an eagle monitoring visit on July 13, 2020 (Figures 8, 9).

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

Figure 8. Mink Tracks Observed Along Shoreline on July 13, 2020

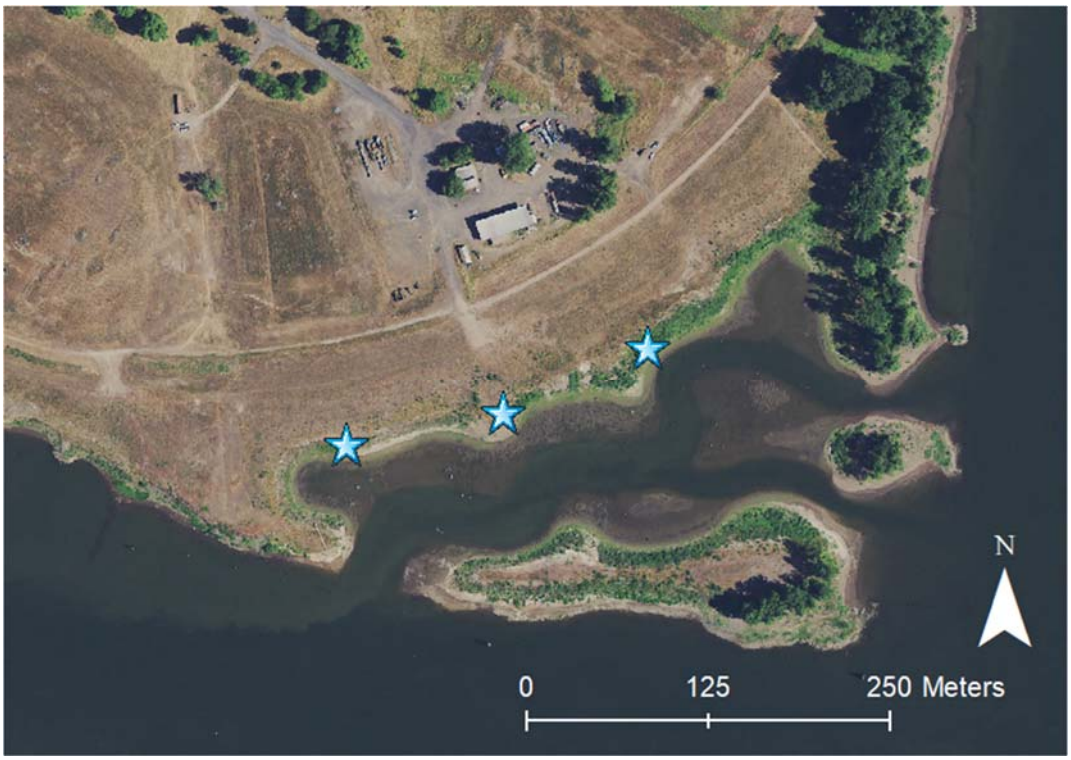

Figure 9. Location of Mink Tracks Observed on July 13, 2020

ANALYSIS & CONCLUSIONS

Turnstone conducted baseline monitoring in 2013 and 2014, prior to restoration efforts, for bird assemblages, eagles and raptors and mink. In 2017 and 2018, Turnstone conducted post-restoration monitoring for juvenile salmonids and bird assemblages. For the 2019-2020 period, monitoring conducted by Turnstone included eagle/raptor surveys, bird assemblage point count surveys, and fish monitoring.

A comparison of data collected over time is included for bird assemblages, fish monitoring, and eagle survey data. Because Turnstone did not conduct post-restoration mink monitoring, data from those surveys are not included.

Bird Assemblages

Overall abundance of bird assemblages has increased since restoration activities took place, averaging 223 individuals over the three years of post-restoration monitoring, compared to 170 individuals during the baseline surveys (Figure 10). Species richness has stayed relatively the same, averaging 39 different species across the years of post-restoration monitoring which is similar to the baseline surveys. However, the composition of these species has changed over the years. As of 2020, the most common species was the Savannah sparrow, which prefers open meadows and similar habitats; prior to restoration, this species was recorded just four times over two visits in 2013. Two sensitive species, purple martin and willow flycatcher, have been recorded both pre- and post-restoration monitoring. Proportions of non-native species, including European starling, Eurasian collared-dove, California quail, house finch, and house sparrow, dropped initially after restoration occurred but have increased in the last monitoring season (Figure 11). This is largely attributable to European starlings which frequent the area.

