JARPA Attachment F: Wetland and Waters of the U.S. Delineation Report

UPI #: 091898-09-01
Project Name: Fisher Slough - Tidal Marsh Restoration, Levee Setback, and Siphon Realignment; Skagit County, Washington

TETRA TECH

WETLAND AND WATERS OF THE U.S. DELINEATION

DRAFT REPORT

FISHER SLOUGH - TIDAL MARSH RESTORATION, LEVEE SETBACK, AND SIPHON REALIGNMENT SKAGIT COUNTY, WASHINGTON

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INTRODUCTION

The Fisher Slough Restoration Project is a multi-phase project involving the restoration of natural hydrology and freshwater tidal marsh habitat. The project is a collaborative effort being undertaken by The Nature Conservancy, Skagit County Public Works, Diking District #3, and other partners. Fisher Slough and the surrounding farmland has been highly modified from historic conditions as a result of channelization and levee construction for flood control, drainage, and agricultural development on the Skagit River delta for the past 150 years. The purpose of this project is to restore tidal marsh landscape processes and habitat functions within Fisher Slough, while also providing additional benefits to local landowners and farmers, including improved flood protection and drainage.

The Fisher Slough project site is located off Pioneer Highway about two miles south of the town of Conway, WA (Figure 1). Fisher Slough is located at the downstream end of the Carpenter Creek watershed, at the confluence with Tom Moore Slough on the South Fork of the Skagit River and at the far southeast corner of the Skagit River Delta (Figure 2). The upstream tributary watershed to Fisher Slough is 23 square miles with 6 sub-basins including Carpenter, Sandy, Johnson, Bulson, Big and Little Fisher Creeks. Carpenter, Sandy, Johnson and Bulson Creeks have been channelized and rerouted into Hill Ditch. The confluence of Hill Ditch with Big Fisher and Little Fisher Creeks is at the eastern boundary of the Fisher Slough project. Fisher Slough and the tributaries are confined by two lateral dikes that connect to Pioneer Highway. The slough drains through a floodgate located at the Pioneer Highway Bridge, and connects with Tom Moore Slough on the South Fork Skagit River immediately downstream of the bridge.

Fisher Slough is within the tidal range of the Skagit River estuary and could provide a significant area of tidal slough and marsh habitat for ocean-bound juvenile salmonids approaching Skagit Bay. However, the presence of the floodgate that closes during high tidal and river flow events reduces access into the slough significantly, and fish passage is further inhibited by the presence of the Big Ditch undercrossing (Figure 2). Currently, Fisher Slough is straightened and constrained between dikes, resulting in a minimum of channel habitat and tidal wetland. A small amount of tidal forest and scrub-shrub wetland remains. About 8% of the channel edge has riparian forest.

Carpenter Creek (Hill Ditch) is the largest of the three creeks that feed into Fisher Slough. Big Fisher and Little Fisher Creeks join Carpenter Creek at the head of the slough. The alluvial fan where Big and Little Fisher Creeks enter the slough is also confined by dikes, resulting in minimal confluence habitat, higher sediment loads to Fisher Slough, an elevated stream bed that increases farm flooding, and high storm flow energies that scour instream habitat and threaten dike integrity.

The project will include the following restoration elements (see Figure 2): 1) replacement of the floodgate with a lowered invert and self-regulating gates; 2) realignment of Big Ditch to eliminate the existing passage barrier and to consolidate drainage ditches; and 3) removal and setback of dikes to reconnect Fisher Slough and Big Fisher and Little Fisher Creeks to a large portion of their historic floodplain and tidal zone.