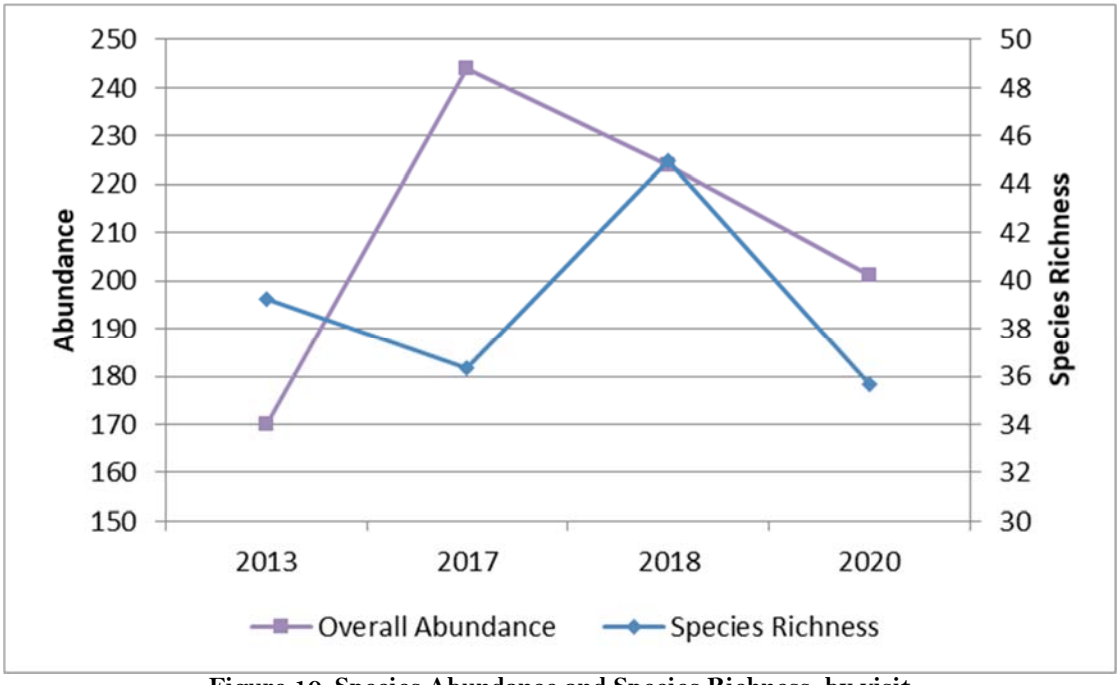

Figure 10. Species Abundance and Species Richness, by visit

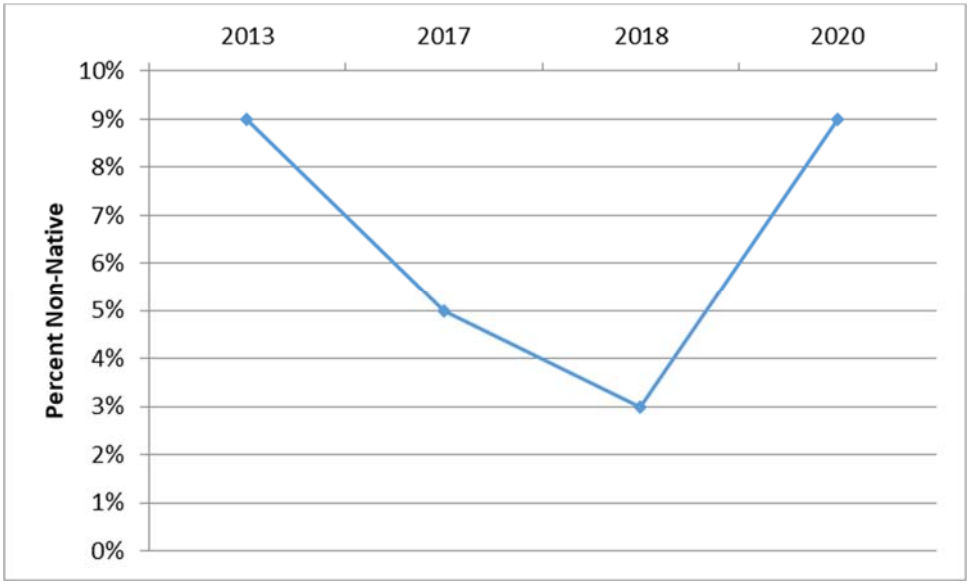

Figure 11. Percent Non-Native Species Recorded, by Year

Eagle Surveys

Turnstone did not conduct post-restoration surveys in 2017; thus, the data from those surveys is not included in this comparative discussion. When comparing 2013/2014 and 2019/2020 survey data, eagle use of the site seems to have stayed relatively constant despite the restoration efforts, with 52 detections recorded during baseline surveys compared to the 46 recorded in the most recent survey effort. In both monitoring seasons, one or two, sometimes up to three, individuals were seen on or around the site. Accipiter species seem to be no longer using the site, with no detections recorded in 2020. In their place, American kestrels have started utilizing the area, with a pair seen regularly early in the year. Ospreys and red-tailed hawks continue to be regular visitors, regularly seen perching and hunting throughout the site.

Fish Monitoring

Turnstone did not conduct pre-restoration fish monitoring. Post-restoration, biologists have recorded juvenile salmonids in both 2017 and 2020. No detections occurred in 2018; however, this is likely due to extremely low visibility due to high turbidity levels. In addition, overall fish presence increased dramatically when stationary GoPro video stations were adopted. In 2017, a juvenile coho was captured during beach seine surveys. In 2020, juvenile salmonids that could not be identified to species were recorded during multiple monitoring visits. Results suggest that juvenile salmonids regularly use the restored channels for resting and feeding.

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.

APPENDIX A: DATA TABLES

Table 2. Point Count Data Summary Table

Species	Common Name	17-Apr	15-May	19-Jun	Total
Corvus brachyrhynchos	American Crow	1	1	0	2
Carduelis tristis	American Goldfinch	5	15	5	25
Falco sparverius	American kestrel	0	3	1	4
Turdus migratorius	American Robin	19	3	2	24
Calypte anna	Anna's Hummingbird	2	0	0	2
Strix caria	Barred owl	0	1	0	1
Haliaeetus leucocephalus	Bald Eagle	0	2	1	3
Hirundo rustica	Barn Swallow	2	34	21	57
Poecile atricapillus	Black-capped Chickadee	9	0	0	9
Megaceryle alcyon	Belted Kingfisher	1	0	1	2
Thryomanes bewickii	Bewick's Wren	2	0	0	2
Pheucticus melanocephalus	Black-headed Grosbeak	0	0	0	0
Euphagus cyanocephalus	Brewer's Blackbird	0	1	2	3
Certhia americana	Brown Creeper	0	0	1	1
Psaltriparus minimus	Bushtit	0	0	4	4
Callipepla california	California Quail	0	4	2	6
Branta canadensis	Canada Goose	25	0	0	25
Aphelocoma californica	California Scrub-jay	3	3	2	8
Poecile rufescens	Chestnut-backed Chickadee	0	1	0	1
Bombycilla cedrorum	Cedar Waxwing	0	2	2	4
Petrochelidon pyrrhonota	Cliff Swallow	0	1	18	19
Accipiter cooperii	Cooper's Hawk	1	0	0	1
Corvus corax	Common Raven	0	2	0	2
Geothlypis trichas	Common Yellowthroat	27	8	8	43
Phalacrocorax auritus	Double-crested Cormorant	1	1	0	2
Junco hyemalis	Dark-eyed Junco	0	5	0	5
Streptopelia decaocto	Eurasian Collared-Dove	1	0	0	1
Sturnus vulgaris	European Starling	16	21	10	47
Ardea herodias	Great Blue Heron	3	2	1	6
Ardea alba	Great Egret	0	0	1	1
Larus glaucescens	Glacous-winged Gull	1	0	0	1
Picoides villosus	Hairy Woodpecker	1	0	0	1
Passer domesticus	House Sparrow	0	2	0	2
Charadrius vociferus	Killdeer	7	3	0	10
Anas platyrhynchos	Mallard	1	0	0	1
Cistothorus palustris	Marsh Wren	0	2	3	5
Zenaida macroura	Mourning Dove	0	2	3	5
Colaptes auratus	Northern Flicker	10	2	5	17
Vermivora celata	Orange-crowned Warbler	0	2	0	2
Pandion haliaetus	Osprey	1	1	1	3
Empidonax difficilis	Pacific-slope Flycatcher	0	2	0	2