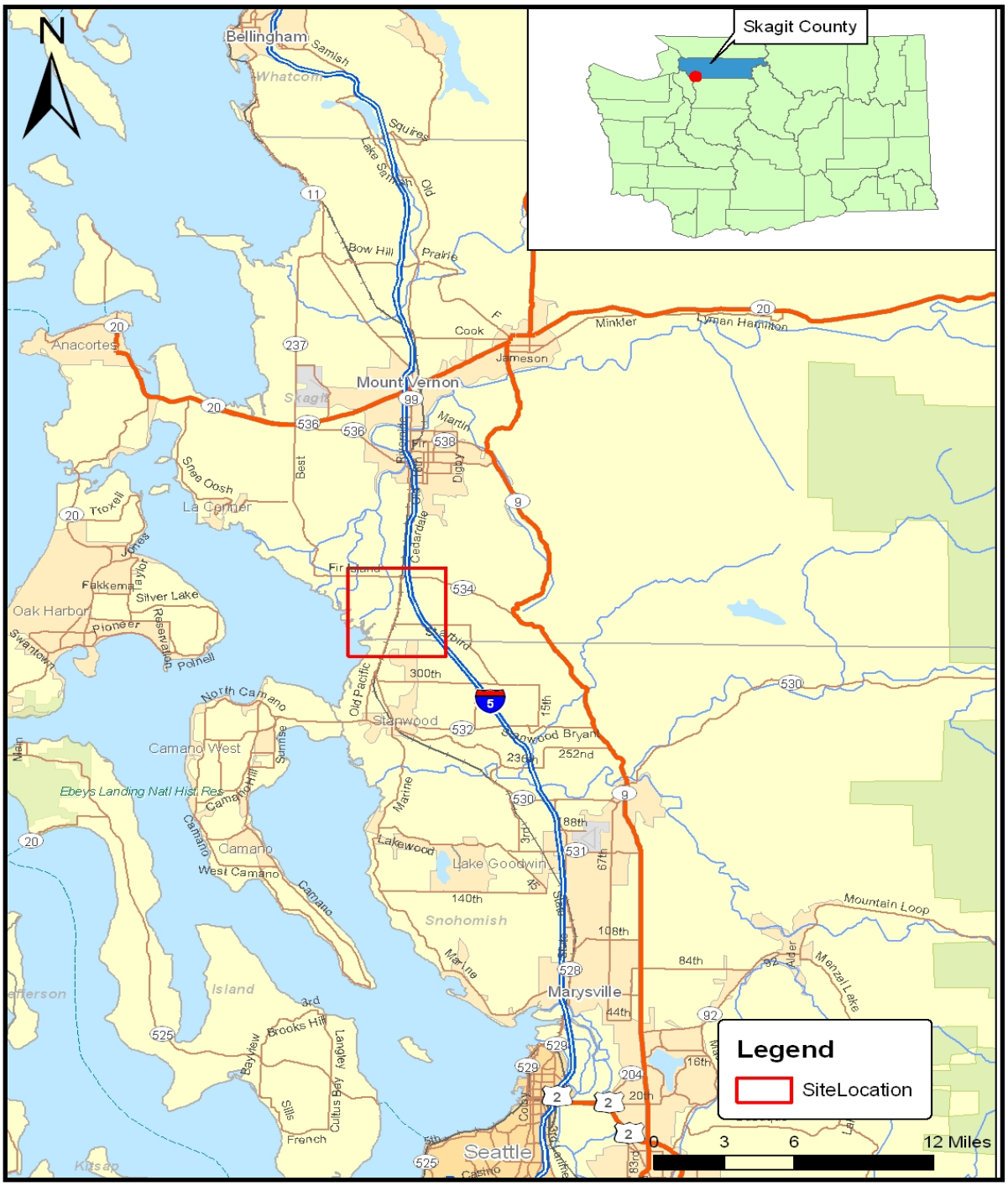

Figure 1. Fisher Slough Vicinity Map

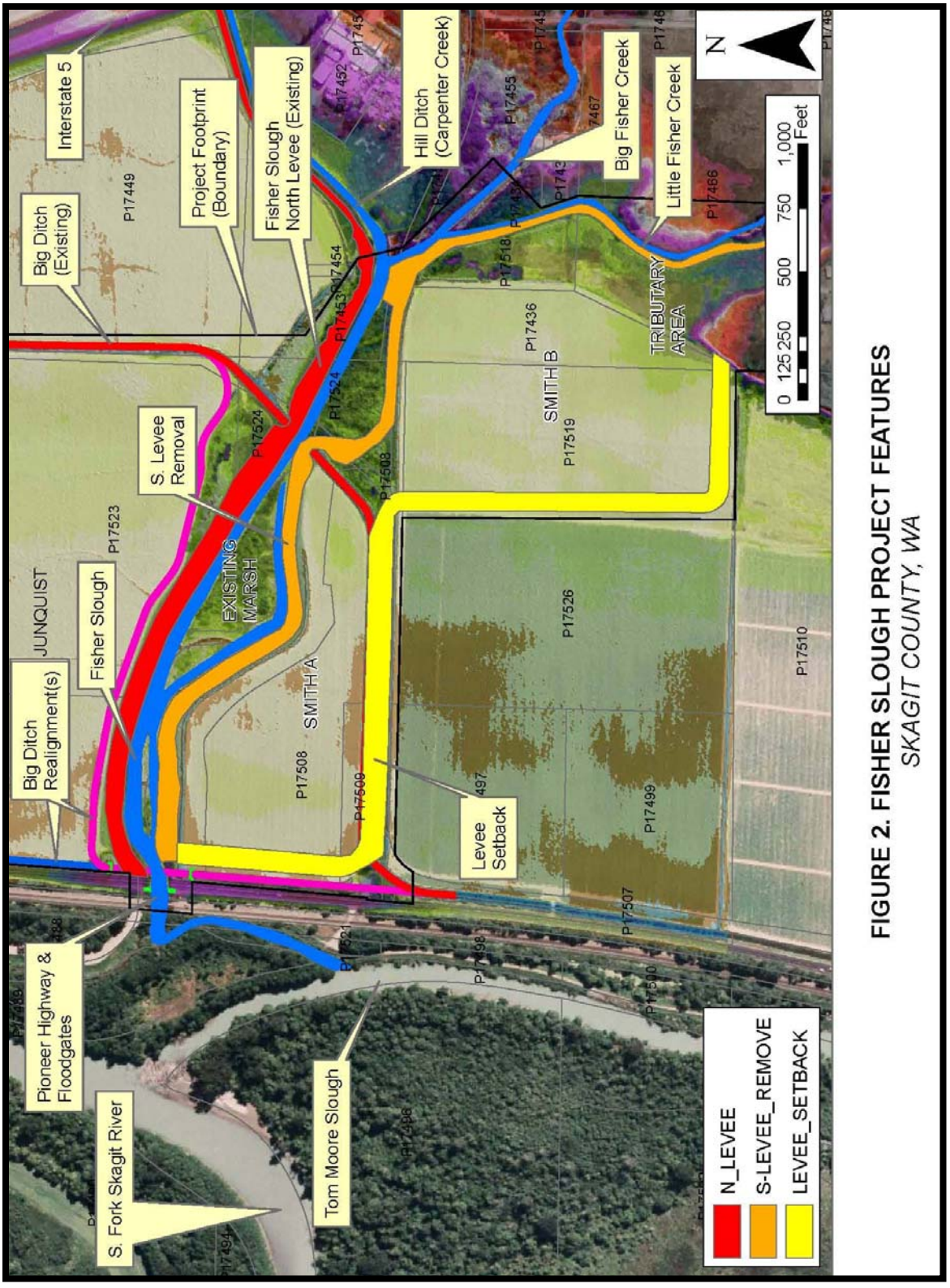

Figure 2: Location of Slated Restoration Elements

METHODS

This wetland and Waters of the U.S. delineation was conducted via field investigations following the 1987 Corps of Engineers Wetland Delineation Manual (USACE 1987) and subsequent implementation guidance including the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2008). Tetra Tech staff biologists, Merri Martz and Jeff Barna, conducted all wetland field investigations on June 17, 24, and 25, 2009.

Potential wetland areas were initially identified from aerial photographs and the National Wetland Inventory (USFWS–NWI 2009). Soil surveys for the Skagit County Area (USDA–NRCS 2009) were reviewed to determine mapped soil characteristics (see Appendix A maps). Hydrologic data and modeling outputs from the restoration design study were used to identify Ordinary High Water (OHW) along Fisher Slough/Carpenter Creek. Additionally, hydrologic data was provided to document water level conditions in Big Ditch and other ditches on the project site

The intermediate-level field sampling methodology described in the Corps 1989 manual (FICWD 1989) was used to develop transects and sampling plan; however, the determination of wetland/not wetland made at each plot used the criteria from the 1987 manual (USACE 1987) and the Interim Regional Supplement (USACE 2008). Additional references utilized included the Munsell® Soil Color Charts (2000 Edition), *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), *Wetland Plants of Western Washington and Northwestern Oregon* (Cooke 1997), *Plants of the Pacific Northwest Coast* (Pojar and MacKinnon 1994), *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed 1988) and the 1993 Supplement (Reed 1993).

In order to identify wetlands at the project site, transects, individual sample plots, and additional vegetation only sample plots were sampled systematically throughout the project site. The locations of transects and plots were determined using known locations of the various proposed restoration features and vegetation and topography differences that were apparent during the initial site reconnaissance. Because the purpose of the proposed project is to restore more natural hydrology to the project site so as to restore historic wetlands in the area and because of the significant amount of modification that has occurred on the site to specifically drain the wetlands, it was determined that a thorough documentation of the existing plant communities and wetland conditions would provide a more reasonable basis for permitting, rather than delineating the myriad small pockets of wetland and upland throughout the site. However, a determination of wetland or not wetland was made at each sample location and is described in detail in the results section.

Data collected at each sample plot consisted of identifying indicators of vegetation, hydrology, and soils using data sheets from the Interim Regional Supplement (USACE 2008). Vegetation was assessed within each sample plot in a diameter of approximately 11 feet, or a reasonable dimension to fit within the vegetation community being sampled. Percent cover was estimated visually for all plant species present in each cover layer. Typically, all species were documented at each site and then dominants were calculated in each stratum (herbaceous, shrub/sapling, tree). Soil pits were dug to a

standard depth of 14 inches for determination of both wetland hydrology and hydric soil indicators. Depths to standing water or saturated soil were measured, if present. Soil horizons and texture were identified at each plot and soil matrix and mottle colors, if present, were determined using the Munsell ® Soil Color Charts. GPS coordinates were taken at each sample plot location with sub-meter accuracy. In most cases, transects were sampled in order to best capture topographic and vegetation community profiles noted during initial identification. Upland sites were sampled to characterize the distinctions between upland and wetland areas. Vegetation data was also collected to characterize distinctive vegetation communities in areas that had standing water such as ditches, creeks, or ponds.

Before the field delineation began, it was decided that the study area should be divided into four sites based on geography and physical differences noted in the initial identification; Site 1, Site 2, Site 3, Site 4 (Figure 3).

- **Site 1**: Site 1 is the northernmost site and includes parcels P17486, P17523, and P17524. Site 1 is bordered in the north by North Ditch; the west by West Ditch; the south by Fisher Slough; and the east by Big Ditch.
- **Site 2**: Site 2 is located directly south of Site 1 and includes parcels P17508 and P17509. Site 2 is bordered in the north by Fisher Slough; the west by West Ditch; and the south and east by Big Ditch. Site 2 is also known as Smith Parcel A.
- **Site 3**: Site 3 is located to the southeast of Site 2 and includes parcels P17519 and P17436. Site 3 is bordered in the north by Fisher Slough; the west by parcel P17526; the south by parcel P17510; and the east by parcel P17518. Site 3 is also known as Smith Parcel B.
- **Site 4**: Site 4 is located directly east of Site 3 and includes parcels P17518 and the western portions of parcels P17434, P17433, P17467, and P17466. This site is bordered by Fisher Slough to the north; Site 3 to the west; parcel P17468 to the south; and parcel P17455 and portions of parcels P17434, P17433, P17467, and P17466 to the east. Site 4 is also known as the Moyer Parcel.

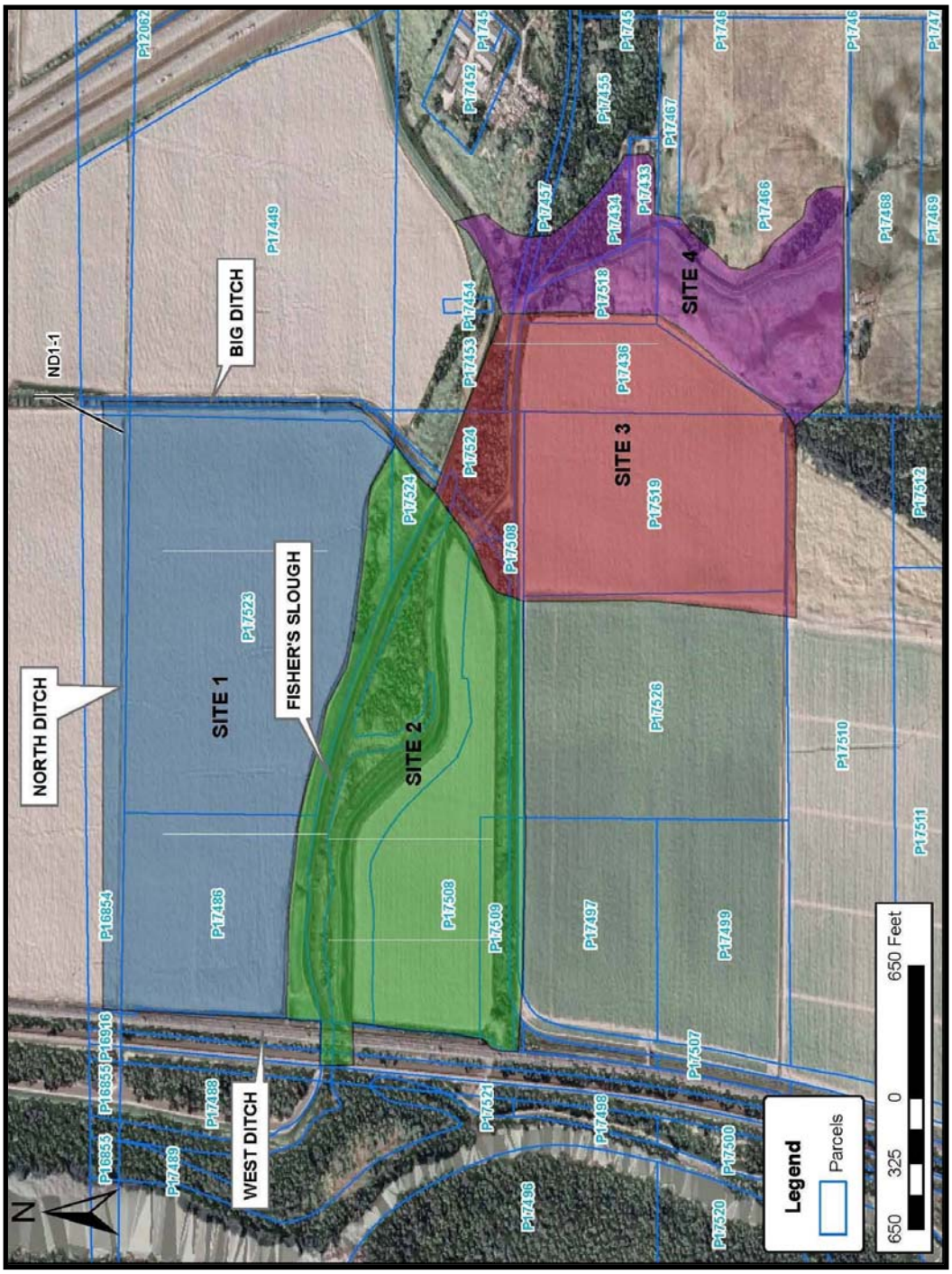

Figure 3: Location of Sites in Project Area

SITE CONDITIONS

A current National Wetland Inventory Map (NWI map) generated for this study shows a narrow freshwater emergent wetland and freshwater forested/shrub wetland found near the confluence between Tom Moore Slough and Fisher Slough (USFWS–NWI 2009) (Appendix A). A historic NWI map, however, shows the entire site to have been wetland (Appendix A). In general, the entire site is extensively altered from its natural state. Past and present agricultural operations have resulted in the installation of dikes, ditches, and drain tiles intended to drain the site to facilitate crop production.

Soils

The Custom Soil Resource Report for Skagit County Area, Washington (USDA–NRCS 2009a) indicates that the majority of the study area contains Skagit silt loam (approximately 50% of the total area), Bow gravelly loam, 3 to 8 percent slopes (approximately 12% of the total area), Hoogdal silt loam, and Skipopa silt loam. Bow gravelly loam, Skagit silt loam, and Skipopa silt loam are all listed on the 2009 Hydric Soils of the U.S. list (USDA-NRCS 2009). Other soil types are present in the area in at much lower frequency (Table 1). A soil map for the study area can be viewed in Appendix A.

Table 1. Soil Types Present in the Fisher Slough Study Area. Soil Types Are Listed in Ranked Order of Occurrence; all Percentages are Approximate Values from USDA–NRCS 2009.