Species	Common Name	17-Apr	15-May	19-Jun	Total
Carpodacus purpureus	Purple Finch	0	3	2	5
Progne subis	Purple Martin	0	0	3	3
Sphyrapicus ruber	Red-breasted Sapsucker	1	1	2	4
Buteo jamaicensis	Red-tailed Hawk	1	1	3	5
Agelaius phoeniceus	Red-winged Blackbird	10	11	14	35
Passerculus sandwichensis	Savannah Sparrow	27	10	24	61
Melospiza melodia	Song Sparrow	14	10	11	35
Actitis macularia	Spotted Sandpiper	0	6	2	8
Pipilo maculatus	Spotted Towhee	3	1	2	6
Cyanocitta stelleri	Steller's Jay	3	0	1	4
Tachycineta bicolor	Tree Swallow	0	27	3	30
Cathartes aura	Turkey Vulture	1	2	0	3
Trochilidae spp.	Unknown Hummingbird	0	0	3	3
Contopus sordidulus	Western Wood-Pewee	0	1	3	4
Zonotrichia leucophrys	White-crowned Sparrow	18	3	0	21
Empidonax traillii	Willow Flycatcher	0	0	3	3
Wilsonia pusilla	Wilson's Warbler	0	2	0	2
Aix sponsa	Wood Duck	2	8	0	10
Setophaga coronata	Yellow-rumped Warbler	1	0	1	2
	Total	**220**	**212**	**171**	**603**

Table 3. Eagle Data Summary Table

Date	Start Time	BAEA	On-Site Use?	OSPR	RTHA	RLHA	AMKE	MERL
12/16/19	14:33	0	-		2		2	
12/28/19	13:59	2	N				2	
1/3/20	12:29	1	N		2		1	
1/9/20	14:13	0	-		2		1	
1/17/20	11:49	0	-		1		1	
1/20/20	11:57	1	Y		1		2	
1/31/20	12:08	2	Y		1		2	
2/3/20	15:25	2	N				2	
2/12/20	12:23	2	N		2		1	
2/18/20	15:00	1	Y					
2/26/20	9:07	3	Y		1		2	
3/3/20	14:00	3	Y		3		1	
3/10/20	8:10	3	Y				2	
3/19/20	7:45	2	Y	1	3		2	
3/26/20	11:50	0	-		1			
3/30/20	14:25	3	N	1	1		4	
4/9/20	12:41	1	N	1	1		1	
4/16/20	11:38	0	-	1	1		1	
4/25/20	15:17	1	Y	1	1			
4/30/20	16:00	1	N	3		1	1	

Date	Start Time	BAEA	On-Site Use?	OSPR	RTHA	RLHA	AMKE	MERL
5/6/20	8:20	4	Y	1			1	
5/14/20	8:46	2	Y	4	1		1	
5/19/20	7:30	1	Y	1	1			
5/27/20	8:55	0	-	3			1	
6/6/20	14:35	1	Y	1	1			
6/14/20	13:38	2	N	2				
6/19/20	12:00	1	Y	2	1			
6/25/20	17:02	0	-	1				
7/3/20	9:11	0	-	2	1			
7/9/20	10:04	0	-	1				
7/13/20	9:10	2	N	4				
7/24/20	13:16	3	Y	2	1			1
7/30/20	7:42	0	-	2			2	1
8/3/20	17:06	2	Y	2			2	1
8/10/20	18:26	0	-	1			2	
8/19/20	6:30	0	-	2			1	
8/27/20	10:09	0	-	4	1			
8/31/20	16:01	0	-	2	1		2	