Soil Type	% Total Area
Skagit silt loam	50%
Tokul gravelly loam, 8 to 15 percent slopes	13%
Bow gravelly loam, 3 to 8 percent slopes	12%
Mukilteo muck	6%
Skipopa silt loam, 0 to 3 percent slopes	5%
Skipopa silt loam, 3 to 8 percent slopes	3%
Dystric Xerochrepts, 45 to 70 percent slopes	1%
Xerorthents, 0 to 5 percent slopes	1%
Bellingham mucky silt loam	1%
Bellingham silt loam	1%
Hoogdal silt loam, 30 to 60 percent slopes	1%
Tokul gravelly loam, 0 to 8 percent slopes	1%
Tokul gravelly loam, 30 to 65 percent slopes	0.5%
Hoogdal silt loam, 8 to 15 percent slopes	0.5%

Skagit silt loam is a poorly drained soil type that is approximately 80 inches deep and has high water capacity and ability to transmit water (USDA–NRCS 2009a). Tokul gravelly loam, 8 to 15 percent slopes is a moderately well drained soil type that is 20 to 40 inches deep and has very low to moderately low water capacity and ability to transmit water (USDA–NRCS 2009a). Bow gravelly loam, 3 to 8 percent slopes is a somewhat poorly drained soil type that is approximately 80 inches deep and has high water transmission ability and moderately low to moderately high water capacity (USDA–NRCS 2009).

Hydrology

The Skagit River drains over 3,100 square miles of the Cascade Mountains, western foothills, and Skagit Valley. Based on watershed size, the Skagit River is the third-largest river on the west coast of the contiguous United States, after the Columbia and Sacramento Rivers. The Skagit flows for 125 miles from British Columbia to Puget Sound, and accounts for approximately 20 percent of the fresh water that flows into Puget Sound. The Skagit River is the only river system outside of Canada and Alaska that supports all five species of anadromous salmon (Ecology 2006). The Skagit River floodplain spans 125 square miles of agricultural lands, tideflats, and estuaries and drains north to Samish Bay, west to Padilla Bay, and south to Skagit Bay (Perkins 2007). The soils of this area support one of the richest agricultural areas in the world and are characterized by being very deep, artificially drained and protected, and are naturally poorly drained and subject to flooding. They have been formed by recent alluvium and volcanic ash deposited on floodplains (NRCS 2005).

Numerous sets of hydrologic data have been collected in support of the Fisher Slough Restoration Project and are summarized below (D. Cline, Tetra Tech, pers. comm. 2009). These data were collected to develop a better understanding of the site hydrology, which is complex. The complexities arise from the unsteady rise and fall of the tidal inflow conditions, as well as tributary runoff and floods from large Skagit River flows and localized runoff. The Mean Higher High Water (MHHW) elevation along Fisher Slough is 9.5 feet elevation, based on gage data collection at the site for more than 1 year. The Ordinary High Water (OHW) as driven by the freshwater and tributary runoff along Fisher Slough and lower Big Fisher and Little Fisher Creeks is at 12.0 feet elevation, based on gage data collection at the site and modeling of flows. The OHW on Big Ditch is 6.0 feet, which is essentially the top of bank. Flows in Big Ditch are at or slightly over the top of bank every winter and spring. The fields in the project footprint that are adjacent to Big Ditch are very flat and basically at or below 6.0 feet elevation. Thus, the water table is at or above the surface every winter and spring. There are drain tiles in the fields that serve more or less effectively to help drain the high water table. However, when flows in Big Ditch and the ancillary ditches are at or near bankfull, the drain tiles cannot effectively convey water off the fields.

Vegetation

The project sites lie in the Eastern Puget Riverine Lowlands ecoregion (EPA 2000). This ecoregion is composed of floodplains and terraces. Western red cedar forest, western hemlock forest, and both riverine and wetland habitat were common prior to settlement. Pastures, cropland, and urban centers now dominate the landscape.

The majority of the trees in the project area are medium to small in size and tend to be one of three species; black cottonwood (*Populus trichocarpa*), willows (*Salix* sp.), and red alder (*Alnus rubra*). Weedy species, most of them invasive, dominate much of the project area (see Appendix C for a full species list). Species such as Himalayan blackberry (*Rubus procerus*), reed canary grass (*Phalaris arundinacea*), *Polygonum* sp., and crop plants are common. Other plants found in the project area are red osier dogwood (*Cornus sericea* spp. *sericea)*, baldhip rose (*Rosa gymnocarpa* var. *gymnocarpa*), Nootka rose (*Rosa nutkana*), red elderberry (*Sambucus racemosa* ssp. *pubens*), and crop or planted species such

as wheat (*Triticum* spp.), white clover (*Trifolium repens*), and ryegrass (*Lolium* sp.). A complete species list is available in Appendix D.

RESULTS

A total of 73 points were collected in the study area; 61 of which were sample plots taken along 21 transects plus an additional six sample plots collected at potential wetland locations found between transects; the remainder were vegetation data points in areas of standing water (Figure 4). Copies of all completed Wetland Determination Data Forms are provided in Appendix B while copies of all completed Vegetation Data Forms are provided in Appendix C. A complete list of vegetation species identified on the site is provided in Appendix D.

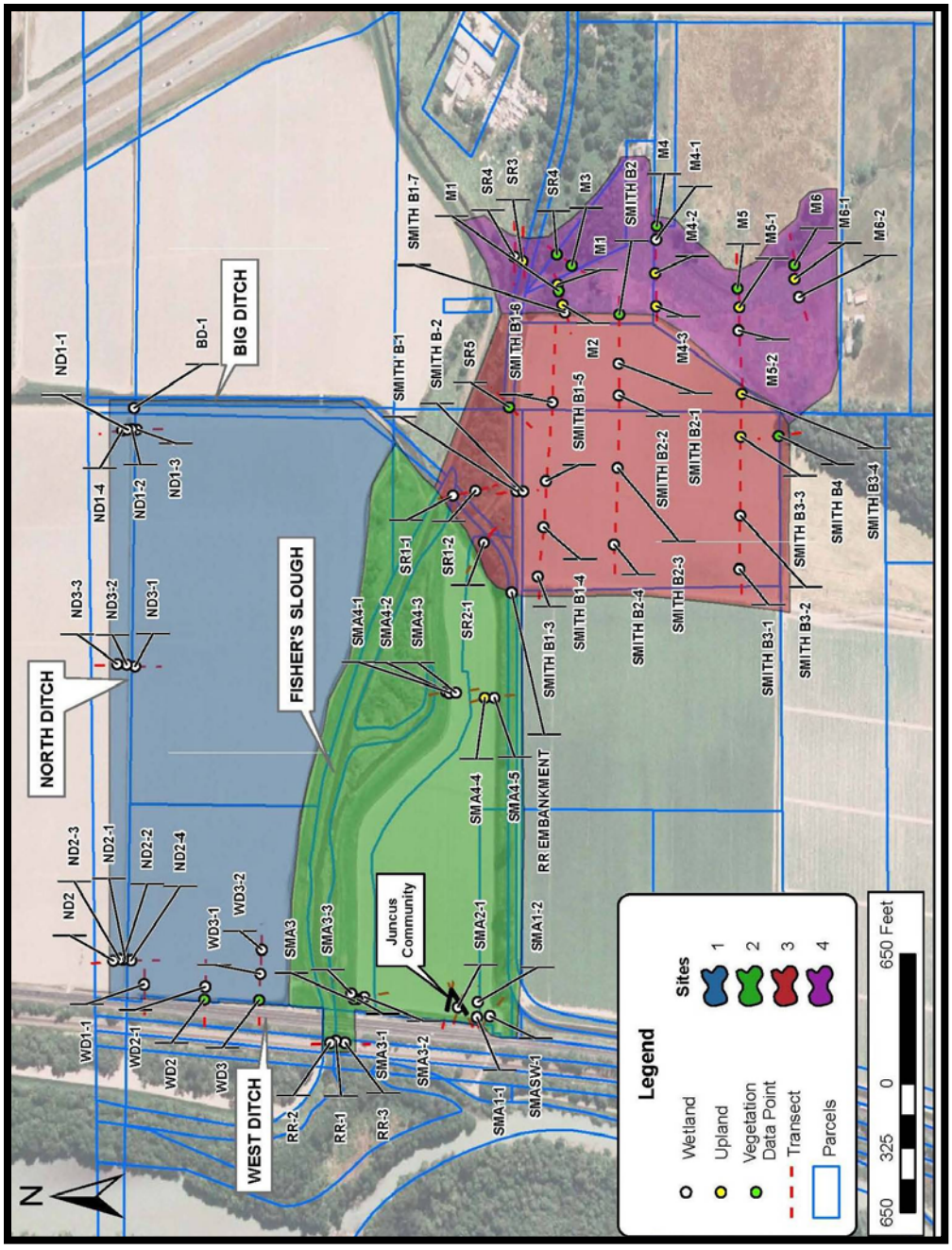

Figure 4: Location of Sample Plots, Transects, and Vegetation Data Points

In this wetland investigation we found the majority of the site is effectively wetland despite the physical modifications to drain wetlands throughout the area. Upland was only documented in two locations in Site 2 and Site 4. For each area within the project, sample locations and hydrologic, hydrophytic vegetation, and hydric soil characteristics are summarized below.

Site 1

The only proposed construction work for Site 1 will be realignment of Big Ditch along the route of the existing North and West Ditches, plus a proposed staging area in the southwest corner. Thus sampling within Site 1 consisted of six transects along the proposed Big Ditch alignment with 16 sample plots, one additional sample plot, and two vegetation only plots. In general, the topography, vegetation, soil, and hydrology appeared to be mostly uniform with wetland indicators found throughout the planted field that dominated the majority of the site (Figure 5 and Figure 6). This planted wheat crop resulted in difficulty in identifying hydrophytic vegetation in some locations. Despite this, 44% of the survey plots still had greater than 50% dominance of plant species that were FAC or wetter. Species common to areas close to the ditches were reed canarygrass (FACW), panicled bulrush (*Scirpus microcarpus*; OBL), and common rush (*Juncus effusus*; FACW) while in the drier areas near or in the field, wheat, spotted ladysthumb (*Polygonum persicaria*; FACW), colonial bentgrass (*Agrostis capillaris*; FAC), prostrate knotweed (*Polygonum aviculare*; FACW-), and slender vetch (*Vicia tetrasperma*; N.L.) were dominant.

Figure 5. Along North Ditch Looking East from Pioneer Highway

Figure 6: Southern End of West Ditch Looking North (Proposed Staging Area)

North Ditch forms the northern border of Site 1 and features a cross section that becomes less pronounced from east to west. A deeper channel with high side-cast berms was present in the eastern half, whereas in the western half, the channel was shallower with virtually no berms. While superficial evidence of flooding and standing water was obvious in many locations along the western portion of the North Ditch and along the West Ditch (Figure 7), the eastern third of the site did not have evidence of standing water. However, H&H data and observations from the site (Cline 2009) indicate that Big Ditch and the associated North Ditch have water levels at or near the top of bank during significant periods of the winter and early spring. Additional sample plots in the eastern portion of the site showed mottling and other evidence of a seasonal high water table. Thus, we determined that the entire area of Site 1 was wetland, and no actual boundary was delineated. It will be assumed for preparation of permits that all fill or excavation areas and quantities within Site 1 are within wetlands, except for that which is located on existing road fill for Pioneer Highway.

A typical sample plot for Site 1 is ND2-2 which had positive indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. Vegetation at ND2-2 was dominated by reed canarygrass (FACW) and panicled bulrush (OBL), with American vetch (N.L.) and narrowleaf cattail (OBL) being present in lower densities. Because ND2-2 was located within the North Ditch, both hydrogen sulfide and surface water were documented at the survey plot. Soil color was not assessed due to the high organic content and

masking of mineral soil colors. The adjacent sample plots taken within the fields such as ND2-3 and ND2-1 had a dominance of wheat (indicator status of N.L.), so had problematic vegetation, but had silty soil with a depleted matrix and color of 10YR 3/2 or 7.5YR 3/2 with a 5% presence of redoximorphic mottles with a color of 7.5YR 4/6. Hydrology indicators included surface soil cracks and oxidized rhizospheres along living roots.

Figure 7: Soil Cracks and Sparse Vegetation in the Northwest Corner of Site 1

Site 2

Site 2 is located south of Fisher Slough and will be the area where the entire south levee will be removed and setback. The existing channel of Fisher Slough will be realigned to the south in this area, and a staging area is proposed for the southwest corner of the site. Sampling within Site 2 consisted of six transects with 15 sampling plots and one additional vegetation only plot. Similar to Site 1, Site 2 had mostly uniform topography and vegetation dominated by a planted field which still displayed wetland characteristics (Figure 8). We also included within Site 2 the Fisher Slough Channel and Big Ditch Channel areas, small forested stands behind or between the levees, and the area of Fisher Slough located just west of the floodgate between Pioneer Highway and the railroad tracks, where the proposed new Big Ditch inverted siphon will be constructed.

Figure 8: Looking to the East along Southern Edge of Site 2

Site 2 was also found to be almost entirely wetland despite past farming and drainage practices and much of the site is planted in ryegrass and white clover. The existing road fill and levee fill were not considered to be wetland. Thus, the wetland boundary is at the toe of these fills. A typical sample plot in the field area of Site 2 was SMA3-2. This plot was dominated by white clover (FAC) with ryegrass (FACU) and redtop (*Agrostis alba*; FAC) also being present in lower densities. The soil was silty with depleted matrix color of 10YR 4/2 and 10% redoximorphic mottles with a color of 10YR 4/6. Surficial indicators of hydrology were not always observed due to the dense mat of white clover present. However, due to the strong vegetation and soils indicators at this location and throughout most of the site, the preponderance of evidence indicates this site is wetland. In total, SMA3-2 was determined to be wetland.

One sample plot within the field in Site 2 was determined to be upland; SMA4-4. None of the criteria for wetlands were met for Sample Plot SMA4-4 despite it being located adjacent to Sample Plot SMA4-5 which was determined to be wetland. SMA4-4 was located in the crop field in a shallow swale dominated by a mat of dead ryegrass (Figure 9). The upland determination of SMA4-4 was most likely due to its proximity to Big Ditch which may provide more effective drainage than the other ditches on the site. It was determined, however, that since all the other sample plots on Site 2 (except on the levees themselves) were determined to be wetland, it is likely that SMA4-4 is a small patch of upland within the greater wetland area of the site. Thus, we will consider all of Site 2 (except for road and levee fills) to be wetland.