APPENDIX B: PERSONNEL BIOGRAPHIES

Name **JEFF REAMS**

Education B.S., Environmental Science & Resource Management: Wildlife Conservation, University of Washington, Seattle, WA (2013)

Relevant Project History

- Terrestrial Wildlife and Avian Surveys, including Survey & Manage and special-status species such as red tree voles and Washington ground squirrels, and raptors and neotropical migrants for multiple clients including City of Salem, Benton County Public Works, Benton County Parks & Rec, Army Corps of Engineers, WEST, Inc., Symbiotics, LLC./Riverbank Power, Wildlands, Inc., Oregon Eagle Foundation, Eugene Water and Electric Board, and Umatilla Power Company (1996-2020)
- Marbled Murrelet Surveys in Oregon and Washington for multiple clients such as Trout Mountain Forestry, Washington Department of Natural Resources, BLM, Weyerhaeuser, The Campbell Group, Oregon Department of Forestry, Forest Capital Partners, City of Corvallis, City of Cannon Beach, West Inc., CH2M Hill, Shapiro, Inc., Miami Corporation, and Bonneville Power Administration (1997-2020)
- Northern Spotted Owl Surveys and Habitat Assessments in Oregon and Washington for multiple clients, including Bureau of Land Management, Center for Natural Lands Management, The Campbell Group, Hancock Forest Management, Pacific Forest Trust, Forest Capital Partners, Miami Corporation, Eugene Water and Electric Board, CH2M Hill, Weyerhaeuser Corp., and USDA Forest Service (2004-2020)
- Environmental Compliance/Natural Resource Assessments and Wetland Delineation/Permitting for BPA Bonneville-Hood River, Salem-Albany, and Keeler-Tillamook Transmission Line Rebuild Projects (2012-2020)
- Mitigation/Enhancement Projects, including Pier 3 for the Port of Astoria, Claremont Road & Johnson Farm Mitigation Banks for Warrenton Fiber, Alder Creek Restoration Project for Wildlands, Inc., Muddy Creek Mitigation Bank, Pier 3 Permitting for the Port of Astoria, and a Willamette Valley Habitat Restoration Design Project for a confidential client (2007-2020)
- Wetland delineations for BPA projects (Marion-Alvey, Silver Creek and Longview Substations, Big Eddy-Knight, Bandon-Rogue), pipeline projects (Oregon LNG, Alaska Natural Gas Development Authority), local/state governments (Washington Military Dept., City of Salem, Benton County PWD) and various private landowners/developers (2006-2020)
- Botanical Survey Projects, including many large-scale and linear projects, for clients including USDA Forest Service, Bonneville Power Administration (BPA), City of Albany, City of Salem, Parsons-Brinckerhoff, Benton County, and various private landowners (2006-2020)

Name **DAPHNE DAY**

Education B.S., Environmental Biology/Zoology, Michigan State University, 2009

Relevant Project History

- Lead Biologist, Avian Point Count Surveys for Portland Metro & Portland Parks and Recreation Department (2015, 2018-2020)
- Lead Biologist, Sun Pass State Forest Raptor/Woodpecker Surveys, Oregon Department of Forestry (2016-2017)
- Lead Biologist, Avian Nest Search Surveys, Bonneville Power Administration (2017)
- Lead Biologist, Burrowing Owl & Pygmy Rabbit Surveys/Assessment, Bonneville Power Administration (2018)
- Lead Biologist, Marbled Murrelet, Red Tree Vole & Terrestrial Mollusk Surveys, Bureau of Land Management & USDA Forest Service (2017-2020)
- Lead Biologist, Northern Spotted Owl Surveys for the Pocket, Waucoma and Grasshopper Planning Areas, USFS Mt Hood National Forest (2018-2020)
- Lead Biologist, Local Wildlife Permitting Projects in Forest Grove, Gresham, and Sandy, OR and Cle Elum, WA (2018-2020)
- Lead Biologist, Western Federal Highway Environmental Assessment Projects (2018-2020)
- Lead Biologist, Colonial Waterbird Surveys, USACE (2017)
- Osprey, Spotted Owl & Mollusk/Amphibian Surveys in the Willamette National Forest, Whitewater Green Energy LLC. (2014-2017)
- Eagle, Osprey, Northern Spotted Owl, and Peregrine Falcon Surveys, Bonneville Power Administration (2014-2020)
- Marbled Murrelet Surveys, Oregon Department of Forestry, Bureau of Land Management, and Bonneville Power Administration (2012-2019)
- Avian Demographic Monitoring, University of Hawaii (2012)
- Avian Demographic Monitoring, Klamath Bird Observatory (2009-2010)