Figure 9: Sample Plot SMA4-4

The area of Site 2 located west of the tide gates on Fisher Slough had characteristics largely unique to the site (Figure 10). Plant species such as Hooker's willow (FACW-), American skunk cabbage (*Lysichiton americanus*; OBL), baldhip rose (FAC), Douglas' spirea (FACW), narrowleaf cattail (OBL), and slough sedge (*Carex obnupta*; OBL) dominate the site. The extensive road and railroad fill that is present in the area made collecting soil data problematic. Despite this, Sample Plot RR-1 which was located mostly away from the fill had silty clay soil with a depleted matrix color of Gley 1 4/N and significant redoximorphic mottles with a color of 5YR 5/8. Hydrology indicators including soil saturation, surface water, and an obvious high water mark located well above the sample plot elevation strongly indicated wetland conditions. In total, RR-1 was determined to be wetland. The boundary of the wetland is at the mean higher high water line on the road and railroad fill.

Figure 10: Railroad Crossing Looking South over Fisher Slough (at Low Tide)

Fisher Slough itself, which is contained between the north and south levees is delineated based on the OHW from hydrologic data and modeling. However, two islands are located in Fisher Slough within Site 2 that have woody vegetation and are thus above the OHWM. These sites were not accessible for sample plots (Figure 11). However, vegetation data forms were filled out for each of the islands (described as "Upstream Island" and "Downstream Island" on the datasheets). Both islands hosted the same dominant plant species including Pacific willow (FACW+), Hooker's willow (*Salix hookeriana*; FACW-), peafruit rose (*Rosa pisocarpa*; FAC), and reed canarygrass. An obvious physical characteristic that was noted in the field was that both islands had high water marks near the top of each island. The combination of the high water mark and the presence of dominant FAC or wetter vegetation indicate that both islands were wetland. We have identified all areas within the north and south levees in the project area along Fisher Slough to be either wetland or below OHWM.

Figure 11: The South Side of Downstream Island

An obvious wetland plant community 0.13 acre in size was present in the southwest corner of the field within Site 2 (Figure 12) and while the entire field is considered wetland, this was a unique native community. Dominant species included common rush (FACW), daggerleaf rush (*Juncus ensifolius*; FACW), and narrowleaf cattail (OBL), and significant areas of bare ground. Soil indicators included depleted matrix color of 10YR3/2 with redoximorphic mottles of 10YR4/6. Hydrology indicators included soil cracks and sparsely vegetated concave surface (see Sample Plot SMA2-1).

Other plant species found in or around the field portion of Site 2 were Canada thistle (*Cirsium arvense*) and colonial bentgrass. The areas adjacent to Fisher Slough and Big Ditch hosted other species such as red alder and Douglas' spirea. Across all of Site 2, 73% of the survey plots had greater than 50% of the dominant species that were FAC or wetter.

Figure 12: *Juncus* Community Found in Southwest Corner of Site 2

Site 3

Site 3 is located east of Site 2 and extends along the area known as the Smith-B parcel. Sampling within Site 3 consisted of six transects with 17 sample plots and three vegetation-only plots. In general, Site 3 had relatively more diversity in vegetation than Site 1 or 2 but maintained mostly uniform topography due to the majority of the site consisting of a fallow field (Figure 13). Site 3 also included a forested area between the north and south levees along Fisher Slough. Sample plots in Site 3 showed that 40% of the plots had 50% of more dominant species that were FAC or wetter. Plant species common to areas close to the ditches were field horsetail (FAC), reed canarygrass (FACW), stinging nettle (FAC+), narrowleaf cattail (OBL), red elderberry (FACU), salmonberry (FAC+), Himalayan blackberry (FACU), and red alder (FAC). In the field area, dominant plant species were meadow fescue (FACU+), reed canarygrass (FACW), ryegrass (FACU), white clover (FAC), and lady's thumb (FACW).

Figure 13: Looking East across Site 3 towards Little Fisher Creek

A typical survey plot for Site 3 is SmithB1-5 which had indicators of both hydrophytic vegetation and wetland hydrology present. Vegetation at SmithB1-5 was dominated by white clover (FAC), reed canarygrass (FACW) and ryegrass (FACU). The soil of SmithB1-5 did not meet the criteria to be considered hydric because while the matrix was depleted with a color of 10YR4/2, there were no mottles. The wetland hydrology indicators at SmithB1-5 included an algal mat or crust and surface soil cracks. Sample Plot SmithB1-5 was determined to be wetland with the strong vegetation and hydrology indicators.

The northern portion of Site 3 was located in a forested area near the intersection of Big Ditch and Fisher Slough; in the area slated for slough realignment. A typical survey plot for this area is SR1-2 which had indicators for hydrophytic vegetation, hydric soil, and wetland hydrology present. Vegetation at SR1-2 was dominated by Hooker's willow (FACW-), Pacific willow (FACW+), Douglas' spirea (FACW), and reed canarygrass (FACW) with red alder (FAC) and Sitka spruce (*Picea sitchensis*; FAC) being present on the periphery of the plot area. The soil of SR1-2 had a depleted matrix and color of 10YR 3/1 with a silty texture. The wetland hydrology indicators at SR1-2 included surface water, hydrogen sulfide odor, and standing water one inch above the surface. Sample Plot SR1-2 was determined to be wetland.

One area in Site 3 was determined to be upland in the southeast corner of Site 3 near the toe of the slope (continuing east into Site 4). None of the criteria for wetland was met for Sample Plots Smith B3-3 and Smith B3-4. Vegetation at both sites was dominated by a mix of reed canary grass (FACW), white clover (FAC), and ryegrass (FACU). The Prevalence Index indicator was met at Smith B3-4, but Smith B3-3 did not meet any hydrophytic vegetation indicators. Neither plot had soil or hydrology indicators. The close proximity of these two sites to a hill slope located to the southeast (in Site 4) indicates they may drain more quickly than sites on the flat field. While this area was determined to be upland, it represents less than 20% of the overall area of Site 3, thus for the purposes of permitting, all fill and excavation features within Site 3 will be considered to be within wetlands.

Site 4

Site 4 is located east of Site 3 and generally follows the alignment of Little Fisher Creek and Big Fisher Creek down to the confluence with Fisher Slough. It includes the pasture west of the levee along Little Fisher Creek and the channels of Little and Big Fisher Creeks. Little Fisher Creek has been channelized into a ditch with an adjacent levee to the west. Sampling within Site 4 consisted of five transects with 12 sampling points and six additional vegetation-only plots. Like Site 3, Site 4 had a relatively high diversity of vegetation because there several distinct subareas, including the pasture (Figure 14), channel, and riparian zone along Little and Big Fisher Creeks. Sample plots in Site 4 showed that 91% had greater than 50% dominant species that were FAC or wetter. Plant species common to areas close to the ditches were field horsetail (FAC), reed canarygrass (FACW), stinging nettle (FAC+), narrowleaf cattail (OBL), red elderberry (FACU), salmonberry (FAC+), Himalayan blackberry (FACU), and red alder (FAC). In addition to these species, the forested riparian areas were also dominated by black cottonwood (FAC), Pacific willow (FACW+), and Hooker's willow (FACW-). In the pasture, dominant species consisted of reed canarygrass (FACW), Canada thistle (FACU), redtop (FAC), and meadow fescue (FACU+).

Figure 14: Looking Southeast across Site 4 Pastureland

A typical survey plot for the pasture area of Site 4 is M5-2 which had indicators of hydrophytic vegetation and hydric soils. Vegetation at M5-2 was dominated by reed canarygrass (FACW) and redtop (FAC). The soil of M5-2 had a depleted matrix and color of 10YR 5/1 with 10% redoximorphic mottles with the color of 5YR 4/6 and a silty-loam texture. No hydrology indicators were observed, but the strong hydrophytic vegetation and soils indicators lead to the preponderance of evidence that the site is a wetland. Sample Plot M5-2 was determined to be wetland.

A higher portion of Site 4 was covered with riparian forest than the other sites examined during the delineation. Forested area was found in a thin strip bordering the east side of Little Fisher Creek and around the area of realignment in the north part of Site 4 where Big Ditch, Fisher Slough, and Big Fisher Creek converge (Figure 15 and Figure 16). A typical sample plot that represents the forested areas of Site 4 is SR-3. Dominant plant species that occurred at SR-3 were black cottonwood (FAC), red alder (FAC), red elderberry (FACU), reed canarygrass (FACW), and stinging nettle (FAC+). Consistent with other sample plots taken from the forested areas of Site 4, SR-3 had distinctly different soil characteristics from Sites 1, 2 and 3, consisting of a cobble-loam matrix with a color of 10YR 4/2. The soil is distinctly coarser in Site 4 and was likely part of the historic alignment and deltas of Big and Little Fisher Creeks. Hydrology characteristics were absent at SR-3. The lack of hydric soil and wetland hydrology characteristics determined SR-3 to be upland riparian zone.

Figure 15: Looking East across Little Fisher Creek

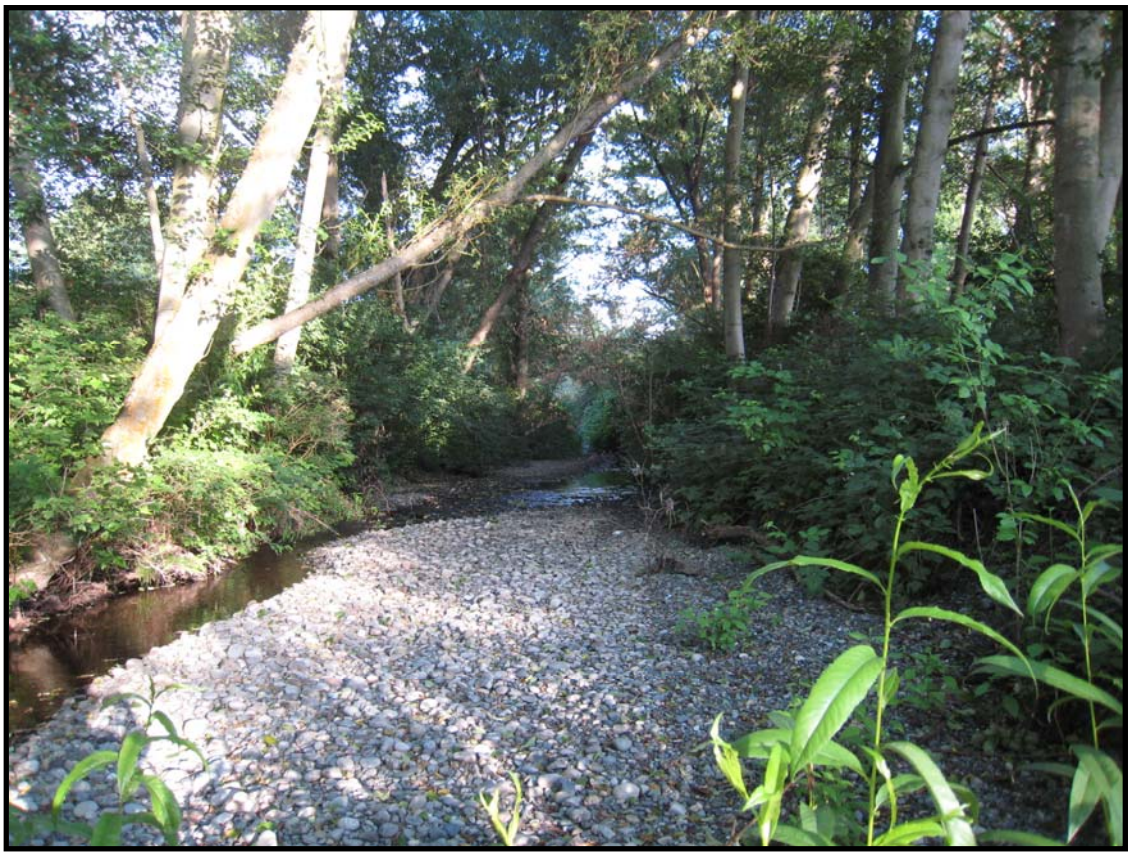

Figure 16: Looking Upstream on Big Fisher Creek from its Confluence with Little Fisher Creek

Several vegetation sheets were taken along Little Fisher Creek in areas too mucky to access. These areas had standing water and were dominated by wetland species. For example, sites M-4, M-5, and M-6. However, these areas are below OHW in Little Fisher Creek, so the area below the OHW elevation on Little Fisher Creek has been determined to be a Water of the U.S. Similarly for Big Fisher Creek, all areas below OHW elevation are Waters of the U.S.

The pasture area of Site 4 was delineated as mostly upland and dominated by reed canary grass (FACW), white clover (FAC), and ryegrass (FACU). In nearly all plots, the dominant species were 50% or greater FAC or wetter species. However, in general, hydric soils and hydrology indicators were lacking. The area located adjacent to the upland area of Site 3 shares the same topography of being located at the base of the small hill (Figure 17). With two exceptions, the sample plots taken in the pasture area were determined to be upland. The two sample plots found to be wetland were both located in small swales that appeared to receive drainage from the adjacent hillslope and may pond water long enough to show wetland indicators (M5-2 and M6-2). However, these wetland areas represent less than 10% of Area 4 and no fill or excavation are proposed in the vicinity of M5-2 or M6-2, thus, the only areas specifically delineated as either wetland or other Waters of the U.S. within Area 4 are the ditches adjacent to the levees and Big and Little Fisher Creeks (delineated by OHWM).

Figure 17: Upland Area West of Little Fisher Creek in the Southern Portion of Site 4

DISCUSSION

In general, evidence of wetlands was abundant throughout the study area despite the great extent that the landscape has been altered from its natural state. Tilling, draining, and diking have fundamentally changed both soil structure and hydrology while the planting of crops and grazing of stock animals has completely altered the natural vegetation communities.

According to the 1987 Manual and Interim Regional Supplement, there must be positive indicators of each parameter (hydrophytic vegetation, hydrology and hydric soils) present to make a wetland determination. However, because this site is a potential problem area due to the extensive diking, draining, and plowing that has occurred and is still occurring, it may be difficult to find clear indicators of hydrophytic vegetation, hydric soil, or wetland hydrology. Despite this, positive indicators for all three parameters were found at 31 of the 73 sample plots.