Name **STEVEN MITCHELL**

Education B.S., Wildlife (Conservation Biology & Applied Vertebrate Ecology), Humboldt State University, 2015

Relevant Project History

- Northern Spotted Owl Surveys, Oregon Department of Forestry, Bureau of Land Management, USDA Forest Service & Bonneville Power Administration (2019-2020)
- Marbled Murrelet & Terrestrial Mollusk Surveys, BLM & USFS (2019-2020)
- Passive Acoustic Monitoring of Spotted Owls and Bats, Olympic National Park (2019)
- American Marten Monitoring Project, Olympic National Park (2019)
- Elk Research Project, Olympic National Park (2019)
- Carnivore Monitoring Program, USFS and The Great Basin Institute (2016-2018)
- Bat Forest Ecology Project, Redwood Sciences Lab (2016)

Name **JORDAN GOMES**

Education B.S., Zoology, Humboldt State University, Arcata, CA, 2010

Relevant Project History
- Avian Point Count Surveys for Portland Metro & Portland Parks and Recreation Department (2015, 2018-2020)
- Eagle, Osprey & Peregrine Falcon Surveys, Bonneville Power Administration (2018-2020)
- Marbled Murrelet Surveys, Oregon Department of Forestry (2011-2015, 2018-2020)
- Northern Spotted Owl Surveys, Bureau of Land Management & Bonneville Power Administration (2014, 2018-2020)
- Red Tree Vole & Terrestrial Mollusk Surveys, Bureau of Land Management (2017-2018)
- Mammal & Other Surveys for the Van Eck Project, Pacific Forest Trust (2018)
- Marbled Murrelet Habitat Delineation Surveys, Washington Department of Natural Resources (2015-2016)

Name **GRAEME RIGGINS**

Education B.S., Environmental Science & Resource Management: Wildlife Conservation, University of Washington, Seattle, WA (2013)

Relevant Project History
- Marbled Murrelet Surveys, Oregon Department of Forestry (2019-2020)
- Northern Spotted Owl Surveys, USFS Mt. Hood National Forest, USFS Fremont-Winema Forest, and Bureau of Land Management (2019-2020)
- Avian Point Count Surveys for the Tualatin Mountains Restoration Project, Metro (2019-2020)
- Wetland and Botanical Projects, Bonneville Power Administration, and others (2018-2020)
- Terrestrial Mollusk Surveys, Bureau of Land Management and USFS Mt Hood National Forest (2018-2020)
- Red Tree Vole Surveys, Bureau of Land Management (2018)
- Avian Point Count Surveys, NCASI (2018)
- Marbled Murrelet Habitat Delineations, Washington DNR (2016-2017)
- Washington Ground Squirrel Toxicology Study, Michigan State University Wildlife Toxicology Lab (2015)
- Black-Backed Woodpecker Green Forest Presence Project, Klamath Bird Observatory (2013)

APPENDIX 8

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		332.46	n/a	$ -
8/27/2020	n/a	Partial 30% Third Credit Release (Year 2 Performance)	n/a	176.00		508.46	n/a	$ -
		Total Number of Credits Credited/Debited		543.46	35.00			
		Total Number of Remaining Credits Available for Sale				**508.46**		**$ 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.