In Site 1, three sample plots were lacking hydrophytic vegetation only. These sites were sampled in or near the planted wheat field which had a vegetation community that was significantly altered from its natural state. All other wetland characteristics were strong throughout Site 1, thus it was all determined to be wetland, except for the road fill. Site 2 had one sample plot lacking hydrophytic vegetation, one

sample plot lacking hydric soil, two sample plots lacking wetland hydrology, and one sample plot lacking all wetland indicators. Similar to Site 1, the altered agricultural landscape of Site 2 made it difficult to find wetland indicators. This was most likely the cause of Sample Plot SMA4-4 lacking all wetland characteristics. However, because wetland indicators were very strong in most sample plots, all of Site 2 was determined to be wetland, except for the road and levee fill locations. Site 3 had one sample plot lacking hydrophytic vegetation, three sample plots lacking hydric soil, two sample plots lacking wetland hydrology, one sample plot lacking hydric soil and wetland hydrology, and one sample plot lacking all wetland indicators. The majority of Site 3 was located in a fallow field which made it difficult to find wetland indicators. Despite this, the majority of the sample plots still showed strong wetland indicators. The southern portion of Site 3 near the hillslope was clearly identified as upland habitat, but the remainder of Site 3 is considered to be wetland, except the levee fills. Site 4 had one sample plot lacking hydrophytic vegetation and hydric soil, and six sample plots lacking hydric soil and wetland hydrology. The soil characteristics of Site 4 clearly differed from the Sites 1-3, suggesting the majority of Site 4 is alluvial material from Little and Big Fisher Creeks. Thus, the majority of Site 4 was determined to be upland, with the exception of the ditches adjacent to the levees and the creek channels.

Approximately 119 acres of the 139 acre project footprint (86%) surveyed for the Fisher Slough realignment wetland delineation were found to either be wetland (100.8 acres) or Waters of the U.S. (17 acres) (Figure 18). Though some sample plots had upland characteristics, the only area clearly delineated as upland (excluding the levees) was found around the southern hill in Site 3 and in Site 4. This area was approximately eight acres in size, but a specific boundary was not delineated. The current quality of the wetland found in this area is very poor compared to its historic state. The plant communities are dominated by reed canary grass and planted species (i.e. wheat, ryegrass, clover). The purpose of the Fisher Slough restoration project is to restore and significantly enhance this degraded habitat by reconnecting natural tidal and freshwater hydrology to the site.

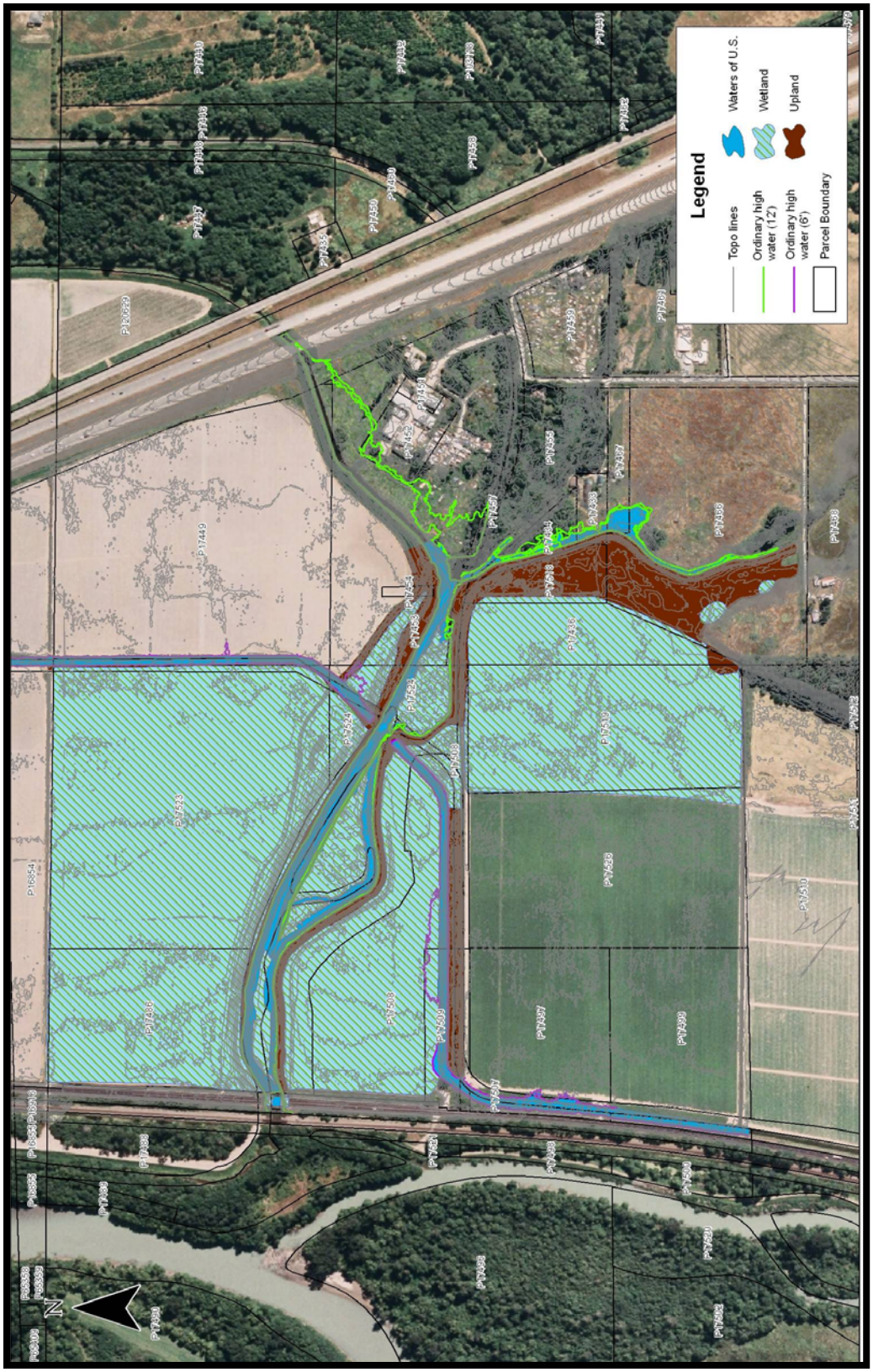

Figure 18: Map of Upland, Wetland, and Waters of the U.S. Identified in the Project area

CONCLUSIONS

In conclusion, one formerly contiguous wetland and four Waters of the U.S., totaling approximately 119 acres are present within the project footprint. Vegetation, soil, and hydrology within the wetland have been altered and heavily degraded through agricultural practices. Crop plants or invasive species cover the majority of the area, decades of plowing have occurred across the majority of the soils, and much of the site has been diked and drained. Despite this, wetland characteristics were apparent throughout the most of the area.

The circumstances of this wetland delineation were to delineate an area of heavily degraded naturally occurring wetland habitat that is slated for restoration. Construction of the realignment will occur in the poor quality wetland identified in the project area, enhancing and returning it to its natural wetland condition. As a result, this report documents a thorough characterization of the project area. Boundaries of the Waters of the U.S. and distinct upland features (i.e. levees) were delineated. However, the small areas of upland within the larger wetland on Site 3 were not separately delineated, because they represent less than 10% of the site and no construction features will be in the area. Similarly, the small areas of wetland at the base of the swales coming off of the hillslope in Site 4 were not delineated. They also represent less than 10% of the area of Site 4 and no construction features will be in the area. These areas will be revegetated with native species and left to evolve over time into their most natural wetland or riparian state.

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